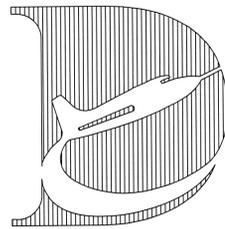




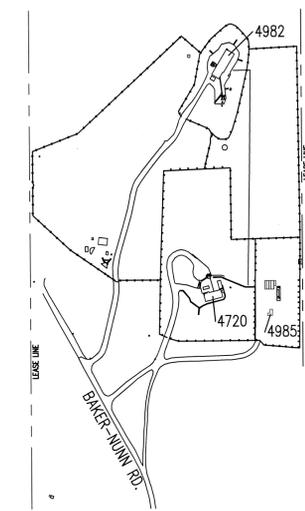
National Aeronautics and Space Administration



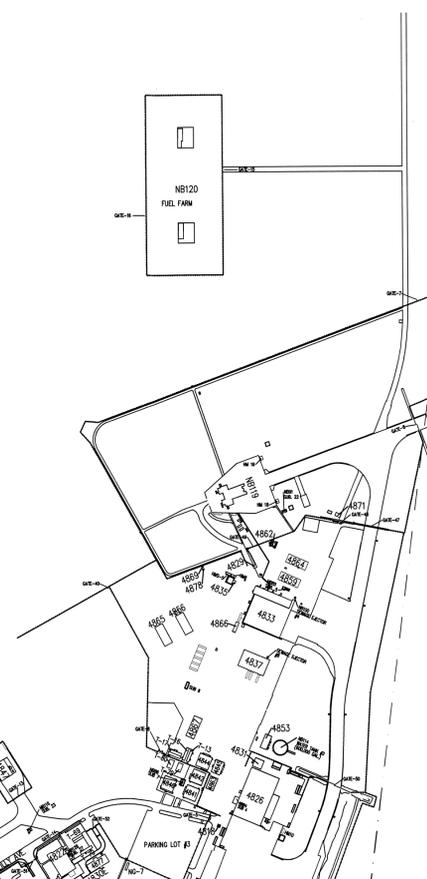
DRYDEN FLIGHT RESEARCH CENTER

PROJECT TITLE:

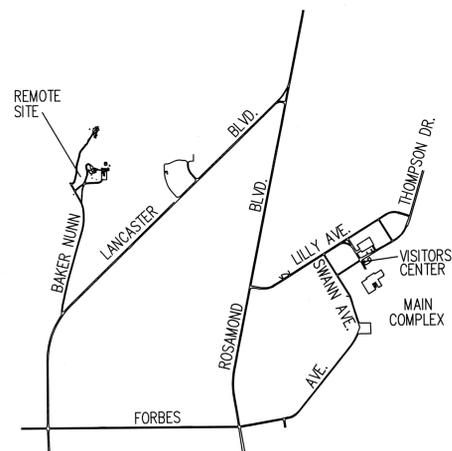
MISSION CONTROL INFRASTRUCTURE REVITALIZATION - PRIMARY



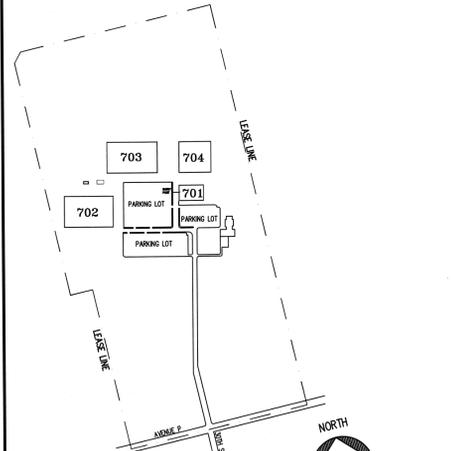
REMOTE SITE PLAN
SCALE: 1" = 400'



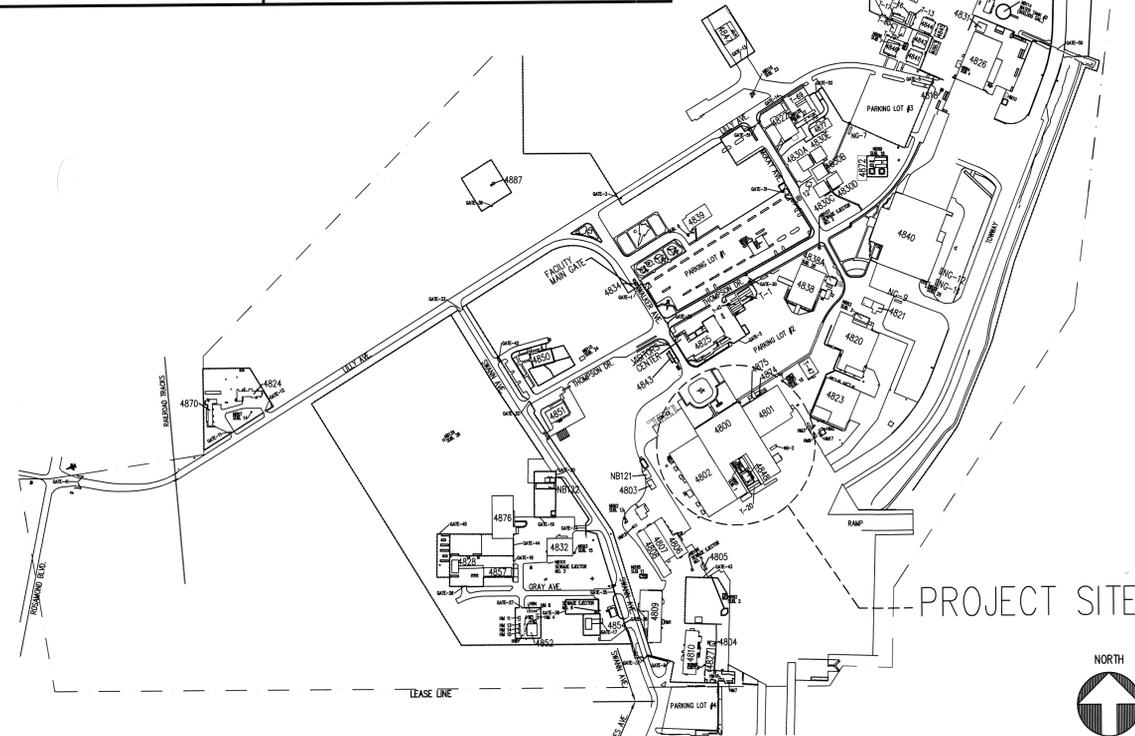
PROJECT SITE



AREA PLAN
NOT TO SCALE

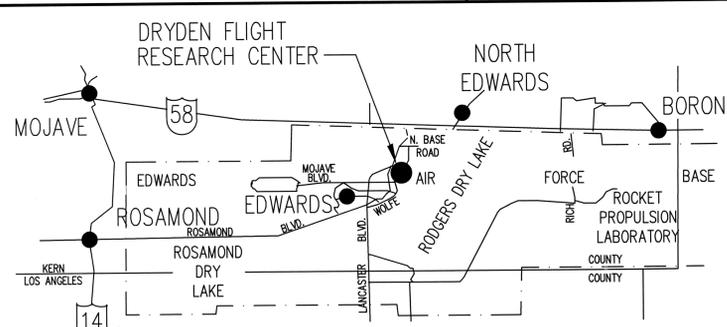
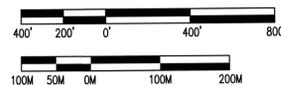


DRYDEN AIRCRAFT OPERATIONS FACILITY
NOT TO SCALE



DRYDEN FLIGHT RESEARCH CENTER MAIN COMPLEX SITE PLAN

SCALE: 1" = 400'



VICINITY MAP
NOT TO SCALE

GENERAL NOTES

1. ALL CONSTRUCTION IS NEW UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS AND CONDITIONS SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR. THE CONTRACTOR SHALL EXERCISE EXTREME CAUTION NOT TO DAMAGE ANY EXISTING STRUCTURES, EQUIPMENT, OR UTILITIES. ANY DAMAGE SHALL BE REPAIRED AT THE CONTRACTORS EXPENSE.
3. ALL RESULTANT DEBRIS SHALL BE DISPOSED OF OFF-BASE BY THE CONTRACTOR.
4. THE CONTRACTOR SHALL PROVIDE ALL LABOR AND MATERIALS TO ASSURE A COMPLETE AND PROPER INSTALLATION OF THIS PROJECT.
5. ALL WORK TO COMPLY WITH APPLICABLE CODES, IBC, NEC, NFPA, UPC, ETC.

| DATE | SYM | REVISION | BY |
|----------|-----|----------------------------------|----|
| 02-21-13 | E | 100% FINAL DESIGN | |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | |
| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | |

| | |
|---|---|
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | |
| DRAWING TITLE | TITLE SHEET |
| PROJECT TITLE | MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN |

| APPROVALS | | DATE | |
|--|-----------------------|-------------|-------------------|
| Chief, Facilities Engineering & Asset Mgmt. Office | | 2-28-13 | |
| Project Manager/Engineer | | 2-28-13 | |
| Facilities Project Manager | | 2/27/13 | |
| Chief, Office of Contract Services | | 2/27/13 | |
| Chief, Safety, Health & Environmental Office | | 2-27-13 | |
| Chief Information Officer | | 2/27/13 | |
| DATE STRD | 02/28/2012 | DATE PRINTD | 2/21/2013 |
| DRAWN BY | JS | TRACE | EDM-1715 |
| SCALE | N.T.S. | SH. No. | |
| FILE NAME | EDM-1715 G-000.DWG | G-000 | SHEET No. 1 of 74 |

PROJECT TEAM

PRINCIPAL DESIGN PROFESSIONAL

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MPE ENGINEER

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 5555 Redwood Street, Suite 201
 T: 702.694.2187
 F: 702.697.2188
 www.hei-eng.com

GENERAL NOTES

- IN ADDITION TO THE INTENT OF THE WORK INDICATED ON THE DRAWINGS, ALL WORK SHALL COMPLY WITH THE SPECIFIC REQUIREMENTS OF CONSTRUCTION, THE GENERAL CONDITIONS OF THE CONSTRUCTION, THE SUPPLEMENTAL CONDITIONS OF THE CONTRACT AND THE PROJECT SPECIFICATIONS.
- THESE DOCUMENTS INDICATE THE SCOPE OF THE PROJECT IN TERMS OF THE ARCHITECTURAL DESIGN PLANS, THE DIMENSIONS OF THE ARCHITECTURAL AND INTERIOR ELEMENTS AND THE CONCEPTS OF THE MAJOR ELECTRICAL SYSTEMS. BASED ON THE SCOPE DESCRIBED OR INDICATED, PROVIDE ALL ITEMS, SYSTEM PRODUCTS, AND LABOR REQUIRED OR INFERRED FOR THE PROPER EXECUTION AND FULL AND COMPLETE PERFORMANCE OF THE PROJECT.
- N/A
- CONSTRUCTION OF WORK INDICATED ON THE DRAWINGS AS (N.I.C.) IS NOT IN CONTRACT.
- WHEN DISCREPANCIES EXIST WITHIN DRAWINGS, OR BETWEEN DRAWINGS AND SPECIFICATIONS, THE MORE STRINGENT REQUIREMENT SHALL APPLY.
- VERIFY ALL DIMENSIONS IN FIELD BEFORE PROCEEDING WITH THE WORK. NOTIFY CONTRACTING OFFICER OF DISCREPANCIES, CONFLICTS, AND MODIFICATIONS.
- WHERE DIMENSIONS OR EXACT LOCATIONS ARE REQUIRED, AND NOT INCLUDED ON THE DRAWINGS, REQUEST INFORMATION FROM CONTRACTING OFFICER.
- WHERE GYPSUM BOARD LAYERS DIFFER BETWEEN TWO ADJOINING WALLS, MAINTAIN CONTINUOUS FINISH FACE OF WALL.
- GLAZING SUBJECT TO HUMAN IMPACT AS IDENTIFIED IN 2009 IBC SHALL BE SAFETY GLAZING MATERIAL. IDENTIFY EACH TYPE OF LAMINATED OR TEMPERED GLAZING BY A PERMANENT LABEL WHICH SPECIFIES THE LABELER OR MANUFACTURER AND THAT SAFETY GLAZING MATERIAL HAS BEEN UTILIZED.
- PROVIDE PROPER ANCHORAGE OF ESSENTIAL EQUIPMENT IN ACCORDANCE WITH APPLICABLE CODES.
- THE CONTRACTOR SHALL COORDINATE AND PROVIDE ALL SLAB AND WALL OPENINGS REQUIRED BY MECHANICAL AND ELECTRICAL SYSTEMS. PROVIDE COORDINATION DRAWINGS TO CONTRACTING OFFICER FOR REVIEW.
- VISIT THE SITE AND BE KNOWLEDGEABLE OF ALL CONDITIONS THEREOF. INVESTIGATE, VERIFY AND BE RESPONSIBLE FOR ALL CONDITIONS OF THE PROJECT AND NOTIFY THE CONTRACTING OFFICER OF ANY CONDITIONS REQUIRING MODIFICATION BEFORE PROCEEDING WITH THE WORK.
- THE AUTOMATIC FIRE SPRINKLER DRAWINGS, THE HYDRAULIC CALCULATIONS AND THE MATERIAL SPECIFICATIONS SHALL BE SUBMITTED TO CONTRACTING OFFICER BY A LICENSED FIRE SPRINKLER CONTRACTOR FOR REVIEW PRIOR TO INSTALLATION.
- N/A
- COATINGS MUST COMPLY WITH ALL LOCAL AND FEDERAL LAWS GOVERNING VOLATILE ORGANIC COMPOUNDS, AND ALL EPA RECOMMENDATIONS.
- DO NOT SCALE DRAWINGS.
- DIMENSIONS ARE TO FACE OF STUDS, UNO.
- ASBESTOS OR PRODUCTS CONTAINING ASBESTOS ARE NOT ALLOWED IN ANY ASPECT OF THIS CONSTRUCTION.
- COORDINATE ALL DISCIPLINES AND ALL ASPECTS OF WORK. CONFLICTS AND DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE CONTRACTING OFFICER IMMEDIATELY.
- ALL CONCRETE SURFACES WHICH RECEIVE A SPECIAL FINISH, FLOOR COVERING, COATINGS, HARDENERS, ETC. SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE SPECIFIC FINISH MANUFACTURER'S SPECIFICATIONS.
- ALL FINISH ELEVATIONS ARE TO TOP OF WALKS, GRADE, PAVING, WALLS, ROOFS, ETC., UNLESS NOTED OTHERWISE.
- ALL EXPOSED WELDS SHALL BE GROUND SMOOTH AND FINISHED WITH NO PITS FOR ARCHITECTURAL APPEARANCE.
- ALL EXPOSED METAL SURFACES THAT ARE NOT PREFINISHED ARE TO BE PAINTED.
- PROVIDE SOLID BLOCKING AND ANCHORAGE FOR CEILING AND WALL MOUNTED EQUIPMENT.
- PROVIDE SEPARATION AND/OR APPROPRIATE COATING BETWEEN ALL DISSIMILAR METALS.
- ALL DOOR AND FRAME ASSEMBLIES AND INSTALLATIONS SHALL BE IN STRICT ACCORDANCE WITH UNIFORM LIFE SAFETY CODES GOVERNING EDITION.
- ALL TRANSITIONS BETWEEN SIMILAR OR DISSIMILAR MATERIALS, EQUIPMENT, ACCESSORIES, ETC. SHALL BE CAULKED AND/OR SEALED AS REQUIRED WITH SPECIFIED SEALANT.

ABBREVIATIONS

| | | | | | | | | | |
|----------|---|--------|--------------------------------|---------|--------------------------|----------|--------------------------------------|--------|---|
| A/C | AIR CONDITIONING | CU FT | CUBIC FEET | G DISP | GARBAGE DISPOSAL | MIRR | MIRROR | SC | SOLID CORE |
| AB | ANCHOR BOLT | CU YD | CUBIC YARD | GFI | GROUND FAULT INTERRUPTER | MISC | MISCELLANEOUS | SCH | SCHEDULE |
| ACT | ACOUSTICAL CEILING TILE | CW | COLD WATER PIPING | GL | GLASS | MO | MASONRY OPENING | SCHD | SCHEDULED |
| AD | AREA DRAIN | D | PENNY (NAIL) | GLU LAM | GLUE LAMINATED WOOD | MOD | MODULE, MODIFY | SEC | SECOND |
| ADDM | ADDENDUM | | | GRD | GRADE | MTD | MOUNTED | SECT | SECTION |
| ADDL | ADDITIONAL | DBL | DOUBLE | GYP BD | GYPSUM BOARD | MULL | MULLION | SF | SQUARE FEET |
| ADJ | ADJUSTABLE, ADJACENT | DEG | DEGREE | GYP | GYPSUM | N | NORTH | SHR | SHOWER |
| A/E | ARCHITECT, ENGINEER | DEPT | DEPARTMENT | H | HATCH (ROOF), HIGH | NO | NUMBER | SHT | SHEET, SHAFT |
| AFF | ABOVE FINISHED FLOOR | DET | DETAIL | HB | HOSE BIBB | NOM | NOMINAL | SHTHG | SHEATHING |
| AGGR | AGGREGATE | DF | DRINKING FOUNTAIN | HC | HANDICAP, HOLLOW CORE | NTS | NOT TO SCALE | SM | SIMILAR |
| AHU | AIR HANDLING UNIT | DIA | DIAMETER | HDBD | HEADBOARD | SQ | SQUARE | SPEC | SPECIFICATIONS |
| ALUM | ALUMINUM | DIAG | DIAGONAL | HDR | HEADER | OC | ON CENTER | SS | STORM SEWER, SERVICE SINK |
| ALT | ALTERNATE | DIFF | DIFFUSER | HDW | HARDWARE | OD | OUTSIDE DIAMETER | SST | STAINLESS STEEL |
| AMP | AMPERE | DIM | DIMENSION | HDWD | HARDWOOD | OFD | OVERFLOW DRAIN | STD | STANDARD |
| ANOD | ANODIZE | DSPL | DISPOSAL | HM | HOLLOW METAL | OFF | OFFICE | STL | STEEL |
| APPD | APPROVED | DL | DEAD LOAD | HORIZ | HORIZONTAL | O.F.O.I. | OWNER FURNISHED CONTRACTOR INSTALLED | STR | STORAGE |
| ARCH | ARCHITECT | DN | DOWN | HP | HORSE POWER | OPNG | OPENING | STOR | STRUCTURAL |
| ASPH | ASPHALT | DR | DOOR | HR | HOUR | OPP | OPPOSITE | SUB FL | SUBFLOOR |
| AVE | AVENUE | DS | DOWNSPOUT | HS | HIGH STRENGTH | OZ | OUNCE | SURF | SURFACE |
| AVG | AVERAGE | DSP | DRY STANDPIPE | HT | HEIGHT | PT | PAINT | SUSP | SUSPEND |
| AWT | ACOUSTICAL WALL TREATMENT | DWG | DRAWING | HW | HOT WATER | PBD | PARTICLE BOARD | SYM | SYMBOL |
| BALC | BALCONY | E | EAST | ID | INSIDE DIAMETER | PRCST | PRECAST | SYMM | SYMMETRICAL |
| BC | BACK OF CURB, BETWEEN CENTERS, BOOKCASES, BUILDING CODE | EA | EACH | IN | INCHES | PERF | PERFORATED | T&B | TOP & BOTTOM |
| BD | BOARD | EJ | EXPANSION JOINT | INSUL | INSULATION | PERP | PERPENDICULAR | T&G | TONGUE & GROOVE |
| BITUM | BITUMINOUS | EL | ELEVATION | INFO | INFORMATION | PH | PHASE | TC | TERRA COTTA |
| BLDG | BUILDING | ELEC | ELECTRICAL | INSP | INSPECT | PL | PROPERTY LINE | TEL | TELEPHONE |
| BLVD | BOULEVARD | ELEV | ELEVATOR | INSP | INSPECT | PLAM | PLASTIC LAMINATE | TEMP | TEMPORARY, TEMPERATURE |
| BM | BEAM, BENCHMARK | EMER | EMERGENCY | INTL | INSTALL | PLAS | PLASTER | TER | TERRAZZO |
| BOT | BOTTOM | ENAM | ENAMEL | INT | INTERIOR | PLYWD | PLYWOOD | TOF | TOP OF FOOTING, TOP OF FLOOR |
| BR | BEDROOM | ENR | ENTRANCE | JAN | JANITOR | PLBG | PLUMBING | THRES | THRESHOLD |
| BRG | BEARING | EP | ELECTRICAL PANEL (PANEL BOARD) | KD | KILN DRIED | PNL | PANEL | TOC | TOP OF CURB, TABLE OF CONTENTS, TOP OF CONCRETE |
| BSMT | BASEMENT | EQ | EQUAL | KIP | KIP ONE THOUSAND POUNDS | PP | PUSH, PULL | TOIL | TOILET |
| Btu | BRITISH THERMAL UNITS | EQUIP | EQUIPMENT | KIT | KITCHEN | PP PL | PUSH, PULL PLATE | TOL | TOLERANCE |
| C | CELIUS, CHANNEL | EST | ESTIMATE | KO | KNOCKOUT | PROP | PROPERTY | TOS | TOP OF STEEL, TOP OF SLAB |
| CAB | CABINET | EWC | ELECTRIC WATER COOLER | KPL | KICKPLATE | PR | PAIR | TO | TOP OF |
| CAP | CAPACITY | EXC | EXCAVATE | LAM | LAMINATE | PREFAB | PREFABRICATE | TV | TELEVISION |
| CPT | CARPET | EXH | EXHAUST | LAV | LAVATORY | PSF | POUNDS PER SQUARE FOOT | TYP | TYPICAL |
| CB | CATCH BASIN, CHALKBOARD | EXP | EXPANSION | LB | POUND | PSI | POUNDS PER SQUARE INCH | UL | UNDERWRITERS LABORATORIES |
| CBC | CALIFORNIA BUILDING CODE | EXT | EXTERIOR | LBR | LUMBER | PTN | PARTITION | UNFIN | UNFINISHED |
| CEM | CEMENT | F | FAHRENHEIT | LDR | LEADER | PVC | POLYVINYL CHLORIDE (PLASTIC) | UR | URINAL |
| CEM PLAS | CEMENT PLASTER | FA | FIRE ALARM, FORCED AIR | LH | LEFT HAND | PVG | PAVING | UNO | UNLESS NOTED OTHERWISE |
| CER | CERAMIC | FD | FLOOR DRAIN | LHR | LEFT HAND REVERSE | QT | QUARRY TILE | UTIL | UTILITY |
| CG | CORNER GUARD | FDN | FOUNDATION | LKR | LOCKER | QTR | QUARTER | VAR | VARIABLE |
| CI | CAST IRON | FE | FIRE EXTINGUISHER | LL | LIVE LOAD | R | RISER, RADIUS, RANGE | YCT | VINYL COMPOSITE TILE |
| CI | CAST-IN-PLACE, CAST IRON PIPE | FIN | FINISH | LPT | LOW POINT | RA | RETURN AIR | VERT | VERTICAL |
| CIP | CAST-IN-PLACE, CAST IRON PIPE | FLR | FLOOR | LR | LIVING ROOM | RB | RUBBER BASE | VEST | VESTIBULE |
| CIR | CIRCLE | FLR SK | FLOOR SINK | LAM GL | LAMINATED GLASS | RCP | REFLECTED CEILING PLAN | VIF | VERIFY IN FIELD |
| CJ | CONTROL JOINT, CONSTRUCTION JOINT | FLUOR | FLUORESCENT | LT | LIGHT | RD | ROOF DRAIN | VWC | VINYL WALL COVERING |
| CJ | CENTER LINE | FOC | FACE OF CONCRETE | LT WT | LIGHT WEIGHT | RF | ROOF | W | WEST, WIDE |
| CL | CEILING | FOM | FACE OF MASONRY | MACH | MACHINE | RFG | ROOFING | W/O | WITHOUT |
| CLG | CLOSE | FOS | FACE OF STUD, FACE OF SLAB | MAINT | MAINTENANCE | REBAR | REINFORCING STEEL BARS | W/ | WITH |
| CLR | CLEAR | FP | FIREPROOF | FT | FEET | RCPTN | RECEPTION | WSC | WAINSCOT |
| CLR | CONCRETE MASONRY UNIT | FR | FIRE RETARDANT, FIRE RATING | FTG | FOOTING | REF | REFERENCE, REFRIGERATOR | WC | WATER CLOSET |
| CMU | CLEAR UNIT, COMPANY | FS | FULL SIZE | FURN | FURNITURE | REINF | REINFORCE | WD | WOOD, WOOD DOOR |
| COL | COLUMN | FT | FEET | FURG | FURRING | REQD | REQUIRED | WDW | WINDOW |
| CONC | CONCRETE | FTG | FOOTING | FUT | FUTURE | RESIL | RESILIENT | WGL | Wired GLASS |
| CONC | CONCRETE | FURN | FURNITURE | G | NATURAL GAS, GROUND | RET | RETURN | WH | WATER HEATER, WEEP HOLE |
| CONC | CONCRETE | MB | MACHINE BOLT | GA | GAGE | REV | REVISION | WI | WROUGHT IRON |
| CONSTR | CONSTRUCTION | MECH | MECHANICAL | GALV | GALVANIZED | RM | ROOM | WP | WATERPROOFING |
| CONT | CONTINUE | MEMB | MEMBRANE | GB | GRAB BAR | RO | ROUGH OPENING | WS | WEATHERSTRIP |
| COORD | COORDINATE | MTL | METAL | CTR | CENTER | ROW | RIGHT OF WAY | WT | WEIGHT, WATERTIGHT |
| COORD | COORDINATE | WTL | WETAL | CU | CUBIC | MIN | MINIMUM, MINUTE | WWF | WELDED WIRE FABRIC |
| CORR | CORRIDOR | MEZZ | MEZZANINE | | | S | SOUTH, SANITARY SEWER | WWM | WELDED WIRE MESH |
| CSK | COUNTER SUNK | MFR | MANUFACTURER | | | | | | |
| CT | CERAMIC TILE | MH | MAN HOLE | | | | | | |
| CTR | CENTER | MN | MINIMUM, MINUTE | | | | | | |
| CU | CUBIC | | | | | | | | |

SYMBOLS

| | | | |
|--|---------------------------|--|---------------------------|
| | INTERIOR ELEVATION MARKER | | EXTERIOR ELEVATION MARKER |
| | DOOR IDENTIFICATION | | CEILING HEIGHT |
| | WALL TYPES | | ROOM FINISH NOTE |
| | KEYNOTES | | ELEVATION HEIGHT TAG |
| | DETAIL NUMBER | | SHEET NOTE |
| | ROOM NAME & NUMBER | | |



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
 DRYDEN FLIGHT RESEARCH CENTER
 EDWARDS, CA

APPROVALS

| APPROVALS | DATE |
|-----------|---------|
| | 2-28-13 |
| | 2-28-13 |
| | 2/27/13 |
| | 2/27/13 |
| | 2/27/13 |
| | 2/27/13 |

GENERAL INFORMATION

PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN

| | | | |
|------------|--------------------|------------|-------------------|
| DATE STRTD | 12/28/2011 | DATE PRNTD | 2/21/2013 |
| DRAWN BY | SK | TRADE | EDM-1715 |
| SCALE | N.T.S. | TRADE | Sh. No. |
| FILE NAME | EDM-1715 G-001.DWG | G-001 | SHEET No. 2 of 24 |

CODE ANALYSIS

| | | | |
|----|--|----------------------|-----------------------------------|
| 1 | Applicable Model Code | Amendment | |
| | Building and Fire Administrative Code | | |
| | 2010 California Building Code (CBC) | | |
| | NASA STD - 8719.11A - Standard for Fire Protection | | |
| | 2010 California Mechanical Code (CMC) | | |
| | 2010 California Plumbing Code (CPC) | | |
| | 2010 California Energy Code (CEC) | | |
| | NFPA 10, Portable Fire Extinguishers | | |
| | NFPA 13, Standard for Installation of Sprinkler Systems | | |
| | NFPA 45, Fire Protection for Laboratories Using Chemicals | | |
| | NFPA 70, National Electrical Code (NEC) | | |
| | NFPA 72, National Fire Alarm Code | | |
| | NFPA 90A, Standard for Installation of Air-Conditioning and Ventilating Systems | | |
| | NFPA 101, Life Safety Code (LSC) | | |
| | NFPA 241, Standard for Safeguarding Construction, Alteration and Demolition Operations | | |
| | July 2004 ADA and ABA Accessibility Guidelines for Buildings and Facilities | | |
| 2 | Occupancy Classification | Code Reference | |
| | L - Laboratory | 2010 CBC section 443 | |
| 3 | Type of Construction (Assumed Equivalent) | Code Reference | |
| | Type II-A | 2010 CBC section 602 | |
| 4 | Fire Sprinklers | Type | Code Reference |
| | Existing | Automatic | 2010 CBC section 903 |
| 5 | Fire Alarm | Code Reference | |
| | Existing | | 2010 CBC section 907 |
| 6 | Building Height | | |
| | Occupancy Classification | Type of Construction | Allowable Height per Table 503 |
| | L - Laboratory | II-A | UL |
| | | | Height increase per section 504.2 |
| | | | N/A |
| | | | Allowable Height |
| | | | N/A |
| | | | Actual Building Height |
| | | | |
| 7 | Stories | | |
| | Occupancy Classification | Type of Construction | Allowable Stories per Table 503 |
| | L - Laboratory | II-A | 5 stories |
| | | | Story increase per section 504.2 |
| | | | N/A |
| | | | Allowable Stories |
| | | | N/A |
| | | | Actual number of Stories |
| | | | 4 stories |
| 8 | Total Existing Building Area | | |
| | 443,562 S.F. | | |
| 9 | Area | | |
| | Allowable Area (Building SF) | UL | Code Reference |
| | Area of Improvement | 5,033 S.F. | 2010 CBC Table 503 |
| 10 | Occupant Load | Code Reference | |
| | 51 Occupants | | 2010 CBC Table 1004.1.1 |
| 11 | Required number of exits | | |
| | Required | Provided | Code Reference |
| | 2 | 2 | 2010 CBC |
| 12 | Required Fire Resistance of Exterior Walls | | |
| | Required | 1 HR | Code Reference |
| | Provided | NA | 2010 CBC Tables 601, 602 |
| | | | Code Reference |
| 13 | Protection of Openings & Max. Area of Exterior Wall Openings | Not Applicable | CBC 704 & Table 704.8 |
| 14 | Fire Resistance Rating Requirements for Building Elements | Not Applicable | CBC Chapter 7 & Table 601, 602 |
| 15 | Spaces Requiring Fire Resistance-Rated Separation | Not Applicable | CBC Section 508 & Table 508.2 |
| 16 | Roof Covering Material | Not Applicable | CBC Table 1505.1 |
| 17 | Required plumbing Fixtures - N/A - Remodel does not modify occupant load. | | CBC 2901 & Table 2902.1 |
| 18 | Special Inspections Required | | Code Reference |
| | Not Applicable | | CBC Chapter 17 |
| 19 | IECC Compliance Report : | Not Applicable | |
| 20 | Non-separated Usage - N/A | No occupancy changed | |

NASA PROJECT EDM-1715 - MISSION CONTROL INFRASTRUCTURE REVITALIZATION

DRAWING INDEX

ARCHITECTURAL

| | SHEET NUMBER | 95% NEAR FINAL REVIEW | 100% FINAL DESIGN |
|--------|---|-----------------------|-------------------|
| G-000 | TITLE SHEET | X | X |
| G-001 | GENERAL INFORMATION | X | X |
| G-002 | CODE INFORMATION AND DRAWING INDEX | X | X |
| AD-301 | TELECONFERENCE ROOM 221 RCP DEMO PLAN | X | X |
| AD-401 | ENLARGED ROOF DEMOLITION PLANS | X | X |
| AD-402 | ENLARGED ROOF DEMOLITION PLANS | X | X |
| A-100 | OVERALL FIRST AND SECOND FLOOR PLAN | X | X |
| A-101 | ENLARGED FIRST FLOOR PLAN AREA E | X | X |
| A-201 | ELEVATION AREA A | X | X |
| A-202 | OPENING DETAILS / DOOR AND WINDOW SCHEDULES | X | X |
| A-301 | TELECONFERENCE ROOM 2221 RCP | X | X |
| A-400 | OVERALL ROOF PLAN | X | X |
| A-401 | ENLARGED ROOF CONSTRUCTION PLAN | X | X |
| A-402 | ENLARGED ROOF CONSTRUCTION PLAN | X | X |
| A-501 | ROOF DETAILS | X | X |
| A-502 | ROOF DETAILS | X | X |
| A-503 | ROOF DETAILS | X | X |

STRUCTURAL

| | | | | |
|-------|---------------------------------|----|---|---|
| S-001 | STRUCTURAL INFORMATION | 18 | X | X |
| S-601 | STRUCTURAL SECTIONS AND DETAILS | 19 | X | X |
| S-602 | STRUCTURAL SECTIONS AND DETAILS | 20 | X | X |
| S-603 | STRUCTURAL SECTIONS AND DETAILS | 21 | | X |

MECHANICAL

| | | | | |
|--------|---|----|---|---|
| M-000 | MECHANICAL LEGENDS | 22 | X | X |
| M-001 | TITLE 24 | 23 | X | X |
| M-002 | TITLE 24 | 24 | X | X |
| MD-101 | BUILDING 4800 MECHANICAL DEMOLITION ROOF PLAN | 25 | X | X |
| MD-102 | BUILDING 4801 MECHANICAL DEMOLITION ROOF PLAN | 26 | X | X |
| M-101 | OVERALL FIRST FLOOR MECHANICAL PLAN | 27 | X | X |
| M-102 | OVERALL SECOND FLOOR MECHANICAL PLAN | 28 | X | X |
| M-103 | OVERALL MECHANICAL THIRD FLOOR AND ROOF PLANS | 29 | X | X |
| M-201 | SOUTH WING MECHANICAL PLAN | 30 | X | X |
| M-202 | 1ST & 2ND FLOOR OFFICES MECHANICAL PLAN | 31 | X | X |
| M-203 | BLUE AND GOLD ROOMS MECHANICAL PLANS | 32 | X | X |
| M-204 | VIDEO CONTROL ROOM MECHANICAL PLAN | 33 | X | X |
| M-205 | LAB 2402 MECHANICAL PLAN | 34 | X | X |
| M-206 | AREA 3302 MECHANICAL PLAN | 35 | X | X |
| M-207 | FAN HOUSE 6, 7, 7A MECHANICAL PLAN | 36 | X | X |
| M-208 | FAN HOUSE 1, 1A MECHANICAL PLAN | 37 | X | X |
| M-209 | 4801 MEZZANINE MECHANICAL PLAN | 38 | X | X |
| M-210 | 4801 TELECONFERENCE ROOM MECHANICAL PLANS | 39 | X | X |
| M-211 | BUILDING 4800 PARTIAL ROOF PLAN | 40 | X | X |
| M-212 | AREA 3103 MECHANICAL PLAN | 41 | X | X |
| M-301 | MECHANICAL SCHEDULES | 42 | X | X |
| M-302 | MECHANICAL SCHEDULES | 43 | X | X |
| M-303 | MECHANICAL SCHEDULES | 44 | X | X |
| M-401 | MECHANICAL DETAILS | 45 | X | X |
| M-402 | MECHANICAL DETAILS | 46 | X | X |
| M-501 | DDC CONTROL POINTS ARCHITECTURE | 47 | X | X |
| M-502 | SIEMENS CONTROL DIAGRAMS | 48 | X | X |
| M-503 | SIEMENS CONTROL DIAGRAMS | 49 | X | X |
| M-601 | CHILLED WATER CENTRAL PLANT FLOW DIAGRAM | 50 | X | X |
| M-602 | CONDENSER WATER CENTRAL PLANT FLOW DIAGRAM | 51 | X | X |
| M-603 | EXISTING CHILLED WATER SCHEMATIC | 52 | | X |

ELECTRICAL

| | | | | |
|-------------|---|----|---|---|
| E-000 | ELECTRICAL LEGENDS | 53 | X | X |
| ED-101 | BUILDING 4800 ELECTRICAL DEMOLITION PLAN | 54 | X | X |
| ED-102 | BUILDING 4801 ELECTRICAL DEMOLITION PLAN | 55 | X | X |
| E-101 | OVERALL ELECTRICAL FIRST FLOOR PLAN | 56 | X | X |
| E-102 | OVERALL ELECTRICAL SECOND FLOOR PLAN | 57 | X | X |
| E-103 | OVERALL ELECTRICAL THIRD FLOOR AND ROOF PLANS | 58 | X | X |
| E-201 | SOUTH WING ELECTRICAL PLAN | 59 | X | X |
| E-202 | 1ST AND 2ND FLOOR OFFICES ELECTRICAL PLAN | 60 | X | X |
| E-203 | VIDEO CONTROL ROOM ELECTRICAL PLAN | 61 | X | X |
| E-204 | BLUE AND GOLD ROOMS ELECTRICAL PLAN | 62 | X | X |
| E-205 | BLDG 4800 ROOF ELECTRICAL PLAN | 63 | X | X |
| E-206 | BLDG 4800 ROOF ELECTRICAL PLAN | 64 | X | X |
| E-207 | FAN HOUSE 1 & 1A ELECTRICAL PLAN | 65 | X | X |
| E-208 | 4801 MEZZANINE ELECTRICAL PLAN | 66 | X | X |
| E-301 | ELECTRICAL ONE-LINE DIAGRAM (DEMOLITION) | 67 | X | X |
| E-302 | BUILDING 4800 ELECTRICAL ONE-LINE DIAGRAM (SUB 1 UNITS A AND C) | 68 | X | X |
| E-303 | BUILDING 4800 ELECTRICAL ONE-LINE DIAGRAM (SUB 1 UNIT B) | 69 | X | X |
| E-304 | BUILDING 4800 ELECTRICAL ONE-LINE DIAGRAM (SUB 1 UNIT F) | 70 | X | X |
| E-305 | BUILDING 4801 ELECTRICAL ONE-LINE DIAGRAM | 71 | X | X |
| E-401 | ELECTRICAL SCHEDULES | 72 | X | X |
| E-402 | ELECTRICAL SCHEDULES | 73 | X | X |
| FIRE | | | | |
| F-101 | FIRE PROTECTION NOTES | 74 | X | X |



| DATE | SYM | REVISION | BY | A'PD |
|----------|-----|----------------------------------|----|------|
| 02-21-13 | E | 100% FINAL DESIGN | | |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | | |
| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | | |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | | |

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
 DRYDEN FLIGHT RESEARCH CENTER
 EDWARDS, CA

DRAWING TITLE
CODE INFORMATION & DRAWING INDEX

PROJECT TITLE
MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN

| APPROVALS | | DATE |
|--|--------------------|---------|
| Chief, Facilities Engineering & Asset Mgmt. Office | <i>[Signature]</i> | 2-28-13 |
| Project Requestor/Customer | <i>[Signature]</i> | 2-28-13 |
| Facilities Program Manager | <i>[Signature]</i> | 2/27/13 |
| Chief, Facilities Protective Services | <i>[Signature]</i> | 2/27/13 |
| Chief, Safety, Health & Environmental Office | <i>[Signature]</i> | 2-27-13 |
| Facilities Information Officer | <i>[Signature]</i> | 2/27/13 |

DATE STRTD: 04/30/2011 DATE PRNTD: 2/21/2013
 DRAWN BY: SK
 SCALE: N.T.S. TRACE SH. No.
 FILE NAME: G-002.DWG G-002 SHEET No. 3 of 24

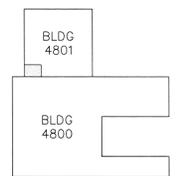
SHEET NOTES

- 1 REMOVE MECHANICAL EQUIPMENT. REFER TO MECHANICAL DRAWINGS FOR MORE INFORMATION.
- 2 REMOVE, CLEAN, AND STORE SMOKE DETECTORS, LIGHT FIXTURES, ACOUSTICAL CEILING GRID, AND TILES FOR REUSE. DISCARD DAMAGED ITEMS AND REPLACE WITH NEW ITEMS. REFER TO NEW CONSTRUCTION PLANS FOR MORE INFORMATION. EXISTING FIRE SPRINKLER HEAD TO REMAIN. COORDINATE REMOVAL OF AUDIO / VISUAL EQUIPMENT WITH GOVERNMENT.

LEGEND

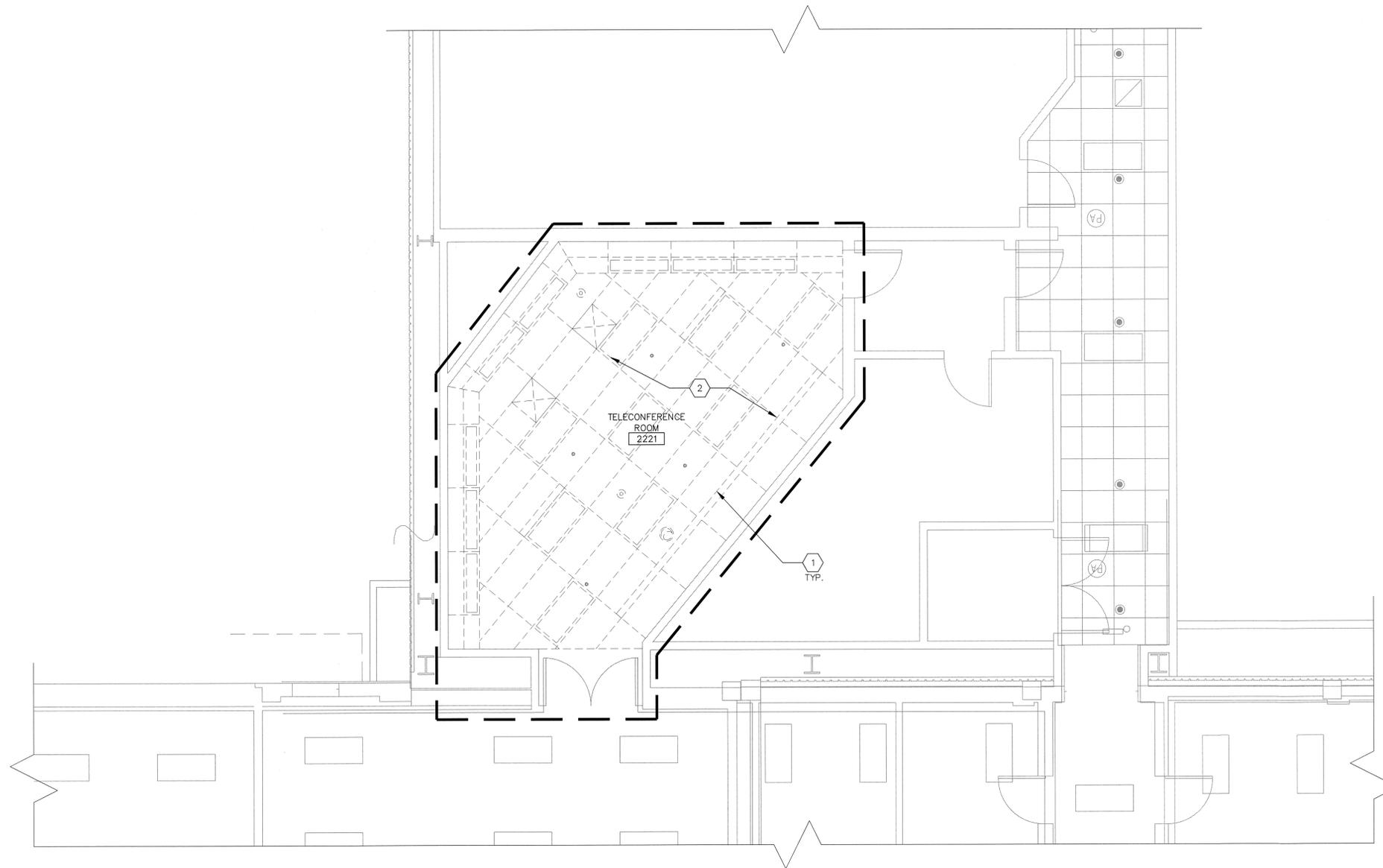
- ROOM NAME
XXX ROOM NAME AND ROOM NUMBER
- [Grid Pattern] REMOVE ACOUSTICAL CEILING TILE
- [Dashed Box] REMOVE 2X4 LIGHT FIXTURE
- [Dashed Box] REMOVE 1X4 LIGHT FIXTURE
- [Square with X] REMOVE SUPPLY AIR
- [Dashed Line] AREA OF WORK

KEY PLAN

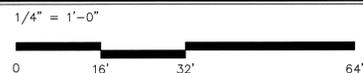


GENERAL NOTES

1. DURING DEMOLITION PROTECT ALL EXISTING TO REMAIN CONSTRUCTION & FURNITURE FROM DAMAGE.
2. COORDINATE ALL DEMOLITION WORK WITH NEW CONSTRUCTION PLANS.
3. DEMOLITION DRAWINGS CREATED FROM FIELD VERIFICATION OF READILY ACCESSIBLE ITEMS. NO DESTRUCTIVE OR INVASIVE INVESTIGATION WAS CONDUCTED. CONTRACTOR TO TAKE CARE WHEN PERFORMING DEMOLITION WORK. CONTRACTOR TO NOTIFY ARCHITECT IMMEDIATELY OF ANY EXISTING CONDITIONS THAT VARY SUBSTANTIALLY FROM THE DRAWINGS.
4. SEE CIVIL, STRUCTURAL, MECHANICAL, PLUMBING, AND ELECTRICAL DRAWINGS FOR ADDITIONAL DEMOLITION REQUIREMENTS.
5. DEMO CEILING AS REQUIRED TO INSTALL FIRE ALARM AND FIRE SPRINKLER SYSTEMS.
6. EXISTING HANGER WIRES MAY BE REUSED IF THEY ARE NOT DAMAGED DURING CONSTRUCTION. IF THEY ARE NOT REUSED THEY MUST BE REMOVED. DO NOT ABANDON EXISTING HANGER WIRES IN PLACE.
7. THROUGH THE COURSE OF DEMO, CONTRACTOR MAY ENCOUNTER ASBESTOS AND/OR LEAD PAINT. IF FOUND, COORDINATE CLOSELY WITH GOVERNMENT FOR REMEDIATION PROCEDURES.
8. CONTRACTOR SHALL COORDINATE ALL WORK WITH GOVERNMENT PRIOR TO CONSTRUCTION.

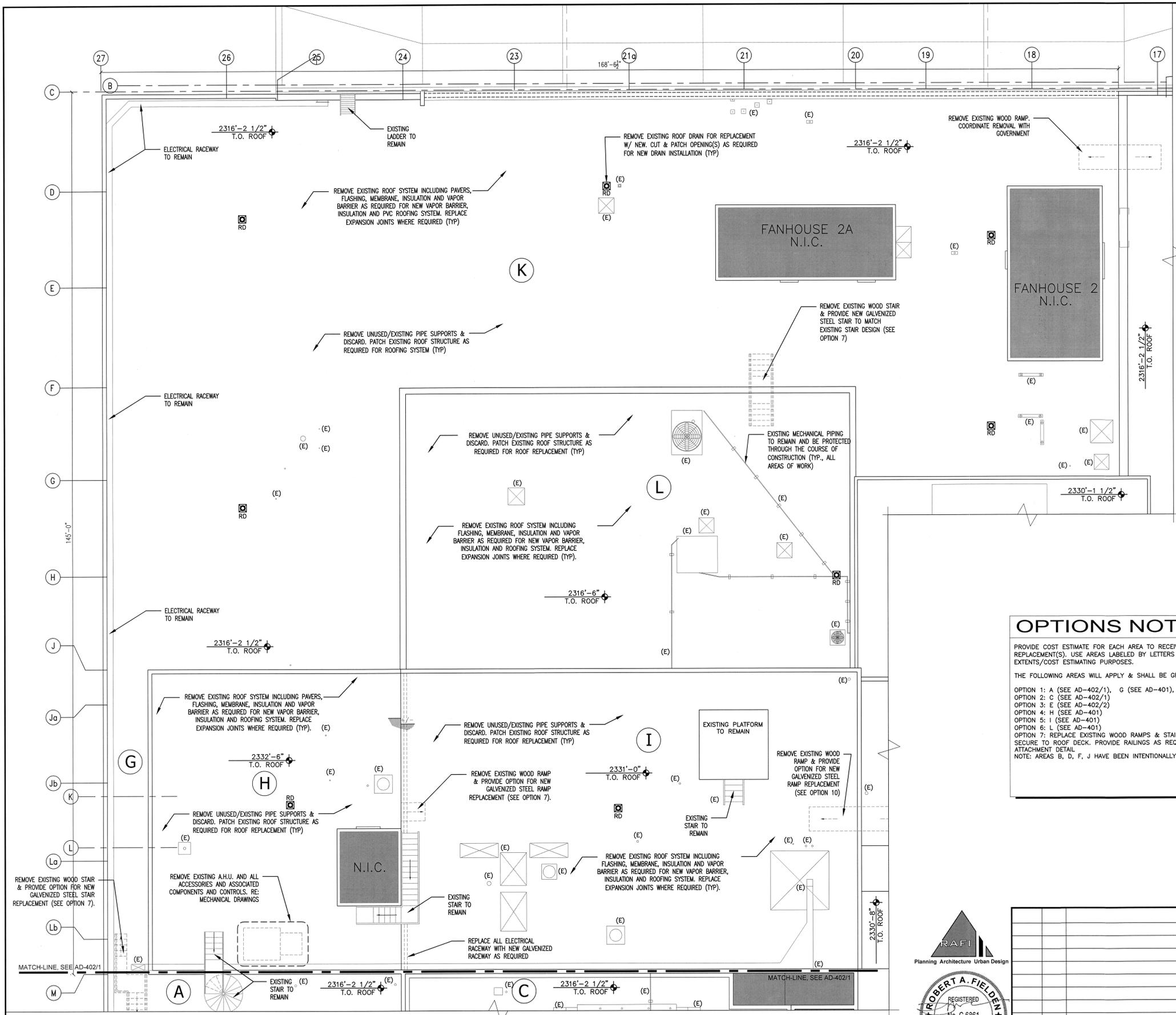


1 BLDG. 4801 TELECONFERENCE ROOM 2221 RCP - DEMO PLAN



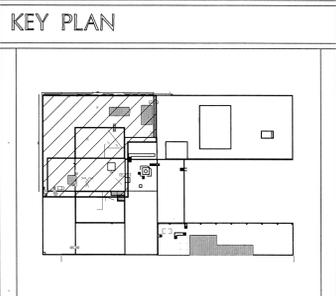
| DATE | SYM | REVISION | BY | A/PD |
|----------|-----|----------------------------------|----|------|
| 02-21-13 | E | 100% FINAL DESIGN | | |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | | |
| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | | |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | | |

| | | |
|--|--|---|
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS Chief, Facilities Engineering & Asset Mgmt. Office <i>[Signature]</i> 2-28-13 Project Requestor/Customer <i>[Signature]</i> 2-28-13 Technical Project Manager <i>[Signature]</i> 2/27/13 Chief, Office of Projective Services <i>[Signature]</i> 2/27/13 Chief, Space Operations Management Office <i>[Signature]</i> 2-27-13 Chief Information Officer <i>[Signature]</i> 2/27/13 |
| DRAWING TITLE BLDG. 4801 TELECONFERENCE ROOM 2221 RCP - DEMO PLAN | | DATE STRD: 12/29/2011 DATE PRINTD: 2/21/2013 DRAWN BY: SK TRADE: EDM-1715 SCALE: 1/4"=1'-0" SH. No. FILE NAME: AD-301.DWG AD-301 SHEET No. 4 of 24 |
| PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | |



LEGEND

| | |
|--------|---|
| (A) | STRUCTURAL GRID |
| (X/XX) | DETAIL / ENLARGED PLAN CALLOUT |
| --- | REMOVE/DEMO |
| (E) | EXISTING MECHANICAL PIPING, MECHANICAL EQUIPMENTS / SUPPORTS, ROOF VENT, AND ETC. TO REMAIN/VERIFY IN FIELD |
| ⊠ | ROOF DRAIN |



- GENERAL NOTES**
- DURING DEMOLITION PROTECT ALL EXISTING TO REMAIN CONSTRUCTION FROM DAMAGE.
 - EXISTING ROOFING MEMBRANE IS TO BE REMOVED. PREPARE EXISTING SUBSTRATE TO RECEIVE NEW ROOFING MEMBRANE.
 - THROUGH THE COURSE OF DEMO, CONTRACTOR MAY ENCOUNTER ASBESTOS AND/OR LEAD PAINT. IF FOUND, COORDINATE CLOSELY WITH GOVERNMENT FOR REMEDIATION PROCEDURES PRIOR TO COMMENCEMENT OF ANY WORK.
 - VERIFY EXISTING ROOF DRAINS, PIPE SUPPORTS AND ROOF PENETRATION LOCATIONS PRIOR TO DEMOLITION & INSTALLATION OF NEW DRAINS AND ROOFING SYSTEM. PATCH AND REPAIR EXISTING ROOF MEMBRANE / INSULATION AS REQUIRED. IF ANY DISCREPANCIES ARE FOUND, NOTIFY GOVERNMENT OF THESE CONDITIONS PRIOR TO COMMENCING WITH ANY WORK.
 - EXISTING MECHANICAL AND ELECTRICAL PIPING, CONDUIT, RACEWAYS, AND ETC. TO REMAIN AND SHALL BE PROTECTED THROUGHOUT THE COURSE OF CONSTRUCTION AS REQUIRED.
 - THE CONTRACTOR IS REQUIRED TO REPAIR / REPLACE THE EXISTING ROOFING SYSTEM (TO MATCH EXISTING) AS REQUIRED FOR ALL MECHANICAL REMODEL / NEW INSTALLATION WORK.

OPTIONS NOTE

PROVIDE COST ESTIMATE FOR EACH AREA TO RECEIVE ROOFING & DRAIN REPLACEMENT(S). USE AREAS LABELED BY LETTERS & SURROUNDED BY PARAPETS FOR EXTENTS/COST ESTIMATING PURPOSES.

THE FOLLOWING AREAS WILL APPLY & SHALL BE GROUPED AS NOTED BELOW:

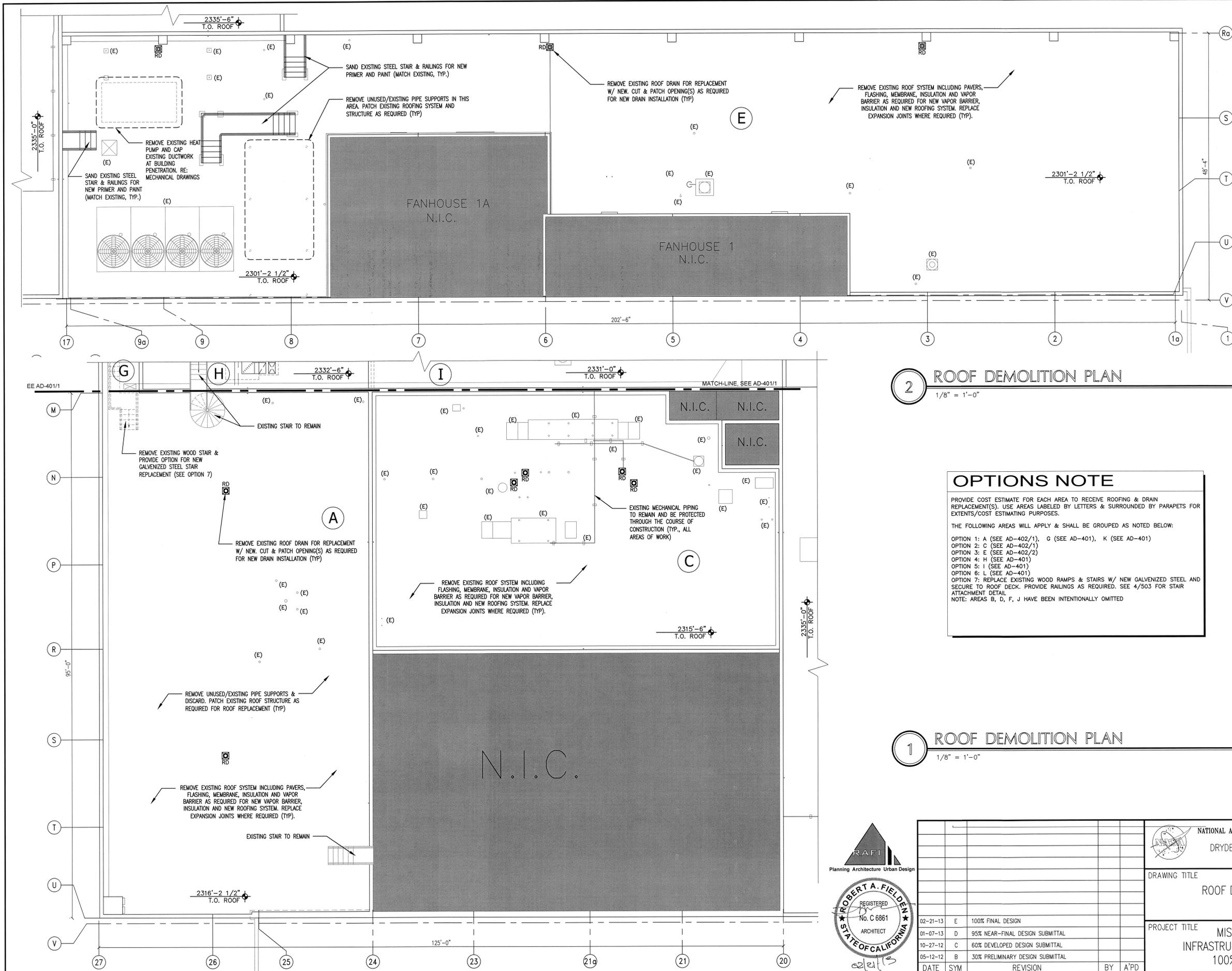
OPTION 1: A (SEE AD-402/1), G (SEE AD-401), K (SEE AD-401)
 OPTION 2: C (SEE AD-402/1)
 OPTION 3: E (SEE AD-402/2)
 OPTION 4: H (SEE AD-401)
 OPTION 5: I (SEE AD-401)
 OPTION 6: L (SEE AD-401)
 OPTION 7: REPLACE EXISTING WOOD RAMPS & STAIRS W/ NEW GALVANIZED STEEL AND SECURE TO ROOF DECK. PROVIDE RAILINGS AS REQUIRED. SEE 4/A503 FOR STAIR ATTACHMENT DETAIL.
 NOTE: AREAS B, D, F, J HAVE BEEN INTENTIONALLY OMITTED



| DATE | SYM | REVISION | BY | A/PD |
|----------|-----|----------------------------------|----|------|
| 02-21-13 | E | 100% FINAL DESIGN | | |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | | |
| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | | |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | | |

| | | |
|---|--|--|
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS Chief, Facilities Engineering & Asset Mgmt. Office 2-28-13 Project Requestor/Customer 2-28-13 Facilities Project Manager 2/27/13 Chief, Project Services 2/27/13 Chief, Safety, Health & Environmental Office 2-27-13 Chief Information Officer 2/27/13 |
| DRAWING TITLE | | DATE |
| ROOF DEMOLITION PLAN | | 2-28-13 |
| PROJECT TITLE | | DATE PRINTED |
| MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | 2/21/2013 |
| DRAWN BY | | TRADE |
| JC | | EDM-1715 |
| SCALE | | SH. No. |
| N.T.S. | | AD-401 |
| FILE NAME | | SHEET No. 5 of 24 |
| EDM-1715 AD-401.DWG | | |

1 ROOF DEMOLITION PLAN
 1/8" = 1'-0"



2 ROOF DEMOLITION PLAN
1/8" = 1'-0"

1 ROOF DEMOLITION PLAN
1/8" = 1'-0"

OPTIONS NOTE

PROVIDE COST ESTIMATE FOR EACH AREA TO RECEIVE ROOFING & DRAIN REPLACEMENT(S). USE AREAS LABELED BY LETTERS & SURROUNDED BY PARAPETS FOR EXTENTS/COST ESTIMATING PURPOSES.

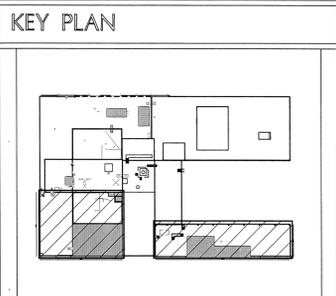
THE FOLLOWING AREAS WILL APPLY & SHALL BE GROUPED AS NOTED BELOW:

OPTION 1: A (SEE AD-402/1), G (SEE AD-401), K (SEE AD-401)
 OPTION 2: C (SEE AD-402/1)
 OPTION 3: E (SEE AD-402/2)
 OPTION 4: H (SEE AD-401)
 OPTION 5: I (SEE AD-401)
 OPTION 6: L (SEE AD-401)
 OPTION 7: REPLACE EXISTING WOOD RAMPS & STAIRS W/ NEW GALVANIZED STEEL AND SECURE TO ROOF DECK. PROVIDE RAILINGS AS REQUIRED. SEE 4/503 FOR STAIR ATTACHMENT DETAIL.

NOTE: AREAS B, D, F, J HAVE BEEN INTENTIONALLY OMITTED

LEGEND

| | |
|--------|---|
| (A) | STRUCTURAL GRID |
| (X/XX) | DETAIL / ENLARGED PLAN CALLOUT |
| --- | REMOVE/DEMO |
| (E) | EXISTING MECHANICAL PIPING, MECHANICAL EQUIPMENTS / SUPPORTS, ROOF VENT, AND ETC. TO REMAIN/VERIFY IN FIELD |
| (RD) | ROOF DRAIN |

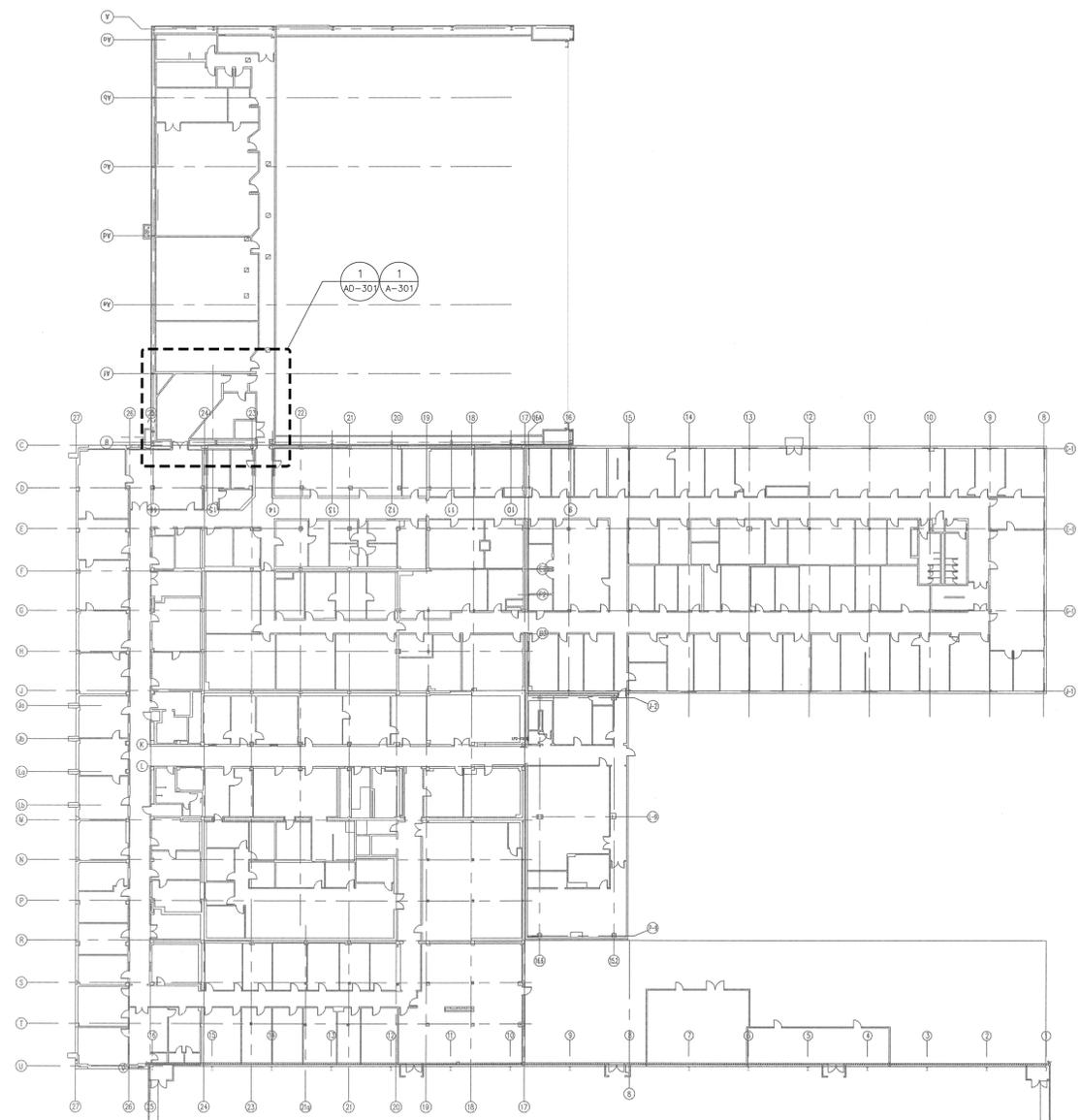


- GENERAL NOTES**
- DURING DEMOLITION PROTECT ALL EXISTING TO REMAIN CONSTRUCTION FROM DAMAGE.
 - EXISTING ROOFING MEMBRANE IS TO BE REMOVED. PREPARE EXISTING SUBSTRATE TO RECEIVE NEW ROOFING MEMBRANE.
 - THROUGH THE COURSE OF DEMO, CONTRACTOR MAY ENCOUNTER ASBESTOS AND/OR LEAD PAINT. IF FOUND, COORDINATE CLOSELY WITH GOVERNMENT FOR REMEDIATION PROCEDURES PRIOR TO COMMENCEMENT OF ANY WORK.
 - VERIFY EXISTING ROOF DRAINS, PIPE SUPPORTS AND ROOF PENETRATION LOCATIONS PRIOR TO DEMOLITION & INSTALLATION OF NEW DRAINS AND ROOFING SYSTEM. PATCH AND REPAIR EXISTING ROOF MEMBRANE / INSULATION AS REQUIRED. IF ANY DISCREPANCIES ARE FOUND, NOTIFY GOVERNMENT OF THESE CONDITIONS PRIOR TO COMMENCING WITH ANY WORK.
 - EXISTING MECHANICAL AND ELECTRICAL PIPING, CONDUIT, RACEWAYS, AND ETC. TO REMAIN AND SHALL BE PROTECTED THROUGHOUT THE COURSE OF CONSTRUCTION AS REQUIRED.
 - THE CONTRACTOR IS REQUIRED TO REPAIR / REPLACE THE EXISTING ROOFING SYSTEM (TO MATCH EXISTING) AS REQUIRED FOR ALL MECHANICAL REMODEL / NEW INSTALLATION WORK.

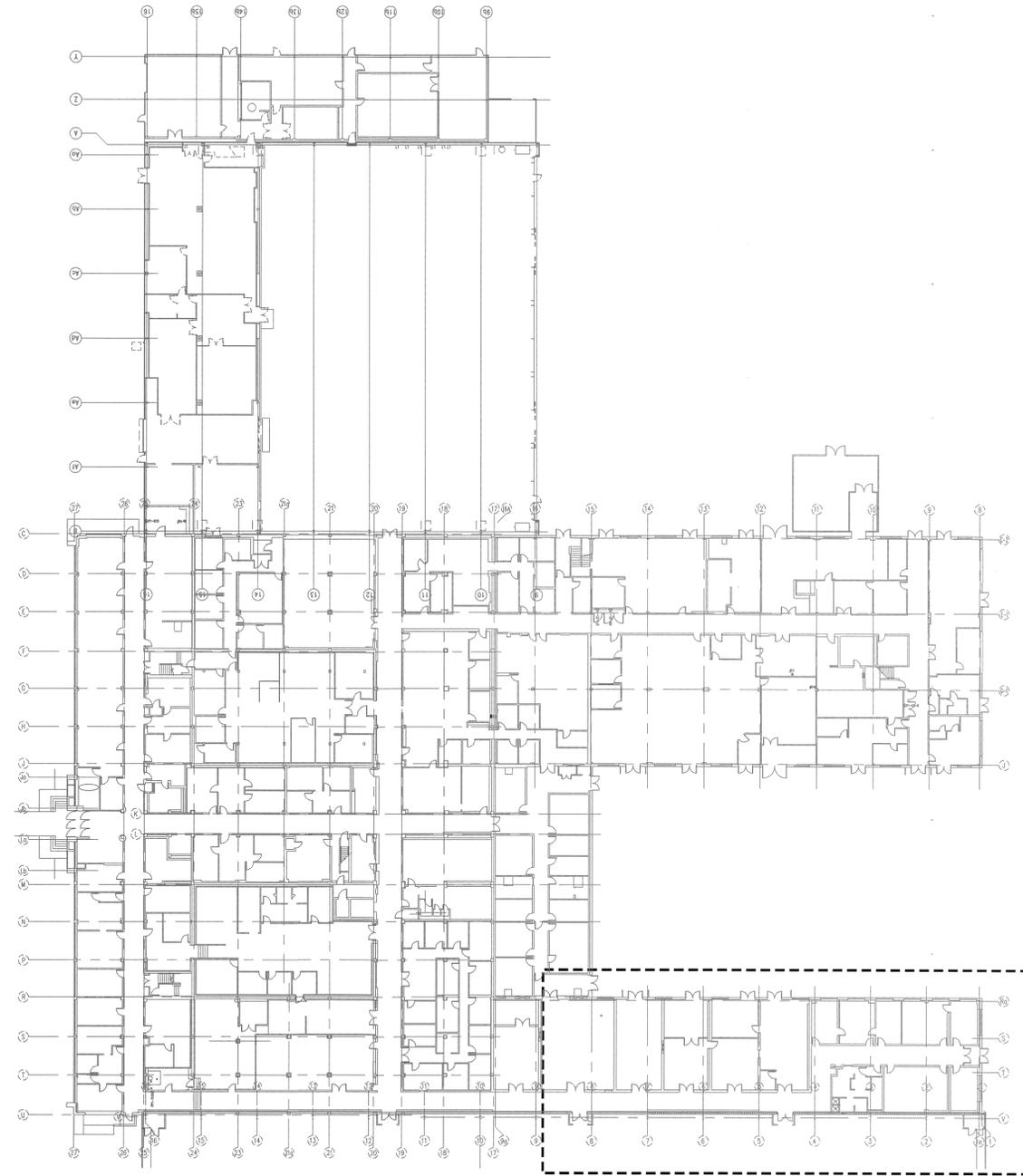


| DATE | SYM | REVISION | BY | A/P/D |
|----------|-----|----------------------------------|----|-------|
| 02-21-13 | E | 100% FINAL DESIGN | | |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | | |
| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | | |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | | |

| | | |
|---|--|--|
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS DATE 2-28-13 2-28-13 2/27/13 2/27/13 2/27/13 |
| DRAWING TITLE ROOF DEMOLITION PLANS | | PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN |
| DATE STRTD: 04/19/2012 DATE PRINTD: 2/21/2013 DRAWN BY: JC SCALE: N.T.S. FILE NAME: EDM-1715-AD-402.DWG | | DATE: 2/21/2013 TRADE: EDM-1715 SHEET No. 6 of 24 |



2 OVERALL SECOND FLOOR PLAN
 1/32" = 1'-0"
 0 32' 64' 128'



1 OVERALL FIRST FLOOR PLAN
 1/32" = 1'-0"
 0 32' 64' 128'



| DATE | SYM | REVISION | BY | A'PD |
|----------|-----|----------------------------------|----|------|
| 02-21-13 | E | 100% FINAL DESIGN | | |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | | |
| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | | |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | | |

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
 DRYDEN FLIGHT RESEARCH CENTER
 EDWARDS, CA

DRAWING TITLE
 OVERALL FIRST AND SECOND FLOOR PLAN

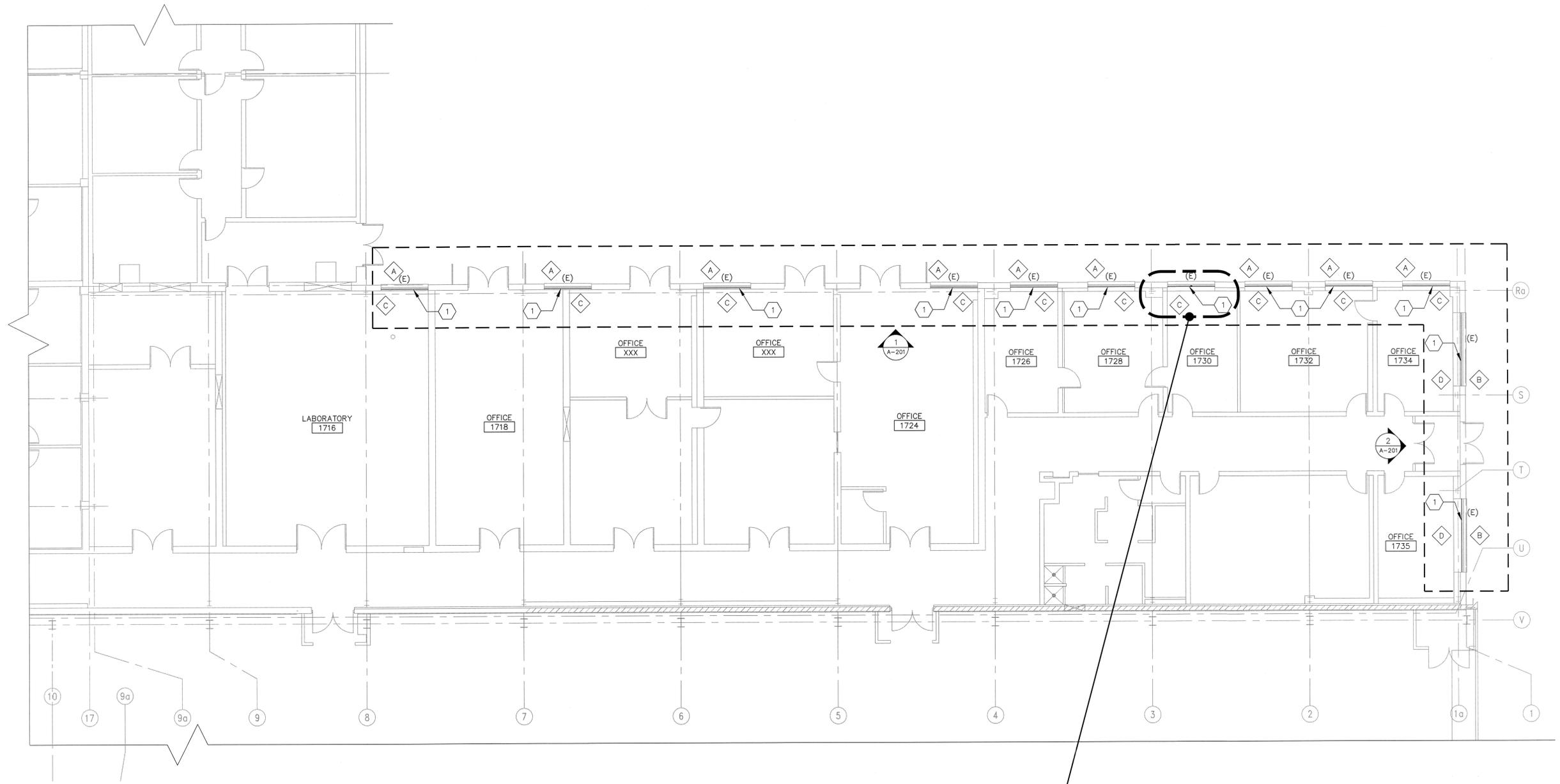
PROJECT TITLE
 MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN

| APPROVALS | DATE |
|--|---------|
| Chief, Facilities Engineering & Assgmt. Office <i>[Signature]</i> | 2-28-13 |
| Project Requestor/Customer <i>[Signature]</i> | 2-28-13 |
| Facilities Project Manager <i>[Signature]</i> | 2/27/13 |
| Chief, Office of Protective Services <i>[Signature]</i> | 2/27/13 |
| Chief, Safety & Health Office <i>[Signature]</i> | 2-27-13 |
| Chief Information Officer <i>[Signature]</i> | 2/27/13 |

| | | | |
|-----------|--------------------|-------------|-------------------|
| DATE STRD | 12/28/2011 | DATE PRINTD | 2/21/2013 |
| DRAWN BY | SK | TRADE | EDM-1715 |
| SCALE | 1/32"=1'-0" | SH. No. | |
| FILE NAME | EDM-1715 A-100.DWG | A-100 | SHEET No. 2 of 24 |

SHEET KEYNOTES

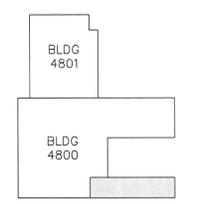
1 INSTALL NEW WINDOW FRAME ASSEMBLY. REFER TO WINDOW SCHEDULE FOR MORE INFORMATION.



LEGEND

- (A) STRUCTURAL GRID
- ROOM NAME XXX ROOM NAME AND ROOM NUMBER
- ◇ WINDOW TAG
- ▲ 1 A-XX ELEVATION MARKER
- - - AREA OF WORK
- (E) EXISTING WINDOW TO REMAIN

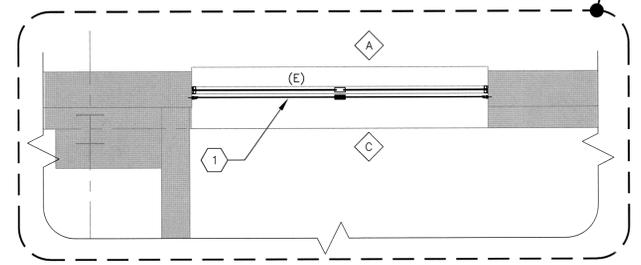
KEY PLAN



GENERAL NOTES

1. GENERAL CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND SITE CONDITIONS PRIOR TO START OF WORK AND NOTIFY GOVERNMENT IMMEDIATELY OF ANY DISCREPANCY.
2. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH ALL LOCAL CODES AND 2004 ADA AND ABA
3. ACCESSIBILITY GUIDELINES.
4. DO NOT SCALE DRAWINGS.
5. FOR THE PURPOSE OF CLARITY, NOT ALL ELEMENTS ARE SHOWN IN THIS DRAWING.
6. CLEAN EXISTING GLAZING PRIOR TO INSTALLING NEW STORM WINDOWS

1 BUILDING 4800 FIRST FLOOR PLAN - AREA E
 1/8" = 1'-0"
 0 16' 32' 64'



2 ENLARGED PLAN @ WINDOW SILL
 N.T.S.



| DATE | SYM | REVISION | BY | A/PD |
|----------|-----|----------------------------------|----|------|
| 02-21-13 | E | 100% FINAL DESIGN | | |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | | |
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| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | | |

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
 DRYDEN FLIGHT RESEARCH CENTER
 EDWARDS, CA

DRAWING TITLE
 BUILDING 4800 FIRST FLOOR PLAN
 AREA E

PROJECT TITLE
 MISSION CONTROL
 INFRASTRUCTURE REVITALIZATION
 100% FINAL DESIGN

| APPROVALS | | DATE |
|---|--------------------|---------|
| Chief, Facilities Engineering & Maint. Mgmt. Office | <i>[Signature]</i> | 2-28-13 |
| Project Requestor/Owner | <i>[Signature]</i> | 2-28-13 |
| Facilities Project Manager | <i>[Signature]</i> | 2/27/13 |
| Chief, Office of Projective Services | <i>[Signature]</i> | 2/27/13 |
| Chief, Space Operations & Environmental Office | <i>[Signature]</i> | 2-27-13 |
| Chief, Information Office | <i>[Signature]</i> | 2/27/13 |

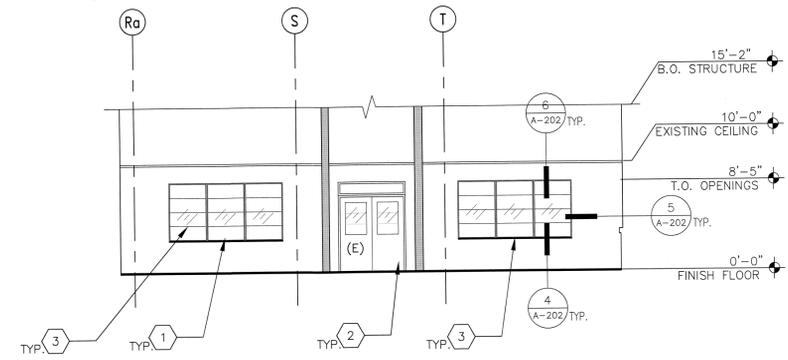
| DATE STRD | DATE PRNTD |
|------------|------------|
| 12/28/2011 | 2/21/2013 |

| DRAWN BY | SCALE | TRADE SH. No. |
|----------|--------|---------------|
| SK | N.T.S. | EDM-1715 |

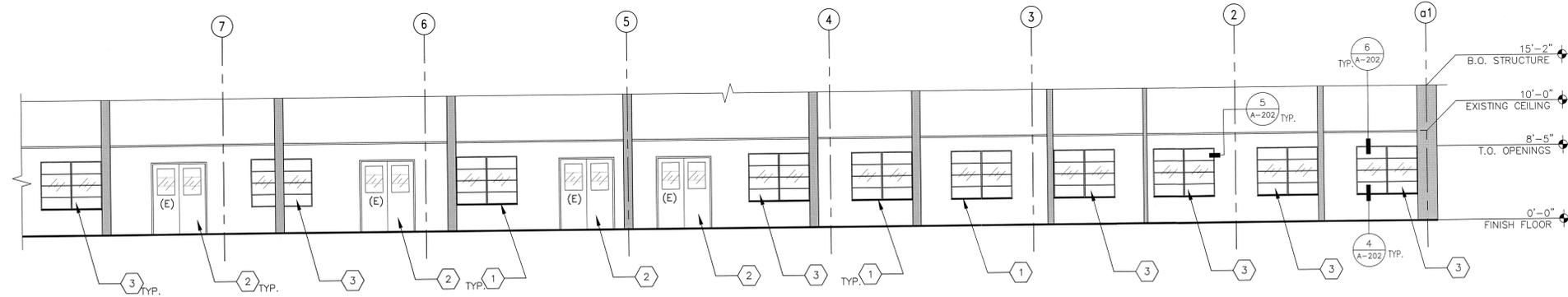
FILE NAME: A-101.DWG A-101 SHEET No. 8 of 24

SHEET KEYNOTES

- 1 REMOVE/SCRAPE OFF EXISTING PUTTY GLAZING COMPOUND & OLD PAINT WHERE APPLICABLE (INTERIOR MULLION). PROVIDE NEW SILICONE AT INT./EXT. SEAMS PRIOR TO NEW STORM WINDOW INSTALL. PROVIDE NEW PAINT ON EXIST. INTERIOR MULLION PRIOR TO NEW WINDOW INSTALLATION.
- 2 REPLACE EXISTING DOOR SEALS
- 3 NEW STORM WINDOW FRAME AND GLAZING.



2 INTERIOR ELEVATION AREA E
1/8" = 1'-0"



1 INTERIOR ELEVATION AREA E
1/8" = 1'-0"



LEGEND

- A ——— STRUCTURAL GRID
- 0'-0" — 0'-0" — ELEVATION HEIGHT
- (XX) — (XX) — DETAIL CALLOUT
- (E) — EXISTING TO REMAIN

GENERAL NOTES

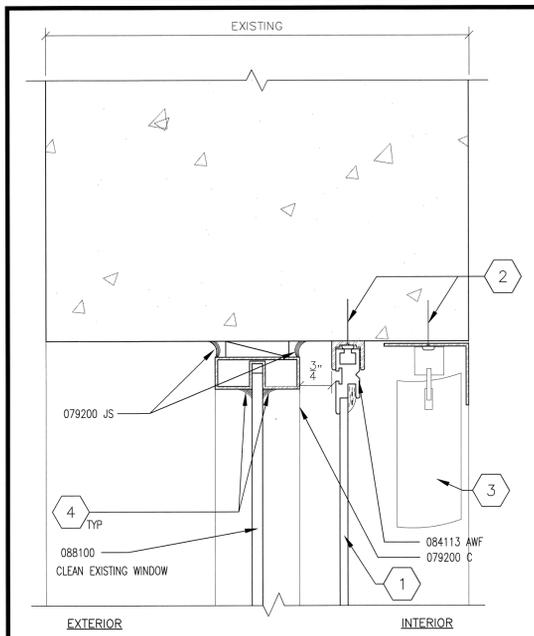
1. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH ALL LOCAL AND STATE CODES.
2. DO NOT SCALE DRAWINGS.
3. DURING DEMOLITION PROTECT ALL EXISTING TO REMAIN CONSTRUCTION & FURNITURE FROM DAMAGE.
4. COORDINATE ALL DEMOLITION WORK WITH NEW CONSTRUCTION PLANS.
5. DEMOLITION DRAWINGS CREATED FROM FIELD VERIFICATION OF READILY ACCESSIBLE ITEMS. NO DESTRUCTIVE OR INVASIVE INVESTIGATION WAS CONDUCTED. CONTRACTOR TO TAKE CARE WHEN PERFORMING DEMOLITION WORK. CONTRACTOR TO NOTIFY GOVERNMENT IMMEDIATELY OF ANY EXISTING CONDITIONS THAT VARY SUBSTANTIALLY FROM THE DRAWINGS.
6. TEMPORARILY RELOCATE AND PROTECT EXISTING FURNITURE AND/OR EQUIPMENT AND ALL AREAS OF FLOORING LEADING TO/FROM THE AREAS OF WORK.
7. THROUGH THE COURSE OF DEMO, CONTRACTOR MAY ENCOUNTER ASBESTOS AND/OR LEAD PAINT. IF FOUND, COORDINATE CLOSELY WITH GOVERNMENT FOR REMEDIATION PROCEDURES.
8. CLEAN EXISTING GLAZING PRIOR TO INSTALLING NEW STORM WINDOWS



| DATE | SYM | REVISION | BY | A/PD |
|----------|-----|----------------------------------|----|------|
| 02-21-13 | E | 100% FINAL DESIGN | | |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | | |
| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | | |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | | |

| | |
|---|--|
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | |
| DRAWING TITLE | |
| ELEVATION AREA E | |
| PROJECT TITLE | |
| MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | |

| APPROVALS | | DATE |
|--|--------------------|-------------------|
| Chief, Facilities Engineering & Asset Mgmt. Office | <i>[Signature]</i> | 2-28-13 |
| Property Requestor/Contractor | <i>[Signature]</i> | 2-28-13 |
| Facilities Project Manager | <i>[Signature]</i> | 2/27/13 |
| Chief, Office of Construction Services | <i>[Signature]</i> | 2/27/13 |
| Chief, Safety, Health & Environmental Office | <i>[Signature]</i> | 2-27-13 |
| Chief, Cost Information Officer | <i>[Signature]</i> | 2/27/13 |
| DATE PRINTED | 04/19/2012 | DATE PRINTED |
| DATE PRINTED | 2/21/2013 | |
| DRAWN BY | JC | EDM-1715 |
| SCALE | N.T.S. | TRADE |
| FILE NAME | A-201.DWG | A-201 |
| | | SHEET No. 9 of 24 |



KEYNOTES

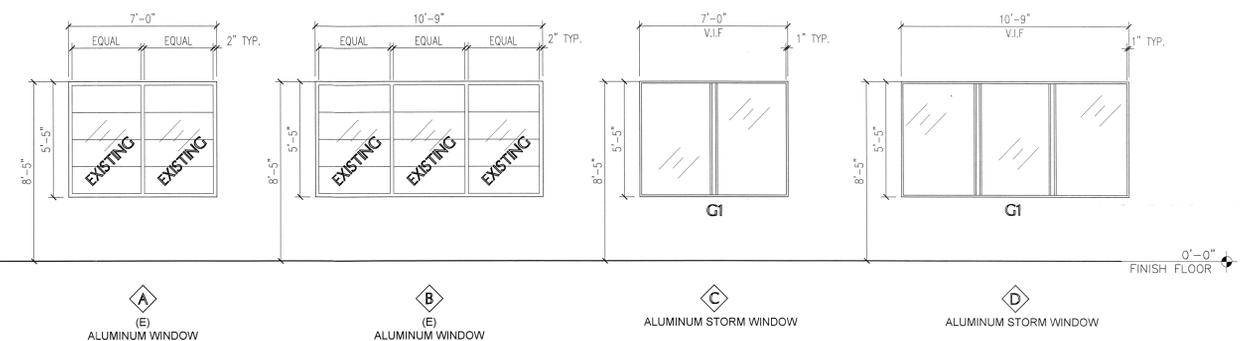
- 07-Thermal and Moisture Protection -
- 079200 C - CAULKING
- 079200 JS - JOINT SEALANT
- 08-Openings -
- 084113 AWF - ALUMINUM STOREFRONT WINDOW FRAME
- 088000 GLAZING -
- 088100 - EXISTING SINGLE PANE GLAZING.

SHEET NOTES

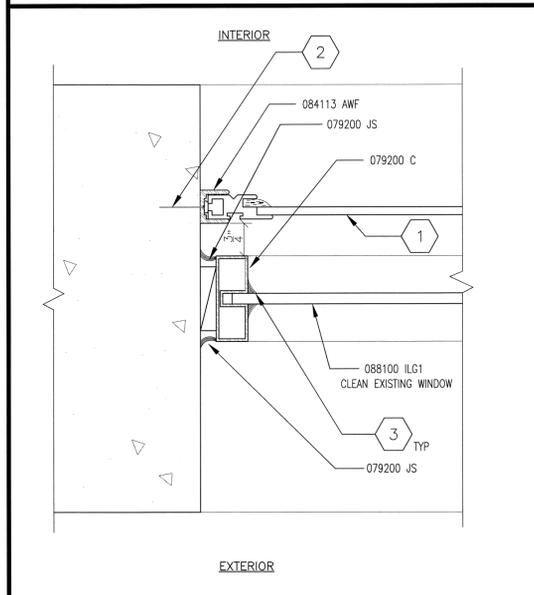
- 1 STORM WINDOW GLAZING SYSTEM REFER TO WINDOW SCHEDULE FOR MORE INFORMATION.
- 2 FASTENERS RECOMMENDED BY MANUFACTURER.
- 3 REMOVE, INSPECT AND REPLACE EXISTING VERTICAL LOUVER BLIND (IF REQ.) AND REPLACE AFTER NEW WINDOW INSTALL.
- 4 REMOVE/SCRAPE OFF EXISTING PUTTY GLAZING COMPOUND & OLD PAINT WHERE APPLICABLE (INTERIOR MULLION). PROVIDE NEW SILICONE AT INT./EXT. SEAMS PRIOR TO NEW STORM WINDOW INSTALL. PROVIDE NEW PAINT ON EXIST. INTERIOR MULLION PRIOR TO NEW WINDOW INSTALLATION.

WINDOW HEAD DETAIL

Scale: 6" = 1'-0"
Project No: 623



NOTES:
1. WINDOWS MUST BE CLEANED PRIOR TO INSTALLATION OF STORM WINDOW.



KEYNOTES

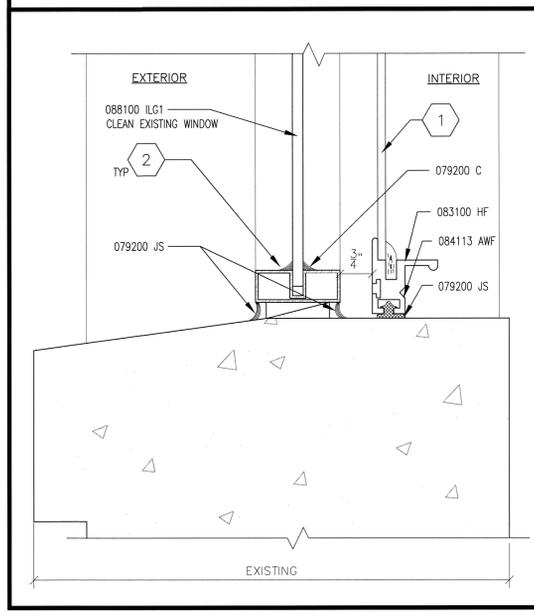
- 07-THERMAL AND MOISTURE PROTECTION -
- 079200 C - CAULKING
- 079200 JS - JOINT SEALANT
- 08-OPENINGS -
- 084113 AWF - ALUMINUM STOREFRONT WINDOW FRAME
- 088100 ILG1 - EXISTING SINGLE PANE GLAZING

SHEET NOTES

- 1 STORM WINDOW GLAZING SYSTEM REFER TO WINDOW SCHEDULE FOR MORE INFORMATION.
- 2 FASTENERS RECOMMENDED BY MANUFACTURER.
- 3 REMOVE/SCRAPE OFF EXISTING PUTTY GLAZING COMPOUND & OLD PAINT WHERE APPLICABLE (INTERIOR MULLION). PROVIDE NEW SILICONE AT INT./EXT. SEAMS PRIOR TO NEW STORM WINDOW INSTALL. PROVIDE NEW PAINT ON EXIST. INTERIOR MULLION PRIOR TO NEW WINDOW INSTALLATION.

WINDOW JAMB DETAIL

Scale: 6" = 1'-0"
Project No: 623



KEYNOTES

- 07-THERMAL AND MOISTURE PROTECTION -
- 079200 C - CAULKING
- 079200 JS - JOINT SEALANT
- 08-OPENINGS -
- 083100 HF - HANDLE FRAME
- 084113 AWF - ALUMINUM STOREFRONT WINDOW FRAME
- 088100 ILG1 - EXISTING SINGLE PANE GLAZING

SHEET NOTES

- 1 STORM WINDOW GLAZING SYSTEM REFER TO WINDOW SCHEDULE FOR MORE INFORMATION.
- 2 REMOVE/SCRAPE OFF EXISTING PUTTY GLAZING COMPOUND & OLD PAINT WHERE APPLICABLE (INTERIOR MULLION). PROVIDE NEW SILICONE AT INT./EXT. SEAMS PRIOR TO NEW STORM WINDOW INSTALL. PROVIDE NEW PAINT ON EXIST. INTERIOR MULLION PRIOR TO NEW WINDOW INSTALLATION. CLEAN EXISTING WINDOWS PRIOR TO NEW WINDOW INSTALLATION.

WINDOW SILL DETAIL

Scale: 6" = 1'-0"
Project No: 623

3 WINDOW TYPES
SCALE: N/A

| WINDOW SCHEDULE | | | | | | | NOTES |
|-----------------|--------|------|-------|---------|---------|---------|---|
| SIZE | | TYPE | FRAME | | | | |
| WIDTH | HEIGHT | | MTRL | HEAD | JAMB | SILL | |
| 7'-0" | 5'-5" | A | ALUM | 6/A-202 | 5/A-202 | 4/A-202 | |
| 10'-9" | 5'-5" | B | ALUM | 6/A-202 | 5/A-202 | 4/A-202 | |
| 7'-0" | 5'-5" | C | ALUM | 6/A-202 | 5/A-202 | 4/A-202 | CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS PRIOR TO FABRICATION OF NEW STORM WINDOW ASSEMBLIES. |
| 10'-9" | 5'-5" | D | ALUM | 6/A-202 | 5/A-202 | 4/A-202 | CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS PRIOR TO FABRICATION OF NEW STORM WINDOW ASSEMBLIES. |

2 WINDOW SCHEDULE
SCALE: N/A

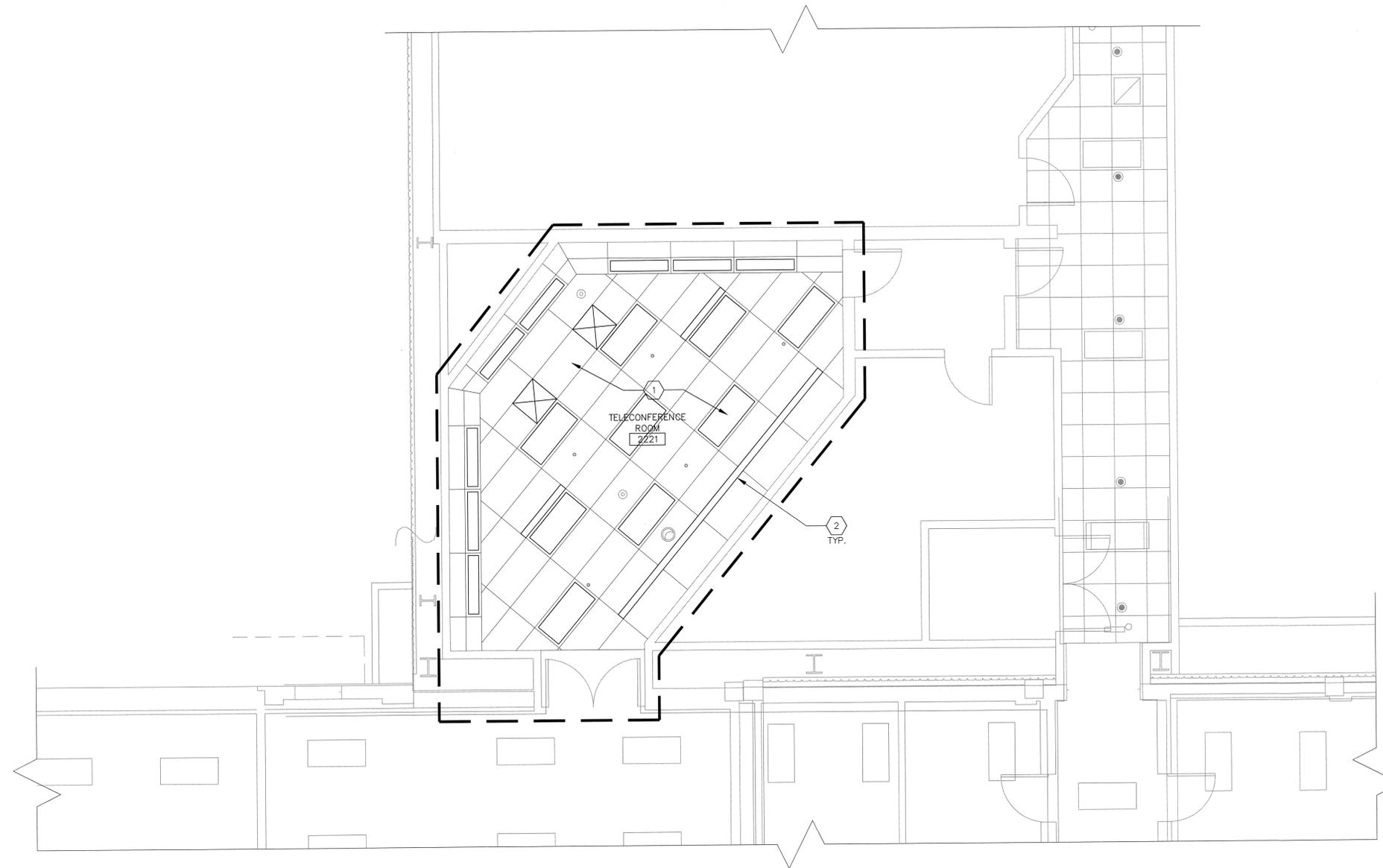
| GLAZING SCHEDULE | | | | |
|------------------|------------|-----------|---------------|----------|
| MARK | GLASS PANE | AIR SPACE | LOW - E GLASS | NOTES |
| G1 | 3/16" | N/A | YES | TEMPERED |

1 GLAZING SCHEDULE
SCALE: N/A



| DATE | SYM | REVISION | BY | A'PD |
|----------|-----|----------------------------------|----|------|
| 02-21-13 | E | 100% FINAL DESIGN | | |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | | |
| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | | |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | | |

| | | |
|---|--|--|
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS DATE 2-28-13 2-28-13 2/27/13 2/27/13 2-29-13 2/27/13 |
| DRAWING TITLE OPENING DETAILS/ DOOR AND WINDOW SCHEDULES | | DATE STRD: 04/20/2011 DATE PRINTD: 2/21/2013 |
| PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | TRADE SH. No. EDM-1715 FILE NAME: A-202.DWG A-202 SHEET No. 10 of 24 |



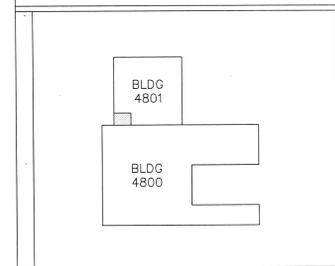
SHEET NOTES

- ① REINSTALL EXISTING SMOKE DETECTOR, LIGHT FIXTURES, ACOUSTICAL CEILING GRID, AND TILES IN PREVIOUS LOCATIONS. EXISTING FIRE SPRINKLER HEAD TO REMAIN. REINSTALL AUDIO/ VISUAL EQUIPMENT AS REQUIRED. COORDINATE INSTALLATION WITH GOVERNMENT.
- ② NEW MECHANICAL EQUIPMENT. REFER TO MECHANICAL DRAWINGS FOR MORE INFORMATION.

LEGEND

| ROOM NAME XXX | ROOM NAME AND ROOM NUMBER |
|------------------|----------------------------------|
| | ACOUSTICAL CEILING TILE |
| | SPRINKLER HEAD |
| | SMOKE DETECTOR |
| | WALL-WASH RECESSED LIGHT FIXTURE |
| | 2X4 LIGHT FIXTURE |
| | 1X4 LIGHT FIXTURE |
| | SUPPLY AIR |
| | AREA OF WORK |

KEY PLAN



GENERAL NOTES

1. GENERAL CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND SITE CONDITIONS PRIOR TO START OF WORK AND NOTIFY CONSTRUCTION MANAGER IMMEDIATELY OF ANY DISCREPANCY.
2. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH ALL LOCAL CODES.
3. DO NOT SCALE DRAWINGS.
4. FOR THE PURPOSE OF CLARITY, NOT ALL ELEMENTS ARE SHOWN IN THIS DRAWING.
5. LIGHT FIXTURES, MECHANICAL DUCTS AND REGISTERS ARE SHOWN FOR LOCATION PURPOSES ONLY. REFER TO ELECTRICAL AND MECHANICAL DRAWINGS FOR ACTUAL QUANTITIES, SIZES AND TYPES.
6. REFER TO FLOOR PLANS FOR ALL SCHEDULE EQUIPMENT
7. PROTECT EXISTING FURNITURE DURING CONSTRUCTION.
8. CONTRACTOR TO COORDINATE ALL WORK WITH GOVERNMENT PRIOR TO CONSTRUCTION.

1 BLDG. 4801 TELECONFERENCE ROOM 2221 RCP

1/4" = 1'-0"



| DATE | SYM | REVISION | BY | A'PD |
|----------|-----|----------------------------------|----|------|
| 02-21-13 | E | 100% FINAL DESIGN | | |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | | |
| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | | |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | | |

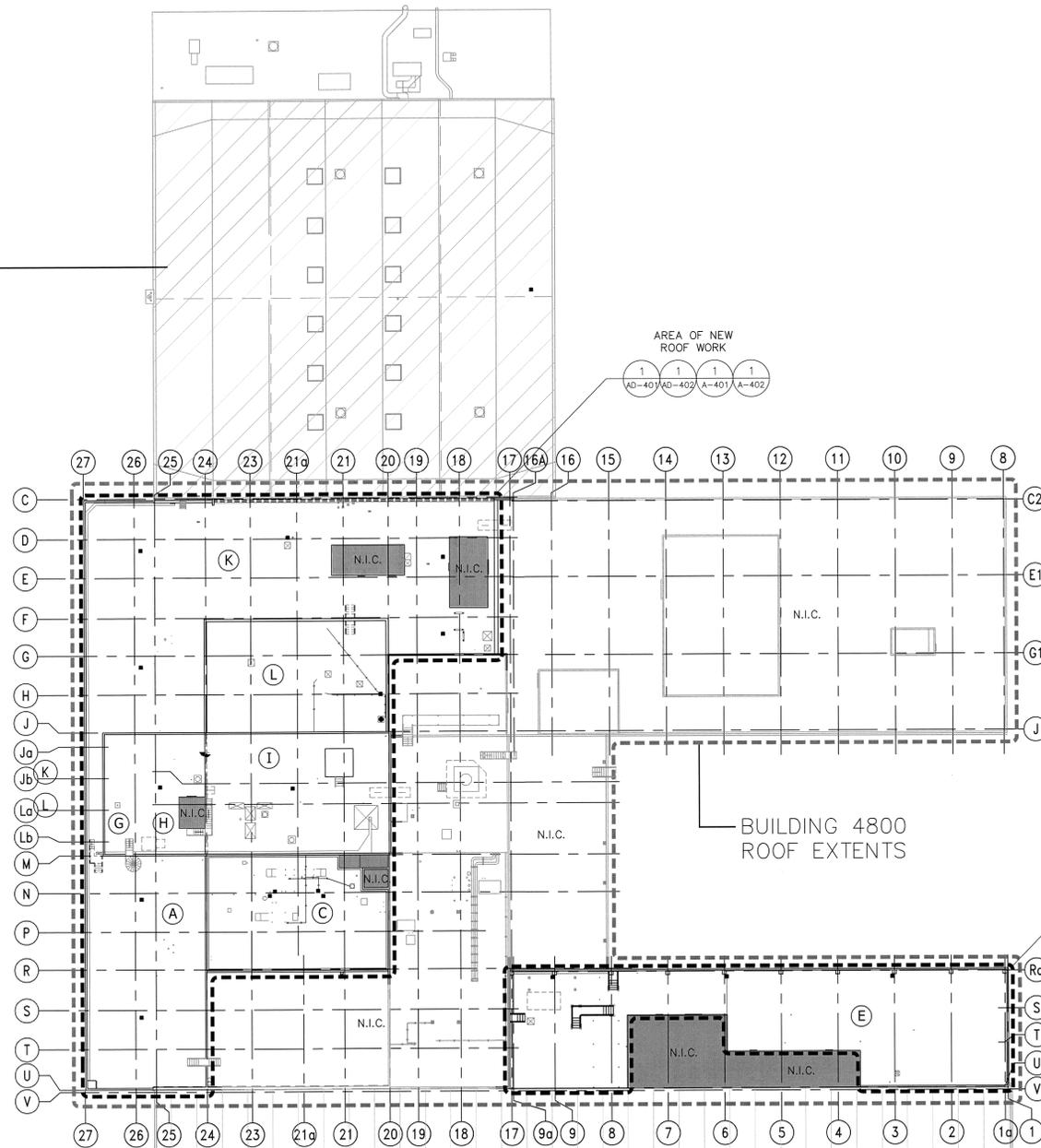
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
 DRYDEN FLIGHT RESEARCH CENTER
 EDWARDS, CA

DRAWING TITLE
 BLDG. 4801 TELECONFERENCE ROOM 2221 RCP

PROJECT TITLE
 MISSION CONTROL
 INFRASTRUCTURE REVITALIZATION
 100% FINAL DESIGN

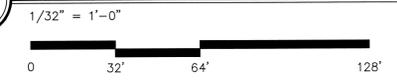
| APPROVALS | | DATE | |
|---|--------------------|-------------|--------------------|
| Chief, Facilities Engineering & Maint. Mgmt. Office | <i>[Signature]</i> | 2-28-13 | |
| Project/Regulator/Inspector | <i>[Signature]</i> | 2-28-13 | |
| Facilities Project Manager | <i>[Signature]</i> | 2/27/13 | |
| Chief, State of Protective Services | <i>[Signature]</i> | 2/27/13 | |
| Chief, Information Management & Planning Office | <i>[Signature]</i> | 2/27/13 | |
| Chief, Information Officer | <i>[Signature]</i> | 2/27/13 | |
| DATE STRD | 12/28/2011 | DATE PRINTD | 2/21/2013 |
| DRAWN BY | SK | TRADE | EDM-1715 |
| SCALE | 1/4"=1'-0" | SH. No. | |
| FILE NAME | A-301.DWG | A-301 | SHEET No. 11 of 14 |

BUILDING 4801
N.I.C.



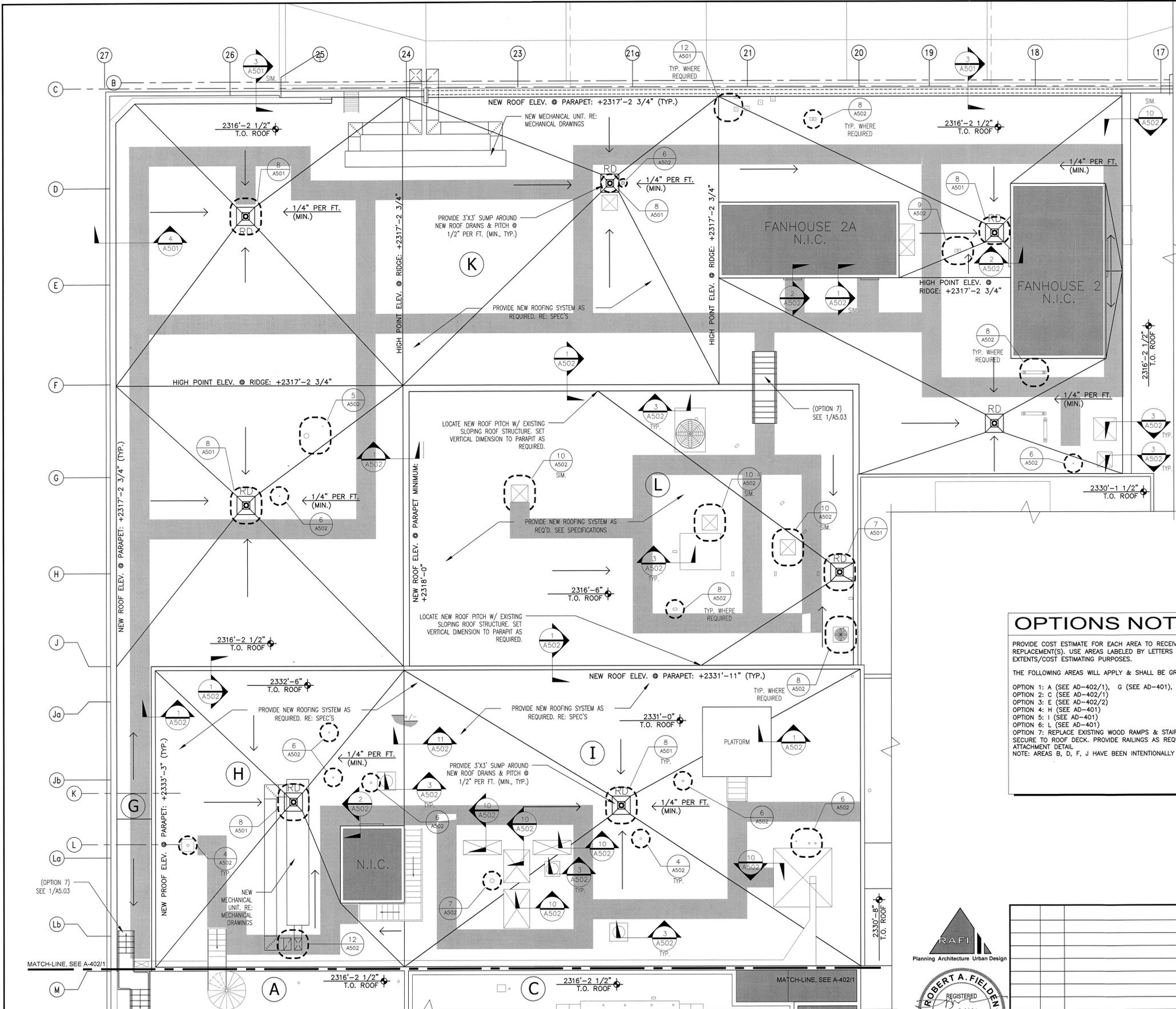
BUILDING 4802
N.I.C.

1 BUILDING 4800 OVERALL ROOF PLAN



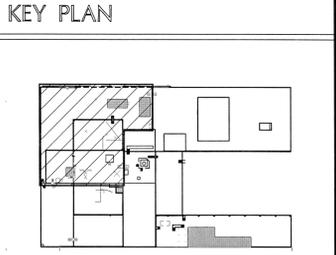
| DATE | SYM | REVISION | BY | A'PD |
|----------|-----|----------------------------------|----|------|
| 02-21-13 | E | 100% FINAL DESIGN | | |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | | |
| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | | |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | | |

| | | | |
|--|---------------------------------|---|--|
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS Chief, Facilities Engineering & Ass't Mgmt. Office <i>[Signature]</i> 2-28-13 Project Requestor/Customer <i>[Signature]</i> 2-28-13 Technical Project Manager <i>[Signature]</i> 2/27/13 Chief, Dept. of Projective Services <i>[Signature]</i> 2/27/13 Chief, Safety & Environmental Office <i>[Signature]</i> 2-27-13 Chief, Information Office <i>[Signature]</i> 2/27/13 | DATE 2-28-13 2-28-13 2/27/13 2-27-13 2/27/13 |
| DRAWING TITLE OVERALL ROOF PLAN | | PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | |
| DATE STRTD 12/08/2011 | DATE PRINTD 2/21/2013 | SCALE N.T.S. | TRADE EDM-1715 |
| FILE NAME EDM-1715 A-400.DWG | TRADE SH. No. A-400 | SHEET No. 12 of 24 | |



LEGEND

- (A) STRUCTURAL GRID
- AREA OF WORK
- 0'-0" / 0'-0" ELEVATION HEIGHT
- X / X.XX SECTION MARKER
- X / X.XX DETAIL / ENLARGED PLAN CALLOUT
- INDICATES SLOPE OF ROOF AND/OR TAPERED INSULATION
- RD PROVIDE NEW ROOF DRAIN, SEE 6/A501. SEE MECH DWGS FOR MORE INFO.
- PROVIDE 39" WIDTH SARNATRED MAT PROTECTION OVER NEW ROOFING MEMBRANE IN AREAS INDICATED BY GREYSCALE SHADE. ADHERE W/ SARNACOL 2170 ADHESIVE AS REQ.



OPTIONS NOTE

PROVIDE COST ESTIMATE FOR EACH AREA TO RECEIVE ROOFING & DRAIN REPLACEMENT(S). USE AREAS LABELED BY LETTERS & SURROUNDED BY PARAPETS FOR EXTENTS/COST ESTIMATING PURPOSES.

THE FOLLOWING AREAS WILL APPLY & SHALL BE GROUPED AS NOTED BELOW:

- OPTION 1: A (SEE AD-402/1), G (SEE AD-401), K (SEE AD-401)
- OPTION 2: C (SEE AD-402/1)
- OPTION 3: E (SEE AD-402/2)
- OPTION 4: H (SEE AD-401)
- OPTION 5: I (SEE AD-401)
- OPTION 6: L (SEE AD-401)
- OPTION 7: REPLACE EXISTING WOOD RAMPS & STAIRS W/ NEW GALVANIZED STEEL AND SECURE TO ROOF DECK. PROVIDE RAILINGS AS REQUIRED. SEE 4/A503 FOR STAIR ATTACHMENT DETAIL.

NOTE: AREAS B, D, F, J HAVE BEEN INTENTIONALLY OMITTED

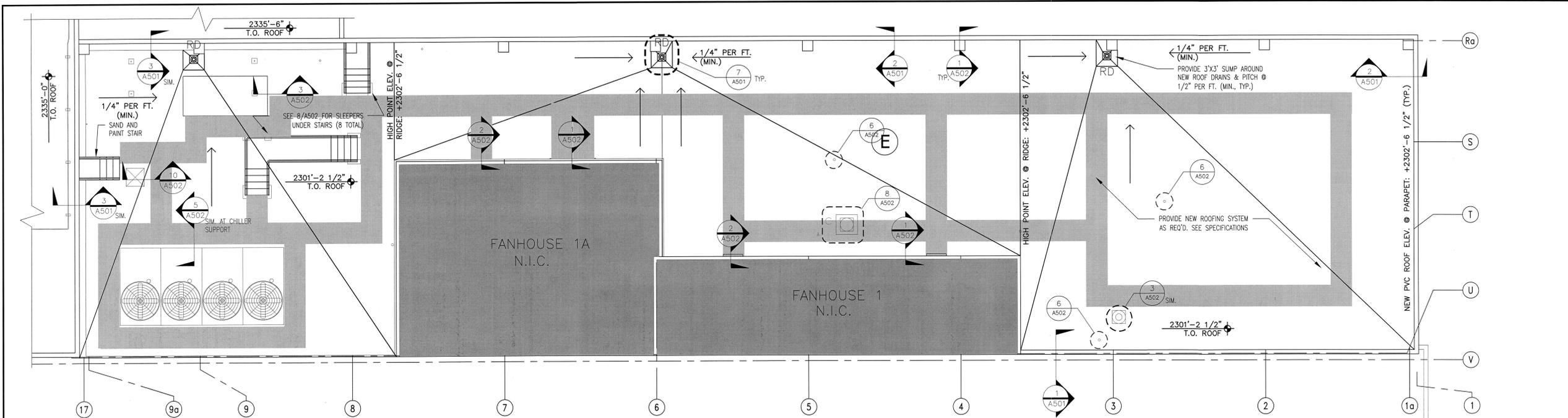
- ### GENERAL NOTES
1. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH ALL LOCAL AND STATE CODES.
 2. DO NOT SCALE DRAWINGS.
 3. ALL VERTICAL SURFACES ON ROOF TO EXTEND MIN. 8" ABOVE FINISHED ROOFING. ROOF FLASH TO EXTEND MIN. 8" ABOVE ROOF SURFACE.
 4. REFER TO STRUCTURAL AND MECHANICAL FOR ROOF PENETRATIONS AND STRUCTURAL SUPPORT.
 5. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO COMMENCING CONSTRUCTION.
 6. ALL EXISTING TO REMAIN SHALL BE COORDINATED W/ THE NEW ROOFING SYSTEM AS REQUIRED.

1 ROOF AREA CONSTRUCTION PLAN
1/8" = 1'-0"



| DATE | SYM | REVISION | BY |
|----------|-----|----------------------------------|----|
| 02-21-13 | E | 100% FINAL DESIGN | |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | |
| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | |

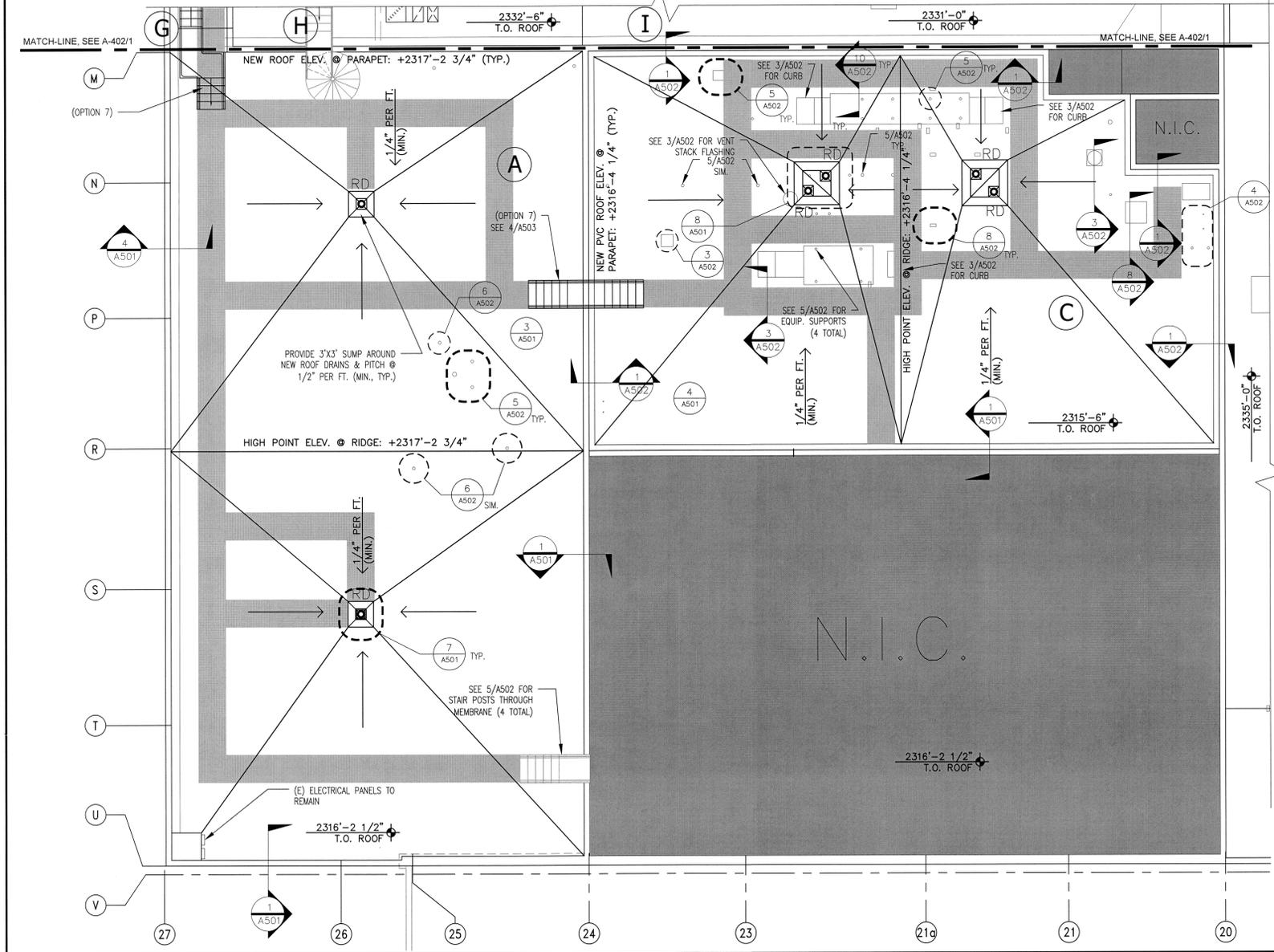
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION | | APPROVALS | | DATE |
|---|--------------------|---|--------------------|---------|
| DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | Chief, Facilities Engineering & Asset Mgmt. Office | | 2-28-13 |
| | | Project Manager | | 2-28-13 |
| | | Facilities Project Manager | | 2/27/13 |
| | | Chief, Office of Protective Services | | 2/27/13 |
| | | Chief, Safety & Security | | 2-27-13 |
| | | Chief, Information Officer | | 2/21/13 |
| DRAWING TITLE | | PROJECT TITLE | | |
| ENLARGED ROOF CONSTRUCTION PLAN | | MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | |
| DRAWN BY | SCALE | TRADE SH. NO. | EDM-1715 | |
| JC | N.T.S. | A-401 | SHEET No. 13 of 24 | |
| FILE NAME | EDM-1715 A-401.DWG | | | |



2 ROOF AREA CONSTRUCTION PLAN
1/8" = 1'-0"

LEGEND

- (A) STRUCTURAL GRID
- AREA OF WORK
- 0'-0" / 0'-0" ELEVATION HEIGHT
- X.XX SECTION MARKER
- X.XX DETAIL / ENLARGED PLAN CALLOUT
- INDICATES SLOPE OF ROOF AND/OR TAPERED INSULATION
- RD PROVIDE NEW ROOF DRAIN, SEE 6/A501. SEE MECH DWGS FOR MORE INFO.
- PROVIDE 39" WIDTH SARNATRED MAT PROTECTION OVER NEW ROOFING MEMBRANE IN AREAS INDICATED BY GREYSCALE SHADE. ADHERE W/ SARNACOL 2170 ADHESIVE AS REQ.



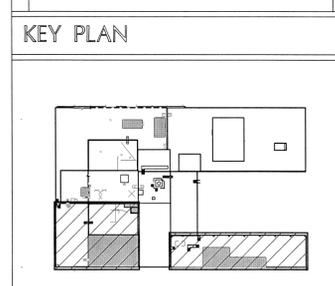
1 ROOF AREA CONSTRUCTION PLAN
1/8" = 1'-0"

OPTIONS NOTE

PROVIDE COST ESTIMATE FOR EACH AREA TO RECEIVE ROOFING & DRAIN REPLACEMENT(S). USE AREAS LABELED BY LETTERS & SURROUNDED BY PARAPETS FOR EXTENTS/COST ESTIMATING PURPOSES.

THE FOLLOWING AREAS WILL APPLY & SHALL BE GROUPED AS NOTED BELOW:

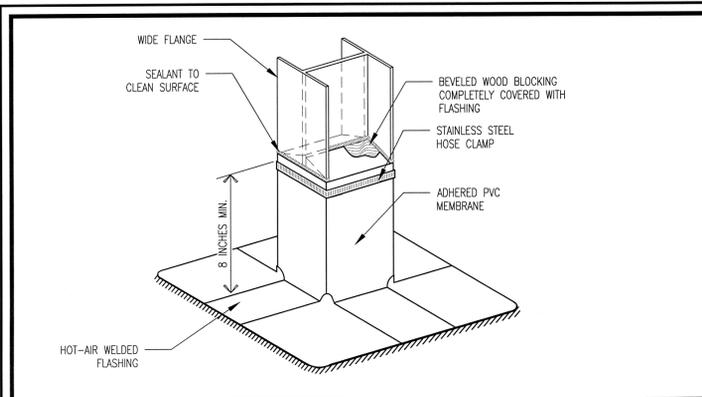
OPTION 1: A (SEE AD-402/1), G (SEE AD-401), K (SEE AD-401)
 OPTION 2: C (SEE AD-402/1)
 OPTION 3: E (SEE AD-402/2)
 OPTION 4: H (SEE AD-401)
 OPTION 5: I (SEE AD-401)
 OPTION 6: L (SEE AD-401)
 OPTION 7: REPLACE EXISTING WOOD RAMPS & STAIRS W/ NEW GALVANIZED STEEL AND SECURE TO ROOF DECK. PROVIDE RAILINGS AS REQUIRED. SEE 4/A503 FOR STAIR ATTACHMENT DETAIL.
 NOTE: AREAS B, D, F, J HAVE BEEN INTENTIONALLY OMITTED



- GENERAL NOTES**
- ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH ALL LOCAL AND STATE CODES.
 - DO NOT SCALE DRAWINGS.
 - ALL VERTICAL SURFACES ON ROOF TO EXTEND MIN. 8" ABOVE FINISHED ROOFING. ROOF FLASH TO EXTEND MIN. 8" ABOVE ROOF SURFACE.
 - REFER TO STRUCTURAL AND MECHANICAL FOR ROOF PENETRATIONS AND STRUCTURAL SUPPORT.
 - CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO COMMENCING CONSTRUCTION.
 - ALL EXISTING TO REMAIN SHALL BE COORDINATED W. THE NEW ROOFING SYSTEM AS REQUIRED.



| | | | | | |
|--|-----|---|----|---|---|
| Planning Architecture Urban Design | | NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS Chief, Facilities Operations & Maint. Office Project Requestor/Engineer Facilities Project Manager Chief, Office of Protective Services Chief, Safety Chief Information Officer | DATE 2-28-13 2-28-13 2/27/13 2/27/13 2/27/13 |
| 02-21-13 E 100% FINAL DESIGN 01-07-13 D 95% NEAR-FINAL DESIGN SUBMITTAL 10-27-12 C 60% DEVELOPED DESIGN SUBMITTAL 05-12-12 B 30% PRELIMINARY DESIGN SUBMITTAL | | DRAWING TITLE ENLARGED ROOF CONSTRUCTION PLAN | | PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | |
| DATE | SYM | REVISION | BY | A'PD | EDM-1715 |
| FILE NAME EDM-1715 A-402.DWG | | | | TRADE SH. NO. A-402 SHEET No. 14 of 24 | |



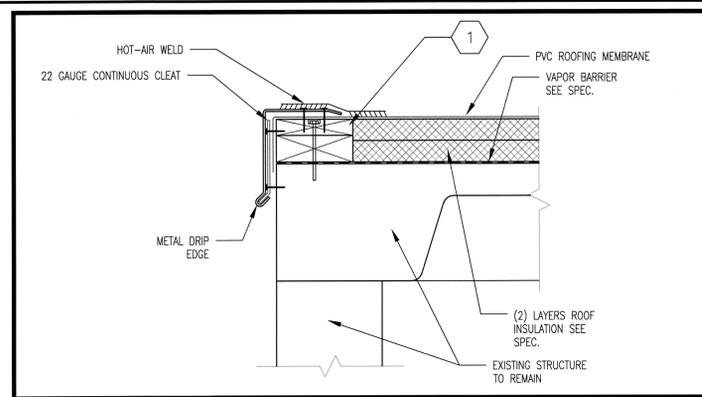
NOTES:

WIDE FLANGE FLASHING

SCALE: NTS

PROJECT NO. 606C

12



NOTES:

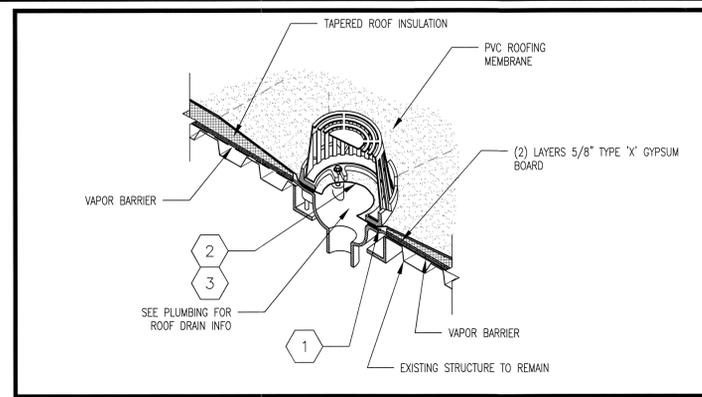
1. MIN. 1-1/2" X 5-1/2" WOOD NAILED: HEIGHT TO MATCH INSULATION OR SURFACE TO WHICH MEMBRANE IS TO BE APPLIED.

DRIP EDGE AT CONC. WALL

SCALE: 1-1/2" = 1'-0"

PROJECT NO. 606C

9



NOTES:

1. MEMBRANE SEAMS SHOULD NOT INTERSECT DRAIN CLAMPING RING. SEAMS THAT FALL WITHIN DRAIN SUMP SHOULD BE STRIPPED IN.

2. INSTALL COMPATIBLE SEALANT BETWEEN DRAIN BOWL FLANGE AND ROOF MEMBRANE.

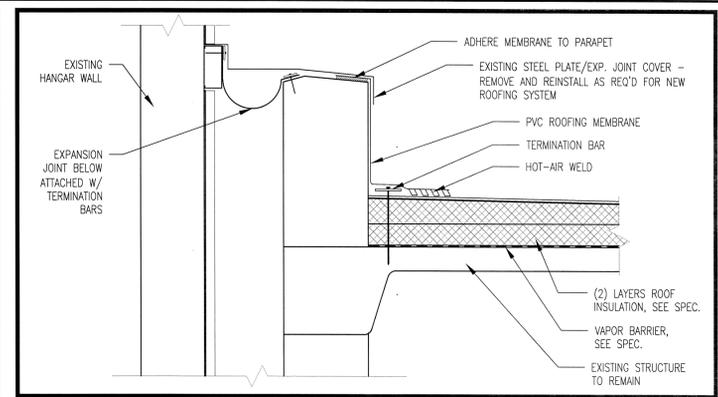
3. ROUND CUT IN MEMBRANE SHALL BE LARGER THAN DRAIN PIPE DIA. EXTEND APPROX. 1" PAST CLAMPING RING.

TYP. ROOF DRAIN ISOMETRIC

SCALE: 1-1/2" = 1'-0"

PROJECT NO. 606C

6



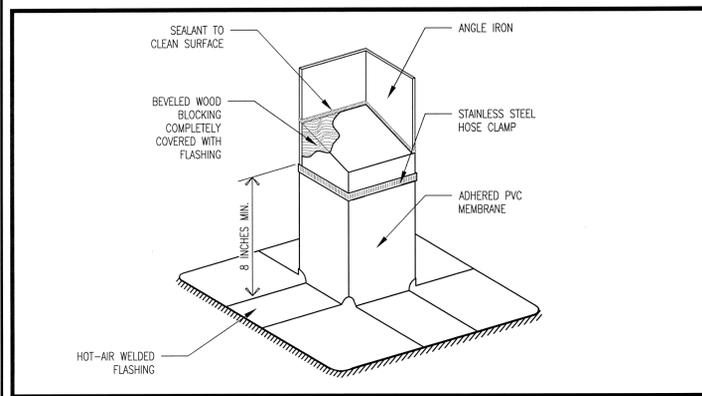
NOTES:

PVC ROOFING AT EXPANSION JOINT

SCALE: 1-1/2" = 1'-0"

PROJECT NO. 606C

3



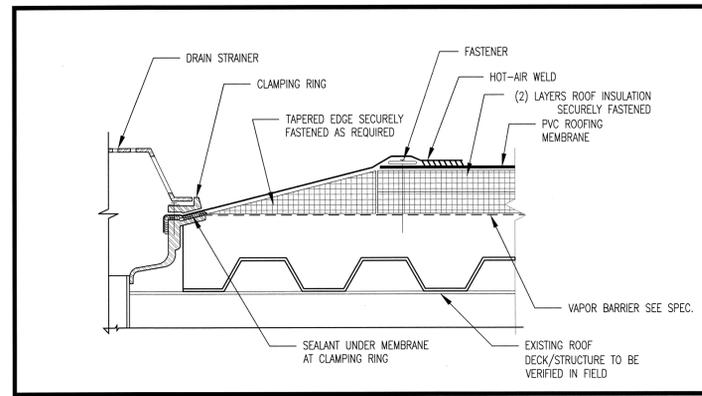
NOTES:

ANGLE IRON FLASHING

SCALE: NTS

PROJECT NO. 606C

11



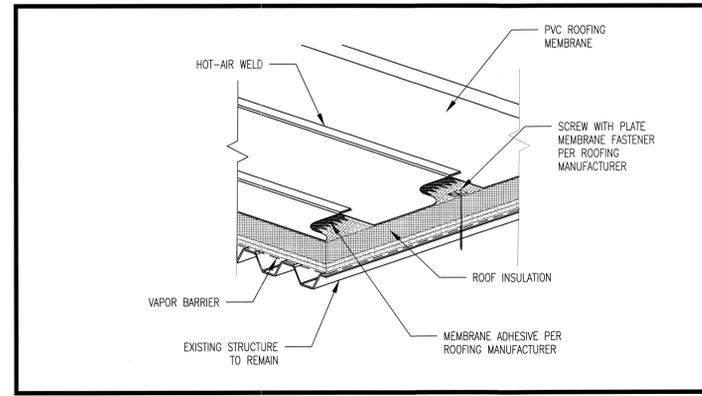
NOTES:

DRAIN CLAMPING RING AT CONC. STRUCTURE

SCALE: 1-1/2" = 1'-0"

PROJECT NO. 606C

8



NOTES:

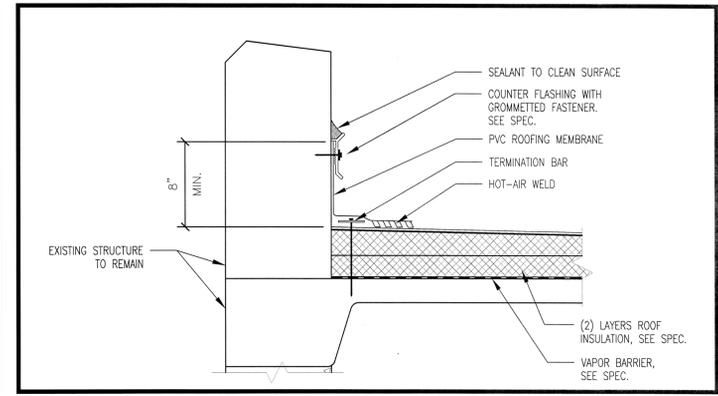
1. VAPOR BARRIER SHALL BE SEALED AT EDGES

TYP. ROOF SECTION - ISOMETRIC

SCALE: 1-1/2" = 1'-0"

PROJECT NO. 606C

5



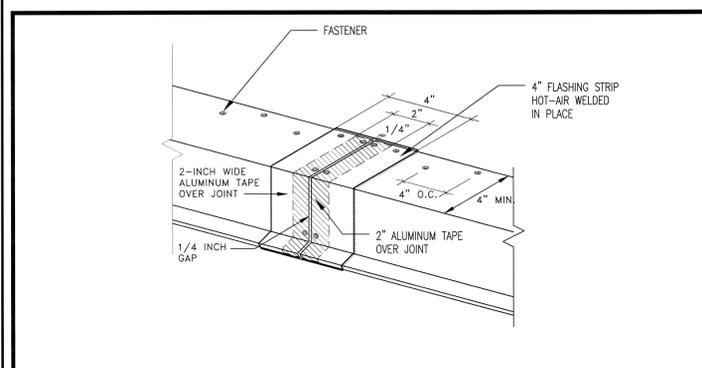
NOTES:

PVC ROOFING AT CONCRETE PARAPET

SCALE: 1-1/2" = 1'-0"

PROJECT NO. 606C

2



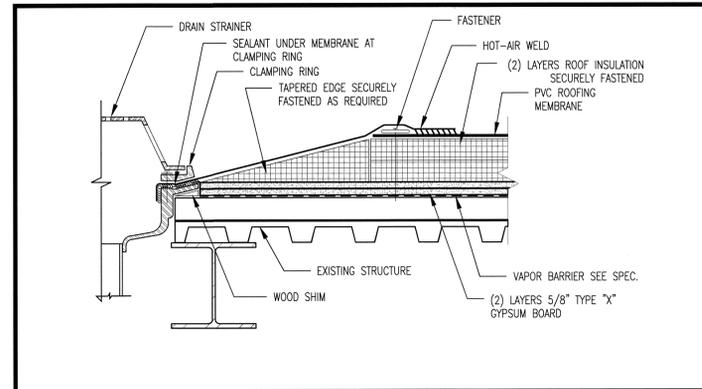
NOTES:

FLASHING AT METAL JOINTS

SCALE: NTS

PROJECT NO. 606C

10



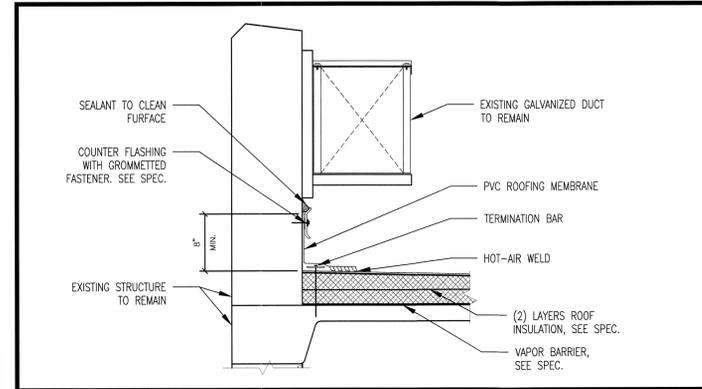
NOTES:

DRAIN CLAMPING RING AT METAL DECK

SCALE: 1-1/2" = 1'-0"

PROJECT NO. 606C

7



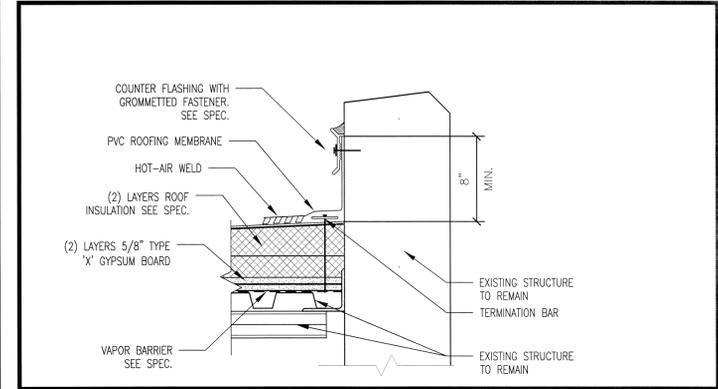
NOTES:

PVC ROOFING AT GALVANIZED DUCT

SCALE: 1" = 1'-0"

PROJECT NO. 606C

4



NOTES:

PARAPET DETAIL

SCALE: 1 1/2" = 1'-0"

PROJECT NO. 606C

1



| DATE | SYM | REVISION | BY |
|----------|-----|----------------------------------|----|
| 02-21-13 | E | 100% FINAL DESIGN | |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | |
| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | |

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
DRYDEN FLIGHT RESEARCH CENTER
EDWARDS, CA

DRAWING TITLE: ROOF DETAILS

PROJECT TITLE: MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN

| APPROVALS | DATE |
|--|---------|
| Chief, Facilities Engineering & Asset Mgmt. Office | 2-28-13 |
| Project Director/Assistant | 2-28-13 |
| Facilities Project Manager | 2/27/13 |
| Chief, Office of Protective Services | 2/27/13 |
| Chief, Mission Support & Performance Office | 2-27-13 |
| Office Information Officer | 2/27/13 |

DATE PRINTED: 2/21/2013

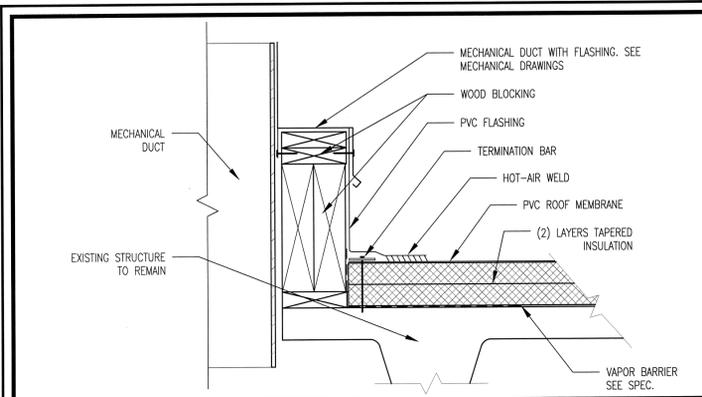
DRAWN BY: SK

SCALE: N.T.S.

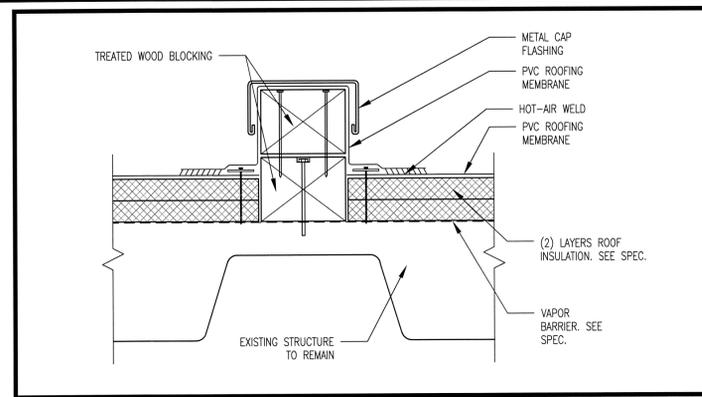
FILE NAME: A-501.DWG

TRADE SH. No. EDM-1715

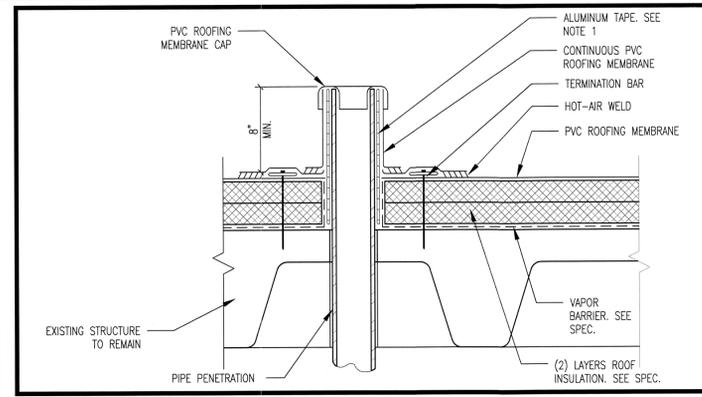
A-501 SHEET No. 15 of 24



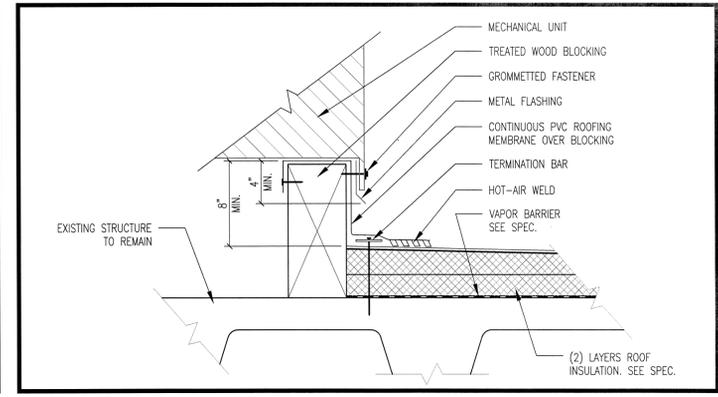
EQUIP. CURB @ DUCT
 SCALE: 1 1/2" = 1'-0"
 PROJECT NO. 606C
 12



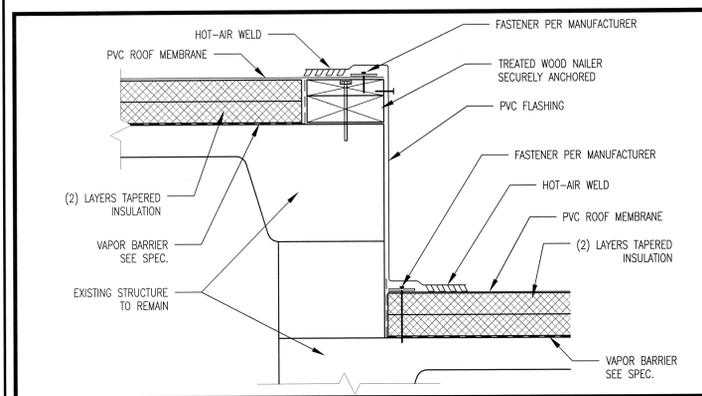
EQUIPMENT SUPPORT
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 PROJECT NO. 606C
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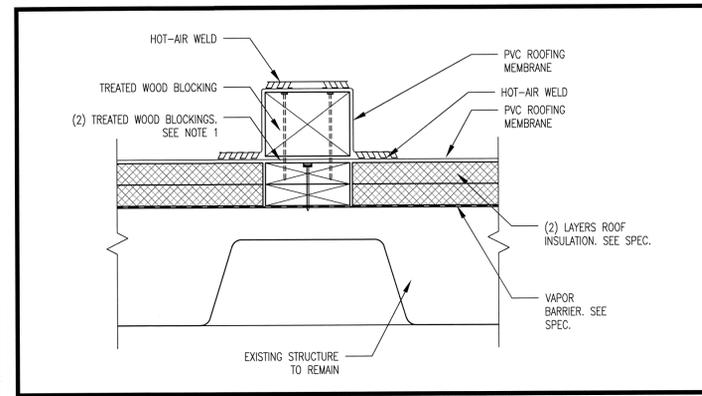
VENT STACK FLASHING
 SCALE: 1-1/2" = 1'-0"
 PROJECT NO. 606C
 6



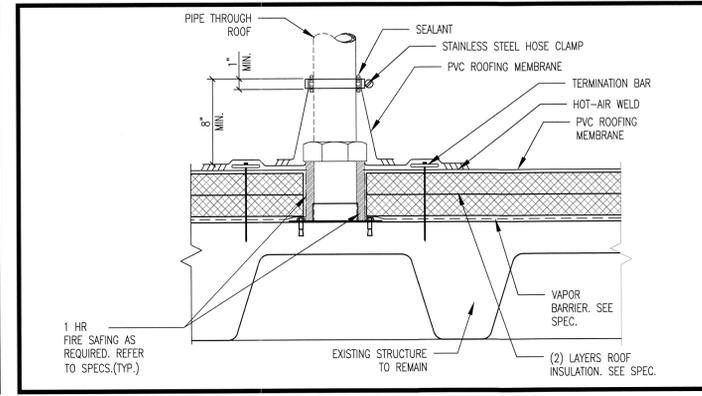
CURB FLASHING
 SCALE: 1-1/2" = 1'-0"
 PROJECT NO. 606C
 3



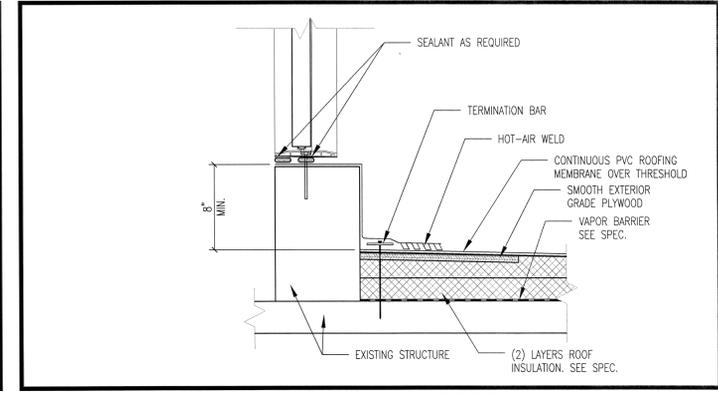
WALL TRANSITION
 SCALE: 1 1/2" = 1'-0"
 PROJECT NO. 606C
 11



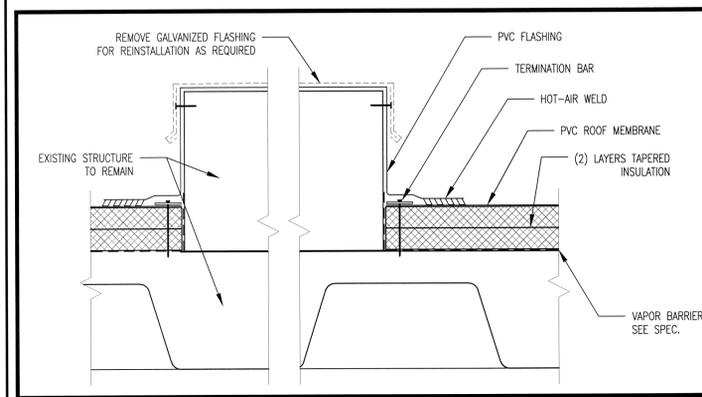
PROTECTED WOOD SLEEPER
 SCALE: 1-1/2" = 1'-0"
 PROJECT NO. 606C
 8



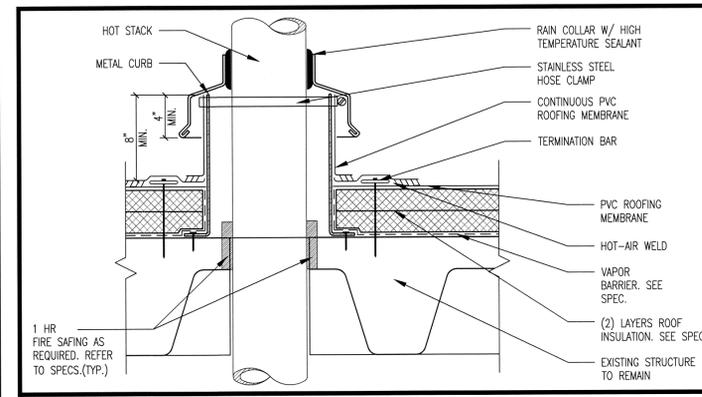
PVC BOOT AT PIPE PENETRATION
 SCALE: 1-1/2" = 1'-0"
 PROJECT NO. 606C
 5



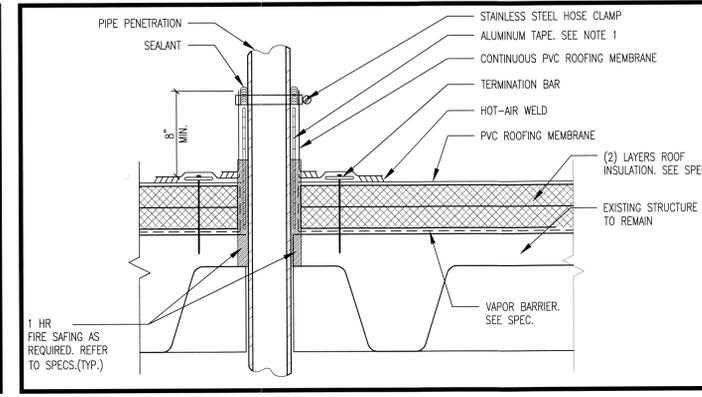
PVC ROOFING AT DOOR THRESHOLD
 SCALE: 1-1/2" = 1'-0"
 PROJECT NO. 606C
 2



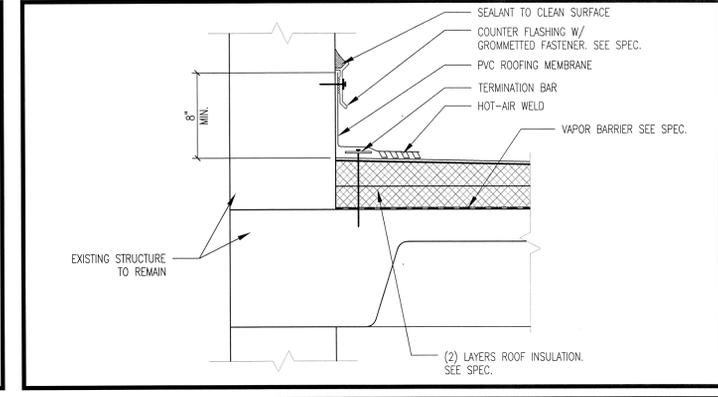
EQUIPMENT PAD
 SCALE: 1 1/2" = 1'-0"
 PROJECT NO. 606C
 10



HEATED STACK FLASHING
 SCALE: 1-1/2" = 1'-0"
 PROJECT NO. 606C
 7



PIPE PENETRATION AT CONC. DECK
 SCALE: 1-1/2" = 1'-0"
 PROJECT NO. 606C
 4



COUNTERFLASHING AT CONC. PARAPET
 SCALE: 1-1/2" = 1'-0"
 PROJECT NO. 606C
 1



| DATE | SYM | REVISION | BY | A/PD |
|----------|-----|----------------------------------|----|------|
| 02-21-13 | E | 100% FINAL DESIGN | | |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | | |
| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | | |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | | |

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
 DRYDEN FLIGHT RESEARCH CENTER
 EDWARDS, CA

APPROVALS

| NAME | DATE |
|-----------------|---------|
| Bar [Signature] | 2-28-13 |
| Bar [Signature] | 2-28-13 |
| [Signature] | 2/27/13 |
| [Signature] | 2-27-13 |
| [Signature] | 2-27-13 |

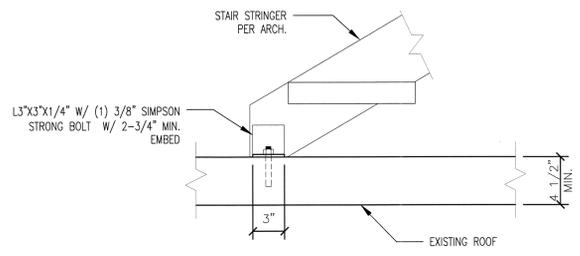
DRAWING TITLE
 ROOF DETAILS

PROJECT TITLE
 MISSION CONTROL
 INFRASTRUCTURE REVITALIZATION
 100% FINAL DESIGN

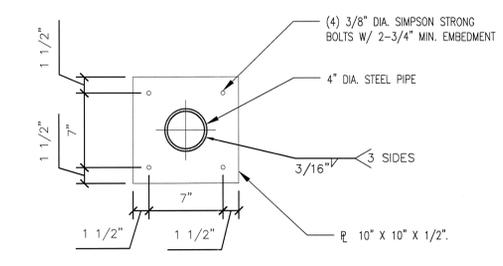
DATE START 04/20/2011 **DATE PRINT** 2/21/2013

DRAWN BY SK **TRADE** EDM-1715

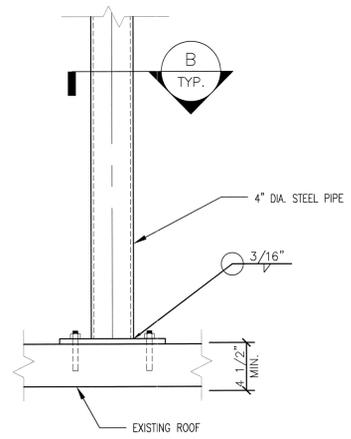
SCALE N.T.S. **FILE NAME** A-502.DWG **TRADE** A-502 **SHEET No.** 16 of 24



C CONNECTION AT STRINGER

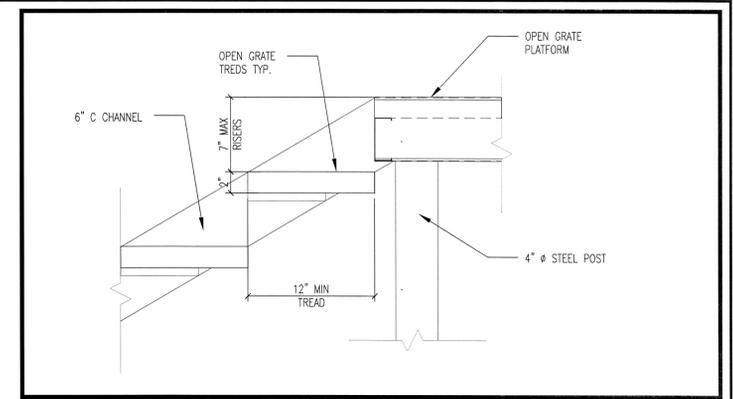


B BASE PLATE CONNECTION

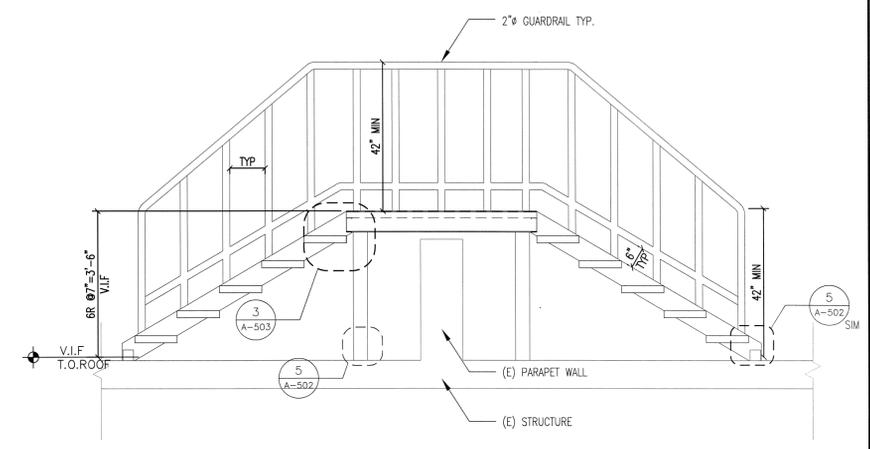


A CONNECTION AT STAIR POST

4 NEW STAIR CONNECTIONS
SCALE: 1-1/2" = 1'-0"



2 GALV. STEEL STAIR SECTION
SCALE: 1/2" = 1'-0"



1 ENLARGED GALV. STEEL STAIR PLAN
SCALE: 1/2" = 1'-0"



| DATE | SYM | REVISION | BY | A'PD |
|----------|-----|----------------------------------|----|------|
| 02-21-13 | E | 100% FINAL DESIGN | | |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | | |
| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | | |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | | |

| | | | | |
|---|------------|--|------------------------------------|---|
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS <small>Chief, Facilities Engineering & Asset Mgmt. Office</small> <small>Project Manager/Regional</small> <small>Facilities Project Manager</small> <small>Chief, Office of Protective Services</small> <small>Chief, Operations & Maintenance</small> <small>Chief, Information Officer</small> | | DATE 2-28-13 2-28-13 2/27/13 2-27-13 2/27/13 |
| DRAWING TITLE | | ROOF DETAILS | | |
| PROJECT TITLE | | MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | |
| DATE STRTD | 02/20/2011 | DATE PRNTD | 2/21/2013 | |
| DRAWN BY | SK | TRADE SH. NO. | EDM-1715 | |
| SCALE | N.T.S. | FILE NAME | A-503.DWG A-503 SHEET No. 17 of 24 | |

Structural Notes

GENERAL

- The Contractor shall verify all dimensions prior to starting construction. The Contracting Officer shall be notified of any discrepancies or inconsistencies.
- Structure noted in the drawings as existing shall be field verified by the contractor and any discrepancies noted shall be reported to the Contracting Officer.
- Do not scale the drawings.
- Typical details and schedules indicated may not be specifically referenced on the drawings. The contractor is responsible to determine where each typical detail or schedule applies. If locations are found where no typical detail, typical schedule, or specific detail applies, notify the Contracting Officer.
- All work shall conform to the minimum standards of following codes:

The 2010 edition of the California Building Code, and other regulating agencies which have authority over any portion of the work, and those codes and standard listed in these notes and in the project specifications.
- See the architectural drawings for the following: details, dimensions not shown on the structural drawings, ceiling assemblies.
- See mechanical and electrical drawings for the following: Pipes, hangers, duct penetration etc., except as shown or noted size and location of machine or equipment bases and anchor bolts for mounts.
- For mechanical and electrical equipment anchorage to be designed by others, see CBC 2010. Use isolators, fasteners and bracing approved by ICC capable of transmitting code required lateral loads. Secure suspended equipment with lateral bracing.
- For piping and ductwork bracing to be designed by others, see the latest edition of "Guidelines for Seismic Restraints of Mechanical Systems" by the Sheet Metal and Air Conditioning Contractors National Association.
- The contract Structural drawings and specifications represent the finished structure. They do not indicate the method of construction. Contractor to provide construction means, methods, techniques, sequences and procedures as required. Contractor to provide adequate, shoring, bracing and erection procedures complying with national, state and local safety ordinances. The Contractor shall provide all measures necessary to protect the structure during construction. Such measures shall include, but not be limited to: bracing and shoring for loads due to wind or seismic forces, construction equipment, etc.

- Observation visits (site visits) by representatives of Contracting Officer do not include inspection of construction means and methods. Site visits during construction are not continuous and detailed inspection services which are to be performed by others. Observations are performed solely for the purpose of determining if the Contractor understands design intent shown in the contract drawings. Observations do not guarantee Contractor's performance and are not to be construed as supervision or verification of construction.
- Notify the Contracting Officer when drawings by others show openings, pockets, etc., not shown on the structural drawings, but which are located in the structural members.
- Design Loads:

A. Other Loads:
selfweight of mechanical equipment.
- CBC Lateral Loads

Internal Wind pressure = 5 psf

Seismic:
Soil site class: = C

Seismic coefficients:
S_s = 0.871
S₁ = 0.406
F_a = 1.05
F_v = 1.39

Design Spectral Acceleration Parameters:
SD_s = 0.611
SD₁ = 0.377

Importance Factor:
I_e = 1.25
I_p = 1.0 (Component Importance Factor)

Seismic Design Category = D

DEFERRED SUBMITTALS

Deferred submittal item calculations and plans shall bear the wet ink signature of the engineer responsible for their preparation and shall bear the shop drawing review stamp or other notation of review by the Contracting Officer.

The following items will have deferred submittals:

- Connections and bracing of sprinkler system piping: Provide design in accordance with applicable codes, sealed by a structural engineer registered in the state of California.

Concrete

- All aspects of work pertaining to the concrete construction shall be in accordance with ACI 318-08, 'Building Code Requirements for Structural Concrete' and the latest edition of 'Specifications for Structural Concrete for Buildings', ACI 301, with modifications as noted on the project drawings and/or specifications.
- Fly ash may be used in concrete mixes. The fly ash shall conform to ASTM C618 Class F. The loss of ignition shall be limited to 2%. The addition rate for fly ash shall be limited to 25% of the cement weight. The contractor shall submit all certificates showing the fly ash is in accordance with the above criteria.
- Do not use concrete or grout containing chlorides.
- All concrete exposed to freeze - thaw cycles shall contain 6% +/- 1% of entrained air.
- Hard rock concrete - aggregate shall conform to all requirements and tests of ASTM C33 and project specifications. Exceptions may be used only with approval of the Contracting Officer. Provide concrete mix design with proven shrinkage characteristics of less than 0.0005 inches/inch.
- Structural concrete 28-day strengths & types are as follows:

| Location of Concrete | Strength, psi | Type |
|----------------------|---------------|-----------|
| Mechanical pads | 4000 | Hard Rock |
| Grout | 7000 | |
- The modulus of elasticity of concrete, shall be tested in accordance with ASTM C469 for framed concrete slabs and beams and shall be at least the value given by the equations in section 8.5.1 of ACI 318 for the specified concrete 28-day strength.
- Concrete mixing operations, etc., shall be in accordance with ASTM C94.

- Concrete placement shall be in accordance with ACI standard 304 and project specifications. Provide keys in construction joints unless detailed otherwise. Thoroughly clean, remove laitance and thoroughly wet and remove standing water in construction joints before placing new concrete. At vertical joints, slush with a coat of neat cement before placing new concrete.
- Roughen concrete surface to a full amplitude of 1/4 inch where new concrete interfaces with existing concrete.
- Clear coverage of concrete over reinforcing bars shall be as follows:

| Location of Concrete | Minimum Concrete Cover |
|---|------------------------|
| Concrete cast against and permanently exposed to earth | 3" |
| Concrete exposed to earth or weather: #6 through #18 bar #5 bar and smaller | 2" 1 1/2" |
| Concrete not exposed to weather or in contact with ground, UNO: Slabs: #14 and #18 bar. #11 bar and smaller. | 1 1/2" 3/4" |
| Slab on grade: | 2" clear from top |
- Prior to concrete placement, all reinforcing bars, anchor bolts and other concrete inserts shall be well secured in position.
- Maintain concrete above 50 degrees Fahrenheit and in a moist condition for a minimum of 7 days after placement unless otherwise accepted by Contracting Officer.

Structural Steel

1. STRUCTURAL STEEL

- Designing, detailing, fabrication, and erection of structural steel shall be in accordance with the American Institute of Steel Construction (latest edition and supplements).
- Structural steel shall comply to ASTM Standard A992. Angles, plates and bars shall comply to ASTM Standard A36, unless noted otherwise.
- The structural steel fabricator shall furnish shop drawings of all structural steel for Contracting Officer review and approve before fabrication.
- Steel not exposed to weather: Prepare prime and paint as per section 05 5000 of the specifications.

2. STRUCTURAL STEEL WELDING

- All welding shall comply to the American Welding Society Standard (AWS D1.1). All welded joints shall be detailed as indicated by the prequalified joint details in the Structural Steel Specification.
- Weld lengths called for on plans are the net effective length required. Weld size shall be AISC minimum unless a larger size is noted. All welds shall use minimum E70XX electrodes.
- Welding tests and inspections, see specifications.

3. STRUCTURAL STEEL BOLTING

- Bolts: shall conform to ASTM A325-N, except anchor bolts which shall conform to ASTM A307, GRADE 'A', unless noted otherwise.
- Bolt holes in steel shall be 1/16 inch larger than nominal size of bolt used, except anchor bolt holes.
- Except as subsequently noted, high strength bolts need not be tightened beyond the snug-tight condition, as defined in section 8.(c) of the specifications for structural joints using ASTM A325 or A490 Bolts. For connections subject to direct tension, connections for braced frames, and other connections shown or noted on the plans as SC (slip critical) or fully tensioned, bolts shall be tightened by one of the methods described in section 8.(c) and to the minimum tension specified in section 8.(d), Table 4.

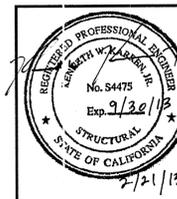
Reinforcing Steel (for Concrete and Masonry)

- All reinforcing steel shall be detailed and placed in accordance with the 'Building Code Requirements for Reinforced Concrete' (ACI 318-08) and the 'Manual of Standard Practice for Reinforced Concrete Construction' by CRSI and WCRSI as modified by the project drawings and specifications.
- Deformed reinforcing bars shall conform to the requirements of ASTM A615 grade 60 and ASTM A706 grade 60 for deformed weldable bars.
- Welding of reinforcing is permitted only where shown on the drawings or when approved by the Contracting Officer. Welding of reinforcing bars shall be with low hydrogen electrodes in accordance with the 'Recommended Practices for Welding Reinforcing Steel, Etc.', American Welding Society, AWS D1.4 and CBC section 1704.4.1 all reinforcing to be welded shall conform to ASTM A706 grade 60 u.n.o.
- All reinforcing bar bends shall be made cold.
- Lap splices shall be made only where shown on the structural drawings.
- All reinforcing bars shall be marked so their identification can be made when the final in-place inspection occurs.

Structural Legend

| | | | |
|--|---|--|------------------------------|
| | Slope Direction (down) | | Masonry (CMU) Wall |
| | Span Direction | | Concrete Wall |
| | Miscellaneous Elevation | | Earth |
| | Floor or Steel Elevation | | Existing Construction |
| | Number of Headed Shear Studs Required | | New Construction |
| | Rigid Connection | | Existing Construction |
| | Camber Up | | |
| | Indicates Size of Deformed Bar. Spacing Center to Center Direction in Which Bars Extend | | Section Cut |
| | Limits of Area Covered By Bars or Post Tension | | Elevation Reference |
| | Brace Up | | |
| | Braced Frame | | |
| | Brace Down | | |
| | Step in Foundation (Footing) | | Welding per AWS |
| | Change (Step) in Elevation | | Structural Steel per AISC |
| | Slip Critical Connection | | Symbols for Concrete per ACI |
| | Revision | | |
| | North | | |

NOTE: This is a master legend. Not all symbols are necessarily used on the drawings.



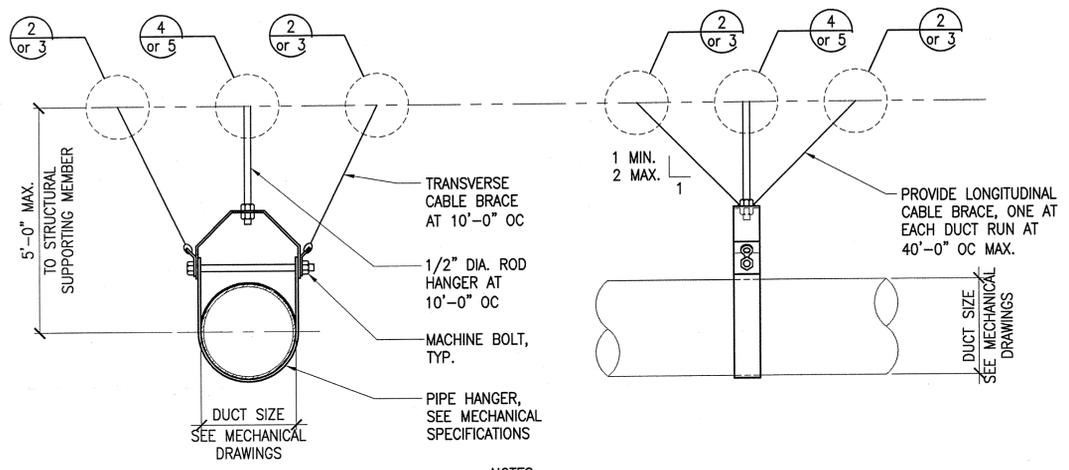
| DATE | SYM | REVISION | BY | A/PD |
|----------|-----|--------------------------------|----|------|
| 02-21-13 | C | 100% FINAL DESIGN | | |
| 01-07-13 | B | 95% NEAR-FINAL DESIGN | | |
| 06-08-12 | A | 30% DEVELOPED DESIGN SUBMITTAL | | |

| APPROVALS | | DATE | |
|-----------|---|-------------|------------|
| | Chief Facilities Engineering & Asset Mgmt. Office | 2-28-13 | |
| | Project Requestor/Customer | 2-28-13 | |
| | Facilities Project Manager | 2/27/13 | |
| | Chief, Office of Project Services | 2/27/13 | |
| | Chief, Safety, Health & Environmental Group | 2-27-13 | |
| | Chief, Cost Information Office | 2/27/13 | |
| DATE STRD | 10/24/2013 | DATE PRINTD | 02/21/2013 |
| DRAWN BY | REF | TRADE | EDM-1715 |
| SCALE | AS SHOWN | TRADE | |
| FILE NAME | 100% FINAL DESIGN | SHEET No. | 18 of 24 |

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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EDWARDS, CA

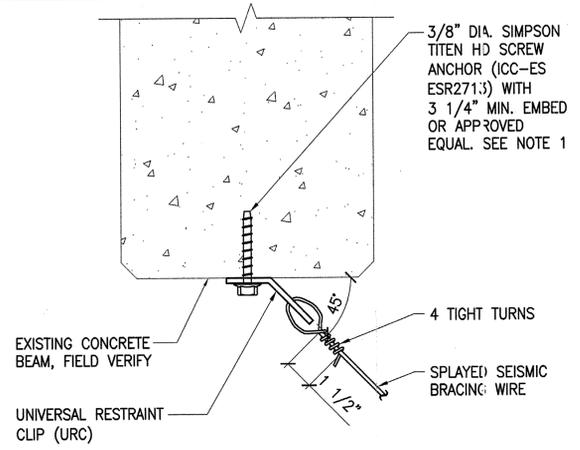
DRAWING TITLE
STRUCTURAL INFORMATION

PROJECT TITLE
MISSION CONTROL
INFRASTRUCTURE REVITALIZATION
100% FINAL DESIGN



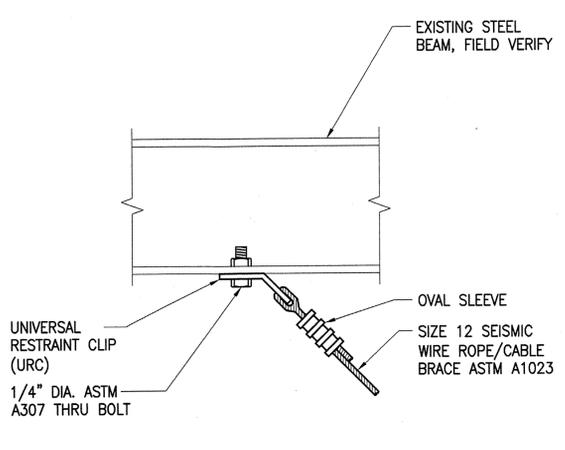
NOTES:
 1. Cable braces shall be size 12 seismic wire rope/cable ASTM A1023.
 2. See mechanical drawings for locations.

1 TYPICAL PIPE BRACING DETAIL Scale: 1 1/2"=1'-0"



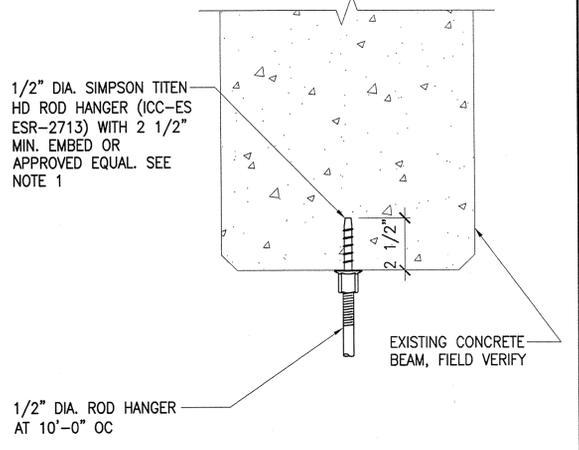
NOTES:
 1. Do not damage existing reinforcing.

2 SPLAYED SEISMIC BRACING WIRE ATTACHMENT Scale: 3"=1'-0"



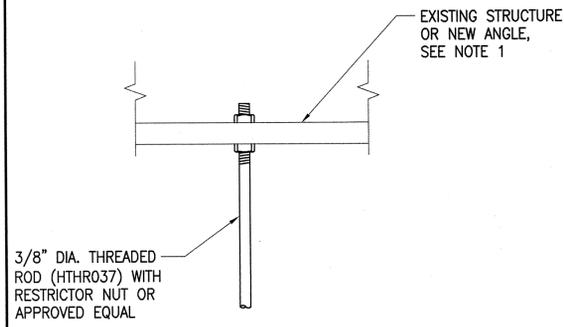
NOTES:
 1. Do not damage existing reinforcing.

3 SPLAYED SEISMIC BRACING WIRE ATTACHMENT Scale: 3"=1'-0"



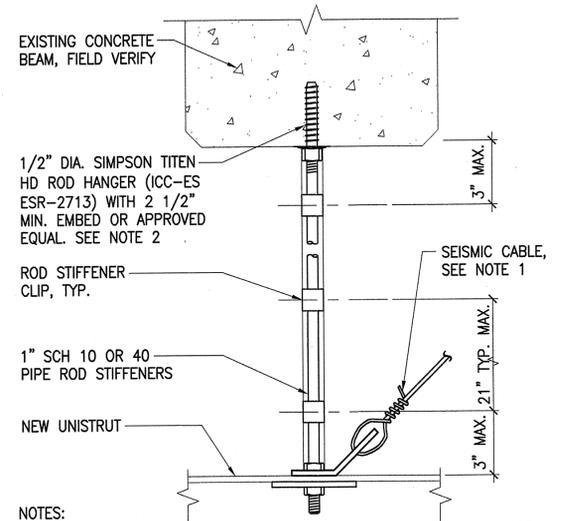
NOTES:
 1. Do not damage existing reinforcing.

4 PIPE HANGER TOP CONNECTION Scale: 3"=1'-0"



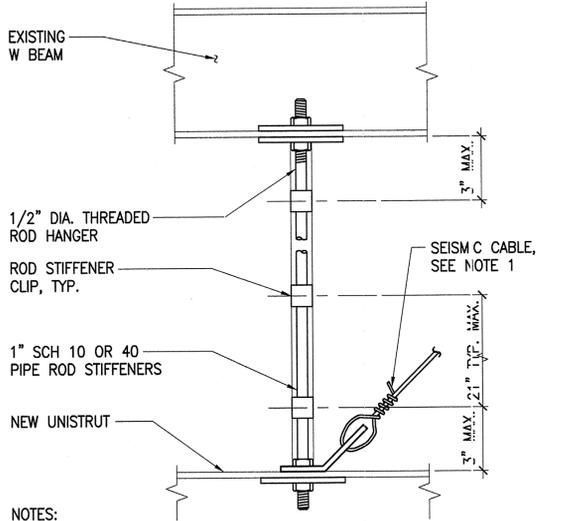
NOTES:
 1. See detail 10/- for connection of new angle to existing structure.

5 PIPE HANGER TOP CONNECTION Scale: 3"=1'-0"



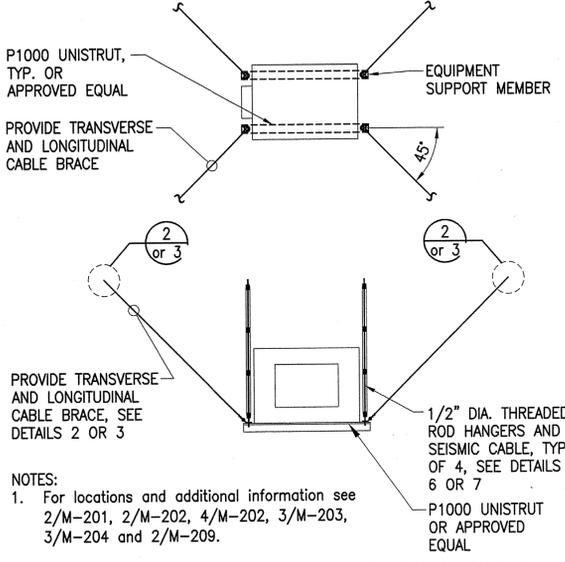
NOTES:
 1. Cable braces shall be size 12 seismic wire rope/cable ASTM A1023.
 2. Do not damage existing reinforcing.

6 UNIT ROD TOP CONNECTION AND STIFFENER Scale: 3"=1'-0"



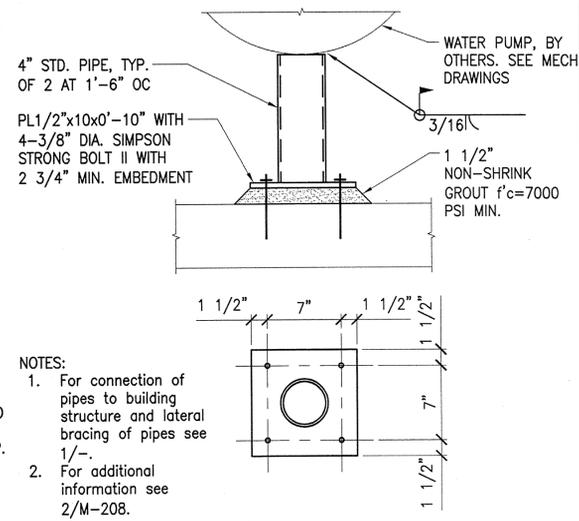
NOTES:
 1. Cable braces shall be size 12 seismic wire rope/cable ASTM A1023.

7 UNIT ROD TOP CONNECTION AND STIFFENER Scale: 3"=1'-0"



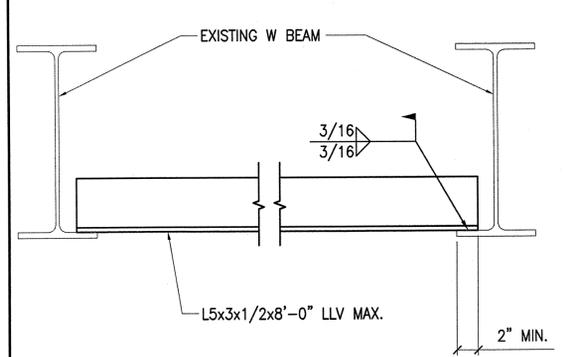
NOTES:
 1. For locations and additional information see 2/M-201, 2/M-202, 4/M-202, 3/M-203, 3/M-204 and 2/M-209.

8 TYPICAL VAV UNIT RIGID CONNECTION TO BUILDING STRUCTURE Scale: 3/4"=1'-0"

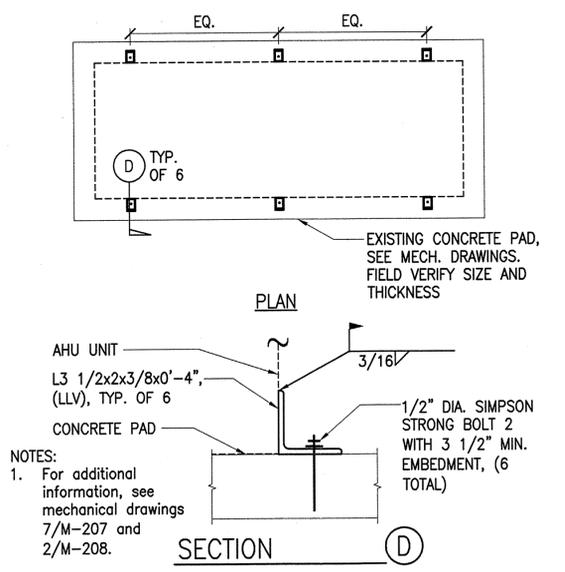


NOTES:
 1. For connection of pipes to building structure and lateral bracing of pipes see 1/-.
 2. For additional information see 2/M-208.

9 CONNECTION TO BUILDING STRUCTURE Scale: 1 1/2"=1'-0"

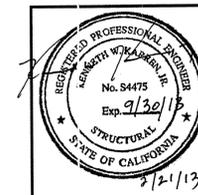


10 NEW ANGLE TO EXISTING STRUCTURE Scale: 1 1/2"=1'-0"



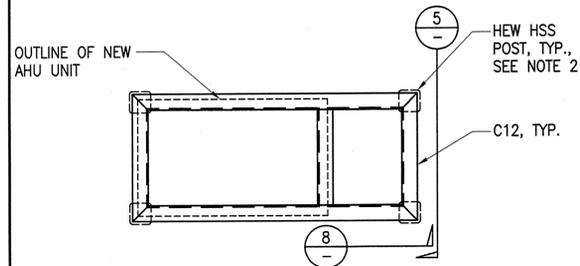
NOTES:
 1. For additional information, see mechanical drawings 7/M-207 and 2/M-208.

11 NEW AHU-A AND AHU-G CONNECTION TO STRUCTURE Scale: 1 1/2"=1'-0"



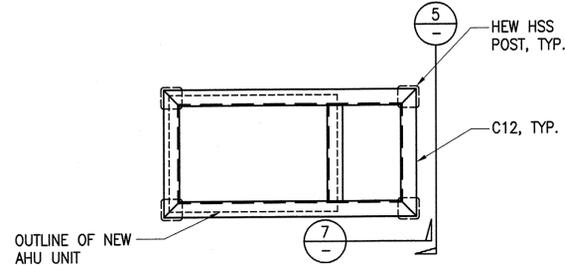
| DATE | SYM | REVISION | BY | A'PD |
|----------|-----|-----------------------|----|------|
| 02-21-13 | C | 100% FINAL DESIGN | | |
| 01-07-13 | B | 95% NEAR-FINAL DESIGN | | |

| | | | | |
|---|--|---|--|---|
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS Chief, Facilities Engineering & Agent Mgmt. Office Project Requirer/Customer Facilities Project Manager Chief, Office of Projective Services Chief, Safety Health & Environmental Office Design Information Officer | | DATE 2-28-13 2-28-13 9/27/13 2-27-13 2/27/13 |
| DRAWING TITLE STRUCTURAL SECTIONS AND DETAILS | | PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | DATE STRD 10/24/2012 DATE PRDVT 02/21/2013 |
| DRAWN BY RFB | | TRADE AS SHOWN | | SHEET No. 18 of 24 |
| SCALE 1/2"=1'-0" | | FILE NAME S-601.dwg | | EDM-1715 |



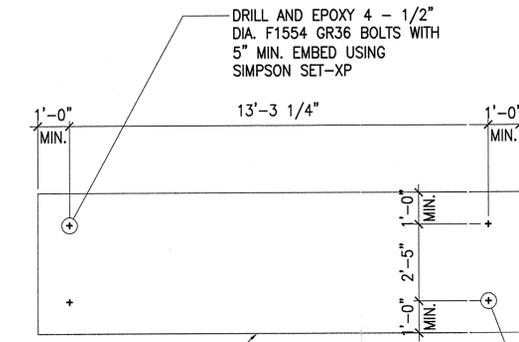
- NOTES:
- For location and additional information see 3/M-205.
 - Repair existing roof at all new HSS post penetrations, see architectural drawings.
 - See 2/S-603 for reinforcing around new openings in existing slab due to duct penetrations as required.

1 PLAN VIEW OF AHU-D ROOF CURB Scale: 3/4"=1'-0"



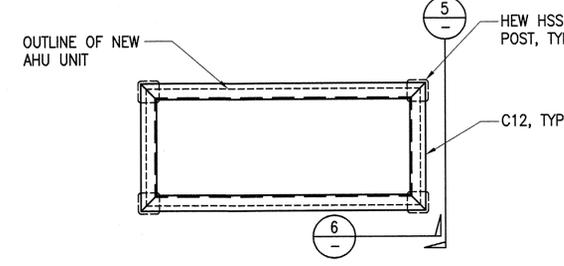
- NOTES:
- For location and additional information see 2/M-212.
 - Repair existing roof at all new HSS post penetrations, see architectural drawings.
 - See 2/S-603 for reinforcing around new openings in existing slab due to duct penetrations as required.

2 PLAN VIEW OF AHU-F ROOF CURB Scale: 3/4"=1'-0"



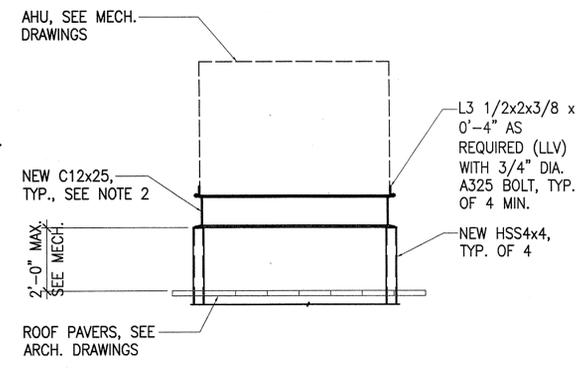
- NOTES:
- For location and additional information see 2/M-208.

3 TYP. CONNECTION OF NEW CHILLER TO EXISTING CONCRETE PAD Scale: 3/8"=1'-0"



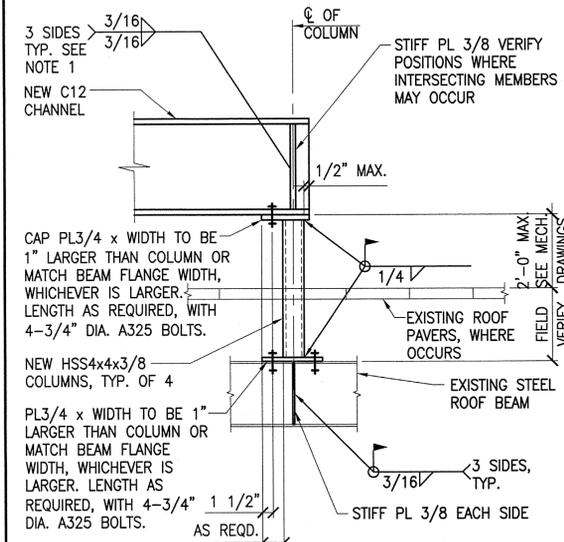
- NOTES:
- For location and additional information see 2/M-209.
 - Repair existing roof at all new HSS post penetrations, see architectural drawings.
 - See 1/S-603 for reinforcing around new openings in existing slab due to duct penetrations as required.

4 PLAN VIEW OF AHU-K ROOF CURB Scale: 3/4"=1'-0"

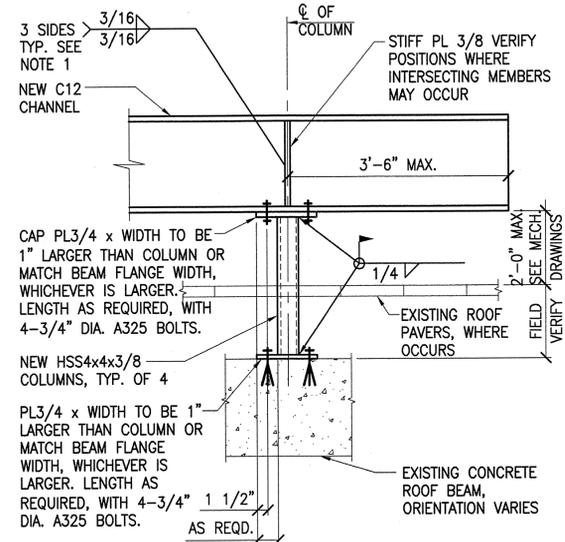


- NOTES:
- See details 6, 7, or 8/- for connection of new channels to roof structure.
 - See detail 12/- for connection of channel to channel.
 - For connection of steel angle to ahu see mech drawings typ.

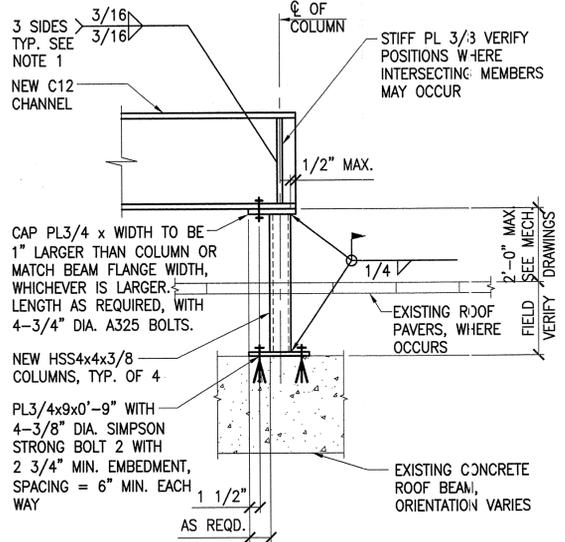
5 TYP. SECTION AT AHU ROOF CURB Scale: 3/8"=1'-0"



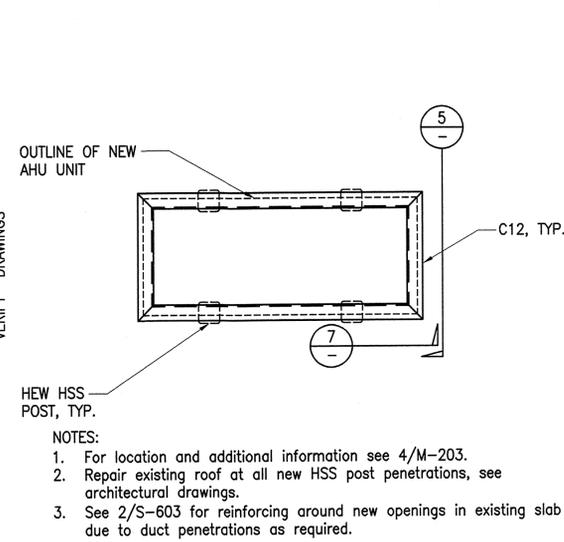
6 BEAM TO COLUMN Scale: 3/4"=1'-0"



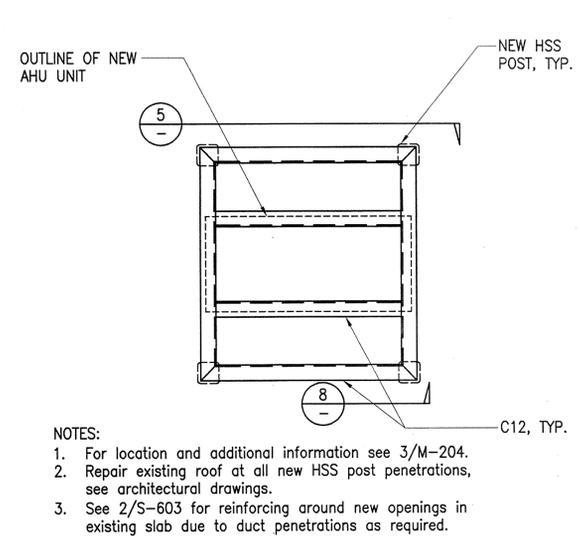
7 BEAM TO COLUMN Scale: 3/4"=1'-0"



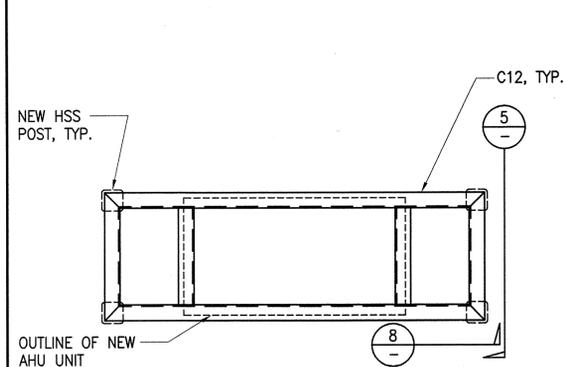
8 BEAM TO COLUMN Scale: 3/4"=1'-0"



9 PLAN VIEW OF AHU-C ROOF CURB Scale: 3/4"=1'-0"

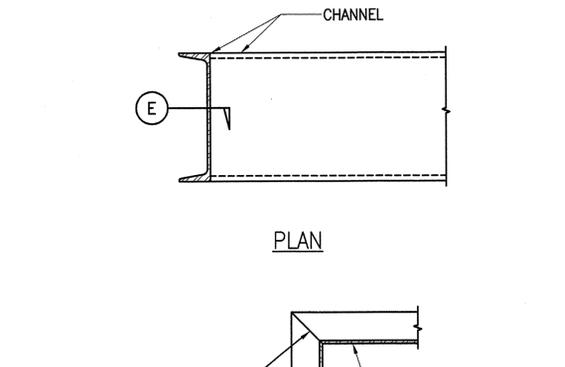


10 PLAN VIEW OF AHU-B ROOF CURB Scale: 3/4"=1'-0"

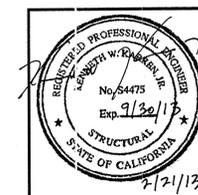


- NOTES:
- For location and additional information see 3/M-210.
 - Repair existing roof at all new HSS post penetrations, see architectural drawings.
 - See 2/S-603 for reinforcing around new openings in existing slab due to duct penetrations as required.

11 PLAN VIEW OF AHU-J ROOF CURB Scale: 3/4"=1'-0"

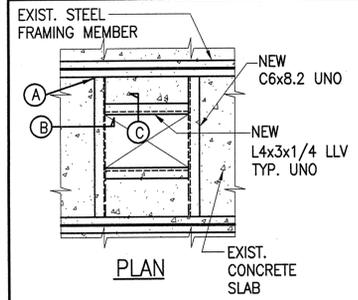


12 TYP. CHANNEL TO CHANNEL CONNECTION Scale: 1 1/2"=1'-0"

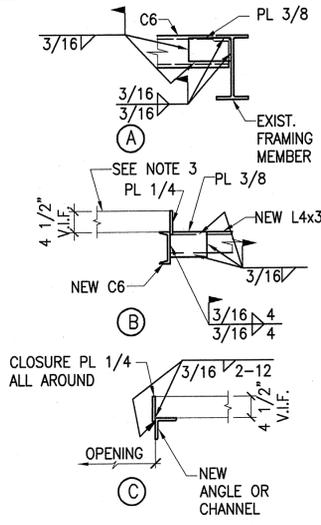


| DATE | SYM | REVISION | BY | A'PD |
|----------|-----|-----------------------|----|------|
| 02-21-13 | C | 100% FINAL DESIGN | | |
| 01-07-13 | B | 95% NEAR-FINAL DESIGN | | |

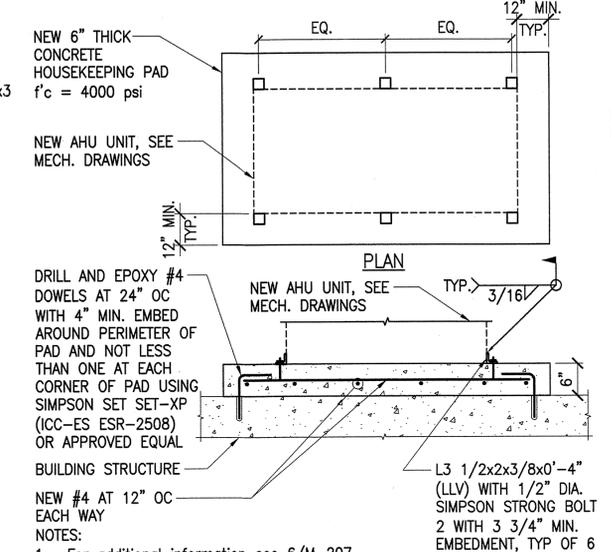
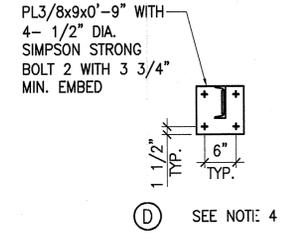
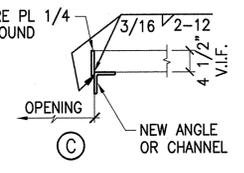
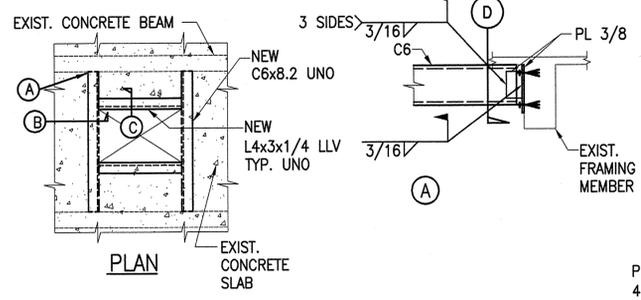
| | | | | | |
|---|--|--|--|--|---|
| | | NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS Chief, Facilities Engineering & Asset Mgmt. Office <i>[Signature]</i> Project Requestor/Contractor <i>[Signature]</i> Facilities Project Manager <i>[Signature]</i> Chief, Office of Protective Services <i>[Signature]</i> Chief, Safety, Health & Environmental Office <i>[Signature]</i> Chief, Civil Information Office <i>[Signature]</i> | DATE 2-28-13 2-28-13 2/27/13 2-27-13 2/27/13 |
| DRAWING TITLE STRUCTURAL SECTIONS AND DETAILS | | | | DATE STRD 10/24/2012 DATE PRINTD 02/21/2013 | |
| PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | | | TRADE EDM-1715 | |
| SCALE AS SHOWN S-602.dwg | | TRADE S-602 | | SHEET No. 20 of 24 | |



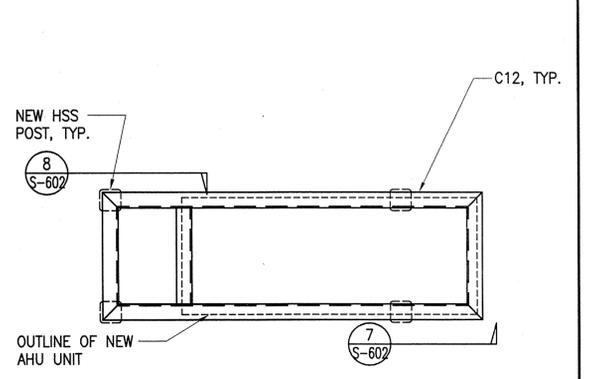
- Notes:
1. Details are similar where other steel sizes and shapes may be shown on the plans.
 2. Use this detail where long opening dimension exceeds 24" up to and including long opening dimension of 60".
 3. For roofing see architectural drawings.



- Notes:
1. Details are similar where other steel sizes and shapes may be shown on the plans.
 2. Use this detail where long opening dimension exceeds 24" up to and including long opening dimension of 60".
 3. For roofing see architectural drawings.
 4. Follow manufacturer's recommendations for post installed anchors. DO NOT DAMAGE existing reinforcing.



- Notes:
1. For additional information see 6/M-207.



- Notes:
1. For location and additional information see 3/M-206.
 2. Repair existing roof at all new HSS post penetrations, see architectural drawings.
 3. See 2/- for reinforcing around new openings in existing slab due to duct penetrations as required.

1 NEW OPENINGS IN EXISTING MEZZANINE LEVEL

Scale: 3/4"=1'-0"

2 NEW OPENINGS IN EXISTING CONCRETE ROOF

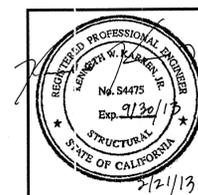
Scale: 3/4"=1'-0"

3 AHU-H HOUSEKEEPING PAD

Scale: 3/4"=1'-0"

4 PLAN VIEW OF AHU-E ROOF CURB

Scale: 3/4"=1'-0"



| DATE | SYM | REVISION | BY | A'PD |
|----------|-----|-------------------|----|------|
| 02-21-13 | C | 100% FINAL DESIGN | | |

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
 DRYDEN FLIGHT RESEARCH CENTER
 EDWARDS, CA

DRAWING TITLE
 STRUCTURAL SECTIONS AND DETAILS

PROJECT TITLE
 MISSION CONTROL
 INFRASTRUCTURE REVITALIZATION
 100% FINAL DESIGN

| APPROVALS | | DATE |
|--|--------------------|---------|
| Chief, Facilities Engineering & Asset Mgmt. Office | <i>[Signature]</i> | 2-28-13 |
| Project Requester/Customer | <i>[Signature]</i> | 2-28-13 |
| Facilities Project Manager | <i>[Signature]</i> | 2/27/13 |
| Chief, Office of Protective Services | <i>[Signature]</i> | 2/27/13 |
| Chief, Space Support & Services Office | <i>[Signature]</i> | 2/27/13 |
| Director, Information Office | <i>[Signature]</i> | 2/27/13 |

| | | | |
|------------|--------------------|-------------|--------------------|
| DATE STRTD | 10/14/2012 | DATE PRINTD | 02/25/2013 |
| DRAWN BY | REF | TRADE | EDM-1715 |
| SCALE | AS SHOWN | SH. No. | |
| FILE NAME | EDM-1715 S-603.dwg | S-603 | SHEET No. 21 of 24 |

CERTIFICATE OF COMPLIANCE and FIELD INSPECTION ENERGY CHECKLIST (Page 1 of 9) MECH-1C

PROJECT NAME: NASA Mission Control DATE: 1/23/2013 CLIMATE ZONE: 14
 PROJECT ADDRESS: Edwards Air Force Base CONDITIONED FLOOR AREA:
 Edwards Air Force Base

GENERAL INFORMATION

BUILDING TYPE: NONRESIDENTIAL HIGH RISE RESIDENTIAL HOTEL/MOTEL GUEST ROOM
 RELOCATABLE PUBLIC CONDITIONED SPACES UNCONDITIONED SPACES
 SCHOOLS (PUBLIC SCHOOLS) SCHOOL BLDG. SPACES

PHASE OF CONSTRUCTION: NEW CONSTRUCTION ADDITION ALTERATION
 APPROACH OF COMPLIANCE: COMPONENT OVERALL ENVELOPE UNCONDITIONED (FILE AFFIDAVIT) TOV ENERGY

FRONT ORIENTATION: N, E, S, W IN DEGREES:

| HVAC SYSTEM DETAILS | | FIELD INSPECTION ENERGY CHECKLIST | |
|--|-------------------------------|-----------------------------------|-------------------------------|
| EQUIPMENT | INSPECTION CRITERIA | MEETS CRITERIA OR REQUIREMENTS | PASS FAIL - DESCRIBE REASON 3 |
| ITEM OR SYSTEM TAGS (i.e. AC-1, RTU-1, HP-1) | AHU-A | | |
| EQUIPMENT TYPE | Air Handling Unit - hot water | | |
| NO. OF SYSTEMS | 6 | | |
| MAX ALLOWED HEATING CAPACITY | 200.5 MBH | | |
| MINIMUM HEATING EFFICIENCY | N/A | | |
| MAX ALLOWED COOLING CAPACITY | 242.3 MBH | | |
| COOLING EFFICIENCY | N/A | | |
| DUCT LOCATION / R-WALL | RS | | |
| WHEN DUCT TESTING IS REQD. | Yes | | |
| SUBMIT MECH 4-A & MECH-4-HERS | No | | |
| ECONOMIZER | Yes | | |
| THERMOSTAT | Yes | | |
| FAN CONTROL | Yes | | |

1. If the Actual installed equipment performance efficiency and capacity is less than the Proposed (from the energy compliance submitted or from the building plans) the responsible party shall resubmit energy compliance to include the new changes.
 2. For additional detailed discrepancy use Page 2 of the Inspection Checklist Form. Compliance Fails in a Fail box is checked.
 3. Indicate Equipment Type: Gasfired or Split, VAV, HP (Gas or Split), Hydronic, PFC, or other.

CERTIFICATE OF COMPLIANCE and FIELD INSPECTION ENERGY CHECKLIST (Page 2 of 9) MECH-1C

PROJECT NAME: NASA Mission Control DATE: 2/14/2010 CLIMATE ZONE: 14
 PROJECT ADDRESS: Edwards Air Force Base CONDITIONED FLOOR AREA:
 Edwards Air Force Base

GENERAL INFORMATION

BUILDING TYPE: NONRESIDENTIAL HIGH RISE RESIDENTIAL HOTEL/MOTEL GUEST ROOM
 RELOCATABLE PUBLIC CONDITIONED SPACES UNCONDITIONED SPACES
 SCHOOLS (PUBLIC SCHOOLS) SCHOOL BLDG. SPACES

PHASE OF CONSTRUCTION: NEW CONSTRUCTION ADDITION ALTERATION
 APPROACH OF COMPLIANCE: COMPONENT OVERALL ENVELOPE UNCONDITIONED (FILE AFFIDAVIT) TOV ENERGY

FRONT ORIENTATION: N, E, S, W IN DEGREES:

| HVAC SYSTEM DETAILS | | FIELD INSPECTION ENERGY CHECKLIST | |
|--|-------------------------------|-----------------------------------|-------------------------------|
| EQUIPMENT | INSPECTION CRITERIA | MEETS CRITERIA OR REQUIREMENTS | PASS FAIL - DESCRIBE REASON 3 |
| ITEM OR SYSTEM TAGS (i.e. AC-1, RTU-1, HP-1) | AHU-C | | |
| EQUIPMENT TYPE | Air Handling Unit - hot water | | |
| NO. OF SYSTEMS | 6 | | |
| MAX ALLOWED HEATING CAPACITY | 103.9 MBH | | |
| MINIMUM HEATING EFFICIENCY | N/A | | |
| MAX ALLOWED COOLING CAPACITY | 153.3 MBH | | |
| COOLING EFFICIENCY | N/A | | |
| DUCT LOCATION / R-WALL | RS | | |
| WHEN DUCT TESTING IS REQD. | Yes | | |
| SUBMIT MECH 4-A & MECH-4-HERS | No | | |
| ECONOMIZER | Yes | | |
| THERMOSTAT | Yes | | |
| FAN CONTROL | Yes | | |

1. If the Actual installed equipment performance efficiency and capacity is less than the Proposed (from the energy compliance submitted or from the building plans) the responsible party shall resubmit energy compliance to include the new changes.
 2. For additional detailed discrepancy use Page 2 of the Inspection Checklist Form. Compliance Fails in a Fail box is checked.
 3. Indicate Equipment Type: Gasfired or Split, VAV, HP (Gas or Split), Hydronic, PFC, or other.

CERTIFICATE OF COMPLIANCE and FIELD INSPECTION ENERGY CHECKLIST (Page 3 of 9) MECH-1C

PROJECT NAME: NASA Mission Control DATE: 2/14/2010 CLIMATE ZONE: 14
 PROJECT ADDRESS: Edwards Air Force Base CONDITIONED FLOOR AREA:
 Edwards Air Force Base

GENERAL INFORMATION

BUILDING TYPE: NONRESIDENTIAL HIGH RISE RESIDENTIAL HOTEL/MOTEL GUEST ROOM
 RELOCATABLE PUBLIC CONDITIONED SPACES UNCONDITIONED SPACES
 SCHOOLS (PUBLIC SCHOOLS) SCHOOL BLDG. SPACES

PHASE OF CONSTRUCTION: NEW CONSTRUCTION ADDITION ALTERATION
 APPROACH OF COMPLIANCE: COMPONENT OVERALL ENVELOPE UNCONDITIONED (FILE AFFIDAVIT) TOV ENERGY

FRONT ORIENTATION: N, E, S, W IN DEGREES:

| HVAC SYSTEM DETAILS | | FIELD INSPECTION ENERGY CHECKLIST | |
|--|-------------------------------|-----------------------------------|-------------------------------|
| EQUIPMENT | INSPECTION CRITERIA | MEETS CRITERIA OR REQUIREMENTS | PASS FAIL - DESCRIBE REASON 3 |
| ITEM OR SYSTEM TAGS (i.e. AC-1, RTU-1, HP-1) | AHU-H | | |
| EQUIPMENT TYPE | Air Handling Unit - hot water | | |
| NO. OF SYSTEMS | 6 | | |
| MAX ALLOWED HEATING CAPACITY | 233.9 MBH | | |
| MINIMUM HEATING EFFICIENCY | N/A | | |
| MAX ALLOWED COOLING CAPACITY | 318.2 MBH | | |
| COOLING EFFICIENCY | N/A | | |
| DUCT LOCATION / R-WALL | RS | | |
| WHEN DUCT TESTING IS REQD. | Yes | | |
| SUBMIT MECH 4-A & MECH-4-HERS | No | | |
| ECONOMIZER | Yes | | |
| THERMOSTAT | Yes | | |
| FAN CONTROL | Yes | | |

1. If the Actual installed equipment performance efficiency and capacity is less than the Proposed (from the energy compliance submitted or from the building plans) the responsible party shall resubmit energy compliance to include the new changes.
 2. For additional detailed discrepancy use Page 2 of the Inspection Checklist Form. Compliance Fails in a Fail box is checked.
 3. Indicate Equipment Type: Gasfired or Split, VAV, HP (Gas or Split), Hydronic, PFC, or other.

CERTIFICATE OF COMPLIANCE and FIELD INSPECTION ENERGY CHECKLIST (Page 4 of 9) MECH-1C

PROJECT NAME: NASA Mission Control DATE: 2/14/2010 CLIMATE ZONE: 14
 PROJECT ADDRESS: Edwards Air Force Base CONDITIONED FLOOR AREA:
 Edwards Air Force Base

GENERAL INFORMATION

BUILDING TYPE: NONRESIDENTIAL HIGH RISE RESIDENTIAL HOTEL/MOTEL GUEST ROOM
 RELOCATABLE PUBLIC CONDITIONED SPACES UNCONDITIONED SPACES
 SCHOOLS (PUBLIC SCHOOLS) SCHOOL BLDG. SPACES

PHASE OF CONSTRUCTION: NEW CONSTRUCTION ADDITION ALTERATION
 APPROACH OF COMPLIANCE: COMPONENT OVERALL ENVELOPE UNCONDITIONED (FILE AFFIDAVIT) TOV ENERGY

FRONT ORIENTATION: N, E, S, W IN DEGREES:

| HVAC SYSTEM DETAILS | | FIELD INSPECTION ENERGY CHECKLIST | |
|--|------------------------------|-----------------------------------|-------------------------------|
| EQUIPMENT | INSPECTION CRITERIA | MEETS CRITERIA OR REQUIREMENTS | PASS FAIL - DESCRIBE REASON 3 |
| ITEM OR SYSTEM TAGS (i.e. AC-1, RTU-1, HP-1) | AHU-D | | |
| EQUIPMENT TYPE | Air Handling Unit - gas heat | | |
| NO. OF SYSTEMS | 4 | | |
| MAX ALLOWED HEATING CAPACITY | 199.2 MBH | | |
| MINIMUM HEATING EFFICIENCY | 80% | | |
| MAX ALLOWED COOLING CAPACITY | 67.4 MBH | | |
| COOLING EFFICIENCY | N/A | | |
| DUCT LOCATION / R-WALL | RS | | |
| WHEN DUCT TESTING IS REQD. | Yes | | |
| SUBMIT MECH 4-A & MECH-4-HERS | No | | |
| ECONOMIZER | Yes | | |
| THERMOSTAT | Yes | | |
| FAN CONTROL | Yes | | |

1. If the Actual installed equipment performance efficiency and capacity is less than the Proposed (from the energy compliance submitted or from the building plans) the responsible party shall resubmit energy compliance to include the new changes.
 2. For additional detailed discrepancy use Page 2 of the Inspection Checklist Form. Compliance Fails in a Fail box is checked.
 3. Indicate Equipment Type: Gasfired or Split, VAV, HP (Gas or Split), Hydronic, PFC, or other.

CERTIFICATE OF COMPLIANCE and FIELD INSPECTION ENERGY CHECKLIST (Page 5 of 9) MECH-1C

PROJECT NAME: NASA Mission Control DATE: 2/14/2010 CLIMATE ZONE: 14
 PROJECT ADDRESS: Edwards Air Force Base CONDITIONED FLOOR AREA:
 Edwards Air Force Base

GENERAL INFORMATION

BUILDING TYPE: NONRESIDENTIAL HIGH RISE RESIDENTIAL HOTEL/MOTEL GUEST ROOM
 RELOCATABLE PUBLIC CONDITIONED SPACES UNCONDITIONED SPACES
 SCHOOLS (PUBLIC SCHOOLS) SCHOOL BLDG. SPACES

PHASE OF CONSTRUCTION: NEW CONSTRUCTION ADDITION ALTERATION
 APPROACH OF COMPLIANCE: COMPONENT OVERALL ENVELOPE UNCONDITIONED (FILE AFFIDAVIT) TOV ENERGY

FRONT ORIENTATION: N, E, S, W IN DEGREES:

| HVAC SYSTEM DETAILS | | FIELD INSPECTION ENERGY CHECKLIST | |
|--|------------------------------|-----------------------------------|-------------------------------|
| EQUIPMENT | INSPECTION CRITERIA | MEETS CRITERIA OR REQUIREMENTS | PASS FAIL - DESCRIBE REASON 3 |
| ITEM OR SYSTEM TAGS (i.e. AC-1, RTU-1, HP-1) | AHU-F | | |
| EQUIPMENT TYPE | Air Handling Unit - gas heat | | |
| NO. OF SYSTEMS | 4 | | |
| MAX ALLOWED HEATING CAPACITY | 59.36 MBH | | |
| MINIMUM HEATING EFFICIENCY | 80% | | |
| MAX ALLOWED COOLING CAPACITY | 64.9 MBH | | |
| COOLING EFFICIENCY | N/A | | |
| DUCT LOCATION / R-WALL | RS | | |
| WHEN DUCT TESTING IS REQD. | Yes | | |
| SUBMIT MECH 4-A & MECH-4-HERS | No | | |
| ECONOMIZER | Yes | | |
| THERMOSTAT | Yes | | |
| FAN CONTROL | Yes | | |

1. If the Actual installed equipment performance efficiency and capacity is less than the Proposed (from the energy compliance submitted or from the building plans) the responsible party shall resubmit energy compliance to include the new changes.
 2. For additional detailed discrepancy use Page 2 of the Inspection Checklist Form. Compliance Fails in a Fail box is checked.
 3. Indicate Equipment Type: Gasfired or Split, VAV, HP (Gas or Split), Hydronic, PFC, or other.

2008 Nonresidential Compliance Forms March 2010

CERTIFICATE OF COMPLIANCE and FIELD INSPECTION ENERGY CHECKLIST (Page 6 of 9) MECH-1C

PROJECT NAME: NASA Mission Control DATE: 1/23/2013
 PROJECT ADDRESS: NASA Mission Control

SPECIAL FEATURES INSPECTION CHECKLIST

Discrepancies:

CERTIFICATE OF COMPLIANCE and FIELD INSPECTION ENERGY CHECKLIST (Page 7 of 9) MECH-1C

PROJECT NAME: NASA Mission Control DATE: 1/23/2013
 PROJECT ADDRESS: NASA Mission Control

REQUIRED ACCEPTANCE TESTS

DESIGNER:
 This form is to be used by the designer and attached to the plans. Listed below are all the acceptance tests for mechanical systems. The designer is required to check the applicable boxes by all acceptable tests that apply and list all equipment descriptions and the number of systems. The NA number designated the Section in the Appendix of the Nonresidential reference appendices that requires an acceptance test. If all equipment of a certain type requires a test, list the equipment Reference Appendices Manual that describes the test. Since this form will be part of the plans, completion of this section will allow the responsible party to budget for the scope of work appropriately.

Enforcement Agency:
 Systems Acceptance. Before occupancy permit is granted for a newly constructed building or space, or a new space-conditioning system serving a building or space is operated for normal use, all control devices serving the building or space shall be certified as meeting the Acceptance requirements for Code Compliance.
 Systems Acceptance. Before occupancy permit is granted. All newly installed HVAC equipment must be tested using the Acceptance Requirements.
 The MECH-1C form is not considered a completed form and is not to be accepted by the building department unless the correct boxes are checked. The equipment requiring testing, person performing the test (Example: HVAC installer, TAB contractor, controls contractor, PE in charge of the project) and what Acceptance test must be conducted. The following checked-off forms are required for ALL newly installed equipment. In addition a Certificate of Acceptance forms shall be submitted to the building department that certifies plans, specifications, installation certificates, and operating and maintenance information meet the requirements of §10-103(b) and Title 24 part 6. The building inspector must receive properly filled out and signed forms before the building can receive final occupancy.

| Test Description | MECH-2A | MECH-3A | MECH-4A | MECH-5A | MECH-6A | MECH-7A | MECH-8A | MECH-9A | MECH-10A | MECH-11A |
|---|---------------------|------------------------------------|---------------------|----------------------|---------------------|------------|---------------|--------------------|-------------------|------------------|
| | Outdoor Ventilation | Constant Volume & Air Distribution | Single-Zone Control | Distribution Control | Control Ventilation | Supply Fan | Valve Leakage | Supply Water Temp. | Var. Flow Control | Demand Automatic |
| Equipment requiring Testing or Verification | # of Units | WAV & DCV | Units | Units | Units | WAV | Test | Reest | Control | Shed Control |
| AHU-A | X | | | | | X | X | | | |
| AHU-B | X | | | | | X | X | | | |
| AHU-C | X | | | | | X | X | | | |
| AHU-D | X | | | | | X | X | | | |
| AHU-E | X | | | | | X | X | | | |
| AHU-F | X | | | | | X | X | | | |
| AHU-G | X | | | | | X | X | | | |
| AHU-H | X | | | | | X | X | | | |
| AHU-I | X | | | | | X | X | | | |
| AHU-J | X | | | | | X | X | | | |
| AHU-K | X | | | | | X | X | | | |
| CH-1 | | | | | | | | | X | |
| CH-2 | | | | | | | | | X | |

2008 Nonresidential Compliance Forms August 2008

CERTIFICATE OF COMPLIANCE and FIELD INSPECTION ENERGY CHECKLIST (Page 8 of 9) MECH-1C

PROJECT NAME: NASA Mission Control DATE: 1/23/2013
 PROJECT ADDRESS: NASA Mission Control

REQUIRED ACCEPTANCE TESTS

DESIGNER:
 This form is to be used by the designer and attached to the plans. Listed below are all the acceptance tests for mechanical systems. The designer is required to check the applicable boxes by all acceptable tests that apply and list all equipment descriptions and the number of systems. The NA number designated the Section in the Appendix of the Nonresidential reference appendices that requires an acceptance test. If all equipment of a certain type requires a test, list the equipment Reference Appendices Manual that describes the test. Since this form will be part of the plans, completion of this section will allow the responsible party to budget for the scope of work appropriately.

Enforcement Agency:
 Systems Acceptance. Before occupancy permit is granted for a newly constructed building or space, or a new space-conditioning system serving a building or space is operated for normal use, all control devices serving the building or space shall be certified as meeting the Acceptance requirements for Code Compliance.
 Systems Acceptance. Before occupancy permit is granted. All newly installed HVAC equipment must be tested using the Acceptance Requirements.
 The MECH-1C form is not considered a completed form and is not to be accepted by the building department unless the correct boxes are checked. The equipment requiring testing, person performing the test (Example: HVAC installer, TAB contractor, controls contractor, PE in charge of the project) and what Acceptance test must be conducted. The following checked-off forms are required for ALL newly installed equipment. In addition a Certificate of Acceptance forms shall be submitted to the building department that certifies plans, specifications, installation certificates, and operating and maintenance information meet the requirements of §10-103(b) and Title 24 part 6. The building inspector must receive properly filled out and signed forms before the building can receive final occupancy.

| Test Description | MECH-12A | MECH-13A | MECH-14A | MECH-15A |
|---|--|--|----------------------------------|------------------------|
| | Fault Detection & Diagnostics for DX Units | Fault Detection & Diagnostics for Air & AC Systems | Distributed Energy Storage (DES) | Thermal Energy Storage |
| Equipment requiring Testing or Verification | # of Units | Units | Units | Units |
| AHU-A | X | | | |
| AHU-B | X | | | |
| AHU-C | X | | | |
| AHU-D | X | | | |
| AHU-E | X | | | |
| AHU-F | X | | | |
| AHU-G | X | | | |
| AHU-H | X | | | |
| AHU-I | X | | | |
| AHU-J | X | | | |
| AHU-K | X | | | |
| CH-1 | | X | X | |
| CH-2 | | X | X | |

2008 Nonresidential Compliance Forms August 2008

CERTIFICATE OF COMPLIANCE and FIELD INSPECTION ENERGY CHECKLIST (Page 9 of 9) MECH-1C

PROJECT NAME: NASA Mission Control DATE: 1/23/2013
 PROJECT ADDRESS: NASA Mission Control

Documentation Author's Declaration Statement
 I certify that this Certificate of Compliance Documentation is accurate and complete.
 Name: BRUCE TAYLOR Signature:
 Company: Henderson Engineers, Inc. Date:
 Address: 5656 REDWOOD ST., STE. 201 City/State/Zip: CA # 95118
 License # 705-697-2187 Phone: 705-697-2187

Principle Mechanical Designer's Declaration Statement
 I am eligible under Division 3 of the California Business and Professions Code to accept responsibility for the mechanical design.
 This Certificate of Compliance identifies the mechanical features and performance specifications required for compliance with Title 24, Parts 1 and 6 of the California Code of Regulations.
 The design features represented on this Certificate of Compliance are consistent with the information provided to document this design on the other applicable compliance forms, drawings, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
 Name: Signature:
 Company: Henderson Engineers, Inc. Date:
 License #
 City/State/Zip: Phone:

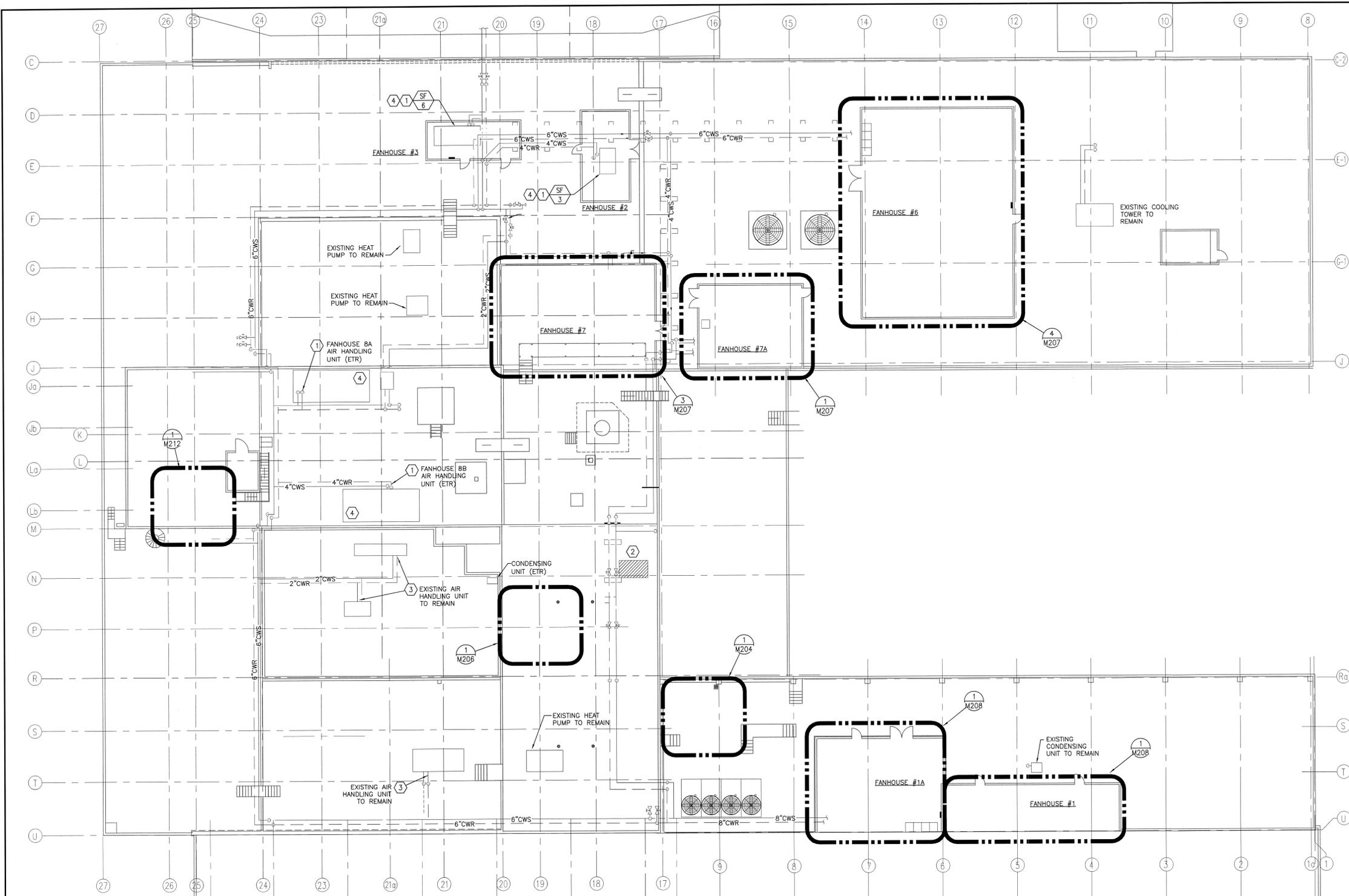
Mandatory Measures
 Indicate location on building plans of Note Book for Mandatory Measures:
Mechanical Compliance Forms & Worksheets (check box if worksheets is included)

MECH-1-C Certificate of Compliance. Required on plans for all submittals.
 MECH-2-C Mechanical Equipment Summary is required for all submittals.
 MECH-3-C Mechanical Ventilation and Relief is required for all submittals with mechanical ventilation.
 MECH-4-C Fan Power Consumption is required for all prescriptive submittals.

2008 Nonresidential Compliance Forms August 2008

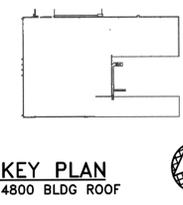
| | | |
|--|---------------------------|--|
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS DATE Chief, Facilities Engineering & Asset Mgmt. Office Requestor/Contractor Project Manager Chief, Office of Protective Services Chief, State & Community Engagement Office State Chief Information Officer |
| DRAWING TITLE TITLE 24 | | DATE STRTD: 02/21/13 DATE PRINTD: 02/21/13 |
| PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | DRAWN BY: HEI SCALE: AS SHOWN TRADE: M FILE NAME: EDM-1715 M-001.DWG SHEET No. 23 of 24 |
| 02-21-13 E 100% FINAL DESIGN 01-07-13 D 95% NEAR-FINAL DESIGN SUBMITTAL 10-27-12 C 60% DEVELOPED DESIGN SUBMITTAL 05-12-12 B 30% PRELIMINARY DESIGN SUBMITTAL | DATE SYM REVISION BY: APD | |





- DEMOLITION PLAN NOTES:**
- 1 DEMOLISH CHILLED WATER 3-WAY VALVE, AIR HANDLING UNIT PNEUMATIC CONTROLS AND ASSOCIATED COMPONENTS. CAP CHILLED WATER PIPING FOR RE-CONNECTION UNDER NEW WORK.
 - 2 DEMOLISH EXISTING AHU ON ROOF AND ALL ASSOCIATED ACCESSORIES AND EQUIPMENT. REMOVE EXISTING CURB. REPAIR ROOF AND MAINTAIN EXISTING ROOF PENETRATION FOR NEW WORK.
 - 3 DEMOLISH CHILLED WATER 3-WAY VALVE. CAP CHILLED WATER PIPING FOR RE-CONNECTION UNDER NEW WORK.
 - 4 DEMOLISH EXISTING PNEUMATIC OPERATED VENTILATION AIR DAMPER AND ASSOCIATED PIPING.

1 BUILDING 4800 MECHANICAL DEMOLITION ROOF PLAN
 1/16" = 1'-0"

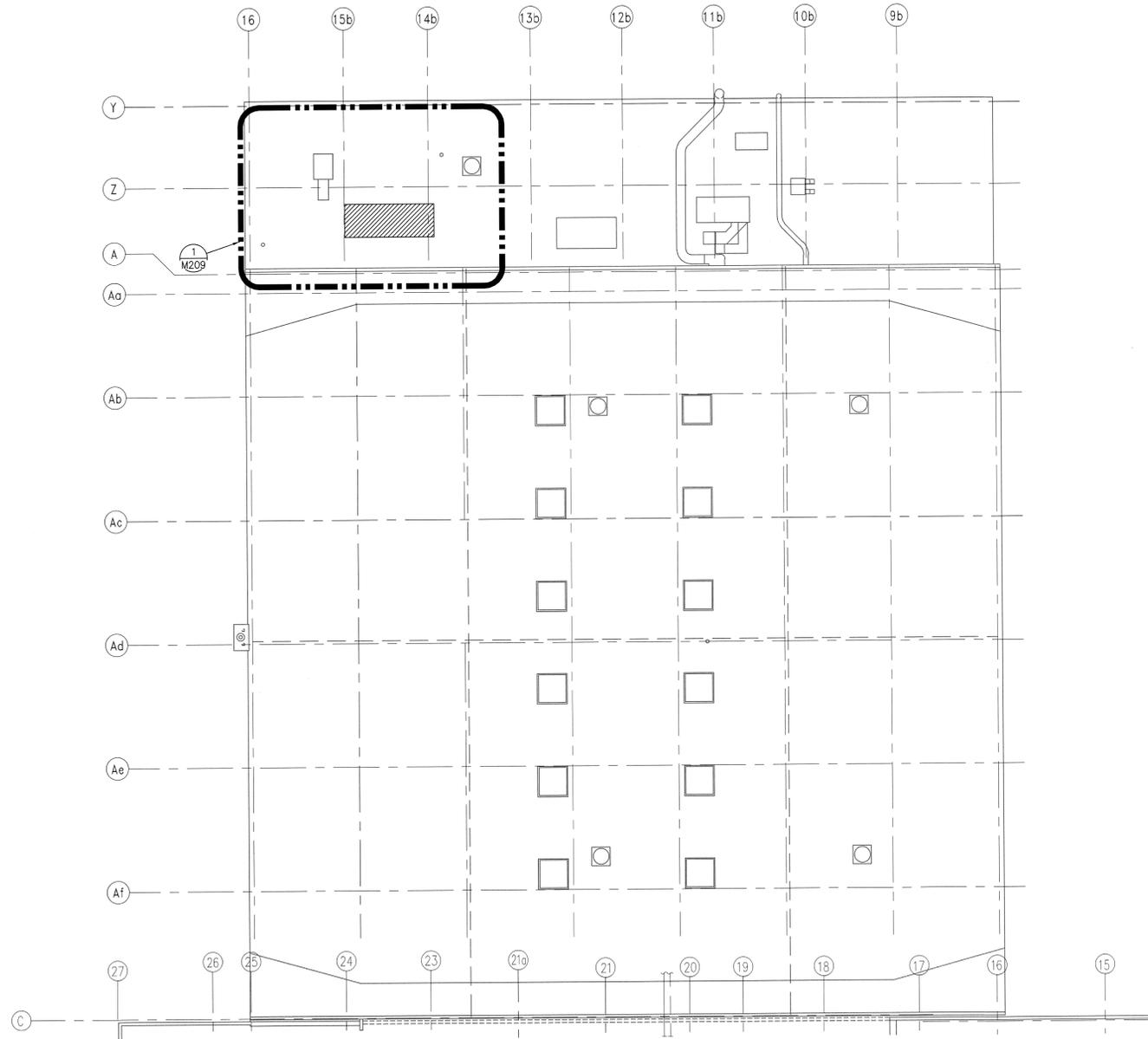


KEY PLAN
 4800 BLDG ROOF

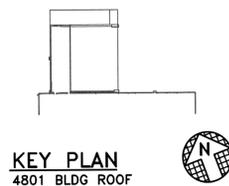
HENDERSON ENGINEERS
 5555 REDWOOD STREET, SUITE 201
 LAS VEGAS, NV 89118
 TEL 702.697.2187 FAX 702.697.2188
 www.hei-eng.com
 1150001704

| DATE | SYM | REVISION | BY | A/PD |
|----------|-----|----------------------------------|----|------|
| 02-21-13 | E | 100% FINAL DESIGN | | |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | | |
| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | | |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | | |

| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION | | APPROVALS | | DATE |
|---|-------------------------|--|---------|---------|
| DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | Chief, Facilities Engineering & Assgmt. Office | | 2-28-13 |
| DRAWING TITLE | | Project Requestor/Customer | | 2-28-13 |
| BUILDING 4800 MECHANICAL DEMOLITION ROOF PLAN | | Facilities Project Manager | | 2/27/13 |
| PROJECT TITLE | | Chief, Office of Proprietary Services | | 2/27/13 |
| MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | Chief, Surface Support & Maintenance Office | | 2-27-13 |
| | | Chief, Chief Information Officer | | 2/27/13 |
| DATE START | DATE PRINT | 02/21/2013 | | |
| DRAWN BY | HEI | EDM-1715 | | |
| SCALE | AS SHOWN | TRADE | NO. 101 | |
| FILE NAME | EDM-1715- MD-101.DWG | M/D | 101 | |
| SHEET No. 25 of 24 | | | | |



1 BUILDING 4801 MECHANICAL DEMOLITION ROOF PLAN
 1/16" = 1'-0"
 0 16' 32' 64'



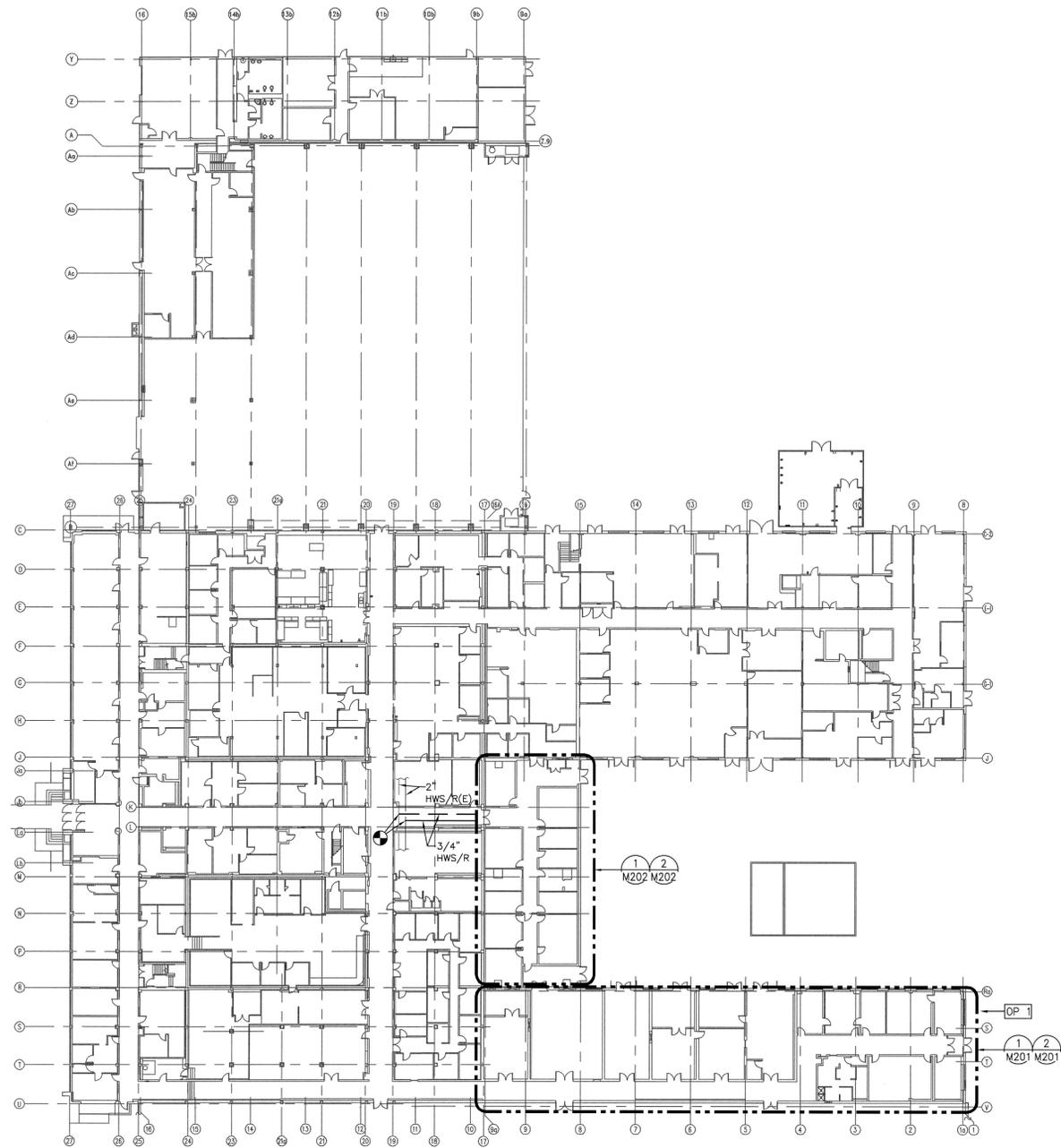
HENDERSON ENGINEERS
 5555 REDWOOD STREET, SUITE 201
 LAS VEGAS, NV 89118
 TEL 702 697 2187 FAX 702 697 2188
 www.hel-eng.com
 1150001704

| DATE | SYM | REVISION | BY | A/PD |
|----------|-----|----------------------------------|----|------|
| 02-21-13 | E | 100% FINAL DESIGN | | |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | | |
| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | | |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | | |

| | |
|--|--|
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | |
| DRAWING TITLE BUILDING 4801 MECHANICAL DEMOLITION ROOF PLAN | |
| PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | |

| APPROVALS | | DATE |
|--|--|---------|
| Chief, Facilities Engineering & Asset Mgmt. Office | | 2-28-13 |
| Project Manager | | 2-28-13 |
| Facilities Project Manager | | 2/27/13 |
| Chief, Office of Protective Services | | 2/27/13 |
| Chief, Safety, Health & Environmental Office | | 2-27-13 |
| Chief, Safety Information Office | | 2/27/13 |

| | | | |
|------------|---------------------|--------------------|------------|
| DATE STRTD | HEI | DATE PRNTD | 02/21/2013 |
| DRAWN BY | HEI | EDM-1715 | |
| SCALE | AS SHOWN | TRACE SH. No. | MD 102 |
| FILE NAME | EDM-1715 MD-102.DWG | SHEET No. 26 of 24 | |



1 OVERALL MECHANICAL FIRST FLOOR PLAN
 1/32" = 1'-0"



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 TEL 702.697.2187 FAX 702.697.2188
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 1150001204

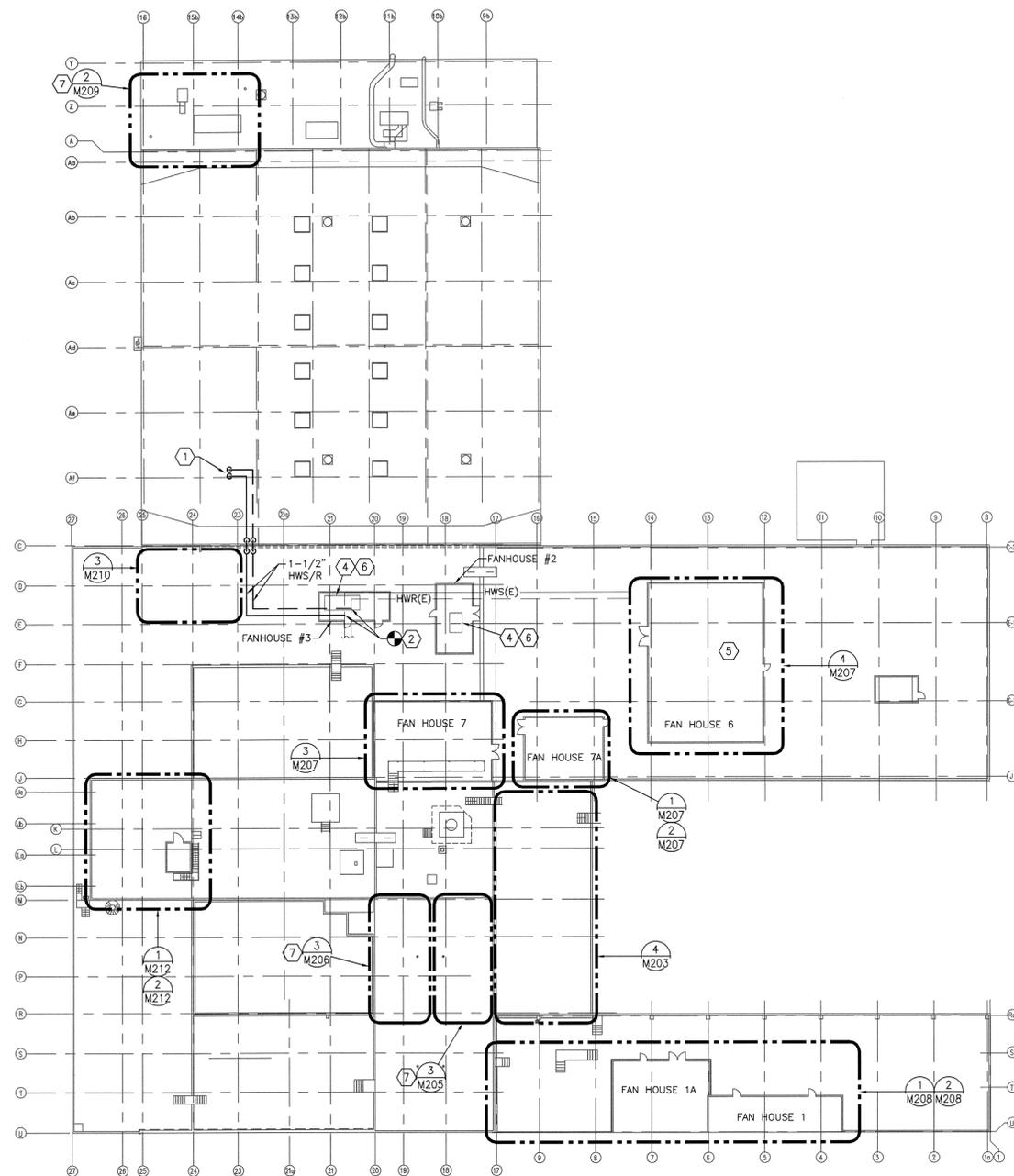
| DATE | SYM | REVISION | BY | A'PD |
|----------|-----|----------------------------------|----|------|
| 02-21-13 | E | 100% FINAL DESIGN | | |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | | |
| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | | |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | | |

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
 DRYDEN FLIGHT RESEARCH CENTER
 EDWARDS, CA

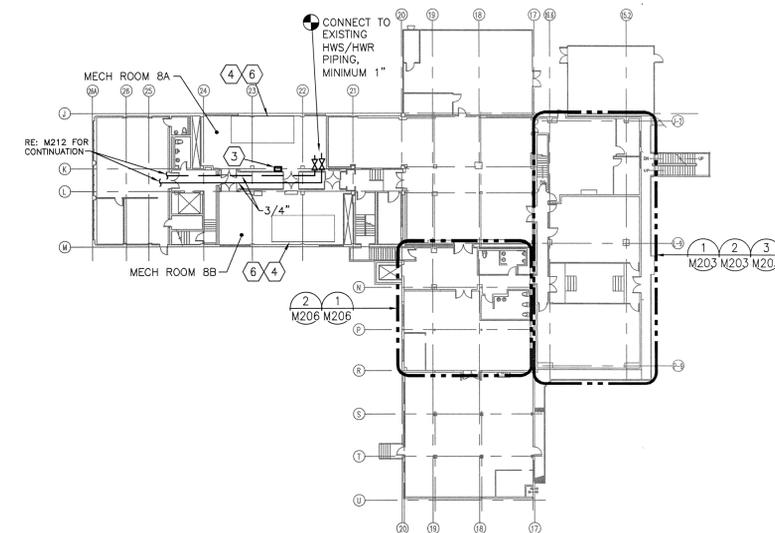
DRAWING TITLE
OVERALL FIRST FLOOR MECHANICAL PLAN

PROJECT TITLE
 MISSION CONTROL
 INFRASTRUCTURE REVITALIZATION
 100% FINAL DESIGN

| APPROVALS | | DATE |
|--|-----------------------|------------------------|
| Chief, Facilities Engineering & Asset Mgmt. Office | <i>[Signature]</i> | 2-28-13 |
| Project Manager/Engineer | <i>[Signature]</i> | 2-28-13 |
| Facilities Project Manager | <i>[Signature]</i> | 2-27-13 |
| Chief, Office of Protective Services | <i>[Signature]</i> | 2-27-13 |
| Chief, Safety/Security/Program Support Office | <i>[Signature]</i> | 2-27-13 |
| AFRC Chief Information Officer | <i>[Signature]</i> | 2/27/13 |
| DATE STRTD | DATE PRNTD | 02/21/2013 |
| DRAWN BY | HEI | EDM-1715 |
| SCALE | AS SHOWN | M |
| FILE NAME | EDM-1715 M-101.DWG | 101 SHEET No. 22 of 24 |



2 OVERALL ROOF MECHANICAL PLAN
 1/32" = 1'-0"
 0 32' 64' 128'

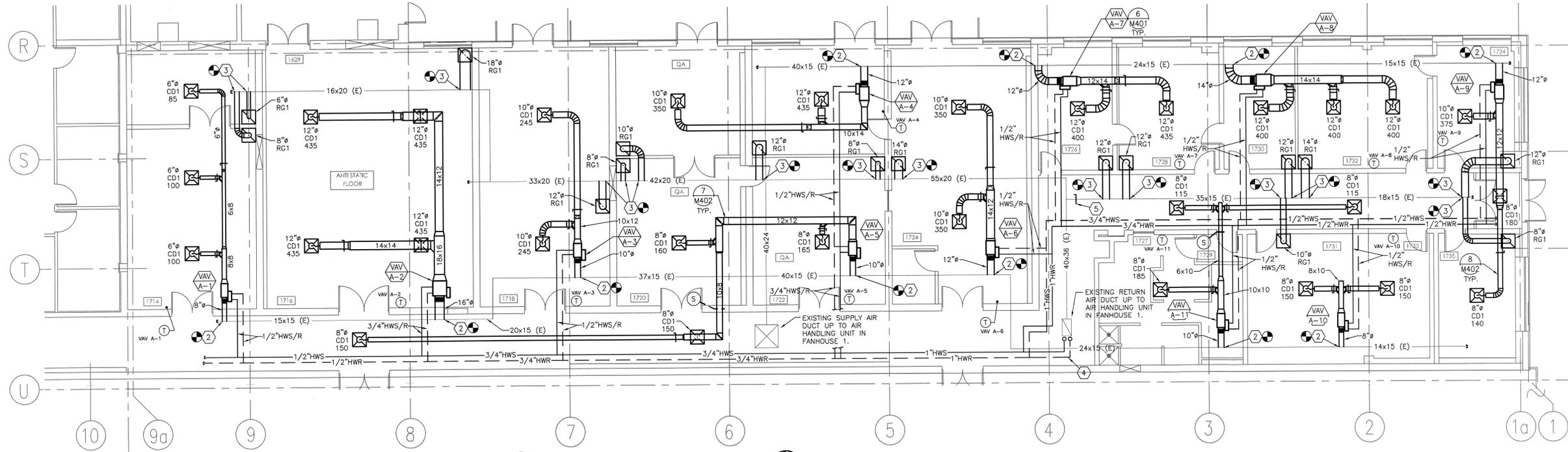


1 OVERALL THIRD FLOOR MECHANICAL PLAN
 1/32" = 1'-0"
 0 32' 64' 128'

- MECHANICAL PLAN NOTES:**
- 1 1-1/2" HOT WATER SUPPLY AND RETURN DOWN TO SERVE MEZZANINE OFFICES. REFER TO 2/M209 FOR CONTINUATION.
 - 2 CONNECT NEW 1-1/2" HEATING HOT WATER SUPPLY AND RETURN PIPE. VERIFY CONNECTION POINT AND EXISTING PIPE SIZE.
 - 3 MOUNT SIEMENS CONTROL BOX FOR AHU-F ON WALL.
 - 4 PROVIDE NEW CHILLED WATER 2-WAY VALVE FOR EXISTING AIR HANDLING UNIT.
 - 5 REPLACE SIEMENS MODULAR BUILDING CONTROLLER (MBC) IN FAN HOUSE 6 WITH NEW. COORDINATE LOCATION AND REQUIREMENTS WITH THE GOVERNMENT.
 - 6 PROVIDE NEW DDC CONTROLLER AND AN ELECTRONIC ACTUATED VENTILATION DAMPER TO SERVE THE EXISTING AIR HANDLING UNIT.
 - 7 PRIOR TO INSTALLATION OF NEW GAS PIPING TO AIR HANDLING UNITS, VERIFY EXISTING GAS EARTHQUAKE VALVE IS IN PROPER WORKING ORDER. PROVIDE NEW GAS EARTHQUAKE VALVE ON GAS SERVICE RISER DOWNSTREAM OF BUILDING SHUT-OFF VALVE IF NECESSARY.

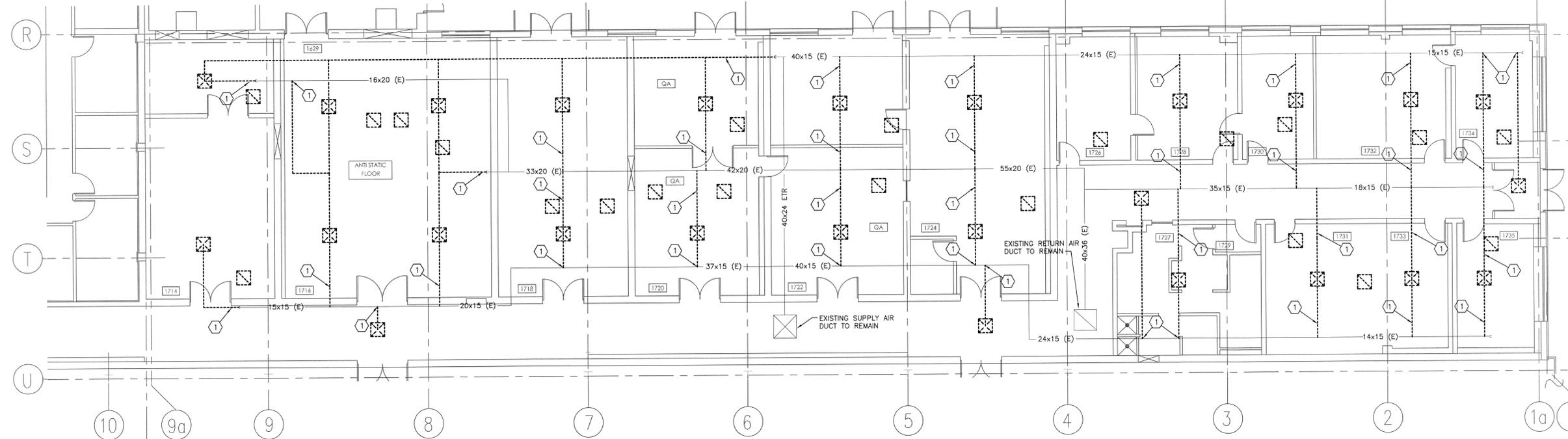


| | | | | |
|--|------------------------------|--|---|--|
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS <small>Chief, Facilities Engineering & Asset Mgmt. Office</small> <small>Facilities Project Manager</small> <small>Chief, Office of Propulsion Services</small> <small>Chief, Solid Rocket Motor Performance Office</small> <small>Chief, User Information Office</small> | | DATE 2-28-13 2-28-13 4/27/13 7/27/13 2-27-13 2/27/13 |
| DRAWING TITLE OVERALL THIRD FLOOR AND ROOF MECHANICAL PLANS | | PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | |
| 02-21-13 E 100% FINAL DESIGN 01-07-13 D 95% NEAR-FINAL DESIGN SUBMITTAL 10-27-12 C 60% DEVELOPED DESIGN SUBMITTAL 05-12-12 B 30% PRELIMINARY DESIGN SUBMITTAL | DATE SYM REVISION BY A'PD | DATE STARTED DRAWN BY HEI SCALE AS/88/11/107 FILE NAME EDM-1715 M-1033.DWG | DATE PRINTED 02/21/2013 TRADE SH. No. EDM-1715 M 103 SHEET No. 28 of 24 | |



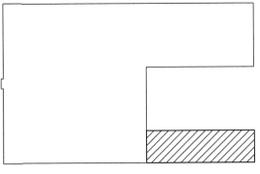
OP 8 **2 SOUTH WING MECHANICAL PLAN**
SCALE: 1/8"=1'-0"

- MECHANICAL PLAN NOTES: [OP 8]**
- DEMOLISH EXISTING DUCTWORK, SUPPLY AIR DIFFUSERS AND RETURN AIR GRILLES SHOWN DASHED. PATCH AND SEAL EXISTING TRUNK DUCT.
 - CONNECT NEW VAV TERMINAL UNIT TO EXISTING SUPPLY AIR TRUNK DUCT. PROVIDE FLEXIBLE CONNECTION BETWEEN VAV AND SUPPLY AIR DUCT.
 - CONNECT NEW RETURN AIR DUCT TO EXISTING TRUNK DUCT.
 - ROUTE 1-1/2" HEATING HOT WATER SUPPLY AND RETURN PIPE UP TO FANHOUSE 1. REFER TO 2/M-208 FOR CONTINUATION.
 - PROVIDE NEW BALANCING DAMPER IN EXISTING RETURN DUCT.



OP 8 **1 SOUTH WING MECHANICAL DEMOLITION PLAN**
SCALE: 1/8"=1'-0"

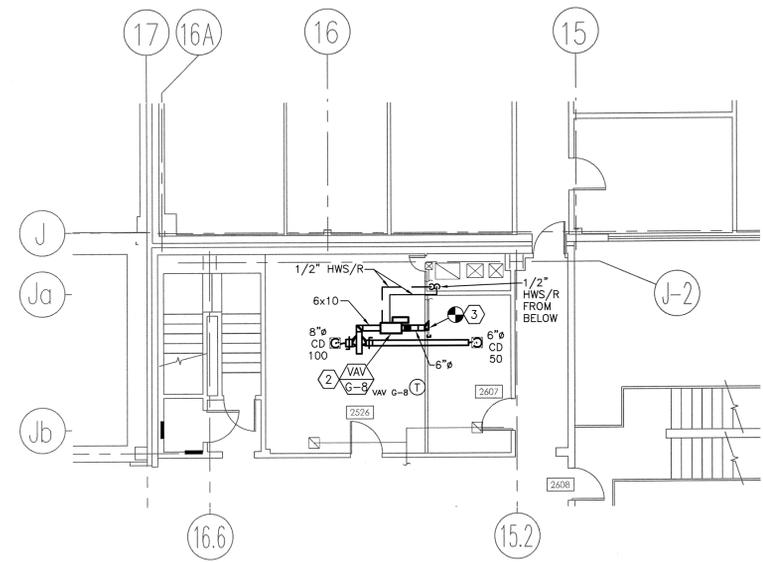
NOTE:
EXISTING CONDITIONS WERE TAKEN FROM ORIGINAL DRAWINGS & SITE VISITS AND MAY NOT REFLECT EXACT "AS-BUILT" CONDITIONS. FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO SUBMITTING FINAL BIDS. CAREFULLY COORDINATE NEW WORK AND DEMOLITION WITH ALL OTHER DISCIPLINES AND EXISTING CONDITIONS.



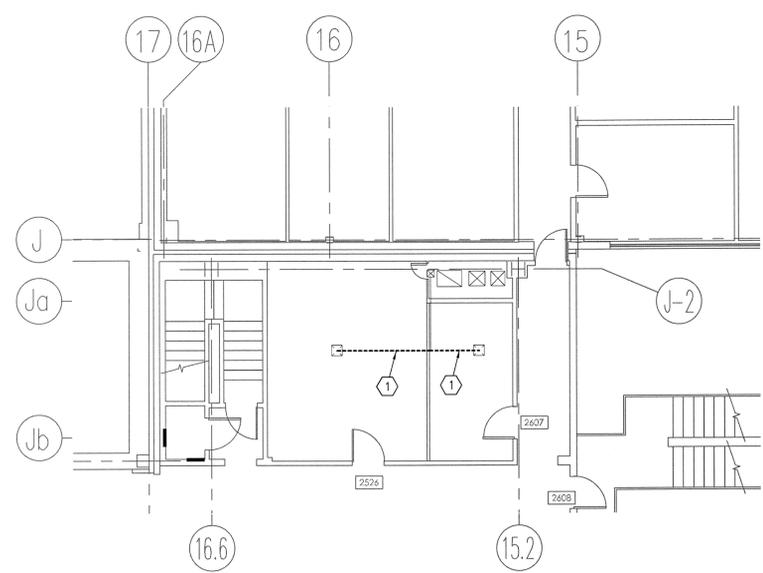
KEY PLAN
4800 BLDG 1ST FLOOR

HENDERSON ENGINEERS
5555 REDWOOD STREET, SUITE 201
LAS VEGAS, NV 89118
TEL 702 697 2181 FAX 702 697 2188
www.hel-eng.com
1150001704

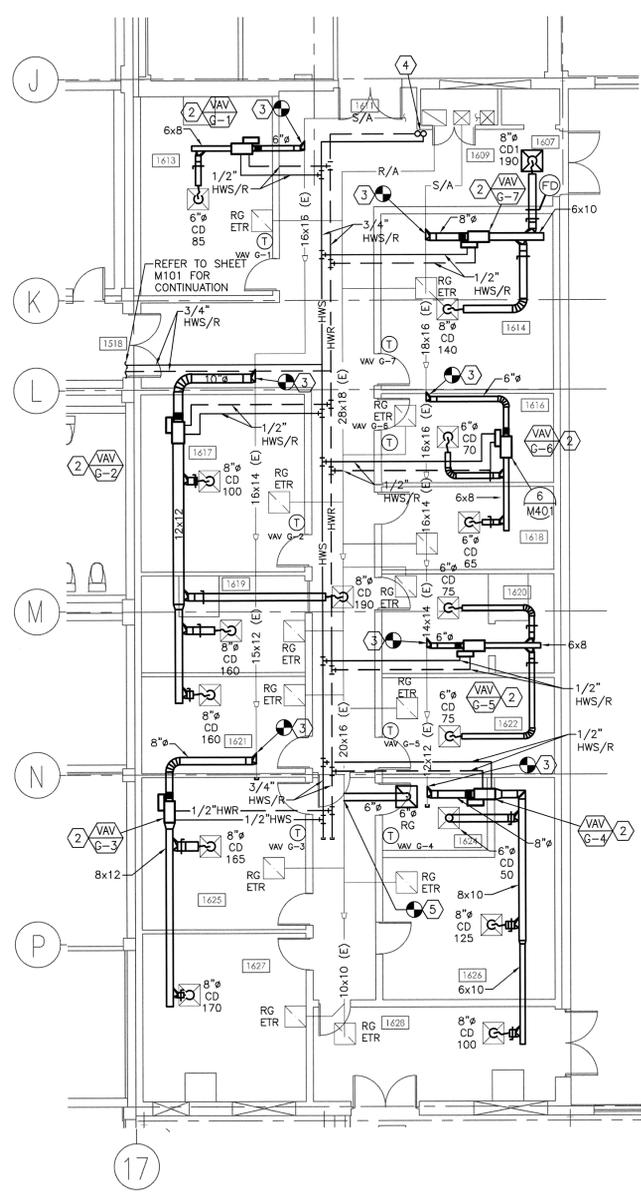
| | | | | |
|--|---------------------|--|--|--------------------|
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS Chief, Facilities Engineering & Assmt Mgmt. Office <i>[Signature]</i> 2-28-13 Project Requestor/Owner <i>[Signature]</i> 2-28-13 Facilities Project Manager <i>[Signature]</i> 3/27/13 Chief, Office of Protective Services <i>[Signature]</i> 3/27/13 Chief, Safety & Health <i>[Signature]</i> 3/27/13 Chief Information Officer <i>[Signature]</i> 3/27/13 | | DATE 02/21/2013 |
| DRAWING TITLE SOUTH WING MECHANICAL PLAN | | PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | |
| 02-21-13 E 100% FINAL DESIGN 01-07-13 D 95% NEAR-FINAL DESIGN SUBMITTAL 10-27-12 C 60% DEVELOPED DESIGN SUBMITTAL 05-12-12 B 30% PRELIMINARY DESIGN SUBMITTAL | REVISION BY A'PD | DATE PRINTED 02/21/2013 | DRAWN BY HEI SCALE AS SHOWN FILE NAME EDM-1715 M-201.DWG | |
| | | DATE 02/21/2013 | SHEET No. 30 of 24 | |



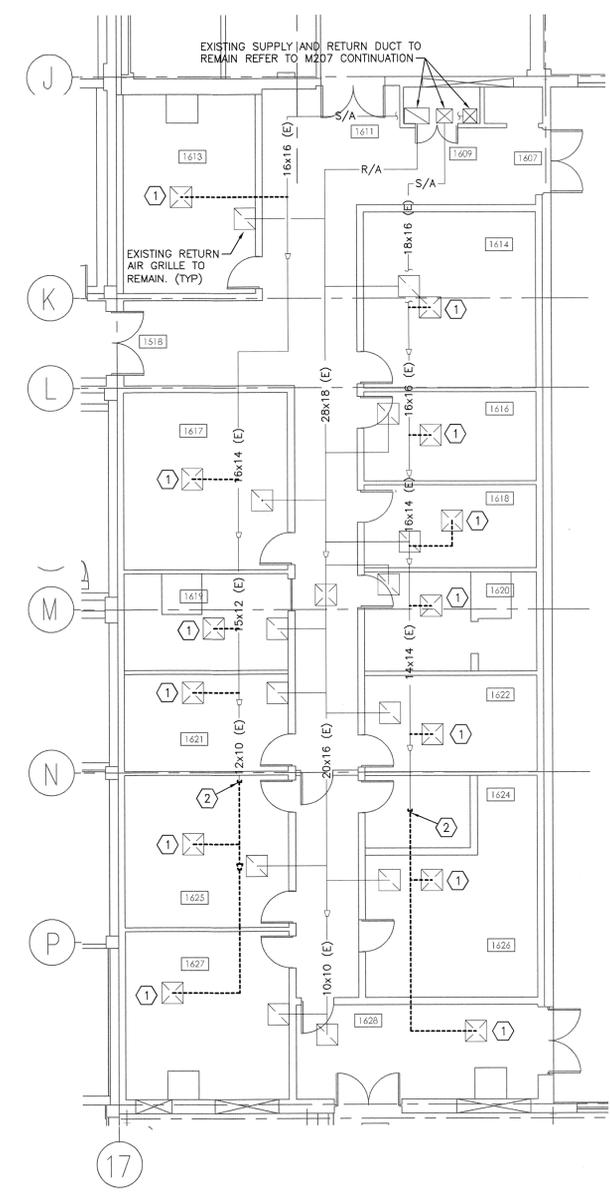
4 2ND FLOOR OFFICES MECHANICAL PLAN
SCALE: 1/8"=1'-0"



3 2ND FLOOR OFFICES MECHANICAL DEMOLITION PLAN
SCALE: 1/8"=1'-0"



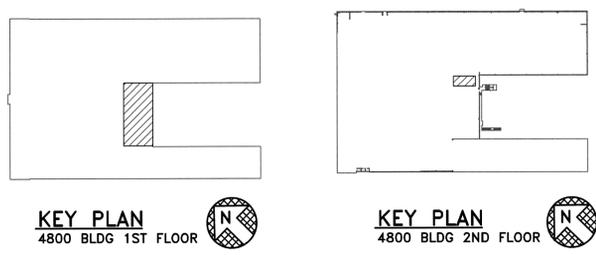
2 1ST FLOOR OFFICES MECHANICAL PLAN
SCALE: 1/8"=1'-0"



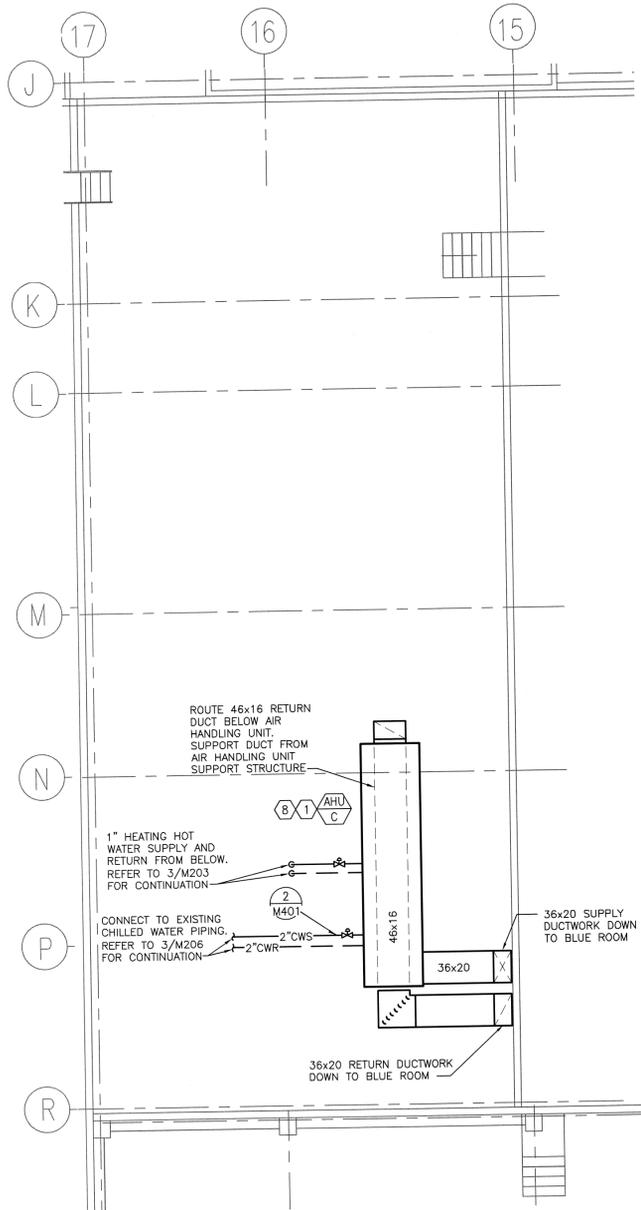
1 1ST FLOOR OFFICES MECHANICAL DEMOLITION PLAN
SCALE: 1/8"=1'-0"

- MECHANICAL PLAN NOTES:**
- DEMOLISH SUPPLY AIR DUCT AND DIFFUSERS SHOWN DASHED. PATCH AND SEAL EXISTING TRUNK DUCT.
 - PROVIDE NEW DDC CONTROLLED VAV TERMINAL UNIT WITH HOT WATER REHEAT.
 - CONNECT NEW DDC VAV TERMINAL UNIT SUPPLY AIR DUCT TO EXISTING TRUNK DUCT.
 - 1/2" HEATING HOT WATER SUPPLY AND RETURN PIPING UP TO SECOND FLOOR. REFER TO M202 DRAWING FOR CONTINUATION.
 - CONNECT NEW DUCTWORK TO EXISTING. SEAL AIR-TIGHT.

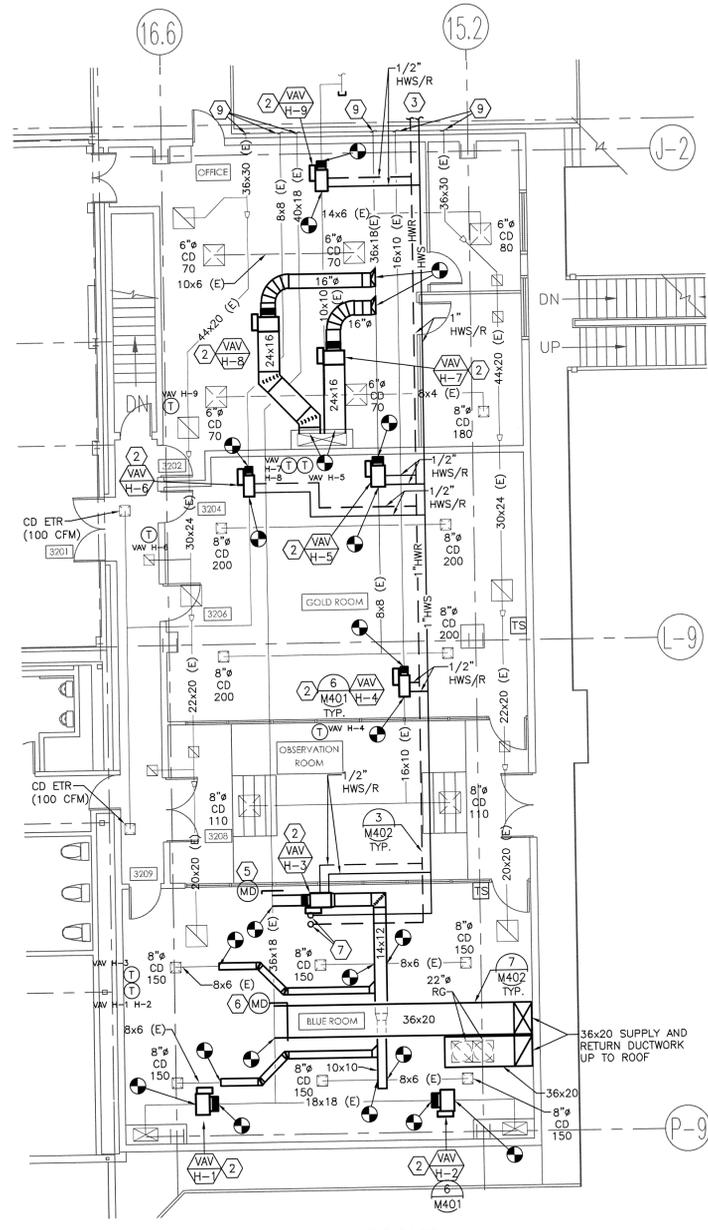
NOTE:
EXISTING CONDITIONS WERE TAKEN FROM ORIGINAL DRAWINGS & SITE VISITS AND MAY NOT REFLECT EXACT "AS-BUILT" CONDITIONS. FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO SUBMITTING FINAL BIDS. CAREFULLY COORDINATE NEW WORK AND DEMOLITION WITH ALL OTHER DISCIPLINES AND EXISTING CONDITIONS.



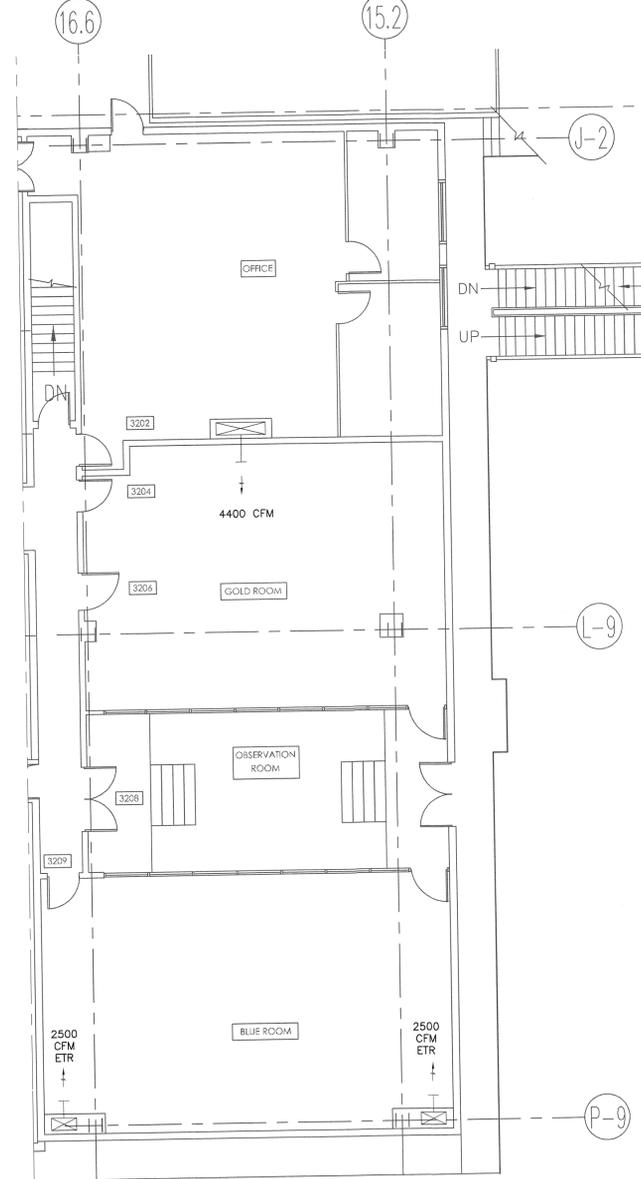
| | | | | |
|---|--|---|--|---|
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS Chief, Facilities Engineering & Assg Mgmt. Office <i>[Signature]</i> Project Requester/Customer <i>[Signature]</i> Facilities Project Manager <i>[Signature]</i> Chief, Office of Project Services <i>[Signature]</i> Chief, Scheduling & Control Office <i>[Signature]</i> Chief Information Officer <i>[Signature]</i> | | DATE 2-28-13 2-28-13 3/27/13 7/2/13 2-27/13 2/27/13 |
| DRAWING TITLE 1ST & 2ND FLOOR OFFICES MECHANICAL PLAN | | PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | |
| DATE SYM REVISION BY A/PD 02-21-13 E 100% FINAL DESIGN 01-07-13 D 95% NEAR-FINAL DESIGN SUBMITTAL 10-27-12 C 60% DEVELOPED DESIGN SUBMITTAL 05-12-12 B 30% PRELIMINARY DESIGN SUBMITTAL | | DRAWN BY HEI SCALE AS SHOWN FILE NAME EDM-1715 TRADE SH. NO. IM SHEET No. 31 of 24 | | |



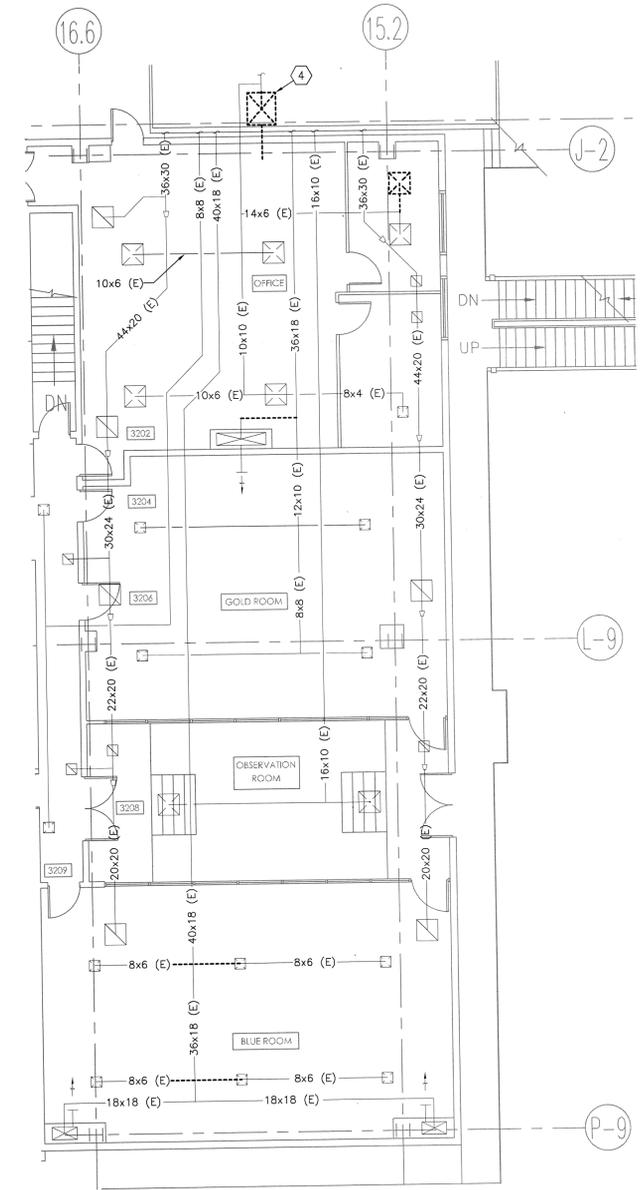
4 BLUE AND GOLD ROOMS ROOF MECHANICAL PLAN
SCALE: 1/8"=1'-0"



3 BLUE AND GOLD ROOMS ABOVE CEILING MECHANICAL PLAN
SCALE: 1/8"=1'-0"



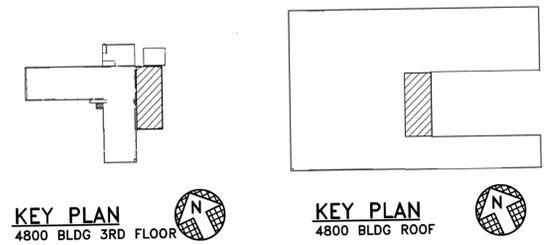
2 BLUE AND GOLD ROOMS UNDER FLOOR MECHANICAL PLAN
SCALE: 1/8"=1'-0"



1 BLUE AND GOLD ROOMS MECHANICAL DEMOLITION PLAN
SCALE: 1/8"=1'-0"

- MECHANICAL PLAN NOTES:**
- PROVIDE BACK UP AIR HANDLING UNIT ON ROOF TO SERVE BLUE ROOM. PROVIDE A 2-WAY VALVE FOR CHILLED WATER SUPPLY AND HEATING HOT WATER SUPPLY. MOUNT UNIT ON RAILS 18" ABOVE ROOF.
 - PROVIDE DDC SERIES FAN POWERED VAV TERMINAL UNIT ABOVE CEILING IN EXISTING DUCT.
 - 1" HEATING HOT WATER SUPPLY AND RETURN PIPE FROM FANHOUSE 7A TO SERVE VAV TERMINAL UNITS ABOVE CEILING. REFER TO 2/M207 FOR CONTINUATION.
 - DEMOLISH EXISTING DUCT SUPPLY DUCT. PATCH AND REPAIR EXISTING DUCTWORK TO REMAIN.
 - PROVIDE MOTORIZED DAMPER. DAMPER TO REMAIN NORMALLY OPEN. IF AHU-C IS ACTIVE, CLOSE DAMPER.
 - PROVIDE MOTORIZED DAMPER. DAMPER TO REMAIN NORMALLY CLOSED. IF AHU-C IS ACTIVE, OPEN DAMPER.
 - 1" HEATING HOT WATER SUPPLY AND RETURN UP TO ROOF. REFER TO 4/M203 FOR CONTINUATION.
 - ROUTE CONDENSATE DRAIN FROM AIR HANDLING UNIT TO OVER NEAREST ROOF DRAIN.
 - REFER TO 2/M207 FOR CONTINUATION.

NOTE:
EXISTING CONDITIONS WERE TAKEN FROM ORIGINAL DRAWINGS & SITE VISITS AND MAY NOT REFLECT EXACT "AS-BUILT" CONDITIONS. FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO SUBMITTING FINAL BIDS. CAREFULLY COORDINATE NEW WORK AND DEMOLITION WITH ALL OTHER DISCIPLINES AND EXISTING CONDITIONS.



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KEY PLAN
4800 BLDG ROOF

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| DATE | SYM | REVISION | BY | A/PD |
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| 02-21-13 | E | 100% FINAL DESIGN | | |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | | |
| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | | |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | | |

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EDWARDS, CA

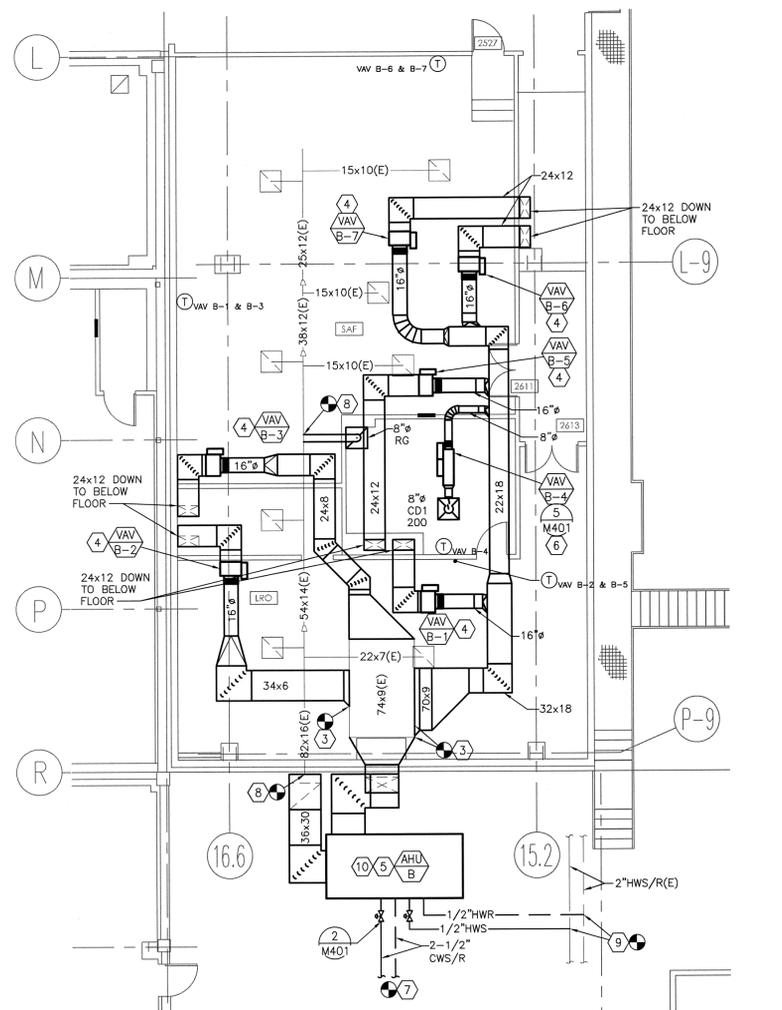
DRAWING TITLE
BLUE AND GOLD ROOMS MECHANICAL PLAN

PROJECT TITLE
MISSION CONTROL INFRASTRUCTURE REVITALIZATION
100% FINAL DESIGN

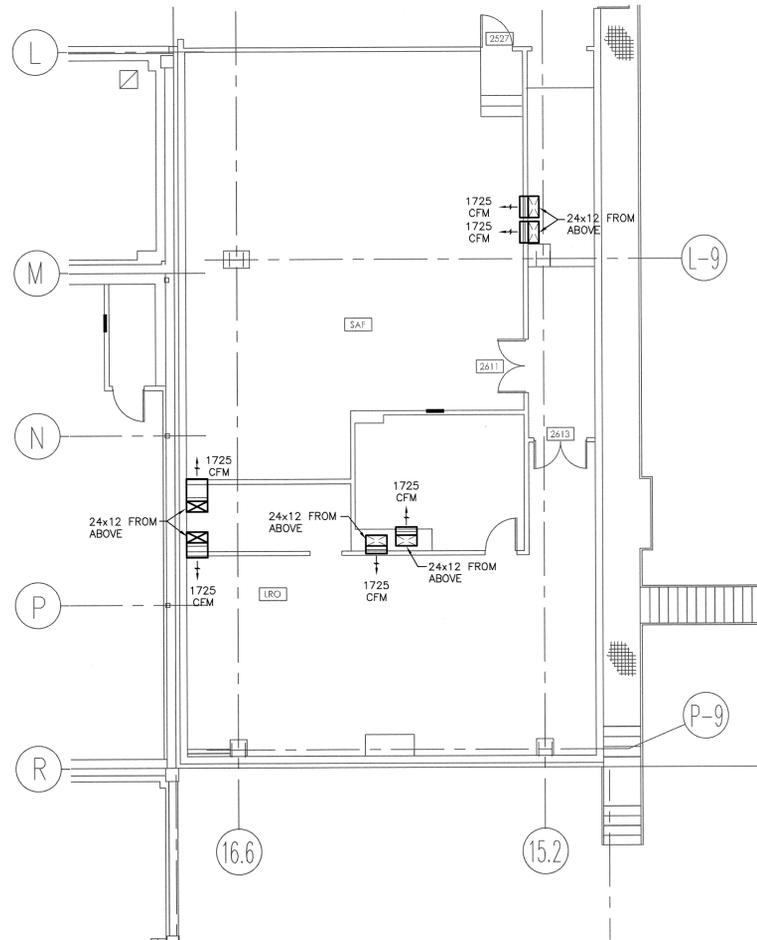
| APPROVALS | | DATE |
|--|---------------|------------------------|
| Chief, Facilities Engineering & Support Services | [Signature] | 2-28-13 |
| Facilities Project Manager | [Signature] | 2-28-13 |
| Chief, Office of Protective Services | [Signature] | 2/27/13 |
| Chief, Security Program Development | [Signature] | 2-27-13 |
| Chief, Information Services | [Signature] | 2/27/13 |
| DATE STD | | DATE PRINTD 02/21/2013 |
| DRAWN BY HEI | TRADE SH. NO. | EDM-1715 |
| SCALE AS SHOWN | M | |
| FILE NAME EDM-1715 | M-203.DWG | 2/03 |
| SHEET No. 32 of 74 | | |

MECHANICAL PLAN NOTES:

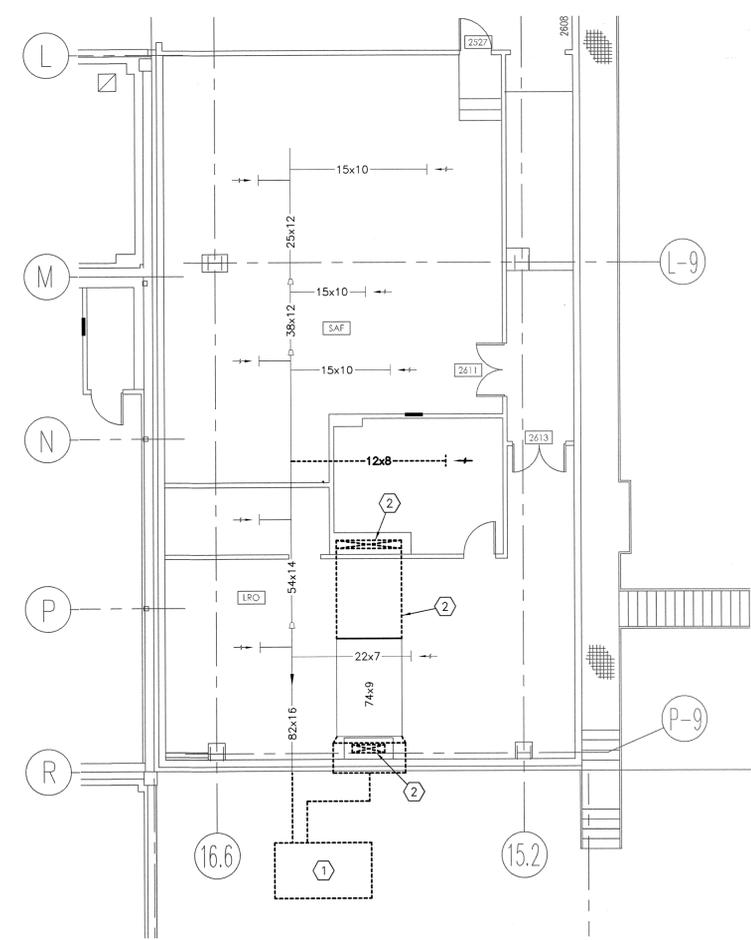
- 1 DEMOLISH EXISTING HEAT PUMP AND CAP EXISTING DUCTWORK AT BUILDING PENETRATION FOR RECONNECTION UNDER NEW WORK.
- 2 DEMOLISH EXISTING SUPPLY DUCT ABOVE CEILING, DOWN IN CHASE AND UNDERFLOOR.
- 3 CONNECT NEW SUPPLY DUCTWORK TO EXISTING SUPPLY DUCTWORK ABOVE CEILING. FIELD VERIFY PLENUM SPACE REQUIREMENTS.
- 4 PROVIDE DDC VAV TERMINAL UNIT ABOVE CEILING. ROUTE DUCT DOWN WALL AND ELBOW UNDER RAISED FLOOR.
- 5 PROVIDE NEW GROUND MOUNTED DDC CONTROLLED CHILLED WATER VARIABLE AIR VOLUME AIR HANDLING UNIT. RECONNECT TO EXISTING DUCTWORK AT EXTERIOR WALL. PROVIDE 2 WAY CONTROL VALVE FOR CHILLED WATER SUPPLY AND HEATING HOT WATER SUPPLY.
- 6 PROVIDE DDC VAV TERMINAL UNIT ABOVE CEILING TO SERVE OFFICE.
- 7 PROVIDE NEW 2-1/2" SUPPLY AND RETURN CHILLED WATER PIPE TO SERVE NEW AHU. CONNECT TO NEAREST EXISTING CHILLED WATER PIPE OF ADEQUATE SIZE. PROVIDE ELECTRONICALLY ACTIVATED DDC 2-WAY VALVE.
- 8 CONNECT NEW RETURN DUCTWORK TO EXISTING RETURN DUCTWORK ABOVE CEILING.
- 9 NEW 1/2" SUPPLY AND RETURN HEATING HOT WATER PIPE TO SERVE NEW AHU. CONNECT TO EXISTING 2" HEATING HOT WATER PIPE AS INDICATED. PROVIDE ELECTRONICALLY ACTIVATED DDC 2-WAY VALVE.
- 10 ROUTE CONDENSATE DRAIN FROM AIR HANDLING UNIT TO OVER NEAREST ROOF DRAIN.



3 VIDEO CONTROL ROOM ABOVE CEILING MECHANICAL PLAN
SCALE: 1/8"=1'-0"

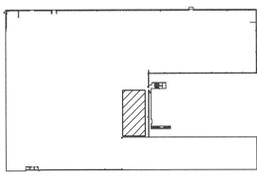


2 VIDEO CONTROL ROOM UNDER FLOOR MECHANICAL PLAN
SCALE: 1/8"=1'-0"



1 VIDEO CONTROL ROOM MECHANICAL DEMOLITION PLAN
SCALE: 1/8"=1'-0"

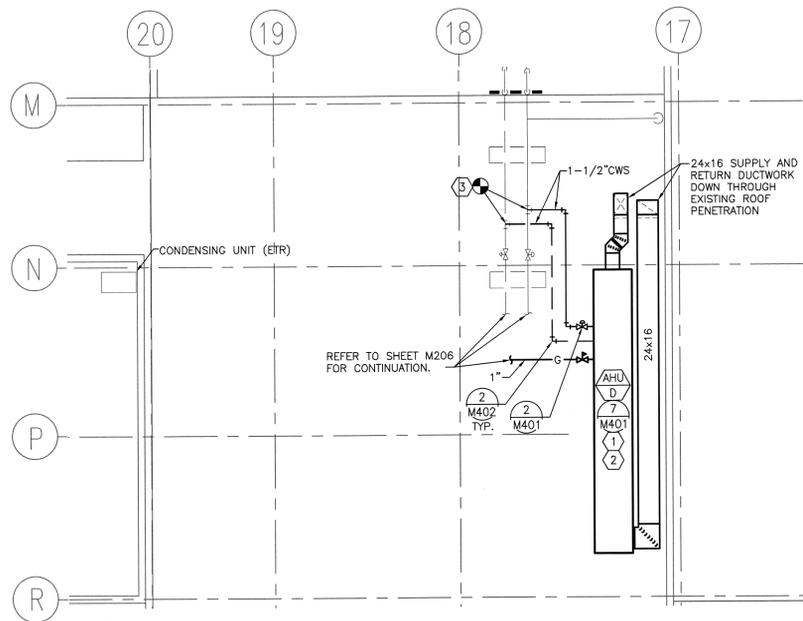
NOTE:
EXISTING CONDITIONS WERE TAKEN FROM ORIGINAL DRAWINGS & SITE VISITS AND MAY NOT REFLECT EXACT "AS-BUILT" CONDITIONS. FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO SUBMITTING FINAL BIDS. CAREFULLY COORDINATE NEW WORK AND DEMOLITION WITH ALL OTHER DISCIPLINES AND EXISTING CONDITIONS.



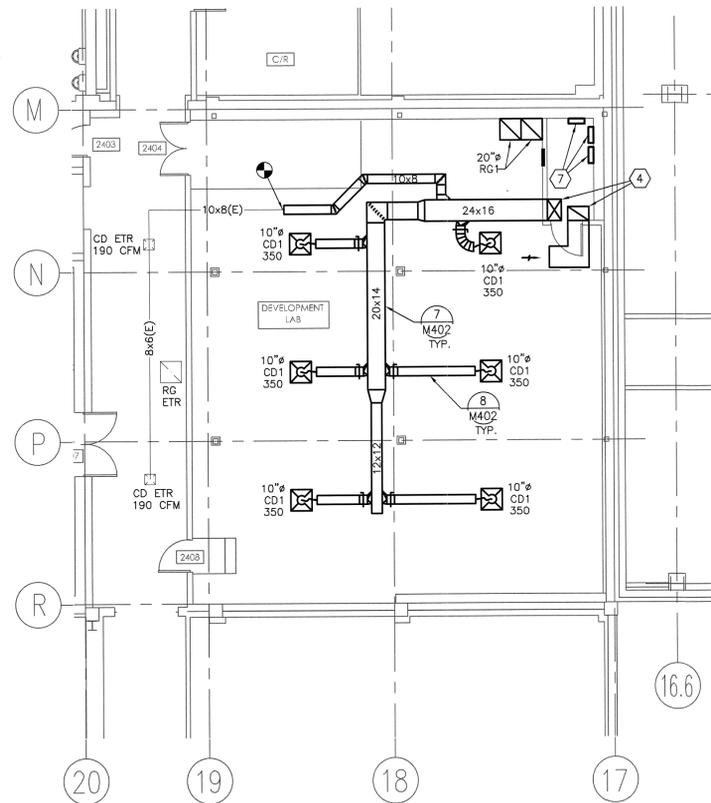
KEY PLAN
4800 BLDG 2ND FLOOR

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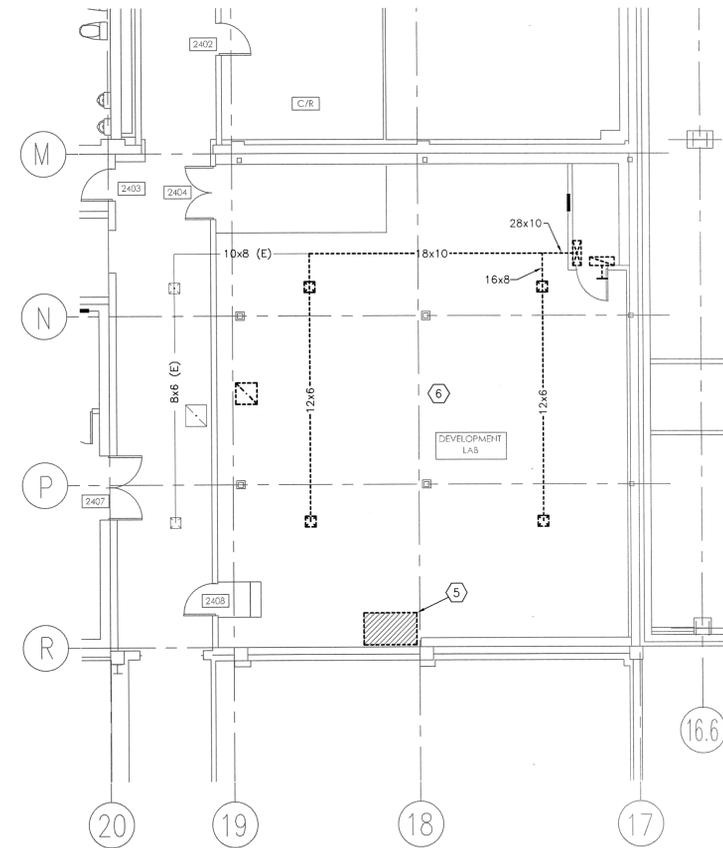
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|------|-----|---|----|--|--|---|
| | | NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS Chief, Facilities Engineering & Asset Mgmt. Office Project Acquisition/Engineer Facilities Project Manager Chief, Office of Procurement Services Chief, Systems Management/Support Office Chief Information Officer | | DATE 2-28-13 2-28-13 2/27/13 2-27-13 2/27/13 |
| | | DRAWING TITLE VIDEO CONTROL ROOM MECHANICAL PLAN | | | | |
| | | PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | DATE PRINTED 02/21/2013 | | |
| | | DRAWN BY HEI | | TRADE ME | | |
| | | SCALE AS SHOWN | | SHEET No. 33 of 24 | | |
| | | FILE NAME EDM-1715 M-204-DWG | | SHEET No. 33 of 24 | | |
| DATE | SYM | REVISION | BY | A'PD | | |



3 LAB 2402 MECHANICAL ROOF PLAN
SCALE: 1/8"=1'-0"



2 LAB 2402 NEW MECHANICAL PLAN
SCALE: 1/8"=1'-0"

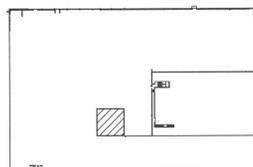


1 LAB 2402 MECHANICAL DEMOLITION PLAN
SCALE: 1/8"=1'-0"

MECHANICAL PLAN NOTES:

- 1 CONNECT NEW GAS PIPE TO EXISTING TO SERVE NEW AIR HANDLING UNIT. PROVIDE GAS REGULATOR
- 2 PROVIDE NEW CHILLED WATER/GAS HEAT AIR HANDLING UNIT AT EXISTING ROOF PENETRATION. PROVIDE 2 WAY CONTROL VALVE FOR CHILLED WATER SUPPLY AND HEATING HOT WATER SUPPLY.
- 3 CONNECT NEW CHILLED WATER SUPPLY AND RETURN PIPING TO EXISTING. PROVIDE 2-WAY VALVE.
- 4 CONNECT EXISTING SUPPLY AND RETURN AIR DUCT TO NEW AIR HANDLING UNIT ON ROOF.
- 5 DEMOLISH CRAC UNIT AND ASSOCIATED COMPONENTS. VALVE, CAP AND SEAL EXISTING CHILLED WATER SUPPLY AND RETURN PIPING ABOVE CEILING.
- 6 DEMOLISH EXISTING SUPPLY AND RETURN AIR DUCT AND DIFFUSERS BACK TO ROOF TOP UNIT.
- 7 MOUNT SIEMENS CONTROL BOX FOR AHU-C, AHU-D, AND AHU-E ON WALL.

NOTE:
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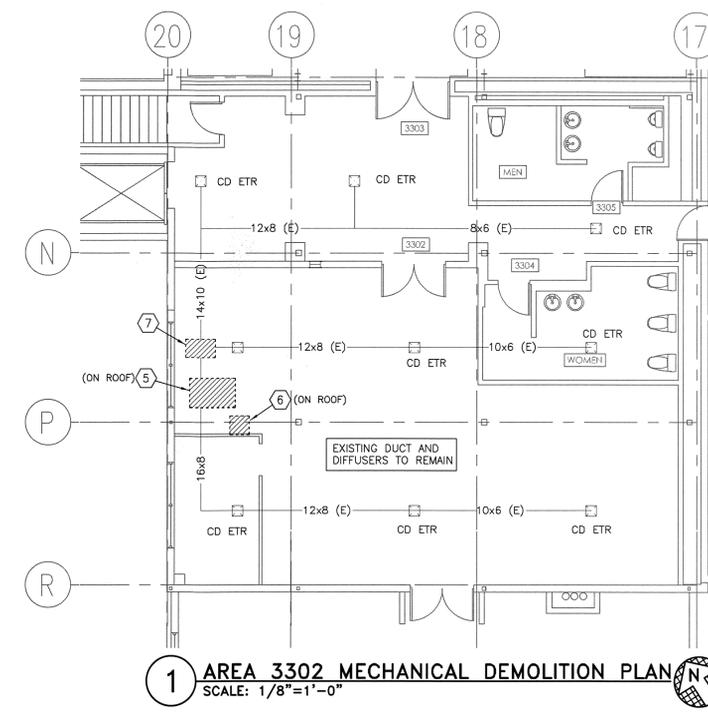
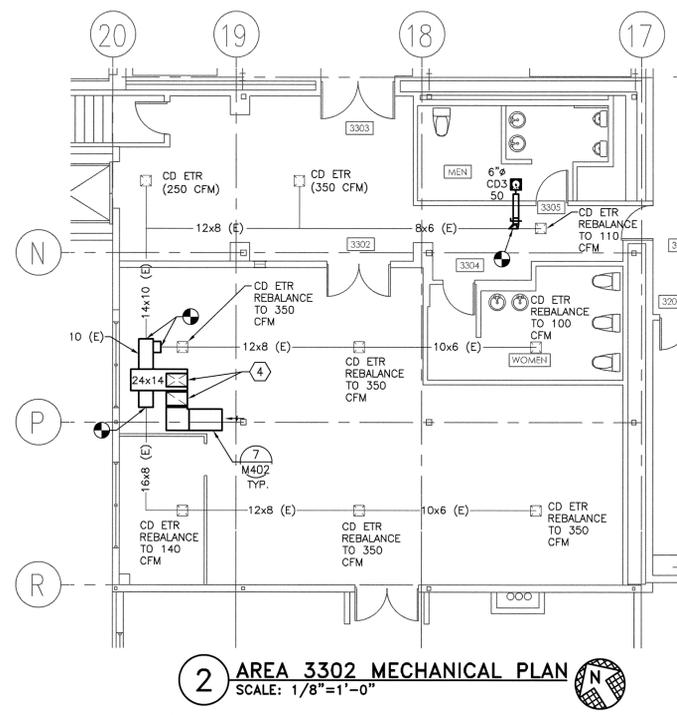
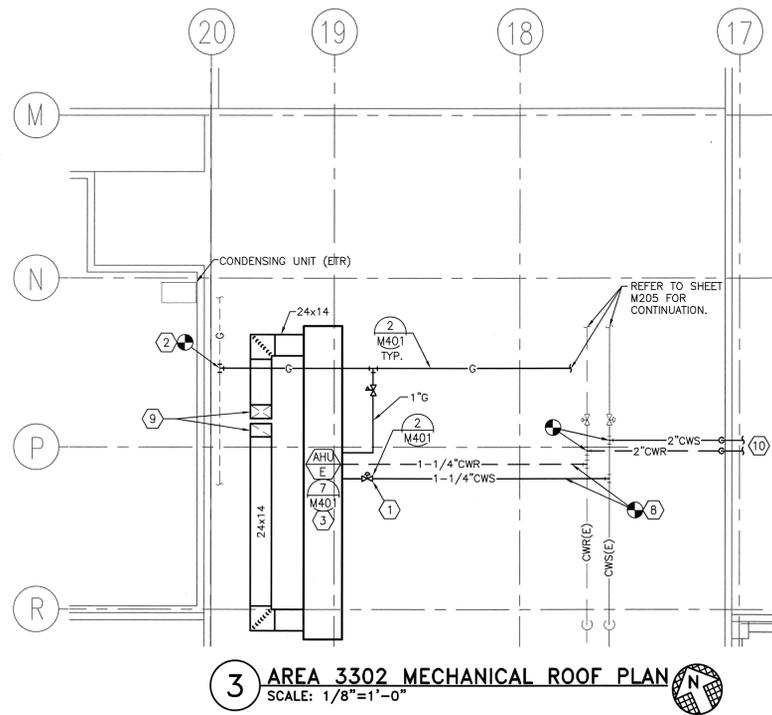


KEY PLAN
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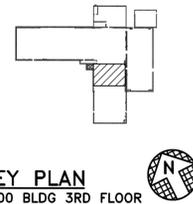
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| DRAWING TITLE LAB 2402 MECHANICAL PLAN | | PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | |
| 02-21-13 E 100% FINAL DESIGN 01-07-13 D 95% NEAR-FINAL DESIGN SUBMITTAL 10-27-12 C 60% DEVELOPED DESIGN SUBMITTAL 05-12-12 B 30% PRELIMINARY DESIGN SUBMITTAL | DATE SYM REVISION BY A/PD | DATE STARTED DRAWN BY HEI SCALE AS SHOWN FILE NAME EDM-1715-M-205.DWG | DATE PRINTED 02/21/2013 TRADE SR. No. M 205 SHEET No. 34 of 24 EDM-1715 | |

- MECHANICAL PLAN NOTES:**
- ① PROVIDE DDC ELECTRONIC ACTIVATED 2-WAY VALVE FOR CHILLED WATER SUPPLY.
 - ② CONNECT NEW GAS LINE TO EXISTING GAS ON ROOF.
 - ③ PROVIDE NEW DDC CONTROLLED CHILLED WATER/GAS HEAT AIR HANDLING UNIT ON ROOF.
 - ④ PROVIDE NEW SUPPLY AIR AND RETURN DUCT FROM AHU TO EXISTING DUCT ABOVE CEILING.
 - ⑤ DEMOLISH ABANDONED AHU ON ROOF AND ALL ASSOCIATED ACCESSORIES AND EQUIPMENT. CAP AND SEAL EXISTING CURB WEATHER TIGHT.
 - ⑥ DEMOLISH EXISTING CONDENSING UNIT AND ASSOCIATED COMPONENTS.
 - ⑦ DEMOLISH EXISTING HORIZONTAL FAN COIL UNIT IN CEILING SPACE AND ASSOCIATED COMPONENTS. CAP EXISTING SUPPLY AIR AND RETURN AIR DUCT FOR NEW WORK.
 - ⑧ CONNECT SUPPLY AND RETURN CHILLED WATER PIPE TO AHU-E.
 - ⑨ ROUTE SUPPLY AND RETURN DUCTWORK DOWN THROUGH ROOF WITH WEATHER PROOF PENETRATION.
 - ⑩ 2" CHILLED WATER SUPPLY AND RETURN TO SERVE AHU-C. REFER TO 4/M203 FOR CONTINUATION.

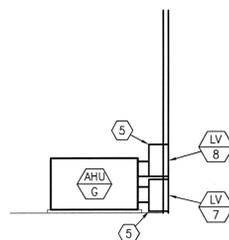


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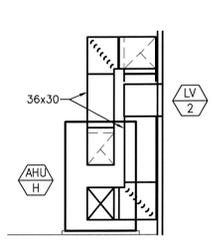


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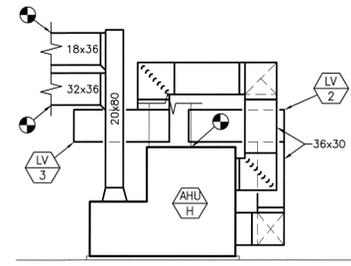
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| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS Chief, Facilities Engineering & Asset Mgmt. Office Project Requestor/Justification Facilities Project Manager Chief, Office of Protection Services Chief, Safety, Health & Environmental Office DRP-CRM Information Office | | DATE 2-28-13 2-28-13 2/27/13 2-27-13 2/27/13 |
| DRAWING TITLE AREA 3302 MECHANICAL PLAN | | DATE PRINTED 02/21/2013 | | |
| PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | DATE 02-21-13 01-07-13 10-27-12 05-12-12 | | |
| DATE 02-21-13 01-07-13 10-27-12 05-12-12 | | REVISION E 100% FINAL DESIGN D 95% NEAR-FINAL DESIGN SUBMITTAL C 60% DEVELOPED DESIGN SUBMITTAL B 30% PRELIMINARY DESIGN SUBMITTAL | | |
| DATE 02-21-13 | | BY ATPD | | |
| SCALE AS SHOWN | | TRADE M | | |
| FILE NAME EDM-1715 M-206.DWG | | SHEET No. 35 of 22 | | |



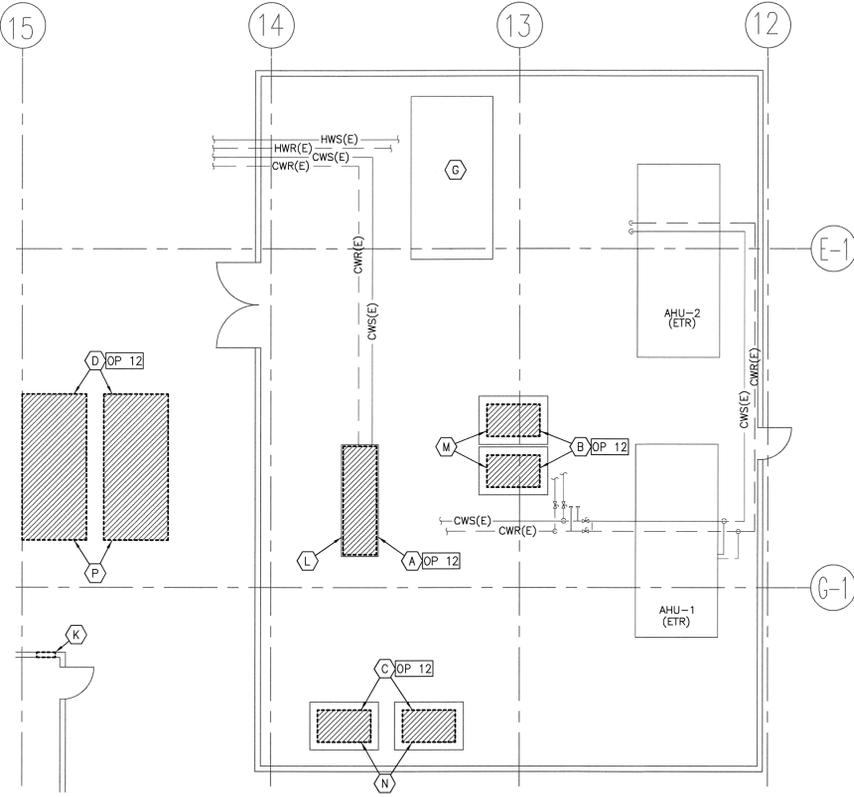
7 FAN HOUSE 7A MECHANICAL SECTION C-C NOT TO SCALE



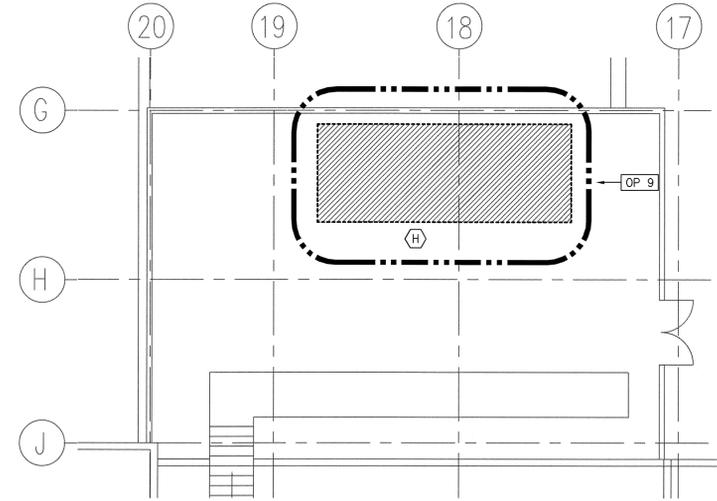
6 FAN HOUSE 7A MECHANICAL SECTION B-B NOT TO SCALE



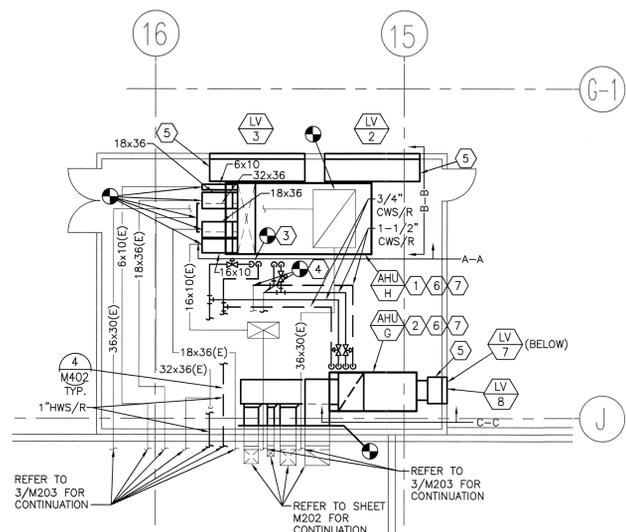
5 FAN HOUSE 7A MECHANICAL SECTION A-A NOT TO SCALE



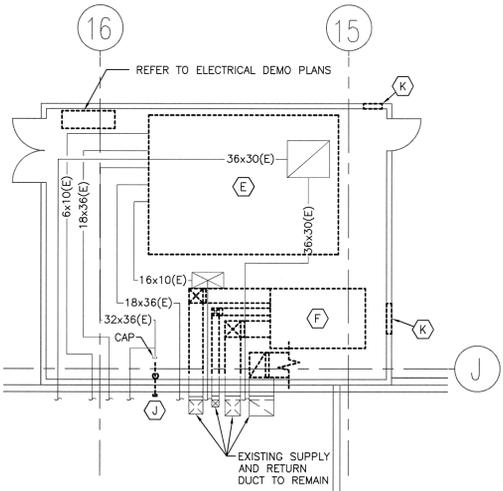
4 FAN HOUSE 6 MECHANICAL DEMOLITION PLAN SCALE: 1/8"=1'-0"



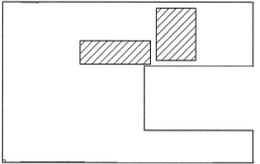
3 FAN HOUSE 7 MECHANICAL DEMOLITION PLAN SCALE: 1/8"=1'-0"



2 FAN HOUSE 7A MECHANICAL PLAN SCALE: 1/8"=1'-0"



1 FAN HOUSE 7A MECHANICAL DEMOLITION PLAN SCALE: 1/8"=1'-0"



KEY PLAN 4800 BLDG ROOF

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DEMOLITION PLAN NOTES:

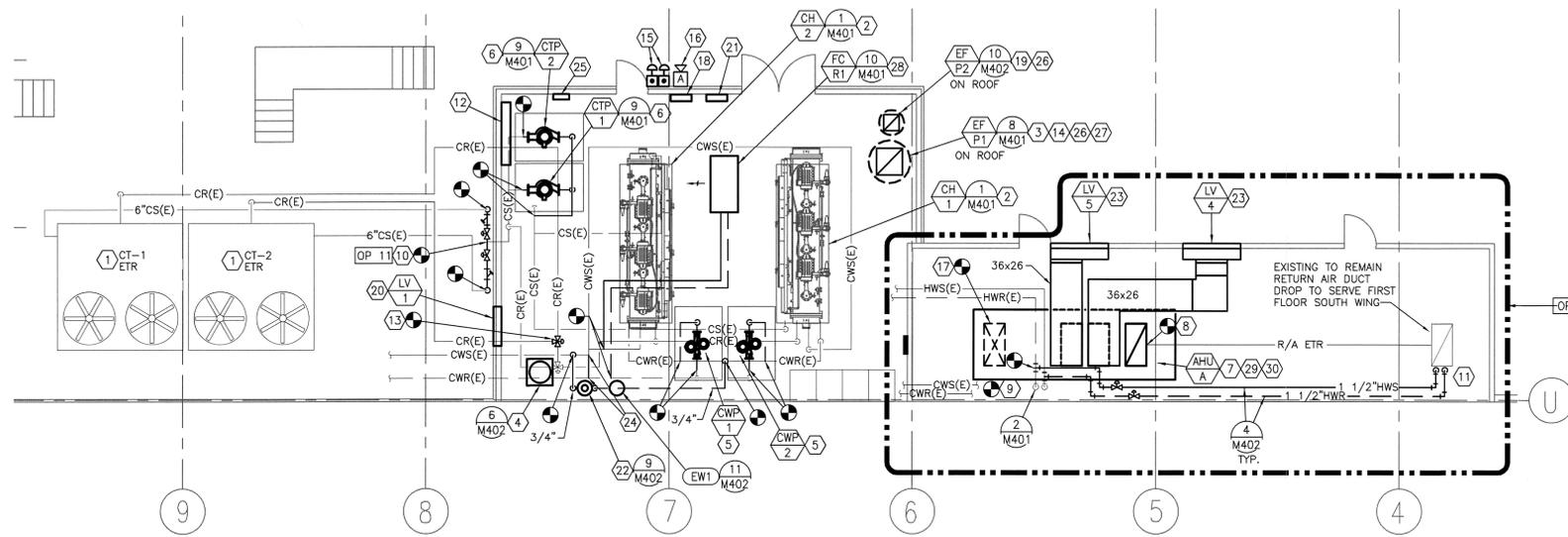
- OP 12(A) DEMOLISH EXISTING CHILLER AND ASSOCIATED COMPONENTS. DEMOLISH EXISTING CHILLED WATER PIPING BACK TO MAIN AND CAP. REFER TO CONSTRUCTION PHASE CRITERIA ON DRAWING M-000 FOR PROJECT TIMING.
- OP 12(B) DEMOLISH EXISTING CHILLED WATER PUMP AND ASSOCIATED COMPONENTS. DEMOLISH EXISTING CHILLED WATER PIPING BACK TO MAIN AND CAP. REFER TO CONSTRUCTION PHASE CRITERIA ON DRAWING M-000 FOR PROJECT TIMING.
- OP 12(C) DEMOLISH EXISTING CONDENSER WATER PUMP AND ASSOCIATED COMPONENTS. DEMOLISH ALL CONDENSER WATER PIPING. REFER TO CONSTRUCTION PHASE CRITERIA ON DRAWING M-000 FOR PROJECT TIMING.
- OP 12(D) DEMOLISH EXISTING COOLING TOWERS AND ASSOCIATED COMPONENTS. DEMOLISH ALL CONDENSER WATER PIPE AND SUPPORTS. REFER TO CONSTRUCTION PHASE CRITERIA ON DRAWING M-000 FOR PROJECT TIMING. REPAIR ROOF PENETRATIONS PER ARCHITECTURAL SPECIFICATIONS.
- (E) DEMOLISH EXISTING AIR HANDLING UNIT, ASSOCIATED COMPONENTS, PNEUMATIC CONTROLS AND PIPING. CAP AND SEAL CHILLED WATER AND HEATING HOT WATER PIPING FOR NEW WORK. DEMOLISH CHILLED WATER 3-WAY VALVE AND PNEUMATIC CONTROLS SERVING AIR HANDLING UNIT AND EXISTING 2-WAY HEATING HOT WATER VALVE. ALL SUPPLY AIR AND RETURN AIR DUCT SHALL REMAIN FOR NEW WORK.
- (F) DEMOLISH EXISTING AIR HANDLING UNIT ASSOCIATED COMPONENTS, PNEUMATIC CONTROLS AND PIPING. CAP AND SEAL CHILLED WATER AND HEATING HOT WATER PIPING FOR NEW WORK. DEMOLISH 3-WAY VALVE AND PNEUMATIC CONTROLS SERVING AIR HANDLING UNIT AND EXISTING 2-WAY HEATING HOT WATER VALVE. DEMOLISH SUPPLY AND RETURN AIR DUCT PRIOR TO FANHOUSE WALL PENETRATION. DEMOLISH RETURN AIR DUCT INLINE FAN AND ASSOCIATED COMPONENTS.
- (G) ABANDONED STEAM BOILER TO REMAIN.
- OP 9(H) DEMOLISH ABANDONED AIR HANDLING UNIT SUPPLY AND RETURN DUCT, CHILLED WATER, HEATING HOT WATER PIPING, AND ASSOCIATED COMPONENTS.
- (J) DEMOLISH ABANDONED 32x36 SUPPLY AIR DUCT. VERIFY WITH CONTRACTING OFFICER BEFORE DEMOLITION.
- (K) DEMOLISH EXISTING LOUVER AND SEAL OPENING AIR TIGHT.
- (L) EXISTING CHILLER TO REMAIN. EVACUATE CHILLED WATER, CONDENSER WATER, AND REFRIGERANT FROM SYSTEM AND ABANDON IN PLACE.
- (M) EXISTING CHILLED WATER PUMP TO REMAIN. EVACUATE CHILLED WATER FROM SYSTEM AND ABANDON IN PLACE.
- (N) EXISTING CONDENSER WATER PUMP TO REMAIN. EVACUATE CONDENSER WATER FROM SYSTEM AND ABANDON IN PLACE.
- (P) EXISTING COOLING TOWER TO REMAIN. EVACUATE CONDENSER WATER FROM SYSTEM AND ABANDON IN PLACE.

MECHANICAL PLAN NOTES:

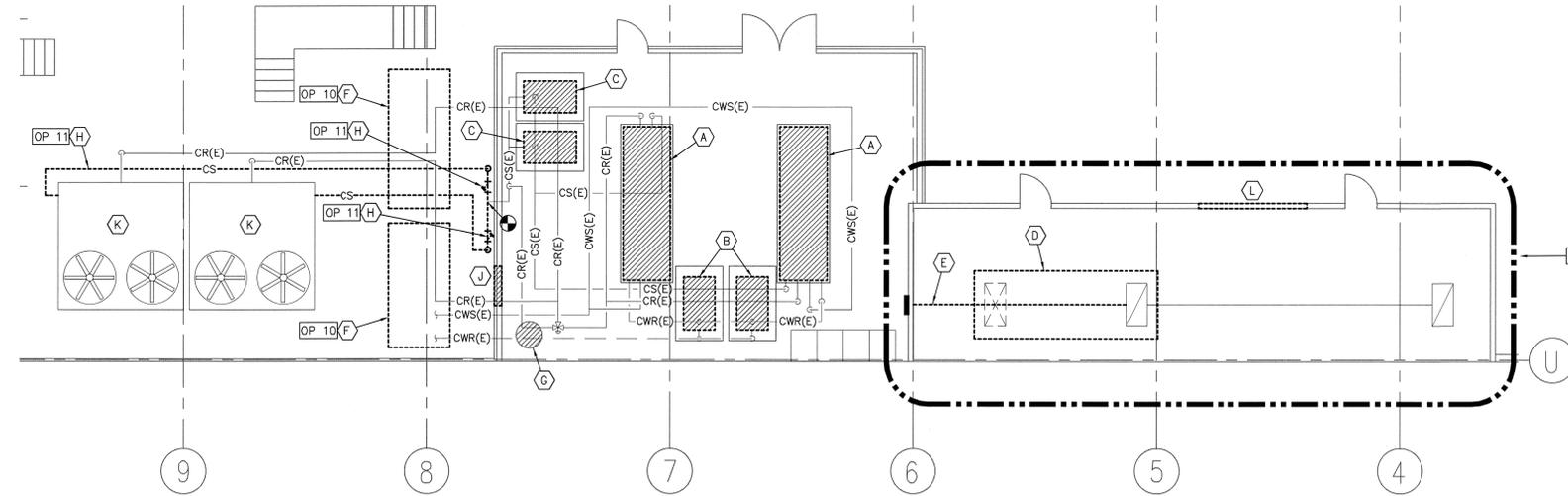
- 1 INSTALL DDC CONTROLLED VARIABLE AIR VOLUME AIR HANDLING UNIT ACCORDING TO MANUFACTURERS RECOMMENDATIONS TO SERVE OFFICE SPACE, BLUE AND GOLD ROOMS. CONNECT TO EXISTING CHILLED WATER AND HEATING HOT WATER PIPING SYSTEM. INSTALL DDC ELECTRONICALLY CONTROLLED 2-WAY CONTROL VALVE FOR CHILLED WATER CONNECTION. INSTALL NEW DDC ELECTRONICALLY CONTROLLED HEATING HOT WATER 2-WAY CONTROL VALVE. CONNECT NEW 2 1/2" CHILLED WATER SUPPLY AND RETURN PIPING AND NEW 3/4" HEATING HOT WATER SUPPLY AND RETURN TO UNIT. COORDINATE INSTALLATION OF DDC CONTROL BOX WITH CONTROLS CONTRACTOR.
- 2 INSTALL DDC CONTROLLED VARIABLE AIR VOLUME AIR HANDLING UNIT ACCORDING TO MANUFACTURERS RECOMMENDATIONS, TO SERVE 2ND AND 1ST FLOOR OFFICE SPACE. CONNECT TO EXISTING CHILLED WATER AND HEATING HOT WATER PIPING SYSTEM. INSTALL A 2-WAY CONTROL VALVE FOR CHILLED WATER CONNECTION. INSTALL NEW DDC ELECTRONICALLY CONTROLLED HEATING HOT WATER 2-WAY CONTROL VALVE. CONNECT NEW 1-1/4" CHILLED WATER SUPPLY AND RETURN PIPING AND NEW 1/2" HEATING HOT WATER SUPPLY AND RETURN TO UNIT. COORDINATE INSTALLATION OF DDC CONTROL BOX WITH CONTROLS CONTRACTOR.
- 3 NEW 2" HEATING HOT WATER SUPPLY AND RETURN PIPING. CONNECT TO EXISTING HEATING HOT WATER SUPPLY AND RETURN PIPE AT AIR HANDLING UNIT. ROUTE 1-1/2" HEATING HOT WATER SUPPLY AND RETURN PIPING TO AHU-H, 3/4" HEATING HOT WATER SUPPLY AND RETURN PIPING TO AHU-G AND 1" HEATING HOT WATER SUPPLY AND RETURN PIPING TO BLUE AND GOLD ROOMS.
- 4 NEW 3" CHILLED WATER SUPPLY AND RETURN PIPING. CONNECT TO EXISTING CHILLED SUPPLY AND RETURN PIPE. ROUTE 1-1/2" CHILLED WATER SUPPLY AND RETURN PIPING TO AHU-G AND 3" CHILLED WATER SUPPLY AND RETURN PIPING TO AHU-H.
- 5 PLENUM BOX TO LOUVER.
- 6 ROUTE CONDENSATE DRAIN FROM AIR HANDLING UNIT TO OVER NEAREST FLOOR DRAIN.
- 7 MOUNT SIEMENS CONTROL BOX ON AIR HANDLING UNIT.

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| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS DATE 2-28-13 2-28-13 2/27/13 2/7/13 2-27-13 2/2/13 | |
| DRAWING TITLE FANHOUSE 6, 7, AND 7A MECHANICAL PLAN | | PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | |
| DATE SYM REVISION BY 02-21-13 E 100% FINAL DESIGN 01-07-13 D 90% NEAR-FINAL DESIGN SUBMITTAL 10-27-12 C 60% DEVELOPED DESIGN SUBMITTAL 05-12-12 B 30% PRELIMINARY DESIGN SUBMITTAL | | DRAWN BY HEI SCALE AS SHOWN TRADE SHEET No. EDM-1715 FILE NAME EDM-1715 M W-207.DWG 207 SHEET No. 36 of 74 | |



2 FAN HOUSE 1 & 1A MECHANICAL PLAN
SCALE: 1/8"=1'-0"



1 FAN HOUSE 1 & 1A MECHANICAL DEMOLITION PLAN
SCALE: 1/8"=1'-0"

- DEMOLITION PLAN NOTES:**
- (A) DEMOLISH EXISTING CHILLER AND ASSOCIATED COMPONENTS. CAP CHILLED WATER FOR RE-CONNECTION UNDER NEW WORK.
 - (B) DEMOLISH EXISTING CHILLED WATER PUMP AND ASSOCIATED COMPONENTS. CAP CHILLED WATER PIPING FOR RE-CONNECTION UNDER NEW WORK.
 - (C) DEMOLISH EXISTING CONDENSER WATER PUMP AND ASSOCIATED COMPONENTS. CAP CONDENSER WATER PIPING FOR RE-CONNECTION UNDER NEW WORK.
 - (D) DEMOLISH AIR HANDLING UNIT ASSOCIATED COMPONENTS, PNEUMATIC CONTROLS AND PIPING. CAP AND SEAL CHILLED WATER AND HEATING HOT WATER PIPING FOR RE-CONNECTION UNDER NEW WORK. DEMOLISH 3-WAY VALVE AND PNEUMATIC CONTROLS SERVING AIR HANDLING UNIT.
 - (E) DEMOLISH EXISTING DUCT ROUTED FROM FANHOUSE 1A TO AHU RETURN AIR INTAKE IN FANHOUSE 1. PATCH AND SEAL WALL BETWEEN FANHOUSE 1A AND FANHOUSE 1.
 - (F) DEMOLISH EXISTING COOLING TOWER FRAME. PATCH AND REPAIR ROOF PER ARCHITECTURAL REQUIREMENTS. REFER TO NASA FRONT END SPECIFICATIONS FOR LEAD ABATEMENT REQUIREMENTS.
 - (G) DEMOLISH EXISTING CHEMICAL TREATMENT SYSTEM AND ASSOCIATED COMPONENTS.
 - (H) DEMOLISH EXISTING 6" CONDENSER WATER SUPPLY PIPE AS INDICATED AND ASSOCIATED STRAINERS.
 - (J) DEMOLISH EXISTING LOUVER. PATCH AND/OR REPAIR WALL FOR NEW WORK.
 - (K) DEMOLISH COOLING TOWER FAN MOTOR FOR REPLACEMENT WITH NEW MOTOR UNDER NEW WORK.
 - (L) SEAL EXISTING LOUVER AIR TIGHT.
 - (4) PROVIDE LAKEWOOD INSTRUMENTS MODEL 140 (OR EQUIVALENT) CONDUCTIVITY COOLING TOWER CONTROLLER AND COMPONENTS FOR A FULLY AUTOMATED CHEMICAL TREATMENT SYSTEM FOR THE CONDENSING WATER LOOP. COORDINATE WITH OTHER TRADES TO INSTALL PER MANUFACTURER'S RECOMMENDATIONS. PRIOR TO INSTALLATION AND START UP, FLUSH THE CHILLED WATER SYSTEM PER SPECIFICATIONS.
 - (5) INSTALL ARMSTRONG DUAL ARM OR APPROVED EQUAL CHILLED WATER PUMP PER MANUFACTURER'S RECOMMENDATIONS. CONNECT TO EXISTING CHILLED WATER SUPPLY AND RETURN PIPING. MOUNT PER MANUFACTURER'S RECOMMENDATIONS.
 - (6) INSTALL VERTICAL INLINE CONDENSER WATER PUMP PER MANUFACTURER'S RECOMMENDATIONS. CONNECT TO WALL MOUNTED VFD. MOUNT PUMP PER MANUFACTURER'S RECOMMENDATIONS.
 - (8) (7) INSTALL DDC CONTROLLED VARIABLE AIR VOLUME AIR HANDLING UNIT TO SERVE FIRST FLOOR OFFICE SPACE. REUSE EXISTING HOUSEKEEPING PAD. COORDINATE INSTALLATION OF DDC CONTROL BOX WITH CONTROLS CONTRACTOR.
 - (8) (8) EXTEND AND CONNECT TO EXISTING RETURN AIR DUCTWORK.
 - (8) (9) CONNECT NEW AIR HANDLING UNIT TO EXISTING CHILLED WATER AND HEATING HOT WATER PIPE. PROVIDE ELECTRONICALLY ACTIVATED DDC CONTROLLED 2-WAY VALVE FOR CHILLED WATER AND HEATING HOT WATER PIPE CONNECTIONS.
 - (8) (10) PROVIDE NEW 6" CONDENSER WATER SUPPLY FROM COOLING TOWER TO EXISTING 8" CONDENSER WATER PIPE INSIDE FANHOUSE 1A. VERIFY EXISTING PIPE SUPPORTS ARE IN GOOD WORKING ORDER FOR REUSE. PROVIDE NEW STRAINER AND DDC CONTROLLED BINARY 2-WAY VALVE FOR EACH TOWER.
 - (8) (11) ROUTE HEATING HOT WATER SUPPLY AND RETURN PIPING DOWN TO SERVE FIRST FLOOR VAV TERMINAL UNITS ABOVE CEILING.
 - (12) INSTALL VFD'S FOR COOLING TOWERS AND COOLING TOWER PUMPS IN THIS LOCATION. VERIFY EXISTING CONDITIONS.
 - (13) PROVIDE NEW DDC CONTROLLED ELECTRONICALLY ACTIVATED 3-WAY VALVE FOR COOLING TOWER CONDENSER WATER RETURN ISOLATION.
 - (14) INTERLOCK EF-P1 WITH REFRIGERANT MONITOR SYSTEM TO OPERATE AT 100% (2,830 CFM) WHEN REFRIGERANT LEAK IS DETECTED.
 - (15) SINGLE BUTTON KILL SWITCH FOR REFRIGERANT MACHINERY AND PURGE FAN ACTIVATION BY ELECTRICAL CONTRACTOR. REFER TO CONTROL DIAGRAM FOR OPERATING REQUIREMENTS. SWITCH TO BE BEHIND CLEAR PROTECTIVE COVER (GLASS OR PLASTIC) AND MOUNTED MINIMUM 60" AFF.
 - (16) PROVIDE VISUAL/AUDIBLE ALARM TIED TO REFRIGERANT MONITORING SYSTEM. MOUNT 84" AFF. (CONFIRM HEIGHT)
 - (8) (17) CONNECT DOWN DISCHARGE AHU TO EXISTING SUPPLY AIR DUCT SERVING OFFICE SPACE BELOW.
 - (18) PROVIDE HALOGAURD (BASIS OF DESIGN) OR EQUIVALENT REFRIGERANT MONITORING SYSTEM. INSTALL PER MANUFACTURER'S RECOMMENDATIONS. WALL MOUNT MONITOR AT 60" AFF. PROVIDE START-UP AND VALIDATION TO THE CONTRACTING OFFICER.
 - (19) PROVIDE 18X18 EXHAUST DUCT 12" BELOW ROOF UP TO NORMAL OPERATION EXHAUST FAN ON ROOF CURB. INSTALL PER MANUFACTURER'S RECOMMENDATIONS. FAN SHALL RUN CONTINUOUSLY DURING OCCUPIED MODE.
 - (20) MOUNT BOTTOM OF LOUVER 12" AFF.
 - (21) PROVIDE SIEMENS DEMAND FLOW (BASIS OF DESIGN) SYSTEM FOR THE CENTRAL PLANT OPTIMIZATION PLATFORM. MOUNT ON WALL 60" AFF.
 - (22) INSTALL CHEMICAL POT FEEDER AT FLOOR FOR ACCESSIBILITY. CONNECT TO EXISTING CHILLED WATER PIPING.
 - (8) (23) MOUNT LOUVER AS HIGH AS POSSIBLE ON WALL.
 - (24) INSTALL 4" CHILLED WATER BYPASS LOOP WITH MODULATING CONTROL VALVE. REFER TO M602 FLOW DIAGRAM.
 - (25) MOUNT SIEMENS CONTROL BOX FOR AHU-B ON WALL.
 - (26) EF-P2 TO OPERATE WHILE FAN HOUSE 7 IS OCCUPIED. EF-P1 TO ACTIVATE BY EMERGENCY BUTTON, BUILDING AUTOMATION SYSTEM, OR REFRIGERANT MONITOR.
 - (27) 20x10 OPENING WITHIN 12" OF STRUCTURE. ROUTE 20x10 DOWN WALL TO WITHIN 12" OF AFF. TERMINATE WITH 1/4" MESH SCREEN.
 - (28) INSTALL FAN COIL UNIT CLOSE TO STRUCTURE. CONNECT 3/4" CHILLED WATER SUPPLY AND RETURN WITH 2-WAY VALVE AND CONNECT TO BAC SYSTEM.
 - (8) (29) ROUTE CONDENSATE DRAIN FROM AIR HANDLING UNIT TO OVER NEAREST FLOOR DRAIN.
 - (8) (30) MOUNT SIEMENS CONTROL BOX ON AIR HANDLING UNIT.

CLEANING AND WATER TREATMENT FOR CHILLED, CONDENSER AND HEATING HOT WATER SYSTEMS

WATER TREATMENT CONSISTS OF TWO SEPARATE STAGES, THE EXACT REQUIREMENTS BEING AS RECOMMENDED BY SPECIALIST WATER TREATMENT EQUIPMENT AND CHEMICAL MANUFACTURERS, ON THE BASIS OF A WATER ANALYSIS PROVIDED BY NASA.

THE FIRST STAGE TREATMENT FOLLOWS THE FLUSHING INDICATED ABOVE, THE SYSTEM THEN BEING CHEMICALLY CLEANED USING A SEQUESTERANT ANTI-FOULANT, OR ALKALINE BASED SOLUTIONS, ACCEPTABLE TO THE NRA AND LOCAL WATER AUTHORITY, HAVING A PH VALUE BETWEEN 5 AND 10.

THE SECOND STAGE CONSISTS OF A COMBINED CORROSION INHIBITOR AND ANTI-BIOLOGICAL FOULING AGENT BEING INTRODUCED.

FIXTURE SCHEDULE:

- (EW1) WALL-MOUNTED EMERGENCY EYE WASH: GUARDIAN # G1814-T, 11 1/2" DIAMETER STAINLESS STEEL BOWL AND STAY-OPEN BALL VALVE, EPOXY COATED ALUMINUM FLAG HANDLE, CAST ALUMINUM WALL BRACKET, TWO FILTERED SPRAY HEADS WITH SELF REGULATING FLOW CONTROL AND DUST COVERS, 1 1/2" CHROME PLATED BRASS TAIL PIECE AND MCGUIRE # B8912CF 1 1/2" 17 GAUGE CAST CHROME PLATED BRASS ADJUSTABLE P-TRAP WITH BRASS CLEANOUT AND ESCUTCHEON AND 1/2" INLET.

INSTALL ACCORDING TO MANUFACTURER'S RECOMMENDATIONS. EXTEND AND CONNECT 1/2" DOMESTIC COLD WATER TO NEAREST BRANCH OF EQUAL OR LARGER SIZE.

- MECHANICAL PLAN NOTES:**
- (1) REFURBISH EXISTING COOLING TOWERS. REPLACE FAN MOTORS WITH US MOTORS MODEL V00183, 15 HP, TEAO, FRAME 254-T PREMIUM EFFICIENCY COOLING TOWER DUTY MOTOR OR APPROVED EQUIVALENT. INSTALL AND CONNECT TO VFD IN FANHOUSE 1A AS INDICATED. REPLACE HOT WATER BASIN WITH NEW 304 STAINLESS STEEL OR BALTBOND PROTECTIVE COATING SYSTEM ON NEW BASIN. INSTALL WEIR DAM TO MATCH CONSTRUCTION OF HOT WATER BASIN AND PROVIDE NOZZLES FOR OPERATION OF THE TOWER DOWN TO 50% OF DESIGN FLOW. FIELD APPLY POLYURETHANE BARRIER (RHINO COAT) TO EXISTING COLD WATER BASIN.
 - (2) INSTALL NEW CHILLER ON EXISTING CONCRETE HOUSEKEEPING PAD WITH NEOPRENE ISOLATION PADS AND PER MANUFACTURER'S RECOMMENDATIONS. CONNECT TO EXISTING CHILLED WATER SUPPLY AND RETURN AND CONDENSER WATER SUPPLY AND RETURN PIPING. CONTRACTOR SHALL COORDINATE WITH THE MANUFACTURER TO PROVIDE ON-SITE CHILLER STARTUP, TUNING, COMMISSIONING AND TRAINING ONCE ALL ASSOCIATED SYSTEMS HAVE BEEN BROUGHT INTO OPERATION. PROVIDE SITE INTEGRATION WITH THE BAC CONTRACTOR TO INSURE PROPER COMMUNICATION AND OPERATION.
 - (3) PROVIDE 24x24 EXHAUST DUCT FROM 12" AFF UP TO EMERGENCY REFRIGERANT PURGE FAN ON ROOF CURB. INSTALL PER MANUFACTURER'S RECOMMENDATIONS.

NOTE:
INSTALL PROPER LOCAL JURISDICTION APPROVED BACKFLOW DEVICE IN THE WATER MAKE-UP FOR CONDENSER WATER AND CHILLED WATER SYSTEMS.

NOTE:
EXISTING CONDITIONS WERE TAKEN FROM ORIGINAL DRAWINGS & SITE VISITS AND MAY NOT REFLECT EXACT "AS-BUILT" CONDITIONS. FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO SUBMITTING FINAL BIDS. CAREFULLY COORDINATE NEW WORK AND DEMOLITION WITH ALL OTHER DISCIPLINES AND EXISTING CONDITIONS.

| ASHRAE 15 COMPLIANCE CALCULATION WORKSHEET | | | |
|--|-----------------|----------|---------------------|
| Item | Option 1 | Option 2 | ASHRAE 15 Reference |
| Altitude (ft) ¹ | 2,300 | | |
| Occupancy Classification ² | Commercial | | 4.1.6 |
| Refrigerating System Classification ³ | Indirect Closed | | 5.1.2 |
| Refrigerating System Leak Probability (High or Low) ⁴ | Low | | 5.2.2 |
| Refrigerant Type | R-134a | | |
| Refrigerant Group ⁵ | A1 | | Table 1 |
| System Application Requirements (1-9) | 4 | | Table 2, 7.4 |
| Quantity of Refrigerant in System (lb) ⁶ | 800 | | |
| Acceptable Refrigerant Quantity in Occupied Space (lb/1,000 ft ³) | 16.00 | | Table 1 |
| Adjusted Acceptable Refrigerant Quantity in Occupied Space (lb/1,000 ft ³) | 15.91 | | |
| Room Dimensions: | | | |
| Length (ft) | 40.0 | | |
| Width (ft) | 29.0 | | |
| Height (ft) | 12.0 | | |
| Room Volume (ft ³) ⁷ | 13,920 | | |
| Calculated Actual Refrigerant Concentrations (lb/1,000 ft ³) ⁸ | 57.47 | | |
| Actual Refrigerant Concentration Exceeds Adjusted Acceptable? | YES | | |
| Machinery Room Required? (YES or NO) | YES | | 7.4 |
| Mechanical Ventilation Required? | YES | | 7.4, 8.13 |
| Ventilation Rate (cfm) ⁹ | 2,828 | | 8.13.5 |
| Detector Required to Alarm and Activate Ventilation? | YES | | 7.4 |
| Remote Control of Machinery and Ventilation Required? | NO | | 8.14 |
| Self-Contained Breathing Apparatus Required? | YES | | 11.6 |

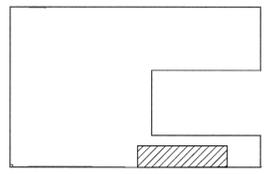
REFRIGERANT MONITOR SYSTEM:

THE DETECTOR(S) SHALL BE LOCATED IN AN AREA WHERE REFRIGERANT FROM A LEAK WILL CONCENTRATE, WHICH SHALL ACTIVATE AN ALARM AND MECHANICAL VENTILATION IN ACCORDANCE WITH 8.13.4 AT A VALUE NOT GREATER THAN THE CORRESPONDING TLV-TWA.

MONITOR SHALL EMPLOY PHOTOACOUSTIC INFRARED (IR) SENSOR TECHNOLOGY, FOR SENSING DOWN TO ONE PART PER MILLION (PPM) AND CALIBRATED FOR REFRIGERANT R-134a. THE SYSTEM SHALL BE CAPABLE OF INDICATING, ALARMING, SHUTTING DOWN EQUIPMENT AND AUTOMATION/VENTILATION INTERFACE.

ALL DISPLAYS SHALL BE VISIBLE FROM THE FRONT PANEL. DISPLAYED INFORMATION SHALL INCLUDE REFRIGERANT TYPE AND CONCENTRATION, SAMPLE LOCATION, AND SELF DIAGNOSTIC CONDITION REPORTS (FAULTS). LED'S SHALL INDICATE POWER, READY, ALARM 1, ALARM 2, ALARM 3 AND ANY FAULT CONDITION. ALL LED'S SHALL HAVE A CORRESPONDING NO/NC RELAY SO THAT THE SAME INFORMATION CAN BE REMOTELY DISPLAYED.

MULTIPLE CHILLER INSTALLATIONS SHALL CONSIDER A MULTIPLE POINT SYSTEM TO ADEQUATELY MONITOR THE MECHANICAL ROOM TO BE COMPLIANT WITHIN REGULATIONS.



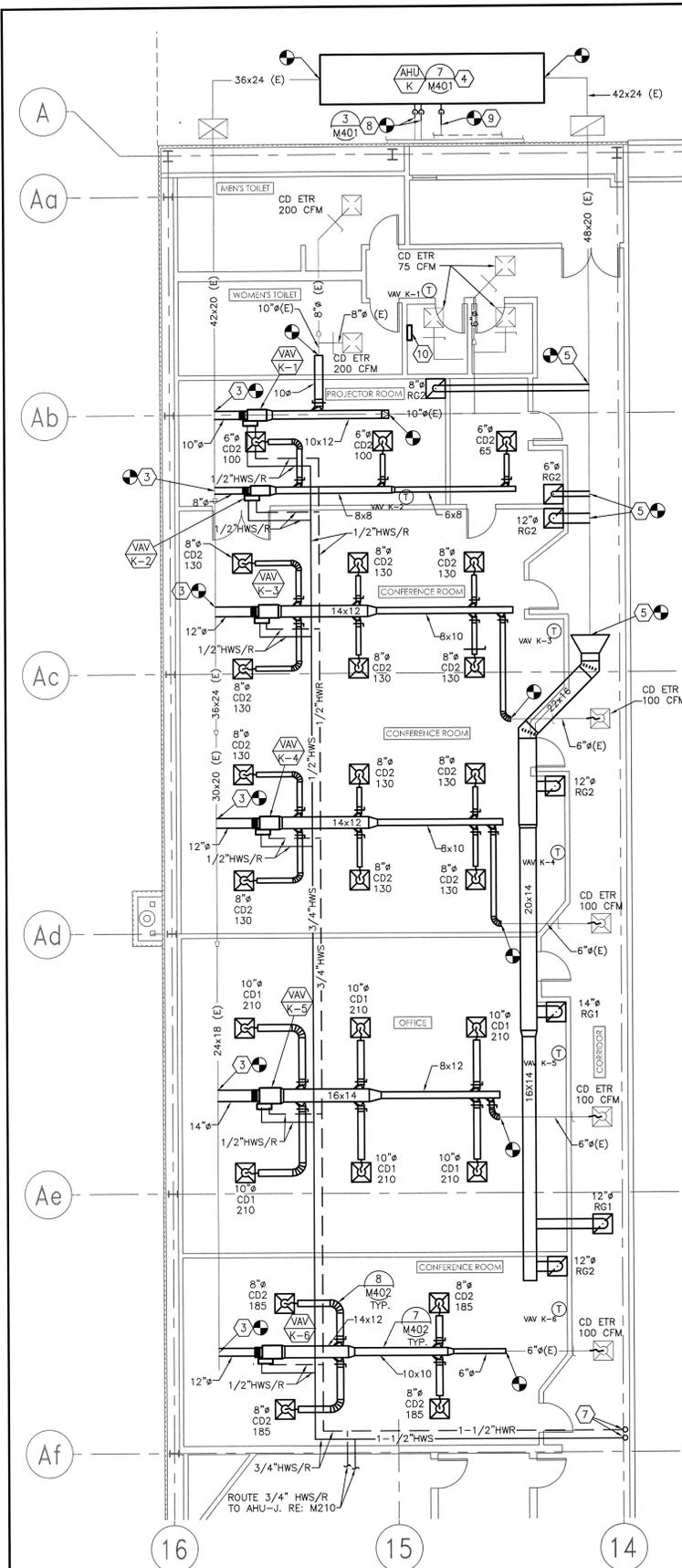
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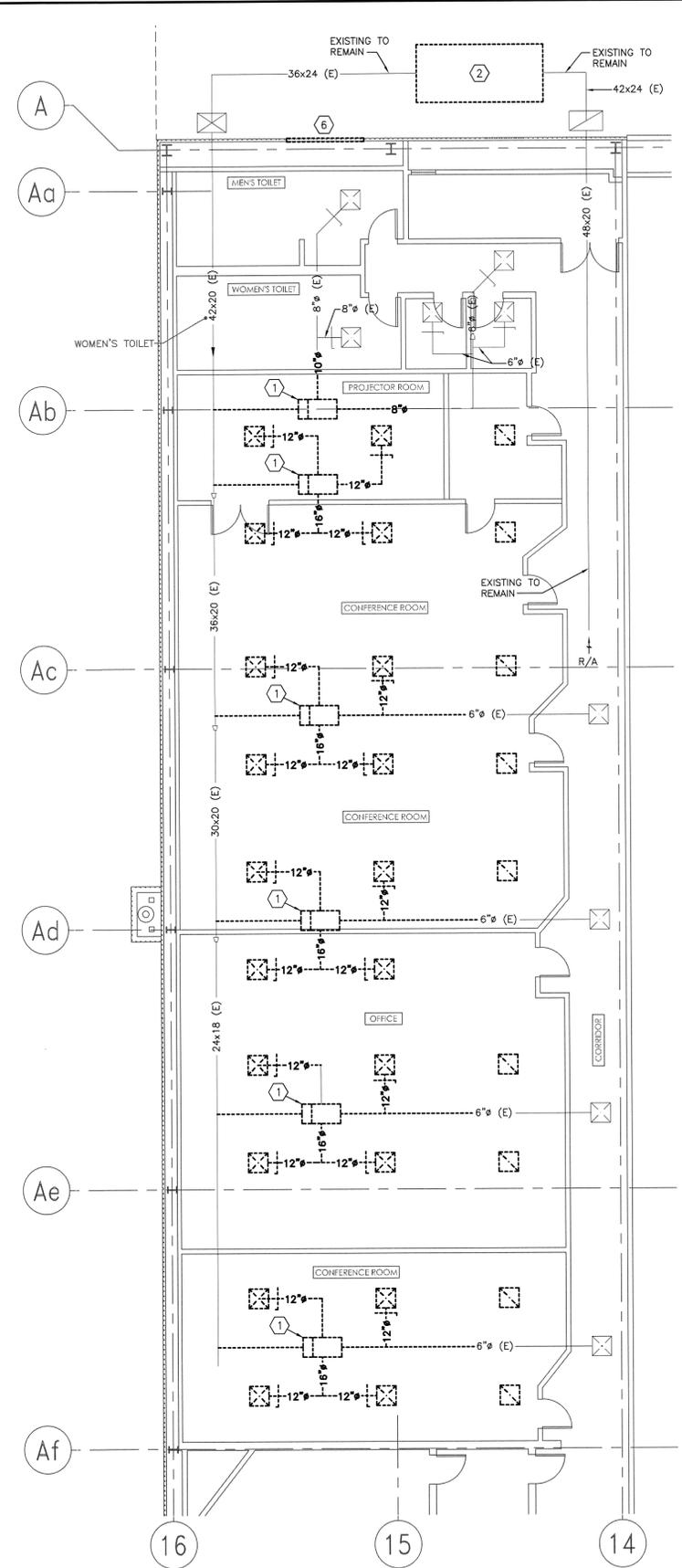
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| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | | |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | | |

| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION | | APPROVALS | | DATE |
|--|--|---|------------|--------------------|
| DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | Project Director/Engineer | 2-28-12 | |
| DRAWING TITLE | | Facilities Project Manager | 2-28-12 | |
| FANHOUSE 1 & 1A MECHANICAL PLAN | | Chief, Office of Protective Services | 2/27/12 | |
| PROJECT TITLE | | Chief, Safety Health & Environment Office | 2-27-13 | |
| MISSION CONTROL INFRASTRUCTURE REVITALIZATION | | AFM Chief Information Officer | 2/27/13 | |
| 100% FINAL DESIGN | | DATE PRINTED | 02/21/2013 | |
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| FILE NAME: EDM-1715-M-208.DWG | | SCALE: M | TRADE: 208 | SHEET No. 32 of 24 |

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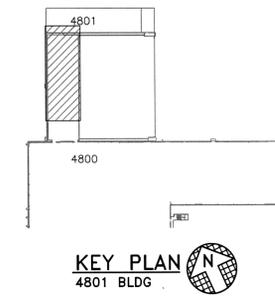


2 4801 MEZZANINE MECHANICAL PLAN
SCALE: 1/8"=1'-0"



1 4801 MEZZANINE MECHANICAL DEMOLITION PLAN
SCALE: 1/8"=1'-0"

- MECHANICAL PLAN NOTES:**
- DEMOLISH EXISTING DAMPER BOX, DUCT AND DIFFUSERS SHOWN DASHED. SEAL DUCTWORK FOR NEW WORK.
 - DEMOLISH EXISTING AIR HANDLING UNIT AND ASSOCIATED COMPONENTS ON ROOF. CAP DUCTWORK, GAS AND CHILLED WATER PIPE FOR RECONNECTION UNDER NEW WORK.
 - PROVIDE NEW VAV TERMINAL UNIT AND RECONNECT TO EXISTING DUCTWORK.
 - PROVIDE NEW VAV AIR HANDLING UNIT AND RECONNECT TO EXISTING EXTERIOR SUPPLY AND RETURN DUCTWORK.
 - CONNECT NEW RETURN DUCTWORK TO EXISTING RETURN AIR GRILLE.
 - SEAL PLENUM LOUVER AIR TIGHT.
 - NEW 1-1/2" HOT WATER SUPPLY AND RETURN PIPING FROM ROOF ABOVE. REFER TO DRAWING M103 FOR CONTINUATION.
 - EXTEND AND CONNECT 2" CHILLED WATER SUPPLY AND RETURN PIPING TO EXISTING PIPING. INSTALL 3-WAY MODULATING VALVE.
 - EXTEND AND CONNECT 1 1/4" GAS PIPE AND REGULATOR FOR 249 MBH TO EXISTING GAS PIPING.
 - MOUNT SIEMENS CONTROL BOX FOR AHU-K ON WALL.

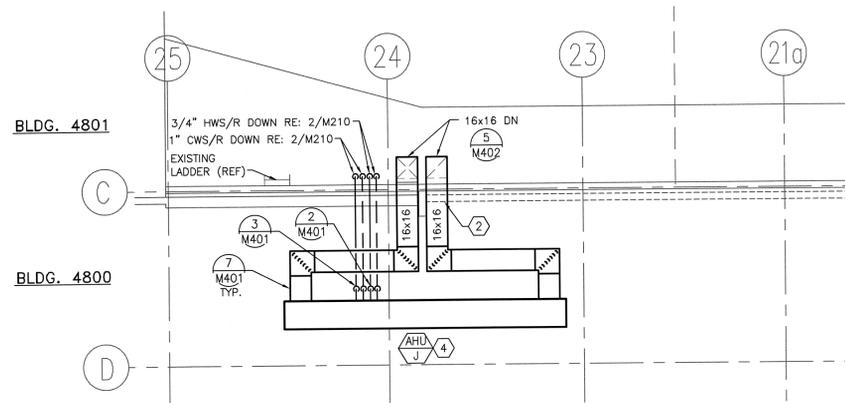


NOTE:
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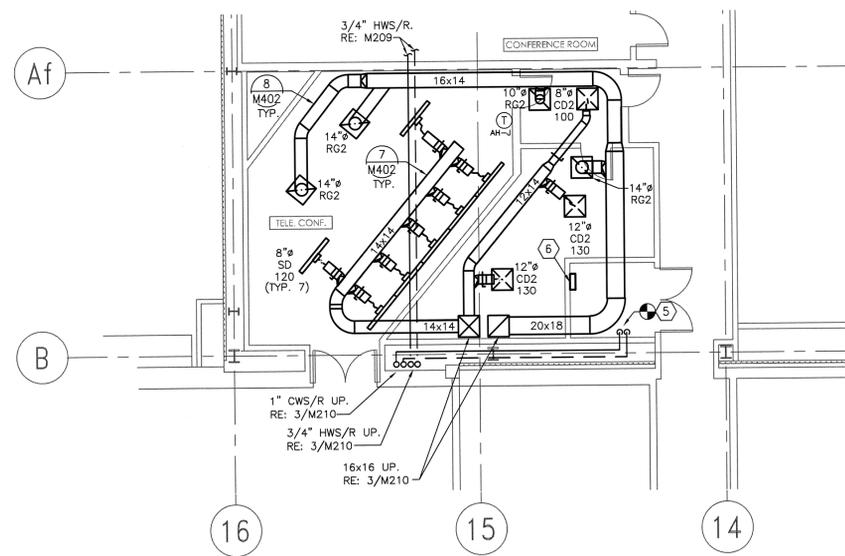
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|--|--|--|--|---|
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS Chief, Facilities Engineering & Maint. Office <i>[Signature]</i> Project Requestor/Customer <i>[Signature]</i> Facilities Project Manager <i>[Signature]</i> Chief, Office of Acoustic Services <i>[Signature]</i> Chief, Safety, Health & Environmental Office <i>[Signature]</i> Chief, Information Office <i>[Signature]</i> | | DATE 2-28-13 2-28-13 2/27/13 2-27-13 2/27/13 |
| DRAWING TITLE 4801 MEZZANINE MECHANICAL PLAN | | DATE PRINTED 02/21/2013 | | |
| PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | DRAWN BY HEI SCALE AS SHOWN TRADE SH. No. M 209 SHEET No. 38 of 24. | | |

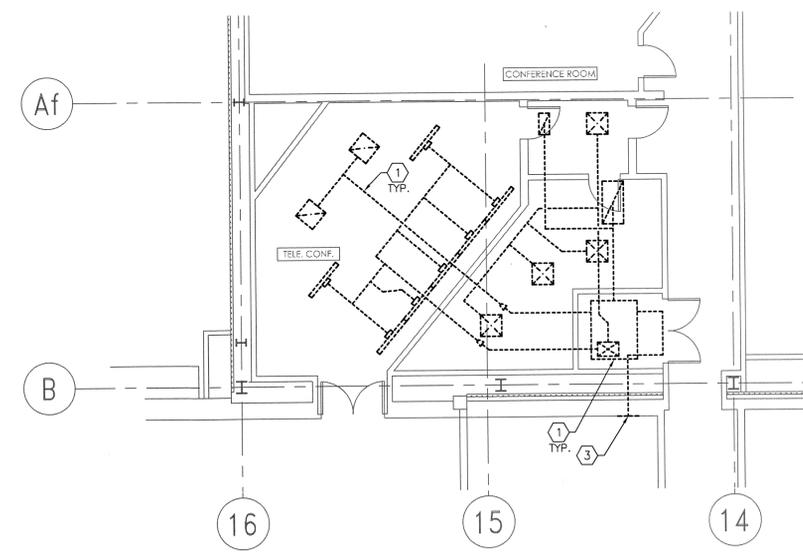


3 4801 TELECONFERENCE ROOM ROOF PLAN
SCALE: 1/8"=1'-0"

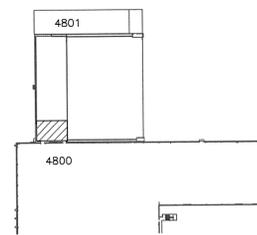
- MECHANICAL PLAN NOTES:**
- 1 DEMOLISH EXISTING AIR HANDLING UNIT AND ASSOCIATED FIXTURES, UTILITIES, AND DUCTWORK. CAP CWS/R FOR RE-CONNECTION.
 - 2 16x16 SUPPLY AND RETURN DUCTWORK THROUGH HANGAR WALL WITH WEATHER PROOF SEAL.
 - 3 DEMOLISH OUTSIDE AIR LOUVER. PATCH AND SEAL WEATHER TIGHT TO MATCH SURROUNDING STRUCTURE.
 - 4 INSTALL AHU ACCORDING TO MANUFACTURERS RECOMMENDATIONS. 3-WAY CHILLED WATER VALVE AND 2-WAY HOT WATER VALVE. REFER TO CONTROLS DIAGRAMS.
 - 5 EXTEND AND CONNECT 1" CWS/R TO EXISTING. LOCATE DIFFERENTIAL PRESSURE SENSOR FOR CHILLED WATER VARIABLE PRIMARY FLOW IN THIS LOCATION.
 - 6 MOUNT SIEMENS CONTROL BOX FOR AHU-J ON WALL.



2 4801 TELECONFERENCE ROOM MECHANICAL PLAN
SCALE: 1/8"=1'-0"



1 4801 TELECONFERENCE ROOM MECHANICAL DEMOLITION PLAN
SCALE: 1/8"=1'-0"

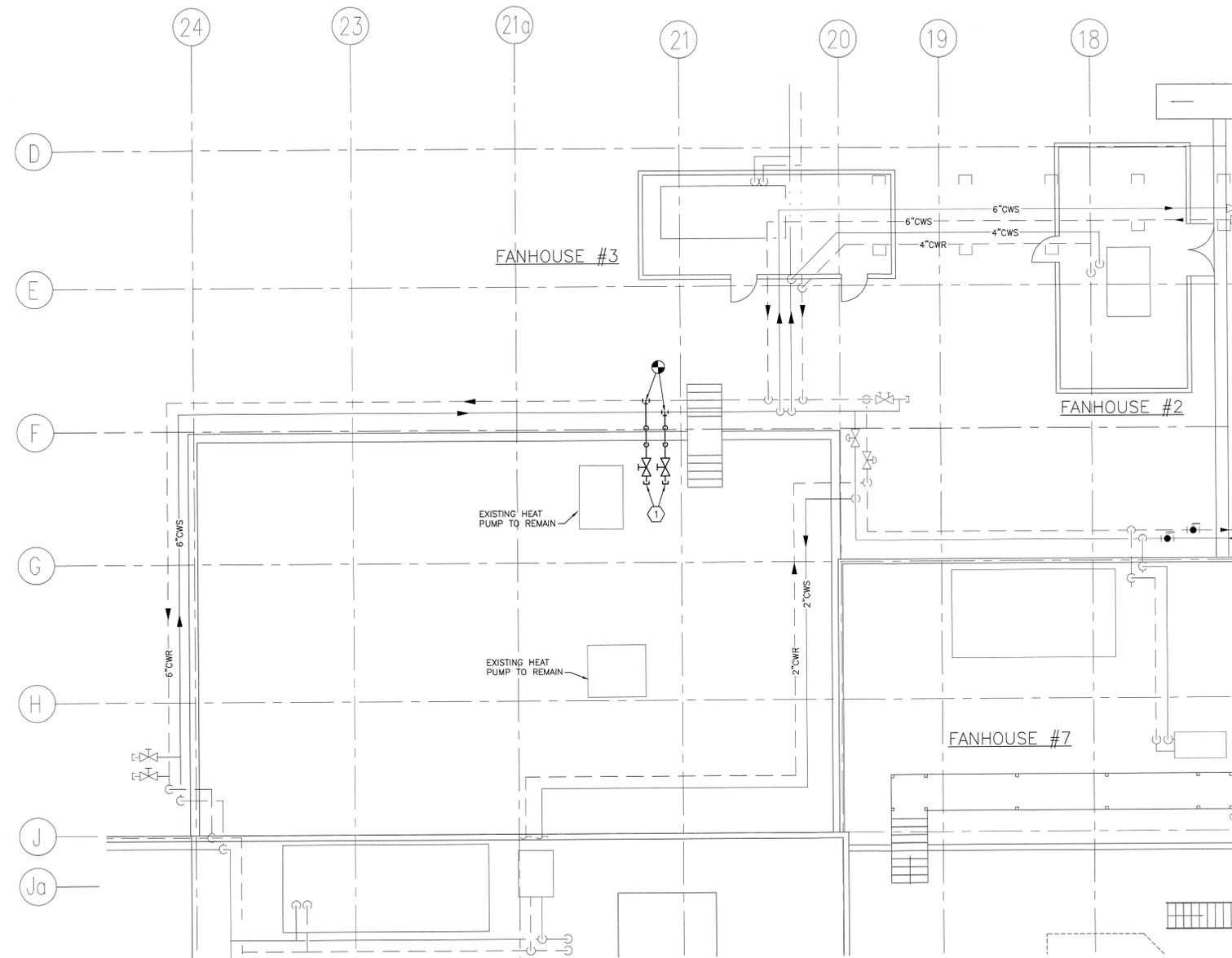


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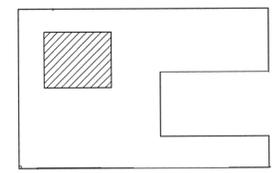
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| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS Chief, Facilities Engineering & Project Mgmt. Office Project Manager Facilities Project Manager Chief, Office of Protective Services Chief, Safety & Environmental Office Chief Information Officer | DATE 2-28-13 2-28-13 2/27/13 2-27-13 2/27/13 |
| DRAWING TITLE 4801 TELECONFERENCE ROOM MECHANICAL PLAN | | DATE STRTD HEI | DATE PRNTD 02/21/2013 |
| PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | SCALE AS SHOWN EDM-1715 M-210DWG | TRADE M 210 |
| | | FILE NAME EDM-1715 M-210DWG | SHEET No. 39 of 24 |



MECHANICAL PLAN NOTES:
 ① PROVIDE NEW 3" CAPPED CHILLED WATER SUPPLY AND RETURN VALVE FOR FUTURE USE.

1 BUILDING 4800 PARTIAL ROOF PLAN
 1/8" = 1'-0"



KEY PLAN
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
 DRYDEN FLIGHT RESEARCH CENTER
 EDWARDS, CA

DRAWING TITLE
 BUILDING 4800 PARTIAL ROOF PLAN

PROJECT TITLE
 MISSION CONTROL
 INFRASTRUCTURE REVITALIZATION
 100% FINAL DESIGN

| APPROVALS | | DATE |
|--|--|---------|
| Chief, Facilities Engineering & Asset Mgmt. Office | | 2-28-13 |
| Project Requestor/Logowner | | 2-28-13 |
| Facilities Project Manager | | 3/29/13 |
| Chief, Office of Property Services | | 2/27/13 |
| Chief, Safety & Environmental Management Office | | 2-27-13 |
| Chief Information Officer | | 3/21/13 |

| DATE STARTD | DATE PRINTD |
|-------------|-------------|
| 02/21/2013 | 02/21/2013 |

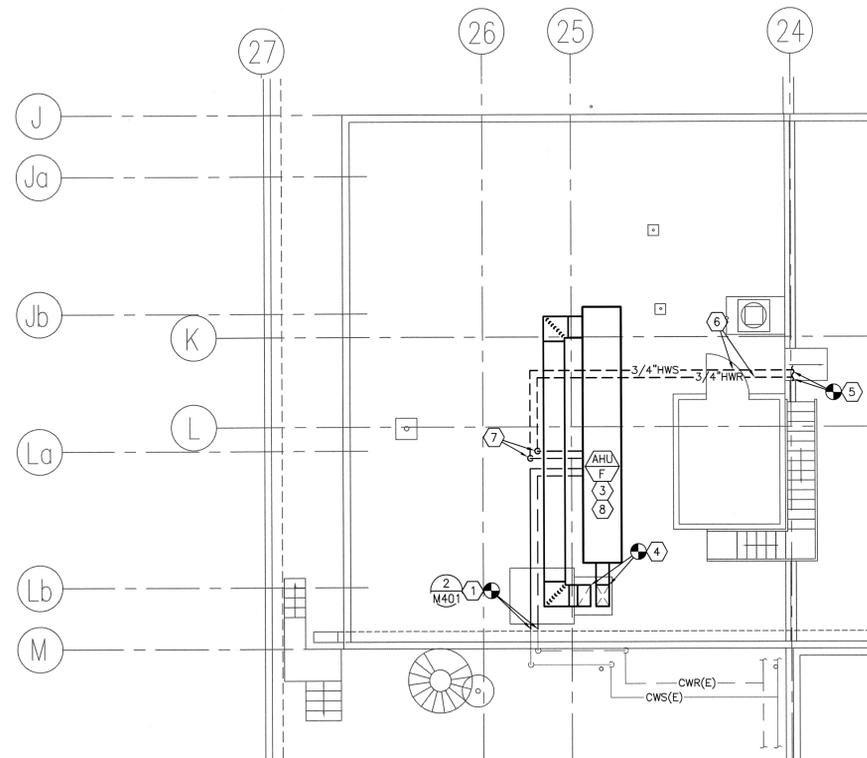
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| EDM-1715 | M-211.DWG |

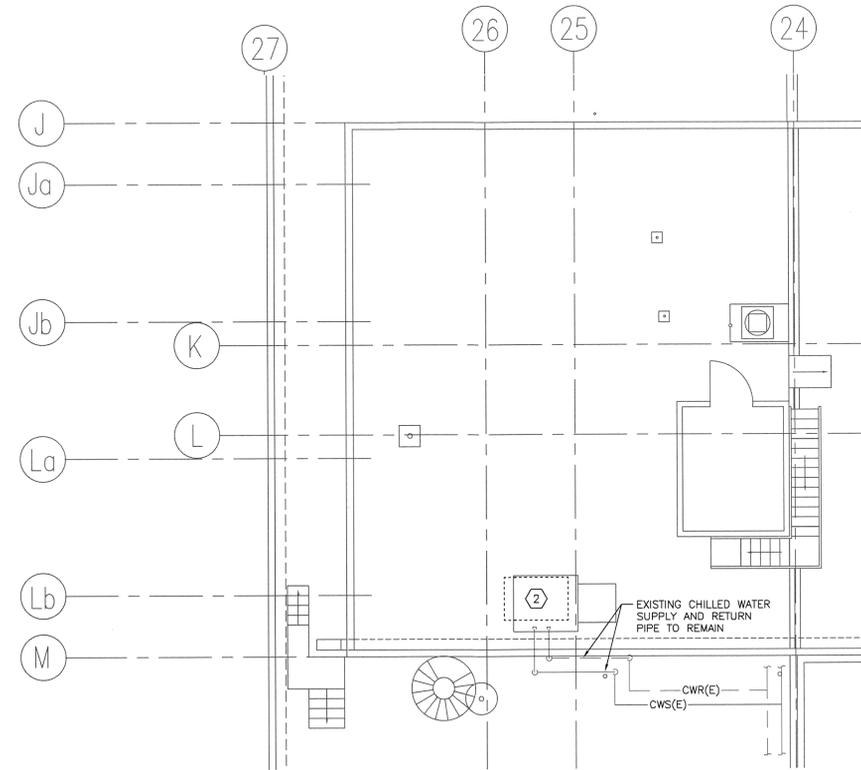
SHEET No. 40 of 74

MECHANICAL PLAN NOTES:

- ① EXTEND AND CONNECT TO EXISTING CHILLED WATER SUPPLY AND RETURN. PROVIDE 2-WAY VALVE FOR CHILLED WATER SUPPLY.
- ② DEMOLISH EXISTING AIR HANDLING UNIT AND ALL ACCESSORIES AND ASSOCIATED COMPONENTS AND CONTROLS. DEMOLISH EXISTING DUCTWORK AND CAP AND SEAL AT ROOF PENETRATION FOR CONNECTION UNDER NEW WORK. DEMOLISH EXISTING PIPING AND VALVES AS NECESSARY AND CAP FOR RE-CONNECTION UNDER NEW WORK. DEMOLISH ANY DUCT MOUNTED HEATING DEVICES FROM THE ASSOCIATED DUCTWORK BELOW. DEMOLISH EXISTING HOUSEKEEPING PAD AND REPAIR ROOF PER ARCHITECTURAL REQUIREMENTS
- ③ PROVIDE NEW DDC CONTROLLED CHILLED WATER/GAS HEAT AIR HANDLING UNIT ON ROOF TO SERVE AREA 3302.
- ④ EXTEND SUPPLY AND RETURN DUCTWORK DOWN TO EXISTING DUCTWORK ABOVE CEILING AND CONNECT.
- ⑤ REFER TO SHEET M103 FOR CONTINUATION. CONNECT TO HEATING HOT WATER PIPING IN MECHANICAL ROOM BA.
- ⑥ 3/4" HEATING HOT WATER SUPPLY AND RETURN LOCATED HIGH IN PLENUM SPACE ON FLOOR BELOW.
- ⑦ 3/4" HEATING HOT WATER SUPPLY AND RETURN FROM FLOOR BELOW TO ABOVE ROOF. PROVIDE 2 WAY CONTROL VALVE FOR HEATING HOT WATER SUPPLY.
- ⑧ ROUTE CONDENSATE DRAIN FROM AIR HANDLING UNIT TO OVER NEAREST ROOF DRAIN.



2 3103 ROOF MECHANICAL PLAN
SCALE: 1/8"=1'-0"



1 3103 ROOF MECHANICAL DEMOLITION PLAN
SCALE: 1/8"=1'-0"

NOTE:
EXISTING CONDITIONS WERE TAKEN FROM ORIGINAL DRAWINGS & SITE VISITS AND MAY NOT REFLECT EXACT "AS-BUILT" CONDITIONS. FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO SUBMITTING FINAL BIDS. CAREFULLY COORDINATE NEW WORK AND DEMOLITION WITH ALL OTHER DISCIPLINES AND EXISTING CONDITIONS.



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1150001204

| DATE | | SYM | REVISION | BY | A/P/D |
|----------|---|-----|----------------------------------|----|-------|
| 02-21-13 | E | | 100% FINAL DESIGN | | |
| 01-07-13 | D | | 95% NEAR-FINAL DESIGN SUBMITTAL | | |
| 10-27-12 | C | | 60% DEVELOPED DESIGN SUBMITTAL | | |
| 05-12-12 | B | | 30% PRELIMINARY DESIGN SUBMITTAL | | |

| | | | | |
|--|--|---|--|---|
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS | | DATE |
| DRAWING TITLE AREA 3103 MECHANICAL PLAN | | Chief, Facilities Engineering & Asset Mgmt. Office Project Requestor/Customer Facilities Project Manager Chief, Office of Protective Services Chief, Safety and Environmental Office AFRC Chief Information Office | | 2-28-13 2-28-13 2/27/13 2-27-13 2/27/13 |
| PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | DATE PRINTED 02/21/2013 | | TRADE M |
| DRAWN BY HEI | | SCALE AS SHOWN | | SHEET No. 41 of 24 |
| FILE NAME EDM-1715 W-212.DWG | | DATE PRINTED 02/21/2013 | | TRADE M |

| LOUVER SCHEDULE | | | | | | | | | | |
|-----------------|---------|--------------|-----------|-------------------|-------|------------------------|--------------------|------------------------|-------|--|
| MARK | SERVICE | MANUFACTURER | MODEL | SIZE (W" x H") | CFM | MIN. FREE AREA (SF) | MAX. VEL. (FPM) | MAX. P.D. (N. W.C.) | NOTES | |
| LV-1 | INTAKE | RUSKIN | ELF375DX | 34x34 | 2830 | 4.33 | 350 | 0.88 | A - E | |
| LV-2 | INTAKE | RUSKIN | ELF6375DX | 108x36 | 12000 | 13.33 | 1000 | 0.1 | A - E | |
| LV-3 | EXHAUST | RUSKIN | ELF6375DX | 108x36 | 12000 | 13.33 | 800 | 0.1 | A - E | |
| LV-4 | INTAKE | RUSKIN | ELF6375DX | 66x36 | 8600 | 8.60 | 1000 | 0.1 | A - E | |
| LV-5 | EXHAUST | RUSKIN | ELF6375DX | 66x36 | 8600 | 8.60 | 800 | 0.1 | A - E | |
| LV-6 | EXHAUST | RUSKIN | ELF6375DX | 24x30 | 1900 | 2.00 | 800 | 0.1 | A - E | |
| LV-7 | INTAKE | RUSKIN | ELF6375DX | 30x36 | 2000 | 3.75 | 1000 | 0.1 | A - E | |
| LV-8 | EXHAUST | RUSKIN | ELF6375DX | 30x36 | 2000 | 3.75 | 800 | 0.1 | A - E | |

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:
 A. PROVIDE 1/4" MESH ALUMINUM BIRD SCREEN.
 B. PROVIDE STANDARD MILL FINISH.
 C. FRAME TYPE SHALL MATCH WALL CONSTRUCTION, COORDINATE WITH ARCHITECT.
 D. PROVIDE WITH INTEGRAL COUNTER-BALANCED BACKDRAFT DAMPER.
 E. PROVIDE LOUVER WITH SEISMIC RATING AND SUPPORTS TO MEET SPECIFIED PROJECT SEISMIC CRITERIA.

OP 1
OP 1

| GRILLE, REGISTER AND DIFFUSER SCHEDULE | | | | | | | | | | |
|--|--------------|-------|--------------------|----------------------|------------------|------------|-------------------------------|-------------|--|--|
| MARK | MANUFACTURER | MODEL | FACE TYPE | MOUNTING LOCATION | FACE SIZE (N) | MAX. NC | MAX. PRESS. DROP (N. W.C.) | NOTES | | |
| CD1 | TITUS | TMS | LOUVERED | LAY-IN | 24x24 | 25 | 0.1 | A,B,C,D,E,F | | |
| CD2 | TITUS | TMS | LOUVERED | GYP CEILING | 24x24 | 25 | 0.1 | A,B,C,D,E,F | | |
| CD3 | TITUS | TMS | LOUVERED | GYP CEILING | 12x12 | 25 | 0.1 | A,B,C,D,E,F | | |
| SD | TITUS | ML-40 | 1-1/2" LINEAR SLOT | GYP CEILING | 48" | 25 | 0.1 | A,C,D,E,G,H | | |
| RG1 | TITUS | 300RL | LOUVERED | LAY-IN | 24x24 | -- | -- | A,C,D,E,F | | |
| RG2 | TITUS | 300RL | LOUVERED | GYP CEILING | 24x24 | -- | -- | A,C,D,E,F | | |

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:
 A. NECK SIZE SHOWN ON DRAWINGS.
 B. 4-WAY THROW PATTERN UNLESS OTHERWISE SHOWN ON DRAWINGS.
 C. BRANCH DUCT SIZE SHALL BE SAME AS NECK SIZE UNLESS OTHERWISE SHOWN ON DRAWINGS.
 D. BAKED ENAMEL FINISH, WHITE TO MATCH CEILING COLOR.
 E. PROVIDE NECK FOR DUCT CONNECTION.
 F. FRAME TYPE TO MATCH CEILING CONSTRUCTION, COORDINATE WITH ARCHITECTURAL REFLECTED CEILING PLAN.
 G. PROVIDE BORDER TYPE TO MATCH CEILING CONSTRUCTION WITH CONCEALED MOUNTING, AND INSULATED PLENUM WITH NECK.
 H. PROVIDE WITH 4 SLOTS.

| CHILLER SCHEDULE (WATER COOLED) | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------------|--------------|-------------|----------------|----------------|--------------|---------------|------|---------------|------------------------|-------------|-------------|-----------------|-------------|-----------------------|-------------|-----------------|------|---------------|-----------------|-----|------|---------------|-------|-------|
| MARK | MANUFACTURER | MODEL | CAP. (TONS) | MAX. KW/TON | MAX. NPLV | REFR. TYPE | PASS | DESIGN GPM | EVAPORATOR MIN. GPM | EWT (°F) | LWT (°F) | MAX. PD (FT) | PASS GPM | CONDENSER EWT (°F) | LWT (°F) | MAX. PD (FT) | V/PH | DISC. TYPE | STARTER TYPE | MCA | MCCP | WEIGHT LBS | NOTES | |
| CH-1 | SMART | WA120.4BG03 | 328 | 0.62 | | 134A | 2 | 786.3 | 267 | 55 | 45 | 6.94 | 2 | 987.5 | 85 | 95 | 9.69 | 480/3 | FUSED | VFD | 340 | 400 | 13907 | A - F |
| CH-2 | SMART | WA120.4BG03 | 328 | 0.62 | | 134A | 2 | 786.3 | 267 | 55 | 45 | 6.94 | 2 | 987.5 | 85 | 95 | 9.69 | 480/3 | FUSED | VFD | 340 | 400 | 13907 | A - F |

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:
 A. DISCONNECT SWITCH FURNISHED BY DIVISION 26 CONTRACTOR.
 B. FACTORY PROVIDED STARTER.
 C. EVAPORATOR BASED ON FOULING FACTOR OF [0.0001]. CONDENSER BASED ON FOULING FACTOR OF [0.00025].
 D. REUSE EXISTING CONCRETE HOUSEKEEPING PAD. VERIFY EXISTING CONDITIONS.
 E. COORDINATE SIZE OF CONDUCTOR TERMINATION LUGS WITH CONDUCTOR SIZES SHOWN ON ELECTRICAL DRAWINGS.
 F. PROVIDE FLOW OR DIFFERENTIAL PRESSURE SWITCH FOR FIELD INSTALLATION.

| FAN SCHEDULE | | | | | | | | | | | | | | |
|--------------|-------------------------|--------------|----------|--------|------|-------------|------------------------|------------|------------|--------------|------------|------------|--------------|-------|
| MARK | SERVICE (EA, RA, SA) | MANUFACTURER | MOUNTING | MODEL | CFM | ESP (IN) | DRIVE (BELT/DIRECT) | MIN. HP | FAN RPM | VFD (Y/N) | ELECTRICAL | | NOTES | |
| | | | | | | | | | | | V/PH | DISC. TYPE | STARTER TYPE | |
| EF-P1 | EA | COOK | ROOFTOP | ACRU-D | 2830 | 0.25 | DIRECT | 3/4 | 1429 | N | 120/1 | FACTORY | --- | A - D |
| EF-P2 | EA | COOK | ROOFTOP | ACE-D | 580 | 0.25 | DIRECT | 1/8 | 1331 | N | 120/1 | FACTORY | --- | A - D |

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:
 A. PROVIDE WITH MINIMUM 8" HIGH ROOF CURB, BIRDSCREEN AND BACKDRAFT DAMPER.
 B. PROVIDE FACTORY MOUNTED DISCONNECT SWITCH.
 C. DIVISION 23 CONTRACTOR TO FURNISH STARTER.
 D. INTERLOCK FAN OPERATION WITH BUILDING AUTOMATION SYSTEM AND REFRIGERANT MONITOR.

| PUMP SCHEDULE | | | | | | | | | | | | | | | |
|---------------|-----------------|--------------|-------------|----------|----------|------------|-----------|---------------|---------|------|-------|--------------------|-----------------|--------------|-------|
| MARK | SERVICE | MANUFACTURER | MODEL | SIZE | MOUNTING | FLOW (GPM) | HEAD (FT) | NPSHA (FT) | MIN. HP | RPM | V/PH | DISCONNECT TYPE | STARTER TYPE | VFD (Y/N) | NOTES |
| CWP-1 | CHILLED WATER | ARMSTRONG | SERIES 4302 | 8x8x11.5 | INLINE | 787 | 110 | 15 | 30 | 1800 | 480/3 | FUSED | VFD | Y | A-F |
| CWP-2 | CHILLED WATER | ARMSTRONG | SERIES 4302 | 8x8x11.5 | INLINE | 787 | 110 | 15 | 30 | 1800 | 480/3 | FUSED | VFD | Y | A-F |
| CTP-1 | CONDENSER WATER | ARMSTRONG | SERIES 4300 | 6x6x13 | INLINE | 988 | 50 | 4 | 20 | 1170 | 480/3 | FUSED | VFD | Y | A-E |
| CTP-2 | CONDENSER WATER | ARMSTRONG | SERIES 4300 | 6x6x13 | INLINE | 988 | 50 | 4 | 20 | 1170 | 480/3 | FUSED | VFD | Y | A-E |

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:
 A. PROVIDE WITH AIR SEPARATOR AND THREE WAY VALVE.
 B. SUPPORT PUMP FROM PIPING.
 C. DISCONNECT SWITCH FURNISHED BY DIVISION 26 CONTRACTOR.
 D. VFD FURNISHED BY PUMP MANUFACTURER.
 E. PUMP MOTOR SHALL BE NON-OVERLOADING THROUGHOUT THE FULL RANGE OF THE PUMP CURVE.
 F. DUALARM STYLE VERTICAL INLINE PUMP

JASON D. ZOELLER



| | | | | |
|---|----------------------|--|----------|------------|
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS Chief, Facilities Engineering & Asset Mgmt. Office <i>[Signature]</i> 2-28-13 Project Requestor/Customer <i>[Signature]</i> 2-28-13 Facilities Manager <i>[Signature]</i> 2/27/13 Chief, Office of Protective Services <i>[Signature]</i> 2/27/13 Chief, Safety & Security, Environmental Office <i>[Signature]</i> 2-27-13 Project Information Officer <i>[Signature]</i> 2/27/13 | | DATE |
| DRAWING TITLE | | MECHANICAL SCHEDULES | | |
| PROJECT TITLE | | MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | |
| 02-21-13 | E | 100% FINAL DESIGN | | |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | | |
| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | | |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | | |
| DATE | SYM | REVISION | BY | A/PD |
| DRAWN BY | | HEI | | |
| SCALE | AS SHOWN | TRADE | EDM-1715 | |
| FILE NAME | EDM-1715 M-3012WC | SHEET No. | 301 | |
| DATE STRTD | | DATE PRNTD | | 02/21/2013 |
| SHEET No. 42 of 24 | | | | |

AIR HANDLING UNIT SCHEDULE (HOT WATER HEAT)

| MARK | MANUFACTURER | MODEL | UNIT TYPE | FAN TYPE | SUPPLY FAN | | | | RETURN FAN | | | | COOLING COIL | | | | HEATING COIL | | | | FILTERS | | | | DISC. TYPE | STARTER TYPE | WEIGHT LBS | NOTES | | | | | | | | | | | | | | | | | | | | | |
|-------|--------------|-------------|-----------|----------|------------|----------|--------|-----------|------------|----------|--------|----------|--------------|-----------|-------|----------|--------------|--------|------|------|---------|----------|----------|---------------|------------|--------------|------------|-------|---------------|-----------------|------------|--------------|-----------------|----------|----------|------|----------|----------|---------------|---------------|-----------------|------------|--------------|--------------|-------------------|----------|---------------------|---------|-----|
| | | | | | CFM | ESP (IN) | MIN HP | VFD (Y/N) | V/PH | FAN TYPE | CFM | ESP (IN) | MIN HP | VFD (Y/N) | V/PH | TH (MBH) | SH (MBH) | EAT DB | WB | LAT | GPM | EWT (°F) | LWT (°F) | MAX. WPD (FT) | | | | | MAX. APD (IN) | MAX. VEL. (FPM) | ROWS / FPI | NO. OF COILS | MIN. CAP. (MBH) | EAT (DB) | LAT (DB) | GPM | EWT (°F) | LWT (°F) | MAX. WPD (FT) | MAX. APD (IN) | MAX. VEL. (FPM) | ROWS / FPI | NO. OF COILS | MIN. O/A CFM | PRE-FILTERS EFF % | SP LOSS | FINAL FILTERS EFF % | SP LOSS | |
| AHU-A | TRANE | PERFORMANCE | AHU | FC | 8,070 | 1.50 | 7.5 | Y | 460/3 | FC | 8,070 | 0.5 | 5 | Y | 460/3 | 242.3 | 237.5 | 80.0 | 63.0 | 54.7 | 53.3 | 48.3 | 45 | 55 | 4.4 | 0.35 | 412 | 6/6 | 1 | 200.5 | 65.0 | 86.6 | 10 | 180 | 140 | 3.27 | 0.07 | 504 | 1/6.7 | 1 | 1300 | --- | --- | 30 | 0.53 | INTEGRAL | INTEGRAL | 4314 | A-L |
| AHU-B | TRANE | PERFORMANCE | AHU | FC | 10,600 | 1.50 | 15 | Y | 460/3 | FC | 10,600 | 0.5 | 10 | Y | 460/3 | 287.8 | 282.2 | 80.0 | 63.0 | 55.0 | 53.7 | 57.4 | 45 | 55 | 6.4 | 0.77 | 631 | 6/7.4 | 1 | 162.5 | 69.0 | 83.1 | 8.12 | 180 | 140 | 0.19 | 0.13 | 707 | 1/6.7 | 1 | 350 | --- | --- | 30 | 0.6 | INTEGRAL | INTEGRAL | 5212 | A-L |
| AHU-C | TRANE | PERFORMANCE | AHU | FC | 5,870 | 1.50 | 7.5 | Y | 460/3 | FC | 5,870 | 0.5 | 5 | Y | 460/3 | 153.1 | 141.8 | 77.0 | 63.0 | 55.0 | 54.1 | 30.5 | 45 | 55 | 2.7 | 0.51 | 477 | 6/7.1 | 1 | 103.6 | 67.0 | 83.3 | 5.18 | 180 | 140 | 0.1 | 0.07 | 522 | 1/6.7 | 1 | 250 | --- | --- | 30 | 0.56 | INTEGRAL | INTEGRAL | 4531 | A-L |
| AHU-F | TRANE | PERFORMANCE | AHU | FC | 2,280 | 1.50 | 2 | Y | 208/3 | FC | 2,280 | 5 | 1.5 | Y | 208/3 | 64.9 | 61.1 | 78.0 | 63.0 | 54.4 | 53.1 | 12.9 | 45 | 55 | 1.7 | 0.3 | 370 | 6/6 | 1 | 59.4 | 62.0 | 86.2 | 2.97 | 180 | 140 | 2.94 | 0.05 | 424 | 1/6.7 | 1 | 200 | --- | --- | 30 | 0.53 | INTEGRAL | INTEGRAL | 3392 | A-L |
| AHU-G | TRANE | PERFORMANCE | AHU | FC | 2,040 | 1.50 | 2 | Y | 460/3 | FC | 2,040 | 0.5 | 1 | Y | 460/3 | 48.2 | 47.2 | 80.0 | 63.0 | 55.0 | 54.3 | 9.6 | 45 | 55 | 0.6 | 0.37 | 421 | 6/8.1 | 1 | 43.3 | 62.0 | 83.0 | 2.16 | 180 | 140 | 0.57 | 0.06 | 475 | 1/6.7 | 1 | 600 | --- | --- | 30 | 0.54 | INTEGRAL | INTEGRAL | 1623 | A-L |
| AHU-H | TRANE | PERFORMANCE | AHU | FC | 11,900 | 1.50 | 10 | Y | 460/3 | FC | 11,900 | 0.5 | 7.5 | Y | 460/3 | 318.2 | 287.5 | 77.0 | 63.0 | 55.0 | 53.9 | 63.4 | 45 | 55 | 4.9 | 0.49 | 476 | 6/6.7 | 1 | 233.9 | 67.0 | 85.1 | 11.7 | 180 | 140 | 0.29 | 0.07 | 494 | 1/6.7 | 1 | 600 | --- | --- | 30 | 0.55 | INTEGRAL | INTEGRAL | 5116 | A-L |
| AHU-J | TRANE | PERFORMANCE | AHU | FC | 1,200 | 1.50 | 1.5 | Y | 460/3 | FC | 1,200 | 0.5 | 1 | Y | 460/3 | 33.1 | 32.9 | 80.0 | 63.0 | 55.0 | 53.5 | 6.6 | 45 | 55 | 3.4 | 0.38 | 480 | 4/9.8 | 1 | 24.4 | 62.0 | 80.8 | 1.22 | 180 | 140 | 0.19 | 0.06 | 480 | 1/6.7 | 1 | 300 | --- | --- | 30 | 0.54 | INTEGRAL | INTEGRAL | 2788 | A-L |

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:

- A. PROVIDE FACTORY MOUNTED DISCONNECT, STARTER, AND VARIABLE FREQUENCY DRIVES.
- B. PROVIDE SINGLE POINT POWER CONNECTION.
- C. SPECIFIED FAN ESP ACCOUNTS FOR DUCT LOSSES EXTERNAL TO UNIT.
- D. SPECIFIED FAN TSP INCLUDES EXTERNAL DUCT AND INTERNAL FILTER, COIL AND CASING LOSSES. FILTER LOSS IS AT MAXIMUM 480 FPM.
- E. DIVISION 28 CONTRACTOR SHALL PROVIDE SMOKE DETECTORS IN RETURN AIR AND SUPPLY AIR DUCTS.
- F. UNIT SHALL BE DRAW THRU CONFIGURATION.
- G. PROVIDE ROOF CURB PER SPECIFICATIONS.
- H. VERIFY THAT ALL UNIT ACCESS DOORS ARE LOCATED ON ACCESSIBLE SIDE OF UNIT. DOORS SHALL NOT BE BLOCKED BY DUCTWORK OR PIPING.
- J. AIR HANDLING UNIT SHALL BE DDC CONTROLLED.
- K. AIR HANDLING UNIT SHALL BE INTERNALLY ISOLATED.
- L. LOCATE PRESSURE GAUGE 2/3 OF THE WAY DOWN DUCTWORK.

AIR HANDLING UNIT SCHEDULE (GAS HEAT)

| MARK | MANUFACTURER | MODEL | UNIT TYPE | FAN TYPE | SUPPLY FAN | | | | RETURN FAN | | | | COOLING COIL | | | | GAS HEAT | | | | FILTERS | | | | DISC. TYPE | STARTER TYPE | WEIGHT LBS | NOTES | | | | | | | | | | | | | | | |
|-------|--------------|-------------|-----------|----------|------------|----------|--------|-----------|------------|----------|-------|----------|--------------|-----------|-------|----------|----------|--------|------|------|---------|----------|----------|---------------|------------|--------------|------------|-------|---------------|-----------------|------------|--------------|-----------------|---------------|------------------|-----------------|---------|---------|-------------------|----------|---------------------|---------|-----|
| | | | | | CFM | ESP (IN) | MIN HP | VFD (Y/N) | V/PH | FAN TYPE | CFM | ESP (IN) | MIN HP | VFD (Y/N) | V/PH | TH (MBH) | SH (MBH) | EAT DB | WB | LAT | GPM | EWT (°F) | LWT (°F) | MAX. WPD (FT) | | | | | MAX. APD (IN) | MAX. VEL. (FPM) | ROWS / FPI | NO. OF COILS | MIN. CAP. (MBH) | MIN. EFF. (%) | NOM. INPUT (MBH) | MIN. NO. STAGES | LAT (F) | O/A CFM | PRE-FILTERS EFF % | SP LOSS | FINAL FILTERS EFF % | SP LOSS | |
| AHU-D | TRANE | PERFORMANCE | AHU | FC | 2,500 | 1.50 | 3 | Y | 460/3 | FC | 2,500 | 0.50 | 2 | Y | 460/3 | 67.4 | 60.4 | 77.0 | 63.0 | 55.0 | 53.8 | 13.4 | 45 | 55 | 1.8 | 0.37 | 409 | 6/6 | 1 | 199.2 | 80% | 249.0 | MODULAR | 141.4 | 300 | --- | --- | 30 | 0.54 | INTEGRAL | INTEGRAL | 4077 | A-L |
| AHU-E | TRANE | PERFORMANCE | AHU | FC | 2,400 | 1.50 | 2 | Y | 460/3 | FC | 2,400 | 0.5 | 2 | Y | 460/3 | 63.8 | 63.0 | 78.0 | 62.0 | 54.0 | 52.7 | 12.7 | 45 | 55 | 1.7 | 0.316 | 393 | 6/6 | 1 | 199.2 | 80% | 249.0 | MODULAR | 140.5 | 220 | --- | --- | 30 | 0.54 | INTEGRAL | INTEGRAL | 4308 | A-L |
| AHU-K | TRANE | PERFORMANCE | AHU | FC | 4,850 | 1.50 | 7.5 | Y | 460/3 | FC | 4,850 | 0.5 | 5 | Y | 460/3 | 173.3 | 173.3 | 86.0 | 63.0 | 55.0 | 51.0 | 34.5 | 45 | 55 | 3.9 | 0.504 | 511 | 6/8.1 | 1 | 199.2 | 80% | 249.0 | MODULAR | 88.5 | 1400 | --- | --- | 30 | 0.56 | INTEGRAL | INTEGRAL | 4648 | A-L |

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NOTES:

- A. PROVIDE FACTORY MOUNTED DISCONNECT, STARTER, AND VARIABLE FREQUENCY DRIVES.
- B. PROVIDE SINGLE POINT POWER CONNECTION.
- C. SPECIFIED FAN ESP ACCOUNTS FOR DUCT LOSSES EXTERNAL TO UNIT.
- D. SPECIFIED FAN TSP INCLUDES EXTERNAL DUCT AND INTERNAL FILTER, COIL AND CASING LOSSES. FILTER LOSS IS AT MAXIMUM 480 FPM.
- E. DIVISION 28 CONTRACTOR SHALL PROVIDE SMOKE DETECTORS IN RETURN AIR AND SUPPLY AIR DUCTS.
- F. UNIT SHALL BE DRAW THRU CONFIGURATION.
- G. PROVIDE ROOF CURB PER SPECIFICATIONS.
- H. VERIFY THAT ALL UNIT ACCESS DOORS ARE LOCATED ON ACCESSIBLE SIDE OF UNIT. DOORS SHALL NOT BE BLOCKED BY DUCTWORK OR PIPING.
- J. AIR HANDLING UNIT SHALL BE DDC CONTROLLED.
- K. AIR HANDLING UNIT SHALL BE INTERNALLY ISOLATED.
- L. LOCATE PRESSURE GAUGE 2/3 OF THE WAY DOWN DUCTWORK.

FAN COIL UNIT SCHEDULE (HYDRONIC COILS)

| MARK | MANUFACTURER | MODEL | SUPPLY FAN | | | COOLING COIL | | | | DISC. TYPE | STARTER TYPE | WEIGHT LBS | NOTES | | | | | | | | | | | |
|-------|--------------|----------|------------|----------|--------|--------------|-----|-----|----------|------------|--------------|------------|-------|----------|------------|---------------|-----------------|--------------|------|-------|--------|-----|-----|-----|
| CFM | MIN. HP | ESP (IN) | TH (MBH) | SH (MBH) | EAT DB | WB | LAT | GPM | EWT (°F) | | | | | LWT (°F) | ROWS / FPI | MAX. WPD (FT) | MAX. VEL. (FPM) | MIN. O/A CFM | V/PH | | | | | |
| FC-R1 | IEC | HLV-20 | 2,000 | 425 | W | 0 | 66 | 48 | 80 | 67 | 55 | 5.3 | 13.2 | 45 | 55 | 4 | 10 | 500 | --- | 115/1 | SWITCH | --- | 255 | A-H |

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:

- A. EQUIPMENT COMPONENTS SHALL BE BY THE SAME MANUFACTURER.
- B. PROVIDE 2" 30X PLEATED THROWAWAY AIR FILTERS.
- C. PROVIDE WITH BACK INLET CONNECTION.
- D. PROVIDE WITH FRONT OUTLET CONNECTION.
- E. PROVIDE FACTORY MOUNTED DISCONNECT SWITCH.
- F. STARTER FURNISHED BY DIVISION 26 CONTRACTOR.
- G. PROVIDE WITH SPRING VIBRATION ISOLATION AND ALL-THREAD HANGING RODS.
- H. PROVIDE AUXILIARY DRAIN PAN WITH AUXILIARY DRAIN PROVIDED BY PLUMBING CONTRACTOR.



| | | | | |
|--|----------------------------|---|-------------------|--|
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS Chief, Facilities Engineering & Asset Mgmt. Office Project Manager/Contractor Facilities Project Manager Chief, Office of Protection Services Chief, Safety/Health & Environmental Office Chief, Staff Information Office | | DATE 2-28-13 2-28-13 2/27/13 2-27-13 2/27/13 |
| | | DRAWING TITLE MECHANICAL SCHEDULES | | PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN |
| 02-21-13 E 100% FINAL DESIGN 01-07-13 D 95% NEAR-FINAL DESIGN SUBMITTAL 10-27-12 C 60% DEVELOPED DESIGN SUBMITTAL 05-12-12 B 30% PRELIMINARY DESIGN SUBMITTAL | DATE PRINTED 02/21/2013 | DRAWN BY HEI | SCALE AS SHOWN | SHEET No. EDM-1715 M 302 of 22 |
| DATE SYM REVISION BY A'PD | | | | |

| VARIABLE AIR VOLUME TERMINAL SCHEDULE (HYDRONIC HEAT) (AHU-A) | | | | | | | | | | | | | | | |
|---|-------------|--------------|-------|-----------------|-------------|-----------------|---------------|--------------|------|------|-----|----------|-------------|-----------|-------|
| MARK | UNIT SERVED | MANUFACTURER | MODEL | INLET SIZE (IN) | PRIMARY CFM | MINIMUM CFM (%) | MIN HEAT. CFM | HEATING COIL | | | | | SOUND POWER | | NOTES |
| | | | | | | | | EAT | MBH | GPM | ROW | WPD (FT) | RADIATED | DISCHARGE | |
| VAV-A-1 | AHU-A | TITUS | DESV | 8 | 285 | 145 | 285 | 55 | 3.1 | 0.21 | 2 | 0.33 | 20 | 18 | A-E |
| VAV-A-2 | AHU-A | TITUS | DESV | 16 | 1740 | 580 | 1840 | 55 | 21.5 | 1.43 | 2 | 0.5 | 36 | 14 | A-E |
| VAV-A-3 | AHU-A | TITUS | DESV | 10 | 490 | 230 | 490 | 55 | 3.1 | 0.21 | 2 | 0.65 | 22 | 19 | A-E |
| VAV-A-4 | AHU-A | TITUS | DESV | 12 | 785 | 325 | 785 | 55 | 8.5 | 0.57 | 2 | 0.84 | 20 | 18 | A-E |
| VAV-A-5 | AHU-A | TITUS | DESV | 10 | 625 | 230 | 425 | 55 | 6.2 | 0.41 | 2 | 0.65 | 22 | 19 | A-E |
| VAV-A-6 | AHU-A | TITUS | DESV | 12 | 700 | 325 | 800 | 55 | 10.3 | 0.68 | 2 | 0.84 | 20 | 18 | A-E |
| VAV-A-7 | AHU-A | TITUS | DESV | 12 | 835 | 325 | 835 | 55 | 9 | 0.6 | 2 | 0.84 | 20 | 18 | A-E |
| VAV-A-8 | AHU-A | TITUS | DESV | 14 | 1200 | 450 | 1200 | 55 | 13 | 0.86 | 2 | 0.56 | 18 | 14 | A-E |
| VAV-A-9 | AHU-A | TITUS | DESV | 12 | 695 | 325 | 695 | 55 | 7.5 | 0.5 | 2 | 0.84 | 20 | 18 | A-E |
| VAV-A-10 | AHU-A | TITUS | DESV | 8 | 300 | 145 | 300 | 55 | 2.7 | 0.18 | 2 | 0.33 | 20 | 18 | A-E |
| VAV-A-11 | AHU-A | TITUS | DESV | 10 | 415 | 230 | 415 | 55 | 4.5 | 0.3 | 2 | 0.65 | 22 | 19 | A-E |

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:
A. HEATING COIL CAPACITY BASED ON 180°F E.W.T., 140°F L.W.T., AND 95°F MAX. DISCHARGE AIR TEMPERATURE.
B. INSTALL FLEXIBLE DUCT CONNECTOR AT INLET CONNECTION.
C. PROVIDE FACTORY INSTALLED 24V CONTROL TRANSFORMER.
D. BOX NOT TO EXCEED SCHEDULED DISCHARGE OR RADIATED SOUND NC LEVEL USING 0.5" PRESSURE DROP.
E. PROVIDE FACTORY--INSTALLED, PRESSURE INDEPENDENT, DDC CONTROL PACKAGE.

| VARIABLE AIR VOLUME TERMINAL SCHEDULE (HYDRONIC HEAT) (AHU-H) | | | | | | | | | | | | | | | |
|---|-------------|--------------|-------|-----------------|-------------|-----------------|---------------|--------------|------|------|-----|----------|-------------|-----------|-------|
| MARK | UNIT SERVED | MANUFACTURER | MODEL | INLET SIZE (IN) | PRIMARY CFM | MINIMUM CFM (%) | MIN HEAT. CFM | HEATING COIL | | | | | SOUND POWER | | NOTES |
| | | | | | | | | EAT | MBH | GPM | ROW | WPD (FT) | RADIATED | DISCHARGE | |
| VAV-H-1 | AHU-H | TITUS | DESV | 24x16 | 2500 | 1400 | 2500 | -- | -- | -- | 2 | -- | 38 | 27 | A-E |
| VAV-H-2 | AHU-H | TITUS | DESV | 24x16 | 2500 | 1400 | 2500 | -- | -- | -- | 2 | -- | 38 | 27 | A-E |
| VAV-H-3 | AHU-H | TITUS | DESV | 12 | 900 | 325 | 900 | 58 | 9720 | 0.65 | 2 | 0.84 | 20 | 18 | A-E |
| VAV-H-4 | AHU-H | TITUS | DESV | 8 | 220 | 145 | 220 | 58 | 2376 | 0.16 | 2 | 0.33 | 20 | 18 | A-E |
| VAV-H-5 | AHU-H | TITUS | DESV | 12 | 800 | 325 | 800 | 58 | 8640 | 0.58 | 2 | 0.84 | 20 | 18 | A-E |
| VAV-H-6 | AHU-H | TITUS | DESV | 8 | 200 | 145 | 200 | 58 | 2160 | 0.14 | 2 | 0.33 | 20 | 18 | A-E |
| VAV-H-7 | AHU-H | TITUS | DESV | 16 | 2200 | 580 | 2200 | -- | -- | -- | 2 | -- | 18 | 16 | A-E |
| VAV-H-8 | AHU-H | TITUS | DESV | 16 | 2200 | 580 | 2200 | -- | -- | -- | 2 | -- | 18 | 16 | A-E |
| VAV-H-9 | AHU-H | TITUS | DESV | 10 | 540 | 230 | 540 | 58 | 5832 | 0.39 | 2 | 0.65 | 22 | 19 | A-E |

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:
A. HEATING COIL CAPACITY BASED ON 180°F E.W.T., 140°F L.W.T., AND 95°F MAX. DISCHARGE AIR TEMPERATURE.
B. INSTALL FLEXIBLE DUCT CONNECTOR AT INLET CONNECTION.
C. PROVIDE FACTORY INSTALLED 24V CONTROL TRANSFORMER.
D. BOX NOT TO EXCEED SCHEDULED DISCHARGE OR RADIATED SOUND NC LEVEL USING 0.5" PRESSURE DROP.
E. PROVIDE FACTORY--INSTALLED, PRESSURE INDEPENDENT, DDC CONTROL PACKAGE.

| VARIABLE AIR VOLUME TERMINAL SCHEDULE (ELECTRIC HEAT) (AHU-B) | | | | | | | | | | | | | | | |
|---|-------------|--------------|-------|-----------------|-------------|-----------------|---------------|--------------|-----|-----|-------|-------|-------------|-----------|-------|
| MARK | UNIT SERVED | MANUFACTURER | MODEL | INLET SIZE (IN) | PRIMARY CFM | MINIMUM CFM (%) | MIN HEAT. CFM | HEATING COIL | | | | | SOUND POWER | | NOTES |
| | | | | | | | | EAT | MBH | KW | STEPS | V/PH | RADIATED | DISCHARGE | |
| VAV-B-1 | AHU-B | TITUS | DESV | 16 | 1725 | 580 | 1725 | -- | -- | -- | -- | -- | 20 | 20 | A-F |
| VAV-B-2 | AHU-B | TITUS | DESV | 16 | 1725 | 580 | 1725 | -- | -- | -- | -- | -- | 20 | 20 | A-F |
| VAV-B-3 | AHU-B | TITUS | DESV | 16 | 1725 | 580 | 1725 | -- | -- | -- | -- | -- | 20 | 20 | A-F |
| VAV-B-4 | AHU-B | TITUS | DESV | 8 | 200 | 145 | 200 | 55 | 8.5 | 2.5 | 1 | 277/1 | 20 | 20 | A-G |
| VAV-B-5 | AHU-B | TITUS | DESV | 16 | 1725 | 580 | 1725 | -- | -- | -- | -- | -- | 20 | 20 | A-F |
| VAV-B-6 | AHU-B | TITUS | DESV | 16 | 1725 | 580 | 1725 | -- | -- | -- | -- | -- | 20 | 20 | A-F |
| VAV-B-7 | AHU-B | TITUS | DESV | 16 | 1725 | 580 | 1725 | -- | -- | -- | -- | -- | 20 | 20 | A-F |
| VAV-B-8 | AHU-B | TITUS | DESV | 16 | 1725 | 580 | 1725 | -- | -- | -- | -- | -- | 20 | 20 | A-F |
| VAV-B-9 | AHU-B | TITUS | DESV | 16 | 1725 | 580 | 1725 | -- | -- | -- | -- | -- | 20 | 20 | A-F |

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:
A. HEATING COIL CAPACITY BASED ON 45°F MAX. AIR TEMPERATURE RISE, 95°F MAX. DISCHARGE AIR TEMPERATURE, AND 450 FPM MINIMUM COIL FACE VELOCITY.
B. INSTALL FLEXIBLE DUCT CONNECTOR AT INLET CONNECTION.
C. PROVIDE INTEGRAL DISCONNECT SWITCH.
D. PROVIDE FACTORY INSTALLED 24V CONTROL POWER TRANSFORMER. COORDINATE PRIMARY POWER WITH ELECTRICAL DRAWINGS.
E. BOX NOT TO EXCEED SCHEDULED DISCHARGE OR RADIATED SOUND NC LEVEL USING 0.5" PRESSURE DROP.
F. PROVIDE FACTORY--INSTALLED, PRESSURE INDEPENDENT, DDC CONTROL PACKAGE.
G. PROVIDE TEMPERATURE SENSOR IN INLET AND CONTROLS FOR AUTOMATIC CHANGEOVER BETWEEN HEATING AND COOLING MODE.

| VARIABLE AIR VOLUME TERMINAL SCHEDULE (HYDRONIC HEAT) (AHU-K) | | | | | | | | | | | | | | | |
|---|-------------|--------------|-------|-----------------|-------------|-----------------|---------------|--------------|-------|------|-----|----------|-------------|-----------|-------|
| MARK | UNIT SERVED | MANUFACTURER | MODEL | INLET SIZE (IN) | PRIMARY CFM | MINIMUM CFM (%) | MIN HEAT. CFM | HEATING COIL | | | | | SOUND POWER | | NOTES |
| | | | | | | | | EAT | MBH | GPM | ROW | WPD (FT) | RADIATED | DISCHARGE | |
| VAV-K-1 | AHU-K | TITUS | DESV | 10 | 625 | 230 | 625 | 85 | 6750 | 0.34 | 2 | 0.65 | 22 | 19 | A-E |
| VAV-K-2 | AHU-K | TITUS | DESV | 8 | 265 | 145 | 265 | 85 | 2862 | 0.14 | 2 | 0.33 | 20 | 18 | A-E |
| VAV-K-3 | AHU-K | TITUS | DESV | 12 | 880 | 325 | 880 | 85 | 9504 | 0.48 | 2 | 0.84 | 20 | 18 | A-E |
| VAV-K-4 | AHU-K | TITUS | DESV | 12 | 880 | 325 | 880 | 85 | 9504 | 0.48 | 2 | 0.84 | 20 | 18 | A-E |
| VAV-K-5 | AHU-K | TITUS | DESV | 14 | 1360 | 450 | 1360 | 85 | 14688 | 0.73 | 2 | 0.56 | 18 | 14 | A-E |
| VAV-K-6 | AHU-K | TITUS | DESV | 12 | 840 | 325 | 840 | 85 | 9072 | 0.45 | 2 | 0.84 | 20 | 18 | A-E |

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:
A. HEATING COIL CAPACITY BASED ON 180°F E.W.T., 140°F L.W.T., AND 95°F MAX. DISCHARGE AIR TEMPERATURE.
B. INSTALL FLEXIBLE DUCT CONNECTOR AT INLET CONNECTION.
C. PROVIDE FACTORY INSTALLED 24V CONTROL TRANSFORMER.
D. BOX NOT TO EXCEED SCHEDULED DISCHARGE OR RADIATED SOUND NC LEVEL USING 0.5" PRESSURE DROP.
E. PROVIDE FACTORY--INSTALLED, PRESSURE INDEPENDENT, DDC CONTROL PACKAGE.

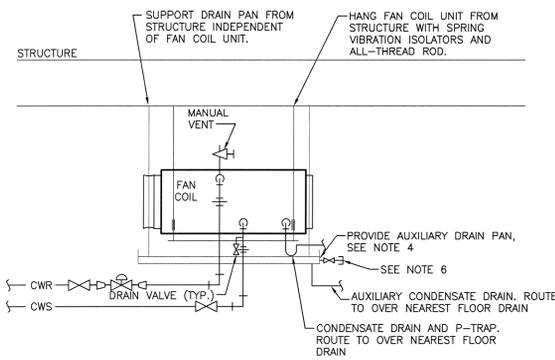
| VARIABLE AIR VOLUME TERMINAL SCHEDULE (HYDRONIC HEAT) (AHU-G) | | | | | | | | | | | | | | | |
|---|-------------|--------------|-------|-----------------|-------------|-----------------|---------------|--------------|------|------|-----|----------|-------------|-----------|-------|
| MARK | UNIT SERVED | MANUFACTURER | MODEL | INLET SIZE (IN) | PRIMARY CFM | MINIMUM CFM (%) | MIN HEAT. CFM | HEATING COIL | | | | | SOUND POWER | | NOTES |
| | | | | | | | | EAT | MBH | GPM | ROW | WPD (FT) | RADIATED | DISCHARGE | |
| VAV-G-1 | AHU-G | TITUS | DESV | 6 | 85 | 80 | 85 | 60 | 918 | 0.06 | 2 | 0.24 | 16 | 14 | A-E |
| VAV-G-2 | AHU-G | TITUS | DESV | 10 | 610 | 230 | 610 | 60 | 6588 | 0.44 | 2 | 0.65 | 22 | 19 | A-E |
| VAV-G-3 | AHU-G | TITUS | DESV | 8 | 335 | 145 | 335 | 60 | 3618 | 0.24 | 2 | 0.33 | 20 | 18 | A-E |
| VAV-G-4 | AHU-G | TITUS | DESV | 8 | 275 | 145 | 275 | 60 | 2970 | 0.2 | 2 | 0.33 | 20 | 18 | A-E |
| VAV-G-5 | AHU-G | TITUS | DESV | 6 | 150 | 80 | 150 | 60 | 1620 | 0.11 | 2 | 0.24 | 16 | 14 | A-E |
| VAV-G-6 | AHU-G | TITUS | DESV | 6 | 135 | 80 | 135 | 60 | 1458 | 0.1 | 2 | 0.24 | 16 | 14 | A-E |
| VAV-G-7 | AHU-G | TITUS | DESV | 6 | 140 | 80 | 140 | 60 | 1512 | 0.1 | 2 | 0.24 | 16 | 14 | A-E |
| VAV-G-8 | AHU-G | TITUS | DESV | 8 | 330 | 80 | 330 | 60 | 3564 | 0.24 | 2 | 0.33 | 20 | 18 | A-E |

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:
A. HEATING COIL CAPACITY BASED ON 180°F E.W.T., 140°F L.W.T., AND 95°F MAX. DISCHARGE AIR TEMPERATURE.
B. INSTALL FLEXIBLE DUCT CONNECTOR AT INLET CONNECTION.
C. PROVIDE FACTORY INSTALLED 24V CONTROL TRANSFORMER.
D. BOX NOT TO EXCEED SCHEDULED DISCHARGE OR RADIATED SOUND NC LEVEL USING 0.5" PRESSURE DROP.
E. PROVIDE FACTORY--INSTALLED, PRESSURE INDEPENDENT, DDC CONTROL PACKAGE.

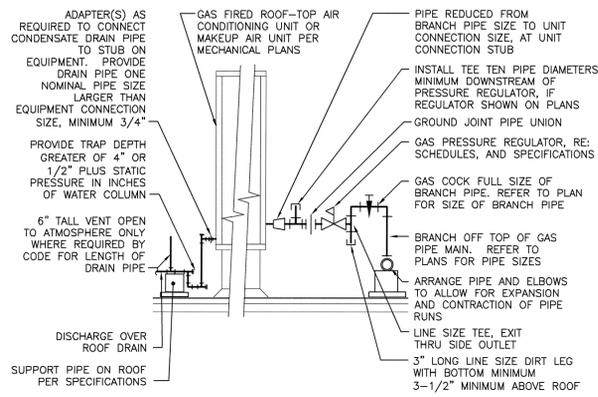


| | | | | |
|---|--|---|--|--|
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS <small>Chief, Facilities Engineering & Asset Mgmt. Office</small> <small>Project Requestor/Owner</small> <small>Facilities Project Manager</small> <small>Chief, Office of Protective Services</small> <small>Chief, Safety, Health & Environmental Office</small> <small>Information Officer</small> | | DATE 2-28-13 2-28-13 2/27/13 2/27/13 2-27-13 2/27/13 |
| DRAWING TITLE MECHANICAL SCHEDULES | | PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | |
| DATE SYM 02-21-13 E 01-07-13 D 10-27-12 C 05-12-12 B | REVISION 100% FINAL DESIGN 95% NEAR-FINAL DESIGN SUBMITTAL 60% DEVELOPED DESIGN SUBMITTAL 30% PRELIMINARY DESIGN SUBMITTAL | DATE PRINTED 02/21/2013 | DRAWN BY HEI SCALE AS SHOWN FILE NAME EDM-1715 W-303.DWG | DATE 02/21/2013 TRADE M 303 SHEET No. 44 of 74 |



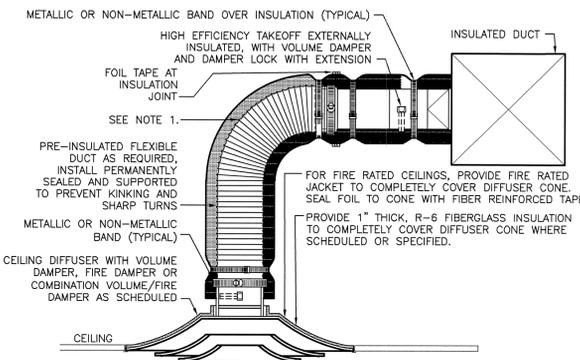
- NOTES:
- ARRANGEMENT SHOWN IS SCHEMATIC, ADJUST TO SUIT FIELD CONDITIONS OR MEET LOCAL CODE REQUIREMENTS.
 - SIZE CONTROL VALVE FOR MAXIMUM PRESSURE DROP OF 5 PSIG BUT NOT LESS THAN 1/2 INCH.
 - EXTEND AUXILIARY DRAIN PAN MINIMUM 3" BEYOND UNIT ON ALL SIDES.
 - PROVIDE 3/4" NORMALLY CLOSED SHUTOFF VALVE WITH 3/4" HOSE CONNECTION AND CAP.

10 2-PIPE FAN COIL UNIT DETAIL
NO SCALE



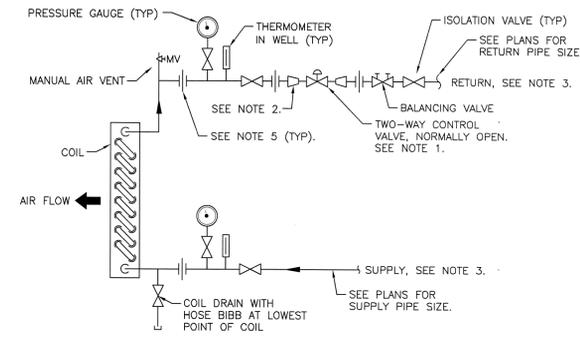
- ARRANGEMENT SHOWN IS SCHEMATIC. ADJUST TO SUIT FIELD CONDITIONS. PROVIDE CONNECTIONS SHOWN IN EQUIPMENT MANUFACTURER'S INSTALLATION INSTRUCTIONS. VERIFY CONNECTION LOCATIONS BEFORE INSTALLING PIPE RUNS. REFER TO SPECIFICATIONS FOR PIPE AND FITTING MATERIALS AND INSTALLATION. PROVIDE DIELECTRIC UNION IF CONNECTING DISSIMILAR METALS. FOR PIPE SIZE(S) REFER TO FLOOR PLANS, OR CODE REQUIREMENTS FOR HVAC UNIT TONNAGE. PROVIDE GAS COCK, UNION AND DIRT LEG SAME SIZE AS BRANCH PIPE. SLOPE CONDENSATE PIPE AS MUCH AS POSSIBLE TOWARD DISCHARGE, 2% MINIMUM. PROVIDE CLEANOUTS IN ENDS AND TURNS OF PIPE PER LOCAL CODE REQUIREMENTS: ADAPTER WITH THREADED CLEANOUT PLUG. OMIT CONDENSATE DRAIN ON MAKEUP AIR UNIT. PROVIDE MINIMUM 6" CLEARANCE TO ROOF UNDER PIPES.

7 CONNECTIONS TO ROOF-TOP UNIT
NO SCALE



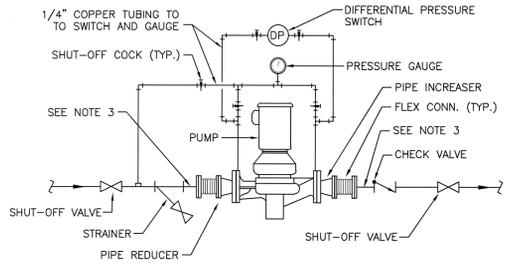
- NOTES:
- EXTEND RIGID METAL DUCT SO THAT MAXIMUM FLEXIBLE DUCT LENGTH DOES NOT EXCEED 5'-0". PROVIDE RIGID 90° ELBOW WHERE REQUIRED TO KEEP FLEXIBLE DUCT WITHIN 5'-0" LENGTH LIMITATION.

4 LAY-IN CEILING DIFFUSER DETAIL
NO SCALE



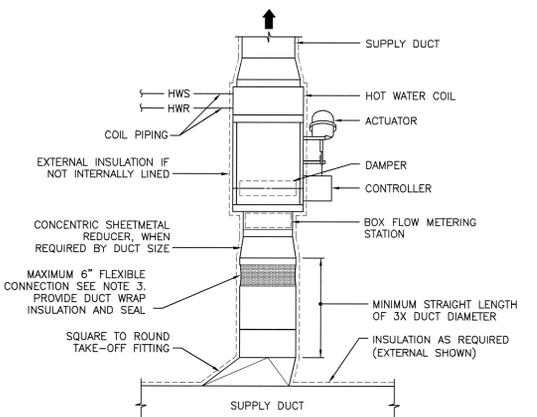
- NOTES:
- INSTALL CONTROL VALVE BETWEEN UNIONS OR FLANGES.
 - PROVIDE CONCENTRIC REDUCERS BOTH SIDES OF CONTROL VALVE AS REQUIRED.
 - WHEN TAPPED INTO TOP OF MAINS, AIR VENT REQUIRED.
 - ARRANGEMENT SHOWN FOR FULL FLOW THROUGH COIL ON FAILURE.
 - REPLACE UNION/FLANGE SET WITH FLEXIBLE PIPE CONNECTOR WHERE EQUIPMENT IS SUPPORTED OR SUSPENDED BY SPRING ISOLATORS.

2 HYDRONIC COIL WITH TWO-WAY CONTROL VALVE PIPING DETAIL
NO SCALE



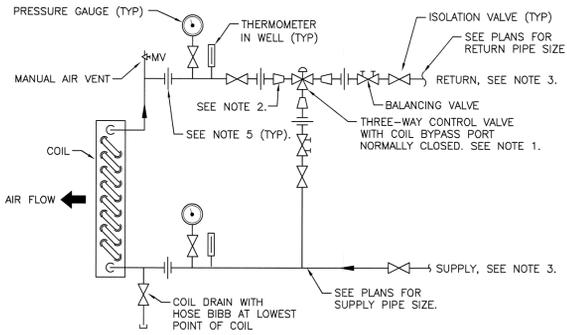
- NOTES:
- SUPPORT PUMP SEPARATE FROM PIPING.
 - CONTRACTOR HAS OPTION OF PROVIDING A TRIPLE DUTY VALVE IN THE PUMP DISCHARGE LINE IN LIEU OF BALANCE, SHUT-OFF, AND CHECK VALVES.
 - PROVIDE MINIMUM OF FIVE PIPE DIAMETERS STRAIGHT LENGTH OF PIPE ON EACH SIDE OF PUMP CONNECTIONS.

9 SUSPENDED IN-LINE PUMP DETAIL
NO SCALE



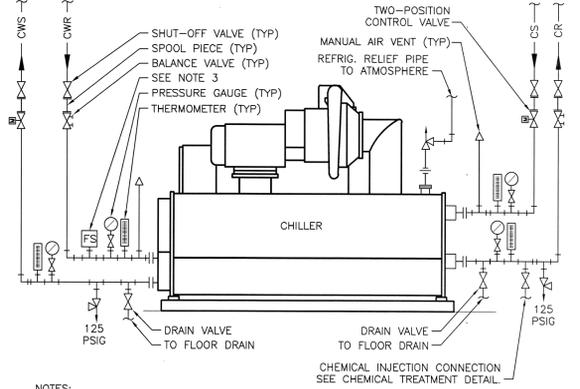
- NOTES:
- SUPPORT AIR TERMINAL UNIT, BOTH ENDS WITH MINIMUM 2" WIDE GALVANIZED 22 GA. HANGER STRAPS.
 - INSTALL BOX NOT MORE THAN 3 FEET ABOVE THE CEILING TO ENABLE ACCESS FOR MAINTENANCE.
 - FLEXIBLE CONNECTION SHALL BE ATCO MODEL UPC# 017, OR DURO-DYNE INSULFLEX.

6 VARIABLE AIR VOLUME BOX WITH HOT WATER REHEAT COIL DETAIL
NO SCALE



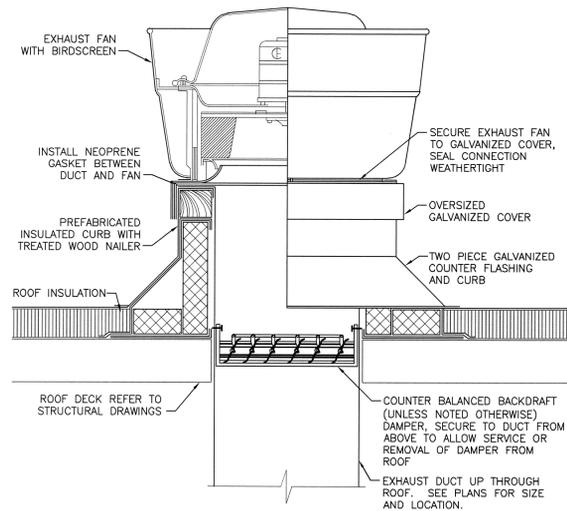
- NOTES:
- INSTALL CONTROL VALVE BETWEEN UNIONS OR FLANGES.
 - PROVIDE CONCENTRIC REDUCERS BOTH SIDES OF CONTROL VALVE AS REQUIRED.
 - WHEN TAPPED INTO TOP OF MAINS, AIR VENT REQUIRED.
 - ARRANGEMENT SHOWN FOR FULL FLOW THROUGH COIL ON FAILURE.
 - REPLACE UNION/FLANGE SET WITH FLEXIBLE PIPE CONNECTOR WHERE EQUIPMENT IS SUPPORTED OR SUSPENDED BY SPRING ISOLATORS.

3 HYDRONIC COIL WITH THREE-WAY CONTROL VALVE PIPING DETAIL
NO SCALE

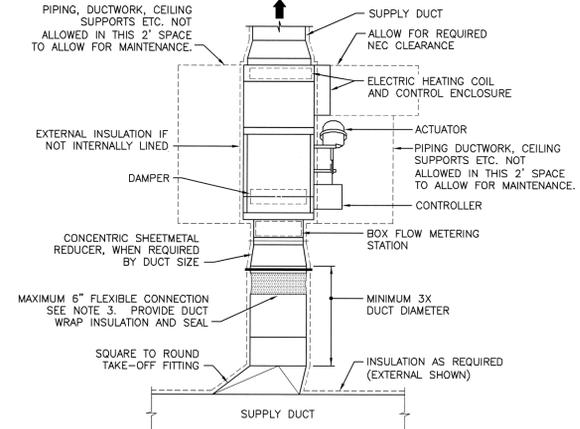


- NOTES:
- REFERENCE PLANS FOR ACTUAL PIPE CONNECTION LOCATIONS ON CHILLER.
 - LOCATE PIPING TO FACILITATE WATER BOX COVER REMOVAL.
 - FLOW SWITCH OR DIFFERENTIAL PRESSURE SWITCH FURNISHED WITH CHILLER TO BE INSTALLED BY CONTRACTOR.

1 CHILLER PIPING DETAIL
NO SCALE



8 UPBLAST EXHAUST FAN DETAIL
NO SCALE



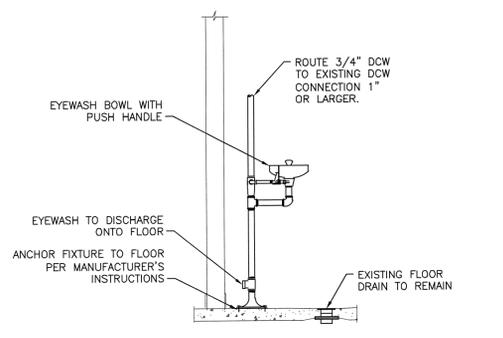
- NOTES:
- SUPPORT AIR TERMINAL UNIT, BOTH ENDS WITH MINIMUM 2" WIDE GALVANIZED 22 GA. HANGER STRAPS.
 - INSTALL BOX NOT MORE THAN 3 FEET ABOVE THE CEILING TO ENABLE ACCESS FOR MAINTENANCE.
 - FLEXIBLE CONNECTION SHALL BE ATCO MODEL UPC# 017, OR DURO-DYNE INSULFLEX.

5 VARIABLE AIR VOLUME BOX WITH ELECTRIC REHEAT COIL DETAIL
NO SCALE

HENDERSON ENGINEERS
5555 REDWOOD STREET, SUITE 201
LAS VEGAS, NV 89118
TEL 702.697.2161 FAX 702.697.2188
www.hei-eng.com
1150001204

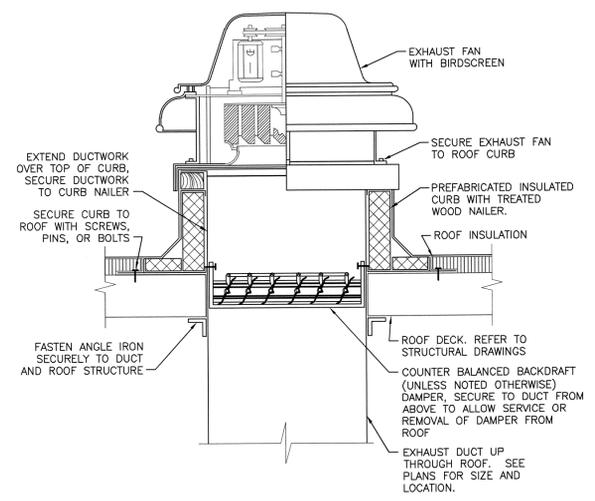
| | | | | | |
|---|-----|---|----|---|--|
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION | | APPROVALS | | DATE | |
| DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | Chief Facilities Engineering & Asses. Mgmt. Office <i>[Signature]</i> Project Requestor/Customer <i>[Signature]</i> Facilities Project Manager <i>[Signature]</i> Chief, Office of Integrative Services <i>[Signature]</i> Chief, Safety, Health, and Environmental Office <i>[Signature]</i> Chief Information Officer <i>[Signature]</i> | | 2-28-13 2-28-13 2/27/13 2-27-13 2/27/13 | |
| DRAWING TITLE | | | | | |
| MECHANICAL DETAILS | | | | | |
| PROJECT TITLE | | | | | |
| MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | | | | |
| DATE | SYM | REVISION | BY | A'PD | |
| 02-21-13 | E | 100% FINAL DESIGN | | | |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | | | |
| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | | | |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | | | |
| DATE STRD | | DATE PRVD | | 02/21/2013 | |
| DRAWN BY HEI | | SCALE AS SHOWN | | TRADE SH. No. EDM-1715 | |
| FILE NAME EDM-1715 | | M 401 | | SHEET No. 45 of 24 | |

NOTE:
REFER TO STRUCTURAL DRAWINGS FOR ALL SUPPORT, SEISMIC BRACING AND HANGING DETAILS FOR ALL MECHANICAL EQUIPMENT, DUCTWORK AND PIPING.

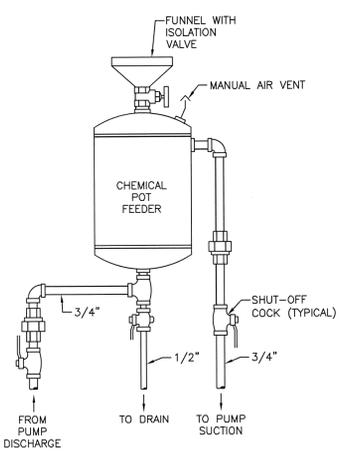


ARRANGEMENT SHOWN IS SCHEMATIC. ADJUST TO SUIT FIELD CONDITIONS. INSTALL PER MANUFACTURER'S RECOMMENDATIONS. REFER TO SPECIFICATIONS AND SCHEDULES FOR FURTHER INFORMATION. REFER TO ARCHITECTURAL PLANS FOR EXACT LOCATION.

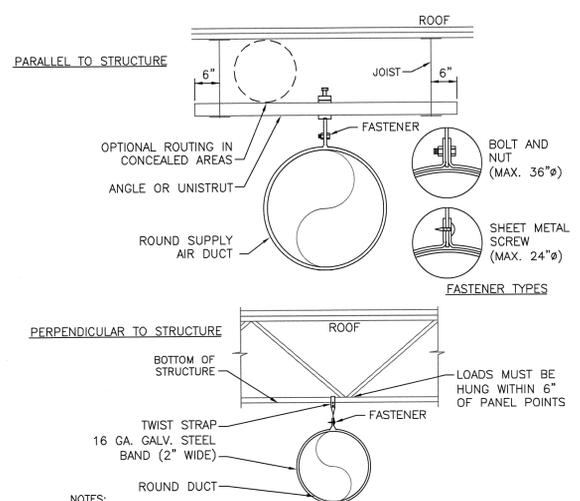
11 EMERGENCY SHOWER AND EYEWASH
NO SCALE



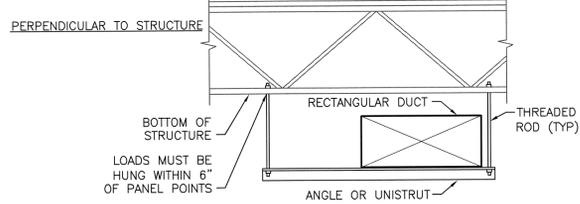
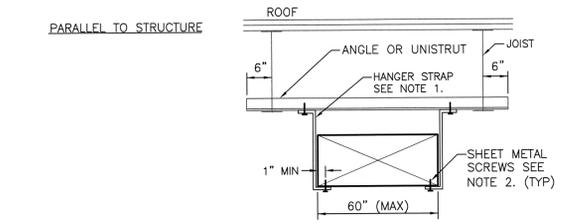
10 DOWNBLAST EXHAUST FAN DETAIL
NO SCALE



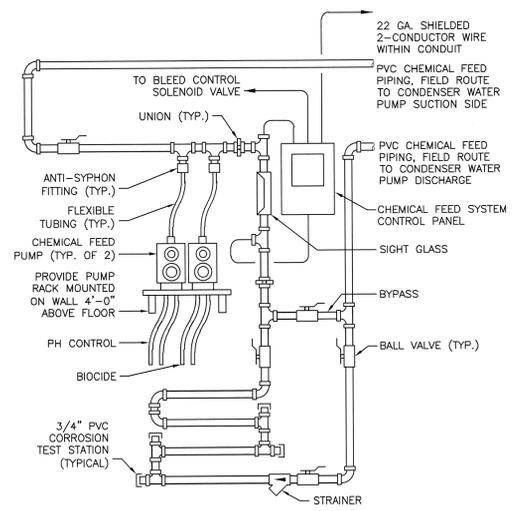
9 CHEMICAL POT FEEDER DETAIL
NO SCALE



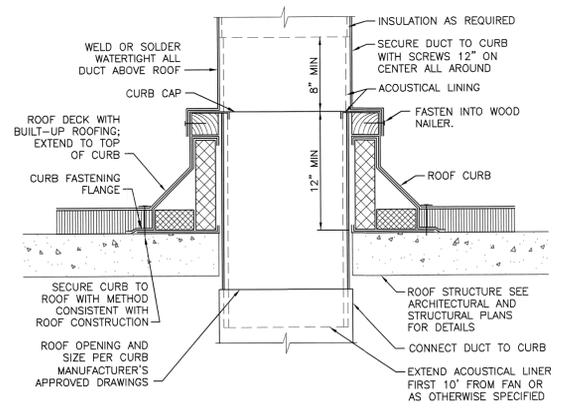
8 ROUND DUCT SUPPORT DETAIL
NO SCALE



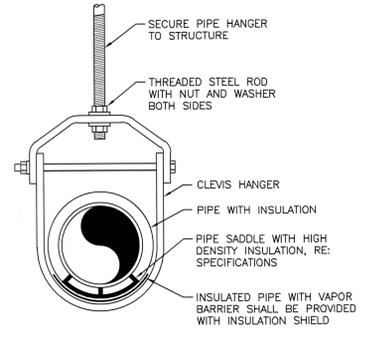
7 RECTANGULAR DUCT SUPPORT DETAIL
NO SCALE



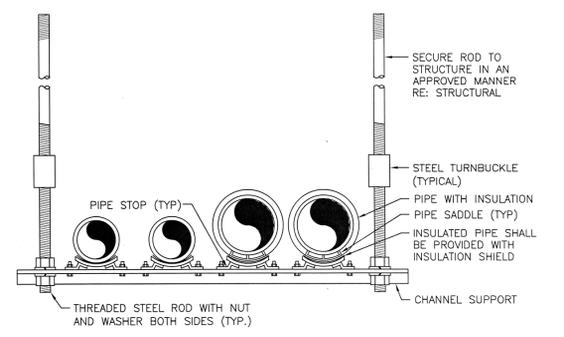
6 CONDENSER WATER CHEMICAL FEED SYSTEM - 2 CHEMICALS
NO SCALE



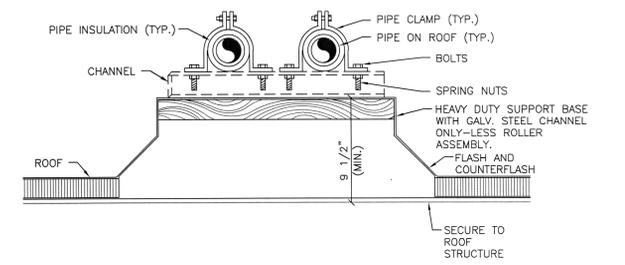
5 RECTANGULAR AIR DUCT PENETRATION THROUGH ROOF DETAIL
NO SCALE



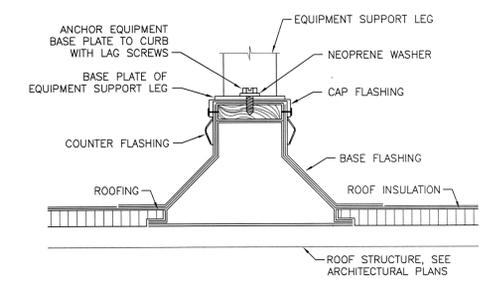
4 CLEVIS PIPE HANGER DETAIL
NO SCALE



3 MULTIPLE PIPE TRAPEZE HANGER DETAIL
NO SCALE



2 ROOF PIPE SUPPORT DETAIL
NO SCALE



1 ROOF EQUIPMENT SUPPORT RAIL DETAIL
NO SCALE

NOTE:
REFER TO STRUCTURAL DRAWINGS FOR ALL SUPPORT, SEISMIC BRACING AND HANGING DETAILS FOR ALL MECHANICAL EQUIPMENT, DUCTWORK AND PIPING.



| DATE | | SYMBOL | REVISION | BY | APPROVED |
|----------|---|--------|----------------------------------|----|----------|
| 02-21-13 | E | | 100% FINAL DESIGN | | |
| 01-07-13 | D | | 95% NEAR-FINAL DESIGN SUBMITTAL | | |
| 10-27-12 | C | | 60% DEVELOPED DESIGN SUBMITTAL | | |
| 05-12-12 | B | | 30% PRELIMINARY DESIGN SUBMITTAL | | |

| | | | |
|--|--|---|---|
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS Chief Facilities Engineering & Asset Mgmt. Office Project Requestor/Author Facility Project Manager Chief Office of Project Services Chief Safety & Environmental Office Chief of Information Office | DATE 2-28-13 2-28-13 2/27/13 2/27/13 2/27/13 |
| DRAWING TITLE MECHANICAL DETAILS | | PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | |
| DATE STARTED: 02/21/2013 DATE PRINTED: 02/21/2013 | | DRAWN BY: HEL SCALE: AS SHOWN FILE NAME: EDM-1715-M-402.DWG SHEET No. 46 of 24 | |

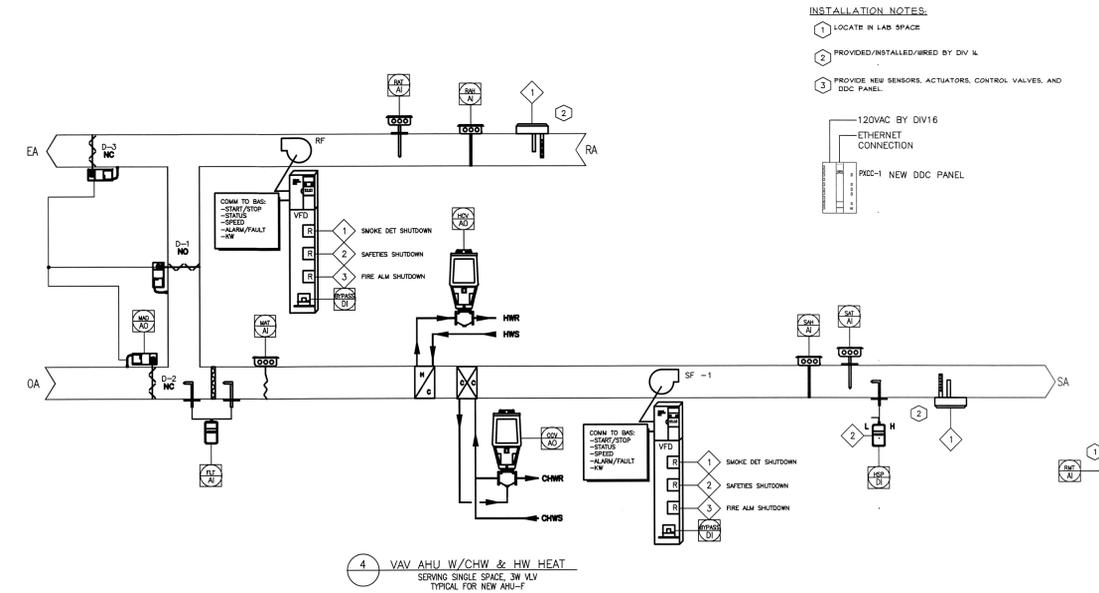
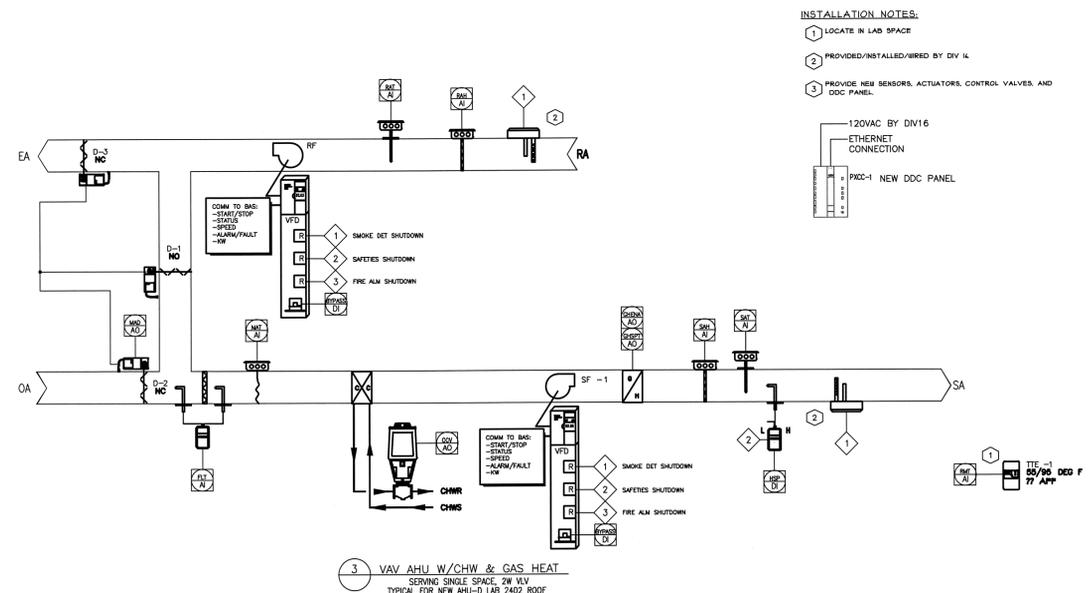
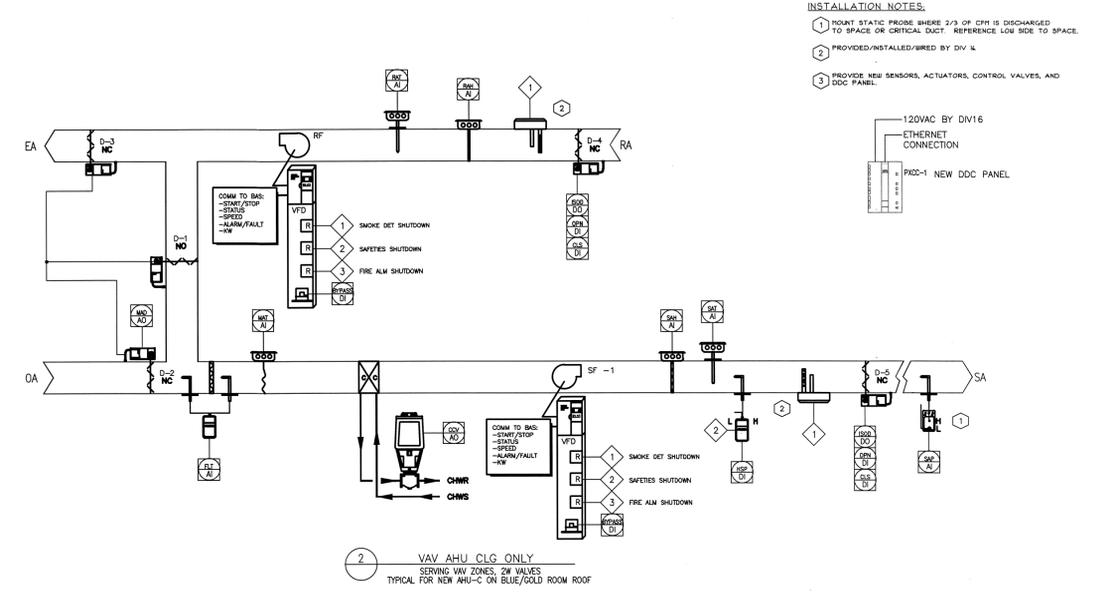
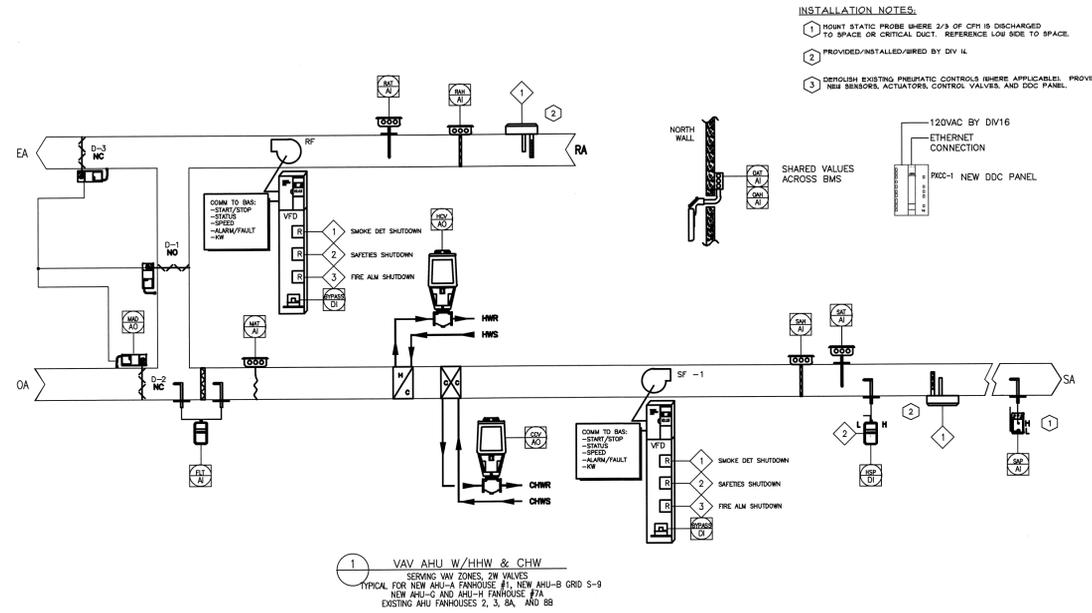
| Name | Description | Address | Controller | FLN | Drop | Point | Type | Function | Sensor | Eng. Unit |
|------------------------|------------------|------------|------------|-----|------|-------|------|----------|---------|-----------|
| B4800.FH1A.CHWST | CHW SUP TMP | 1.2.0.9.1 | 2 | 0 | 9 | 1 | LAI | Value | Current | DEG F |
| B4800.FH1A.CHWRT | CHW RET TMP | 1.2.0.9.2 | 2 | 0 | 9 | 2 | LAI | Value | Current | DEG F |
| B4800.FH1A.CH1 STATUS | CH1 STATUS | 1.2.0.10.1 | 2 | 0 | 10 | 1 | LDI | Status | | |
| B4800.FH1A.CH2 STATUS | CH2 STATUS | 1.2.0.10.2 | 2 | 0 | 10 | 2 | LDI | Status | | |
| B4800.FH1A.CHWP1 PRF | CHW PUMP 1 PROOF | 1.2.0.10.3 | 2 | 0 | 10 | 3 | LDI | Status | | |
| B4800.FH1A.CHWP2 PRF | CHW PUMP 2 PROOF | 1.2.0.10.4 | 2 | 0 | 10 | 4 | LDI | Status | | |
| B4800.FH1A.CDWST | CDW SUP TMP | 1.2.0.11.1 | 2 | 0 | 11 | 1 | LAI | Value | Current | DEG F |
| B4800.FH1A.CDWRT | CDW RET TMP | 1.2.0.11.2 | 2 | 0 | 11 | 2 | LAI | Value | Current | DEG F |
| B4800.FH1A.CDW2 PRF | CD WTR PMP 2 PRF | 1.2.0.12.1 | 2 | 0 | 12 | 1 | LDI | Status | | |
| B4800.FH1A.CDW1 PRF | CD WTR PMP 1 PRF | 1.2.0.12.2 | 2 | 0 | 12 | 2 | LDI | Status | | |
| B4800.FH1A.CTFW STATUS | WEST CT FAN | 1.2.0.12.3 | 2 | 0 | 12 | 3 | LDI | Status | | |
| B4800.FH1A.CTFE STATUS | EAST CT FAN | 1.2.0.12.4 | 2 | 0 | 12 | 4 | LDI | Status | | |
| B4800.HX2.HWST | 4802 E SUP TEMP | 1.2.0.13.1 | 2 | 0 | 13 | 1 | LAI | Value | Current | DEG F |
| B4800.HX2.HWRT | 4802 E RET TEMP | 1.2.0.13.2 | 2 | 0 | 13 | 2 | LAI | Value | Current | DEG F |
| B4800.RM1720.ROOM TEMP | 1720 COM RM TEMP | 1.2.0.15.1 | 2 | 0 | 15 | 1 | LAI | Value | Current | DEG F |
| B4800.HX2.GPM | 4802 E GAL/MIN | 1.2.0.15.2 | 2 | 0 | 15 | 2 | LAI | Value | Current | DEG F |
| B4800.HX2.HWV | 4802 E VALVE | 1.2.0.16.1 | 2 | 0 | 16 | 1 | LAO | Value | | VDC |

| Name | Description | Address | Controller | FLN | Drop | Point | Type | Function | Sensor | Eng. Unit |
|-------------------------|--------------|------------|------------|-----|------|-------|------|----------|--------|-----------|
| B4800.FH1.AHU04.E54ENA | ENABLE ES4 | 1.2.1.6.3 | 2 | 1 | 6 | 3 | LDO | On/Off | | |
| B4800.FH1.AHU04.E54SFP | SFAN PRF ES4 | 1.2.1.6.10 | 2 | 1 | 6 | 10 | LDI | Status | | |
| B4800.FH1.AHU04.E54ST | SMK DET ES4 | 1.2.1.6.11 | 2 | 1 | 6 | 11 | LDI | Status | | |
| B4800.FH1.AHU04.E54FRZ | FRZ STAT ES4 | 1.2.1.6.12 | 2 | 1 | 6 | 12 | LDI | Status | | |
| B4800.FH1.AHU04.E54MIX | MIX TEMP ES4 | 1.2.1.6.13 | 2 | 1 | 6 | 13 | LAI | Value | L-Type | DEG F |
| B4800.FH1.AHU04.E54RT | RA TEMP ES4 | 1.2.1.6.14 | 2 | 1 | 6 | 14 | LAI | Value | L-Type | DEG F |
| B4800.FH1.AHU04.E54CT | COIL TMP ES4 | 1.2.1.6.15 | 2 | 1 | 6 | 15 | LAI | Value | L-Type | DEG F |
| B4800.FH1.AHU04.E54ST | SA TEMP ES4 | 1.2.1.6.16 | 2 | 1 | 6 | 16 | LAI | Value | L-Type | DEG F |
| B4800.FH1.AHU04.E54DAMP | DAMPER ES4 | 1.2.1.6.17 | 2 | 1 | 6 | 17 | LAO | Value | PSI | |
| B4800.FH1.AHU04.E54CV | CHW VLV ES4 | 1.2.1.6.18 | 2 | 1 | 6 | 18 | LAO | Value | PSI | |
| B4800.FH1.AHU04.E54HV | STIM VLV ES4 | 1.2.1.6.19 | 2 | 1 | 6 | 19 | LAO | Value | PSI | |
| B4800.FH1.AHU04.E54SF | RFAN FAN ES4 | 1.2.1.6.20 | 2 | 1 | 6 | 20 | LDO | On/Off | | |
| B4800.FH1.AHU04.E54RFP | RFAN STS ES4 | 1.2.1.6.30 | 2 | 1 | 6 | 30 | LDI | Status | | |
| B4800.FH1.AHU04.E54DP | FILTER ES4 | 1.2.1.6.31 | 2 | 1 | 6 | 31 | LDI | Status | | |
| B4800.FH1.AHU04.E54ZT | ZN TEMP ES4 | 1.2.1.6.34 | 2 | 1 | 6 | 34 | LAI | Value | L-Type | DEG F |
| B4800.FH1.AHU04.E54ECON | ECON ES4 | 1.2.1.6.56 | 2 | 1 | 6 | 56 | LDO | On/Off | | |
| B4800.FH1.AHU04.E54RFA | RET FAN ALRM | 1.2.1.6.60 | 2 | 1 | 6 | 60 | LDO | On/Off | | |
| B4800.FH1.AHU04.E54CVL | CHW VLV ES4 | 1.2.1.6.61 | 2 | 1 | 6 | 61 | LAO | Value | | PCT |
| B4800.FH1.AHU04.E54HVE | STIM VLV ES4 | 1.2.1.6.62 | 2 | 1 | 6 | 62 | LAO | Value | | PCT |
| B4800.FH1.AHU04.E54DME | DAMPER ES4 | 1.2.1.6.63 | 2 | 1 | 6 | 63 | LAO | Value | | PCT |

| Name | Description | Address | Controller | FLN | Drop | Point | Type | Function | Sensor | Eng. Unit |
|--------------------------|--------------|------------|------------|-----|------|-------|------|----------|---------|-----------|
| B4800.FH7A.AHU01.DA1ENA | DA1 ENABLE | 1.3.1.4.3 | 3 | 1 | 4 | 3 | LDO | On/Off | | |
| B4800.FH7A.AHU01.DA1ECON | ECONOMIZER | 1.3.1.4.8 | 3 | 1 | 4 | 8 | LDO | On/Off | | |
| B4800.FH7A.AHU01.DA1SFP | SUP FAN PRF | 1.3.1.4.10 | 3 | 1 | 4 | 10 | LDI | Status | | |
| B4800.FH7A.AHU01.DA1RFP | RET FAN PRF | 1.3.1.4.11 | 3 | 1 | 4 | 11 | LDI | Status | | |
| B4800.FH7A.AHU01.DA1RT | RA TEMP | 1.3.1.4.13 | 3 | 1 | 4 | 13 | LAI | Value | L-Type | DEG F |
| B4800.FH7A.AHU01.DA1MT | MA TEMP | 1.3.1.4.14 | 3 | 1 | 4 | 14 | LAI | Value | L-Type | DEG F |
| B4800.FH7A.AHU01.DA1CT | CD TEMP | 1.3.1.4.15 | 3 | 1 | 4 | 15 | LAI | Value | L-Type | DEG F |
| B4800.FH7A.AHU01.DA1HT | HD TEMP | 1.3.1.4.16 | 3 | 1 | 4 | 16 | LAI | Value | L-Type | DEG F |
| B4800.FH7A.AHU01.DA1CV | CD VALVE | 1.3.1.4.17 | 3 | 1 | 4 | 17 | LAO | Value | PSI | NC |
| B4800.FH7A.AHU01.DA1HD | HD VALVE | 1.3.1.4.18 | 3 | 1 | 4 | 18 | LAO | Value | PSI | NC |
| B4800.FH7A.AHU01.DA1MA | MA DAMPERS | 1.3.1.4.19 | 3 | 1 | 4 | 19 | LAO | Value | PSI | NC |
| B4800.FH7A.AHU01.DA1SFP | SUP FAN | 1.3.1.4.20 | 3 | 1 | 4 | 20 | LDO | On/Off | | |
| B4800.FH7A.AHU01.DA1RFP | RET FAN | 1.3.1.4.21 | 3 | 1 | 4 | 21 | LDO | On/Off | | |
| B4800.FH7A.AHU01.DA1CTL | CLG LOOP OUT | 1.3.1.4.56 | 3 | 1 | 4 | 56 | LAO | Value | | PCT |
| B4800.FH7A.AHU01.DA1MTL | MIX LOOP OUT | 1.3.1.4.66 | 3 | 1 | 4 | 66 | LAO | Value | | PCT |
| B4800.FH7A.AHU02.DA2ENA | DA2 ENABLE | 1.3.1.5.3 | 3 | 1 | 5 | 3 | LDO | On/Off | | |
| B4800.FH7A.AHU02.DA2SFP | SUP FAN PRF | 1.3.1.5.10 | 3 | 1 | 5 | 10 | LDI | Status | | |
| B4800.FH7A.AHU02.DA2AL | CHILLER ALM | 1.3.1.5.11 | 3 | 1 | 5 | 11 | LDI | Status | | |
| B4800.FH7A.AHU02.DA2RT | RA TEMP | 1.3.1.5.12 | 3 | 1 | 5 | 12 | LAI | Value | L-Type | DEG F |
| B4800.FH7A.AHU02.DA2CT | CD TEMP | 1.3.1.5.13 | 3 | 1 | 5 | 13 | LAI | Value | L-Type | DEG F |
| B4800.FH7A.AHU02.DA2HT | HD TEMP | 1.3.1.5.14 | 3 | 1 | 5 | 14 | LAI | Value | L-Type | DEG F |
| B4800.FH7A.AHU02.DA2CV | CD VALVE | 1.3.1.5.15 | 3 | 1 | 5 | 15 | LAO | Value | PSI | |
| B4800.FH7A.AHU02.DA2CV | HD VALVE | 1.3.1.5.16 | 3 | 1 | 5 | 16 | LAO | Value | PSI | |
| B4800.FH7A.AHU02.DA2V | CD VALVE | 1.3.1.5.17 | 3 | 1 | 5 | 17 | LAO | Value | PSI | |
| B4800.FH7A.AHU02.DA2V | HD VALVE | 1.3.1.5.18 | 3 | 1 | 5 | 18 | LAO | Value | PSI | |
| B4800.FH7A.AHU02.DA2SFP | SUP FAN | 1.3.1.5.20 | 3 | 1 | 5 | 20 | LDO | On/Off | | |
| B4800.HX3.HWV | 4802 W VALVE | 1.5.0.16.2 | 5 | 0 | 16 | 2 | LAI | Value | | VDC |
| B4800.AH03.SAT | SUP TMP AH3 | 1.5.0.17.1 | 5 | 0 | 17 | 1 | LAI | Value | Current | DEG F |
| B4800.AH03.RAT | RET TMP AH3 | 1.5.0.17.2 | 5 | 0 | 17 | 2 | LAI | Value | Current | DEG F |

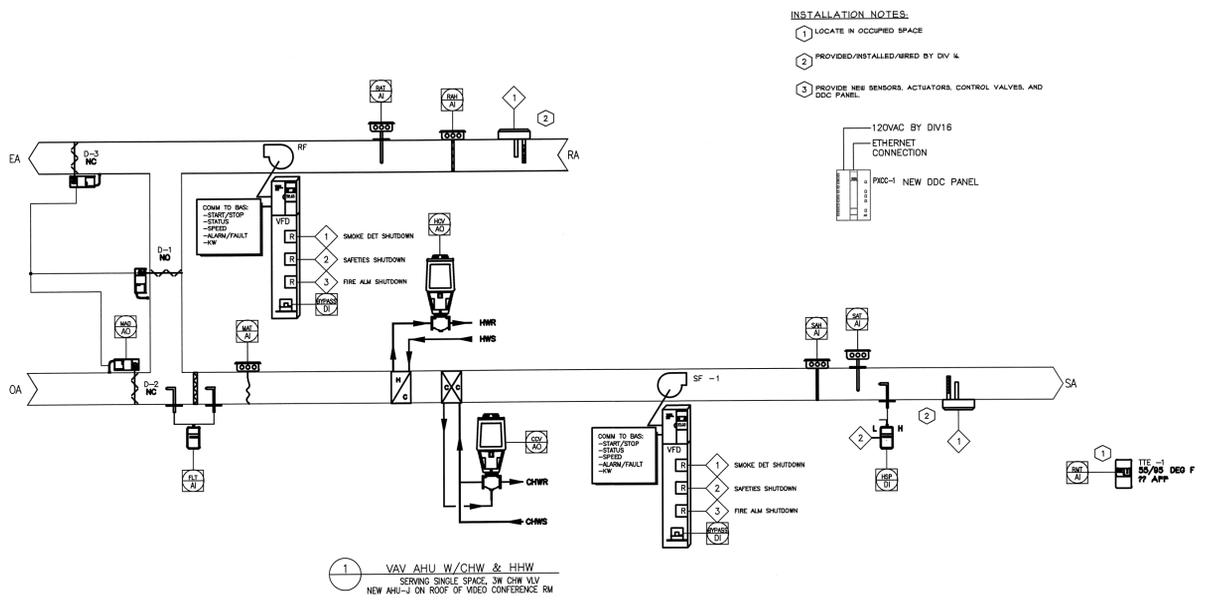
| Name | Description | Address | Controller | FLN | Drop | Point | Type | Function | Sensor | Eng. Unit |
|------------------------|--------------|------------|------------|-----|------|-------|------|----------|--------|-----------|
| B4800.FH3.SF6.E56ENA | ENABLE ES6 | 1.5.1.8.3 | 5 | 1 | 8 | 3 | LDO | On/Off | | |
| B4800.FH3.SF6.E56HWRT | HWRT OFFSET | 1.5.1.8.4 | 5 | 1 | 8 | 4 | LAO | Value | | DEG F |
| B4800.FH3.SF6.E56HWST | HWRT STPT | 1.5.1.8.5 | 5 | 1 | 8 | 5 | LAO | Value | | DEG F |
| B4800.FH3.SF6.E56HXGSP | FLOW STPT | 1.5.1.8.6 | 5 | 1 | 8 | 6 | LAO | Value | | GPM |
| B4800.FH3.SF6.E56HXFMN | MIN FLOW | 1.5.1.8.7 | 5 | 1 | 8 | 7 | LAO | Value | | GPM |
| B4800.FH3.SF6.E56HXFMX | MAX FLOW | 1.5.1.8.8 | 5 | 1 | 8 | 8 | LAO | Value | | GPM |
| B4800.FH3.SF6.E56SFP | SFAN PRF ES6 | 1.5.1.8.10 | 5 | 1 | 8 | 10 | LDI | Status | | |
| B4800.FH3.SF6.E56D11 | D11 | 1.5.1.8.11 | 5 | 1 | 8 | 11 | LDI | Status | | |
| B4800.FH3.SF6.E56D12 | D12 | 1.5.1.8.12 | 5 | 1 | 8 | 12 | LDI | Status | | |
| B4800.FH3.SF6.E56SMT | MA TEMP ES6 | 1.5.1.8.13 | 5 | 1 | 8 | 13 | LAI | Value | L-Type | DEG F |
| B4800.FH3.SF6.E56SRT | RA TEMP ES6 | 1.5.1.8.14 | 5 | 1 | 8 | 14 | LAI | Value | L-Type | DEG F |
| B4800.FH3.SF6.E56SCT | COLD TMP ES6 | 1.5.1.8.15 | 5 | 1 | 8 | 15 | LAI | Value | L-Type | DEG F |
| B4800.FH3.SF6.E56SST | SA TEMP ES6 | 1.5.1.8.16 | 5 | 1 | 8 | 16 | LAI | Value | L-Type | DEG F |
| B4800.FH3.SF6.E56SMD | DAMPER ES6 | 1.5.1.8.17 | 5 | 1 | 8 | 17 | LAO | Value | PSI | |
| B4800.FH3.SF6.E56SDF | CHW VLV ES6 | 1.5.1.8.18 | 5 | 1 | 8 | 18 | LAO | Value | PSI | |
| B4800.FH3.SF6.E56SDF | SUP FAN ES6 | 1.5.1.8.20 | 5 | 1 | 8 | 20 | LDO | On/Off | | |
| B4800.FH3.SF6.E56SDP | FILTER ES6 | 1.5.1.8.31 | 5 | 1 | 8 | 31 | LDI | Status | | |
| B4800.FH3.SF6.E56SGPM | GAL PER MIN | 1.5.1.8.33 | 5 | 1 | 8 | 33 | LAI | Value | L-Type | GPM |
| B4800.FH3.SF6.E56SZN | ZN TEMP ES6 | 1.5.1.8.34 | 5 | 1 | 8 | 34 | LAI | Value | L-Type | DEG F |
| B4800.FH3.SF6.E56SHW | HW VALVE | 1.5.1.8.37 | 5 | 1 | 8 | 37 | LAO | Value | VDC | |
| B4800.FH3.SF6.E56SHAS | SA STPT ES6 | 1.5.1.8.50 | 5 | 1 | 8 | 50 | LAO | Value | DEG F | |
| B4800.FH3.SF6.E56SOAT | QA TEMP ES6 | 1.5.1.8.51 | 5 | 1 | 8 | 51 | LAO | Value | DEG F | |
| B4800.FH3.SF6.E56SLOP | LOOP OUT ES6 | 1.5.1.8.52 | 5 | 1 | 8 | 52 | LAO | Value | PCT | |
| B4800.FH3.SF6.E56SDMN | DMPR MIN ES6 | 1.5.1.8.55 | 5 | 1 | 8 | 55 | LAO | Value | PCT OP | |
| B4800.FH3.SF6.E56SST | ZN STPT ES6 | 1.5.1.8.56 | 5 | 1 | 8 | 56 | LAO | Value | DEG F | |
| B4800.FH3.SF6.E56SECON | ECON ES6 | 1.5.1.8.57 | 5 | 1 | 8 | 57 | LDO | On/Off | | |
| B4800.FH3.SF6.E56SLO | SA LO SP ES6 | 1.5.1.8.58 | 5 | 1 | 8 | 58 | LAO | Value | DEG F | |
| B4800.FH3.SF6.E56SHI | SA HI SP ES6 | 1.5.1.8.59 | 5 | 1 | 8 | 59 | LAO | Value | DEG F | |
| B4800.FH3.SF6.E56SCHW | CHW END ES6 | 1.5.1.8.60 | 5 | 1 | 8 | 60 | LAO | Value | PCT | |
| B4800.FH3.SF6.E56SMDP | DMPR END ES6 | 1.5.1.8.62 | 5 | 1 | 8 | 62 | LAO | Value | PCT | |
| B4800.FH3.SF6.E56SHW | HWV POSITION | 1.5.1.8.63 | 5 | 1 | 8 | 63 | LAO | Value | PCT | |
| B4800.FH3.SF6.E56HFLOW | FLOW ON | 1.5.1.8.69 | 5 | 1 | 8 | 69 | LDO | On/Off | | |
| B4800.FH3.SF6.E56SD1 | SMK DET | 1.5.1.8.91 | 5 | 1 | 8 | 91 | LDO | On/Off | | |
| B4800.FH3.SF6.E56SFRZ | FRZ STAT | 1.5.1.8.92 | 5 | 1 | 8 | 92 | LDO | On/Off | | |

| Name | Description | Address | Controller | FLN | Drop | Point | Type | Function | Sensor | Eng. Unit |
|-----------------------|--------------|------------|------------|-----|------|-------|------|----------|--------|-----------|
| B4800.FH2.SF5.E55ENA | ENABLE ES5 | 1.5.1.7.3 | 5 | 1 | 7 | 3 | LDO | On/Off | | |
| B4800.FH2.SF5.E55SFP | SFAN PRF ES5 | 1.5.1.7.10 | 5 | 1 | 7 | 10 | LDI | Status | | |
| B4800.FH2.SF5.E55D11 | D11 | 1.5.1.7.11 | 5 | 1 | 7 | 11 | LDI | Status | | |
| B4800.FH2.SF5.E55D12 | D12 | 1.5.1.7.12 | 5 | 1 | 7 | 12 | LDI | Status | | |
| B4800.FH2.SF5.E55SMT | MA TEMP ES5 | 1.5.1.7.13 | 5 | 1 | 7 | 13 | LAI | Value | L-Type | DEG F |
| B4800.FH2.SF5.E55SRT | RA TEMP ES5 | 1.5.1.7.14 | 5 | 1 | 7 | 14 | LAI | Value | L-Type | DEG F |
| B4800.FH2.SF5.E55SCT | COLD TMP ES5 | 1.5.1.7.15 | 5 | 1 | 7 | 15 | LAI | Value | L-Type | DEG F |
| B4800.FH2.SF5.E55SST | SA TEMP ES5 | 1.5.1.7.16 | 5 | 1 | 7 | 16 | LAI | Value | L-Type | DEG F |
| B4800.FH2.SF5.E55SMD | DAMPER ES5 | 1.5.1.7.17 | 5 | 1 | 7 | 17 | LAO | Value | PSI | |
| B4800.FH2.SF5.E55SDF | CHW VLV ES5 | 1.5.1.7.18 | 5 | 1 | 7 | 18 | LAO | Value | PSI | |
| B4800.FH2.SF5.E55SHW | HW VALVE ES5 | 1.5.1.7.19 | 5 | 1 | 7 | 19 | LAO | Value | VDC | |
| B4800.FH2.SF5.E55SDF | SUP FAN ES5 | 1.5.1.7.20 | 5 | 1 | 7 | 20 | LDO | On/Off | | |
| B4800.FH2.SF5.E55SDP | FILTER ES5 | 1.5.1.7.31 | 5 | 1 | 7 | 31 | LDI | Status | | |
| B4800.FH2.SF5.E55SZN | ZONE TMP ES5 | 1.5.1.7.34 | 5 | 1 | 7 | 34 | LAI | Value | L-Type | DEG F |
| B4800.FH2.SF5.E55SAS | SA STPT ES5 | 1.5.1.7.50 | 5 | 1 | 7 | 50 | LAO | Value | DEG F | |
| B4800.FH2.SF5.E55SOAT | QA TEMP ES5 | 1.5.1.7.51 | 5 | 1 | 7 | 51 | LAO | Value | DEG F | |
| B4800.FH2.SF5.E55SLOP | LOOP OUT ES5 | 1.5.1.7.52 | 5 | 1 | 7 | 52 | LAO | Value | PCT | |
| B4800.FH2.SF5.E55SPG | P GAIN ES5 | 1.5.1.7.53 | 5 | 1 | 7 | 53 | LAO | Value | GAIN | |
| B4800.FH2.SF5.E55SG | I GAIN ES5 | 1.5.1.7.54 | 5 | 1 | 7 | 54 | LAO | Value | GAIN | |
| B4800.FH2.SF5.E55ECON | ECON ES5 | 1.5.1.7.57 | 5 | 1 | 7 | 57 | LDO | On/Off | | |
| B4800.FH2.SF5.E55SCHW | CHW VLV ES5 | 1.5.1.7.60 | 5 | 1 | 7 | 60</ | | | | |

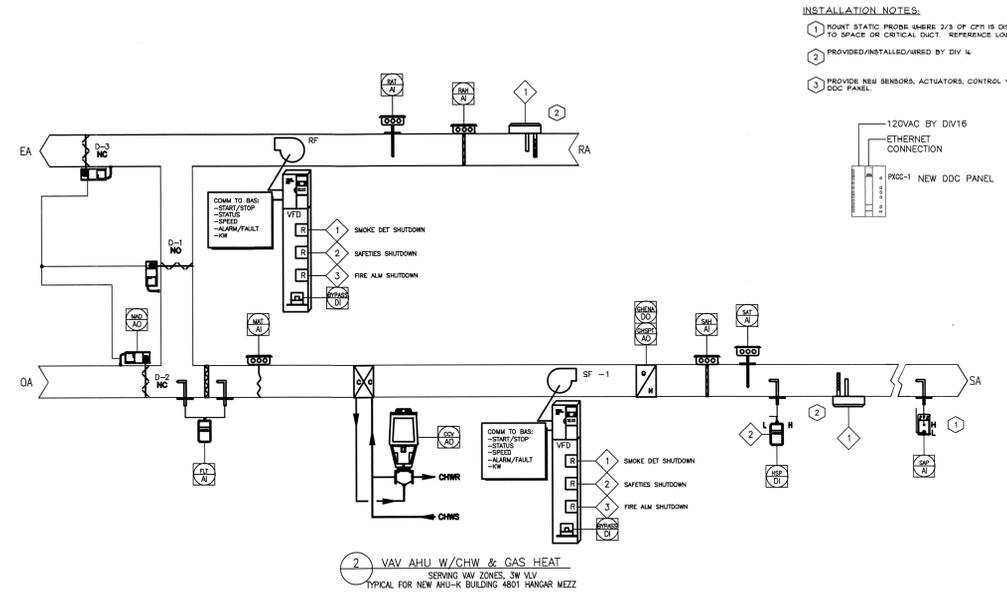


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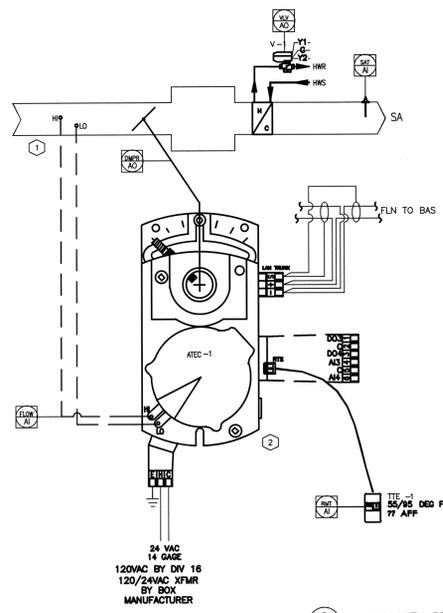
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| | | NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS Chief, Facilities Engineering & Asset Mgmt. Office <i>[Signature]</i> Project Requester/Estimator <i>[Signature]</i> Facilities Project Manager <i>[Signature]</i> Chief, Office of Protective Services <i>[Signature]</i> Chief, Safety & Environmental Office <i>[Signature]</i> Chief, Information Office <i>[Signature]</i> | DATE 2-28-13 2-28-13 2/27/13 2-27-13 2/27/13 |
| | | DRAWING TITLE SIEMENS CONTROL DIAGRAMS | | PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | |
| 02-21-13 E 100% FINAL DESIGN 01-07-13 D 95% NEAR-FINAL DESIGN SUBMITTAL 10-27-12 C 60% DEVELOPED DESIGN SUBMITTAL 05-12-12 B 30% PRELIMINARY DESIGN SUBMITTAL | | DATE SYM REVISION BY A/PD | | DATE STARTED DATE PRINTED 02/21/2013 DRAWN BY HEI SCALE AS SHOWN TRADE SH. NO. EDM-1715 FILE NAME EDM-1715 M-502.DWG M SIZE SHEET No. 48 of 74 | |



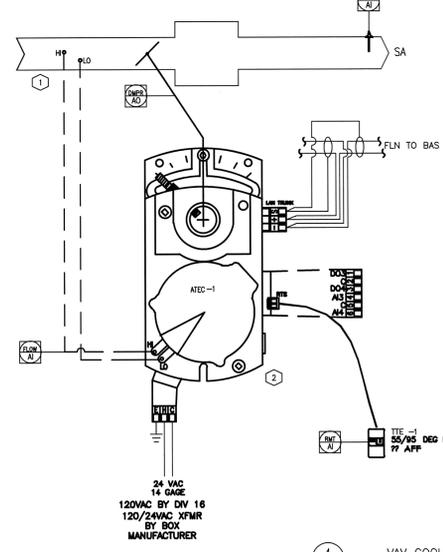
- INSTALLATION NOTES:**
- 1 LOCATE IN OCCUPIED SPACE
 - 2 PROVIDED/INSTALLED/WIRED BY DIV 4
 - 3 PROVIDER NEW SENSORS, ACTUATORS, CONTROL VALVES, AND DDC PANEL.



- INSTALLATION NOTES:**
- 1 POINT STATIC PROBE WHERE 2/3 OF CFM IS DISCHARGED TO SPACE OR CRITICAL DUCT. REFERENCE LOW SIDE TO SPACE.
 - 2 PROVIDED/INSTALLED/WIRED BY DIV 4
 - 3 PROVIDER NEW SENSORS, ACTUATORS, CONTROL VALVES, AND DDC PANEL.



- INSTALLATION NOTES:**
- 1 VAV BOX INSTALLED BY MECHANICAL CONTRACTOR WITH 3 TO 5 STRAIGHT DUCT DIAMETERS UPSTREAM OF BOX TO PROVIDE PROPER FLOW SENSING
 - 2 ATEC-1 TO BE MOUNTED IN MANUFACTURER SUPPLIED CONTROLLER ENCLOSURE



- INSTALLATION NOTES:**
- 1 VAV BOX INSTALLED BY MECHANICAL CONTRACTOR WITH 3 TO 5 STRAIGHT DUCT DIAMETERS UPSTREAM OF BOX TO PROVIDE PROPER FLOW SENSING
 - 2 ATEC-1 TO BE MOUNTED IN MANUFACTURER SUPPLIED CONTROLLER ENCLOSURE

3 VAV WITH REHEAT COIL
 COPYRIGHT 2009 SIEMENS BUILDING TECHNOLOGIES, INC.
 ATX0018 REV 2 10/16/2009

4 VAV COOLING ONLY
 COPYRIGHT 2009 SIEMENS BUILDING TECHNOLOGIES, INC.
 ATX0018 REV 2 10/16/2009

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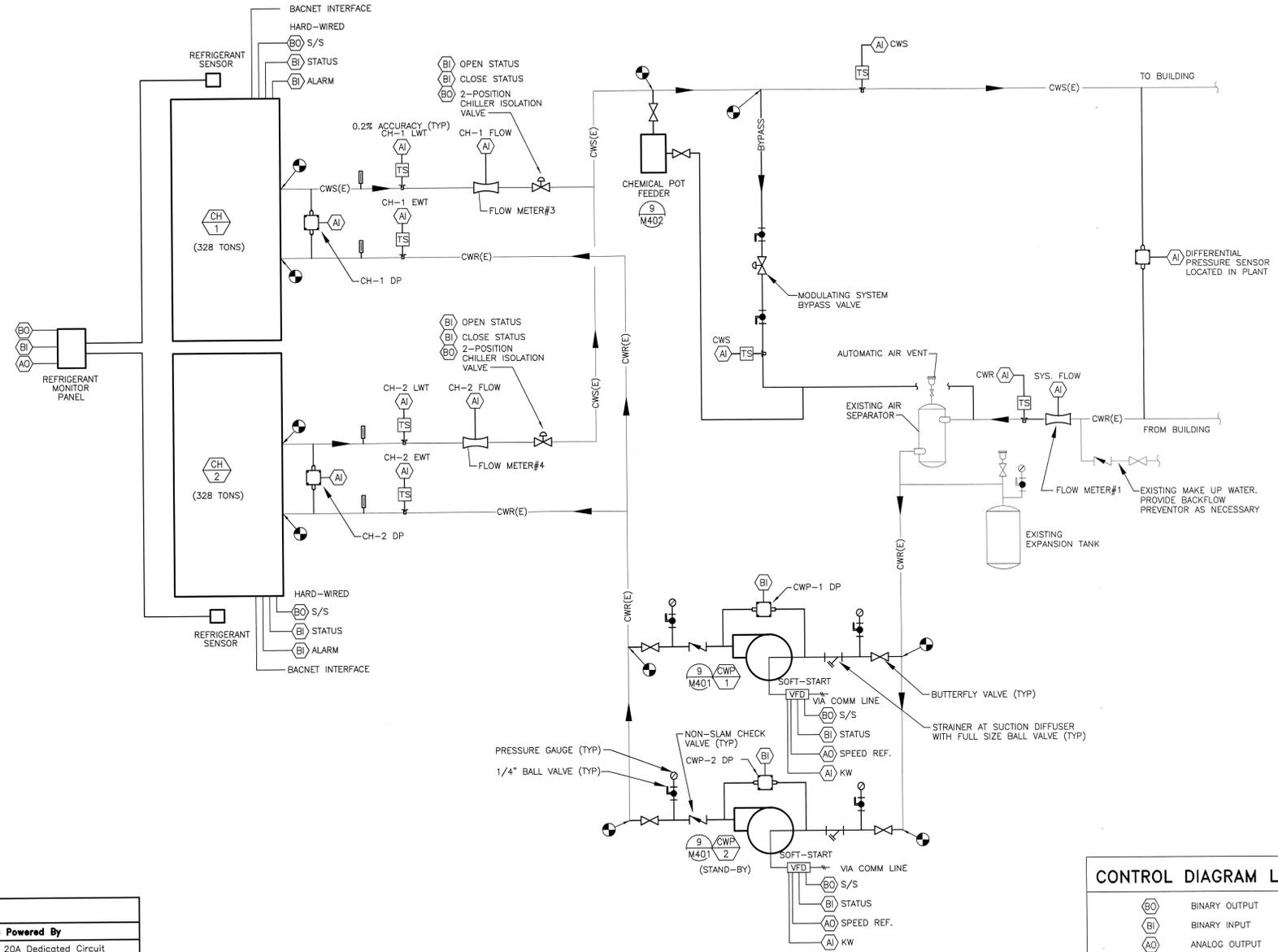
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|------|-----|---|----|---|--|------|
| | | NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS Chief, Facilities Engineering & Asset Mgmt. Office <i>[Signature]</i> 2-28-13 Project Requestor/Assistant <i>[Signature]</i> 2-28-13 Facilities Project Manager <i>[Signature]</i> 2/27/13 Chief, Office of Logistics Services <i>[Signature]</i> 2/27/13 Chief, Safety, Health & Environmental Affairs <i>[Signature]</i> 2/27/13 Director, Information Office <i>[Signature]</i> 2/27/13 | | DATE |
| | | DRAWING TITLE SIEMENS CONTROL DIAGRAMS | | | | |
| | | PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | DATE STRTD DATE PRINTD 02/21/2013 | | |
| | | DRAWN BY HEI | | TRADE SH. No. EDM-1715 | | |
| | | SCALE AS SHOWN | | M 503 | | |
| | | FILE NAME EDM-1715 M-503.DWG | | SHEET No. 49 of 74 | | |
| DATE | SYM | REVISION | BY | A'PD | | |

CENTRAL PLANT SEQUENCE OF OPERATION:

- THE CONTRACTOR SHALL IMPLEMENT THE FOLLOWING SEQUENCE OF OPERATION TO ALLOW VARIABLE PRIMARY CHILLED WATER FLOW AT NEW WATER-COOLED CHILLERS, CH-1 AND CH-2.
- THE CHILLER SEQUENCER AND AUTOMATION SYSTEM SHALL CONTROL THE OPERATION OF THE CHILLER PLANT. THE CHILLER PLANT CONTROL SYSTEM SHALL INCLUDE A CHILLER PLANT OPTIMIZATION SEQUENCE THAT CALCULATES THE SYSTEM LOAD AND CONTROLS THE CHILLERS, COOLING TOWERS, CHILLED WATER PUMPS AND CONDENSER WATER PUMPS TOGETHER AS A SYSTEM TO ACHIEVE THE HIGHEST PLANT OPERATING EFFICIENCY FOR THE SYSTEM LOAD.
- THE CHILLER PLANT ENABLE/DISABLE BASED ON AN OPTIMAL START/STOP PROGRAM OR FROM A MANUAL COMMAND FROM THE PLANT OPERATOR.
- ON A START COMMAND FROM THE BUILDING AUTOMATION SYSTEM, THE CHILLED WATER AND CONDENSER WATER NORMALLY CLOSED MOTORIZED ISOLATION VALVES (LOCATED ON THE LEAVING SIDE OF THE LEAD CHILLER) SHALL OPEN. THE LEAD CHILLED WATER PUMP AND THE LEAD CONDENSER WATER PUMP SHALL START AND THE COOLING TOWER FANS SHALL START. THE SPEED OF THE LEAD CONDENSER WATER PUMP SHALL BE SET TO MAINTAIN THE DESIGN CONDENSER WATER FLOWRATE REQUIRED THROUGH THE LEAD CHILLER. THE MINIMUM SPEED OF THE LEAD CHILLED WATER PUMP SHALL BE SET TO THE DESIGN CHILLED WATER MINIMUM FLOWRATE REQUIRED THROUGH THE LEAD CHILLER.
- AFTER THE FAN AT EACH COOLING TOWER IS STARTED, THE VARIABLE FREQUENCY DRIVE ASSOCIATED WITH EACH COOLING TOWER FAN SHALL BE UTILIZED TO MODULATE THE SPEED OF THE COOLING TOWER FAN. THE FANS SHALL MODULATE AT A UNIFORM SPEED TO MAINTAIN A CONDENSER WATER SUPPLY TEMPERATURE SETPOINT OF 85 DEGREE F (ADJUSTABLE).
- AFTER FLOW IS PROVEN THROUGH THE CHILLED WATER AND CONDENSER WATER BARRELS OF THE LEAD CHILLER, THE LEAD CHILLER SHALL START AND SHALL OPERATE TO MAINTAIN A CHILLED WATER SUPPLY TEMPERATURE OF 45 DEGREES F (ADJUSTABLE).
- WHILE THE LEAD CHILLER IS OPERATING, THE SPEED OF THE LEAD CHILLED WATER PUMP SHALL MODULATE TO MAINTAIN THE CHILLED WATER SYSTEM SUPPLY / RETURN DIFFERENTIAL PRESSURE SETPOINT OF THE EXISTING DIFFERENTIAL PRESSURE MASTER CONTROLLER. THE MINIMUM SPEED OF THE LEAD CHILLED WATER PUMP SHALL BE LIMITED SUCH THAT THE TOTAL CHILLED WATER FLOW DELIVERED TO THE LEAD CHILLER IS GREATER THAN THE MINIMUM REQUIRED BY THE CHILLER MANUFACTURER (REFER TO MINIMUM REQUIRED CHILLED WATER FLOW RATES NOTED BELOW). THE FLOW METER INSTALLED IN THE CHILLED WATER SUPPLY OF THE ACTIVE CHILLER (FLOW METER #3 OR #4) SHALL SENSE CHILLED WATER FLOW THROUGH THE ACTIVE CHILLER AND MODULATE THE SYSTEM BYPASS VALVE TO ENSURE THAT THE MINIMUM REQUIRED FLOW IS MAINTAINED THROUGH THE ACTIVE CHILLER.
- WHEN THE CHILLED WATER RETURN TEMPERATURE EXCEEDS 60 DEGREES F (ADJUSTABLE) FOR A PERIOD OF 15 MINUTES (ADJUSTABLE) THE CHILLED WATER AND CONDENSER WATER NORMALLY CLOSED MOTORIZED ISOLATION VALVES LOCATED ON THE LEAVING SIDE OF THE LAG CHILLER SHALL OPEN. THE SPEED OF THE LEAD CONDENSER WATER PUMP SHALL BE INCREASED TO 100 PERCENT AND THE SPEED OF THE LEAD CHILLED WATER PUMP SHALL BE SET TO 70 PERCENT (ADJUSTABLE). AFTER A 30 SECOND DELAY, THE CHILLED WATER BYPASS VALVE SHALL OPEN TO 30 PERCENT (ADJUSTABLE). AFTER ANOTHER 30 SECONDS DELAY AND AFTER FLOW IS PROVEN THROUGH THE CHILLED WATER AND CONDENSER WATER BARRELS OF THE LAG CHILLER, THE LEAD CHILLER SHALL BE DEMAND-LIMITED TO 50 PERCENT CAPACITY (ADJUSTABLE) AND THE LAG CHILLER SHALL START.
- DURING CHILLER STAGING THE SPEED OF THE LEAD CHILLED WATER PUMP SHALL REMAIN AT 70 PERCENT AND THE POSITION OF THE CHILLED WATER BYPASS VALVE SHALL REMAIN AT 30 PERCENT FOR 15 MINUTES (ADJUSTABLE) TO ALLOW LEAD AND LAG CHILLER OPERATION TO STABILIZE. AFTER 15 MINUTES HAS EXPIRED, NORMAL OPERATION OF THE LEAD AND LAG CHILLERS SHALL COMMENCE. THE LEAD AND LAG CHILLER WILL MODULATE IN UNISON.
- WHEN THE LEAD CHILLED WATER PUMP SPEED EXCEEDS 90% (ADJUSTABLE) THE LAG CHILLED WATER PUMP WILL START AND RAMP TO MEET THE LEAD CHILLED WATER PUMP SPEED. THE CHILLED WATER PUMPS WILL MODULATE IN UNISON TO MAINTAIN DIFFERENTIAL PRESSURE SETPOINT. WHEN BOTH THE LEAD AND LAG CHILLED WATER PUMP SPEED IS BELOW 45% THE LAG CHILLED WATER PUMP SHALL STOP.
- DURING NORMAL OPERATION OF THE LEAD AND LAG CHILLERS, THE SPEED OF THE LEAD CONDENSER WATER PUMP SHALL REMAIN AT 100 PERCENT AND THE SPEED OF THE LEAD CHILLED WATER PUMP SHALL MODULATE TO MAINTAIN THE CHILLED WATER SYSTEM SUPPLY / RETURN DIFFERENTIAL PRESSURE SETPOINT OF THE SYSTEM. THE MINIMUM SPEED OF THE LEAD CHILLED WATER PUMP SHALL BE LIMITED SUCH THAT THE TOTAL CHILLED WATER FLOW DELIVERED TO THE CHILLERS IS GREATER THAN THE MINIMUM REQUIRED BY THE CHILLER MANUFACTURER (REFER TO MINIMUM REQUIRED CHILLED WATER FLOW RATES NOTED BELOW). THE FLOW METERS INSTALLED IN THE CHILLED WATER SUPPLY (FLOW METER #3 AND #4) SHALL SENSE THE CHILLED WATER FLOW THROUGH EACH CHILLER AND MODULATE THE SYSTEM BYPASS VALVE TO ENSURE THAT THE MINIMUM REQUIRED FLOW IS MAINTAINED THROUGH EACH CHILLER.
- IF THE CONDENSER WATER SUPPLY TEMPERATURE FALLS BELOW 68 DEGREES F, THE CONDENSER WATER BYPASS VALVE WILL OPEN. THE BYPASS VALVE WILL MODULATE TO MAINTAIN A CONDENSER WATER SUPPLY TEMPERATURE OF 68 DEGREES F. THE BYPASS VALVE WILL CLOSE WHEN THE CONDENSER WATER SUPPLY TEMPERATURE EXCEEDS 68 DEGREES F.
- WHEN THE CHILLED WATER RETURN TEMPERATURE FALLS BELOW 52 DEGREES F (ADJUSTABLE) FOR A PERIOD OF 15 MINUTES (ADJUSTABLE) WHILE BOTH THE LEAD AND LAG CHILLERS ARE OPERATING, THE LAG CHILLER SHALL BE STAGED OFF. THE CHILLED WATER AND CONDENSER WATER NORMALLY CLOSED MOTORIZED ISOLATION VALVES LOCATED ON THE LEAVING SIDE OF THE LAG CHILLER SHALL CLOSE AND SPEED OF THE CONDENSER WATER PUMP SHALL BE REDUCED TO THE SPEED REQUIRED TO MAINTAIN THE DESIGN CONDENSER WATER FLOWRATE REQUIRED THROUGH THE LEAD CHILLER.
- WHEN LEAD CHILLER OPERATION IS DISCONTINUED, THE CHILLED WATER AND CONDENSER WATER NORMALLY CLOSED MOTORIZED ISOLATION VALVES LOCATED ON THE LEAVING SIDE OF THE LEAD CHILLER SHALL CLOSE. THE LEAD CONDENSER WATER PUMP SHALL STOP AND THE COOLING TOWER FANS SHALL STOP. THE LEAD CHILLED WATER PUMP SHALL CONTINUE TO OPERATE FOR A PERIOD OF 1 MINUTE (ADJUSTABLE) TO REMOVE RESIDUAL REFRIGERATION CAPACITY.

NOTES:

- MINIMUM REQUIRED CHILLED WATER FLOWRATE THROUGH CH-1 AND CH-2 IS 280 GPM; MINIMUM REQUIRED CONDENSER WATER FLOWRATE THROUGH CH-1 AND CH-2 IS 290 GPM.
- THE CHILLED WATER BYPASS VALVE SHALL BE MODULATED TO THE FULLY OPEN POSITION WHENEVER THE SYSTEM IS SHUTDOWN.
- CHILLERS (CH-1 AND CH-2), CHILLED WATER PUMPS (CWP-1 AND CWP-2), AND CONDENSER WATER PUMPS (CTP-1 AND CTP-2) SHALL BE ROTATED FROM LEAD TO LAG ON A WEEKLY BASIS.
- CHILLERS SHALL AUTOMATICALLY ROTATE LEAD/LAG ARRANGEMENT UPON FAILURE OF LEAD CHILLER TO START.
- UPON FAILURE OF LEAD OR LAG CHILLED WATER PUMP TO START, THE STAND-BY CHILLED WATER PUMP SHALL START AND AN ALARM WILL BE SENT TO THE WORKSTATION.
- UPON FAILURE OF LEAD OR LAG CONDENSER WATER PUMP TO START, THE STAND-BY CONDENSER WATER PUMP SHALL START AND AN ALARM WILL BE SENT TO THE WORKSTATION.
- CHILLER ISOLATION VALVES SHALL BE PROGRAMMED FOR SLOW OPEN / SLOW CLOSED OPERATION TO SLOW THE RATE OF CHANGE OF WATER FLOW THROUGH THE OPERATING CHILLER(S).



1 CHILLED WATER CENTRAL PLANT FLOW DIAGRAM

CONTROL DIAGRAM LEGEND

| | |
|------|------------------------|
| (BO) | BINARY OUTPUT |
| (BI) | BINARY INPUT |
| (AO) | ANALOG OUTPUT |
| (AI) | ANALOG INPUT |
| CWS | CHILLED WATER SUPPLY |
| CWR | CHILLED WATER RETURN |
| CS | CONDENSER WATER SUPPLY |
| CR | CONDENSER WATER RETURN |

CENTRAL PLANT CONTROLS RESPONSIBILITY MATRIX

| Device Type | Device Provided By | Device Installed By | Device Wired By | Device Powered By |
|-------------------------------------|--------------------------------|-----------------------|--|--|
| BMS Control Panels | Controls Contractor | Controls Contractor | Controls Contractor | Div 16 120VAC 20A Dedicated Circuit |
| Chiller BACnet Interface | Chiller Manufacturer | Chiller Manufacturer | Chiller Manufacturer | N/A |
| Chiller Control Hardwire Points | Points by Chiller Manufacturer | N/A | Controls Contractor | N/A |
| Chiller Flow Switch (if applicable) | Chiller Manufacturer | Mechanical Contractor | Controls Contractor | N/A |
| CHW Bypass Valve | Controls Contractor | Mechanical Contractor | Controls Contractor | Controls Contractor (24VAC) |
| CT Bypass Valve | Controls Contractor | Mechanical Contractor | Controls Contractor | Div 16 120VAC 20A |
| Differential Pressure Sensors | Controls Contractor | Mechanical Contractor | Controls Contractor | N/A |
| Differential Pressure Switches | Controls Contractor | Mechanical Contractor | Controls Contractor | N/A |
| Flow Meter | Controls Contractor | Mechanical Contractor | Controls Contractor | Div 16 (pending device selection) |
| Isolation Valves | Controls Contractor | Mechanical Contractor | Controls Contractor | Div 16 (2) 120VAC 20A Circuits |
| Mechanical Valves | Mechanical Contractor | Mechanical Contractor | N/A | N/A |
| Pressure Gauges | Mechanical Contractor | Mechanical Contractor | N/A | N/A |
| Refrigerant Monitor | Controls Contractor | Controls Contractor | Controls Contractor | Div 16 120VAC 20A Emergency Circuit on UPS |
| Refrigerant Sensors | Controls Contractor | Controls Contractor | Controls Contractor | N/A |
| Temperature Gauges | Mechanical Contractor | Mechanical Contractor | N/A | N/A |
| Temperature Sensors | Controls Contractor | Mechanical Contractor | Controls Contractor | N/A |
| VFD's | Div 16 | Div 16 | Control Points Wiring by Controls Contractor | Div 16 |
| Humidifiers/safeties | Mechanical Contractor | Mechanical Contractor | Controls Contractor | Controls Contractor (24VAC) |
| Cooling Coil Valves | Controls Contractor | Mechanical Contractor | Controls Contractor | Controls Contractor (24VAC) |
| Air Flow Measuring Stations | Controls Contractor | Mechanical Contractor | Controls Contractor | Controls Contractor (24VAC) |
| AHU VFD's | Mechanical Contractor | Mechanical Contractor | Controls Contractor (low voltage) | Div 16 |
| Isolation Dampers | Mechanical Contractor | Mechanical Contractor | Controls Contractor | Div 16 |
| Room temp sensors | Controls Contractor | Controls Contractor | Controls Contractor | N/A |
| Duct temp sensors | Controls Contractor | Controls Contractor | Controls Contractor | N/A |
| VAV box DDC controller | Controls Contractor | Controls Contractor | Controls Contractor | Div 16 120VAC 20A |
| VAV box transformer | Mechanical Contractor | Mechanical Contractor | Controls Contractor | Div 16 120VAC 20A |
| VAV box control enclosure | Mechanical Contractor | Mechanical Contractor | N/A | N/A |
| VAV reheat valve | Controls Contractor | Mechanical Contractor | Controls Contractor | Controls Contractor (24VAC) |

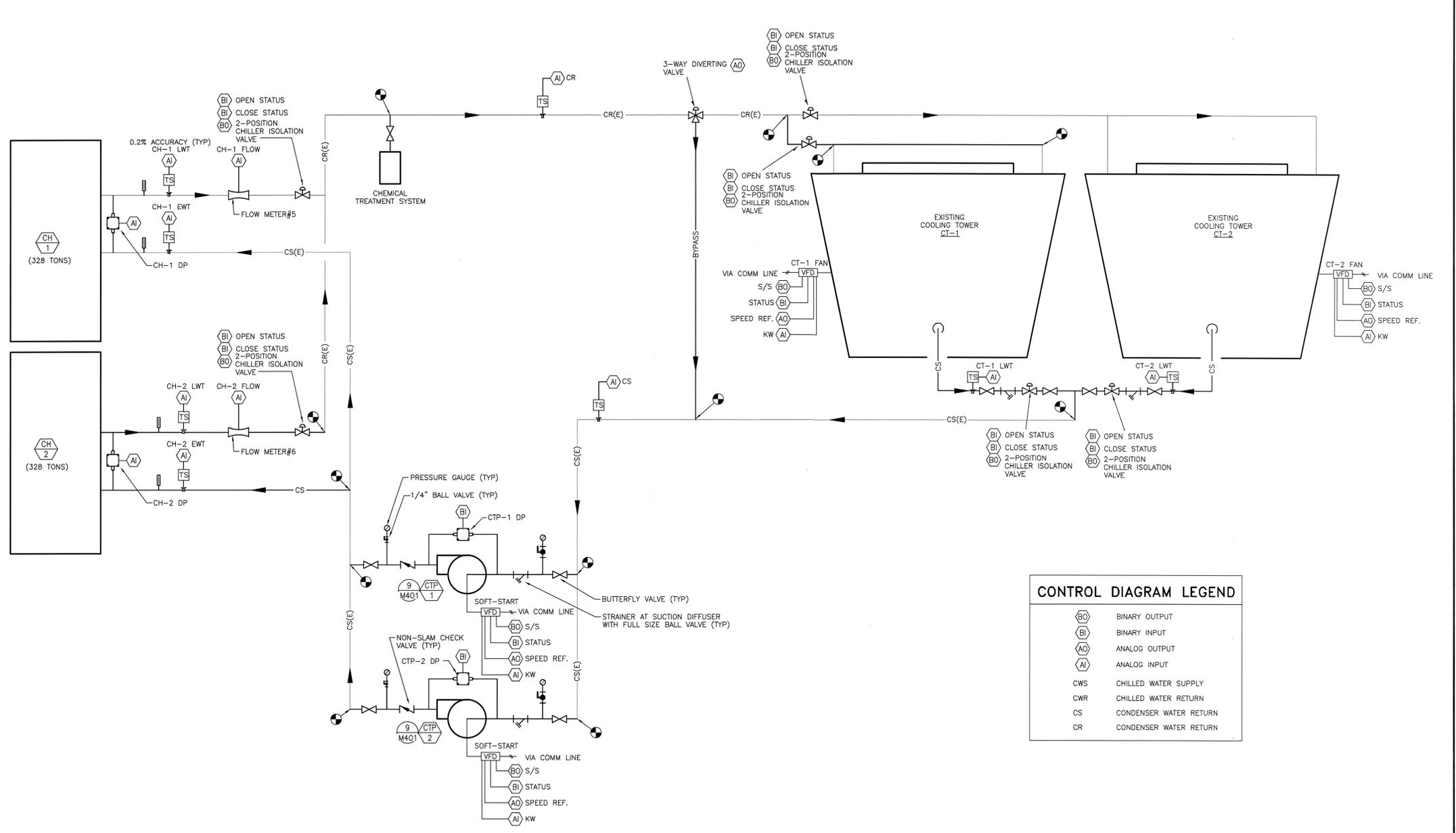


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| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS Chief, Facilities Engineering & Maint. Mgmt. Office Project Review Authority Facilities Project Manager Chief, Office of Protective Services Chief, Safety, Health & Environmental Office Chief, Civil Information Office | DATE 2-28-13 2-28-13 2/27/13 2-27-13 2/27/13 |
| DRAWING TITLE CHILLED WATER CENTRAL PLANT FLOW DIAGRAM | | DATE STRTD 02-21-13 | |
| PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | DATE PRNTD 02/21/2013 | TRADE M |
| 02-21-13 E 100% FINAL DESIGN 01-07-13 D 95% NEAR-FINAL DESIGN SUBMITTAL 10-27-12 C 60% DEVELOPED DESIGN SUBMITTAL 05-12-12 B 30% PRELIMINARY DESIGN SUBMITTAL | | SCALE AS SHOWN | FILE NAME EDM-1715 M-601.DWG |
| DATE SYM REVISION BY | | SHEET No. 52 of 24 | |

AHU-F, AHU-I
CHW/HW VALVES, SINGLE ZONE
 THE AHU SHALL ENABLE/DISABLE BASED ON OPTIMAL START/STOP ACCORDING TO ITS OCCUPIED/ UNOCCUPIED SCHEDULE.
 DURING OCCUPIED HOURS THE AHU SHALL MODULATE CHW AND HW VALVES TO MAINTAIN SUPPLY AIR TEMPERATURE SETPOINT. WHEN ENABLED, THE OA AND EA DAMPER SHALL OPEN TO MINIMUM. THE SUPPLY AND RETURN FANS SHALL START. THE SPEED OF THE SUPPLY FAN WILL MODULATE TO MAINTAIN SPACE TEMPERATURE SETPOINT. THE RETURN FAN SHALL TRACK THE SUPPLY FAN.
 DURING COOLING MODE, IF OA TEMP IS HIGHER THAN SA TEMP SETPOINT AND RA ENTHALPY IS HIGHER THAN OA ENTHALPY, THE OA AND EA DAMPERS SHALL OPEN AND RA DAMPER SHALL SHUT. THE CHWR VALVE SHALL MODULATE TO MAINTAIN SA TEMPERATURE SETPOINT. DURING COOLING MODE, IF OA TEMP IS LOWER THAN SUPPLY SA TEMPERATURE SETPOINT AND RA ENTHALPY IS HIGHER THAN OA ENTHALPY, THE OA, OA AND RA DAMPERS SHALL MODULATE TO MAINTAIN SA TEMPERATURE SETPOINT. DURING HEATING MODE, THE ECONOMIZER WILL BE LOCKED OUT AND THE HWR VALVE WILL MODULATE TO MAINTAIN SA TEMP. SETPOINT.
 THE SAT SHALL RESET ACCORDING TO OA TEMPERATURE, BASED ON THE FOLLOWING SCHEDULE:
 COOLING MODE OA TSAT 60°F / 40°F / 80°F 90°F
 DURING UNOCCUPIED MODE THE OA AND EA DAMPER SHALL CLOSE. THE SAT SETPOINT WILL FOLLOW A NIGHT SETBACK/SETUP SCHEDULE. THE SAT SETPOINT SHALL RAISE 5°F (ADJUSTABLE) IN COOLING MODE AND LOWER 5 DEGREES F (ADJUSTABLE) IN HEATING MODE.
SAFETIES:
HIGH DUCT STATIC: A STATIC PRESSURE HIGH LIMIT SWITCH LOCATED IN THE DUCTWORK IMMEDIATELY AFTER THE AHU IN THE MAIN SUPPLY AIR DUCT, SHALL DISABLE THE AIR HANDLING UNIT FAN IN THE EVENT OF THE DETECTION OF PRESSURES IN EXCESS OF HIGH LIMIT SETPOINT OF 3"WG AND SIGNAL AN ALARM TO THE OPERATORS WORK STATION.
SMOKE: UPON SENSING SMOKE IN THE SUPPLY OR RETURN DUCT, THE AHU WILL SHUTDOWN AND SEND AN ALARM TO THE OPERATORS WORKSTATION.
FIRE: UPON FIRE ALARM DETECTION, THE AHU WILL SHUTDOWN AND SEND AN ALARM TO THE OPERATORS.
FREEZE PROTECTION: DURING OCCUPIED MODE, WHEN THE OA TEMPERATURE IS BELOW 40°F THE CHILLED WATER VALVE WILL OPEN TO 25% (ADJ.). DURING UNOCCUPIED MODE, WHEN THE OA TEMPERATURE IS BELOW 40°F THE CHILLED WATER VALVE WILL OPEN TO 25% (ADJ.). THE HW VALVE WILL MODULATE TO MAINTAIN A MAT OF 45°F MIN. (ADJ.).

AHU-A, AHU-B, AHU-G, AHU-H
CHW/HW VALVES, MULTIPLE ZONE VAV
 THE AHU SHALL ENABLE/DISABLE BASED ON OPTIMAL START/STOP ACCORDING TO ITS OCCUPIED/ UNOCCUPIED SCHEDULE.
 DURING OCCUPIED HOURS THE AHU SHALL MODULATE CHILLED WATER VALVES TO MAINTAIN OCCUPIED SETPOINT. AHU-B AND AHU-H WILL MODULATE HW VALVE TO MAINTAIN OCCUPIED SETPOINT. WHEN ENABLED, THE OA AND EA DAMPER SHALL OPEN TO MINIMUM. THE SUPPLY AND RETURN FANS SHALL START. THE SPEED OF THE SUPPLY FAN WILL MODULATE TO MAINTAIN SPACE TEMPERATURE SETPOINT. THE RETURN FAN SHALL TRACK THE SUPPLY FAN.
 DURING COOLING MODE, IF OA TEMP IS HIGHER THAN SA TEMP SETPOINT AND RA ENTHALPY IS HIGHER THAN OA ENTHALPY, THE OA AND EA DAMPERS SHALL OPEN AND RA DAMPER SHALL SHUT. THE CHWR VALVE SHALL MODULATE TO MAINTAIN SA TEMPERATURE SETPOINT. DURING COOLING MODE, IF OA TEMP IS LOWER THAN SUPPLY SA TEMPERATURE SETPOINT AND RA ENTHALPY IS HIGHER THAN OA ENTHALPY, THE OA, OA AND RA DAMPERS SHALL MODULATE TO MAINTAIN SA TEMPERATURE SETPOINT. DURING HEATING MODE, THE ECONOMIZER WILL BE LOCKED OUT AND THE HWR VALVE WILL MODULATE TO MAINTAIN SA TEMP. SETPOINT.
 DURING UNOCCUPIED MODE THE OA AND EA DAMPER SHALL CLOSE TO OA. THE SAT SETPOINT WILL FOLLOW A NIGHT SETBACK/SETUP SCHEDULE. THE SAT SETPOINT SHALL RAISE 5°F IN COOLING MODE AND LOWER 5°F IN HEATING MODE.
SAFETIES:
HIGH DUCT STATIC: A STATIC PRESSURE HIGH LIMIT SWITCH LOCATED IN THE DUCTWORK IMMEDIATELY AFTER THE AHU AND UPSTREAM OF THE FIRST VAV TERMINAL UNIT IN THE MAIN SUPPLY AIR DUCT, SHALL DISABLE THE AIR HANDLING UNIT FAN IN THE EVENT OF THE DETECTION OF PRESSURES IN EXCESS OF HIGH LIMIT SETPOINT OF 3"WG AND SIGNAL AN ALARM TO THE OPERATORS WORK STATION.
SMOKE: UPON SENSING SMOKE IN THE SUPPLY OR RETURN DUCT, THE AHU WILL SHUTDOWN AND SEND AN ALARM TO THE OPERATORS WORKSTATION.
FIRE: UPON FIRE ALARM DETECTION, THE AHU WILL SHUTDOWN AND SEND AN ALARM TO THE OPERATORS.
FREEZE PROTECTION: DURING OCCUPIED MODE, WHEN THE OA TEMPERATURE IS BELOW 40°F THE CHILLED WATER VALVE WILL OPEN TO 25% (ADJ.). DURING UNOCCUPIED MODE, WHEN THE OA TEMPERATURE IS BELOW 40°F THE CHILLED WATER VALVE WILL OPEN TO 25% (ADJ.). THE HW VALVE WILL MODULATE TO MAINTAIN A MAT OF 45°F MIN. (ADJ.).

AHU-D, AHU-E
CHW VALVE/GAS HEAT, SINGLE ZONE
 THE AHU SHALL ENABLE/DISABLE BASED ON OPTIMAL START/STOP ACCORDING TO ITS OCCUPIED/ UNOCCUPIED SCHEDULE.
 DURING OCCUPIED HOURS THE AHU SHALL MODULATE CHW VALVE AND GAS HEAT TO MAINTAIN OCCUPIED SETPOINT. WHEN ENABLED, THE OA AND EA DAMPER SHALL OPEN TO MINIMUM. THE SUPPLY AND RETURN FANS SHALL START. THE SPEED OF THE SUPPLY FAN WILL MODULATE TO MAINTAIN SPACE TEMPERATURE SETPOINT. THE RETURN FAN SHALL TRACK THE SUPPLY FAN.
 DURING COOLING MODE, IF OA TEMP IS HIGHER THAN SA TEMP SETPOINT AND RA ENTHALPY IS HIGHER THAN OA ENTHALPY, THE OA AND EA DAMPERS SHALL OPEN AND RA DAMPER SHALL SHUT. THE CHWR VALVE SHALL MODULATE TO MAINTAIN SA TEMPERATURE SETPOINT. DURING COOLING MODE, IF OA TEMP IS LOWER THAN SUPPLY SA TEMPERATURE SETPOINT AND RA ENTHALPY IS HIGHER THAN OA ENTHALPY, THE OA, OA AND RA DAMPERS SHALL MODULATE TO MAINTAIN SA TEMPERATURE SETPOINT. DURING HEATING MODE, THE ECONOMIZER WILL BE LOCKED OUT AND THE HWR VALVE WILL MODULATE TO MAINTAIN SA TEMP. SETPOINT.
 THE SAT SHALL RESET ACCORDING TO OA TEMPERATURE, BASED ON THE FOLLOWING SCHEDULE:
 COOLING MODE OA TSAT 60°F / 40°F / 80°F 90°F
 DURING UNOCCUPIED MODE THE OA AND EA DAMPER SHALL CLOSE TO OA. THE SAT SETPOINT WILL FOLLOW A NIGHT SETBACK/SETUP SCHEDULE. THE SAT SETPOINT SHALL RAISE 5°F IN COOLING MODE AND LOWER 5°F IN HEATING MODE.
SAFETIES:
HIGH DUCT STATIC: A STATIC PRESSURE HIGH LIMIT SWITCH LOCATED IN THE DUCTWORK IMMEDIATELY AFTER THE AHU AND UPSTREAM OF THE FIRST VAV TERMINAL UNIT IN THE MAIN SUPPLY AIR DUCT, SHALL DISABLE THE AIR HANDLING UNIT FAN IN THE EVENT OF THE DETECTION OF PRESSURES IN EXCESS OF HIGH LIMIT SETPOINT OF 4"WG AND SIGNAL AN ALARM TO THE OPERATORS WORK STATION.
SMOKE: UPON SENSING SMOKE IN THE SUPPLY OR RETURN DUCT, THE AHU WILL SHUTDOWN AND SEND AN ALARM TO THE OPERATORS WORKSTATION.
FIRE: UPON FIRE ALARM DETECTION, THE AHU WILL SHUTDOWN AND SEND AN ALARM TO THE OPERATORS.
FREEZE PROTECTION: DURING OCCUPIED MODE, WHEN THE OA TEMPERATURE IS BELOW 40°F THE CHILLED WATER VALVE WILL OPEN TO 25% (ADJ.). DURING UNOCCUPIED MODE, WHEN THE OA TEMPERATURE IS BELOW 40°F THE CHILLED WATER VALVE WILL OPEN TO 25% (ADJ.). THE AHU WILL START AND THE FIRST STAGE OF GAS HEATING WILL MODULATE TO MAINTAIN A MAT OF 45°F MIN. (ADJ.).



1 CONDENSER WATER CENTRAL PLANT FLOW DIAGRAM
 NTS

MULTIPLE ZONE VAV AHU RESET SEQUENCES:
 SUPPLY STATIC PRESSURE RESET: BAS SHALL MONITOR POSITION OF VAV DAMPERS AND RESET STATIC PRESSURE SETPOINT BETWEEN 0.5" AND 1.0" W.C. (ADJ.) TO MAINTAIN CRITICAL VAV TERMINAL DAMPER ST MAXIMUM 95% OPEN.

TEMPERATURE RESET: BAS SHALL MONITOR VAV TERMINAL UNITS AND RESET SUPPLY AIR TEMPERATURE 1 DEGREE EVERY 15 MINUTES UP TO A MAXIMUM OF 65°F. WHEN ALL TERMINAL UNITS ARE LESS THAN 70% OPEN AND/OR IN HEATING MODE, TEMPERATURE SHALL RESET BACK DOWN WHEN ANY BOX OPENS TO MORE THAN BOX AIRFLOW.

VAV BOXES
VAV - COOLING ONLY:
 DURING OCCUPIED HOURS THE VAV WILL MAINTAIN TEMPERATURE SETPOINT WITHIN A 2°F BAND (ADJ.). DURING COOLING OPERATION THE VAV WILL MODULATE AIR FLOW TO MAINTAIN SPACE TEMPERATURE SETPOINT.
 DURING UNOCCUPIED HOURS, THE VAV WILL CLOSE TO MINIMUM POSITION. AHU WILL ENABLE THE VAV TO MAINTAIN TEMPERATURE SETPOINT WITHIN AN 8°F BAND (ADJ.).

VAV WITH HOT WATER REHEAT:
 DURING OCCUPIED HOURS THE VAV WILL MAINTAIN TEMPERATURE SETPOINT WITHIN A 2°F BAND (ADJ.). DURING COOLING OPERATION THE VAV WILL MODULATE AIR FLOW TO MAINTAIN SPACE TEMPERATURE SETPOINT. IN HEATING MODE, THE VAV WILL MODULATE TO HEATING CFM SETPOINT (ADJ.) AND HOT WATER VALVE WILL MODULATE TO MAINTAIN SPACE TEMPERATURE SETPOINT.
 DURING UNOCCUPIED HOURS THE VAV WILL CLOSE TO MINIMUM POSITION. AHU WILL ENABLE THE VAV TO MAINTAIN TEMPERATURE SETPOINT WITHIN AN 8°F BAND (ADJ.).



| DATE | SYM | REVISION | BY | A'PD |
|----------|-----|----------------------------------|----|------|
| 02-21-13 | E | 100% FINAL DESIGN | | |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | | |
| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | | |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | | |

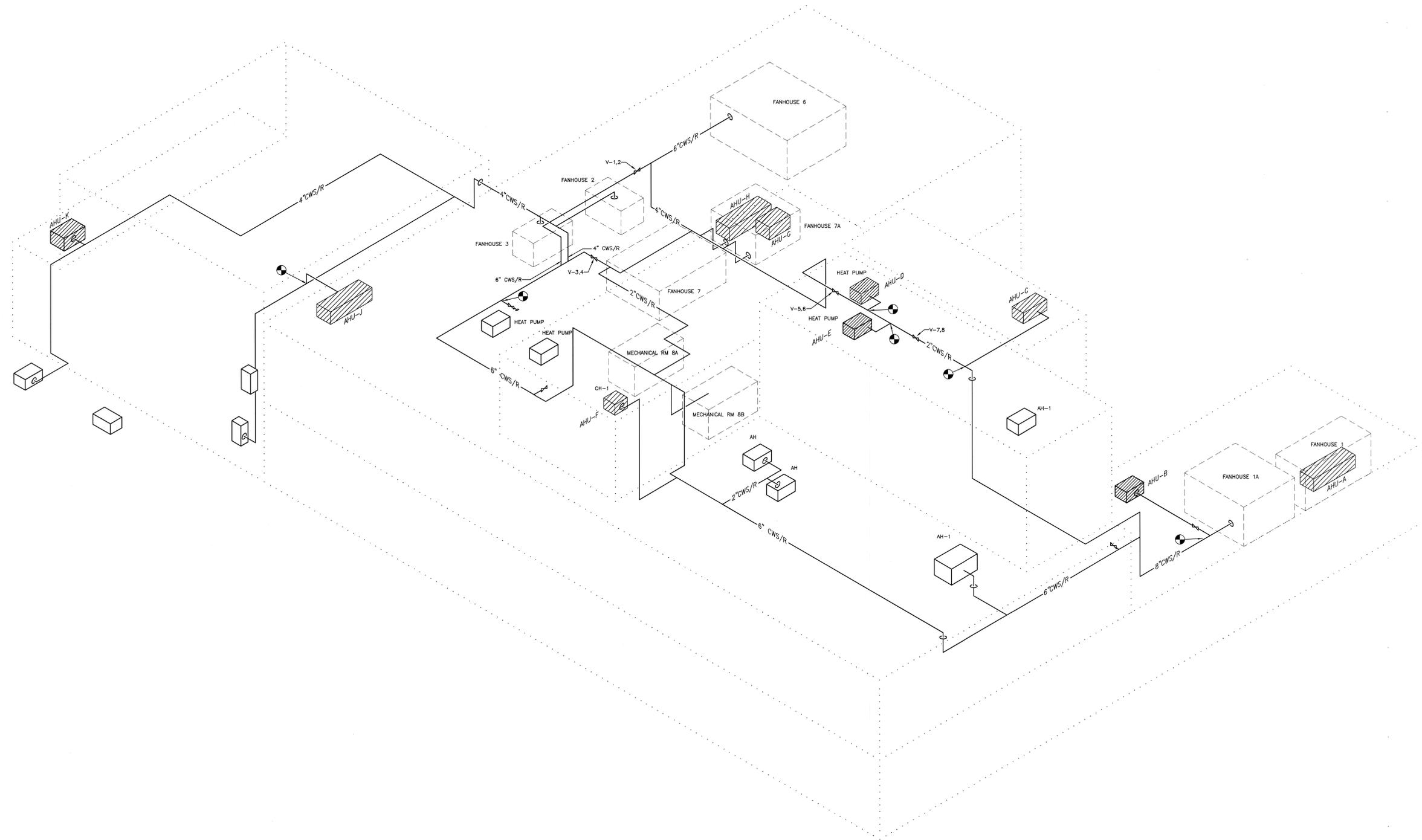
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
DRYDEN FLIGHT RESEARCH CENTER
 EDWARDS, CA

DRAWING TITLE
 CONDENSER WATER CENTRAL PLANT FLOW DIAGRAM

PROJECT TITLE
 MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN

| APPROVALS | DATE |
|--|---------|
| Chief, Facilities Engineering & Asset Mgmt. Office | 2-28-13 |
| Project Manager/Designer | 2-28-13 |
| Facilities Project Manager | 2/27/13 |
| Chief, Office of Protective Services | 2/27/13 |
| Chief, Safety & Health Program Office | 2/27/13 |
| Chief, Chief Information Officer | 2/27/13 |

DATE START: 02/21/2013 DATE PRINT: 02/21/2013
 DRAWN BY: HEI
 SCALE: AS SHOWN TRADE SH. No. M
 FILE NAME: EDM-1715 M-602.DWG 602 SHEET No. 21 of 21



1 EXISTING CHILLED WATER SCHEMATIC
NOT TO SCALE
BUILDING 4800/4801

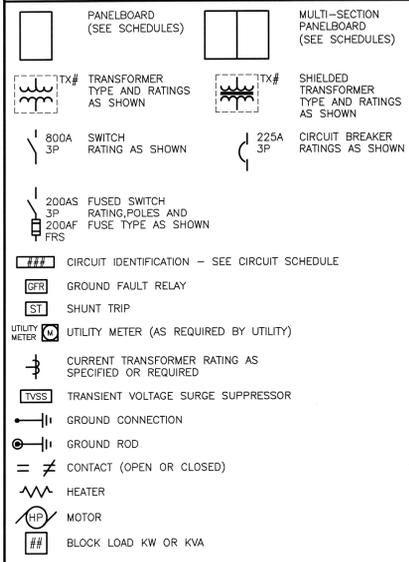


| | | | | | | |
|----------|-----|---|----|--|--|----------|
| | | NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS Chief, Facilities Engineering & Maint. Office <i>[Signature]</i> 2-28-13 Project Administrator/Engineer <i>[Signature]</i> 2-28-13 Facilities Project Manager <i>[Signature]</i> 2/27/13 Chief, Office of Process Services <i>[Signature]</i> 2/27/13 Chief, Science & Technology Office <i>[Signature]</i> 2-27-13 Director Information Office <i>[Signature]</i> 2/27/13 | | DATE |
| | | DRAWING TITLE | | | | |
| | | EXISTING CHILLED WATER SCHEMATIC | | | | |
| | | PROJECT TITLE | | | | |
| | | MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | | | |
| | | DATE START | | DATE PRINTED | | |
| | | 02-21-13 | | 02/21/2013 | | |
| | | DRAWN BY | | TRADE SH. No. | | |
| | | HEI | | M | | EDM-1715 |
| | | SCALE | | M | | |
| | | AS SHOWN | | 6003 | | |
| | | FILE NAME | | SHEET No. | | |
| | | EDM-1715 M-603.DWG | | 22 of 24 | | |
| DATE | SYM | REVISION | BY | A'PD | | |
| 02-21-13 | E | 100% FINAL DESIGN | | | | |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | | | | |
| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | | | | |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | | | | |

ELECTRICAL SYMBOLS

NOTE: THIS IS A MASTER LEGEND AND NOT ALL SYMBOLS, ABBREVIATIONS, ETC. ARE NECESSARILY USED ON THE DRAWINGS.

ELECTRICAL ONE-LINE & RISER



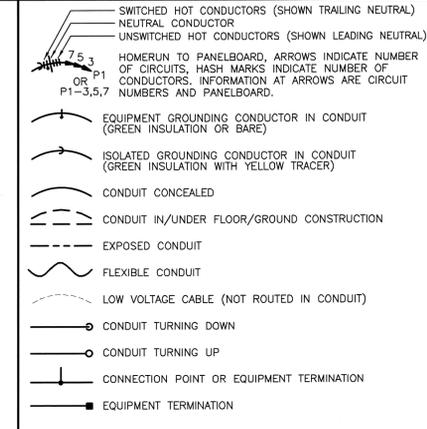
SIGNALING



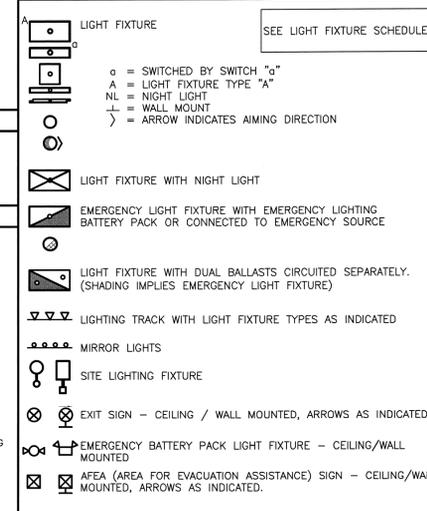
ABBREVIATIONS

| | | | |
|-------|----------------------------------|---------|--------------------------------|
| A | AMPERES, AIR (COMPRESSED) | MAX | MAXIMUM |
| A/C | AIR CONDITIONING | MCA | MINIMUM CIRCUIT AMPACITY |
| A/F | AMPERE FUSE | MCB | MAIN CIRCUIT BREAKER |
| AF | ABOVE FINISHED CEILING | MCC | MOTOR CONTROL CENTER |
| AFCI | ARC FAULT CIRCUIT INTERRUPTER | MD | MOTORIZED DAMPER |
| AFA | AREA FOR EVACUATION ASSISTANCE | MDP | MAIN DISTRIBUTION PANEL |
| AF | ABOVE FINISHED FLOOR | MFR | MANUFACTURER |
| AFG | ABOVE FINISHED GRADE | MG | MOTOR GENERATOR |
| AI | ANALOG INPUT | MH | MANHOLE |
| AIC | AMPERE INTERRUPTING CURRENT | MIN | MINIMUM |
| AL | ALUMINUM | NLO | MAIN LUGS ONLY |
| AO | ANALOG OUTPUT | MOC | MAXIMUM OVERCURRENT PROTECTION |
| AP | ACCESS PANEL | MSB | MAIN SWITCHBOARD |
| AS | AUTOMATIC TRANSFER SWITCH | MSWB | MAIN SWITCHBOARD |
| AWG | AMERICAN WIRE GAUGE | MS/TP | MASTER SLAVE/TOKEN PASSING |
| BAS | BUILDING AUTOMATION SYSTEM | PCU | POWER DISTRIBUTION UNIT |
| BFB | BELOW FINISHED FLOOR | PH | PHASE |
| BFG | BELOW FINISHED GRADE | PV | POST INDICATOR VALVE |
| BI | BINARY INPUT | PNL | PANEL |
| BKR | BREAKER | PNLBD | PANELBOARD |
| BO | BINARY OUTPUT | PROVIDE | FURNISH AND INSTALL |
| C | CONDUIT | PT | POTENTIAL TRANSFORMER |
| CD | CANDELA | PH, P | PHASE |
| CT | CURRENT TRANSFORMER | PV | POST INDICATOR VALVE |
| CTV | CABLE TELEVISION SYSTEM | PNL | PANEL |
| CTV | CLOSED CIRCUIT TELEVISION | PNLBD | PANELBOARD |
| CKT | CIRCUIT | PROVIDE | FURNISH AND INSTALL |
| CPT | CONTROL POWER TRANSFORMER | PT | POTENTIAL TRANSFORMER |
| CU | COPPER, CONDENSING UNIT | PTZ | FAN, TILT, ZOOM |
| CU | CUMULATIVE VOLTAGE DROP | QTY | QUANTITY |
| DD | DIRECT DIGITAL CONTROL | RCPT | RECEPTACLE |
| DI | DIGITAL INPUT, DUCTILE IRON | RLA | RUNNING LOAD AMPS |
| DN | DOWN | RTU | ROOFTOP UNIT |
| DPDT | DOUBLE-POLE, DOUBLE-THROW | SD | SMOKE DETECTOR, SUPPLY DUCT |
| DPST | DOUBLE-POLE, SINGLE-THROW | SF | SQUARE FEET, SUPPLY FAN |
| (E) | EXISTING TO REMAIN | SPOT | SINGLE-POLE, DOUBLE-THROW |
| EM | EMERGENCY | SPST | SINGLE-POLE, SINGLE-THROW |
| EPO | EMERGENCY POWER OFF | SS | STAINLESS STEEL, SANITARY |
| ETR | EXISTING TO REMAIN | SEWER | SEWER |
| FAC | FIRE ALARM CONTROL PANEL | ST | SHUNT TRIP, STEAM TRAP |
| FBO | FURNISHED BY OTHERS/OWNER | SWBD | SWITCHBOARD |
| FCA | FAULT CURRENT AMPS | TL | TWISTLOCK |
| FF | FINISHED FLOOR | TR | TAMPER RESISTANT |
| FLA | FULL LOAD AMPS | TX | TRANSFORMER |
| FLR | FLOOR | TY | TYPICAL |
| FNR | FULL-VOLTAGE, NON-REVERSING | U/F | UNDERFLOOR |
| GC | GENERAL CONTRACTOR | U/G | UNDERGROUND |
| GFCI | GROUND FAULT CIRCUIT INTERRUPTER | UH | UNIT HEATER |
| GFR | GROUND FAULT RELAY | U/S | UNDERSLAB |
| GND | GROUND | UL | UNDERWRITERS LABORATORIES |
| GRS | GALVANIZED RIGID STEEL | UNO | UNLESS NOTED OTHERWISE |
| HOA | HAND-OFF-AUTOMATIC | UPS | UNINTERRUPTIBLE POWER SUPPLY |
| IG | ISOLATED GROUND | V | VOLT(S) |
| ISC | SHORT CIRCUIT CURRENT | VAC | VOLTS ALTERNATING CURRENT |
| JB | JUNCTION BOX | VD | VOLTAGE DROP |
| J-BOX | JUNCTION BOX | VDC | VOLTS DIRECT CURRENT |
| kmil | 1000 CIRCULAR MILS | VFD | VARIABLE FREQUENCY DRIVE |
| KRK | KEY | W | WIRE |
| KV | KILOVOLT | WP | WEATHER PROOF COVER |
| KVA | KILOVOLT-AMPS | WR | WEATHER RESISTANT |
| KVAR | KILOVOLT-AMPS REACTIVE | XP | EXPLOSION-PROOF |
| KW | KILOWATT | | |
| KWH | KILOWATT-HOUR | | |
| LF | LINEAR FEET | | |
| MATV | MASTER ANTENNA TELEVISION SYSTEM | | |

CIRCUITING & WIRING



LIGHTING

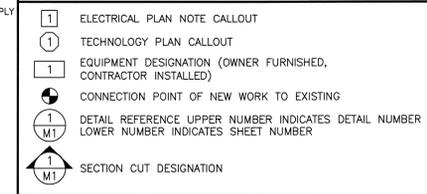


STANDARD MOUNTING HEIGHTS

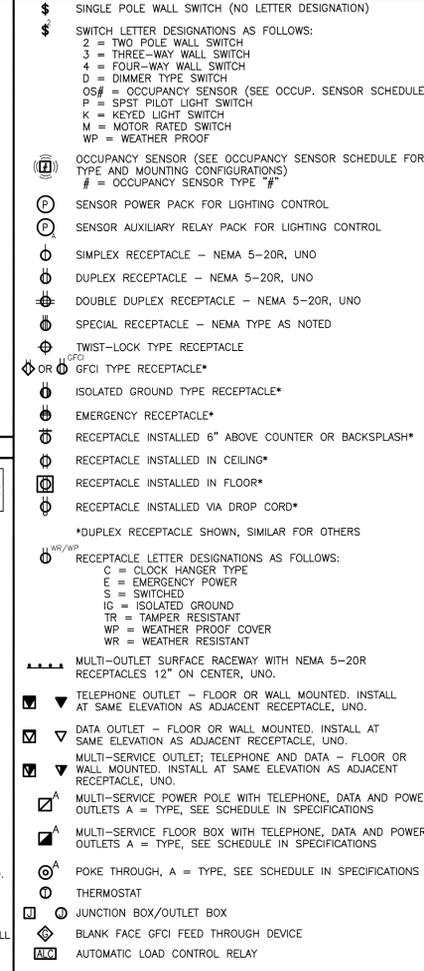
(AFF, AFC, UNLESS NOTED OTHERWISE)

| | |
|---|------------------|
| ELECTRICAL | |
| ALARMS | 48" |
| ANNUNCIATOR PANELS | 48" |
| CLOCK OUTLETS (CENTERLINE) | 84" |
| CONTROLS (CENTERLINE) | 48" |
| EXIT SIGNS (WALL MOUNTED, BOTTOM) | 80" |
| INTERCOM (AFA ONLY) | 36" |
| INTERCOMS | 48" |
| PANELS/PANELBOARDS (TOP) | 72" |
| PHOTOCELLS | 144" |
| RECEPTACLES (CENTERLINE) | 18" |
| RECEPTACLES (EXTERIOR) | 24" |
| RECEPTACLES (GARAGES) | 26" |
| RECEPTACLES IN EQUIPMENT ROOMS | 48" |
| REMOTE INDICATING LIGHT (EQUIPMENT ROOMS) | 48" |
| REMOTE INDICATING LIGHT (FINISHED AREAS) | CEILING |
| SAFETY SWITCHES | 48" |
| STARTERS | 48" |
| SWITCHES (CENTERLINE) | 48" |
| TELEPHONES (PUBLIC) | 1 @ 48", 1 @ 36" |
| TELEPHONE, DATA OUTLETS (CENTERLINE) | 18" |
| TELEPHONE TERMINAL BOARD (BOTTOM) | 6" |
| TELEVISION OUTLETS | 18" |

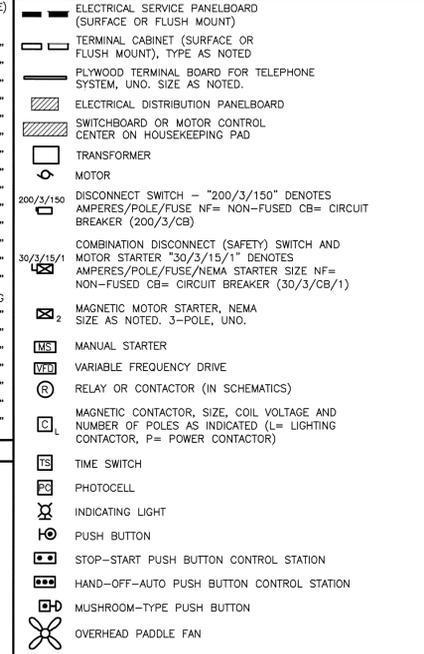
ANNOTATION



WIRING DEVICES & OUTLETS



POWER EQUIPMENT & DEVICES



GENERAL ELECTRICAL DEMOLITION NOTES:

- PRIOR TO SUBMITTING BID, VISIT THE JOB SITE AND BECOME FULLY ACQUAINTED WITH THE EXISTING CONDITIONS OF THE FACILITY. REVIEW THE GENERAL NOTES AND ALL OTHER TRADE DRAWINGS FOR ADDITIONAL REQUIREMENTS THAT MAY NOT BE CALLED OUT IN THIS PORTION OF THE CONSTRUCTION DOCUMENTS. NOTIFY THE CONTRACTING OFFICER OF ANY CONFLICTS OR DISCREPANCIES PRIOR TO SUBMITTING BID.
- EXISTING CONDITIONS WERE TAKEN FROM ORIGINAL DRAWINGS AND LIMITED SITE VISITS AND MAY NOT REFLECT EXACT "AS-BUILT" CONDITIONS. FIELD VERIFY ALL EXISTING CONDITIONS AND CAREFULLY COORDINATE NEW UTILIZATION WITH ALL OTHER DISCIPLINES AND EXISTING CONDITIONS.
- REMOVE ALL ELECTRICAL COMPONENTS INCLUDING BUT NOT LIMITED TO DISCONNECT SWITCHES, WIRING, CONDUIT, AND JUNCTION BOXES ASSOCIATED WITH THE REMOVAL OF MECHANICAL EQUIPMENT BACK TO ITS ORIGINATING SOURCE. WHEN NEW EQUIPMENT IS TO REPLACE THE DEMOLISHED IN SAME LOCATION RE-USE EXISTING CONDUIT IF IN GOOD CONDITION. IF CIRCUIT BREAKER IS NOT REPLACED TURN OFF EXISTING AND LABEL AS SPARE.
- AVOID DAMAGING EXISTING SURFACES AND EQUIPMENT TO REMAIN DURING DEMOLITION. REPAIR DAMAGE CAUSED DURING WORK AT NO EXTRA COST TO THE OWNER.
- AVOID DAMAGING EXISTING WIRING FOR INTERCOM, FIRE ALARM AND CLOCK SYSTEMS. REPAIR DAMAGE CAUSED DURING WORK BACK TO NORMAL OPERATING CAPACITY AT NO EXTRA COST TO OWNER IMMEDIATELY.
- SEAL ALL PENETRATIONS THROUGH FLOORS, WALLS, CEILINGS, AND ROOF (INCLUDING HOLES LEFT FROM ANCHORS, BOLTS, SCREWS, ETC) WHERE ELECTRICAL COMPONENTS ARE REMOVED AND WHERE THE EXISTING PENETRATION IS NOT USED FOR THE NEW INSTALLATION. REPAIR DAMAGED SURFACES TO MATCH ADJACENT AREAS.

GENERAL ELECTRICAL NOTES:

- CONDUIT SIZES CALLED OUT ON DRAWINGS ARE NOT NECESSARILY BASED ON THE MINIMUM SIZE OF THE NATIONAL ELECTRICAL CODE AND MAY BE PURPOSELY OVERSIZED FOR EASE OF CONDUCTOR PULLING OR TO AVOID EXCESS CONDUIT HEATING. IN NO CASE SHALL CONDUIT SIZE BE SMALLER THAN IS REQUIRED BY THE NATIONAL ELECTRICAL CODE. THE MINIMUM CONDUIT SIZE SHALL BE 3/4 INCH USED AT NASA DRYDAN/DAOF.
- THE CONTRACTOR SHALL PROVIDE AND INSTALL ALL JUNCTION AND PULL BOXES REQUIRED FOR THE NATIONAL ELECTRICAL CODE DEVICES AND EQUIPMENT, WHETHER OR NOT SPECIFICALLY INDICATED ON THE PLANS. SIZE OF THESE BOXES SHALL BE PER THE NATIONAL ELECTRICAL CODE.
- THE CONTRACTOR SHALL FURNISH ALL EQUIPMENT FOR TEMPORARY CONSTRUCTION POWER AND LIGHTING AS REQUIRED.
- ALL PENETRATIONS THROUGH FIRE BARRIERS SHALL BE FIRE STOPPED TO MAINTAIN THE INTEGRITY OF THE FIRE BARRIER. FIRE STOPPING MATERIAL SHALL BE U.L. LISTED.
- THE CONTRACTOR SHALL OBTAIN APPROVAL FROM THE CONTRACTING OFFICER BEFORE DRILLING ANY PENETRATION THROUGH STRUCTURAL MEMBERS OR FIRE RATED WALLS AND SLABS.
- SHOULD PROJECT CONDITIONS REQUIRE REARRANGEMENT OF WORK, THE CONTRACTOR SHALL MARK SUCH CHANGES ON THE AS-BUILT DRAWINGS. IF THESE CHANGES REQUIRE ALTERNATE METHODS TO THOSE SPECIFIED IN THE CONTRACT DOCUMENTS, THE CONTRACTOR SHALL SUBMIT DRAWINGS SHOWING THE PROPOSED ALTERNATE METHODS TO THE CONTRACTING OFFICER. THE CONTRACTOR SHALL NOT PROCEED UNTIL APPROVAL IS OBTAINED. REARRANGEMENT OF WORK FOR THE PURPOSE OF COORDINATION SHALL NOT BE CONSIDERED AN ITEM FOR EXTRA COST.
- THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. TESTING SHALL BE DONE IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. SUBMIT A COPY OF SHOP DRAWINGS TO THE CONTRACTING OFFICER FOR INFORMATION.
- DEMONSTRATE ELECTRICAL SYSTEM EQUIPMENT TESTS AND RUNNING TEST TO DEMONSTRATE ITS OPERATING AND COMPLIANCE WITH THE EQUIPMENT SPECIFICATIONS. TEST ALL WIRING AND EQUIPMENT TO INSURE PROPER OPERATION ACCORDING TO FUNCTIONS SPECIFIED HEREIN AND ON THE DRAWINGS. THE CONTRACTOR WILL SUBMIT DETAILED TESTING PLANS TO THE GOVERNMENT FOR REVIEW AND APPROVAL BEFORE TESTING CAN BEGIN. A PRETEST WILL BE PERFORMED BY THE CONTRACTOR AND ALL DISCREPANCIES MITIGATED BEFORE THE GOVERNMENT ACCEPTANCE TESTING WILL BEGIN. THE PRETEST WILL BE WITNESSED BY A GOVERNMENT REPRESENTATIVE. VERY LOW FREQUENCY TESTING, PER SECTION 337102, SHALL BE ONLY PERFORMED ON NEW MEDIUM VOLTAGE CABLES.
- WARRANTY: ALL WORK IN THIS SECTION SHALL BE UNDER WARRANTY FOR A PERIOD OF ONE YEAR FROM THE DATE OF ACCEPTANCE OF THE WORK AS A WHOLE BY THE CONTRACTING OFFICER. SHOULD ANY EQUIPMENT OR MATERIAL FAIL WITHIN THIS PERIOD, THE CONTRACTOR SHALL REPLACE OR REPAIR THAT ITEM AT NO COST FOR MATERIAL AND/OR SERVICES IF SUCH IS DUE TO FAULTY WORKMANSHIP OR QUALITY OF MATERIAL FURNISHED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DAMAGE TO ANY PART OF THE PREMISES CAUSED BY FAILURE IN THE EQUIPMENT FURNISHED AS PART OF THE CONTRACT DRAWINGS FOR A PERIOD OF ONE YEAR AFTER THE FINAL ACCEPTANCE OF THE WORK AS A WHOLE.
- ALL MECHANICAL CONTROL SYSTEMS EQUIPMENT SHALL BE PROVIDED, INSTALLED, AND WIRED BY THE MECHANICAL CONTRACTOR PER THE CONTRACT DOCUMENT. ELECTRICAL CONTRACTOR SHALL PROVIDE CONDUITS ONLY FOR CONTROL WIRING. ELECTRICAL POWER FOR THE MECHANICAL CONTROL SYSTEM EQUIPMENT SHALL BE PROVIDED BY THE ELECTRICAL CONTRACTOR. THIS INCLUDES THE POWER WIRING AND CONNECTION TO THE MECHANICAL CONTROL SYSTEMS EQUIPMENT.
- ALL EQUIPMENT SHALL BE DESIGNED AND INSTALLED FOR USE IN A SEISMIC ZONE 4 AREA. ALL SEISMIC DESIGN SHALL BE STAMPED AND SIGNED BY A PROFESSIONAL STRUCTURAL ENGINEER LICENSED IN THE STATE OF CALIFORNIA.

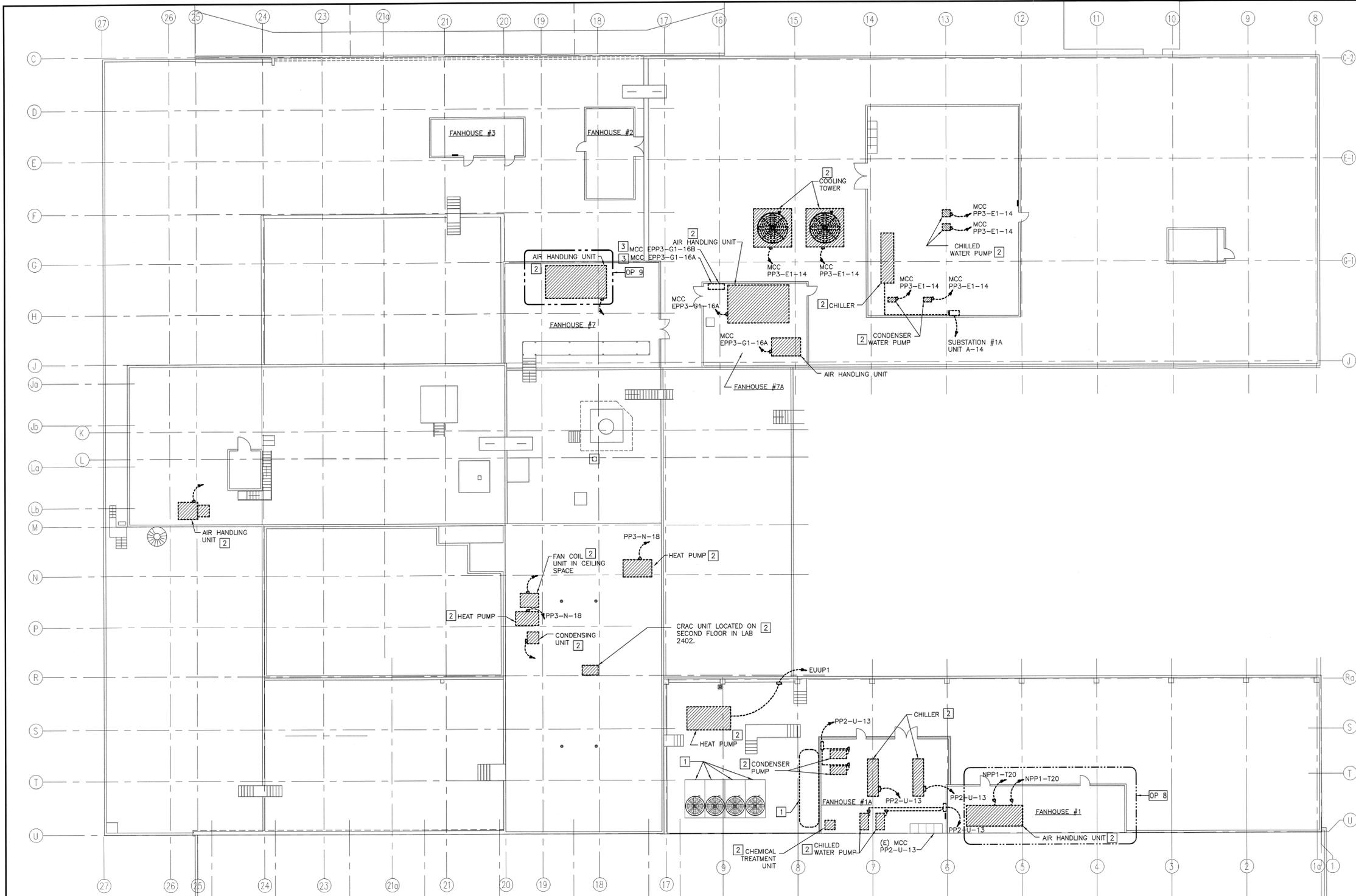
- POTHOLE AND LOCATE ALL UTILITY LINES WITHIN THE PROJECT AREA PRIOR TO START OF EXCAVATION IN ORDER TO AVOID DAMAGE TO EXISTING UNDERGROUND UTILITIES. REPAIR ALL DAMAGES TO EXISTING UTILITIES AT NO COST TO OWNER.
- PATCH AND PAINT ALL EXPOSED ELECTRICAL MATERIAL, INCLUDING CONDUIT, SURFACE METAL RACEWAYS, JUNCTION BOXES, PANELS, AND DEVICES TO MATCH THE ADJACENT SURFACES IN TEXTURE AND COLOR.
- REPAIR ANY DAMAGE TO EXISTING CONSTRUCTION RESULTING FROM THE INSTALLATION OF ELECTRICAL ITEMS. THE AREAS REPAIRED SHALL MATCH THE ADJACENT SURFACES IN TEXTURE AND COLOR.
- PROVIDE DEWATERING EFFORT FOR NEW BELOW GRADE EXCAVATION/TRENCHING IF GROUND WATER IS ENCOUNTERED. THE CONTRACTOR SHALL OBTAIN A DIGGING PERMIT BEFORE ANY EXCAVATION OR TRENCHING.
- ALL ELECTRICAL SPLICES SHALL BE WATERPROOF. THE CONTRACTOR SHALL SUBMIT AN AHA ON HOW SPLICING IS TO BE PERFORMED TO MITIGATE THE RISK OF ACCIDENTAL EXPOSURE TO HIGH VOLTAGE.
- ALL MOUNTING HARDWARE, CHANNELS, AND FASTENING DEVICES IN EXTERIOR LOCATIONS SHALL BE 316 STAINLESS STEEL, UNLESS NOTED.
- PROVIDE A COMPLETE AND OPERATING ELECTRICAL SYSTEM. PROVIDE SHALL MEAN FURNISH AN INSTALL. WORK INCLUDES INSTALLATION OF ALL ELECTRICAL EQUIPMENT AND SYSTEMS, INCLUDING ANY FURNISHED BY OWNER OR OTHER TRADES, COMPLETE AND OPERATING TO THE SATISFACTION OF THE CONTRACTING OFFICER, AS LIMITED BY THE INTENT OF THE CONTRACT DOCUMENTS.
- THE CONTRACTOR SHALL COMPLY WITH THE CONSTRUCTION PRACTICES AND REQUIREMENTS OF THE LATEST ADOPTED EDITIONS OF THE NATIONAL ELECTRICAL CODE (NFPA 70), NATIONAL ELECTRICAL SAFETY CODE, AMERICAN ELECTRICIANS HANDBOOK BY CROFT EDISON ELECTRIC INSTITUTE, AMERICANS WITH DISABILITIES ACT, APPLICABLE AND THE INSTRUCTIONS OF MANUFACTURERS OF EQUIPMENT AND MATERIALS SUPPLIED FOR THE PROJECT, AND ALL ORDINANCES, RULES, AND POLICIES OF THE STATE AND COUNTY IN WHICH THE WORK IS TO BE PERFORMED.
- THE CONTRACTOR SHALL VISIT THE JOB SITE AND FAMILIARIZE HIMSELF WITH ALL EXISTING CONDITIONS AND THE EXTENT OF REMOVAL, RELOCATION, RECONNECTION, AND/OR NEW WORK PRIOR TO BIDDING. BID SUBMISSION SHALL BE RESOLVED ALL DISCREPANCIES AND QUESTION AND NO EXTRA PAYMENT WILL BE AUTHORIZED FOR WORK MADE NECESSARY BY THE CONTRACTORS FAILURE TO DO SO.
- ALL CIRCUITS SHALL INCLUDE AN INSULATED GREEN GROUNDING CONDUCTOR, SIZED PER THE NATIONAL ELECTRICAL CODE. THIS CONDUCTOR SHALL BE CARRIED IN ALL RACEWAYS, INCLUDING THOSE INSTALLED FOR SWITCH LEGS, AND SHALL BE ATTACHED TO THE DEVICE AND EQUIPMENT HOUSING USING A SUITABLE GROUNDING LUG.
- AT COMPLETION OF CONSTRUCTION, THE CONTRACTOR SHALL PROVIDE A COPY OF AS-BUILT DRAWINGS IN CD-ROM TO THE CONTRACTING OFFICER.
- SAWCUT EXISTING AC PAVEMENT/SIDEWALK FOR NEW UNDERGROUND DUCTLINE INSTALLATION, PATCH, AND REPAIR AC PAVEMENT/SIDEWALK TO MATCH EXISTING ADJACENT SURFACES. AT NON-PAVED AREAS, RESTORE SURFACES TO MATCH EXISTING ADJACENT SURFACES.
- ALL OUTAGES SHALL BE COORDINATED AND SCHEDULED WITH THE CONTRACTOR OFFICE AT LEAST (3) WEEKS IN ADVANCE OF REQUESTED OUTAGE IN WRITING. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING GENERATOR SUPPORT FOR SCHEDULED ELECTRICAL OUTAGE DUE TO CONSTRUCTION CONTRACT WORK.
- ALL NEW PRIMARY ELECTRICAL DUCTS SHALL BE ENCASED WITH RED COLORED CONCRETE.
- ALL SITE 15KV DISTRIBUTION CONDUITS SHALL INCLUDE #4/0 AWG BARE COPPER GROUND CONDUCTOR.
- PROVIDE GROUND BOND OF SWITCHGEAR SECTIONS TO SUBSTATION GRID USING #4/0 AWG BARE COPPER WIRE AND BOLTED CONNECTIONS.
- ALL ELECTRICAL CONDUCTORS FOR DISTRIBUTION AT 480 VOLTS AND BELOW SHALL BE THHN, 90°C INSULATION EXCEPT WHERE SPECIFIED ON SINGLE LINE DIAGRAM TO INSTALL DOL TYPE RHH/RHW-2 90°C CONDUCTORS.
- MINIMUM CONDUCTOR SIZE SHALL BE #12 AWG FOR BOTH POWER AND CONTROL CIRCUITS.
- OBTAIN CONFINED SPACE PERMIT FROM NASA PRIOR TO ENTRY OF UNDERGROUND MANHOLES AND VAULTS. SUBMIT A WRITTEN CONFINED SPACE SAFETY PLAN FOR REVIEW. PROVIDE PERSONNEL TRAINING CERTIFICATIONS AND MONITORING EQUIPMENT CALIBRATION TEST CERTIFICATION.
- GOVERNMENT RESERVES THE RIGHT TO WITNESS FACTORY TESTING. NOTIFY GOVERNMENT 30 CALENDAR DAYS PRIOR TO EQUIPMENT FACTORY TESTS FOR GOVERNMENT REPRESENTATIVE ATTENDANCE.
- A FAULT CURRENT AND COORDINATION STUDY WILL BE PERFORMED BY A REGISTERED ELECTRICAL ENGINEER, HIRED BY THE CONTRACTOR TO VERIFY EQUIPMENT BUS BRACING REQUIREMENTS, CIRCUIT BREAKER AIC RATING REQUIREMENTS AND ESTABLISH CIRCUIT BREAKER TRIP COORDINATION SETTINGS AT ALL NEW DISTRIBUTION EQUIPMENT IN THE SCOPE OF WORK. EQUIPMENT BUS BRACING AND AMPERE INTERRUPT CAPABILITY WILL EXCEED THE AVAILABLE SHORT CIRCUIT CURRENT AT THE INPUT TERMINATION. AN ARC FLASH STUDY, FOR EQUIPMENT LABEL APPLICATIONS, WILL BE PERFORMED BY THE ENGINEER, PER NFPA 70E AND IEEE STANDARD 2584, FOR THE CREATION OF MAINTENANCE PERSONNEL WARNING LABELS.

OPTIONS (SECONDARY SCOPE OF WORK)

DEMOLITION AND REPLACEMENT OF ELECTRICAL COMPONENTS ASSOCIATED WITH AHU IN FAN HOUSE 1 AND RENOVATION OF ASSOCIATED CONTROLS RE: 1/ED101 AND 2/ED207. ADD VAV BOXES AND ADD NEW THERMOSTATS IN SOUTH WING RE: E201.
 DEMOLITION OF ELECTRICAL COMPONENTS ASSOCIATED WITH ABANDONED AIR HANDLER EQUIPMENT FROM FAN HOUSE 7. RE: 1/ED101.

| | | | |
|--|-------------------------|---|--------------------------------|
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS DATE | |
| DRAWING TITLE ELECTRICAL LEGENDS | | Chief, Facilities Engineering & Asset Mgmt. Office Project Manager 2/28/13 2/28/13 2/27/13 Chief, Office of Procurement Services Chief, Safety & Health Management Office Chief, Staff Information Officer 2/27/13 2/27/13 | |
| PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | DATE STRTD 02-21-13 | DATE PRNTD 02/21/2013 |
| DATE 01-07-13 10-27-12 05-12-12 | SYM E D C B | REVISION 100% FINAL DESIGN 95% NEAR-FINAL DESIGN SUBMITTAL 60% DEVELOPED DESIGN SUBMITTAL 30% PRELIMINARY DESIGN SUBMITTAL | BY A'PD |
| DRAWN BY HEI | | SCALE AS SHOWN | SHEET NO. EDM-1715 |
| FILE NAME EDM-1715 E-000.DWG | | TRADE E | SHEET NO. OF TOTAL 33 OF 72 |

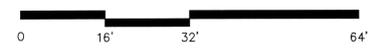
HENDERSON ENGINEERS
 5555 BROWARD STREET, SUITE 201
 LOS ANGELES, CA 90018
 TEL: 702.697.2191 FAX: 702.697.2188
 www.hei-eng.com
 1150001204



- ELECTRICAL PLAN NOTES:**
- 1 DEMOLISH EXISTING STARTERS, DISCONNECTS, WIRING, CONDUIT, AND JUNCTION BOXES ASSOCIATED WITH COOLING TOWER FAN MOTORS UPGRADED TO VARIABLE SPEED. REMOVE ALL ASSOCIATED WIRING, CONDUIT AND JUNCTION BOXES BACK TO MCC PP2-U-13. REFER TO ONE-LINE DIAGRAM ON SHEET E-301 FOR ADDITIONAL INFORMATION.
 - 2 REMOVE ALL ELECTRICAL COMPONENTS INCLUDING BUT NOT LIMITED TO DISCONNECT SWITCHES, WIRING, CONDUIT, AND JUNCTION BOXES ASSOCIATED WITH THE REMOVAL OF MECHANICAL EQUIPMENT BACK TO ITS ORIGINATING SOURCE. WHERE NEW EQUIPMENT IS TO REPLACE THE DEMOLISHED IN SAME LOCATION RE-USE EXISTING CONDUIT IF IN GOOD CONDITION.
 - 3 REMOVE EXISTING MOTOR CONTROL CENTER.

NOTE:
 EXISTING CONDITIONS WERE TAKEN FROM ORIGINAL DRAWINGS & SITE VISITS AND MAY NOT REFLECT EXACT "AS-BUILT" CONDITIONS. FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO SUBMITTING FINAL BIDS. CAREFULLY COORDINATE NEW WORK AND DEMOLITION WITH ALL OTHER DISCIPLINES AND EXISTING CONDITIONS.

1 BUILDING 4800 ELECTRICAL DEMOLITION PLAN
 1/16" = 1'-0"



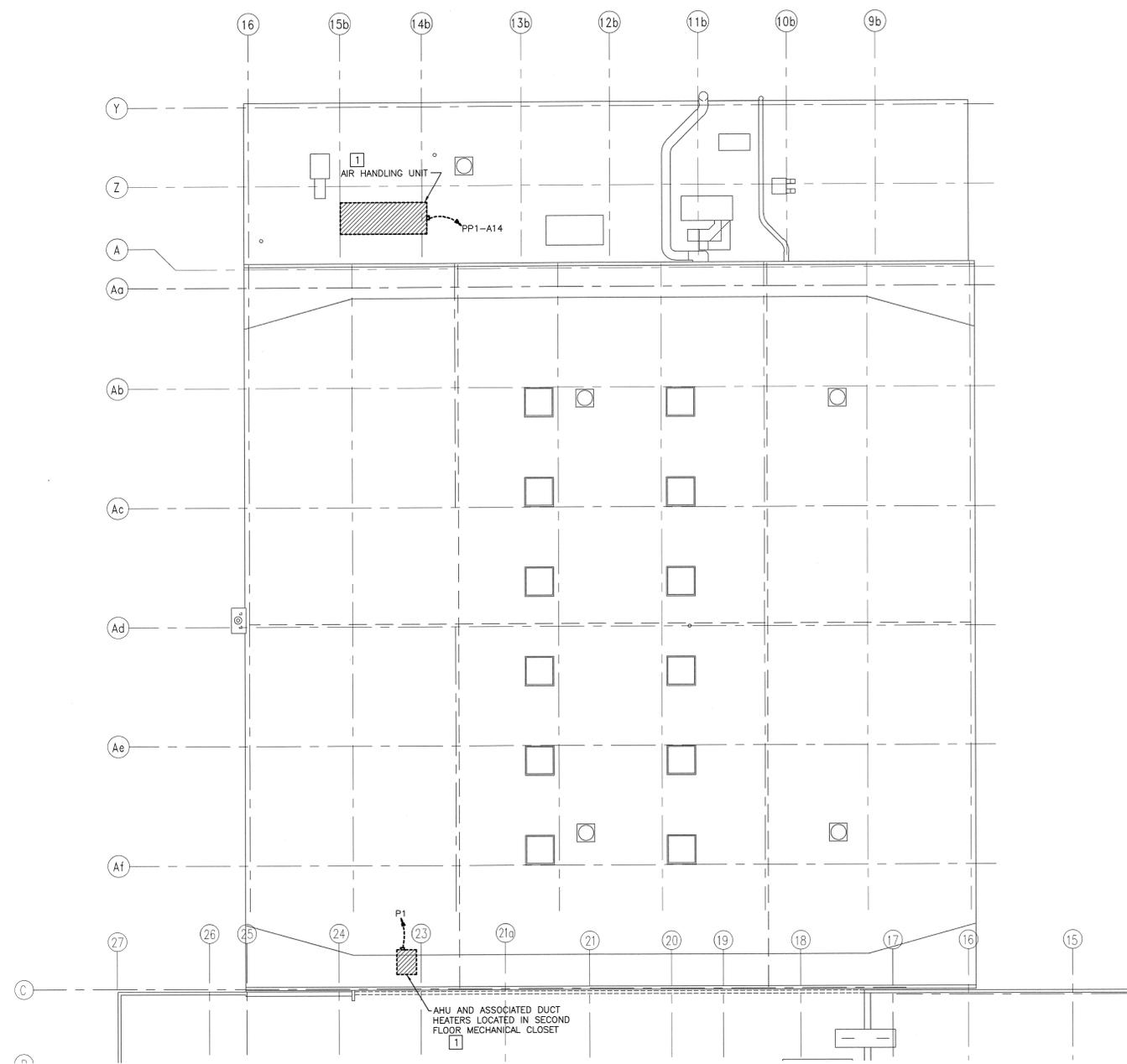
HENDERSON ENGINEERS
 5555 REDWOOD STREET, SUITE 201
 LOS ANGELES, CA 90019
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| DATE | SYM | REVISION | BY | A/PD |
|----------|-----|----------------------------------|----|------|
| 02-21-13 | E | 100% FINAL DESIGN | | |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | | |
| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | | |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | | |

| | | | | |
|---|--|---|--|---|
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS Chief, Facilities Engineering & Asset Mgmt. Office <i>[Signature]</i> 2-28-13 Project Manager/Customer <i>[Signature]</i> 2-28-13 Facilities Project Manager <i>[Signature]</i> 2/27/13 Chief, Office of Protection Services <i>[Signature]</i> 2/27/13 Chief, Safety & Environmental Services Office <i>[Signature]</i> 2-27-13 Program Information Office <i>[Signature]</i> 2/27/13 | | DATE 2-28-13 |
| | | DRAWING TITLE BUILDING 4800 ELECTRICAL DEMOLITION PLAN | | PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN |
| DRAWN BY HEI | | TRADE SH. NO. ED 101 | | |
| SCALE AS SHOWN | | SHEET No. 54 of 24 | | |
| FILE NAME EDM-1715-ED-101.DWG | | SHEET No. 54 of 24 | | |

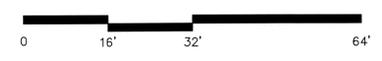
ELECTRICAL PLAN NOTES:

1 REMOVE ALL ELECTRICAL COMPONENTS INCLUDING BUT NOT LIMITED TO DISCONNECT SWITCHES, WIRING, CONDUIT, AND JUNCTION BOXES ASSOCIATED WITH THE REMOVAL OF MECHANICAL EQUIPMENT BACK TO ITS ORIGINATING SOURCE. WHERE NEW EQUIPMENT IS TO REPLACE THE DEMOLISHED IN SAME LOCATION RE-USE EXISTING CONDUIT IF IN GOOD CONDITION.



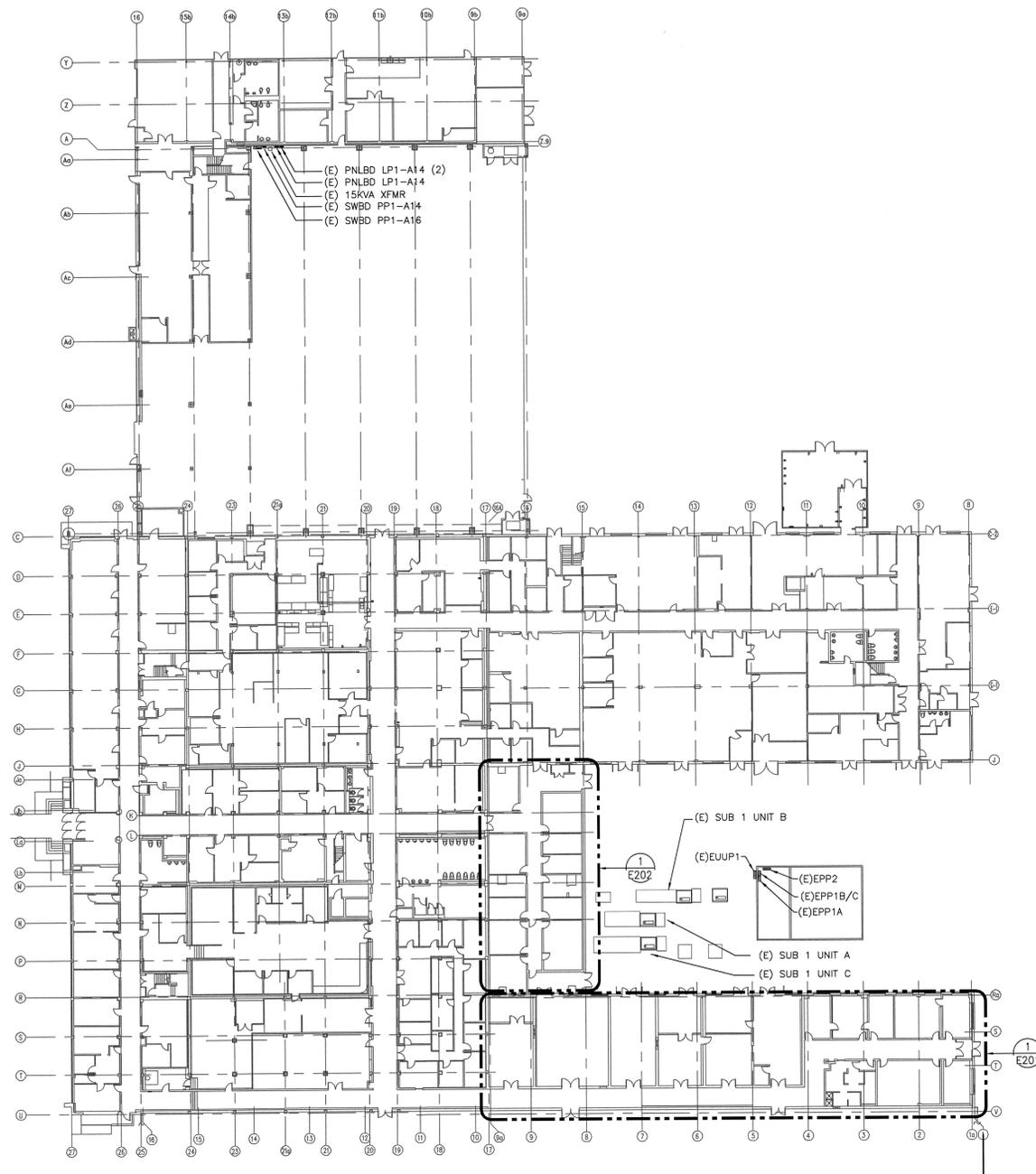
NOTE:
EXISTING CONDITIONS WERE TAKEN FROM ORIGINAL DRAWINGS & SITE VISITS AND MAY NOT REFLECT EXACT "AS-BUILT" CONDITIONS. FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO SUBMITTING FINAL BIDS. CAREFULLY COORDINATE NEW WORK AND DEMOLITION WITH ALL OTHER DISCIPLINES AND EXISTING CONDITIONS.

1 BUILDING 4801 ELECTRICAL DEMOLITION PLAN
1/16" = 1'-0"



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| | | | | | | |
|----------|-----|---|----|--|------------|-------------------------|
| | | NATIONAL AERONAUTICS AND SPACE ADMINISTRATION | | APPROVALS | | DATE |
| | | DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | Chief, Facilities Engineering & Asset Mgmt. Office | | 2-28-13 |
| | | DRAWING TITLE | | Project Requestor/Owner | | 2-28-13 |
| | | BUILDING 4801 ELECTRICAL DEMOLITION PLAN | | Facilities Project Manager | | 2/27/13 |
| | | PROJECT TITLE | | Chief, Office of Contractive Services | | 2/27/13 |
| | | MISSION CONTROL INFRASTRUCTURE REVITALIZATION | | Chief, Subcontract & Environmental Office | | 2-27-13 |
| | | 100% FINAL DESIGN | | Spec. Chief Information Officer | | 2/27/13 |
| 02-21-13 | E | 100% FINAL DESIGN | | DATE STRD | | DATE PRINTD |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | | DATE STRD | | 02/21/2013 |
| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | | DRAWN BY | HEI | EDM-1715 |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | | SCALE | AS SHOWN | TRADE SH. NO. |
| DATE | SYM | REVISION | BY | ED | EDM-1715 | ED |
| | | | | FILE NAME | ED-102.DWG | 102 SHEET No. 55 of 74. |



1 OVERALL ELECTRICAL FIRST FLOOR PLAN
 1/32" = 1'-0"



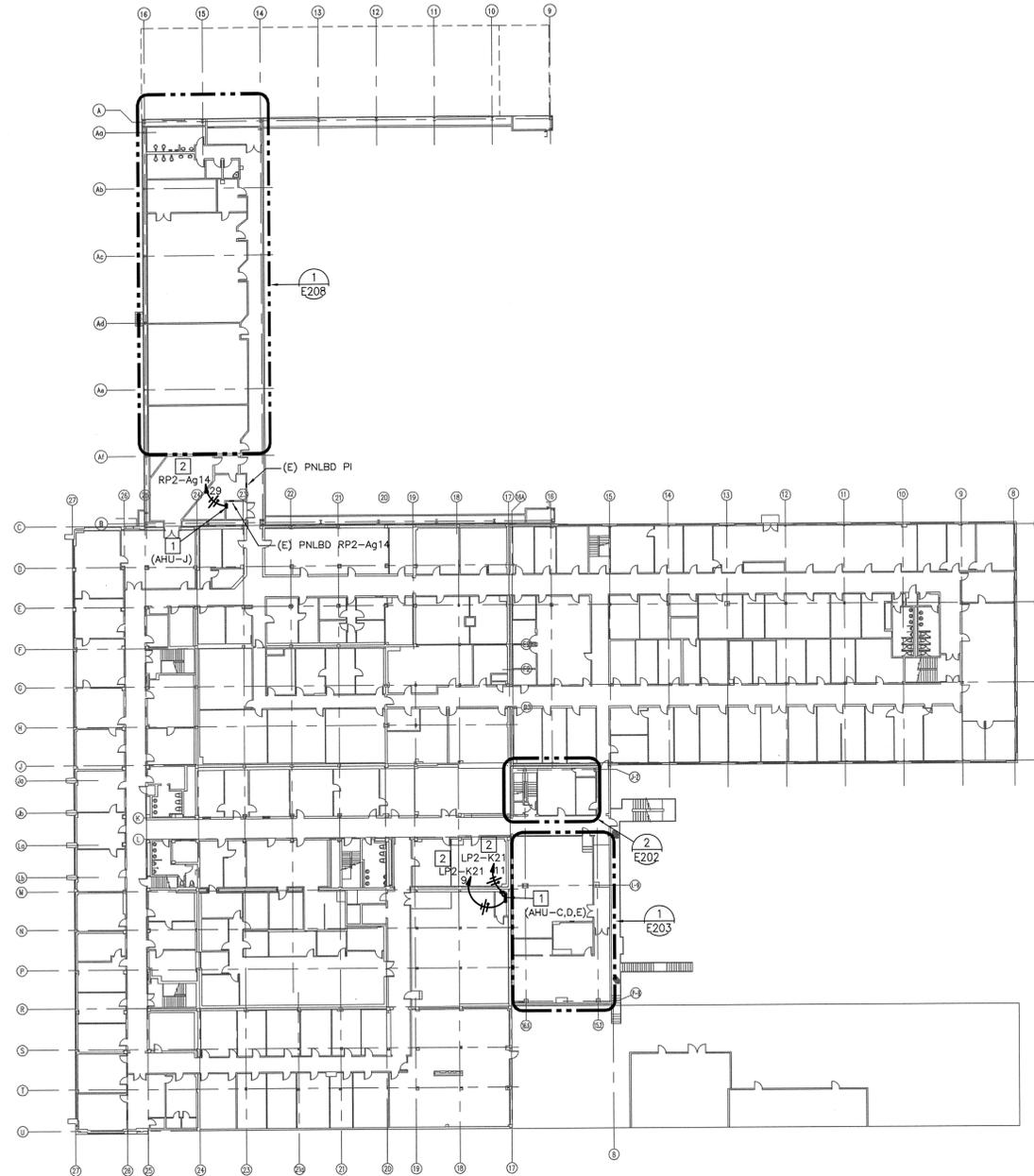
NOTE:
 EXISTING CONDITIONS WERE TAKEN FROM ORIGINAL DRAWINGS & SITE VISITS AND MAY NOT REFLECT EXACT "AS-BUILT" CONDITIONS. FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO SUBMITTING FINAL BIDS. CAREFULLY COORDINATE NEW WORK AND DEMOLITION WITH ALL OTHER DISCIPLINES AND EXISTING CONDITIONS.

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|--|--|--|--|---|--|--|--|
| | | NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS Chief, Facilities Engineering & Ass't. Maint. Office Project Requestor/Customer Facilities Project Manager Chief, Office of Protective Services Chief, Safety, Health & Environmental Office Chief, Staff Information Office | | DATE 2-28-13 2-28-13 2/27/13 2-27-13 2/27/13 | |
| | | DRAWING TITLE OVERALL ELECTRICAL FIRST FLOOR PLAN | | | | | |
| | | PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | | | DATE PRINTD: 02/21/2013 DRAWN BY: HEI SCALE: AS SHOWN FILE NAME: EDM-1715-E-101.DWG | |
| 02-21-13 E 100% FINAL DESIGN 01-07-13 D 95% NEAR-FINAL DESIGN SUBMITTAL 10-27-12 C 60% DEVELOPED DESIGN SUBMITTAL 05-12-12 B 30% PRELIMINARY DESIGN SUBMITTAL | | | | | | DATE: 02-21-13 SYM: E REVISION: 100% FINAL DESIGN BY: A/PD | |
| | | | | | | TRADE: E SHEET No. 56 of 24 | |

ELECTRICAL PLAN NOTES:

- 1 PROVIDE POWER TO AIR HANDLING UNIT CONTROL PANELS. FIELD VERIFY EXACT LOCATION AND REQUIREMENTS WITH DIVISION 23 CONTRACTOR PRIOR TO INSTALLATION.
- 2 PROVIDE 3/4" CONDUIT WITH 2#12 AND 1#12 GROUND TO EXISTING PANELBOARD. REFERENCE SHEET E-401 AND E-402 FOR PANELBOARD SCHEDULES.



1 OVERALL ELECTRICAL SECOND FLOOR PLAN
 1/32" = 1'-0"



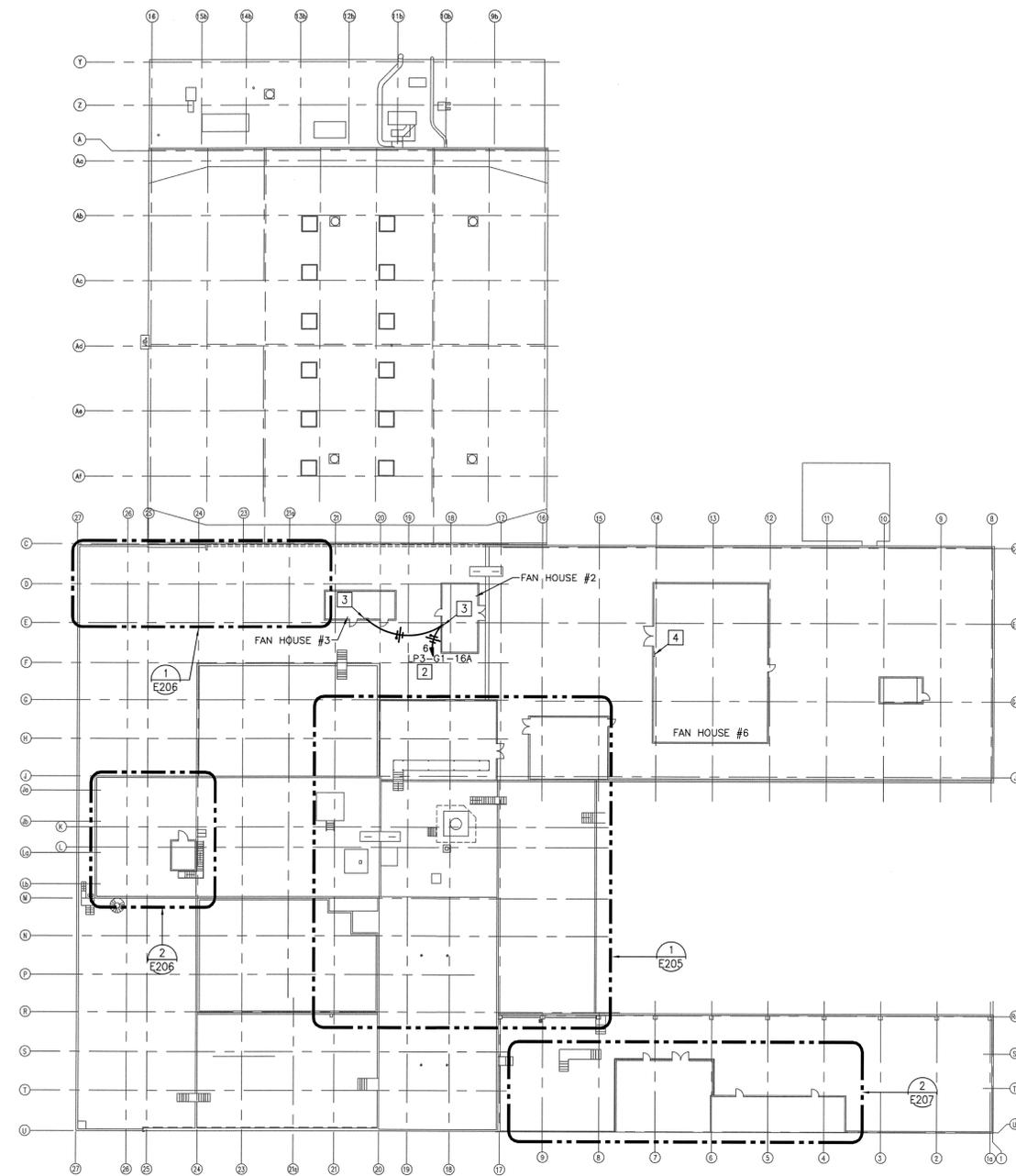
NOTE:
 EXISTING CONDITIONS WERE TAKEN FROM ORIGINAL DRAWINGS & SITE VISITS AND MAY NOT REFLECT EXACT "AS-BUILT" CONDITIONS. FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO SUBMITTING FINAL BIDS. CAREFULLY COORDINATE NEW WORK AND DEMOLITION WITH ALL OTHER DISCIPLINES AND EXISTING CONDITIONS.

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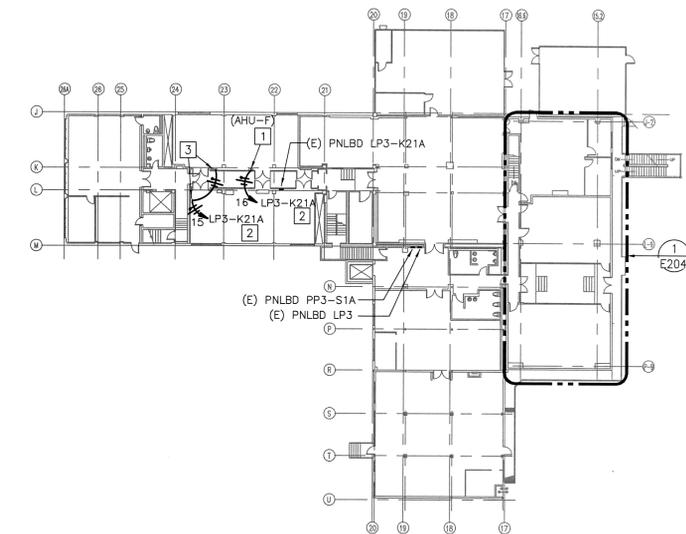
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|------|-----|--|----|--|--|------------------------|--|
| | | NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS | | DATE | |
| | | DRAWING TITLE OVERALL ELECTRICAL SECOND FLOOR PLAN | | Chief, Facilities Engineering & Asset Mgmt. Office <i>[Signature]</i> | | 2-28-13 | |
| | | PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | Project Requestor/Customer <i>[Signature]</i> | | 2-28-13 | |
| | | | | Facility Project Manager <i>[Signature]</i> | | 2/27/13 | |
| | | | | Chief, Office of Protective Services <i>[Signature]</i> | | 2/27/13 | |
| | | | | Chief, Safety, Health & Environmental Control <i>[Signature]</i> | | 2-27-13 | |
| | | | | TRS Chief Information Officer <i>[Signature]</i> | | 2/27/13 | |
| | | | | DATE STRTD: <i>[Signature]</i> | | DATE PRNTD: 02/21/2013 | |
| | | | | DRAWN BY: HEI | | EDM-1715 | |
| | | | | SCALE: AS SHOWN | | SHEET No. 57 of 24 | |
| | | | | FILE NAME: EDM-1715 E-102.DWG | | SHEET No. 57 of 24 | |
| DATE | SYM | REVISION | BY | A'PD | | | |

ELECTRICAL PLAN NOTES:

- 1 PROVIDE POWER TO NEW DDC CONTROL PANEL. FIELD VERIFY EXACT LOCATION AND REQUIREMENTS WITH DIVISION 23 CONTRACTOR PRIOR TO INSTALLATION.
- 2 PROVIDE 3/4" CONDUIT WITH 2#12 AND 1#12 GROUND TO PANELBOARD INDICATED. REFERENCE SHEET E-401 FOR PANELBOARD SCHEDULES.
- 3 PROVIDE POWER TO NEW DDC CONTROL PANEL REPLACING EXISTING PNEUMATIC CONTROL SYSTEM. FIELD VERIFY EXACT LOCATION AND REQUIREMENTS WITH DIVISION 23 CONTRACTOR PRIOR TO INSTALLATION.
- 4 RECONNECT POWER TO NEW DDC CONTROLLER REPLACING EXISTING MODULAR BUILDING CONTROLLER IN SAME LOCATION. FIELD VERIFY EXACT LOCATION AND REQUIREMENTS WITH DIVISION 23 CONTRACTOR PRIOR TO INSTALLATION.



2 OVERALL ELECTRICAL ROOF PLAN
1/32" = 1'-0"



1 OVERALL ELECTRICAL THIRD FLOOR PLAN
1/32" = 1'-0"



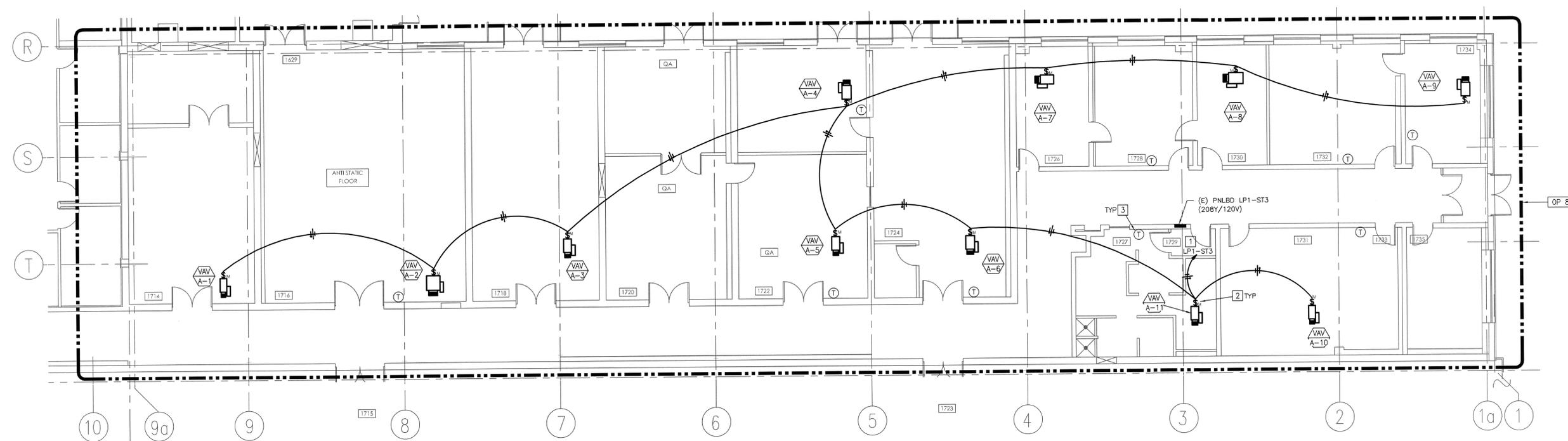
NOTE:
EXISTING CONDITIONS WERE TAKEN FROM ORIGINAL DRAWINGS & SITE VISITS AND MAY NOT REFLECT EXACT "AS-BUILT" CONDITIONS. FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO SUBMITTING FINAL BIDS. CAREFULLY COORDINATE NEW WORK AND DEMOLITION WITH ALL OTHER DISCIPLINES AND EXISTING CONDITIONS.

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|--|--|---|--|---|--|---|
| | | NATIONAL AERONAUTICS AND SPACE ADMINISTRATION | | APPROVALS | | DATE |
| | | DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | Chief Facilities Engineering @ Asst. Mgmt. Office Project Requestor/Assistant Facilities Project Manager Chief, Office of Facilities Services Chief, Safety & Environmental Office Chief, Information Office | | 2-28-13 2-28-13 2/27/13 2-27-13 2/27/13 |
| | | DRAWING TITLE | | DATE STRTD | | DATE PRNTD |
| | | OVERALL ELECTRICAL THIRD FLOOR AND ROOF PLAN | | | | 02/21/2013 |
| | | PROJECT TITLE | | DRAWN BY | | TRADE |
| | | MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | HEI | | EDM-1715 |
| | | DATE | | SCALE | | FILE NAME |
| | | SYM | | AS SHOWN | | EDM-1715 E-103.0MG |
| | | REVISION | | BY | | E 103 SHEET No. 58 of 74 |
| | | A'PD | | | | |

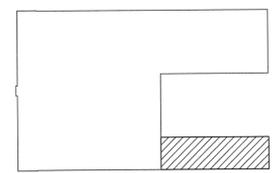
| | | | | |
|----------|---|----------------------------------|--|--|
| 02-21-13 | E | 100% FINAL DESIGN | | |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | | |
| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | | |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | | |

- ELECTRICAL PLAN NOTES:**
- 1 PROVIDE 3/4" CONDUIT WITH 2#12 AND 1#12 GROUND TO EXISTING PANELBOARD. PROVIDE NEW 20A/1P CIRCUIT BREAKER MATCHING EXISTING AIC RATING.
 - 2 PROVIDE MOTOR RATED TOGGLE SWITCH AT UNIT FOR LOCAL DISCONNECTING MEANS AND 120V CONNECTION TO INTEGRAL VAV CONTROL TRANSFORMER.
 - 3 PROVIDE 3/4" CONDUIT WITH BUSHING AT FREE ENDS CONCEALED WITHIN WALL FROM ALL THERMOSTAT LOCATIONS TO 6" ABOVE ACCESSIBLE CEILING.



1 SOUTH WING ELECTRICAL PLAN
SCALE: 1/8"=1'-0"

NOTE:
EXISTING CONDITIONS WERE TAKEN FROM ORIGINAL DRAWINGS & SITE VISITS AND MAY NOT REFLECT EXACT "AS-BUILT" CONDITIONS. FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO SUBMITTING FINAL BIDS. CAREFULLY COORDINATE NEW WORK AND DEMOLITION WITH ALL OTHER DISCIPLINES AND EXISTING CONDITIONS.



KEY PLAN
4800 BLDG 1ST FLOOR

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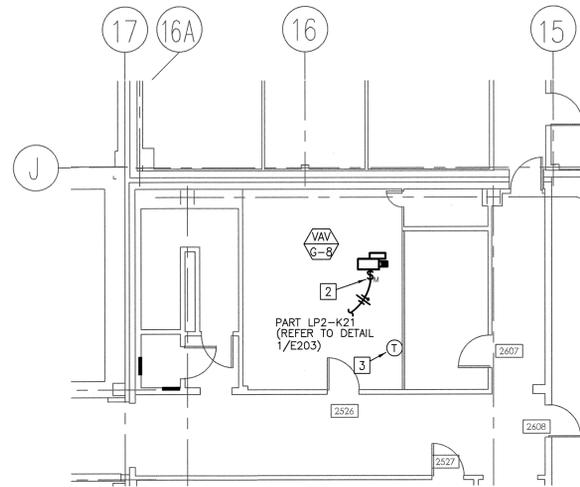
| DATE | SYM | REVISION | BY | A'PD |
|----------|-----|----------------------------------|----|------|
| 02-21-13 | E | 100% FINAL DESIGN | | |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | | |
| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | | |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | | |

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EDWARDS, CA

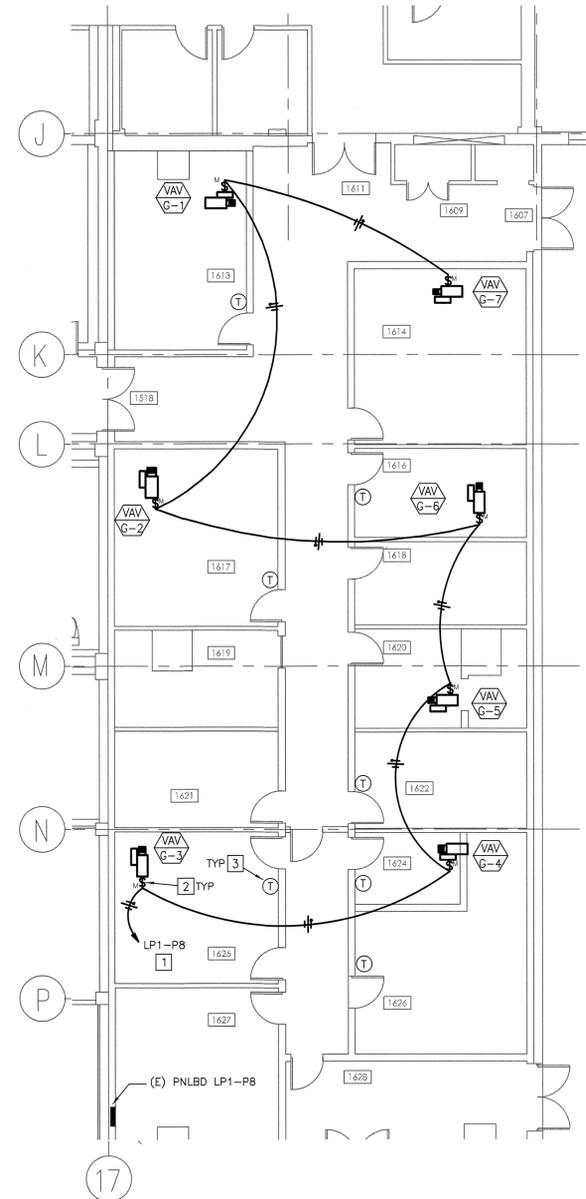
DRAWING TITLE
SOUTH WING ELECTRICAL PLAN

PROJECT TITLE
MISSION CONTROL
INFRASTRUCTURE REVITALIZATION
100% FINAL DESIGN

| APPROVALS | | DATE |
|--|--------------------|--------------------|
| Chief, Facilities Engineering & Support Mgmt. Office | <i>[Signature]</i> | 2-28-13 |
| Project Scheduling/Assistant | <i>[Signature]</i> | 2-28-13 |
| Facilities Project Manager | <i>[Signature]</i> | 2/27/13 |
| Chief, Office of Protection Services | <i>[Signature]</i> | 2/27/13 |
| Chief, Safety, Health & Environmental Engineering | <i>[Signature]</i> | 2/27/13 |
| Local Air Operations Office | <i>[Signature]</i> | 2/27/13 |
| DRAWN BY | HEJ | DATE PRINTED |
| SCALE | AS SHOWN | TRADE |
| FILE NAME | EDM-1715 | SHEET No. 52 of 74 |



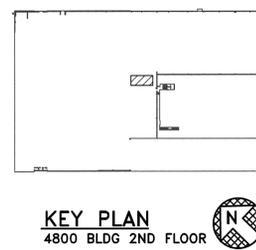
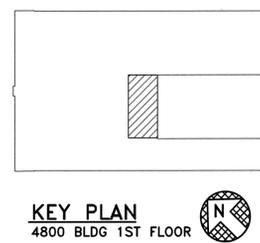
2 2ND FLOOR OFFICES ELECTRICAL PLAN
SCALE: 1/8"=1'-0"



1 1ST FLOOR OFFICES ELECTRICAL PLAN
SCALE: 1/8"=1'-0"

- ELECTRICAL PLAN NOTES:**
- 1 PROVIDE 3/4" CONDUIT WITH 2#12 AND 1#12 GROUND TO EXISTING PANELBOARD. PROVIDE NEW 20A/1P CIRCUIT BREAKER MATCHING EXISTING AIC RATING.
 - 2 PROVIDE MOTOR RATED TOGGLE SWITCH AT UNIT FOR LOCAL DISCONNECTING MEANS AND 120V CONNECTION TO INTEGRAL VAV CONTROL TRANSFORMER.
 - 3 PROVIDE 3/4" CONDUIT WITH BUSHING AT FREE ENDS CONCEALED WITHIN WALL FROM ALL THERMOSTAT LOCATIONS TO 6" ABOVE ACCESSIBLE CEILING.

NOTE:
EXISTING CONDITIONS WERE TAKEN FROM ORIGINAL DRAWINGS & SITE VISITS AND MAY NOT REFLECT EXACT "AS-BUILT" CONDITIONS. FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO SUBMITTING FINAL BIDS. CAREFULLY COORDINATE NEW WORK AND DEMOLITION WITH ALL OTHER DISCIPLINES AND EXISTING CONDITIONS.



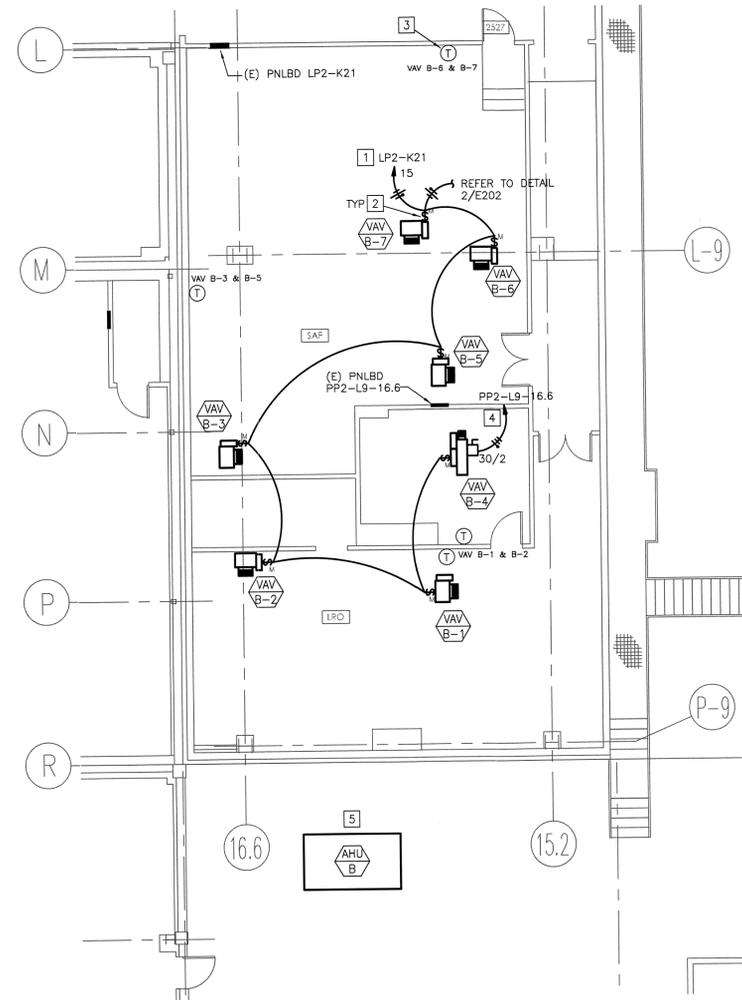
HENDERSON ENGINEERS
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| DATE | | SYM | REVISION | BY | A/PD |
|----------|---|-----|----------------------------------|----|------|
| 02-21-13 | E | | 100% FINAL DESIGN | | |
| 01-07-13 | D | | 95% NEAR-FINAL DESIGN SUBMITTAL | | |
| 10-27-12 | C | | 60% DEVELOPED DESIGN SUBMITTAL | | |
| 05-12-12 | B | | 30% PRELIMINARY DESIGN SUBMITTAL | | |

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|--|--|---|--|------------------------------------|
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS Chief, Facilities Engineering & Asset Mgmt. Office <i>[Signature]</i> 2-28-13 Project Director/Systems <i>[Signature]</i> 2-28-13 Facilities Project Manager <i>[Signature]</i> 2/27/13 Chief, Office of Protective Services <i>[Signature]</i> 2/27/13 Chief, Mission Support & Engineering Office <i>[Signature]</i> 2-27-13 Chief, Field Operations Office <i>[Signature]</i> 2/27/13 | | DATE 02/21/2013 |
| DRAWING TITLE 1ST AND 2NDFLOOR OFFICES ELECTRICAL PLAN | | PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | TRADE SH. No. EDM-1715 E 202 |
| DRAWN BY HEI | | SHEET No. 02 of 24 | | SHEET No. 02 of 24 |

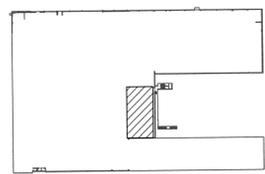
ELECTRICAL PLAN NOTES:

- 1 PROVIDE 3/4" CONDUIT WITH 2#12 AND 1#12 GROUND TO EXISTING PANELBOARD, REFERENCE SHEET E-401 FOR PANELBOARD SCHEDULE.
- 2 PROVIDE MOTOR RATED TOGGLE SWITCH AT UNIT FOR LOCAL DISCONNECTING MEANS AND 120V CONNECTION TO INTEGRAL VAV CONTROL TRANSFORMER.
- 3 PROVIDE 3/4" CONDUIT WITH BUSHING AT FREE ENDS CONCEALED WITHIN WALL FROM ALL THERMOSTAT LOCATIONS TO 6" ABOVE ACCESSIBLE CEILING.
- 4 PROVIDE 3/4" CONDUIT WITH 2#10 AND 1#10 GROUND TO EXISTING PANELBOARD, PROVIDE NEW 30A/2P CIRCUIT BREAKER MATCHING EXISTING AIC RATING.
- 5 REFERENCE SHEET E207 FOR AHU-B ELECTRICAL REQUIREMENTS.



1 VIDEO CONTROL ROOM ABOVE CEILING ELECTRICAL PLAN
SCALE: 1/8"=1'-0"

NOTE:
EXISTING CONDITIONS WERE TAKEN FROM ORIGINAL DRAWINGS & SITE VISITS AND MAY NOT REFLECT EXACT "AS-BUILT" CONDITIONS. FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO SUBMITTING FINAL BIDS. CAREFULLY COORDINATE NEW WORK AND DEMOLITION WITH ALL OTHER DISCIPLINES AND EXISTING CONDITIONS.



KEY PLAN
4800 BLDG 2ND FLOOR

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1150001204

| DATE | SYM | REVISION | BY | A/PD |
|----------|-----|----------------------------------|----|------|
| 02-21-13 | E | 100% FINAL DESIGN | | |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | | |
| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | | |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | | |

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DRYDEN FLIGHT RESEARCH CENTER
EDWARDS, CA

DRAWING TITLE
VIDEO CONTROL ROOM ELECTRICAL PLAN

PROJECT TITLE
MISSION CONTROL
INFRASTRUCTURE REVITALIZATION
100% FINAL DESIGN

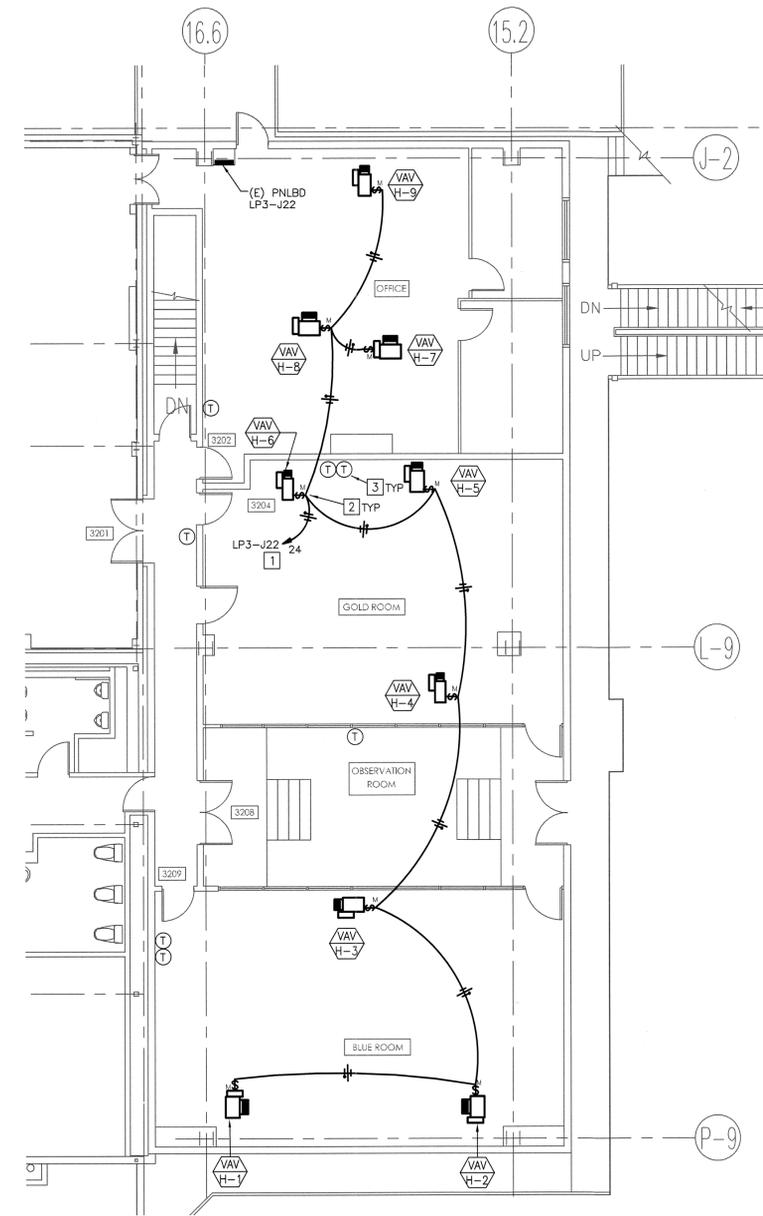
| APPROVALS | | DATE |
|--|--------------------|---------|
| Chief, Facilities Engineering & Asset Mgmt. Office | <i>[Signature]</i> | 2-28-13 |
| Project Requestor/Customer | <i>[Signature]</i> | 2-28-13 |
| Facilities Project Manager | <i>[Signature]</i> | 2/27/13 |
| Chief, Office of Acquisition Services | <i>[Signature]</i> | 2/27/13 |
| Chief, Solid Rocket Motor & Configuration Office | <i>[Signature]</i> | 2/27/13 |
| Chief, Flight Information Office | <i>[Signature]</i> | 2/27/13 |

| DATE STRTD | DATE PRINTD | EDM-1715 |
|------------|-------------|----------|
| 02/21/2013 | 02/21/2013 | EDM-1715 |

| DRAWN BY | SCALE | TRACE | SHEET No. |
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| HEI | AS SHOWN | E | 61 of 74 |

ELECTRICAL PLAN NOTES:

- 1 PROVIDE 3/4" CONDUIT WITH 2#12 AND 1#12 GROUND TO EXISTING PANELBOARD. REFERENCE SHEET E-401 FOR PANELBOARD SCHEDULE.
- 2 PROVIDE MOTOR RATED TOGGLE SWITCH AT UNIT FOR LOCAL DISCONNECTING MEANS AND 120V CONNECTION TO INTEGRAL VAV CONTROL TRANSFORMER.
- 3 PROVIDE 3/4" CONDUIT WITH BUSHING AT FREE ENDS CONCEALED WITHIN WALL FROM ALL THERMOSTAT LOCATIONS TO 6" ABOVE ACCESSIBLE CEILING.



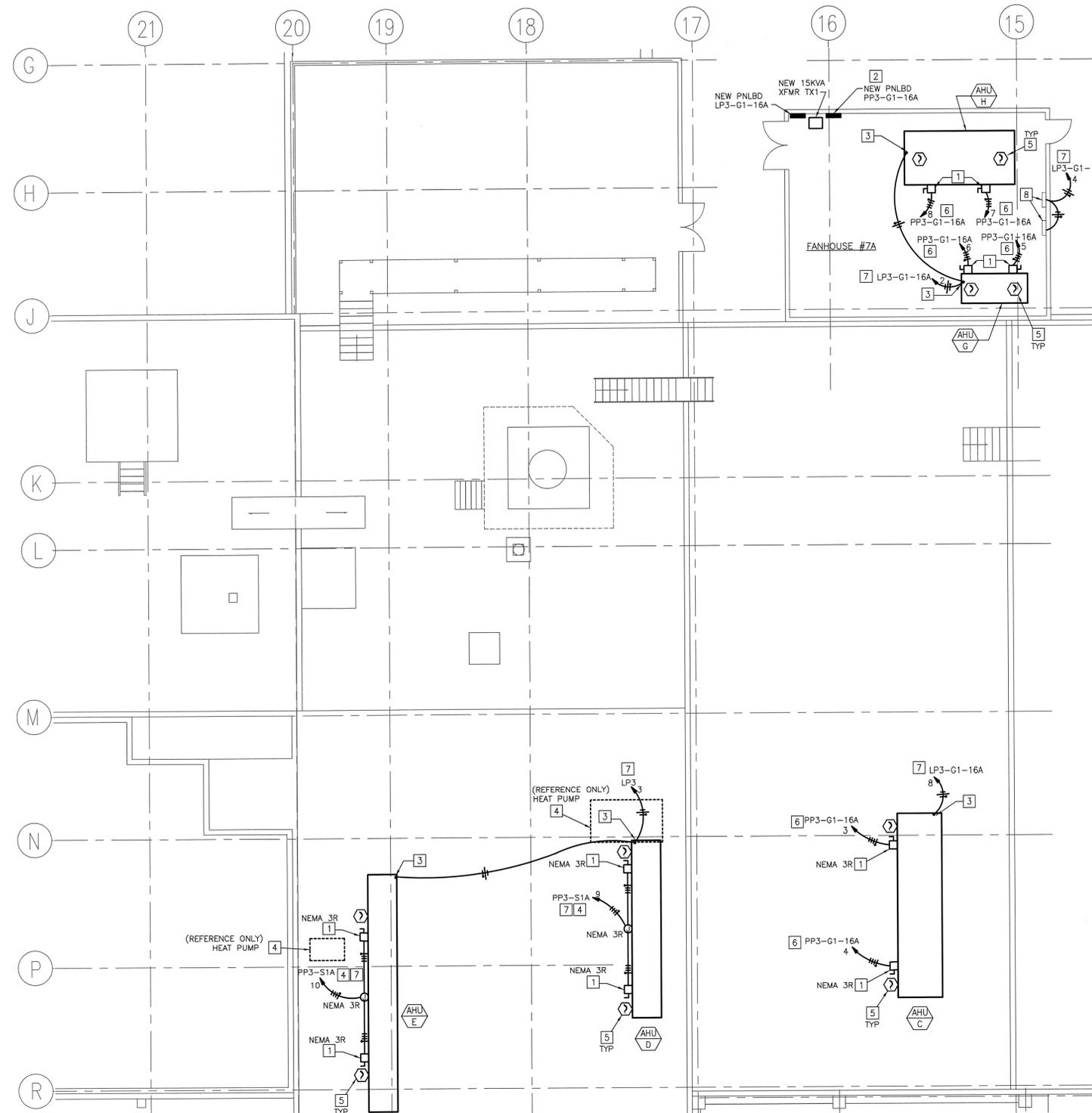
1 BLUE AND GOLD ROOMS ABOVE CEILING ELECTRICAL PLAN
SCALE: 1/8"=1'-0"

NOTE:
EXISTING CONDITIONS WERE TAKEN FROM ORIGINAL DRAWINGS & SITE VISITS AND MAY NOT REFLECT EXACT "AS-BUILT" CONDITIONS. FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO SUBMITTING FINAL BIDS. CAREFULLY COORDINATE NEW WORK AND DEMOLITION WITH ALL OTHER DISCIPLINES AND EXISTING CONDITIONS.



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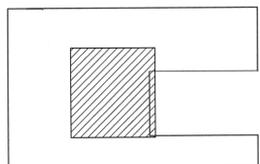
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|--|--|--|--|--|
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS Chief, Facilities Engineering & Reg. Mgmt. Office Project Requester/Customer Facilities Project Manager Chief, Office of Program Services Chief, Safety & Health Management Office Reg. Chief Information Officer | | DATE 2-28-13 2-28-13 2/27/13 2/27/13 2-27-13 2/27/13 |
| DRAWING TITLE BLUE AND GOLD ROOMS ELECTRICAL PLAN | | DATE STRTD DATE FINTD 02/21/2013 | | |
| PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | TRADE SHEET No. EDM-1715 | | |
| DATE SYM REVISION BY A'PD | | SCALE AS SHOWN FILE NAME EDM-1715 E-204.DWG | | |



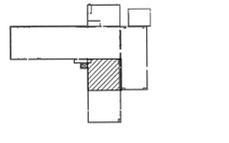
- ELECTRICAL PLAN NOTES:**
- 1 PROVIDE CONNECTION TO INTEGRAL VFD AND DISCONNECT PROVIDED WITH UNIT.
 - 2 PROVIDE NEW SURFACE MOUNTED PANELBOARD IN SAME LOCATION AS DEMOLISHED MOTOR CONTROL CENTER. REFERENCE ONE-LINE DIAGRAM SHEET E-304 FOR MORE INFORMATION.
 - 3 PROVIDE 120V POWER FOR INTEGRAL MECHANICAL UNIT SERVICE RECEPTACLE AND LIGHTING. VERIFY EXACT CONNECTION LOCATION AND REQUIREMENTS WITH DIVISION 23 CONTRACTOR PRIOR TO INSTALLATION. CONNECT LIGHTING AHEAD OF GFCI RECEPTACLE.
 - 4 MODIFY AND EXTEND EXISTING CONDUIT FROM LOCATION OF DEMOLISHED HEAT PUMP TO LOCATION OF NEW UNIT. LOCATION OF EXISTING UNIT SHOWN ON PLAN FOR REFERENCE ONLY.
 - 5 LOCATION OF DUCT DETECTORS SHOWN FOR REFERENCE ONLY. FIELD VERIFY FINAL LOCATIONS AND REQUIREMENTS WITH DIVISION 23 AND 28 CONTRACTORS PRIOR TO INSTALLATION. PROVIDE 3/4" RED CONDUIT FROM DETECTORS TO NEAREST AVAILABLE FIRE ALARM CONTROL PANEL FOR WIRING PROVIDED BY OTHERS.
 - 6 REFERENCE ELECTRICAL ONE-LINE DIAGRAM ON SHEET E-304 FOR CIRCUIT AND CONDUIT INFORMATION.
 - 7 PROVIDE 3/4" CONDUIT WITH 2#12 AND 1#12 GROUND TO PANELBOARD INDICATED. REFERENCE SHEET E-401 AND E-402 FOR PANELBOARD SCHEDULES.
 - 8 PROVIDE POWER TO NEW DDC CONTROL PANEL. FIELD VERIFY EXACT LOCATION AND REQUIREMENTS WITH DIVISION 23 CONTRACTOR PRIOR TO INSTALLATION.

NOTE:
 EXISTING CONDITIONS WERE TAKEN FROM ORIGINAL DRAWINGS & SITE VISITS AND MAY NOT REFLECT EXACT "AS-BUILT" CONDITIONS. FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO SUBMITTING FINAL BIDS. CAREFULLY COORDINATE NEW WORK AND DEMOLITION WITH ALL OTHER DISCIPLINES AND EXISTING CONDITIONS.

1 BUILDING 4800 ELECTRICAL ROOF PLAN
 SCALE: 1/8"=1'-0"



KEY PLAN
 4800 BLDG ROOF

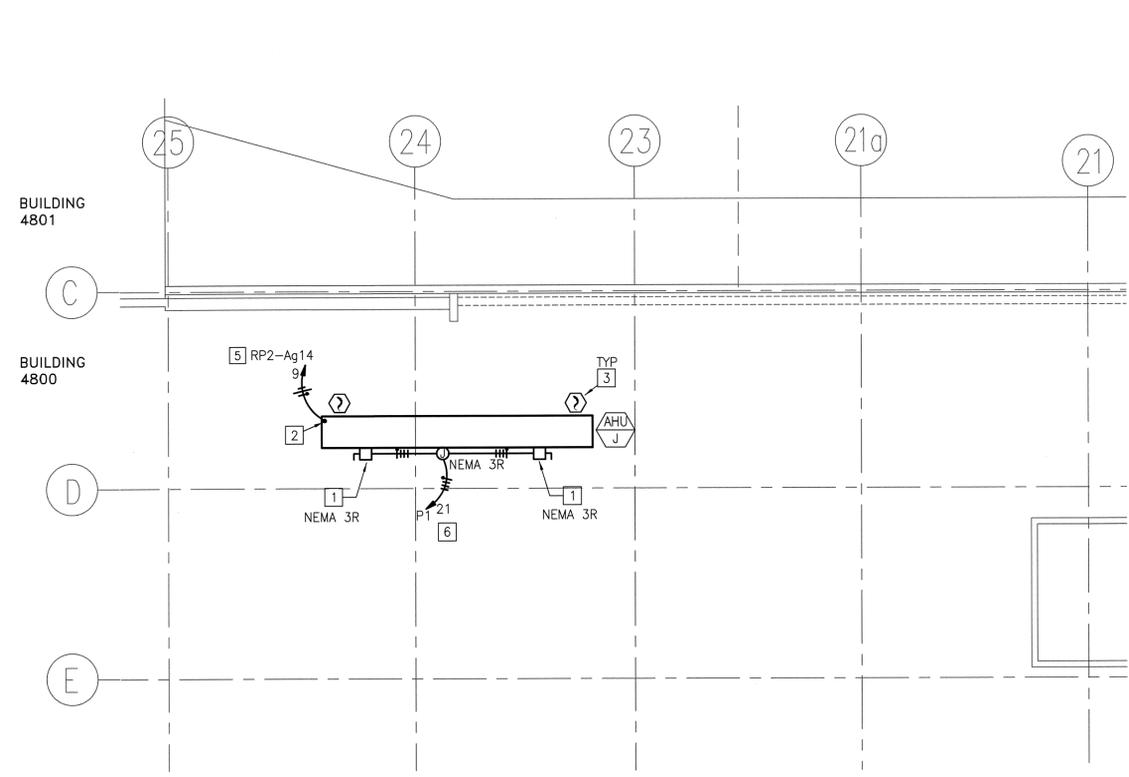


KEY PLAN
 4800 3RD FLOOR

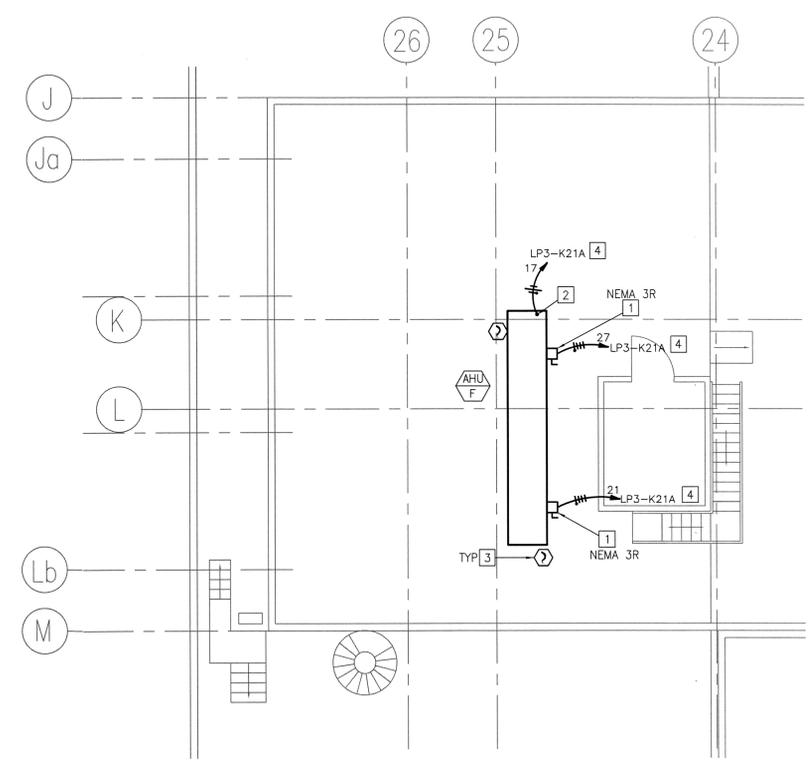
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| | | NATIONAL AERONAUTICS AND SPACE ADMINISTRATION | | APPROVALS | | DATE |
| | | DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | Chief, Facilities Engineering & Asset Mgmt. Office <i>[Signature]</i> 2/28/13 Project Requestor/Authorizer <i>[Signature]</i> 2/28/13 Facilities Project Manager <i>[Signature]</i> 2/27/13 Chief, Office of Protective Services <i>[Signature]</i> 2/27/13 Chief, Safety, Health & Environmental Office <i>[Signature]</i> 2/27/13 DPMR Tech. Information Officer <i>[Signature]</i> 2/27/13 | | |
| | | DRAWING TITLE | | PROJECT TITLE | | |
| | | BLDG 4800 ROOF ELECTRICAL PLAN | | MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | |
| | | DATE STRTD 02-21-13 01-07-13 10-27-12 05-12-12 | | DATE PRNTD 02/21/2013 | | |
| | | E 100% FINAL DESIGN D 95% NEAR-FINAL DESIGN SUBMITTAL C 60% DEVELOPED DESIGN SUBMITTAL B 30% PRELIMINARY DESIGN SUBMITTAL | | DRAWN BY HEI | | EDM-1715 |
| | | DATE SYM REVISION BY A/PD | | SCALE AS SHOWN FILE NAME EDM-1715 E-205.DWG | | SHEET No. 63 of 74 TRADE SR. No. E 205 |

- ELECTRICAL PLAN NOTES:**
- 1 PROVIDE CONNECTION TO INTEGRAL VFD AND DISCONNECT PROVIDED WITH UNIT.
 - 2 PROVIDE 120V POWER FOR INTEGRAL MECHANICAL UNIT SERVICE RECEPTACLE AND LIGHTING. VERIFY EXACT CONNECTION LOCATION AND REQUIREMENTS WITH DIVISION 23 CONTRACTOR PRIOR TO INSTALLATION. CONNECT LIGHTING AHEAD OF GFCI RECEPTACLE.
 - 3 LOCATION OF DUCT DETECTORS SHOWN FOR REFERENCE ONLY. FIELD VERIFY FINAL LOCATIONS AND REQUIREMENTS WITH DIVISION 23 AND 28 CONTRACTORS PRIOR TO INSTALLATION. PROVIDE 3/4" RED CONDUIT FROM DETECTORS TO NEAREST AVAILABLE FIRE ALARM CONTROL PANEL FOR WIRING PROVIDED BY OTHERS.
 - 4 PROVIDE 3/4" CONDUIT WITH 2#12 AND 1#12 GROUND TO EXISTING PANELBOARD. REFERENCE SHEET E-402 FOR PANELBOARD SCHEDULE AND SHEET E-103 FOR PANELBOARD LOCATION.
 - 5 PROVIDE 3/4" CONDUIT WITH 2#12 AND 1#12 GROUND TO EXISTING PANELBOARD. REFERENCE SHEET E-402 FOR PANELBOARD SCHEDULE AND REFERENCE SHEET E-102 FOR LOCATION.
 - 6 PROVIDE 3/4" CONDUIT WITH 3#12 AND 1#12 GROUND TO EXISTING PANELBOARD. REFERENCE SHEET E-402 FOR PANELBOARD SCHEDULE AND REFERENCE SHEET E-102 FOR LOCATION.

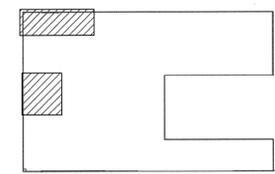


2 BUILDING 4800 ELECTRICAL ROOF PLAN
SCALE: 1/8"=1'-0"



1 BLUE AND GOLD ROOF ELECTRICAL PLAN
SCALE: 1/8"=1'-0"

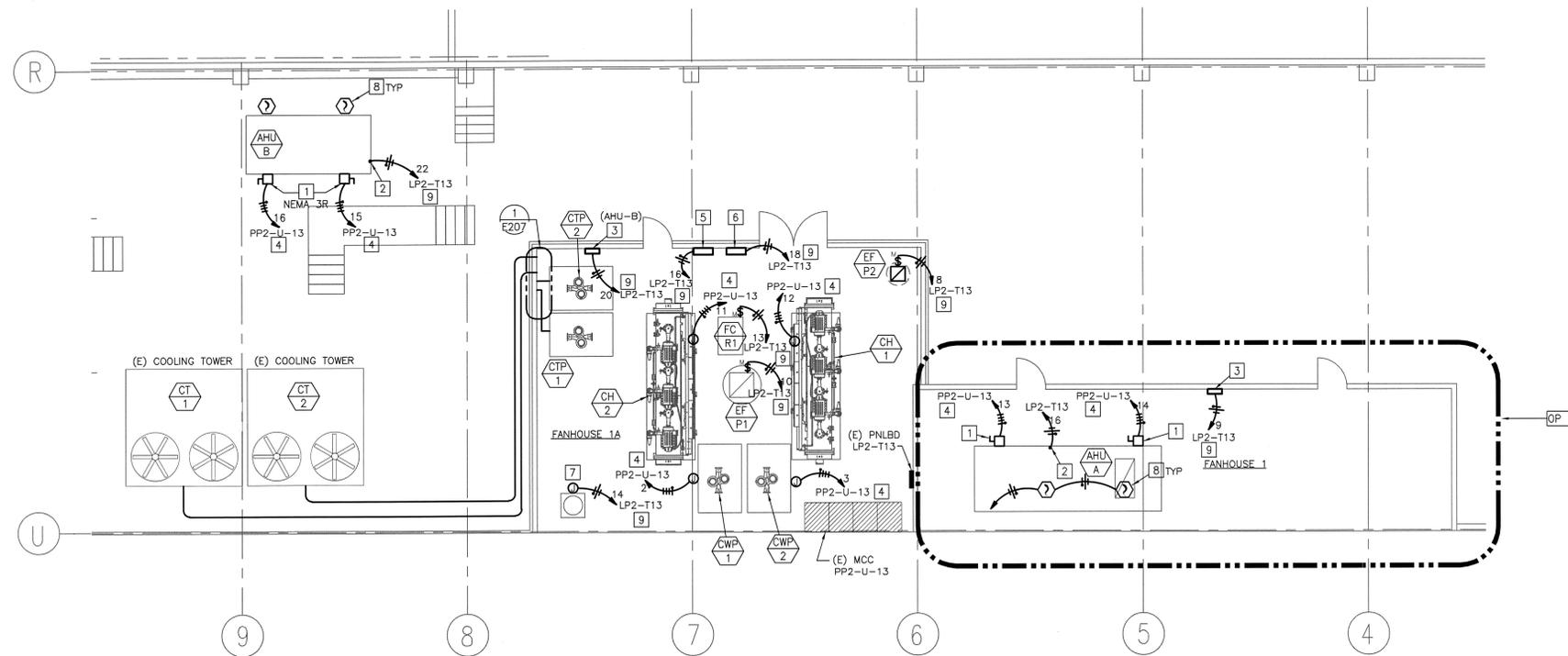
NOTE:
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KEY PLAN
4800 BLDG ROOF

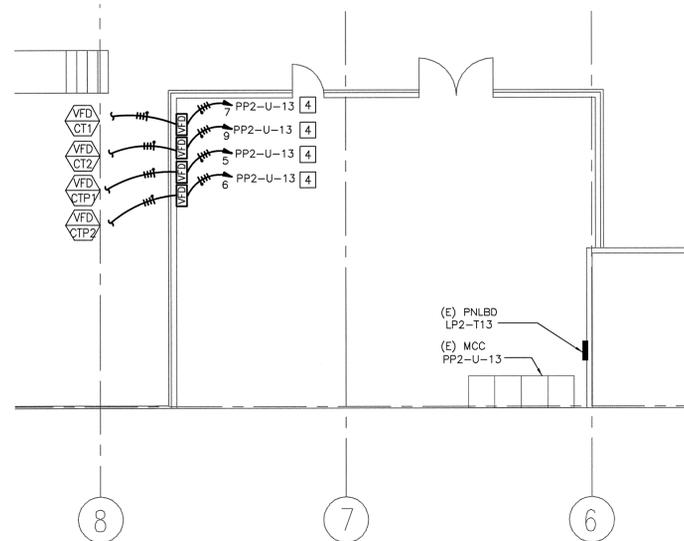
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|--|-----|--|----|--|--|--|
| | | NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS Chief, Facilities Engineering & Asst. Maint. Office <i>[Signature]</i> Project Requester/Owner <i>[Signature]</i> Facilities Project Manager <i>[Signature]</i> Chief, Division of Facilities Services <i>[Signature]</i> Chief, Subcontracting & Facilities Management Office <i>[Signature]</i> Director, Information Office <i>[Signature]</i> | | DATE 2-28-13 2-28-13 2/27/13 2/27/13 2/27/13 |
| | | DRAWING TITLE BLDG 4800 ROOF ELECTRICAL PLAN | | | | |
| | | PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | | | |
| 02-21-13 E 100% FINAL DESIGN 01-07-13 D 95% NEAR-FINAL DESIGN SUBMITTAL 10-27-12 C 60% DEVELOPED DESIGN SUBMITTAL 05-12-12 B 30% PRELIMINARY DESIGN SUBMITTAL | | | | DATE STRTD: [] DATE PRINTD: 02/21/2013 DRAWN BY: HEI SCALE: AS SHOWN TRADE SH. NO. FILE NAME: EDM-1715 E-200.DWG E 206 SHEET No. 84 of 24 | | |
| DATE | SYM | REVISION | BY | A/PD | | |

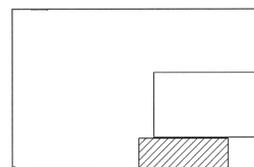


- ELECTRICAL PLAN NOTES:**
- 1 PROVIDE CONNECTION TO INTEGRAL VFD AND DISCONNECT PROVIDED WITH UNIT.
 - 2 PROVIDE 120V POWER FOR INTEGRAL MECHANICAL UNIT SERVICE RECEPTACLE AND LIGHTING. VERIFY EXACT CONNECTION LOCATION AND REQUIREMENTS WITH DIVISION 23 CONTRACTOR PRIOR TO INSTALLATION. CONNECT LIGHTING AHEAD OF GFCI RECEPTACLE.
 - 3 PROVIDE POWER TO AHU CONTROL PANEL. FIELD VERIFY EXACT LOCATION AND REQUIREMENTS WITH DIVISION 23 CONTRACTOR PRIOR TO INSTALLATION.
 - 4 REFERENCE ELECTRICAL ONE-LINE DIAGRAM ON SHEET E-303 FOR CIRCUIT AND CONDUIT INFORMATION.
 - 5 PROVIDE POWER TO NEW REFRIGERANT MONITORING SYSTEM. PROVIDE ALL LOAD SIDE CONNECTIONS TO MECHANICAL EQUIPMENT AS NECESSARY FOR CONTROL WIRING BY OTHERS. VERIFY ALL ELECTRICAL REQUIREMENTS WITH MANUFACTURER PRIOR TO INSTALLATION.
 - 6 PROVIDE POWER TO SIEMENS DEMAND FLOW SYSTEM. PROVIDE ALL LOAD SIDE CONNECTIONS TO MECHANICAL EQUIPMENT AS NECESSARY FOR CONTROL WIRING BY OTHERS. VERIFY ALL ELECTRICAL REQUIREMENTS WITH MANUFACTURER PRIOR TO INSTALLATION.
 - 7 PROVIDE POWER TO AUTOMATED CHEMICAL TREATMENT SYSTEM. PROVIDE ALL LOAD SIDE CONNECTIONS TO MECHANICAL EQUIPMENT AS NECESSARY FOR CONTROL WIRING BY OTHERS. VERIFY ALL ELECTRICAL REQUIREMENTS WITH MANUFACTURER PRIOR TO INSTALLATION.
 - 8 LOCATION OF DUCT DETECTORS SHOWN FOR REFERENCE ONLY. FIELD VERIFY FINAL LOCATIONS AND REQUIREMENTS WITH DIVISION 23 AND 28 CONTRACTORS PRIOR TO INSTALLATION. PROVIDE 3/4" RED CONDUIT FROM DETECTORS TO NEAREST AVAILABLE FIRE ALARM CONTROL PANEL FOR WIRING PROVIDED BY OTHERS.
 - 9 PROVIDE 3/4" CONDUIT WITH 2#12 AND 1#12 GROUND TO EXISTING PANELBOARD. REFERENCE SHEET E-401 FOR PANELBOARD SCHEDULE.

2 FAN HOUSE 1 & 1A ELECTRICAL PLAN
SCALE: 1/8"=1'-0"



1 FAN HOUSE 1A ELECTRICAL PLAN
SCALE: 1/8"=1'-0"

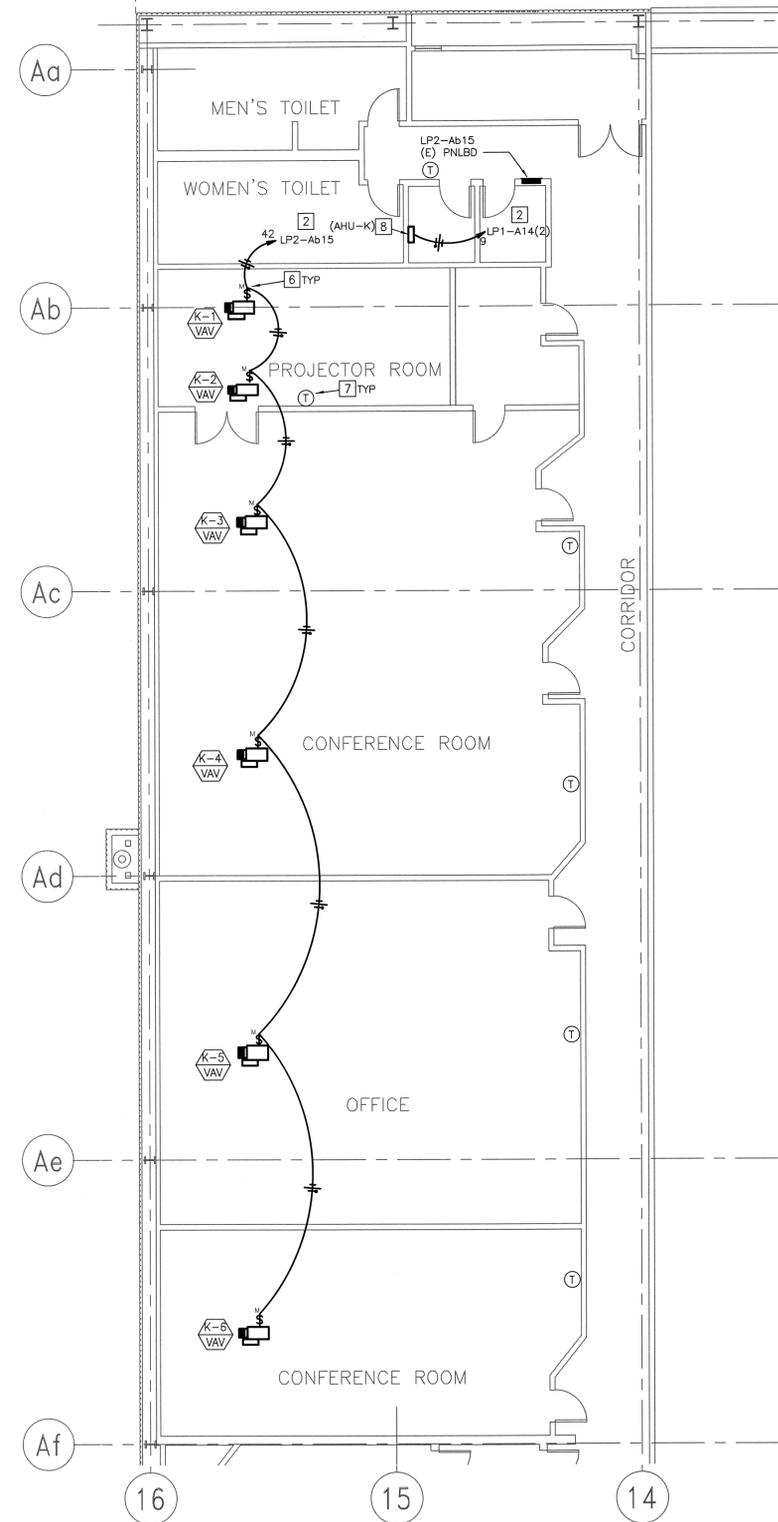
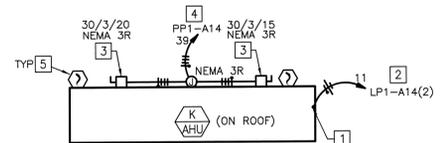


KEY PLAN
4800 BLDG ROOF

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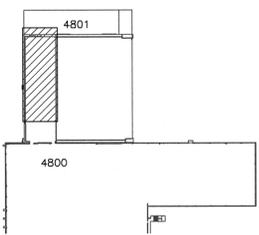
NOTE:
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| | | | | | | |
|--|-----|--|----|---|--|---|
| | | NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS Chief Facilities Engineering & Asset Mgmt. Office Project Requestor/Customer Facilities Project Manager Chief, Office of Procurement Services Chief, Space Support & Environmental Office Chief, Safety Information Office | | DATE 2-28-13 2-28-13 2/27/13 2/27/13 2/27/13 |
| | | DRAWING TITLE FANHOUSE 1 & 1A ELECTRICAL PLAN | | | | |
| | | PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | | | |
| 02-21-13 E 100% FINAL DESIGN 01-07-13 D 95% NEAR-FINAL DESIGN SUBMITTAL 10-27-12 C 60% DEVELOPED DESIGN SUBMITTAL 05-12-12 B 30% PRELIMINARY DESIGN SUBMITTAL | | DATE STARTD DATE PRINTD 02/21/2013 | | TRADE SH. No. EDM-1715 E-207.DWG SHEET No. 55 of 24 | | |
| DATE | SYM | REVISION | BY | APD | | |



- ELECTRICAL PLAN NOTES:**
- 1 PROVIDE 120V POWER FOR INTEGRAL MECHANICAL UNIT SERVICE RECEPTACLE AND LIGHTING. VERIFY EXACT LOCATION AND REQUIREMENTS WITH DIVISION 23 CONTRACTOR PRIOR TO INSTALLATION. CONNECT LIGHTING AHEAD OF GFCI RECEPTACLE.
 - 2 PROVIDE 3/4" CONDUIT WITH 2#12 AND 1#12 GROUND TO EXISTING PANELBOARD. REFERENCE SHEET E-401 FOR PANELBOARD SCHEDULE AND SHEET E-101 FOR PANELBOARD LOCATION.
 - 3 PROVIDE SEPARATE FUSED DISCONNECT SWITCH AHEAD OF INTEGRAL UNIT VFD.
 - 4 PROVIDE (3)#10, 1#10 GROUND IN EXISTING CONDUIT TO EXISTING PANELBOARD. REFERENCE SHEET E-402 FOR PANELBOARD SCHEDULE AND SHEET E-101 FOR LOCATION OF PANELBOARD.
 - 5 LOCATION OF DUCT DETECTORS SHOWN FOR REFERENCE ONLY. FIELD VERIFY FINAL LOCATIONS AND REQUIREMENTS WITH DIVISION 23 AND 28 CONTRACTORS PRIOR TO INSTALLATION. PROVIDE 3/4" RED CONDUIT FROM DETECTORS TO NEAREST AVAILABLE FIRE ALARM CONTROL PANEL FOR WIRING PROVIDED BY OTHERS.
 - 6 PROVIDE MOTOR RATED TOGGLE SWITCH AT UNIT FOR LOCAL DISCONNECTING MEANS AND 120V CONNECTION TO INTEGRAL VAV CONTROL TRANSFORMER.
 - 7 PROVIDE 3/4" CONDUIT WITH BUSHING AT FREE ENDS CONCEALED WITHIN WALL FROM ALL THERMOSTAT LOCATIONS TO 6" ABOVE ACCESSIBLE CEILING.
 - 8 PROVIDE POWER TO AHU CONTROL PANEL. FIELD VERIFY EXACT LOCATION AND REQUIREMENTS WITH DIVISION 23 CONTRACTOR PRIOR TO INSTALLATION.

NOTE:
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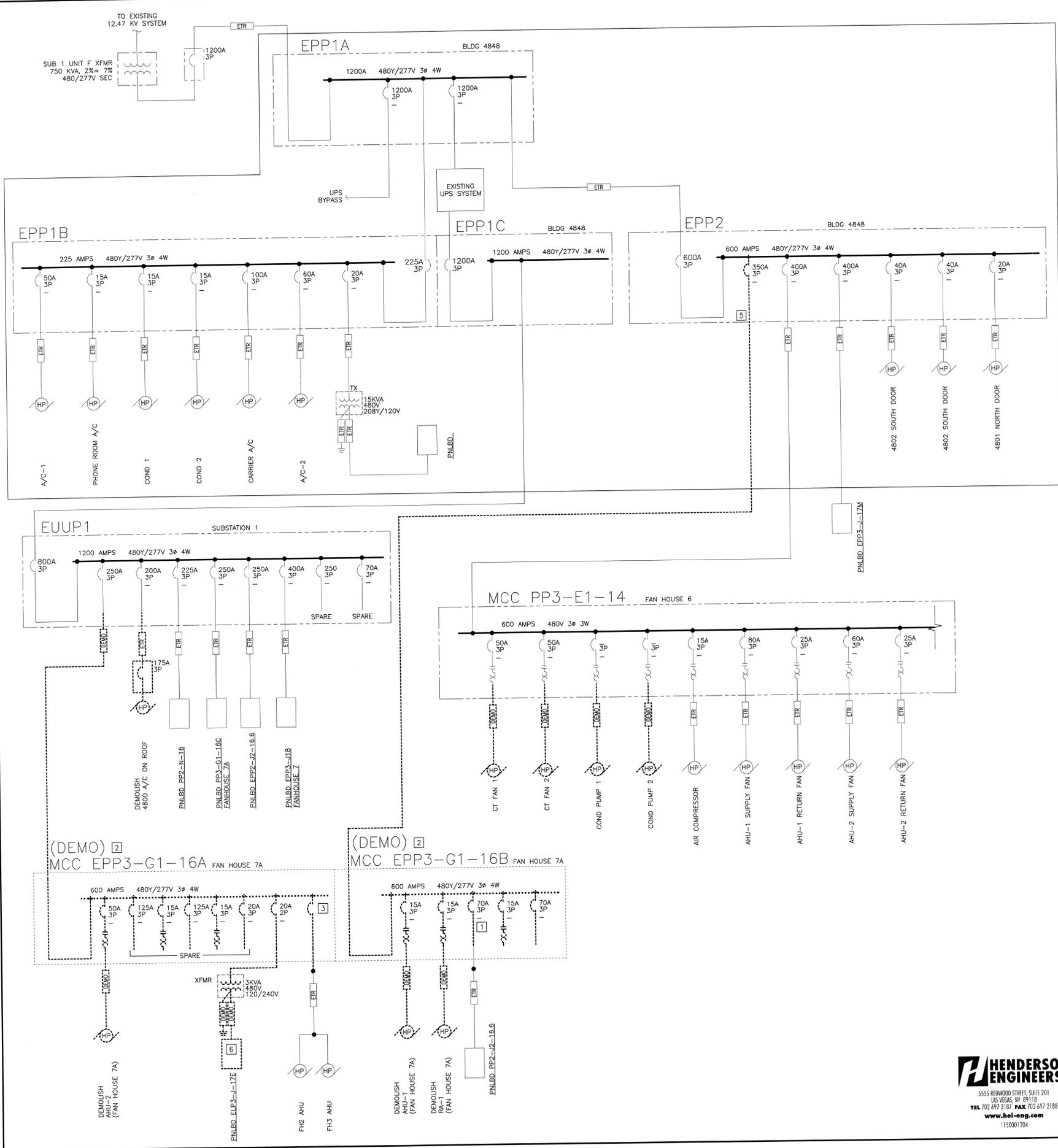


KEY PLAN
4801 BLDG

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| | | NATIONAL AERONAUTICS AND SPACE ADMINISTRATION | | APPROVALS | | DATE |
| | | DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | Chief/Regulation Engineering & Support Mgmt. Office | | 2-28-13 |
| | | DRAWING TITLE | | Project/Requirement/Contractor | | 2-28-13 |
| | | 4801 MEZZANINE ELECTRICAL PLAN | | Facilities Project Manager | | 2/27/13 |
| | | PROJECT TITLE | | Chief, Office of Protective Services | | 2/27/13 |
| | | MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | Chief, Office of Information Systems | | 2/27/13 |
| | | DATE SYM | | Chief, Information Office | | 2/27/13 |
| | | REVISION | | DATE START | | DATE PRINT |
| | | BY APD | | 02/21/2013 | | |
| | | | | DRAWN BY HEI | | EDM-1715 |
| | | | | SCALE AS SHOWN | | TRADE SH. No. |
| | | | | FILE NAME EDM-1715 E-208.DWG | | E 2/09 |
| | | | | SHEET No. 66 of 74 | | |

1 4801 MEZZANINE ELECTRICAL PLAN
SCALE: 1/8"=1'-0"

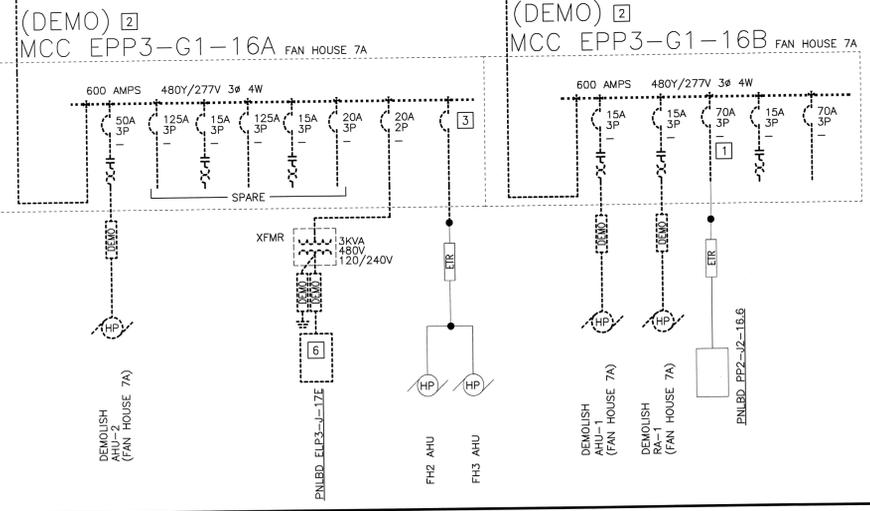
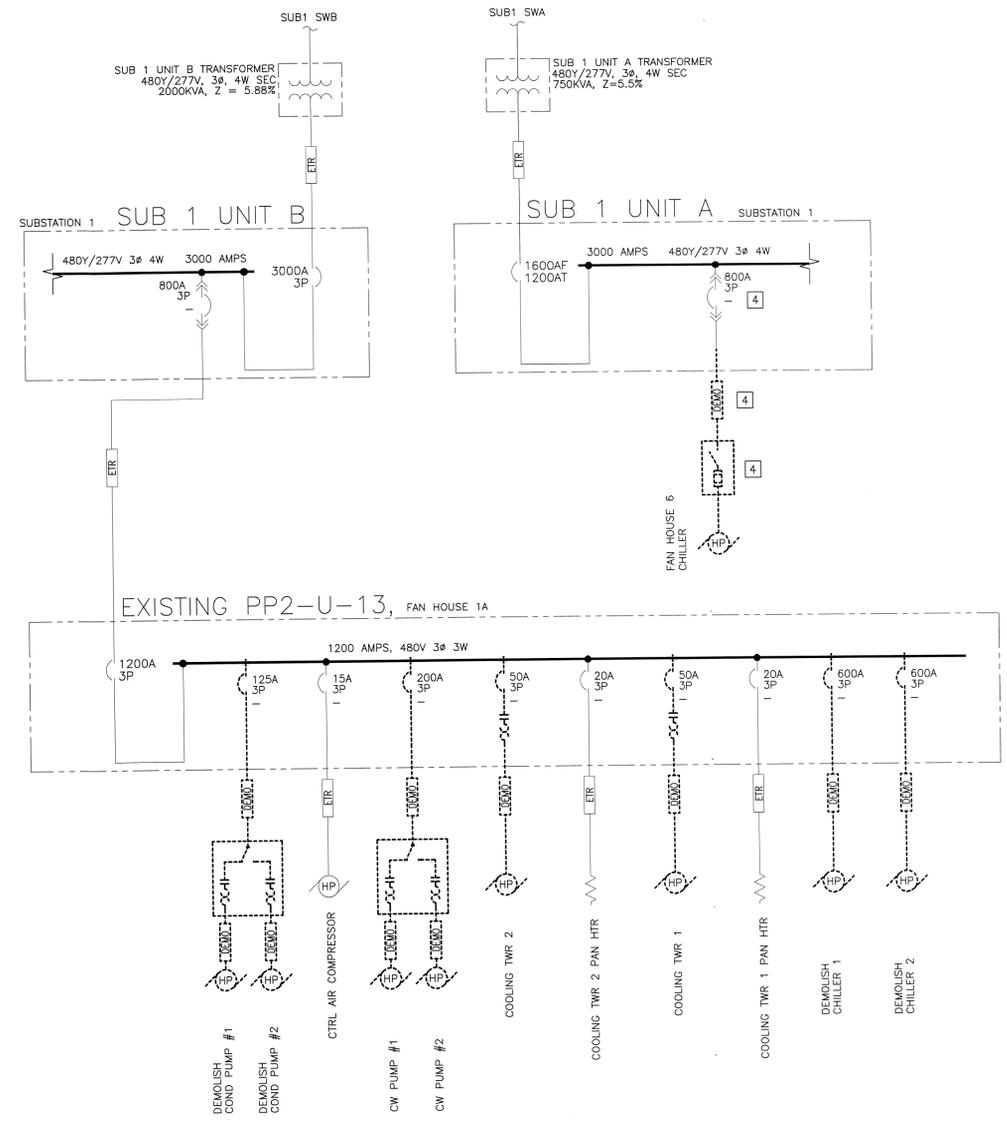


CIRCUIT SCHEDULE:

- [REMOVED] REMOVE ALL WIRING, CONDUIT, JUNCTION BOXES ETC BACK TO ORIGINATING SOURCE. SWITCH OFF OCPD AND LABEL AS SPARE.
- [ETR] EXISTING FEEDER AND CONDUIT TO REMAIN.

SINGLE LINE DIAGRAM NOTES:

- 1 RELOCATE EXISTING CIRCUIT BREAKER AND FEEDERS SERVING PANELBOARD PP2-J-16.6 TO MCC PP3-G1-16A PRIOR TO REMOVAL OF MCC PP3-G1-16B.
- 2 MAINTAIN FEED TO MCC EPP3-G1-16A UNTIL NEW PANELBOARD IS INSTALLED IN PLACE OF MCC EPP3-G1-16B.
- 3 FIELD VERIFY SIZE OF EXISTING OCPD SERVING FAN HOUSE 2 & 3 AIR HANDLING UNITS. MAINTAIN EXISTING CIRCUITING FOR RECONNECTION TO NEW PANELBOARD PP3-G1-16A.
- 4 REMOVE ALL CONDUITS, FEEDERS, JUNCTION BOXES AND FUSED DISCONNECT ASSOCIATED WITH FAN HOUSE 6 CHILLER. RELABEL EXISTING CIRCUIT BREAKER IN SUBSTATION 1A AS SPARE.
- 5 REMOVE ALL FEEDERS AND CIRCUIT BREAKER SERVING MCC PP3-G1-16B. MAINTAIN EXISTING 3" CONDUIT FROM EPP2 TO NEW PANELBOARD PP3-G1-16A. REFERENCE SHEET E-304 FOR INFORMATION ON NEW WORK.
- 6 MAINTAIN FEED TO PANELBOARD ELP3-J-17E MOUNTED ON SIDE OF MCC EPP3-G1-16A UNTIL REMOVAL OF MCC.



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|--|--|---|--|---|
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS Chief, Facilities Engineering & Asset Mgmt. Office Project Requestor/Customer Facilities Project Manager Chief, Office of Protective Services Chief, Safety, Health & Environment Office Data Center Information Officer | | DATE 2-28-12 2-28-12 3/27/12 2/29/12 2/27/12 2/27/12 |
| DRAWING TITLE ELECTRICAL ONE-LINE DIAGRAM (DEMOLITION) | | PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | |
| REVISIONS 02-21-13 E 100% FINAL DESIGN 01-07-13 D 95% NEAR-FINAL DESIGN SUBMITTAL 10-27-12 C 60% DEVELOPED DESIGN SUBMITTAL 05-12-12 B 30% PRELIMINARY DESIGN SUBMITTAL | | DATE STRD DATE PRNTD 02/21/2013 02/21/2013 | | |
| DATE SYM REVISION BY A/PD | | DRAWN BY HEI SCALE AS SHOWN TRACE No. EDM-1715 FILE NAME EDM-1715 E-301S SHEET No. 62 of 24 | | |

SUB 1 UNIT A

Short-Circuit and Voltage Drop Calculations
Distances are for calculation purposes only and shall not be used for contractor takeoffs nor bidding - Contractor shall notify Engineer of any field condition that results in a change of 10% or greater circuit distance

The following calculations are based on the 'Point-by-Point' method where:

ISC (2) = ISC(1) x MD M = 1/(1+f)
ISC (1) = short circuit current at fault point 1
ISC (2) = short circuit current at fault point 2

Feeder F (3Ø) = $\frac{1.732 \times L \times I_{sc}}{C \times E}$
Feeder F (1Ø) = $\frac{2 \times L \times I_{sc}}{C \times E}$

XFMR f (3Ø) = $\frac{I_p(\%I_{sc}) \times V_p \times 1.73 \times Z}{100,000 \times KVA}$
XFMR f (1Ø) = $\frac{I_p(\%I_{sc}) \times V_p \times Z}{100,000 \times KVA}$

VOLTAGE DROP (3Ø)
 $XVD = \frac{R \times I \times \cos(\arccos(pf)) + X \times I \times \sin(\arccos(pf))}{L/\# \times I \times 1.73} / E$

VOLTAGE DROP (1Ø)
 $XVD = \frac{R \times I \times \cos(\arccos(pf)) + X \times I \times \sin(\arccos(pf))}{2 \times L/\# \times D} / E$

L = Length of circuit E = Line to line volts
C = "C" Factor from Busman table where "C" = 1 / impedance per linear foot

IP = Primary short circuit current
Vp = Primary voltage
Is = Secondary short circuit current
Vs = Secondary voltage

%VD CUM = Cumulative Voltage Drop from Fault Point 1 to Fault Point #
R = resistance in ohms per LF
X = reactances in ohms per LF

Feeder Types =
NM - Non Magnetic Conduit, M - Magnetic Conduit, FB - Feeder Busway, PB - Plug-in Busway, TX - Transformer

| Fault Point (F#) | Bus/Feeder Description | Phase | Source (Fault Point) | Source Isc (amps) | Feeder Conduit Type | Material CU or AL # | Wire/Bus Size | Conductor 'C' value | Busway C value | L-L Length | Load Power Factor(pf) | Circuit Load A | Resistance R | Reactance X | Conductor Impedance, Z/Ø | Transformer Type | kVA | Degree Rise | Z | V sec | f | M | FAULT CURRENT Isc | VOLTAGE DROP %VD | TOTAL V.D. %VD CUM | Fault Point (F#) | |
|------------------|------------------------|-------|----------------------|-------------------|---------------------|---------------------|-----------------------|---------------------|----------------|------------|-----------------------|----------------|--------------|-------------|--------------------------|------------------|-----|-------------|---|-------|---|-------|-------------------|------------------|--------------------|------------------|---|
| 1 | Utility Service Point | | 16402 | 17602 | M | CU | 6 Set(s) of 300 kcmil | 18177 | | 480 | 0.9 | 1280 | 0.000045 | 0.000051 | 0.451027 | | | | | | | 0.003 | 1.00 | 17551 | 0.02% | 0.02% | 2 |
| 2 | Motor Contribution | | 200 | 17602 | M | CU | 6 Set(s) of 300 kcmil | 18177 | | 480 | 0.9 | 180 | 0.000029 | 0.000048 | 0.451027 | | | | | | | 0.285 | 0.78 | 13653 | 0.31% | 0.33% | 3 |
| 3 | To Sub1 Unit A | 3 | 17551 | 17551 | M | CU | 1 Set(s) of 500 kcmil | 22185 | | 480 | 0.9 | 120 | 0.000100 | 0.000054 | 0.451027 | | | | | | | 0.344 | 0.74 | 10162 | 0.37% | 0.70% | 4 |
| 4 | To Pnlbrd PP3-S1A | 3 | 13653 | 13653 | M | CU | 1 Set(s) of 2/0 AWG | 10755 | | 480 | 0.85 | 12 | 0.002000 | 0.000068 | 0.554811 | | | | | | | 4.180 | 0.19 | 1969 | 0.53% | 1.22% | 5 |

SUB 1 UNIT C

Short-Circuit and Voltage Drop Calculations
Distances are for calculation purposes only and shall not be used for contractor takeoffs nor bidding - Contractor shall notify Engineer of any field condition that results in a change of 10% or greater circuit distance

The following calculations are based on the 'Point-by-Point' method where:

ISC (2) = ISC(1) x MD M = 1/(1+f)
ISC (1) = short circuit current at fault point 1
ISC (2) = short circuit current at fault point 2

Feeder F (3Ø) = $\frac{1.732 \times L \times I_{sc}}{C \times E}$
Feeder F (1Ø) = $\frac{2 \times L \times I_{sc}}{C \times E}$

XFMR f (3Ø) = $\frac{I_p(\%I_{sc}) \times V_p \times 1.73 \times Z}{100,000 \times KVA}$
XFMR f (1Ø) = $\frac{I_p(\%I_{sc}) \times V_p \times Z}{100,000 \times KVA}$

VOLTAGE DROP (3Ø)
 $XVD = \frac{R \times I \times \cos(\arccos(pf)) + X \times I \times \sin(\arccos(pf))}{L/\# \times I \times 1.73} / E$

VOLTAGE DROP (1Ø)
 $XVD = \frac{R \times I \times \cos(\arccos(pf)) + X \times I \times \sin(\arccos(pf))}{2 \times L/\# \times D} / E$

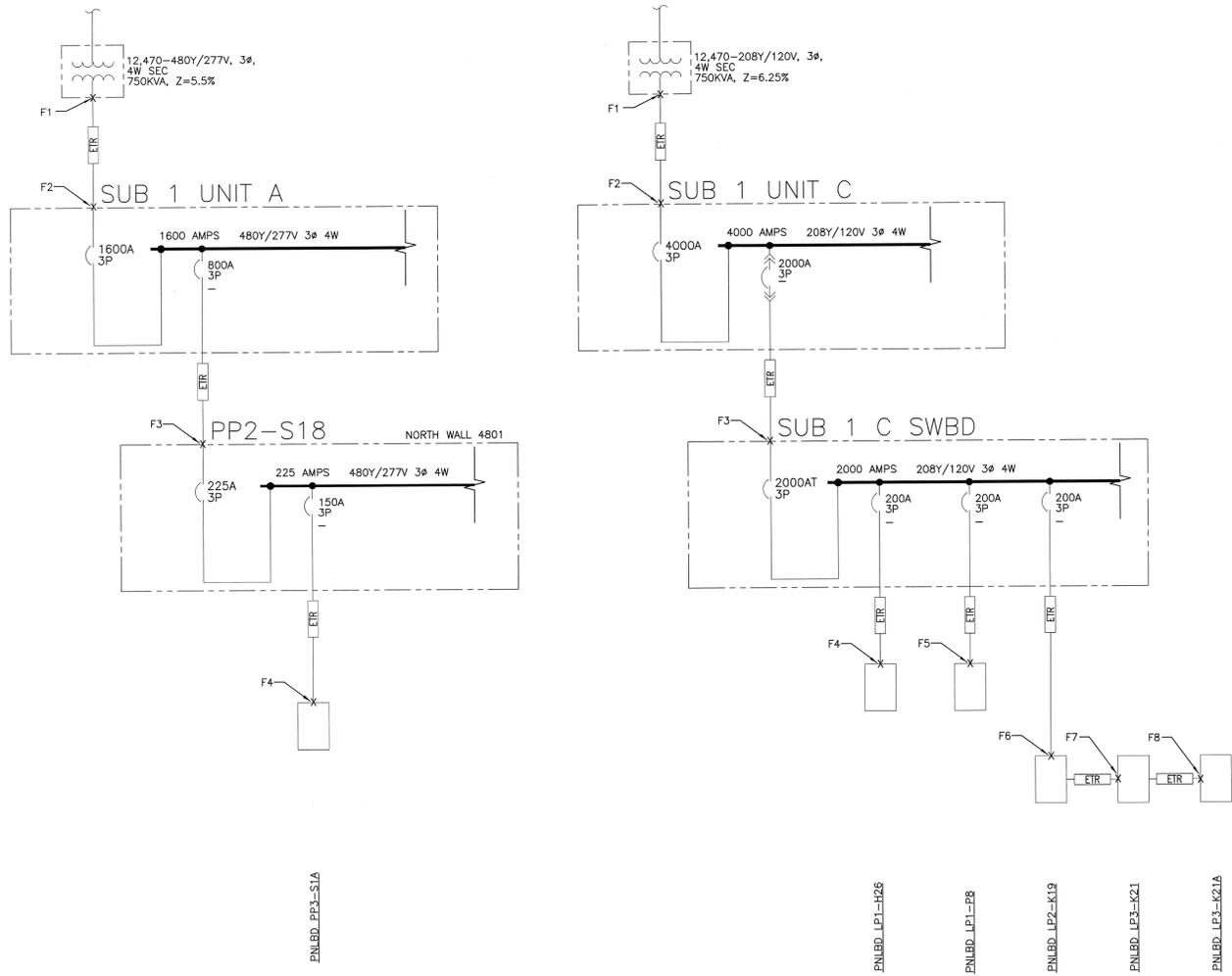
L = Length of circuit E = Line to line volts
C = "C" Factor from Busman table where "C" = 1 / impedance per linear foot

IP = Primary short circuit current
Vp = Primary voltage
Is = Secondary short circuit current
Vs = Secondary voltage

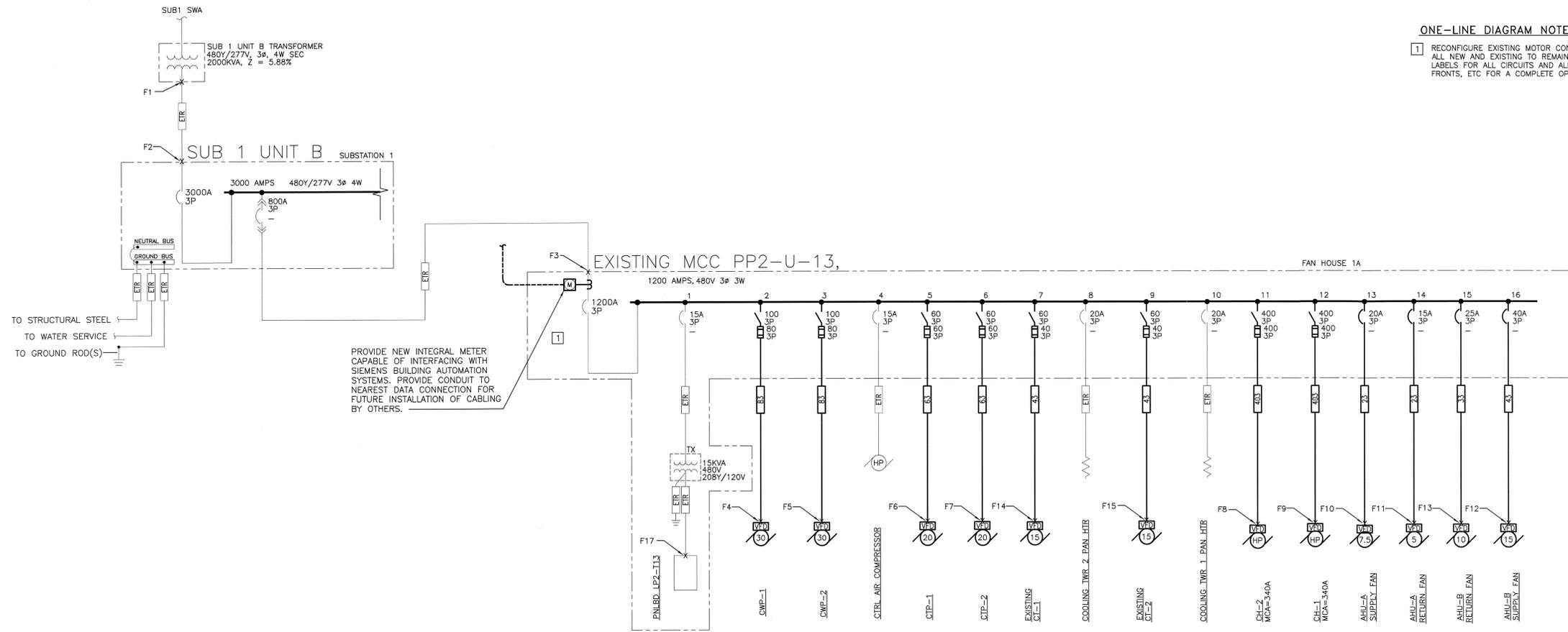
%VD CUM = Cumulative Voltage Drop from Fault Point 1 to Fault Point #
R = resistance in ohms per LF
X = reactances in ohms per LF

Feeder Types =
NM - Non Magnetic Conduit, M - Magnetic Conduit, FB - Feeder Busway, PB - Plug-in Busway, TX - Transformer

| Fault Point (F#) | Bus/Feeder Description | Phase | Source (Fault Point) | Source Isc (amps) | Feeder Conduit Type | Material CU or AL # | Wire/Bus Size | Conductor 'C' value | Busway C value | L-L Length | Load Power Factor(pf) | Circuit Load A | Resistance R | Reactance X | Conductor Impedance, Z/Ø | Transformer Type | kVA | Degree Rise | Z | V sec | f | M | FAULT CURRENT Isc | VOLTAGE DROP %VD | TOTAL V.D. %VD CUM | Fault Point (F#) | |
|------------------|------------------------|-------|----------------------|-------------------|---------------------|---------------------|------------------------|---------------------|----------------|------------|-----------------------|----------------|--------------|-------------|--------------------------|------------------|-----|-------------|---|-------|---|-------|-------------------|------------------|--------------------|------------------|---|
| 1 | Utility Service Point | | 14433 | 15633 | M | CU | 6 Set(s) of 300 kcmil | 18177 | | 480 | 0.9 | 3200 | 0.000018 | 0.000046 | 0.451027 | | | | | | | 0.006 | 0.99 | 15548 | 0.10% | 0.10% | 2 |
| 2 | Motor Contribution | | 200 | 15633 | M | CU | 2 Set(s) of 1000 kcmil | 25278 | | 480 | 0.9 | 1600 | 0.000035 | 0.000049 | 0.451027 | | | | | | | 0.001 | 1.00 | 15525 | 0.02% | 0.12% | 3 |
| 3 | To Sub 1 Unit C | 3 | 15546 | 15546 | M | CU | 6 Set(s) of 400 kcmil | 20566 | | 480 | 0.9 | 1600 | 0.000039 | 0.000050 | 0.451027 | | | | | | | 1.804 | 0.36 | 5536 | 2.08% | 2.20% | 4 |
| 4 | To Pnlbrd LP1-H26 | 3 | 15525 | 15525 | M | CU | 1 Set(s) of 350 kcmil | 19704 | | 208 | 0.9 | 160 | 0.000063 | 0.000051 | 0.451027 | | | | | | | 0.643 | 0.61 | 9450 | 0.79% | 0.91% | 5 |
| 5 | To Pnlbrd LP1-PB | 3 | 15525 | 15525 | M | CU | 1 Set(s) of 4/0 AWG | 15082 | | 208 | 0.9 | 160 | 0.000063 | 0.000051 | 0.451027 | | | | | | | 1.067 | 0.48 | 7512 | 1.25% | 1.37% | 6 |
| 6 | To Pnlbrd LP2-K19 | 3 | 15525 | 15525 | M | CU | 1 Set(s) of 300 kcmil | 18177 | | 208 | 0.9 | 80 | 0.000045 | 0.000051 | 0.451027 | | | | | | | 0.172 | 0.85 | 6409 | 0.21% | 1.58% | 7 |
| 7 | To Pnlbrd LP3-K21 | 3 | 7512 | 7512 | M | CU | 1 Set(s) of 300 kcmil | 18177 | | 208 | 0.9 | 80 | 0.000045 | 0.000051 | 0.451027 | | | | | | | 0.172 | 0.85 | 6409 | 0.21% | 1.58% | 7 |
| 8 | To Pnlbrd LP3-K21A | 3 | 6409 | 6409 | M | CU | 1 Set(s) of 2 AWG | 5907 | | 208 | 0.9 | 80 | 0.000200 | 0.000037 | 0.451027 | | | | | | | 0.316 | 0.76 | 4869 | 0.48% | 2.06% | 8 |



| | | | |
|---|--|---|--|
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS DATE | |
| DRAWING TITLE BUILDING 4800 ELECTRICAL ONE-LINE DIAGRAM (SUB 1 UNITS A AND C) | | 2-28-13 2-28-13 2/27/13 2/27/13 2/27/13 | |
| PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | DATE STRTD: 02/21/2013 DATE PRNTD: 02/21/2013 | |
| DATE SYM REVISION | | BY A'PD | |
| SCALE AS SHOWN | | TRADE SH. No. E | |
| FILE NAME EDM-1715-E-302.DWG | | SHEET No. 68 of 24 | |



SUB 1 UNIT B

Short-Circuit and Voltage Drop Calculations v2.09.02

Distances are for calculation purposes only and shall not be used for contractor takeoffs nor bidding - Contractor shall notify Engineer of any field condition that results in a change of 10% or greater circuit distance

The following calculations are based on the "Point-by-Point" method where:

ISC (2) = ISC(1) x MD N = 1/(1+F) Feeder f (3Ø) = $1.732 \times I \times I_{sc}$ XFMR: f (3Ø) = $\frac{I^2 \times R_{sc} \times V_p \times 1.73 \times \sqrt{Z}}{100,000 \times KVA}$ Vs VOLTAGE DROP (3Ø) %VD = $\frac{\langle R \times \cos(\arccos(pf)) \rangle + X \times \sin(\arccos(pf)) \times L/\# \times I \times 1.73}{E}$

ISC (1) = short circuit current at fault point 1 C x E Feeder f (1Ø) = $\frac{I \times I_{sc}}{C \times E}$ XFMR: f (1Ø) = $\frac{I^2 \times R_{sc} \times V_p \times \sqrt{Z}}{100,000 \times KVA}$ Vs VOLTAGE DROP (1Ø) %VD = $\frac{\langle R \times \cos(\arccos(pf)) \rangle + X \times \sin(\arccos(pf)) \times 2 \times L/\# \times I}{E}$

ISC (2) = short circuit current at fault point 2 C x E

L = Length of circuit E = Line to line volts IP = Primary short circuit current %VD CUM = Cumulative Voltage Drop from Fault Point 1 to Fault Point #
 C = "C" Factor from Busman table where "C" = 1 / impedance per linear foot Vs = Secondary voltage R = resistance in ohms per LF X = reactances in ohms per LF

Feeder Types =
 NM - Non Magnetic Conduit, M - Magnetic Conduit, FB - Feeder Busway, PB - Plug-in Busway, TX - Transformer

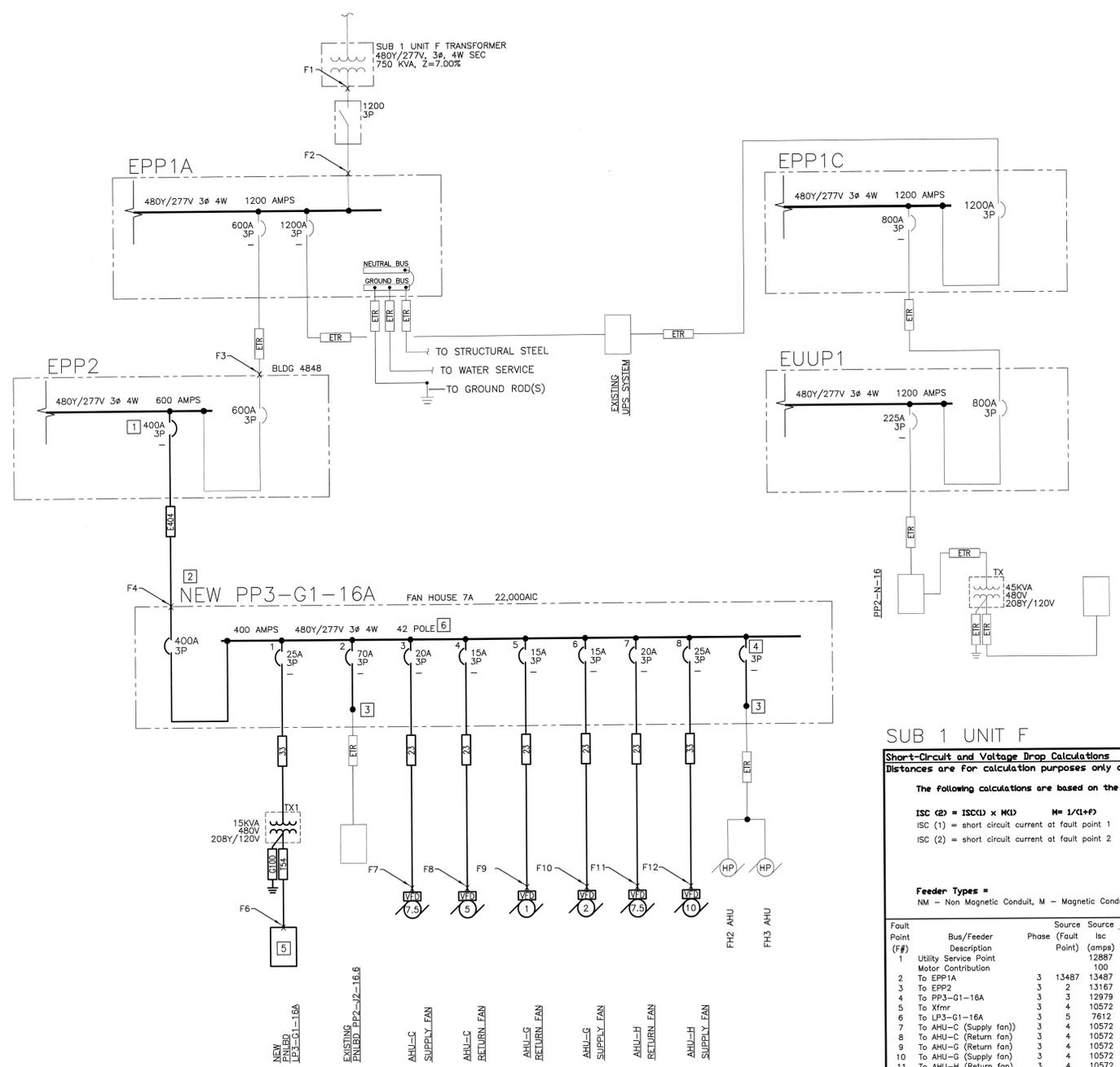
| Fault Point (F#) | Bus/Feeder Description | Phase | Source (Fault Point) | Source (amps) | Feeder Conduit Type | Material CU or AL | Wire/Bus Size | Conductor 'C' value | Busway C value | L-L Volts | Circuit Length | Load Power Factor(pf) | Circuit Load A | Conductor Resistance R | Conductor Reactance X | Conductor Impedance, Z/Ø | Transformer Type | kVA | Degree Rise | Z | V sec | f | M | FAULT CURRENT I _{sc} | VOLTAGE DROP %VD | TOTAL V.D. %VD CUM | Fault Point (F#) | |
|------------------|------------------------|-------|----------------------|---|---------------------|-------------------|-----------------------|---------------------|----------------|-----------|----------------|-----------------------|----------------|------------------------|-----------------------|--------------------------|------------------|-----|-------------|-----|-------|---|--------|-------------------------------|------------------|--------------------|------------------|----|
| 1 | Utility Service Point | | 40912 | at the secondary of the utility transformer | | | 480Y/277V - 3 phase | | | | | | | | | | | | | | | | 43912 | | | 1 | | |
| 2 | Motor Contribution | | 500 | The connected full load motor amps (includes compressors) on the system | | | | | | | | | | | | | | | | | | | | | | 2 | | |
| 3 | To Sub1 UnitB | 3 | 43912 | 43912 | NM | CU | 8 Set(s) of 500 kcmil | 26706 | | 480 | 5 | 0.9 | 2560 | 0.000027 | 0.000039 | 0.451027 | | | | | | | 0.004 | 1.00 | 43750 | 0.02% | 0.02% | 2 |
| 4 | To PP2-U13 | 3 | 2 | 43750 | M | CU | 3 Set(s) of 300 kcmil | 18177 | | 480 | 60 | 0.9 | 960 | 0.000045 | 0.000051 | 0.451027 | | | | | | | 0.174 | 0.85 | 37275 | 0.43% | 0.46% | 3 |
| 5 | To CWP-1 | 3 | 3 | 37275 | M | CU | 1 Set(s) of 4 AWG | 3806 | | 480 | 60 | 0.9 | 64 | 0.000310 | 0.000060 | 0.451027 | | | | | | | 2.120 | 0.32 | 11946 | 0.42% | 0.88% | 4 |
| 6 | To CWP-2 | 3 | 3 | 37275 | M | CU | 1 Set(s) of 6 AWG | 2425 | | 480 | 60 | 0.9 | 48 | 0.000490 | 0.000064 | 0.451027 | | | | | | | 3.328 | 0.23 | 8613 | 0.43% | 0.95% | 5 |
| 7 | To CTP-1 | 3 | 3 | 37275 | M | CU | 1 Set(s) of 6 AWG | 2425 | | 480 | 60 | 0.9 | 48 | 0.000490 | 0.000064 | 0.451027 | | | | | | | 3.328 | 0.23 | 8613 | 0.49% | 0.95% | 6 |
| 8 | To CTP-2 | 3 | 3 | 37275 | M | CU | 1 Set(s) of 6 AWG | 2425 | | 480 | 60 | 0.9 | 48 | 0.000490 | 0.000064 | 0.451027 | | | | | | | 3.328 | 0.23 | 8613 | 0.49% | 0.95% | 7 |
| 9 | To CH-1 | 3 | 3 | 37275 | M | CU | 2 Set(s) of 3/0 AWG | 12844 | | 480 | 40 | 0.9 | 320 | 0.000079 | 0.000052 | 0.451027 | | | | | | | 0.209 | 0.83 | 30820 | 0.22% | 0.67% | 8 |
| 10 | To CH-2 | 3 | 3 | 37275 | M | CU | 2 Set(s) of 3/0 AWG | 12844 | | 480 | 40 | 0.9 | 320 | 0.000079 | 0.000052 | 0.451027 | | | | | | | 0.209 | 0.83 | 30820 | 0.22% | 0.67% | 9 |
| 11 | To AHU-1(SUPPLY FAN) | 3 | 3 | 37275 | M | CU | 1 Set(s) of 12 AWG | 617 | | 480 | 40 | 0.9 | 16 | 0.002000 | 0.000068 | 0.451027 | | | | | | | 8.720 | 0.10 | 3835 | 0.42% | 0.98% | 10 |
| 12 | To AHU-1(RETURN FAN) | 3 | 3 | 37275 | M | CU | 1 Set(s) of 12 AWG | 617 | | 480 | 40 | 0.9 | 12 | 0.002000 | 0.000068 | 0.451027 | | | | | | | 8.720 | 0.10 | 3835 | 0.32% | 0.78% | 11 |
| 13 | To AHU-2(SUPPLY FAN) | 3 | 3 | 37275 | M | CU | 1 Set(s) of 10 AWG | 981 | | 480 | 107 | 0.9 | 32 | 0.001200 | 0.000063 | 0.451027 | | | | | | | 14.671 | 0.06 | 2379 | 1.37% | 1.83% | 12 |
| 14 | To AHU-2(RETURN FAN) | 3 | 3 | 37275 | M | CU | 1 Set(s) of 8 AWG | 1557 | | 480 | 107 | 0.9 | 20 | 0.000780 | 0.000065 | 0.451027 | | | | | | | 9.243 | 0.10 | 3639 | 0.56% | 1.02% | 13 |
| 15 | To CT-1 | 3 | 3 | 37275 | M | CU | 1 Set(s) of 8 AWG | 1557 | | 480 | 60 | 0.9 | 32 | 0.000780 | 0.000065 | 0.451027 | | | | | | | 5.183 | 0.16 | 6028 | 0.51% | 0.96% | 14 |
| 16 | To CT-2 | 3 | 3 | 37275 | M | CU | 1 Set(s) of 8 AWG | 1557 | | 480 | 60 | 0.9 | 32 | 0.000780 | 0.000065 | 0.451027 | | | | | | | 5.183 | 0.16 | 6028 | 0.51% | 0.96% | 15 |
| 17 | To 15 KVA Xfmr | 3 | 3 | 37275 | TX | CU | 1 | 10 | | 480 | 5 | 0.9 | 40 | 0.000780 | 0.000065 | 0.451027 | Ext'g | 15 | 150 | 1.2 | 208 | | 24.791 | 0.04 | 3335 | 0.46% | 1.6 | 16 |
| 18 | To Panel LP2-T13 | 3 | 16 | 3335 | M | CU | 1 Set(s) of 8 AWG | 1557 | | 208 | 10 | 0.9 | 40 | 0.000780 | 0.000065 | 0.451027 | | | | | | | 0.178 | 0.85 | 2830 | 0.24% | 0.70% | 17 |

PANELBOARD PP-2-U13 LOAD SUMMARY 480Y/277V, 3PH, 4W

| LOAD DESCRIPTION | Connected KVA | Demand FACTOR | Demand KVA |
|-------------------------|---------------|---------------|----------------|
| HVAC - SUMMER | 707.72 | 100% | 707.72 |
| HVAC - WINTER | 0.00 | 100% | 0.00 |
| LIGHTING | 1.58 | 125% | 1.98 |
| RECEPTACLES | 0.36 | 100%/50% | 0.36 |
| MOTOR LOADS | 27.05 | 100% | 27.05 |
| LARGEST MOTOR LOAD | 33.26 | 125% | 41.57 |
| MISCELLANEOUS EQUIPMENT | 4.40 | 100% | 4.40 |
| TOTAL LOAD | 786.36 | KVA | 795.07 |
| TOTAL AMPACITY | 945.85 | AMPS | 956.32 |
| PANEL AMPACITY | 1200 | AMPS | 1200.00 |
| SPARE CAPACITY | | AMPS | 244 |



| | | | | |
|---|-------|---|------------|-----------|
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION | | APPROVALS | | DATE |
| DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | Project Engineer/Designer: [Signature] | | 2-28-13 |
| | | Facilities Project Manager: [Signature] | | 2-28-13 |
| | | Chief, Office of Production Services: [Signature] | | 2/27/13 |
| | | Chief, Support Services & Engineering Office: [Signature] | | 2-27-13 |
| | | Chief, Information Officer: [Signature] | | 2/27/13 |
| DRAWING TITLE | | DATE START | DATE PRINT | |
| BUILDING 4800 ELECTRICAL ONE-LINE DIAGRAM (SUB 1 UNIT B) | | | 02/21/2013 | |
| PROJECT TITLE | | DRAWN BY | TRADE | SHEET No. |
| MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | HEI | EDM-1715 | 02 of 24 |
| DATE | SYM | REVISION | BY | AP'D |
| 02-21-13 | E | 100% FINAL DESIGN | | |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | | |
| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | | |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | | |
| FILE NAME | SCALE | AS SHOWN | TRADE | SHEET No. |
| EDM-1715 E-303.0WG | | | E | 02 of 24 |



- CIRCUIT SCHEDULE:**
- ALL CONDUCTOR SIZES ARE BASED ON 75 DEG C RATED TERMINATION AND COPPER CONDUCTORS WITH TYPE THHN/THWN-2 INSULATION.
- 23 20A, (3)#12, (1)#12G, 3/4" C
 - 33 30A, (3)#10, (1)#10G, 3/4" C
 - 40A 40A, (4)#400CMIL, (1)#3G, IN EXISTING 3" C
 - ETR EXISTING TO REMAIN
 - 6100 GND, #8 COPPER GROUND, 3/4" C
 - 154 50A, (4)#8, (1)#8G, 1" C

- SINGLE LINE DIAGRAM NOTES:**
- 1 PROVIDE NEW CIRCUIT BREAKER IN SAME LOCATION AS CIRCUIT BREAKER SERVING MCC PP3-G1-16B REMOVED DURING DEMOLITION. RATING OF NEW CIRCUIT BREAKER SHALL EXCEED THE AIC VALUE INDICATED IN THE SHORT CIRCUIT CALCULATION TABLE BY A MINIMUM OF 10%.
 - 2 OBTAIN SERVICES OF A LICENSED ELECTRICAL ENGINEER TO PERFORM ARC FLASH STUDY FOR EQUIPMENT LABEL APPLICATIONS PER NFPA 70E AND IEEE STANDARD 2584 FOR THE CREATION OF MAINTENANCE PERSONNEL WARNING LABEL. REFERENCE FAULT CURRENT CALCULATION TABLE FOR AVAILABLE FAULT CURRENT AT NEW PANELBOARD.
 - 3 RECONNECT EXISTING TO REMAIN EQUIPMENT TO NEW PANELBOARD.
 - 4 VERIFY CIRCUIT BREAKER AMPERAGE IN MOTOR CONTROL CENTER REMOVED DURING DEMOLITION AND PROVIDE NEW TO MATCH.
 - 5 RECONNECT ALL EXISTING TO REMAIN BRANCH CIRCUITS FROM 240/120V PANELBOARD REMOVED DURING DEMOLITION OF MCC PP3-G1-16A.
 - 6 PROVIDE A 20A/1P CIRCUIT BREAKER IN THE REMAINDER OF AVAILABLE SPACE AFTER BREAKERS INDICATED BELOW ARE PROVIDED.

SUB 1 UNIT F

Short-Circuit and Voltage Drop Calculations
Distances are for calculation purposes only and shall not be used for contractor takeoffs nor bidding - Contractor shall notify Engineer of any field condition that results in a change of 10% or greater circuit distance

The following calculations are based on the "Point-by-Point" method where:

ISC (2) = ISCD x MID M = 1/(1+P) Feeder# (3Ø) = $\frac{1.732 \times L \times I_{sc}}{C \times E}$ XFMR f (3Ø) = $\frac{I_{sc} \times V_p \times 1.73 \times X_Z}{100,000 \times KVA}$ VOLTAGE DROP (3Ø) $ZVD = \langle R \times \cos(\arccos(pf)) + X \times \sin(\arccos(pf)) \rangle \times L / \# \times I \times 1.73 / E$

ISC (1) = short circuit current at fault point 1 Feeder# (1Ø) = $\frac{2 \times L \times I_{sc}}{C \times E}$ XFMR f (1Ø) = $\frac{I_{sc} \times V_p \times X_Z}{100,000 \times KVA}$ VOLTAGE DROP (1Ø) $ZVD = \langle R \times \cos(\arccos(pf)) + X \times \sin(\arccos(pf)) \rangle \times 2 \times L / \# \times I / E$

ISC (2) = short circuit current at fault point 2 L = Length of circuit E = Line to line volts IP = Primary short circuit current %VD CUM = Cumulative Voltage Drop from Fault Point 1 to Fault Point #

C = "c" Factor from Busman table where "c" = 1 / impedance per linear foot Vp = Primary voltage R = resistance in ohms per LF

IS = Secondary short circuit current Vs = Secondary voltage X = reactances in ohms per LF

| Fault Point (F#) | Bus/Feeder Description | Phase (Fault Point) | Source (amps) | Source Isc | Feeder Conduit | Material | Type | CU or AL | # | Wire/Bus Size | Conductor "c" value | Busway C value | L-L Volts | Circuit Length | Load Power | Circuit Load Factor(pf) | Conductor Resistance | Reactance | Conductor Impedance, Z/Ø | Transformer Type | KVA | Degree Rise | Z | V sec | f | M | FAULT CURRENT Isc | VOLTAGE DROP %VD | TOTAL V.D. %VD | Fault Point (F#) | |
|------------------|------------------------|---------------------|---------------|------------|----------------|----------|------|-----------|-----|---------------|---------------------|----------------|-----------|----------------|------------|-------------------------|----------------------|-----------|--------------------------|------------------|-----|-------------|-----|-------|-------|------|-------------------|------------------|----------------|------------------|------------|
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Source Isc |
| 1 | Utility Service Point | | 12887 | 12887 | | | | | | | | | 480 | 12 | 0.9 | 480 | 0.000039 | 0.000050 | 0.451027 | | | | | | | | | 13167 | 0.19% | 0.19% | 2 |
| 2 | To EPP1A | 3 | 13487 | 13487 | NM | CU | 3 | Set(s) of | 500 | kcml | 26706 | | 480 | 40 | 0.9 | 960 | 0.000027 | 0.000039 | 0.451027 | | | | | | | | 12979 | 0.06% | 0.25% | 3 | |
| 3 | To EPP2 | 3 | 2 | 13167 | M | CU | 2 | Set(s) of | 350 | kcml | 19704 | | 480 | 100 | 0.9 | 280 | 0.000035 | 0.000049 | 0.451027 | | | | | | | | 10572 | 0.53% | 0.78% | 4 | |
| 4 | To PP3-G1-16A | 3 | 3 | 12979 | M | CU | 1 | Set(s) of | 400 | kcml | 20566 | | 480 | 10 | 0.9 | 40 | 0.001200 | 0.000063 | 0.451027 | TP-1 | 15 | 150 | 5.1 | 208 | 0.389 | 0.72 | 7612 | 0.78% | 0.78% | 5 | |
| 5 | To Xtr | 3 | 4 | 10572 | M | CU | 1 | Set(s) of | 10 | AWG | 981 | | 208 | 5 | 0.9 | 40 | 0.000780 | 0.000065 | 0.451027 | | | | | | | 6324 | 0.12% | 0.91% | 6 | | |
| 6 | To LP3-G1-16A | 3 | 5 | 7612 | M | CU | 1 | Set(s) of | 8 | AWG | 1557 | | 480 | 120 | 0.9 | 16 | 0.002000 | 0.000068 | 0.451027 | | | | | | | 1256 | 1.27% | 2.05% | 7 | | |
| 7 | To AHU-C (Supply fan) | 3 | 4 | 10572 | M | CU | 1 | Set(s) of | 12 | AWG | 617 | | 480 | 50 | 0.9 | 12 | 0.002000 | 0.000068 | 0.451027 | | | | | | | 2584 | 0.40% | 1.18% | 8 | | |
| 8 | To AHU-C (Return fan) | 3 | 4 | 10572 | M | CU | 1 | Set(s) of | 12 | AWG | 617 | | 480 | 50 | 0.9 | 12 | 0.002000 | 0.000068 | 0.451027 | | | | | | | 2584 | 0.40% | 1.18% | 9 | | |
| 9 | To AHU-G (Return fan) | 3 | 4 | 10572 | M | CU | 1 | Set(s) of | 12 | AWG | 617 | | 480 | 50 | 0.9 | 12 | 0.002000 | 0.000068 | 0.451027 | | | | | | | 3044 | 0.42% | 1.21% | 10 | | |
| 10 | To AHU-G (Supply fan) | 3 | 4 | 10572 | M | CU | 1 | Set(s) of | 12 | AWG | 617 | | 480 | 50 | 0.9 | 12 | 0.002000 | 0.000068 | 0.451027 | | | | | | | 3044 | 0.42% | 1.21% | 11 | | |
| 11 | To AHU-H (Return fan) | 3 | 4 | 10572 | M | CU | 1 | Set(s) of | 12 | AWG | 617 | | 480 | 50 | 0.9 | 12 | 0.002000 | 0.000068 | 0.451027 | | | | | | | 3044 | 1.27% | 2.05% | 12 | | |
| 12 | To AHU-H (Supply fan) | 3 | 4 | 10572 | M | CU | 1 | Set(s) of | 6 | AWG | 617 | | 480 | 40 | 0.9 | 48 | 0.002000 | 0.000068 | 0.451027 | | | | | | | 3044 | 1.27% | 2.05% | 12 | | |

PANEL BOARD PP3-G1-16A LOAD SUMMARY

| LOAD DESCRIPTION | 480Y/277V, 3PH, 4W | | |
|-----------------------------|--------------------|---------------|------------|
| | Connected KVA | Demand FACTOR | Demand KVA |
| EXISTING LOAD | 45.00 | 125% | 56.25 |
| HVAC - SUMMER | 0.00 | 100% | 0.00 |
| HVAC - WINTER | 0.00 | 100% | 0.00 |
| LIGHTING | 0.00 | 125% | 0.00 |
| RECEPTACLES | 0.54 | 100%/50% | 0.54 |
| MOTOR LOADS | 26.39 | 100% | 26.39 |
| LARGEST MOTOR LOAD | 11.60 | 125% | 14.50 |
| MISCELLANEOUS EQUIPMENT | 2.00 | 100% | 2.00 |
| EXISTING LOAD TO BE DELETED | 0.00 | 100% | 0.00 |
| TOTAL LOAD | 41.13 | KVA | 100.43 |
| TOTAL AMPACITY | 49.47 | AMPS | 120.80 |
| PANEL AMPACITY | 400 | AMPS | 400.00 |
| SPARE CAPACITY | | AMPS | 279 |



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
DRYDEN FLIGHT RESEARCH CENTER
EDWARDS, CA

APPROVALS

Chief, Facilities Engineering & Asset Mgmt. Office: [Signature] 2/28/13
 Project/Program Management: [Signature] 2/28/13
 Facilities Project Manager: [Signature] 2/27/13
 Chief, Office of Protective Services: [Signature] 2/27/13
 Chief, Safety, Health & Environmental Office: [Signature] 2/27/13
 Technical Information Officer: [Signature] 2/27/13

DRAWING TITLE
BUILDING 4800
ELECTRICAL ONE-LINE DIAGRAM
(SUB 1 UNIT F)

PROJECT TITLE
MISSION CONTROL
INFRASTRUCTURE REVITALIZATION
100% FINAL DESIGN

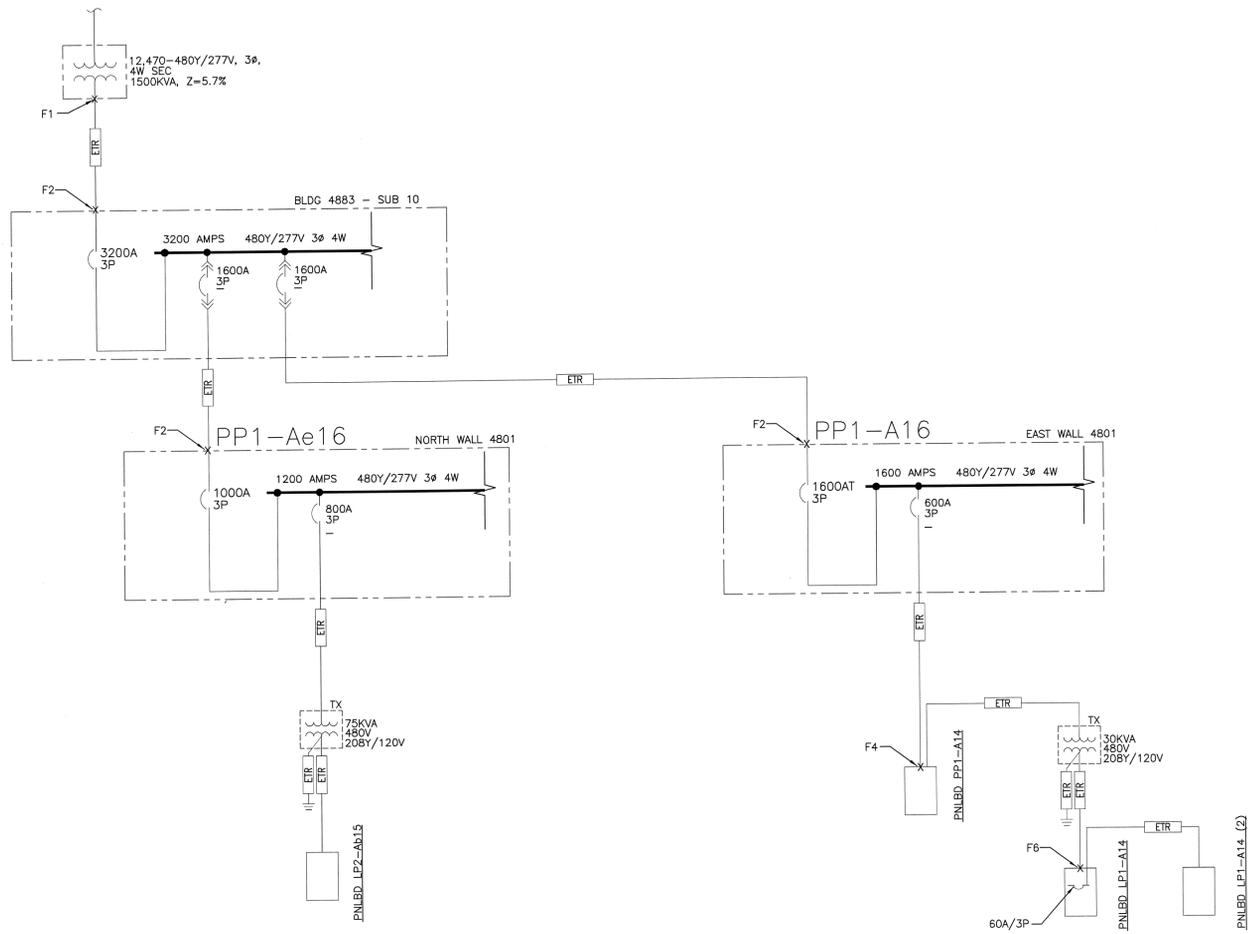
DATE SYM REVISION REVISION BY A'PD

02-21-13 E 100% FINAL DESIGN
 01-07-13 D 95% NEAR-FINAL DESIGN SUBMITTAL
 10-27-12 C 60% DEVELOPED DESIGN SUBMITTAL
 05-12-12 B 30% PRELIMINARY DESIGN SUBMITTAL

DATE STRTD DATE PRNTD 02/21/2013

DRAWN BY HEI
 SCALE AS SHOWN
 FILE NAME EDM-1715 E-304.DWG
 SHEET No. 20 of 24

EDM-1715
304



Short-Circuit and Voltage Drop Calculations v2.09.02

Distances are for calculation purposes only and shall not be used for contractor takeoffs nor bidding - Contractor shall notify Engineer of any field condition that results in a change of 10% or greater circuit distance

The following calculations are based on the "Point-by-Point" method where:

ISC (2) = $ISC(1) \times M(I)$ $M = 1/(1+f)$ Feeder f (30) = $\frac{1732 \times I \times I_{sc}}{C \times E}$ XFMR f (30) = $\frac{IP(sca) \times V_p \times 1.73 \times XZ}{100,000 \times KVA}$ VOLTAGE DROP (30) = $\langle R \times \cos(\arccos(pf)) \rangle + X \times \sin(\arccos(pf)) \times L / \# \times I \times 1.73 / E$

ISC (1) = short circuit current at fault point 1 C = "C" Factor from Busman table where "C" = 1 / impedance per linear foot XFMR f (10) = $\frac{IP(sca) \times V_p \times XZ}{100,000 \times KVA}$ VOLTAGE DROP (10) = $\langle R \times \cos(\arccos(pf)) \rangle + X \times \sin(\arccos(pf)) \times 2 \times L / \# \times D / E$

ISC (2) = short circuit current at fault point 2 L = Length of circuit E = Line to line volts IP = Primary short circuit current %VD CUM = Cumulative Voltage Drop from Fault Point 1 to Fault Point #

Feeder Types = NM - Non Magnetic Conduit, M - Magnetic Conduit, FB - Feeder Busway, PB - Plug-in Busway, TX - Transformer Vp = Primary voltage R = resistance in ohms per LF X = reactances in ohms per LF

| Fault Point (F#) | Bus/Feeder Description | Phase | Source (Fault Point) | Source Isc (amps) | Feeder Conduit Type | Material CU or AL | # | Wire/Bus Size | Conductor "C" value | Busway C value | L-L Volts E | Circuit Length L | Load Power Factor(pf) | Circuit Load A | Conductor Resistance R | Reactance X | Conductor Impedance, Z/∅ | Transformer Type | kVA | Degree Rise | Z | V sec | f | M | Source Isc + 6X Motor Contribution = | IsC | VOLTAGE DROP %VD | TOTAL V.D. %VD CUM | Fault Point (#) | | | | | |
|------------------|------------------------|-------|----------------------|-------------------|---------------------|-------------------|---|----------------------|---------------------|----------------|-------------|------------------|-----------------------|----------------|------------------------|-------------|--------------------------|------------------|-----|-------------|-----|-------|---|---|--------------------------------------|------|------------------|--------------------|-----------------|-----|-----|---------|--|--|
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | IsC | %VD | %VD CUM | | |
| 1 | Utility Service Point | | | 31652 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Motor Contribution | | | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | To SUB 10 Unit 10 SWGR | 3 | 32252 | 32252 | M | CU | 2 | Set(s) of 1000 kcmil | 480 | | 480 | 40 | 0.9 | 2560 | 0.000018 | 0.000046 | 0.451027 | | | | | | | | 0.092 | 0.92 | 29533 | 0.67% | 0.67% | 2 | | | | |
| 4 | To PP1-A16 | 3 | 2 | 29533 | M | CU | 6 | Set(s) of 300 kcmil | 480 | | 480 | 200 | 0.9 | 1280 | 0.000045 | 0.000051 | 0.451027 | | | | | | | | 0.195 | 0.84 | 24705 | 0.97% | 1.64% | 3 | | | | |
| 5 | To PP1-A14 | 3 | 3 | 24705 | M | CU | 2 | Set(s) of 350 kcmil | 480 | | 480 | 6 | 0.9 | 480 | 0.000038 | 0.000050 | 0.451027 | | | | | | | | 0.014 | 0.99 | 24374 | 0.03% | 1.67% | 4 | | | | |
| 6 | To 30KVXFMR | 3 | 4 | 24374 | TX | CU | 1 | 6 | 480 | | 480 | 10 | 0.9 | 40 | 0.000490 | 0.000064 | 0.451027 | Ext'g | 30 | 150 | 1.2 | 208 | | | 8.105 | 0.11 | 6177 | 0.07% | 1.73% | 5 | | | | |
| 6 | To LP1-A14 | 3 | 5 | 6177 | M | CU | 1 | Set(s) of 2 AWG | 208 | | 208 | 10 | 0.9 | 80 | 0.000200 | 0.000057 | 0.451027 | | | | | | | | 0.087 | 0.92 | 5683 | 0.14% | 1.87% | 6 | | | | |



| | | | | |
|---|-------------------------|---|---------------------------|---|
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS Chief, Safety Engineering & Support Maint. Office Project Manager/Engineer Facility Project Manager Chief, Office of Protective Services Chief, Safety, Health & Environmental Office Information Office | | DATE 2-28-13 2-28-13 2/27/13 2/27/13 2/27/13 |
| DRAWING TITLE BUILDING 4801 ELECTRICAL ONE-LINE DIAGRAM | | PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | |
| DATE 02-21-13 01-07-13 10-27-12 05-12-12 | SYM E D C B | REVISION 100% FINAL DESIGN 95% NEAR-FINAL DESIGN SUBMITTAL 60% DEVELOPED DESIGN SUBMITTAL 30% PRELIMINARY DESIGN SUBMITTAL | DATE PRINTD 02/21/2013 | |
| DRAWN BY HEI | | SHEET No. EDM-1715 E 305 | | |
| SCALE AS SHOWN | | SHEET No. 21 of 24 | | |

| PANELBOARD: LP1-A14(2) (EXISTING) | | | | | | | | | | | | EQUIPMENT GROUND BUS | | | | | | | | | | | |
|---|--------------------|----------------|-----|-----|----------|---------|----|----------|----------------|-----|-----|---|---------------|-----|-------------|----------|-------|---------------|----------|----|----------|--|--|
| BUS AMPS: 225A MAIN SIZE/TYP: MLO VOLTS/PHASE: 208Y/120V, 3PH, 4W | | | | | | | | | | | | FAULT CURRENT: REFER TO ONE-LINE DIAGRAM AIC RATING: FCA +10% MINIMUM, FULLY RATED SERVES: FIRST FLOOR MOUNTING: SURFACE LOCATION: ELECTRICAL ROOM, ROOM #100 | | | | | | | | | | | |
| CKT NO. | DESCRIPTION | VOLTAMPS/PHASE | | | WIRE NO. | BKR NO. | P | WIRE NO. | VOLTAMPS/PHASE | | | DESCRIPTION | CKT NO. | | | | | | | | | | |
| | | A | B | C | | | | | A | B | C | | | | | | | | | | | | |
| 1 | HYDRAULIC SYSTEM | 500 | | | EX | 20 | 1 | 20 | EX | 500 | | | WORKSTATIONS | 2 | | | | | | | | | |
| 3 | WALL POWER | | 500 | | EX | 20 | 1 | 20 | EX | 500 | | | WORKSTATIONS | 4 | | | | | | | | | |
| 5 | SPARE | | | | | 20 | 1 | 20 | EX | | | | WORKSTATIONS | 6 | | | | | | | | | |
| 7 | SPARE | | | | | 20 | 1 | 20 | EX | 500 | | | WORKSTATIONS | 8 | | | | | | | | | |
| 9 | AHU-K CNTRL | | 500 | | EX | 12 | 20 | 1 | 20 | EX | 500 | | WORKSTATIONS | 10 | | | | | | | | | |
| 11 | AHU-K RCPT AND LTS | | | 480 | EX | 12 | 20 | 1 | 20 | EX | 500 | | WORKSTATIONS | 12 | | | | | | | | | |
| 13 | SPACE | | | | | 1 | 20 | EX | 500 | | | | WORKSTATIONS | 14 | | | | | | | | | |
| 15 | SPACE | | | | | 1 | 20 | EX | 500 | | | | WORKSTATIONS | 16 | | | | | | | | | |
| 17 | SPACE | | | | | 1 | 20 | EX | 500 | | | | EXISTING LOAD | 18 | | | | | | | | | |
| 19 | SPACE | | | | | 1 | 1 | | | | | | SPACE | 20 | | | | | | | | | |
| 21 | SPACE | | | | | 1 | 1 | | | | | | SPACE | 22 | | | | | | | | | |
| 23 | SPACE | | | | | 1 | 1 | | | | | | SPACE | 24 | | | | | | | | | |
| 25 | SPACE | | | | | 1 | 1 | | | | | | SPACE | 26 | | | | | | | | | |
| 27 | SPACE | | | | | 1 | 1 | | | | | | SPACE | 28 | | | | | | | | | |
| 29 | SPACE | | | | | 1 | 1 | | | | | | SPACE | 30 | | | | | | | | | |
| SUBTOTAL | | | | | | | | | | | | 500 | 1,000 | 480 | | 2,000 | 1,500 | 1,500 | SUBTOTAL | | | | |
| TOTAL PHASE A - VA | | | | | | | | | | | | 2,500 | | | LOAD | CONN. VA | DF | LOAD | CONN. VA | DF | SUBTOTAL | | |
| TOTAL PHASE B - VA | | | | | | | | | | | | 2,500 | | | COOLING | 1.00 | | REFRIGERATION | 1.00 | | SUBTOTAL | | |
| TOTAL PHASE C - VA | | | | | | | | | | | | 1,980 | | | HEATING | 0 | | SIGN/DISPLAY | 1.25 | | SUBTOTAL | | |
| TOTAL PNLBD - VA | | | | | | | | | | | | 6,980 | | | LIGHTING | 300 | 1.25 | KITCHEN | 1.00 | | SUBTOTAL | | |
| TOTAL PHASE A - VA | | | | | | | | | | | | 1,980 | | | RECEPTACLES | 180 | 1.0/5 | EXISTING | 1.00 | | SUBTOTAL | | |
| TOTAL PHASE B - VA | | | | | | | | | | | | 1,980 | | | MOTORS | 1.00 | | LARGE MOTOR | 1.25 | | SUBTOTAL | | |
| TOTAL PHASE C - VA | | | | | | | | | | | | 1,980 | | | SUPP HEAT | 1.00 | | SHOW WINDOW | 1.25 | | SUBTOTAL | | |
| TOTAL PNLBD - VA | | | | | | | | | | | | 6,980 | | | MISC EQUIP | 6,500 | 1.00 | LTG TRACK | 1.00 | | SUBTOTAL | | |

| PANELBOARD: LP2-Ab15 (EXISTING) | | | | | | | | | | | | EQUIPMENT GROUND BUS | | | | | | | | | | | |
|---|----------------------------|----------------|-------|-----|----------|---------|---|----------|----------------|-------|---|--|------------------------|-------|-------------|----------|-------|---------------|----------|----|----------|--|--|
| BUS AMPS: 225A MAIN SIZE/TYP: MCB VOLTS/PHASE: 208Y/120V, 3PH, 4W | | | | | | | | | | | | FAULT CURRENT: REFER TO ONE-LINE DIAGRAM AIC RATING: FCA +10% MINIMUM, FULLY RATED SERVES: FIRST FLOOR MOUNTING: SURFACE LOCATION: MEZZ NORTH WALL | | | | | | | | | | | |
| CKT NO. | DESCRIPTION | VOLTAMPS/PHASE | | | WIRE NO. | BKR NO. | P | WIRE NO. | VOLTAMPS/PHASE | | | DESCRIPTION | CKT NO. | | | | | | | | | | |
| | | A | B | C | | | | | A | B | C | | | | | | | | | | | | |
| 1 | RCPTS-ROOM 202 | 900 | | | EX | 20 | 1 | 20 | EX | 650 | | | RMS 208,207,208,209 | 2 | | | | | | | | | |
| 3 | RCPTS-ROOM 202 | | 900 | | EX | 20 | 1 | 20 | EX | 250 | | | STAIRWELL 110,210 | 4 | | | | | | | | | |
| 5 | RCPTS-ROOM 202 | | | 900 | EX | 20 | 1 | 20 | EX | | | | ELEC WATER COOLER | 6 | | | | | | | | | |
| 7 | RCPTS-ROOM 202 | 900 | | | EX | 20 | 1 | 20 | EX | 300 | | | WASTE DISPOSAL | 8 | | | | | | | | | |
| 9 | RM 202 POWER POLE | | 1,000 | | EX | 20 | 1 | 20 | EX | 720 | | | RMS 208,207,208,209 | 10 | | | | | | | | | |
| 11 | RM 202 POWER POLE | | 1,000 | | EX | 20 | 1 | 20 | EX | 1,000 | | | RM 202-POWER POLE | 12 | | | | | | | | | |
| 13 | RM 202 POWER POLE | | 1,000 | | EX | 20 | 1 | 20 | EX | 1,000 | | | RM 202-POWER POLE | 14 | | | | | | | | | |
| 15 | RM 202 POWER POLE | | 1,000 | | EX | 20 | 1 | 20 | EX | 1,000 | | | RM 202-POWER POLE | 16 | | | | | | | | | |
| 17 | RM 202 POWER POLE | | 1,000 | | EX | 20 | 1 | 20 | EX | 1,000 | | | RM 202-POWER POLE | 18 | | | | | | | | | |
| 19 | RM 202 POWER POLE | | 1,000 | | EX | 20 | 1 | 20 | EX | 1,000 | | | RM 202-POWER POLE | 20 | | | | | | | | | |
| 21 | RM 202 POWER POLE | | 1,000 | | EX | 20 | 1 | 20 | EX | 1,000 | | | RM 202-POWER POLE | 22 | | | | | | | | | |
| 23 | RM 202 POWER POLE | | 1,000 | | EX | 20 | 1 | 20 | EX | 1,000 | | | RM 202-POWER POLE | 24 | | | | | | | | | |
| 25 | RM 202 POWER POLE | | 1,000 | | EX | 20 | 1 | 20 | EX | 1,000 | | | RM 202-POWER POLE | 26 | | | | | | | | | |
| 27 | RM 202 POWER POLE | | 1,000 | | EX | 20 | 1 | 20 | EX | 1,000 | | | RM 202-POWER POLE | 28 | | | | | | | | | |
| 29 | RM 202 POWER POLE | | 1,000 | | EX | 20 | 1 | 20 | EX | 1,000 | | | RM 202-POWER POLE | 30 | | | | | | | | | |
| 31 | RM 202 POWER POLE | | 1,000 | | EX | 20 | 1 | 20 | EX | 1,000 | | | RM 202-POWER POLE | 32 | | | | | | | | | |
| 33 | RM 202 POWER POLE | | 1,000 | | EX | 20 | 1 | 20 | EX | 1,000 | | | RM 202-POWER POLE | 34 | | | | | | | | | |
| 35 | RM 202 POWER POLE | | 1,000 | | EX | 20 | 1 | 20 | EX | 380 | | | CATWALK RCPT | 36 | | | | | | | | | |
| 37 | RM 202 POWER POLE | | 1,000 | | EX | 20 | 1 | 20 | EX | 1,000 | | | OUTSIDE LIGHT | 38 | | | | | | | | | |
| 39 | RM 2204 MOTORIZED DOOR | | | 500 | EX | 20 | 1 | 20 | EX | 1,000 | | | OUTSIDE LIGHT | 40 | | | | | | | | | |
| 41 | RM 2213 RACK FOR PROJECTOR | | | 500 | EX | 20 | 1 | 20 | EX | 600 | | | VAV K-1 THRU K-6 CNTRL | 42 | | | | | | | | | |
| SUBTOTAL | | | | | | | | | | | | 6,800 | 6,400 | 6,400 | | 5,950 | 5,970 | 5,460 | SUBTOTAL | | | | |
| TOTAL PHASE A - VA | | | | | | | | | | | | 12,750 | | | LOAD | CONN. VA | DF | LOAD | CONN. VA | DF | SUBTOTAL | | |
| TOTAL PHASE B - VA | | | | | | | | | | | | 12,370 | | | COOLING | 1.00 | | REFRIGERATION | 1.00 | | SUBTOTAL | | |
| TOTAL PHASE C - VA | | | | | | | | | | | | 103 | | | HEATING | 0 | | SIGN/DISPLAY | 1.25 | | SUBTOTAL | | |
| TOTAL PHASE A - VA | | | | | | | | | | | | 11,860 | | | LIGHTING | 2,900 | 1.25 | KITCHEN | 1.00 | | SUBTOTAL | | |
| TOTAL PHASE B - VA | | | | | | | | | | | | 99 | | | RECEPTACLES | 31,980 | 1.0/5 | EXISTING | 1.00 | | SUBTOTAL | | |
| TOTAL PHASE C - VA | | | | | | | | | | | | 36,980 | | | MOTORS | 1.00 | | LARGE MOTOR | 1.25 | | SUBTOTAL | | |
| TOTAL PNLBD - VA | | | | | | | | | | | | 6,980 | | | SUPP HEAT | 1.00 | | SHOW WINDOW | 1.25 | | SUBTOTAL | | |
| TOTAL PNLBD - VA | | | | | | | | | | | | 103 | | | MISC EQUIP | 2,100 | 1.00 | LTG TRACK | 1.00 | | SUBTOTAL | | |

| PANELBOARD: LP2-K21 (EXISTING) | | | | | | | | | | | | EQUIPMENT GROUND BUS | | | | | | | | | | | |
|---|------------------------|----------------|-----|-------|----------|---------|----|----------|----------------|-----|-----|--|-----------------------|-------|-------------|----------|-------|---------------|----------|----|----------|--|--|
| BUS AMPS: 100A MAIN SIZE/TYP: MLO VOLTS/PHASE: 208Y/120V, 3PH, 4W | | | | | | | | | | | | FAULT CURRENT: REFER TO ONE-LINE DIAGRAM AIC RATING: FCA +10% MINIMUM, FULLY RATED SERVES: SURFACE MOUNTING: SURFACE LOCATION: SEE SHEET E-203 | | | | | | | | | | | |
| CKT NO. | DESCRIPTION | VOLTAMPS/PHASE | | | WIRE NO. | BKR NO. | P | WIRE NO. | VOLTAMPS/PHASE | | | DESCRIPTION | CKT NO. | | | | | | | | | | |
| | | A | B | C | | | | | A | B | C | | | | | | | | | | | | |
| 1 | NOT USED | | | | | | | | | | | | NOT USED | 2 | | | | | | | | | |
| 3 | NOT USED | | | | | | | | | | | | NOT USED | 4 | | | | | | | | | |
| 5 | NOT USED | | | | | | | | | | | | NOT USED | 6 | | | | | | | | | |
| 7 | FLOOR RECEPT | 360 | | | EX | 20 | 1 | 20 | EX | 360 | | | FLOOR RECEPT | 8 | | | | | | | | | |
| 9 | AHU-C CNTRL | | 500 | | EX | 12 | 20 | 1 | 20 | EX | | | SPARE | 10 | | | | | | | | | |
| 11 | AHU-D AND E CNTRL | | | 1,000 | EX | 12 | 20 | 1 | 20 | EX | | | SPARE | 12 | | | | | | | | | |
| 13 | SPARE | | | | | 20 | 1 | 20 | EX | | | | SPARE | 14 | | | | | | | | | |
| 15 | VAV B-1 THRU B-7 CNTRL | | 700 | | EX | 12 | 20 | 1 | 20 | EX | 360 | | FURN. OUTLETS RM 2161 | 16 | | | | | | | | | |
| 17 | SPARE | | | | | 20 | 1 | 20 | EX | | 360 | | FURN. OUTLETS RM 2161 | 18 | | | | | | | | | |
| 19 | SPARE | | | | | 20 | 1 | 20 | EX | 360 | | | FURN. OUTLETS RM 2161 | 20 | | | | | | | | | |
| SUBTOTAL | | | | | | | | | | | | 360 | 1,200 | 1,000 | | 720 | 360 | 360 | SUBTOTAL | | | | |
| TOTAL PHASE A - VA | | | | | | | | | | | | 1,080 | | | LOAD | CONN. VA | DF | LOAD | CONN. VA | DF | SUBTOTAL | | |
| TOTAL PHASE B - VA | | | | | | | | | | | | 1,560 | | | COOLING | 1.00 | | REFRIGERATION | 1.00 | | SUBTOTAL | | |
| TOTAL PHASE C - VA | | | | | | | | | | | | 13 | | | HEATING | 0 | | SIGN/DISPLAY | 1.25 | | SUBTOTAL | | |
| TOTAL PHASE A - VA | | | | | | | | | | | | 1,360 | | | LIGHTING | 360 | 1.25 | KITCHEN | 1.00 | | SUBTOTAL | | |
| TOTAL PHASE B - VA | | | | | | | | | | | | 11 | | | RECEPTACLES | 1,440 | 1.0/5 | EXISTING | 1.00 | | SUBTOTAL | | |
| TOTAL PHASE C - VA | | | | | | | | | | | | 4,000 | | | MOTORS | 1.00 | | LARGE MOTOR | 1.25 | | SUBTOTAL | | |
| TOTAL PNLBD - VA | | | | | | | | | | | | 11 | | | SUPP HEAT | 2,200 | 1.00 | SHOW WINDOW | 1.25 | | SUBTOTAL | | |
| TOTAL PNLBD - VA | | | | | | | | | | | | 11 | | | MISC EQUIP | 2,200 | 1.00 | LTG TRACK | 1.00 | | SUBTOTAL | | |

| PANELBOARD: LP2-T13 (EXISTING) | | | | | | | | | | | | EQUIPMENT GROUND BUS | | | | | | | | | | | |
|---|----------------------|----------------|-----|-----|----------|---------|----|----------|----------------|-------|-------|---|---------------------|-------|-------------|----------|-------|---------------|----------|----|----------|--|--|
| BUS AMPS: 100A MAIN SIZE/TYP: 50A MCB VOLTS/PHASE: 208Y/120V, 3PH, 4W | | | | | | | | | | | | FAULT CURRENT: REFER TO ONE-LINE DIAGRAM AIC RATING: FCA +10% MINIMUM, FULLY RATED SERVES: HVAC EQUIP MOUNTING: SURFACE LOCATION: FANHOUSE 1A | | | | | | | | | | | |
| CKT NO. | DESCRIPTION | VOLTAMPS/PHASE | | | WIRE NO. | BKR NO. | P | WIRE NO. | VOLTAMPS/PHASE | | | DESCRIPTION | CKT NO. | | | | | | | | | | |
| | | A | B | C | | | | | A | B | C | | | | | | | | | | | | |
| 1 | LTS-SOUTH | 700 | | | EX | 20 | 1 | 20 | EX | | | | SPARE | 2 | | | | | | | | | |
| 3 | LTS-NORTH | | 700 | | EX | 20 | 1 | 20 | EX | 1,000 | | | AIR DRYER ACTUATOR | 4 | | | | | | | | | |
| 5 | RCPT | | | 360 | EX | 20 | 1 | 20 | EX | 500 | | | EXISTING LOAD | 6 | | | | | | | | | |
| 7 | SPARE | | | | | 20 | 1 | 15 | 12 | 130 | | | EP-P2 | 8 | | | | | | | | | |
| 9 | AHU-A CNTRL | | 500 | | EX | 12 | 20 | 1 | 20 | EX | 1,666 | | | FC-P1 | 10 | | | | | | | | |
| 11 | AHU-A RECEPT AND LTS | | | 480 | EX | 12 | 20 | 1 | 20 | EX | 500 | | | FC-P1 | 12 | | | | | | | | |
| 13 | RCPT | | | 480 | EX | 12 | 20 | 1 | 15 | 12 | 500 | | | FC-P1 | 14 | | | | | | | | |
| 15 | SPACE | | | | | 1 | 15 | 12 | | 500 | | | AUTO CHEM TREATMENT | 16 | | | | | | | | | |
| 17 | EXISTING LOAD | | | 700 | EX | 30 | 2 | 1 | 15 | 12 | 500 | | REF MONITOR SYSTEM | 18 | | | | | | | | | |
| 19 | SPACE | | | | | 1 | 15 | 12 | | 500 | | | KILTECH CONTROL BOX | 20 | | | | | | | | | |
| 21 | SPACE | | | | | 1 | 15 | 12 | | 500 | | | AHU-B CNTRL | 22 | | | | | | | | | |
| 23 | SPACE | | | | | 1 | 15 | 12 | | 480 | | | AHU-B RCPT AND LTS | 24 | | | | | | | | | |
| SUBTOTAL | | | | | | | | | | | | 1,828 | 1,200 | 1,540 | | 1,130 | 3,636 | 1,500 | SUBTOTAL | | | | |
| TOTAL PHASE A - VA | | | | | | | | | | | | 2,958 | | | LOAD | CONN. VA | DF | LOAD | CONN. VA | DF | SUBTOTAL | | |
| TOTAL PHASE B - VA | | | | | | | | | | | | 4,636 | | | COOLING | 1.00 | | REFRIGERATION | 1.00 | | SUBTOTAL | | |
| TOTAL PHASE C - VA | | | | | | | | | | | | 3,040 | | | HEATING | 0 | | SIGN/DISPLAY | 1.25 | | SUBTOTAL | | |
| TOTAL PNLBD - VA | | | | | | | | | | | | 10,834 | | | LIGHTING | 2,000 | 1.25 | KITCHEN | 1.00 | | SUBTOTAL | | |
| TOTAL PNLBD - VA | | | | | | | | | | | | 30 | | | RECEPTACLES | 720 | 1.0/5 | EXISTING | 1.00 | | SUBTOTAL | | |
| TOTAL PNLBD - VA | | | | | | | | | | | | 25 | | | MOTORS | 3,714 | 1.00 | LARGE MOTOR | 1.25 | | SUBTOTAL | | |
| TOTAL PNLBD - VA | | | | | | | | | | | | 30 | | | SUPP HEAT | 4,400 | 1.00 | SHOW WINDOW | 1.25 | | SUBTOTAL | | |
| TOTAL PNLBD - VA | | | | | | | | | | | | 30 | | | MISC EQUIP | 4,400 | 1.00 | LTG TRACK | 1.00 | | SUBTOTAL | | |

| PANELBOARD: LP3 (EXISTING) | | | | | | | | | | | | EQUIPMENT GROUND BUS | | | | | | | | | | | |
|---|----------------------|----------------|-------|-------|----------|---------|----|----------|----------------|----|---|---|---------|-------|-------------|----------|-------|---------------|----------|----|----------|--|--|
| BUS AMPS: 225A MAIN SIZE/TYP: MLO VOLTS/PHASE: 208Y/120V, 3PH, 4W | | | | | | | | | | | | FAULT CURRENT: REFER TO ONE-LINE DIAGRAM AIC RATING: FCA +10% MINIMUM, FULLY RATED SERVES: THIRD FLOOR MOUNTING: RECESSED LOCATION: SEE SHEET E-103 | | | | | | | | | | | |
| CKT NO. | DESCRIPTION | VOLTAMPS/PHASE | | | WIRE NO. | BKR NO. | P | WIRE NO. | VOLTAMPS/PHASE | | | DESCRIPTION | CKT NO. | | | | | | | | | | |
| | | A | B | C | | | | | A | B | C | | | | | | | | | | | | |
| 1 | EXISTING LOAD | 700 | | | EX | 20 | 1 | 20 | EX | | | | SPARE | 2 | | | | | | | | | |
| 3 | AHU D/E RCPT AND LTS | | 660 | | EX | 12 | 20 | 1 | 20 | EX | | | SPARE | 4 | | | | | | | | | |
| 5 | SPARE | | | | | 20 | 1 | 20 | EX | | | | SPARE | 6 | | | | | | | | | |
| 7 | SPARE | | | | | 20 | 1 | 20 | EX | | | | SPARE | 8 | | | | | | | | | |
| 9 | LTS-HALL | | 1,000 | | EX | 20 | 1 | 20 | EX | | | | SPARE | 10 | | | | | | | | | |
| 11 | WATER HEATER | | | 1,500 | EX | 20 | 1 | 20 | EX | | | | SPARE | 12 | | | | | | | | | |
| SUBTOTAL | | | | | | | | | | | | 700 | 1,660 | 1,500 | | | | | SUBTOTAL | | | | |
| TOTAL PHASE A - VA | | | | | | | | | | | | 700 | | | LOAD | CONN. VA | DF | LOAD | CONN. VA | DF | SUBTOTAL | | |
| TOTAL PHASE B - VA | | | | | | | | | | | | 6 | | | COOLING | 1.00 | | REFRIGERATION | 1.00 | | SUBTOTAL | | |
| TOTAL PHASE C - VA | | | | | | | | | | | | 1,660 | | | HEATING | 0 | | SIGN/DISPLAY | 1.25 | | SUBTOTAL | | |
| TOTAL PNLBD - VA | | | | | | | | | | | | 14 | | | LIGHTING | 1,300 | 1.25 | KITCHEN | 1.00 | | SUBTOTAL | | |
| TOTAL PHASE A - VA | | | | | | | | | | | | 1,500 | | | RECEPTACLES | 360 | 1.0/5 | EXISTING | 1.00 | | SUBTOTAL | | |
| TOTAL PHASE B - VA | | | | | | | | | | | | 13 | | | MOTORS | 1.00 | | LARGE MOTOR | 1.25 | | SUBTOTAL | | |
| TOTAL PHASE C - VA | | | | | | | | | | | | 3,860 | | | SUPP HEAT | 2,200 | 1.00 | SHOW WINDOW | 1.25 | | SUBTOTAL | | |
| TOTAL PNLBD - VA | | | | | | | | | | | | 11 | | | MISC EQUIP | 2,200 | 1.00 | LTG TRACK | 1.00 | | SUBTOTAL | | |

FIRE SPRINKLER GENERAL NOTES:

1. SPRINKLER SYSTEM DESIGN, INSTALLATION AND MATERIALS SHALL BE IN ACCORDANCE WITH NFPA 13. SYSTEM SHALL ALSO MEET ALL APPLICABLE BUILDING CODES, FIRE CODES, NASA-STD-8719.11A, AND THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION. VERIFY REQUIREMENTS PRIOR TO BID SUBMITTAL.
2. INFORMATION ON CONTRACT DOCUMENTS IS GENERAL INFORMATION AND FOR BID PURPOSES ONLY. LAYOUT SYSTEM, PERFORM REQUIRED CALCULATIONS AND COORDINATE WITH OTHER TRADES.
3. PROVIDE ADDITIONAL MATERIALS AND LABOR REQUIRED DUE TO LACK OF COORDINATION AND TO MEET AUTHORITY HAVING JURISDICTION REQUIREMENTS AT NO ADDITIONAL COST TO THE OWNER.
4. MODIFICATION TO THE EXISTING SPRINKLER SYSTEM SHALL ONLY BE DONE AS NECESSARY. COORDINATE ALL NEW MEP WORK WITH THE EXISTING LOCATION OF THE SPRINKLER SYSTEM. RELOCATE AND/OR PROVIDE ADDITIONAL SPRINKLERS, PIPING, HANGERS, ETC. COORDINATE WITH WALLS, CEILINGS, LIGHTS, DIFFUSERS, STRUCTURE, OBSTRUCTIONS, ETC., IN AREAS AFFECTED BY SCOPE OF WORK.
5. COORDINATE SPRINKLER SYSTEM MODIFICATIONS TO MINIMIZE SYSTEM IMPAIRMENT. PROVIDE FIRE WATCH AND INTERIM FIRE PROTECTION MEASURES WHERE REQUIRED BY THE AUTHORITY HAVING JURISDICTION AND CONTRACTING OFFICER.
6. COORDINATE PIPE ROUTING NEAR ELECTRICAL EQUIPMENT WITH NFPA 70.
7. COORDINATE SPRINKLER TEMPERATURES NEAR HEAT-PRODUCING SOURCES WITH NFPA 13.
8. DO NOT CONNECT MORE THAN ONE SPRINKLER TO AN EXISTING ONE-INCH OUTLET.
9. REMOVE ALL ABANDONED PIPING, FITTINGS, HANGERS, ETC.
10. FORWARD COMPLETED CONTRACTOR MATERIAL TEST CERTIFICATES TO THE OWNER.
11. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

FIRE ALARM GENERAL NOTES:

1. FIRE ALARM SYSTEM DESIGN, INSTALLATION AND MATERIALS SHALL BE IN ACCORDANCE WITH NFPA 70 AND NFPA 72. SYSTEM SHALL ALSO MEET ALL APPLICABLE BUILDING CODES, FIRE CODES, NASA-STD-8719.11A, AND THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION. VERIFY REQUIREMENTS PRIOR TO BID SUBMITTAL.
2. INFORMATION ON CONTRACT DOCUMENTS IS GENERAL INFORMATION AND FOR BID PURPOSES ONLY. PERFORM REQUIRED CALCULATIONS AND COORDINATE WITH OTHER TRADES.
3. MODIFICATIONS TO EXISTING SYSTEM SHALL BE FORMALLY SUBMITTED TO THE GOVERNMENT FOR APPROVAL.
4. MODIFY EXISTING FIRE ALARM SYSTEM. RELOCATE AND/OR PROVIDE ADDITIONAL FIRE ALARM EQUIPMENT, WIRING, RACEWAY, ETC., AS REQUIRED FOR A COMPLETE AND OPERATIONAL FIRE ALARM SYSTEM.
5. PROVIDE NEW FIRE ALARM EQUIPMENT COMPATIBLE WITH AND CONNECTED TO THE EXISTING FIRE ALARM SYSTEM.
6. ALL FIRE ALARM CONDUIT TO BE INSTALLED OR REUSED SHALL BE RED AND A MINIMUM OF 3/4". ALL TERMINATIONS SHALL BE INSTALLED ON TERMINAL STRIPS, WIRE NUTS ARE PROHIBITED.
7. PROVIDE AUDIBLE AND VISIBLE NOTIFICATION APPLIANCES AS REQUIRED FOR NEW WORK.
8. DO NOT INSTALL SMOKE DETECTORS IN A DIRECT AIR FLOW NOR CLOSER THAN 3 FEET (1 METER) FROM AN AIR SUPPLY DIFFUSER OR RETURN AIR OPENING.
9. PROVIDE DUCT DETECTION AND SHUTDOWN FOR AIR DISTRIBUTION SYSTEMS EXCEEDING 2000 CFM. DUCT SMOKE DETECTION SHALL BE COMPATIBLE WITH EXISTING SIMPLEX-GRINNELL ALARM SYSTEM AND TRANSMIT A SUPERVISORY SIGNAL TO THE FACP.
10. PROVIDE FIRE ALARM EQUIPMENT AND CONNECTIONS REQUIRED TO SHUTDOWN FAN POWERED AIR DISTRIBUTION EQUIPMENT THAT IS LESS THAN 2000 CFM AND IS NOT PROVIDED WITH DUCT SMOKE DETECTION WHEN IT'S RESPECTIVE AIR HANDLING UNIT IS SHUTDOWN.
11. COORDINATE FIRE ALARM SYSTEM MODIFICATIONS TO MINIMIZE SYSTEM IMPAIRMENT. PROVIDE FIRE WATCH AND/OR INTERIM FIRE PROTECTION MEASURES WHERE REQUIRED BY THE GOVERNMENT.
12. FORWARD COMPLETED FIRE ALARM CERTIFICATE OF COMPLETION TO THE GOVERNMENT.
13. DESIGN DRAWINGS/WORKING PLANS SHALL BE SUBMITTED ON ANY CHANGES TO THE FIRE SPRINKLER OR ALARM SYSTEMS.
14. ALL SMOKE DETECTORS AND FIRE DAMPERS SHALL BE TESTED AND WITNESSED BY A REPRESENTATIVE OF THE SH OFFICE.
15. CONTRACTOR SHALL SUBMIT TEST SHEETS ON PROCEDURES FOR TESTING SMOKE DETECTORS AND FIRE DAMPERS. TESTING PROCEDURES SHALL BE IN COMPLIANCE WITH NFPA 72, NATIONAL FIRE ALARM CODE. PERFORM TESTING AFTER HOURS.
16. SUBMIT CUT SHEETS ON SMOKE DAMPERS, HVAC UNIT SMOKE DETECTORS AND DUCT SENSOR HOUSING UNITS.
17. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.



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| | | NATIONAL AERONAUTICS AND SPACE ADMINISTRATION DRYDEN FLIGHT RESEARCH CENTER EDWARDS, CA | | APPROVALS Chief, Facilities Engineering & Safety Mgmt. Office Project Proponent/Customer Facility Project Manager Chief, Office of Protective Services Chief, Safety, Health & Environmental Office Dir. of Information Office | | DATE 2-28-13 2-28-13 2/27/13 2/27/13 2/27/13 |
| | | DRAWING TITLE FIRE PROTECTION NOTES | | | | |
| | | PROJECT TITLE MISSION CONTROL INFRASTRUCTURE REVITALIZATION 100% FINAL DESIGN | | | | |
| | | DATE SYM REVISION BY A/PD | | | | |
| 02-21-13 | E | 100% FINAL DESIGN | | | | |
| 01-07-13 | D | 95% NEAR-FINAL DESIGN SUBMITTAL | | | | |
| 10-27-12 | C | 60% DEVELOPED DESIGN SUBMITTAL | | | | |
| 05-12-12 | B | 30% PRELIMINARY DESIGN SUBMITTAL | | | | |
| | | | | DATE STRTD DATE PRINTD 02/21/2013 DRAWN BY HEI SCALE AS SHOWN TRADE SH. NO. EDM-1715 FILE NAME EDM-1715-000 DRAWING 000 SHEET No. 24 of 24 | | |