REQUEST FOR PROPOSALS (RFP) **DB**

649 MUNS MUNITIONS STORAGE MAGAZINES

HILL AFB, UT

PROJECT NO. KRSM143007
SPECIFICATION FILE NO. 2093
DESIGN FILE NO. 180-25-0950

US Army Corps of Engineers
Sacramento District

FEBRUARY 2017
DISTRIBUTION STATEMENT A
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649 MUNS MUNITIONS STORAGE MAGAZINES
HILL AFB, UTAH

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ATTACHMENT 01

NOT USED

ATTACHMENT 02

NOT USED

ATTACHMENT 03

NOT USED

ATTACHMENT 04

NOT USED

ATTACHMENT 05

DRAWING FORMAT

DRAWING FORMAT

1.0 **Policy:** Drawings shall be prepared in accordance with the applicable provisions of the "A/E/C CADD Standard, Release 6.0" dated August 2015 except as noted herein for title block/borders, drawing size, and file naming conventions. All subsequent references to the A/E/C CADD Standard, Release 6.0 will be referenced simply as "A/E/C CADD Standard." The A/E/C CADD Standard, Release 6.0 is available for download at:

https://cadbimcenter.erdc.dren.mil/default.aspx?p=a&t=1&i=7

2.0 **Title and Border Sheets:** Current standard drawing title blocks and border files can be downloaded from:

https://cadbim.usace.army.mil/default.aspx?p=a&t=1&i=12

See the drawings at the end of this attachment to clarify who and what titles should be shown in the title blocks, including "Drawn By", "Designed By", "Reviewed By" and "Submitted By". Border sheets have an instruction layer that enumerates the various layers and settings required for the Proposer to set.

3.0 **Drawing Size:** The paper size for drawings shall be 22 inches x 34 inches (ANSI D) and. The border size provided conveniently reduces to half size 11 inches x 17 inches and will successfully plot from a standard laser printer that supports 11" x 17" paper.

4.0 **File Naming Convention and Directory Structure:** File names for this project shall be as indicated in this paragraph, and conform to the A/E/C CADD Standard. See the CADD Directory Structure listing at the end of this paragraph for an example of the recommended organization of electronic files delivered to the Sacramento District. This is Sacramento District's interpretation of the current A/E/C CADD Standard.

4.1 **Production Drawings:** Production drawings (sheet files) shall be stored under file names consisting of the project code **H50**, followed by a letter, followed by a hyphen (-) or a second level designator, to indicate design discipline that produced the sheet. Drawing organization shall conform to this order (see Table 2-3):

G General
H Hazardous Materials
V Surveys
B Geotechnical
C Civil
L Landscape
S Structural
A Architectural
I Interior Design
Q Equipment
F Fire Protection
P Plumbing
M Mechanical
E Electrical
T Telecommunications

Sheet type shall be indicated by the following Sheet Type Designators (See Table 2-4):

0	General (Symbols, Legends, Notes, etc.)
1	Plans (horizontal views)
2	Elevations (vertical views)
3	Sections (sectional views)
4	Large Scale Views (enlarged plans, elevations, or sections that are not details)
5	Details
6	Schedules and Diagrams
7	User Defined
8	User Defined
9	3D Representations (isometrics, perspectives, photographs)

The complete drawing sheet file name will thus conform to the following (see Figure 2-3):

H50	Project Code
A-	Discipline Designation
1	Sheet Type Designator
01	Sheet Sequence Number
XXX	User Definable
.DWG	CADD File Extension

Examples:

H50C-101XXX.dwg	Civil Site Plan
H50CG101XXX.dwg	Civil Grading Plan
H50A-101XXX.dwg	Architectural Key Plan
H50A-203XXX.dwg	Intermediate Architectural Elevations
H50A-515XXX.dwg	Architectural Detail Sheet
H50A-620.XXX.dwg	Possible Door Schedule Sheet

All drawing sets must start with the number 1, i.e. 101, 201, 301, etc. Use of 00 as in 000, 100, 200, 300, etc. is prohibited.

4.2 **Reference File Drawings:** Reference file drawings (model files) of floor plans, elevations, sections, etc., used to generate production drawings shall be stored under file names consisting of the project code H50 followed by a designator of the discipline that produced the sheet, as indicated in Table 2-1 (page 11 of the A/E/C CADD Standard). This is followed by a hyphen (-) and a Model File Type designator (Table 2-2):

Example Model File Type designators (may vary by discipline):

FP	Floor Plan
EL	Elevation
SH	Schedule
SC	Section
PR	Profile
LG	Legend
DG	Diagram
DT	Detail
3D	Isometric/3D

The complete reference file (model file) drawing name will thus conform to the following (see Figure 2-2):

H50	Project Code
A-	Discipline Designation (note: some CADD software programs automatically place a hyphen before the discipline designator as in -A-; this is acceptable, as long as all reference files are named consistently.)
FP	Sheet Type Designator
XXXX	User Definable
.DWG	CADD File Extension

Examples:

H50-A-FPXXXX.dwg	Architectural Reference Floor Plan
H50-A-ELXXXX.dwg	Architectural Reference Elevations
H50-A-SCXXXX.dwg	Architectural Reference Building Sections
H50-A-SHDOOR.dwg	Architectural Reference Door Schedule

Example: Reference model file H50-A-FPXXXX.dwg would be used to create the production drawing of the floor plan named: H50A-101XXX.dwg.

4.3 **BIM Model.** BIM models shall also follow the A/E/C CADD Standard as applicable. Template files are available from the USACE CAD-BIM Center website. Each discipline's model shall follow the following format:

H50	Project Code
A	Discipline Designation
.rvt	BIM File Extension

Example:

H50A.rvt	Architectural Revit Model
H50E.rvt	Electrical Revit Model

See Attachment 16 for more information on BIM requirements.

5.0 **Layer/Level Convention, Line Symbologies, Font Libraries and Color/Pen Tables:** The Architect-Engineer shall use the AIA version of the CADD layer/level convention, line symbologies (including layer color, line weight, and line type), font libraries (restrict font usage on drawings to AutoCAD font Romans (Roman Simplex), with a 0.8 width factor and Arial Bold for title sheet fonts), and color tables as indicated in the appendices of the A/E/C CADD Standard.

6.0 **Hard Copy Data to be Included:** Existing hard copy data to be included in construction drawings shall be scanned to raster format (however, vectorized is preferred), and incorporated into the electronic files or may be included as references following the reference file paragraph above.

7.0 **Plot Configuration Documentation:** The plot configuration file for each drawing shall be provided. This ASCII text format documentation shall include the plotter configuration (e.g., name and model of plotter, pen settings, colors, widths, drawing orientation, drawing size, and other special instructions). Acceptable plot configuration or plot documentation files end in the following file extensions: *.pcp, *.pc2, or *.pc3.

ATTACHMENT 06

HAFB STORAGE MAGAZINES MEMORANDUM

DEPARTMENT OF DEFENSE EXPLOSIVES SAFETY BOARD
2461 EISENHOWER AVENUE
ALEXANDRIA, VIRGINIA 22331-0600

JUL 15 2013

DDESB-PD

MEMORANDUM FOR DIRECTOR OF ENGINEERING, HUNTSVILLE CENTER, U.S. ARMY CORPS OF ENGINEERS, ATTENTION: CEHNC-ED

SUBJECT: DDESB Approval of Modular Storage Magazine (MSM), U.S. Army Corps of Engineers Standard Drawing Series 421-80-08

References: (a) CEHNC-ED Memorandum of 24 June 2013, Subject: New Modular Storage Magazine (MSM) Series 421-80-08, with enclosures

(b) U.S. Army Corps of Engineers, Huntsville Center Drawings, Modular Storage Magazine, Box-Type STD 421-80-08 with 14'-8" Door, dated June 2013 (26 Sheets)

(c) DoD 6055.09-M, Department of Defense Ammunition and Explosives Safety Standards, 29 February 2008, administratively reissued 4 August 2010, with changes through 12 March 2012

(d) Department of the Air Force, Ogden Air Logistics Center, Office of Civil Engineering, Ogden, Utah, Munitions Storage Module, Buildings 2580 and 2581, Hill Air Force Base, Utah, Project No. KRSM 020070/020071 Drawings dated May 2002 (27 Sheets)

(e) DDESB-KO Memorandum of 11 July 2002, Subject: Expeditious Explosives Safety Site Plan Requests, Construct Two Modified Earthcovered Magazines, Buildings 2580 and 2581, AFMC-Hill 02-S33 and S34 (Hill AFB, UT)

(f) DDESB TP 15, Approved Protective Construction, Revision 3, May 2010

As requested by reference (a), we have reviewed the reference (b) drawings for compliance with Department of Defense explosives safety criteria found in reference (c). The attachment to reference (a) describes the modifications that have been incorporated into those drawings.

Based on our evaluation, reference (b) is approved as a 7-Bar earth-covered magazine (ECM). This new design supersedes the previous reference (d) Munitions Storage Module ("14-ft MSM") design.

The maximum allowable Hazard Division (HD) 1.1 explosive limit for the reference (b) design is 500,000 pounds net explosive weight (NEW). It is noted that while the approval memorandum of reference (e) set the HD 1.1 explosive limit of Buildings (Munitions Storage Modules) 2580 and 2581 to 150,000 pounds (lbs) NEW, this was based on site-specific quantity-distance (QD) constraints and was not intended as a general/standard magazine approval. The supporting analysis provided to substantiate the approval memorandum of reference (e) was based on loads from a donor ECM containing 500,000 lbs HD 1.1 NEW. The specific siting constraints of a project involving ECM construction will dictate the actual NEW limits.

The new drawing series corrects omissions, updates the design to meet current Architectural, Engineering and Construction Computer Aided Design standards and improves overall constructability of this economical design that has been used extensively by the Services. Lessons learned from previous construction efforts have been incorporated in the new design, a conventional load analysis was completed to assist designers during the site adaptation process, and special inspection requirements were added to improve quality verification of explosives safety related construction elements.

Reference (b) will be added to Table AP 1-1 of reference (f), as approved for new construction, and reference (d) will be relocated from Table AP 1-1 to Table AP 1-2 of reference (f), and considered not being approved for new construction. However, any explosives safety site plans that use the reference (d) design and, as of the date of this memorandum, are currently within the review/approval process will continue to be processed by the DDESB.

The point of contact for this action is Mr. William L. Robertson, (571) 372-6776, DSN 372-6776, E-mail address: william.l.robertson3.civ@mail.mil.

THERRY L. CHIAPELLO
Executive Director
DDESB

cc:
USATCES
AFSC/SEW
NOSSA/N511
MARCORSYSCOM/AM-EES
NAVFAC EXWC/CI7

DEPARTMENT OF THE ARMY
HUNTSVILLE CENTER, CORPS OF ENGINEERS
P.O. BOX 1600
HUNTSVILLE, ALABAMA 35807-4301

REPLY TO
ATTENTION OF

CEHNC-ED

24 June 2013

MEMORANDUM FOR Department of Defense Explosives Safety Board, Policy Development Division (Ms. Lea Ann Cotton) 4800 Mark Center Drive, Suite 16E12, Alexandria, VA 22350

SUBJECT: New Modular Storage Magazine (MSM) Series 421-80-08

1. We have completed the new subject drawing series. The new series updates the drawings to meet current Architectural, Engineering and Construction Computer Aided Design standards, improved plan readability, constructability, and correct omissions within the construction drawings. Another key element performed during the revision was the incorporation of lessons learned from previous MSM projects at various User organizations. In addition, a conventional structural load analysis was performed to identify some key loading limits, which will assist the designer during the site-adaption process. Many upgrades were made to the drawing package to improve the drawings in an effort to enhance construction of all new magazines. We recommend the 421-80-08 be considered a 7-bar structural designation, based on the justifications utilized to determine its' predecessor's, MSM at Hill AFB, 7-bar structural designation.

2. We will provide electronic versions of the narrative and drawings by way of email. The drawings will be in Bentley MicroStation, Autodesk AutoCAD and Portable Document Format file formats.

3. We appreciate the opportunity to support you on this effort. Our point of contact for this action is Mr. Josh Umphrey at commercial 256-895-1652 or DSN 760-1652. We look forward to providing explosive effects consultation and support to you in the near future.

BOYCE L. ROSS, P.E.
Director of Engineering

Encl

CEHNC-ED 24 June 2013

MEMORANDUM FOR Department of Defense Explosives Safety Board, Policy Development Division (Ms. Lea Ann Cotton) 4800 Mark Center Drive, Suite 16E12, Alexandria, VA 22350

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1. We have completed the new subject drawing series. The new series updates the drawings to meet current Architectural, Engineering and Construction Computer Aided Design standards, improved plan readability, constructability, and correct omissions within the construction drawings. Another key element performed during the revision was the incorporation of lessons learned from previous MSM projects at various User organizations. In addition, a conventional structural load analysis was performed to identify some key loading limits, which will assist the designer during the site-adaption process. Many upgrades were made to the drawing package to improve the drawings in an effort to enhance construction of all new magazines. We recommend the 421-80-08 be considered a 7-bar structural designation, based on the justifications utilized to determine its' predecessor's, MSM at Hill AFB, 7-bar structural designation.

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Encl

BOYCE L. ROSS, P.E.
Director of Engineering

CEHNC-ED
SUBJECT: New Modular Storage Magazine (MSM) Series 421-80-08

CF:
ED Read File
EDC- Read File
EDC-S Read File
EDC-S (Coulston, Umphrey)

	Initial	Date
EDC-S, Coulston	JWC	24 Jun 13
EDC, Murdock		6/27/13

APPENDIX A

STATEMENT OF TECHNICAL REVIEW

COMPLETION OF INDEPENDENT TECHINICAL REVIEW

The Huntsville Center has completed the new Modular Storage Magazine 421-80-08. Notice has hereby given that an independent technical review, which is appropriate to the level of risk and complexity inherent in the project, has been conducted. During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This verification included review of assumptions; methods, procedures, and materials used in analyses; alternatives evaluated; the appropriateness of data used and level obtained; and reasonableness of the result, including whether the product meets the customer's needs consistent with the law and existing Corps policy. The independent technical review was accomplished by a team established in accordance with EC 1110-105. All comments resulting from the independent technical review have been resolved and no outstanding issues remain.

Roy A. Wright
Technical Review Team Leader

24 Jun 13
Date

Jeff Coulter
Technical Manager

24 Jun 13
Date

CERTIFICATION OF INDEPENDENT TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows:

There were no significant concerns encountered during the independent technical review.

As noted above, all concerns resulting from the independent technical review of the project have been fully resolved.

Director of Engineering

6/24/13
Date

ATTACHMENT 07

MSM BOX-TYPE STANDARD 421-80-08 DRAWING SET

US Army Corps
of Engineers
Huntsville Center

MODULAR STORAGE MAGAZINE, BOX-TYPE STD 421-80-08 WITH 14'-8" DOOR

SEE 01 10 10 FOR REQUIREMENTS REGARDING LIGHTNING PROTECTION AND ELECTRICAL DESIGN. 01 10 10 SUPERSEDES SHEETS E-101, E-102, E-103, E-104 WITHIN THIS MSM BOX-TYPE STANDARD 421-80-08 HAYMAN IGLOO DRAWING SET.

US Army Corps
of Engineers
Huntsville Center

No.	Description	Date	Appr.

Revisions

Designed by: JMU
Drawn by: JMU
Checked by: RSW
Project Engineer/Architect: Jeff Coulston
Date: JUNE 2013
Scale:
Drawing code:
Date:

U. S. ARMY CORPS OF ENGINEERS
ENGINEERING AND
SUPPORT CENTER,
HUNTSVILLE, ALABAMA

MODULAR STORAGE MAGAZINE
BOX-TYPE, STD 421-80-08

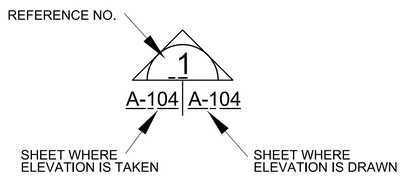
COVER SHEET

Sheet reference number:
G-001
Sheet 1 of 26

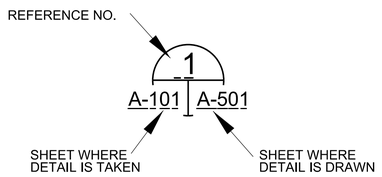
GENERAL ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR
ALUM	ALUMINUM
APPROX	APPROXIMATELY
BLDG	BUILDING
BOTT	BOTTOM
BRG	BEARING
CIP	CAST-IN-PLACE
CJ	CONTROL JOINT
CL	CENTER LINE
CMU	CONCRETE MASONRY UNIT
CP	CENTER POINT
COL	COLUMN
COORD	COORDINATE
CONC	CONCRETE
CONT	CONTINUE, CONTINUOUS
DIA	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
EA	EACH
ELEV	ELEVATION
EF	EACH FACE
EJ	EXPANSION JOINT
EQ	EQUAL
E.W.	EACH WAY
(E) OR EXIST	EXISTING
EXT	EXTERIOR
FTG	FOOTING
FV	FIELD VERIFY
GALV	GALVANIZED
HD	HEADED
HT	HEIGHT
INT	INTERIOR
ID	INSIDE DIAMETER
LLH	LONG-LEG HORIZONTAL
LLV	LONG-LEG VERTICAL
MIN	MINIMUM
MANF	MANUFACTURER
NTS	NOT TO SCALE
O.C.	ON CENTER
OD	OUTSIDE DIAMETER
OH	OPPOSITE HAND
R	RADIUS
REINF	REINFORCEMENT
REQ'D	REQUIRED
SF	SQUARE FEET
SHT	SHEET
SIM	SIMILAR
SOG	SLAB-ON-GRADE
STIFF	STIFFENER
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
VIF	VERIFY IN FIELD
WWF	WELDED WIRE FABRIC
WWR	WELDED WIRE REINFORCEMENT
W/	WITH
WP	WORKING POINT

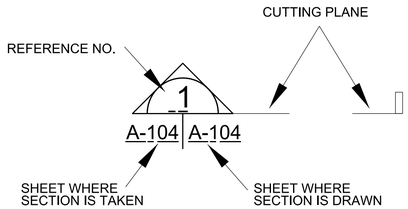
DRAWING SYMBOLS



ELEVATION REFERENCE



DETAIL REFERENCE



SECTION CUT

DRAWING INDEX

DISCIPLINE	SHEET NO.	SHEET REF. NO.	DRAWING CODE	SHEET TITLE
GENERAL	G-001	1	XXXXXX	COVER SHEET
	G-002	2	XXXXXX	INDEX, SYMBOLS, & ABBREVIATIONS
STRUCTURAL	S-001	3	XXXXXX	GENERAL NOTES
	S-002	4	XXXXXX	SPECIAL INSPECTIONS
	S-101	5	XXXXXX	FOUNDATION PLAN
	S-102	6	XXXXXX	ROOF FRAMING PLAN
	S-201	7	XXXXXX	ELEVATIONS
	S-202	8	XXXXXX	ELEVATIONS
	S-301	9	XXXXXX	BUILDING SECTION
	S-302	10	XXXXXX	BUILDING SECTION
	S-303	11	XXXXXX	SECTIONS
	S-501	12	XXXXXX	TYPICAL DETAILS
	S-701	13	XXXXXX	DOOR FRAME ELEVATION & DETAILS
	S-701 (A)	14	XXXXXX	DOOR FRAME ELEVATION & DETAILS
	S-702	15	XXXXXX	DOOR ELEVATIONS
	S-702 (A)	16	XXXXXX	DOOR ELEVATIONS
	S-703	17	XXXXXX	DOOR SECTIONS
	S-703 (A)	18	XXXXXX	DOOR SECTIONS
	S-704	19	XXXXXX	DOOR DETAILS
	S-704 (A)	20	XXXXXX	DOOR DETAILS
	S-705	21	XXXXXX	HIGH SECURITY HASP
	S-705 (A)	22	XXXXXX	INTERNAL LOCKING DEVICES
ELECTRICAL	E-101	23	XXXXXX	LIGHTNING PROTECTION SYSTEM
	E-102	24	XXXXXX	LIGHTNING PROTECTION SYSTEM
	E-103	25	XXXXXX	LIGHTNING PROTECTION SYSTEM
	E-104	26	XXXXXX	LIGHTNING PROTECTION SYSTEM

US Army Corps of Engineers
Huntsville Center

Revisions

No.	Description	Date	Appr.

Date: JUNE 2013
Scale:
Drawing code:
Date:
Designed by: JMU
Drawn by: JMU
Checked by: RSW
Project Engineer/Architect: Jeff Coulston

U. S. ARMY CORPS OF ENGINEERS
ENGINEERING AND
SUPPORT CENTER,
HUNTSVILLE, ALABAMA

MODULAR STORAGE MAGAZINE
BOX-TYPE, STD 421-80-08

INDEX, SYMBOLS,
& ABBREVIATIONS

Sheet reference number:
G-002
Sheet 2 of 26

1.0 DESIGN CRITERIA:

A. BUILDING CODES AND SPECIFICATIONS:

1. INTERNATIONAL BUILDING CODE 2009 (IBC) AS MODIFIED BY UFC 1-200-01
2. AMERICAN CONCRETE INSTITUTE (ACI 318)
3. AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC 13th ED.)
4. AMERICAN WELDING SOCIETY, A.W.S.

B. LIVE LOADS

ROOF----------100 PSF
FLOOR---------100 PSF

SNOW LOAD:

GROUND SNOW LOAD (Pg) = 60 PSF
IMPORTANCE FACTOR (I) = 1.2
EXPOSURE CATEGORY (Ce) = 1.0
THERMAL CATEGORY (Ct) = 1.0

C. WIND LOAD:

BASIC WIND SPEED: 130 MPH
IMPORTANCE FACTOR (I): 1.15
EXPOSURE CATEGORY: C
ENCLOSURE CLASSIFICATION: ENCLOSED

D. EARTHQUAKE:

OCCUPANCY CATEGORY=III
Ie= 1.25
Ss= 0.65
Sds= 0.49
S1 = 0.18
Sd1 = 0.19
SITE CLASS: C
BASIC SEISMIC-FORCE RESISTING SYSTEM=
INTERMEDIATE PRECAST SHEAR WALLS, R = 4
SEISMIC DESIGN CATEGORY= C
ANALYSIS PROCEDURE = EQUIVALENT LATERAL FORCE PROCEDURE

E. SOILS

SOIL DENSITY (Ɣ): 120 PCF
ANGLE OF INTERNAL FRICTION OF THE SOIL (Φ) : 30 DEGREES
EQUIVALENT FLUID PRESSURE (EFP) : 60 PSF PER FOOT OF DEPTH

2.0 GENERAL

2.1 CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND SITE CONDITIONS PRIOR TO CONSTRUCTION/FABRICATION. CONTRACTOR SHALL NOTIFY CONTRACTING OFFICER OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION.

2.2 THE STRUCTURE (MEMBERS AND CONNECTIONS) HAS BEEN DESIGNED TO SUPPORT IN-PLACE DESIGN LOADS ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LIMITING CONSTRUCTION LOADS SUCH THAT THESE LOADS DO NOT EXCEED THE DESIGN LOADS NOTED ABOVE.

2.3 IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE CONSTRUCTION METHODS, PROCEDURES, AND SEQUENCES TO ENSURE STABILITY AND SAFETY DURING CONSTRUCTION. THE CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO PROTECT AND MAINTAIN THE STRUCTURAL INTEGRITY OF ALL NEW AND EXISTING CONSTRUCTION AT ALL STAGES.

2.4 SECTIONS AND DETAILS SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE CONSIDERED TYPICAL FOR SIMILAR CONDITIONS THAT DO NOT HAVE A SPECIFIC SECTION INDICATED.

2.5 THE CONTRACTOR SHALL COORDINATE STANDARD DRAWINGS WITH THE VENDOR/MANF. SHOP DRAWINGS TO VERIFY SIZES AND LOCATIONS OF OPENINGS, SLEEVES, INSERTS, DEPRESSIONS, FINISHES, SLOPES, ETC. ANY DISCREPANCY SHALL BE BROUGHT TO THE ATTENTION OF THE CONTRACTING OFFICER.

2.6 SEE CIVIL SITE LAYOUT DRAWINGS (PART OF SITE ADAPTION) FOR ACTUAL FINISHED FLOOR ELEVATIONS (F.F.E.) FOR ALL BUILDINGS. ELEVATIONS SHOWN IN STRUCTURAL DOCUMENTS WILL BE BASED ON REFERENCED F.F.E. EQUAL TO 100'-0", U.O.N.

2.7 ANY DISCREPANCIES BETWEEN DRAWINGS, SPECIFICATIONS, REFERENCE STANDARDS, OR GOVERNING CODE, THE MORE STRINGENT REQUIREMENTS SHALL GOVERN. CONTRACTOR SHALL NOTIFY THE CONTRACTING OFFICER OF DISCREPANCIES AND OBTAIN DIRECTION PRIOR TO PROCEEDING.

2.8 CONTRACTOR SHALL PROVIDE TEMPORARY SHORING AND BRACING OF ALL STRUCTURAL WORK, AND SOIL EXCAVATION AS REQUIRED. SHORING AND BRACING SHALL NOT BE REMOVED UNTIL ALL FINAL CONNECTIONS HAVE BEEN COMPLETED IN ACCORDANCE WITH THE DRAWINGS, AND MATERIALS HAVE ACHIEVED DESIGN STRENGTH.

3.0 FOUNDATIONS

3.1 SEE CIVIL DRAWINGS AND SPECIFICATIONS (PART OF SITE ADAPTION) FOR EARTHWORK PREPARATION OF FOUNDATIONS INCLUDING THE REMOVAL OF ORGANIC MATERIALS, COMPACTING SOILS BENEATH STRUCTURES, BACK FILL REQUIREMENTS FOR OVER EXCAVATION AND REMOVAL OF UNSUITABLE MATERIALS.

3.2 MAXIMUM ASSUMED NET SOIL BEARING PRESSURE USED FOR DESIGN: 3000 PSF .

3.3 ASSUMED UNIT WEIGHT OF SOIL USED FOR DESIGN: 120 PCF

3.4 ALL FOUNDATION BEARING SURFACES SHALL BE REVIEWED BY THE GEOTECHNICAL ENGINEER PRIOR TO PLACING CONCRETE TO ENSURE THEIR COMPLIANCE WITH THE PRESSURES NOTE ABOVE.

3.5 ALL FOOTINGS SHALL PROJECT AT LEAST 1'-6" INTO UNDISTURBED NATURAL SOIL OR COMPACTED ENGINEERED FILL HAVING A SOIL BEARING PRESSURE THAT MEETS OR EXCEEDS THAT SPECIFIED ABOVE.

3.6 ALL DISTURBED EARTH UNDER FOOTINGS SHALL BE REPLACED WITH LEAN CONCRETE.

3.7 CONCRETE SHALL NOT BE PLACED OVER FROZEN SOIL OR FOOTING EXCAVATIONS SUBJECTED TO WATER.

4.0 CONCRETE

4.1 ALL CONCRETE WORK INCLUDING DETAILING, FABRICATION, PLACEMENT OF REINFORCING, MIXING, HANDLING, PLACING, FINISHING, AND CURING SHALL CONFORM TO THE FOLLOWING DOCUMENTS:

ACI 301----------"STANDARD SPECIFICATIONS FOR STRUCTURAL CONCRETE"
ACI 315----------"MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES"
ACI 318----------"BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE"

4.2 ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS, U.O.N.
ALL CONCRETE SHALL CONFORM TO ASTM C94.

4.3 REINFORCING BARS SHALL BE DEFORMED TYPE CONFORMING TO ASTM A615 GRADE 60 U.O.N.

4.4 WELDED WIRE REINFORCEMENT SHALL CONFORM TO ASTM A185. MINIMUM LAP AND EMBEDMENT TO BE THE GREATER OF ONE CROSS WIRE SPACING PLUS 2" OR 6", WHICHEVER IS GREATER.

4.5 FABRICATE AND PROVIDE BAR SUPPORTING ACCESSORIES IN ACCORDANCE WITH ACI MANUAL OF STANDARD PRACTICE AND C.R.S.I. SPECIFICATIONS. REINFORCING SHALL NOT BE WELDED IN ANY MANNER U.O.N. IN CONSTRUCTION DOCUMENTS.

4.6 REINFORCING SHALL BE CONTINUOUS WITH CLASS "B" TENSION LAP SPLICES, U.O.N.

4.7 CONCRETE COVERAGE OF REINFORCEMENT FOR CAST-IN-PLACE CONSTRUCTION U.O.N.:

CONCRETE CAST AGAINST EARTH:.....3 INCHES
FORMED CONCRETE EXPOSED TO EARTH OR WEATHER:
NO. 6 BAR AND LARGER.....2 INCHES
NO. 5 BAR AND SMALLER.....1 1/2 INCHES
CONCRETE NOT EXPOSED TO WEATHER:
SLABS, WALLS, JOISTS.....1 INCHES
BEAMS AND COLUMNS.....1 1/2 INCHES
SLAB ON GRADE.....MID-DEPTH OF SLAB

4.8 PROVIDE REINFORCING BARS IN CONCRETE FOOTINGS TO MATCH THE SIZE AND SPACING OF THE HORIZONTAL REINFORCING AT ALL CORNERS AND INTERSECTIONS OF STRIP FOOTINGS. PROVIDE LEG LENGTH EQUIVALENT TO CLASS "A" TENSION LAP SPLICE U.O.N.

4.9 PROVIDE DOWEL TO FOUNDATION WITH 90 DEGREE HOOK TO MATCH SIZE AND SPACING OF VERTICAL REINFORCING AT ALL PEDESTALS, WALLS, AND COLUMNS.

4.10 FOOTINGS AND SLABS SHALL HAVE NO HORIZONTAL JOINTS (POURED TO THEIR FULL DEPTHS IN ONE OPERATION). ANY STOP IN CONCRETE WORK SHALL BE BULKHEAD AND KEYED, U.O.N.

4.11 REINFORCEMENT SHALL NOT BE BENT OR STRAIGHTENED IN A MANNER THAT WILL DAMAGE THE MATERIAL. BARS WITH WITH KINKS OR IMPROPER BENDS SHALL NOT BE USED.

4.12 REINFORCEMENT SHALL BE CONTINUOUS THROUGH ALL CONSTRUCTION JOINTS, BUT DISCONTINUOUS THROUGH ALL CONTROL JOINTS, U.O.N..

4.13 A CLASS C FINISH IS REQUIRED FOR EXPOSED FORMED SURFACES OF PRECAST PANELS. A CLASS D FINISH IS REQUIRED FOR SURFACES WHICH WILL BE BELOW GRADE OR NOT EXPOSED TO VIEW AFTER FINAL ASSEMBLY.

4.13 REFER TO GEOTECHNICAL REPORT FOR RECOMMENDATIONS RELATIVE TO SUBGRADE PREPARATION FOR SLAB ON GRADE WORK.

5.0 STRUCTURAL STEEL

5.1 STRUCTURAL STEEL FABRICATION, ERECTION, AND CONNECTION DESIGN SHALL CONFORM TO A.I.S.C.'S "SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS."

5.2 STRUCTURAL STEEL SHALL CONFORM TO THE FOLLOWING ASTM DESIGNATIONS:

W SHAPES.....ASTM A36
STEEL CHANNELS, ANGLES, PLATES AND BARS: .....ASTM A36
RECTANGULAR, SQUARE, AND ROUND HSS.....ASTM A500, GRADE B
STEEL PIPE (HSS).....ASTM A53, GRADE B

5.3 STRUCTURAL FASTENERS SHALL CONFORM TO THE FOLLOWING ASTM DESIGNATIONS:

ANCHOR BOLTS.....ASTM 307
THREADED RODS.....ASTM A36
HEADED STUDS.....ASTM A108, GRADES 1015 TO 1020 (60 KSI TENSILE STRENGTH)

5.4 BOLTED CONNECTIONS SHALL CONFORM TO RCSC'S "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS". ALL BOLTS SHALL BE 3/4" DIAMETER UNLESS OTHERWISE NOTED.

5.5 WELDED CONNECTIONS SHALL CONFORM TO AWS D1.1 "STRUCTURAL WELDING CODE-STEEL". MINIMUM SIZE FILLET WELDS SHALL BE 3/16" UNLESS OTHERWISE NOTED AND ELECTRODES SHALL BE E70xx. WELDERS SHALL BE QUALIFIED IN ACCORDANCE WITH AWS.

5.6 UNLESS SPECIFICALLY DETAILED ON THE CONTRACT DRAWINGS, ALL FRAMED BEAM CONNECTIONS SHALL BE DESIGNED BY A QUALIFIED PROFESSIONAL ENGINEER EMPLOYED BY THE FABRICATOR. STANDARD BEAM CONNECTIONS (NON-COMPOSITE) SHALL BE DESIGNED BASED ON A REACTION EQUAL TO ONE-HALF THE MAXIMUM TOTAL UNIFORM LOAD CAPACITY FROM AISC'S "MAXIMUM TOTAL UNIFORM LOAD" TABLE MULTIPLIED BY A FACTOR OF 1.2, UNLESS REACTIONS ARE SHOWN ON STRUCTURAL DRAWINGS. MINIMUM REACTION TO DESIGN FOR SHALL BE (12.0 KIPS).

5.7 ALL EXTERIOR STEEL EXPOSED TO THE WEATHER SHALL BE HOT DIPPED GALVANIZED, UON. MEMBERS NOT REQUIRED FOR CORROSION PROTECTION SHALL RECEIVE ONE COAT OF STANDARD PRIMER PAINT. DO NOT PRIME OR PAINT SURFACES WHICH ARE TO RECEIVE FIELD WELDED HEADED SHEAR STUDS. PROVIDE 3" MINIMUM CONCRETE COVER FOR ALL STEEL BELOW GRADE AND PAINT WITH 2 COATS OF COAL TAR EPOXY. EPOXY SHALL MEET THE REQUIREMENTS OF PAINT SPECIFICATION SSPC-PAINT 16.

5.8 ALL STIFFENERS AND GUSSETS PLATES SHALL BE MINIMUM 3/8" THICK, UNLESS OTHERWISE NOTED.

6.0 STRUCTURAL PRECAST CONCRETE

6.1 ALL PRECAST ELEMENTS NOT DETAILED ON DRAWINGS SHALL BE DESIGNED FOR THE SPAN AND CONCRETE AND CONSTRUCTION LOADING CONDITIONS SHOWN ON THE DRAWINGS BY A LICENSED STRUCTURAL ENGINEER. ALL DESIGN CALCULATIONS, INCLUDING THE DESIGN OF ALL STRUCTURAL ELEMENTS AND LIFTING POINTS SHALL BE SUBMITTED TO THE CONTRACTING OFFICER FOR REVIEW PRIOR TO THE START OF FABRICATION.

6.2 THE PRECAST MANUFACTURER SHALL BE RESPONSIBLE FOR COORDINATION OF ALL DISCIPLINES AS THEY EFFECT THE PRECAST ELEMENTS.

6.3 THERE SHALL BE NO FIELD CUTTING OF PRECAST ELEMENTS WITHOUT THE APPROVAL OF THE CONTRACTING OFFICER.

6.4 CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH AT TWENTY-EIGHT DAYS OF 4000 PSI.

6.5 ALL GROUT SHALL BE NON-SHRINK, NON-METALLIC WITH F'c = 6000 PSI.

7.0 LIGHTNING PROTECTION SYSTEM (LPS)

7.1 ALL METAL PARTS, TO INCLUDE REINFORCEMENT IN FLOOR, PRECAST WALLS AND ROOF PANELS, LOUVERS, VENTILATORS, DOORS AND DOOR FRAME, SHALL BE MADE ELECTRICALLY CONTINUOUS BY BONDING (CLIPPING, BRAZING OR WELDING) AT 5 LINEAR FEET INTERVALS. ELECTRICAL CONTINUITY SHALL BE PROVIDED ACROSS FLOOR EXPANSION AND ISOLATION JOINTS TO FOUNDATION PEDESTALS AND PRECAST ROOF PANELS, AND BETWEEN PRECAST WALLS AND CONCRETE PEDESTAL FOOTING SHALL BE PROVIDED DURING CONSTRUCTION. ACCEPTABLE CONTINUITY METHODS ARE REINFORCING BARS (MINIMUM OVERLAP SHALL BE 20 BAR DIAMETERS), COPPER STRAPS, ETC. SEE ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION REGARDING LPS.

DESIGNER NOTES: TO BE REMOVED WHEN PREPARING CONSTRUCTION DRAWINGS FOR SITE ADAPTION OF THIS DESIGN.

1. THE MAGAZINE HAS BEEN ANALYZED FOR THE LOADS LISTED ON THIS SHEET AND DETERMINED TO BE ADEQUATE UNDER THESE LOADINGS. HOWEVER, THE DESIGNER SHOULD VERIFY THE STRUCTURE FOR THE SITE-SPECIFIC LOADING CRITERIA. IF SITE-SPECIFIC LOADS EXCEED THESE LISTED ON THIS SHEET, THE DESIGNER SHOULD ADDRESS ALL DEFICIENCIES THAT DO NOT MEET CURRENT BUILDING CODES.
2. FOUNDATIONS SHALL BE REVISED TO REFLECT SPECIFIC SITE SOIL CONDITIONS INCLUDING LOCAL SITING, TOPOGRAPHIC CONDITIONS, AND FROST PENETRATION DEPTHS.
3. STRUCTURAL COMPONENTS, WITH THE EXCEPTION OF THE FOUNDATION (FOOTINGS), SLAB-ON-GRADE, AND WING WALLS SHALL NOT BE MODIFIED WITHOUT THE APPROVAL OF THE CONTRACTING OFFICER, WHO SHOULD CONSULT WITH THE U.S. ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE (STRUCTURAL BRANCH). STRUCTURE HAS BEEN DETERMINED TO BE ADEQUATE FOR THE DESIGN CRITERIA LISTED ON THIS SHEET.
4. SHEETS S701 - S705 (HIGH SECURITY HASP) AND S701(A) - S705(A) (ILD) IDENTIFY TWO DIFFERENT LOCKING SYSTEMS. THE DESIGNER SHALL VERIFY WITH THE CONTRACTING OFFICER THE CORRECT LOCKING SYSTEM REQUIRED AND REMOVE THE REDUNDANT SHEETS FROM THE CONSTRUCTION CONTRACT DOCUMENTS FOR THE SYSTEM NOT USED.

STRUCTURAL DESIGNATION (7-BAR) NOTES:

1. ANY DEVIATION FROM THE STANDARD APPROVED DESIGN DRAWINGS FOR THE CONCRETE HEADWALL, STEEL DOOR, CONCRETE ROOF OR THEIR SUPPORTS WITHOUT WRITTEN APPROVAL FROM THE DEPARTMENT OF DEFENSE EXPLOSIVE SAFETY BOARD (DDESB) MAY REQUIRE THE MAGAZINE TO BE CONSIDERED AN UNDEFINED MAGAZINE AND MAY SEVERELY RESTRICT THE ALLOWABLE STORAGE CAPACITY.
2. IF CONSTRUCTED PER THESE DRAWINGS, FACILITY MEETS BLAST-RESISTANT DESIGN CRITERIA FOR A 7-BAR STRUCTURAL DESIGNATION PER DOD 6055.09-M. THIS DESIGNATION IN NO WAY IMPLIES VALIDATION OF THE DESIGN AGAINST OTHER LOAD CASES.

1. THIS STANDARD DESIGN DRAWING DATED JUNE 2013; STD 421-80-08 SHEETS 1-26, UPDATE AND SUPERSEDE THE STANDARD DESIGN MUNITIONS STORAGE MODULE BUILDING, HILL AIR FORCE BASE, UTAH, PROJECT NOS. KRSM 003013, 033005, AND 033004.

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GENERAL NOTES

Sheet reference number:
S-001
Sheet 3 of 26

SPECIAL INSPECTION SCHEDULE/VERIFICATION

ITEM	EXTENT OF INSPECTION [1]	REFERENCE	COMMENTS/SCOPE
CONCRETE CONSTRUCTION			
REINFORCING STEEL PLACEMENT	P	ACI 318: 3.5, 7.1-7.7	INSPECT SIZE, SPACING, COVER, POSITIONING AND GRADE OF REINFORCING STEEL. VERIFY THAT REINFORCING BARS ARE FREE OF FORM OIL OR OTHER DELETERIOUS MATERIALS. INSPECT BAR LAPS AND MECHANICAL SPLICES. VERIFY THAT BARS ARE ADEQUATELLY TIED AND SUPPORTED ON CHAIRS OR BOLSTERS
WELDING OF RIENFORCEMENT	C, P	AWS D1.4, ACI 318:3.5.2	VISUALLY INSPECT ALL REINFORCING STEEL WELDS. VERIFY WELDABILITY OF REINFORCING STEEL. INSPECT PREHEATING OF STEEL WHEN REQUIRED.
CONCRETE PLACEMENT	C	ACI 318: 5.9, 5.10	INSPECT PLACEMENT OF CONCRETE. VERIFY THAT CONCRETE CONVEYANCE AND DEPOSITING AVOIDS SEGREGATION OR CONTAMINATION. VERIFY THAT CONCRETE IS PROPERLY CONSOLIDATED
SAMPLING AND TESTING OF CONCRETE	C	ASTM C 172 ASTM C 31 ACI 318: 5.6, 5.8	TEST CONCRETE COMPRESSIVE STRENGTH, SLUMP, AIR-CONTENT AND TEMPERATURE
CURING AND PROTECTION	P	ACI 318: 5.11-5.13	INSPECT CURING, COLD WEATHER PROTECTION AND HOT WEATHER PROTECTION PROCEDURES
FORMWORK	P	ACI 318: 6.1.1	INSPECT FORWORK FOR SHAPE, LOCATION, AND DIMENSIONS OF THE CONCRETE MEMBER BEING FORMED
PRECAST CONCRETE			
PLANT CERTIFICATION/QUALITY CONTROL PROCEDURES	S		REVIEW OF PLANT OPERATIONS AND QUALITY CONTROL PROCEDURES
MIX DESIGN	S		INSPECT CONCRETE BATCHING OPERATIONS AND VERIFY COMPLIANCE WITH APPROVED MIX DESIGN
MATERICAL CERTIFICATION	S		REVIEW FOR CONFORMANCE TO ACI 318
REINFORCEMENT INSTALLATION	P		INSPECT SIZE, SPACING, POSITION AND GRADE OF REINFORCING STEEL
CONNECTIONS/EMBEDDED ITEMS	P		INSPECT INTERFACE CONNECTIONS INCLUDING END AND EDGE DOWELING. INSPECT EMBEDMENTS FOR PROPER LOCATION AND WELDING OF CONNECTIONS
CONCRETE PLACEMENT	C	ACI 318: 5.9, 5.10	INSPECT PLACEMENT OF CONCRETE. VERIFY THAT CONCRETE CONVEYANCE AND DEPOSITING AVOIDS SEGREGATION OR CONTAMINATION. VERIFY THAT CONCRETE IS PROPERLY CONSOLIDATED
SAMPLING AND TESTING	C		
CURING AND PROTECTION	P		
ERECTED PRECAST ELEMENTS	C	ACI 318: Ch. 16	INSPECT ERECTION OF PRECAST CONCRETE INCLUDING MEMBER CONFIGURATION, CONNECTIONS, WELDING AND GROUTING
DOOR CONSTRUCTION			
FABRICATOR CERTIFICATION/QUALITY CONTROL PROCEDURES	S		REVIEW OF FABRICATOR'S QUALITY CONTROL PROCEDURES OR AISC CERTIFICATION
FABRICATOR INSPECTION	P		INSPECT IN-PLANT FABRICATION, OR REVIEW FABRICATOR'S APPROVED INDEPENDENT INSPECTION AGENCY'S REPORTS
SPECIAL ITEMS RELATED TO THE OTHER EXPLOSIVES SAFETY RELATED ITEMS			
REBAR FARADAY-SHIELD	P	DWGS E-101; E-102	INSPECT REINFORCING STEEL TO ENSURE ELECTRICAL CONTINUITY BETWEEN THE CAP, WALLS, SLAB AND FOUNDATION THROUGH BONDING WELDS. DOCUMENT BONDS WITH PHOTOS AND CONTINUITY TEST.
ECM GROUNDNG	P	DWGS E-101; E-102	VISUALLY INSPECT TO ENSURE ECM FOUNDATION IS BONDED TO THE GROUNDING SYSTEM. DOCUMENT WITH PHOTOS.
GROUNDING SYSTEM	P	DWGS E-101; E-102, NFPA 780, DA PAM 385-64, 17-27.	VISUALLY INSPECT GROUNDING SYSEM CONDUCTORS TO ENSURE NO DAMAGE, BREAKAGE, OR CORROSION HAS OCCURRED TO THE CONDUCTORS DURING INSTALL AND BEFORE EARTH BURIAL.
INDIVIDUAL BONDS	P	DWGS E-101, E-102, NFPA 780, 8.9 DA PAM 385-64, 17.27.	INSPECT ALL BONDS FOR LOOSE CONNECTIONS THAT MIGHT RESULT IN HIGH-RESISTANCE CONNECTIONS.
LPS COMPONENTS	P	NFPA 780, 8.9 DA PAM 385-64, 17-27.	INSPECT LPS COMPONENTS FOR SECURE MOUNTING AND PROTECTION AGAINST ACCIDENTAL MECHANICAL DISPLACEMENT.
LPS TESTING	S	NFPA 780, 8.9 DA PAM 385-64, 17-28.	PERFORM BONDING TEST ACROSS EACH BOND, AND AN EARTH ELECTRODE TEST OF THE LPS.
EARTH COVER	P	DWGS S-301-302	INSPECT DEPTH GAUGES ON ROOF PRIOR TO EARTH COVER PLACEMENT FOR SIZE AND STABILITY. INSPECT EARTH COVER DEPTH AND SLOPE TO ENSURE A 2' MIN. IS PROVIDED ABOVE STRUCTURE
DOOR LAPS	C	DWG S-701	INSPECT DOOR LAPS AT TOP AND BOTTOM OF DOOR FRAME

SPECIAL INSPECTION NOTES:

1 INSPECTION INTERVALS ARE AS FOLLOWS:
C - Continuous: The full-time observation of work requiring special inspection by an approved special inspector who is present in the area where the work is being performed
P - Periodic: The part-time or intermittent observation of work requiring special inspection by an approved special inspector who is present in the area where the work has been or is being performed and at the completion of the work.
S - Submittal
2 STRUCTURAL TEST AND SPECIAL INSPECTIONS ARE BASED ON CHAPTER 17 OF THE IBC 2009 EDITION
3 CONTRACTOR SHALL HIRE A QUALIFIED INSPECTION AND TESTING AGENCY TO PERFORM SPECIAL INSPECTIONS AND TESTING IN ACCORDANCE WITH THE IBC. SUBMIT INSPECTION REPORTS TO THE CONTRACTING OFFICER FOR EACH DAY SPECIAL INSPECTIONS AND TESTING IS PERFORMED.

DESIGNER NOTES: TO BE REMOVED WHEN PREPARING CONSTRUCTION DRAWINGS FOR SITE ADAPTION OF THIS DESIGN.

1. SPECIAL INSPECTION SCHEDULE SHALL BE REVISED TO REFLECT SPECIFIC PROJECT REQUIREMENTS IN ACCORDANCE WITH CHAPTER 17 OF THE INTERNATIONAL BUILDING CODE; HOWEVER, AT A MINIMUM THE SPECIAL ITEMS RELATED TO THE 'OTHER EXPLOSIVES SAFETY RELATED ITEMS' SHALL BE INSPECTED AS SHOWN ON THIS SCHEDULE.

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MODULAR STORAGE MAGAZINE
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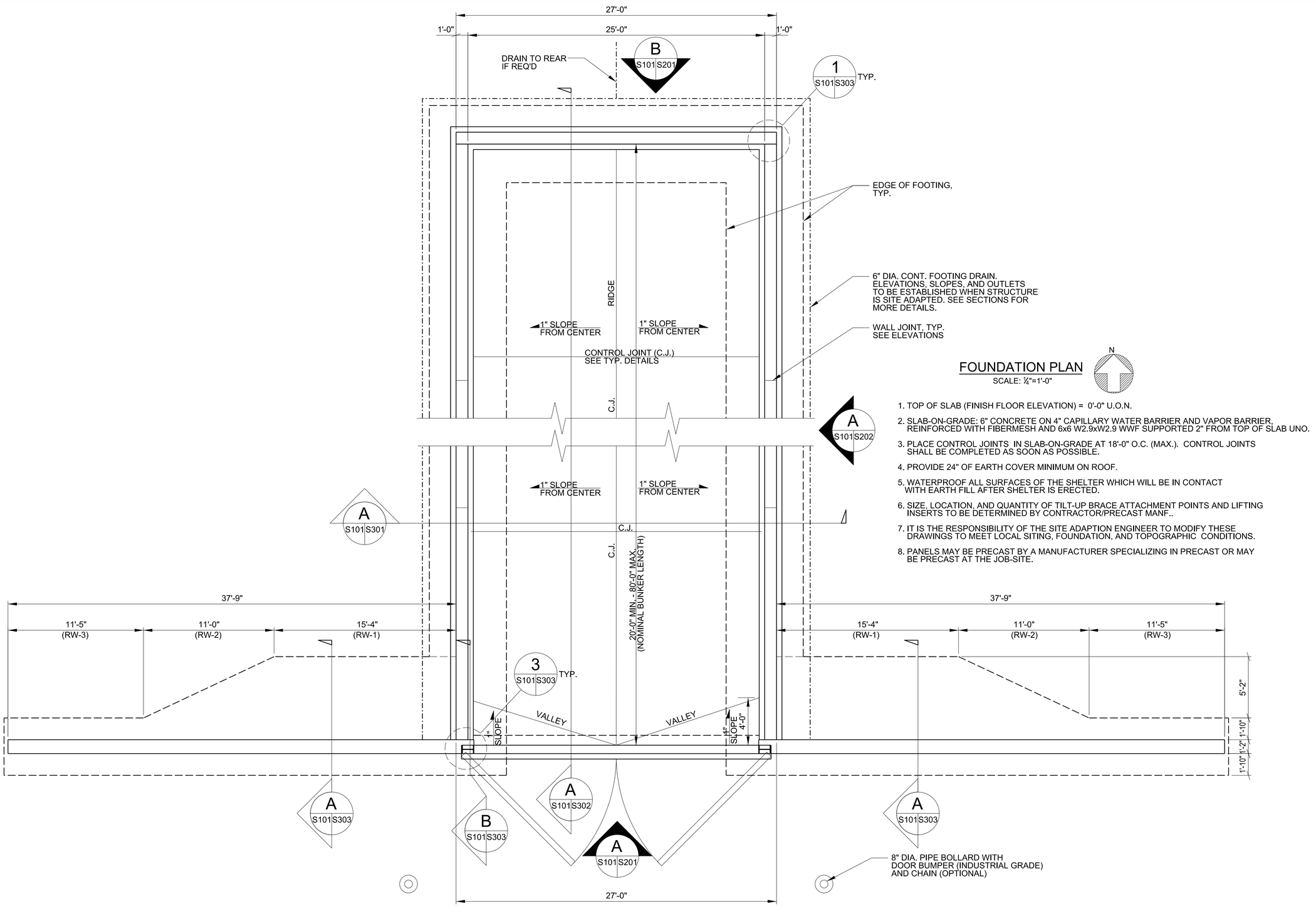
SPECIAL INSPECTIONS

Sheet reference number:
S-002
Sheet 4 of 26



FOUNDATION PLAN

SCALE: ¼"=1'-0"

N

1. TOP OF SLAB (FINISH FLOOR ELEVATION) = 0'-0" U.O.N.
2. SLAB-ON-GRADE: 6" CONCRETE ON 4" CAPILLARY WATER BARRIER AND VAPOR BARRIER, REINFORCED WITH FIBERMESH AND 6x6 W2.9xW2.9 WWF SUPPORTED 2" FROM TOP OF SLAB UNO.
3. PLACE CONTROL JOINTS IN SLAB-ON-GRADE AT 18'-0" O.C. (MAX.). CONTROL JOINTS SHALL BE COMPLETED AS SOON AS POSSIBLE.
4. PROVIDE 24" OF EARTH COVER MINIMUM ON ROOF.
5. WATERPROOF ALL SURFACES OF THE SHELTER WHICH WILL BE IN CONTACT WITH EARTH FILL AFTER SHELTER IS ERECTED.
6. SIZE, LOCATION, AND QUANTITY OF TILT-UP BRACE ATTACHMENT POINTS AND LIFTING INSERTS TO BE DETERMINED BY CONTRACTOR/PRECAST MANF..
7. IT IS THE RESPONSIBILITY OF THE SITE ADAPTION ENGINEER TO MODIFY THESE DRAWINGS TO MEET LOCAL SITING, FOUNDATION, AND TOPOGRAPHIC CONDITIONS.
8. PANELS MAY BE PRECAST BY A MANUFACTURER SPECIALIZING IN PRECAST OR MAY BE PRECAST AT THE JOB-SITE.

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FOUNDATION PLAN

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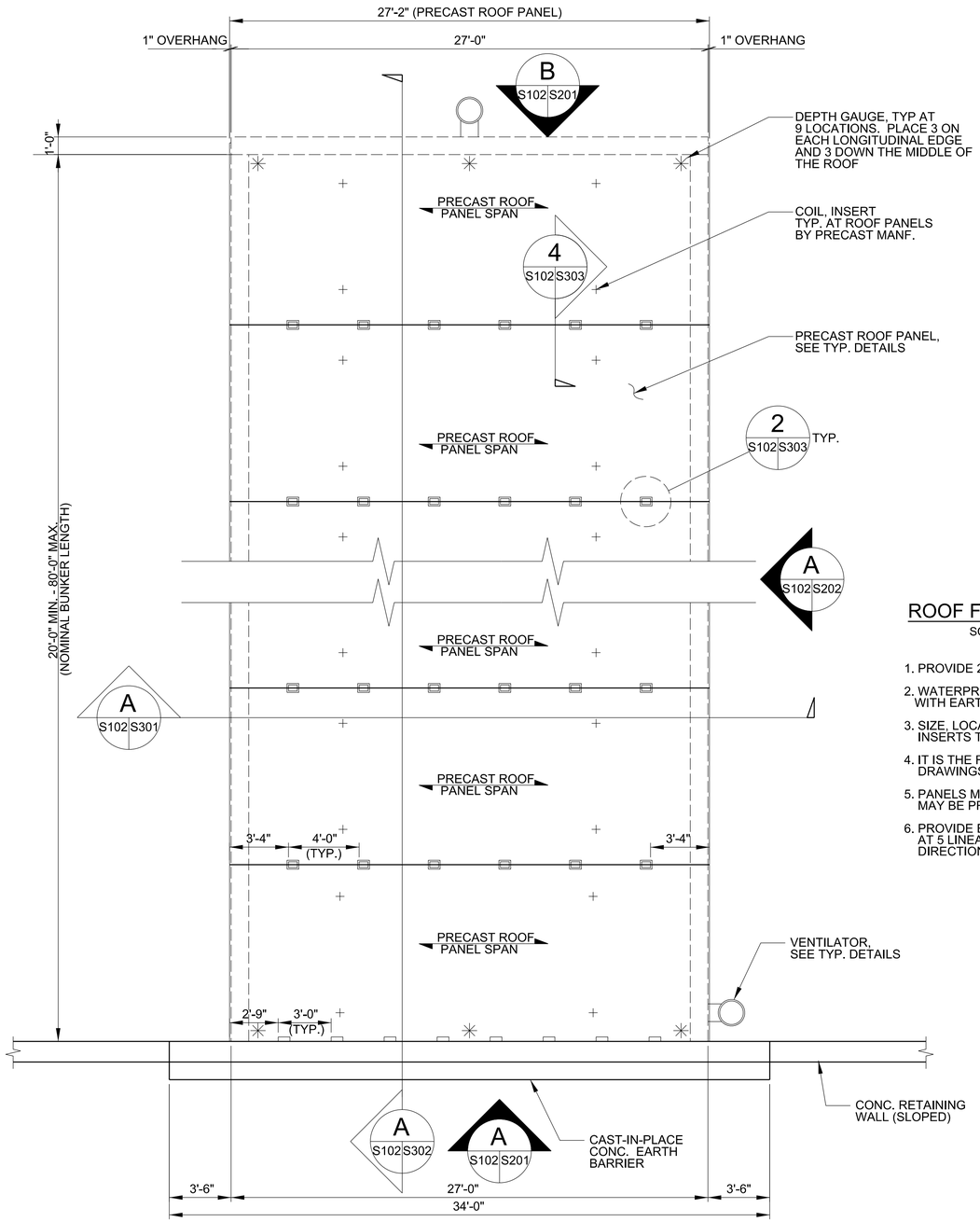
S-101
Sheet 5 of 26



ROOF FRAMING PLAN

SCALE: ¼"=1'-0"

N

1. PROVIDE 24" OF EARTH COVER MINIMUM ON ROOF.
2. WATERPROOF ALL SURFACES OF THE SHELTER WHICH WILL BE IN CONTACT WITH EARTH FILL AFTER SHELTER IS ERECTED.
3. SIZE, LOCATION, AND QUANTITY OF TILT-UP BRACE ATTACHMENT POINTS AND LIFTING INSERTS TO BE DETERMINED BY CONTRACTOR/PRECAST MANF..
4. IT IS THE RESPONSIBILITY OF THE SITE ADAPTION ENGINEER TO MODIFY THESE DRAWINGS TO MEET LOCAL SITING, FOUNDATION, AND TOPOGRAPHIC CONDITIONS.
5. PANELS MAY BE PRECAST BY A MANUFACTURER SPECIALIZING IN PRECAST OR MAY BE PRECAST AT THE JOB-SITE.
6. PROVIDE ELECTRICAL CONTINUITY WITHIN THE PRECAST ROOF PANELS BY WELDING AT 5 LINEAR FEET INTERVALS ACROSS TOP OF STIRRUPS TO END ANGLES IN ONE DIRECTION. IN THE OTHER DIRECTION, WELD #4 BAR FROM BOTTOM PLATE TO #4 REINF.

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ROOF FRAMING PLAN

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S-102
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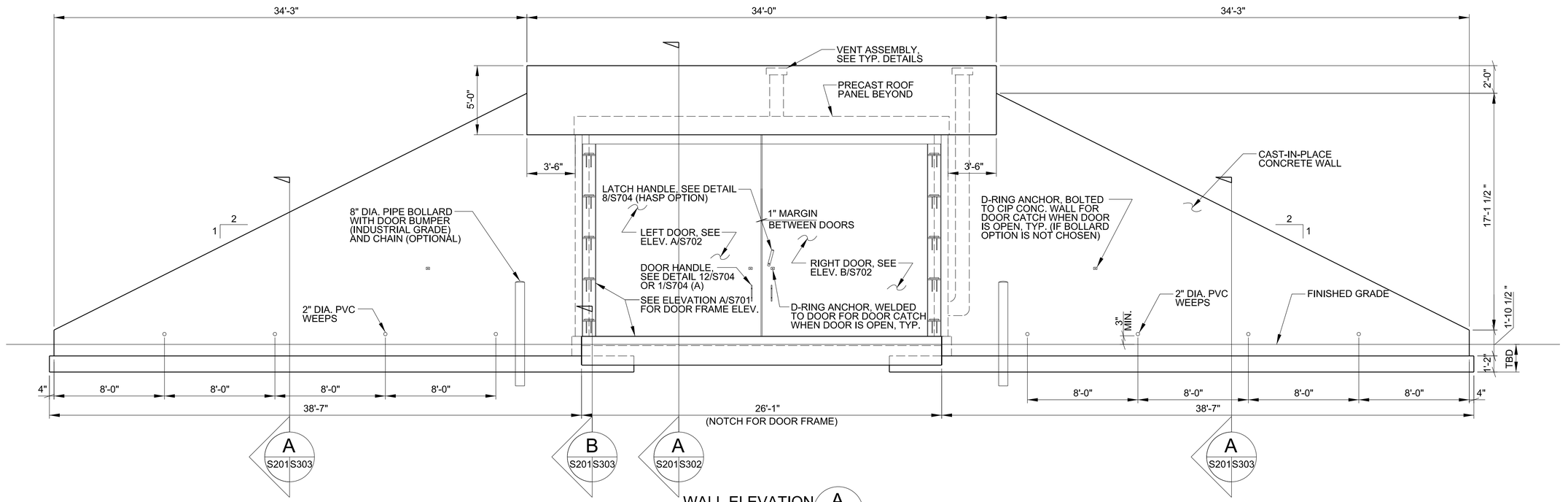
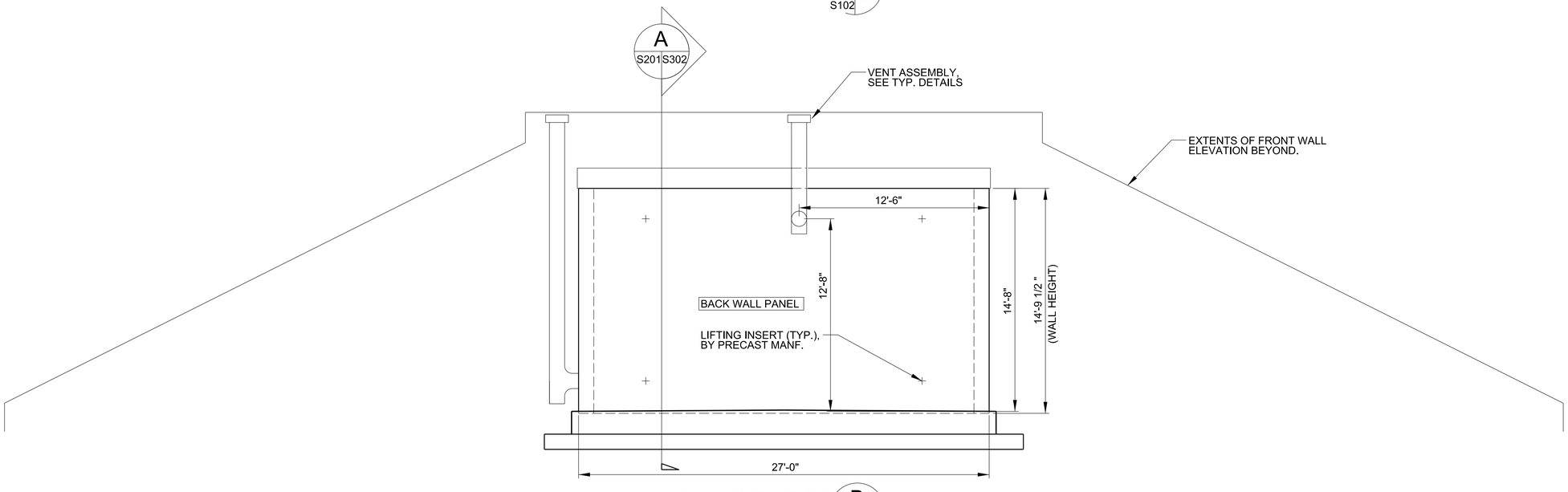


WALL ELEVATION A
SCALE: ¼"=1'-0"
S101 S201 S102



WALL ELEVATION B
SCALE: ¼"=1'-0"
S101 S201 S102

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ELEVATIONS

Sheet reference number:
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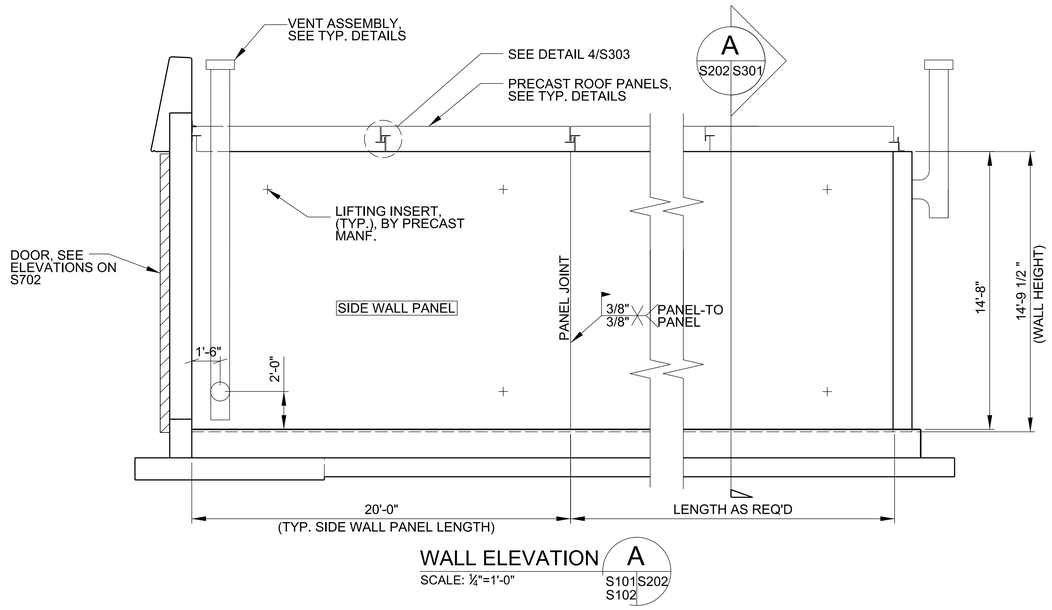
Sheet 7 of 26



WALL ELEVATION A
SCALE: ¼"=1'-0"
S101 S202
S102

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ELEVATIONS

Sheet reference number:

S-202

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WATERPROOFING MEMBRANE (60 MIL), TYP. AT ROOF AND WALLS

SLOPE FILL

SEE PLAN

REASONABLY COHESIVE SOILS ONLY. SOLID OR WET CLAY SHALL NOT BE USED.

NOTE:
EARTH FILL SHALL CONTAIN NO STONES HEAVIER THAN 10 POUNDS OR LARGER THAN 6" (15.2) IN ANY DIMENSION

DEPTH GAUGE, SEE DETAIL F/S501. REFER TO ROOF PLAN FOR LOCATIONS

2'-0" MIN.

2 MIN. 1

#4 BARS TO MATCH STIRRUP SPACING

1'-4"

2" (TYP.)

#6 BARS CONT., TYP.

PRECAST ROOF PANELS, SEE TYP. DETAILS

(2) #5 HORZ. CONT. TOP & BOTT. TYP. AT TOP OF WALLS

#4 STIRRUPS AT 4" O.C., TYP. ENCLOSE HORIZ. REINFORCEMENT WITHIN STIRRUPS

10"

1'-2"

#4 BAR AT 5'-0" O.C. WELDED TO PL. AND REINF. FOR ELECTRICAL CONTINUITY. (SEE NOTE 6 ON S102)

1/2" DIA. x 8" HEADED STUDS AT 12" O.C. (START 4 3/4" FROM END)

(2) #4 CONT.

TYP. 1/4

1"

2" (TYP.)

1"

1"

1/2"x10"x9'-11 3/8" LONG PL. EACH END OF EACH PANEL

C12x20.7 CONT.

TYP. 3/8 3/8

#4 BAR AT 5'-0" O.C. WELDED TO CHANNELS AND VERT. REINF. FOR ELECTRICAL CONTINUITY.

1/2" DIA. x 8" HEADED STUDS AT 12" O.C., STAGGERED.

NOTE:
STAGGER REBAR LAYERS TO FORM A 6"x6" SQUARE MESH PATTERN OF #5 AND #8 REBAR.

1" (TYP.)

1'-0" (TYP.)

PRECAST WALL PANELS

#8 VERT. AT 12" O.C., TYP.

#5 HORZ. AT 12" O.C. W/ SEISMIC HOOK EA END, TYP.

6" SAND MATERIAL (SW)

14'-8"

3" DIAMETER GALV. CORRUGATED STEEL CONDUIT (24 GAUGE MIN.). GROUT SHALL BE 5000 PSI HIGH STRENGTH, NON-SHRINK

1 1/2" TYP.

1 1/2"

3"

4"

5000 PSI HIGH STRENGTH, NON-SHRINK GROUT

#7 DOWELS AT 12" O.C. ALTERNATE HOOK DIRECTION.

4'-1" (EMBEDMENT)

#4 BAR AT 5'-0" O.C. BRAZED OR WELDED TO REINF.

3" DIAMETER GALV. CORRUGATED STEEL CONDUIT (24 GAUGE MIN.). GROUT SHALL BE 5000 PSI HIGH STRENGTH, NON-SHRINK

#7 DOWELS AT 12" O.C. ALTERNATE HOOK DIRECTION.

1 1/2" DIA. WEEPS AT 1'-8" O.C.

#5 DOWELS AT 12" O.C.

6" DIA. PERFORATED FOOTING DRAIN PIPE, TYP. (TURN PERFORATIONS DOWN)

FILTER FABRIC

#4 BAR AT 5'-0" O.C. BRAZED OR WELDED TO REINF. AND HEADED STUDS

3 1/2" (MIN.) WIDE PRE-SLOPED TRENCH CONT.. PROVIDE BOTTOM OUTLETS/DRAINS (2" DIA.) AT 20'-0" O.C. MAX. RUN DRAINS THRU FOUNDATION STEM WALL AND TERMINATE WITHIN 6" OF FOOTING DRAIN PIPE. (NOT SHOWN)

JOINT SEALER,1/2" MIN. DEPTH

1/2" EXP. JOINT W/ JOINT FILLER

SLAB-ON-GRADE SEE PLAN

SLOPE

SLOPE

4" MIN.

VARIES

1'-6"

WRAP END OF WEEPS WITH FILTER FABRIC, TYP.

1'-0"

#4 BAR AT 5'-0" O.C. WELDED TO WWF AND REINF.

8" 3" 8"

#5 CONT. AT 12" O.C. TOP AND BOTT.

GRAVEL MATERIAL (GW)

#5 TRANSVERSE BARS AT 12" O.C. TOP AND BOTT.

#6 HORZ. CONT. AT 12" O .C.

10" 1'-9 1/2 " 1'-11" 2'-9 1/2 " 6'-6"

2'-9 1/2 " 1'-11" 1'-9 1/2 " 10" 6'-6"

A SECTION
S101 S301 S102 S202
SCALE: 3/4"=1'-0"

US Army Corps of Engineers Huntsville Center

No.	Description	Date	Appr.

Revisions

Date: JUNE 2013
Scale: AS SHOWN
Drawing code:
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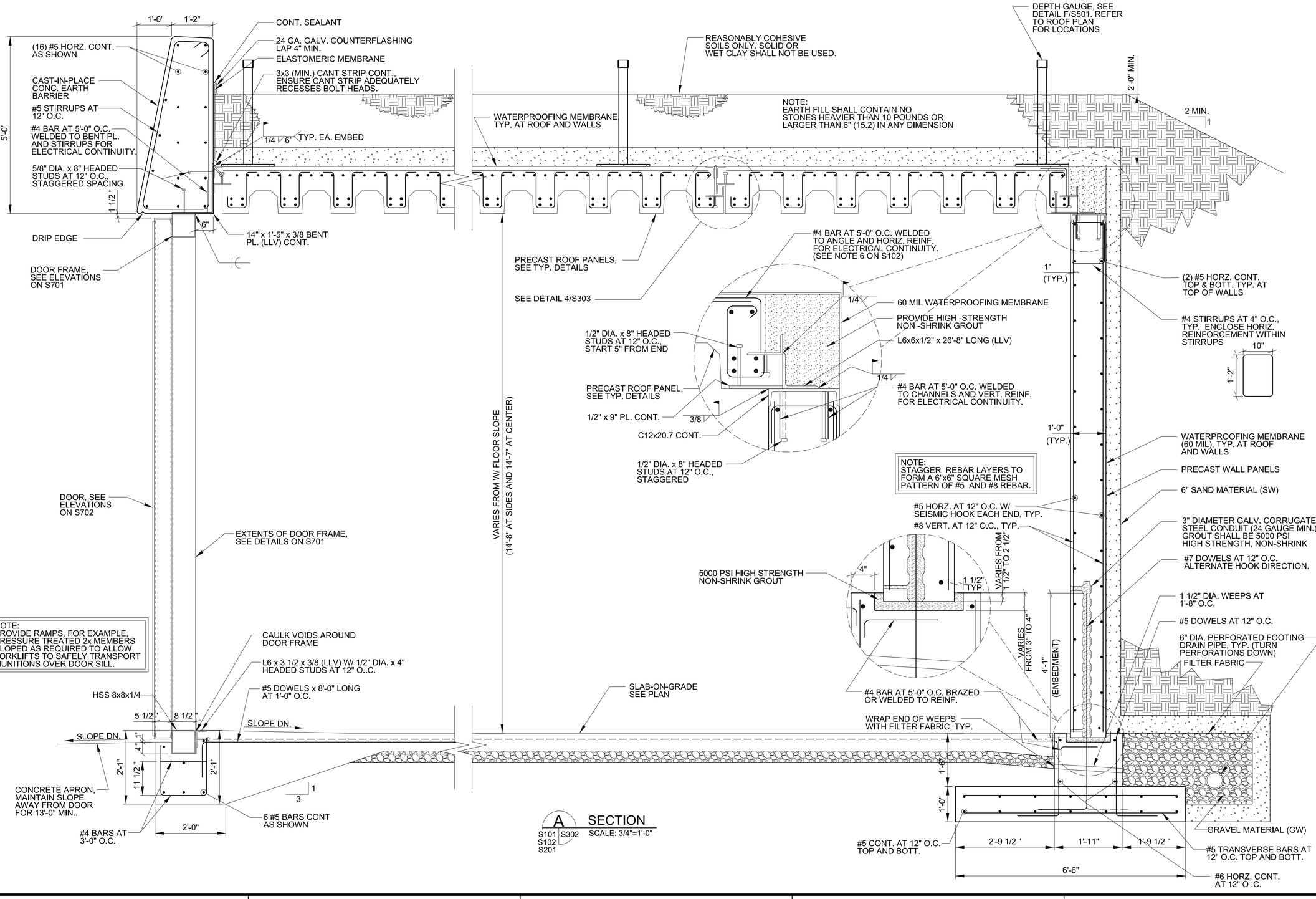
Designed by: JMU
Drawn by: JMU
Checked by: RSW
Project Engineer/Architect: Jeff Coulston

U. S. ARMY CORPS OF ENGINEERS
ENGINEERING AND SUPPORT CENTER, HUNTSVILLE, ALABAMA

MODULAR STORAGE MAGAZINE BOX-TYPE, STD 421-80-08

BUILDING SECTION

Sheet reference number:
S-301
Sheet 9 of 26



A SECTION
S101 | S302
S102
S201
SCALE: 3/4"=1'-0"

US Army Corps of Engineers
Huntsville Center

No.	Description	Revisions	Date	Appr.

Designed by: JMU
Drawn by: JMU
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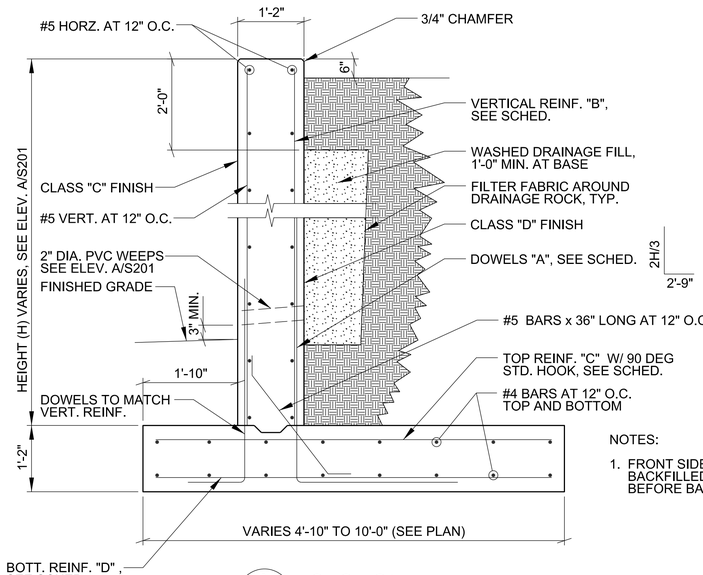
Project Engineer/Architect: Jeff Coulston
Date:

U. S. ARMY CORPS OF ENGINEERS
ENGINEERING AND SUPPORT CENTER, HUNTSVILLE, ALABAMA

MODULAR STORAGE MAGAZINE BOX-TYPE, STD 421-80-08

BUILDING SECTION

Sheet reference number:
S-302
Sheet 10 of 26

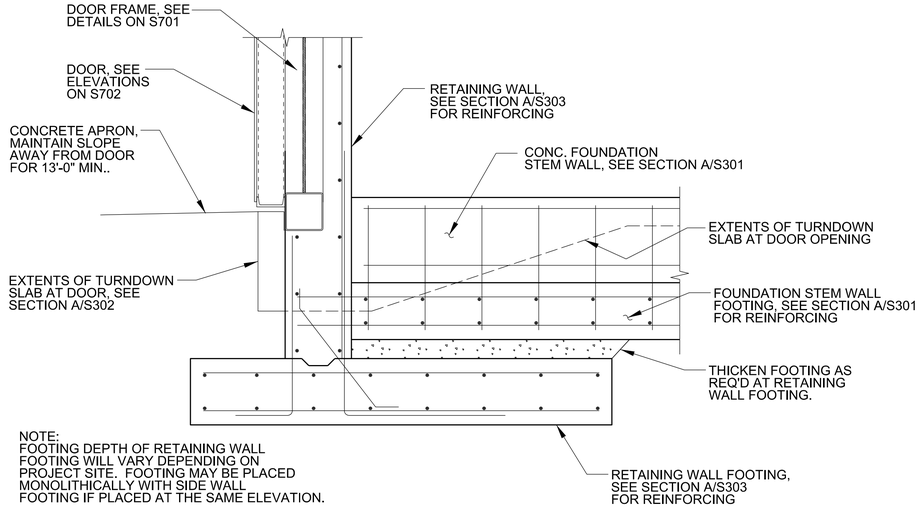


A SECTION
S101 | S201 S303 SCALE: 3/4"=1'-0"

RETAINING WALL SCHED.				
WALL TYPE	STEM REINF.		WALL REINF.	
	DOWELS "A"	VERTICAL "B"	TOP "C"	BOTTOM "D"
RW-1	#7 AT 5 ½"	#7 AT 11"	#7 AT 5 ½"	#5 AT 11"
RW-2	#7 AT 11"	#7 AT 11"	#7 AT 11"	#5 AT 11"
RW-3	#5 AT 12"	#5 AT 12"	#5 AT 12"	#5 AT 12"

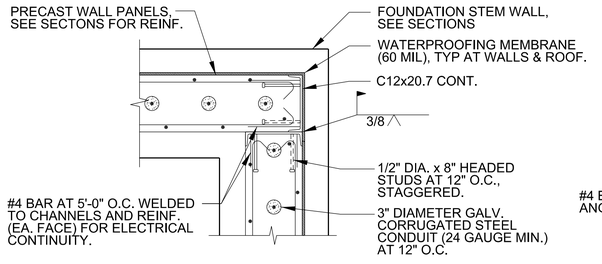
NOTES:

1. FRONT SIDE OF WALL MUST BE BACKFILLED AND COMPACTED BEFORE BACKFILLING BEHIND WALL.

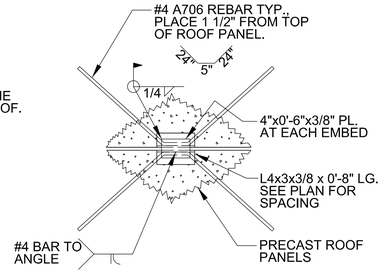


NOTE:
FOOTING DEPTH OF RETAINING WALL FOOTING WILL VARY DEPENDING ON PROJECT SITE. FOOTING MAY BE PLACED MONOLITHICALLY WITH SIDE WALL FOOTING IF PLACED AT THE SAME ELEVATION.

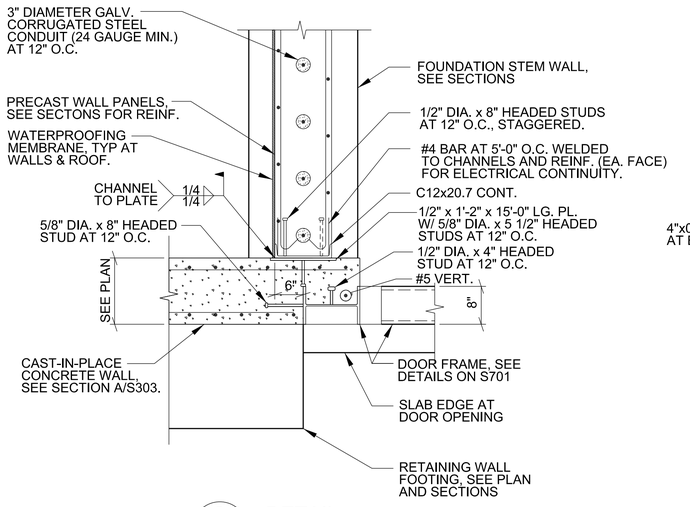
B SECTION
S101 | S201 S303 SCALE: 3/4"=1'-0"



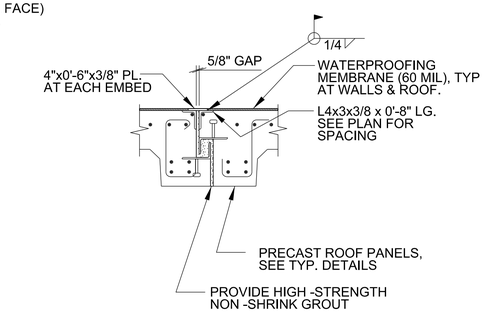
1 DETAIL
S101 | S303 SCALE: 3/4"=1'-0"



2 DETAIL
S102 | S303 SCALE: 3/4"=1'-0"



3 DETAIL
S101 | S303 SCALE: 3/4"=1'-0"



4 DETAIL
S102 | S303 S202 S302 SCALE: 3/4"=1'-0"

US Army Corps of Engineers
Huntsville Center

Revisions			
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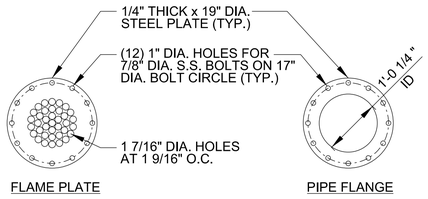
ENGINEERING AND SUPPORT CENTER, HUNTSVILLE, ALABAMA

MODULAR STORAGE MAGAZINE BOX-TYPE, STD 421-80-08

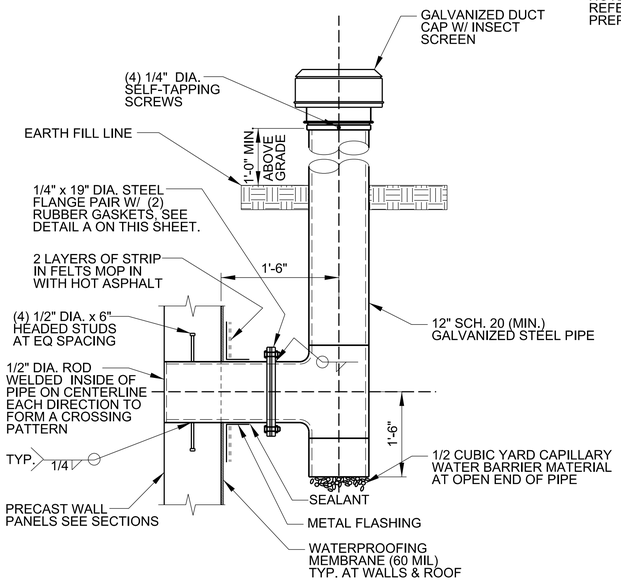
SECTIONS

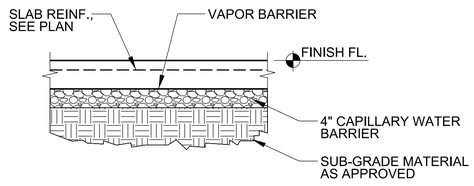
Sheet reference number:
S-303
Sheet 11 of 26



NOTE:
CLASS 150 FORGED FLANGES MAY BE SUBSTITUTED FOR FABRICATED PLATE FLANGES

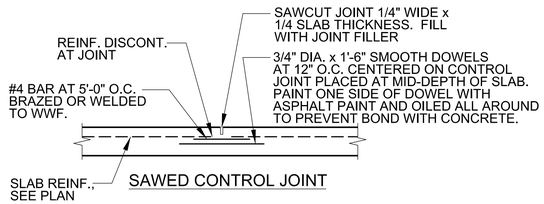
VENTILATOR FLAME PLATE DETAIL A
SCALE: 3/4"=1'-0"
S501



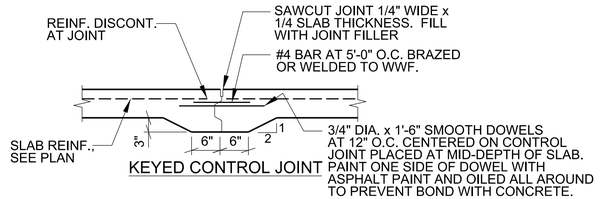


SLAB-ON-GRADE DETAIL B
SCALE: 3/4"=1'-0"
S501

NOTES:
REFER TO GEOTECHNICAL REPORT FOR THE SUBGRADE PREPARATION AND EARTHWORK RECOMMENDATIONS.



SAWED CONTROL JOINT



KEYED CONTROL JOINT

SLAB CONTROL JOINT DETAIL C
SCALE: 3/4"=1'-0"
S501

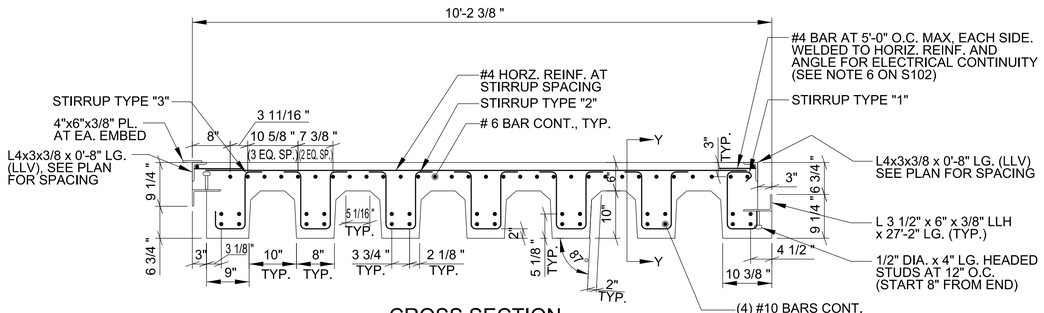
USE EITHER AT CONTRACTOR'S OPTION
SAWCUT JOINTS AS EARLY AS ALLOWED
HAND- TOOL AREAS INACCESSIBLE BY SAW

SPLICE LENGTHS					DEVELOPMENT LENGTHS	
BAR SIZE	f_c= 4000 PSI				f_c= 4000 PSI	
	TOP BARS		OTHER BARS		TOP BARS	OTHER BARS
NO.	A	B	A	B		
#3	19"	24"	15"	19"	19"	15"
#4	25"	32"	19"	25"	25"	19"
#5	31"	40"	24"	31"	31"	24"
#6	37"	48"	29"	37"	37"	29"
#7	54"	70"	42"	54"	54"	42"
#8	62"	80"	48"	60"	62"	48"
#9	78"	101"	60"	78"	70"	54"
#10	85"	111"	66"	85"	79"	61"

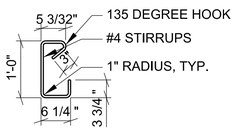
TOP BARS ARE HORIZONTAL REINF. WITH MORE THAN 12" ON CONCRETE CAST BELOW THE REINF.

CONCRETE LAP LENGTHS SHALL BE INCREASED 20 PERCENT WHERE EPOXY COATING IS USED.

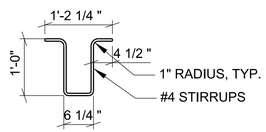
WHEN LAPPING TWO DIFFERENT SIZE BARS, USE THE LARGER OF THE LAP SPLICE DIMENSION OF THE SMALLER BAR OR THE DEVELOPMENT LENGTH OF THE LARGER BARS



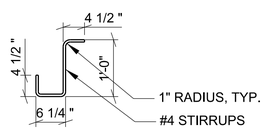
CROSS SECTION
SCALE: 3/4"=1'-0"



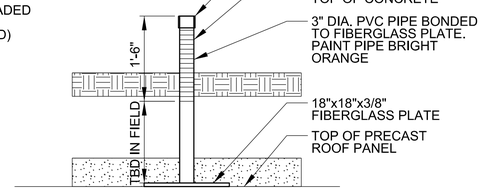
STIRRUP TYPE "1"
SCALE: 3/4"=1'-0"



STIRRUP TYPE "2"
SCALE: 3/4"=1'-0"



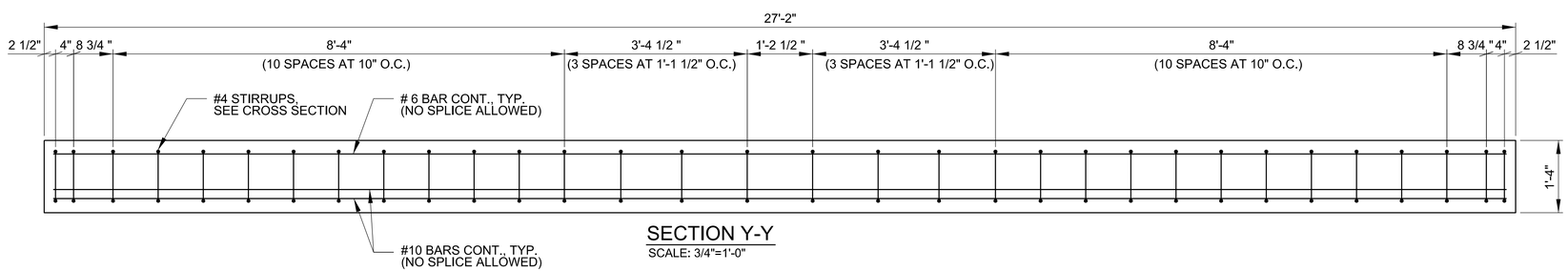
STIRRUP TYPE "3"
SCALE: 3/4"=1'-0"



DEPTH GAUGE DETAIL F
SCALE: 3/4"=1'-0"
S501

TYPICAL VENT DETAIL D
SCALE: 3/4"=1'-0"
S501

NOTE:
PROVIDE ELECTRICAL CONTINUITY BY WELDING VERTICAL AND HORZ. REINFORCEMENT TO VENT PIPE



SECTION Y-Y
SCALE: 3/4"=1'-0"

PRECAST ROOF PANEL DETAIL E
SCALE: 3/4"=1'-0"
S501

NOTES:
PROVIDE ELECTRICAL CONTINUITY WITHIN THE PRECAST ROOF PANEL BY BONDING AT 5 LINEAR FEET INTERVALS ACROSS TOP OF STIRRUPS TO END ANGLES IN ONE DIRECTION. IN THE OTHER DIRECTION, FROM BOTTOM PLATE TO #4 REINFORCEMENT

US Army Corps of Engineers
Huntsville Center

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MODULAR STORAGE MAGAZINE
BOX-TYPE, STD 421-80-08

TYPICAL DETAILS

Sheet reference number:
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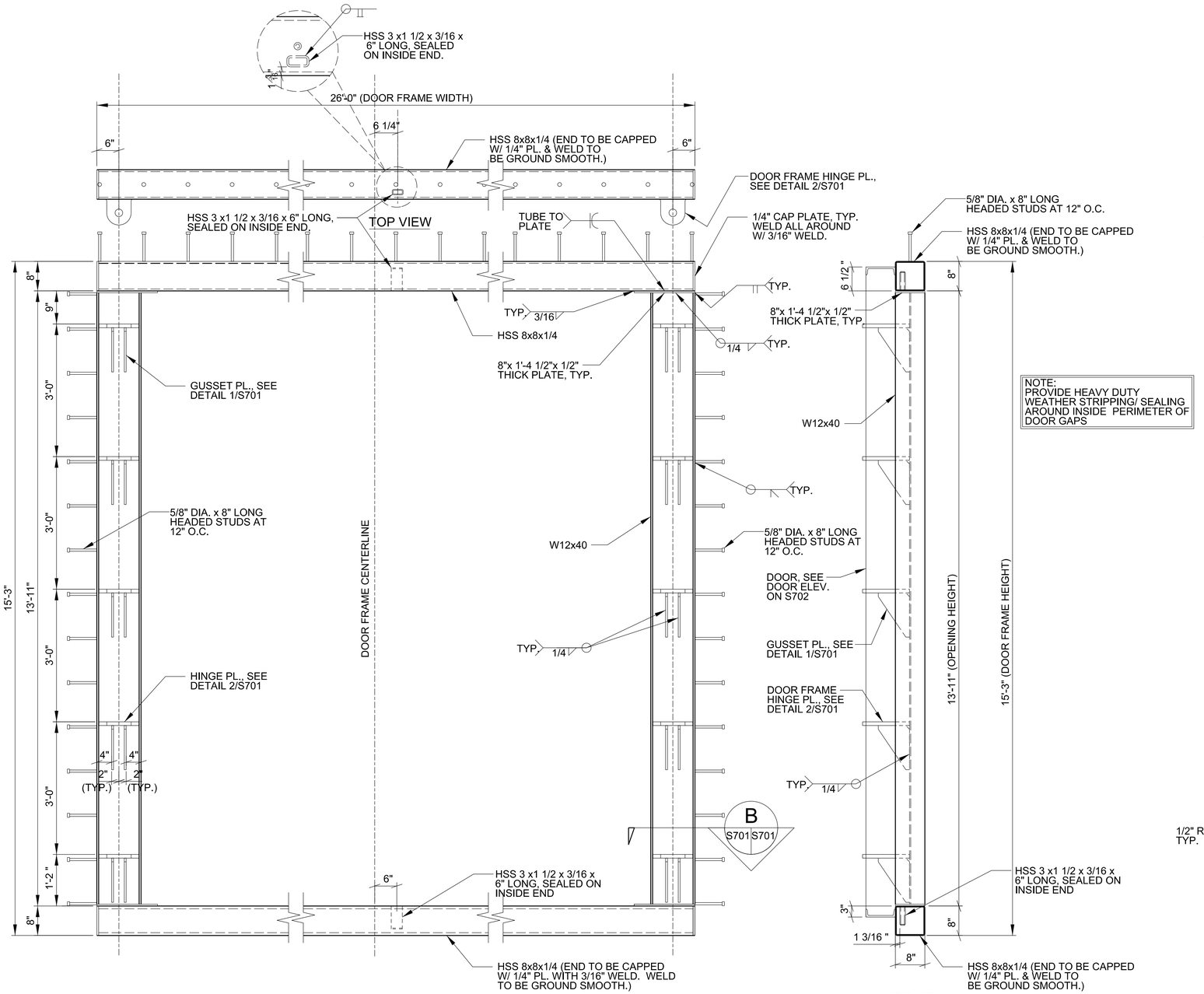
Sheet 12 of 26

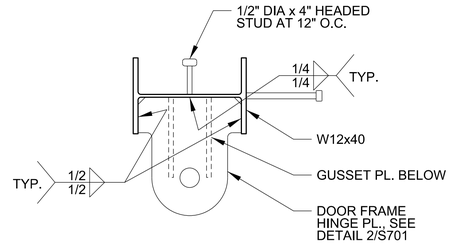


DOOR FRAME ELEVATION A
SCALE: 3/4"=1'-0"
S201 S701

SIDE VIEW

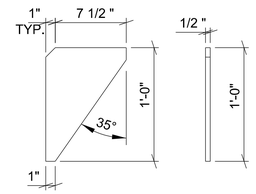
NOTE:
PROVIDE HEAVY DUTY WEATHER STRIPPING/ SEALING AROUND INSIDE PERIMETER OF DOOR GAPS

NOTE:
THE 6 1/2" AND 3" DOOR OVERLAP AT THE TOP AND BOTT. OF THE DOOR FRAME, RESPECTIVELY SHALL NOT BE REDUCED AS THIS IS IMPERATIVE TO CARRY OUT THE DESIGN INTENT.

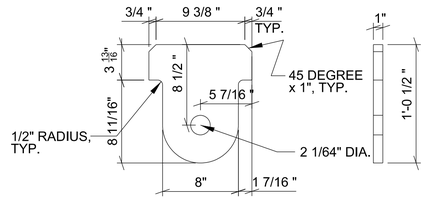


NOTE:
CONCRETE WALLS NOT SHOWN, SEE DETAIL 3/S303 FOR WALLS

SECTION B
SCALE: 1 1/2"=1'-0"
S701 S701



GUSSET PL. DETAIL 1
SCALE: 1 1/2"=1'-0"
S701 S701



DOOR FRAME HINGE PL. DETAIL 2
SCALE: 1 1/2"=1'-0"
S701 S701

DESIGNER NOTE: TO BE REMOVED WHEN PREPARING CONSTRUCTION DRAWINGS FOR SITE ADAPTION DESIGN

SHEETS S701 - S705 (HIGH SECURITY HASPS) AND S701(A) - S705(A) (ILD) IDENTIFY TWO DIFFERENT LOCKING SYSTEMS. THE DESIGNER SHALL VERIFY WITH THE CONTRACTING OFFICER THE CORRECT LOCKING SYSTEM REQUIRED AND REMOVE THE REDUNDANT SHEETS FROM THE CONSTRUCTION CONTRACT DOCUMENTS FOR THE SYSTEM NOT USED.

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Huntsville Center

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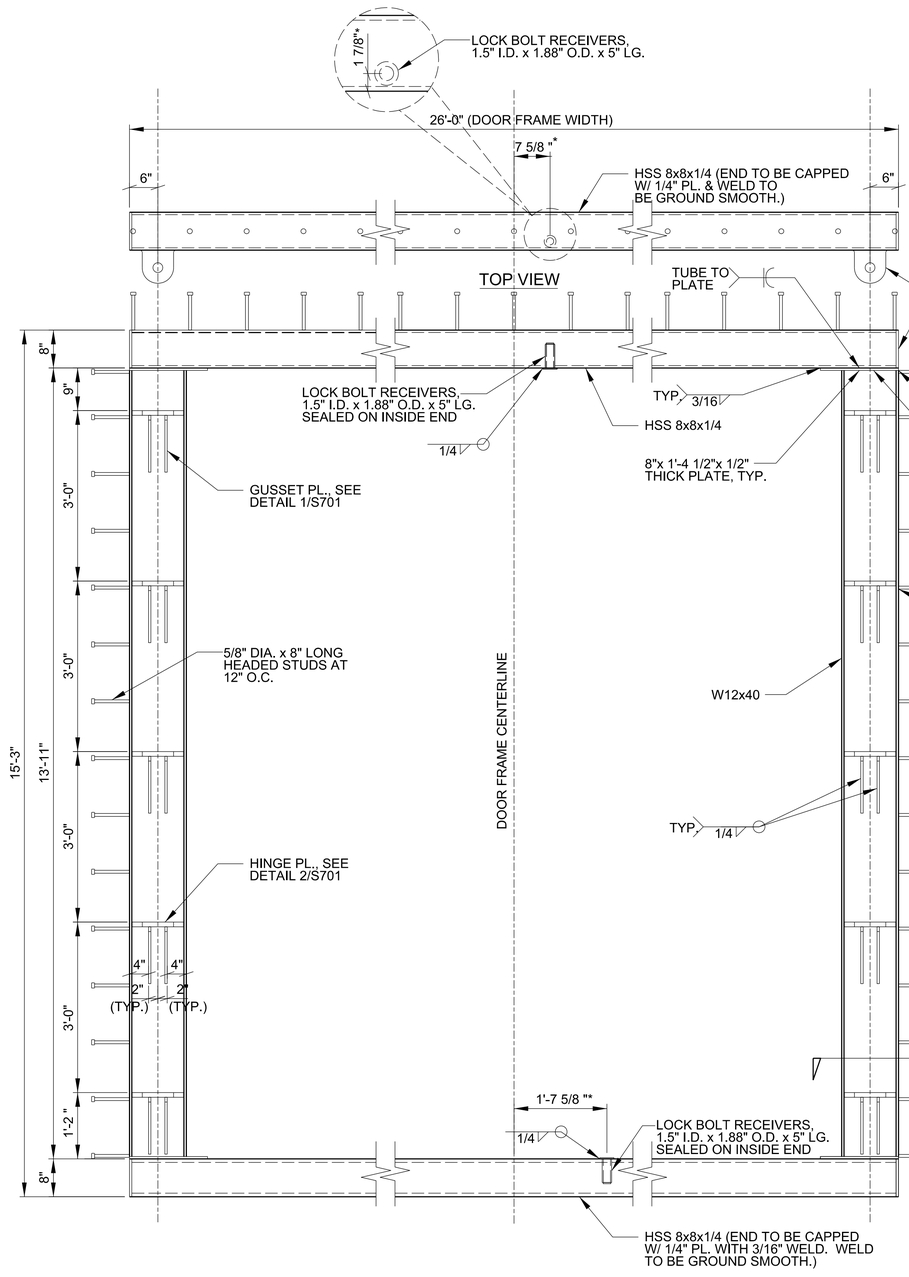
ENGINEERING AND SUPPORT CENTER,
HUNTSVILLE, ALABAMA

MODULAR STORAGE MAGAZINE
BOX-TYPE, STD 421-80-08

DOOR FRAME ELEVATIONS AND DETAILS

Sheet reference number:
S-701
Sheet 13 of 26



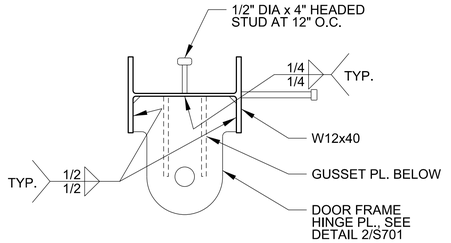
DOOR FRAME ELEVATION A
SCALE: 3/4"=1'-0"
S201 | S701

* DENOTES VERIFICATION W/ ILD MANUFACTURER

SIDE VIEW

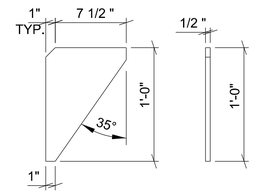
NOTE:
THE 6 1/2" AND 3" DOOR OVERLAP AT THE TOP AND BOTT. OF THE DOOR FRAME, RESPECTIVELY SHALL NOT BE REDUCED AS THIS IS IMPERATIVE TO CARRY OUT THE DESIGN INTENT.

NOTE:
PROVIDE HEAVY DUTY WEATHER STRIPPING/ SEALING AROUND INSIDE PERIMETER OF DOOR GAPS

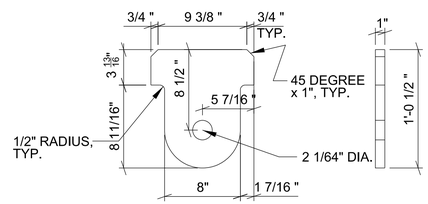


NOTE:
CONCRETE WALLS NOT SHOWN, SEE DETAIL 3/S303 FOR WALLS

SECTION B
SCALE: 1 1/2"=1'-0"
S701 | S701



GUSSET PL. DETAIL 1
SCALE: 1 1/2"=1'-0"
S701 | S701



DOOR FRAME HINGE PL. DETAIL 2
SCALE: 1 1/2"=1'-0"
S701 | S701

DESIGNER NOTE: TO BE REMOVED WHEN PREPARING CONSTRUCTION DRAWINGS FOR SITE ADAPTION DESIGN

SHEETS S701 - S705 (HIGH SECURITY HASPS) AND S701(A) - S705(A) (ILD) IDENTIFY TWO DIFFERENT LOCKING SYSTEMS. THE DESIGNER SHALL VERIFY WITH THE CONTRACTING OFFICER THE CORRECT LOCKING SYSTEM REQUIRED AND REMOVE THE REDUNDANT SHEETS FROM THE CONSTRUCTION CONTRACT DOCUMENTS FOR THE SYSTEM NOT USED.

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Huntsville Center

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Checked by: RSW
Project Engineer/Architect: Jeff Coulston
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ENGINEERING AND SUPPORT CENTER,
HUNTSVILLE, ALABAMA

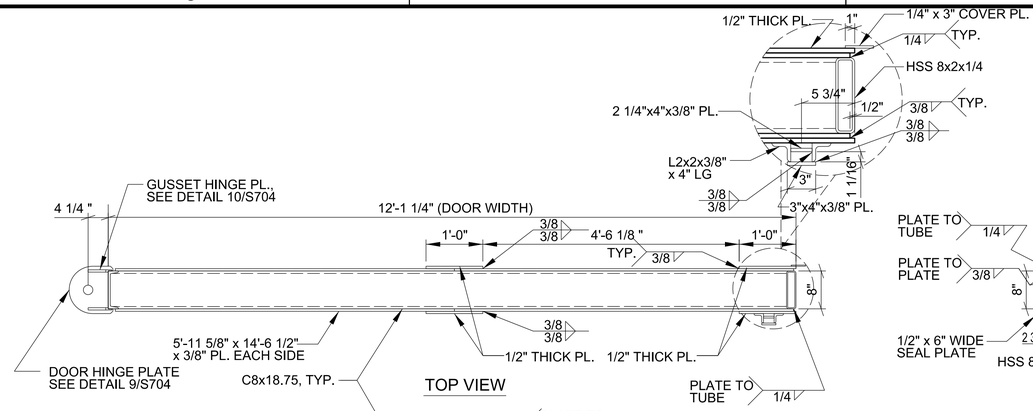
MODULAR STORAGE MAGAZINE
BOX-TYPE, STD 421-80-08

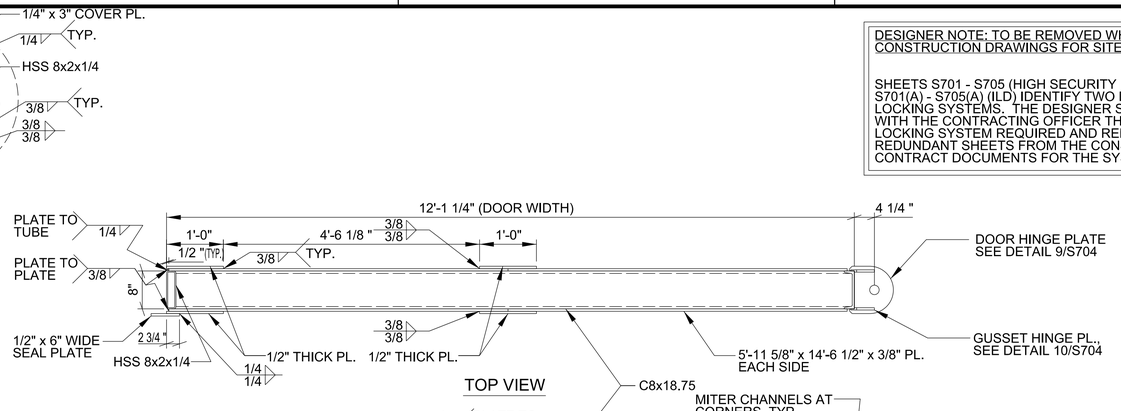
DOOR FRAME ELEVATIONS AND DETAILS

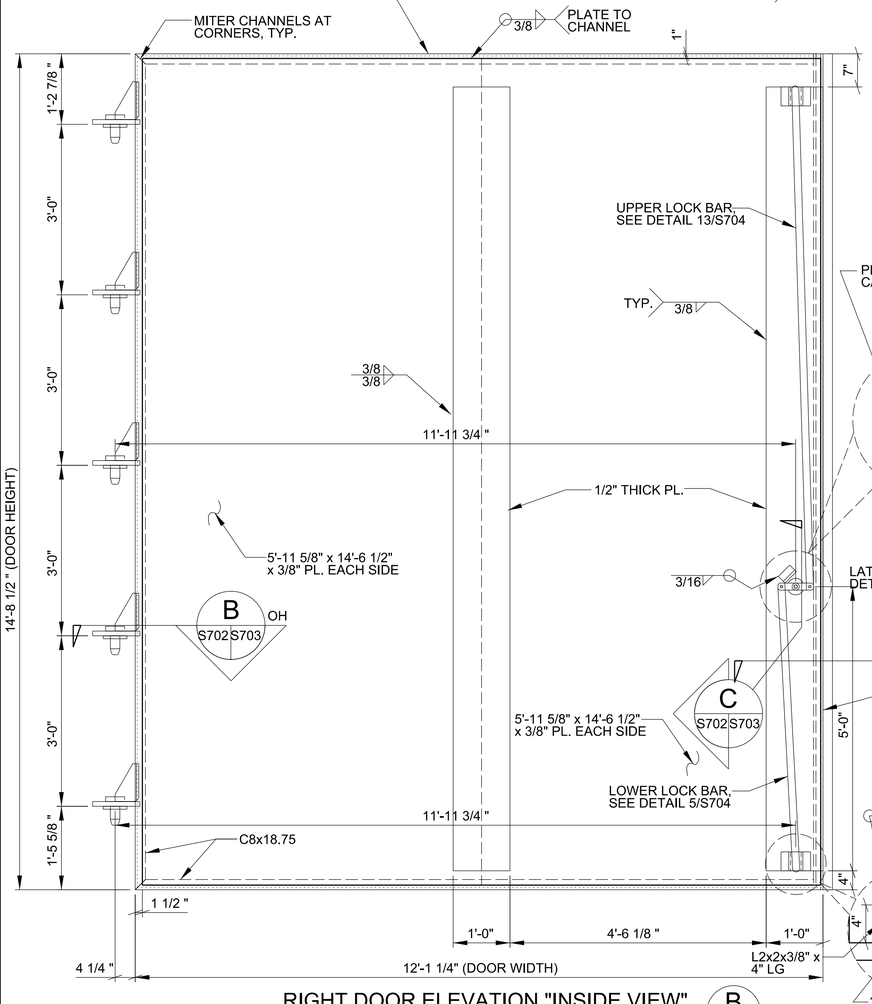
Sheet reference number:
S-701 (A)
Sheet 14 of 26

DESIGNER NOTE: TO BE REMOVED WHEN PREPARING CONSTRUCTION DRAWINGS FOR SITE ADAPTION DESIGN

SHEETS S701 - S705 (HIGH SECURITY HASPS) AND S701(A) - S705(A) (ILD) IDENTIFY TWO DIFFERENT LOCKING SYSTEMS. THE DESIGNER SHALL VERIFY WITH THE CONTRACTING OFFICER THE CORRECT LOCKING SYSTEM REQUIRED AND REMOVE THE REDUNDANT SHEETS FROM THE CONSTRUCTION CONTRACT DOCUMENTS FOR THE SYSTEM NOT USED.





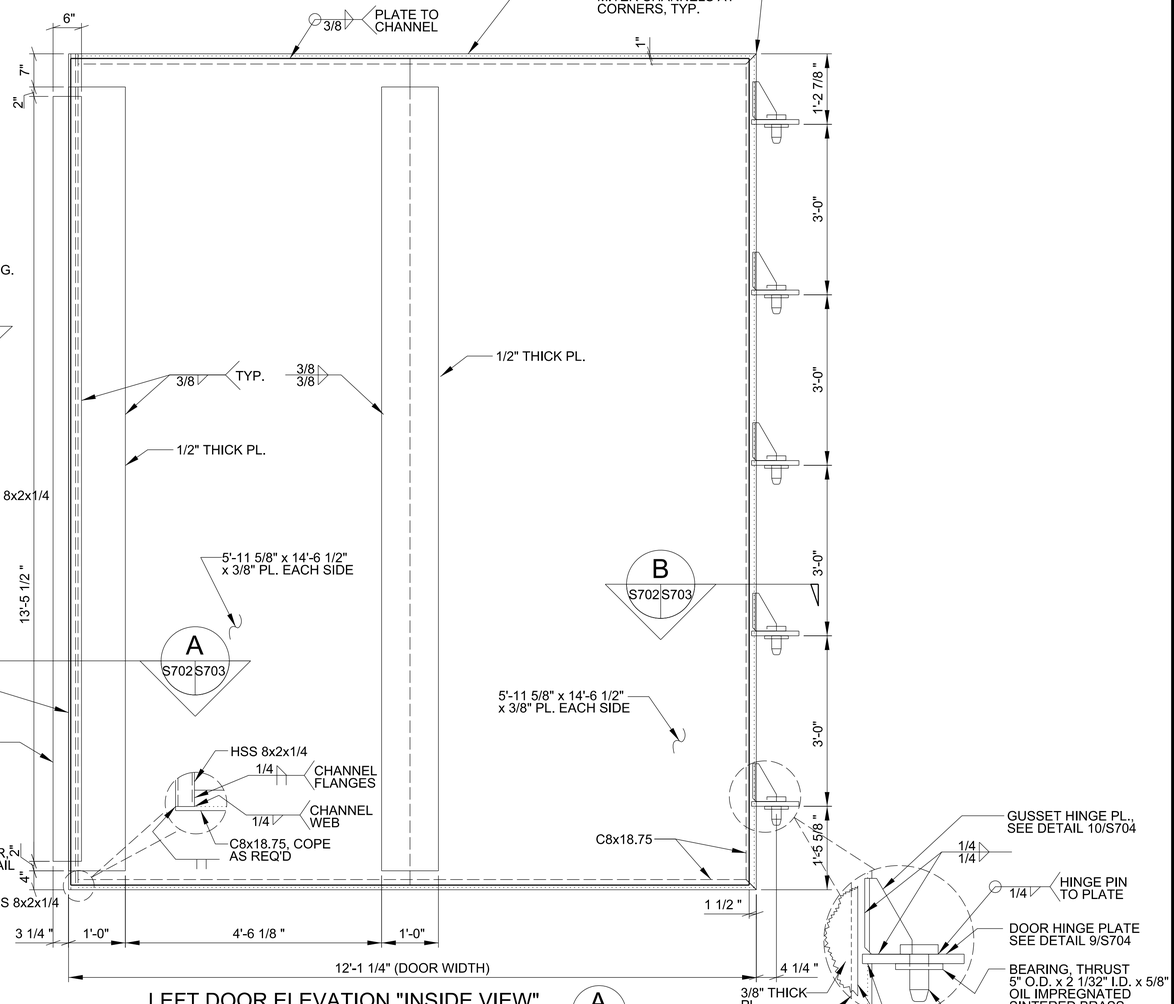


RIGHT DOOR ELEVATION "INSIDE VIEW"

B S201 S702

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

NOTE:
1. SEE DOOR PLATE ELEVATION E/S703 FOR INNER DOOR SUPPORT FRAMING.
2. SEE DOOR LOCKING DEVICES ON SHEET S705 FOR ADDITIONAL REQUIREMENTS.



LEFT DOOR ELEVATION "INSIDE VIEW"

A S201 S702

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

NOTE:
1. SEE DOOR PLATE ELEVATION E/S703 FOR INNER DOOR SUPPORT FRAMING.
2. SEE DOOR LOCKING DEVICES ON SHEET S705 FOR ADDITIONAL REQUIREMENTS.

US Army Corps of Engineers
Huntsville Center

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Date: JUNE 2013
Scale: AS SHOWN
Drawing code:
Designed by: JMU
Drawn by: JMU
Checked by: RSW
Project Engineer/Architect: Jeff Coulston
Date:

U. S. ARMY CORPS OF ENGINEERS
ENGINEERING AND SUPPORT CENTER,
HUNTSVILLE, ALABAMA

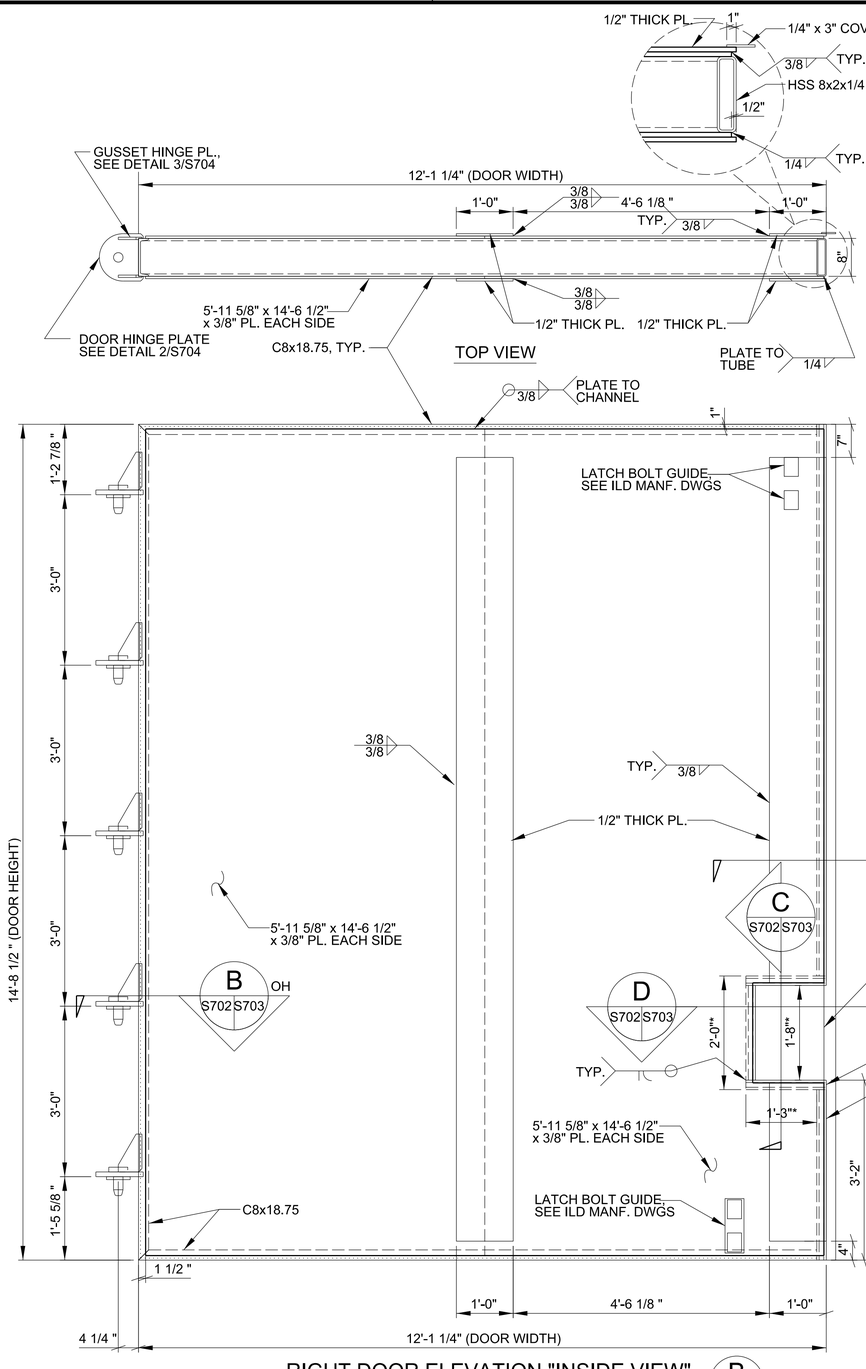
MODULAR STORAGE MAGAZINE
BOX-TYPE, STD 421-80-08

DOOR ELEVATIONS

Sheet reference number:
S-702
Sheet 15 of 26

DESIGNER NOTE: TO BE REMOVED WHEN PREPARING CONSTRUCTION DRAWINGS FOR SITE ADAPTION DESIGN

SHEETS S701 - S705 (HIGH SECURITY HASPS) AND S701(A) - S705(A) (ILD) IDENTIFY TWO DIFFERENT LOCKING SYSTEMS. THE DESIGNER SHALL VERIFY WITH THE CONTRACTING OFFICER THE CORRECT LOCKING SYSTEM REQUIRED AND REMOVE THE REDUNDANT SHEETS FROM THE CONSTRUCTION CONTRACT DOCUMENTS FOR THE SYSTEM NOT USED.



RIGHT DOOR ELEVATION "INSIDE VIEW"

B — S201 | S702

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

NOTE:
1. SEE DOOR PLATE ELEVATION E/S703 FOR INNER DOOR SUPPORT FRAMING.
2. SEE DOOR LOCKING DEVICES ON SHEET S705 FOR ADDITIONAL REQUIREMENTS.

* DENOTES VERIFICATION W/ ILD MANUFACTURER

LEFT DOOR ELEVATION "INSIDE VIEW"

A — S201 | S702

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

NOTE:
1. SEE DOOR PLATE ELEVATION E/S703 FOR INNER DOOR SUPPORT FRAMING.
2. SEE DOOR LOCKING DEVICES ON SHEET S705 FOR ADDITIONAL REQUIREMENTS.

US Army Corps of Engineers
Huntsville Center

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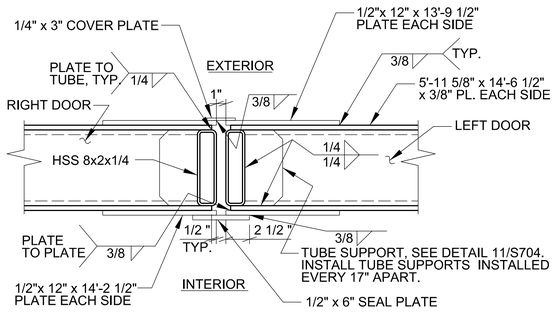
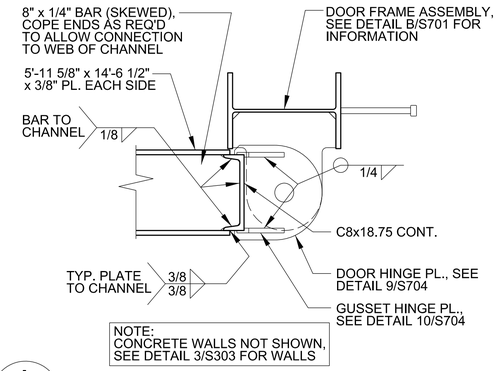
MODULAR STORAGE MAGAZINE
BOX-TYPE, STD 421-80-08

DOOR ELEVATIONS

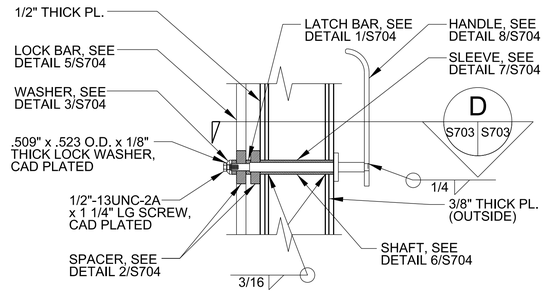
Sheet reference number:
S-702 (A)

Sheet 16 of 26

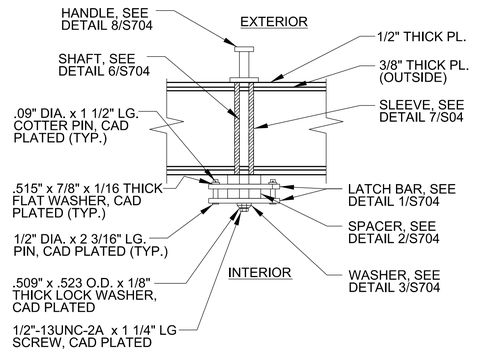




NOTE:
CONCRETE WALLS NOT SHOWN, SEE DETAIL 3/S303 FOR WALLS



NOTE:
THE HANDLE IS TURNED UP IN THE "UNLOCK" POSITION



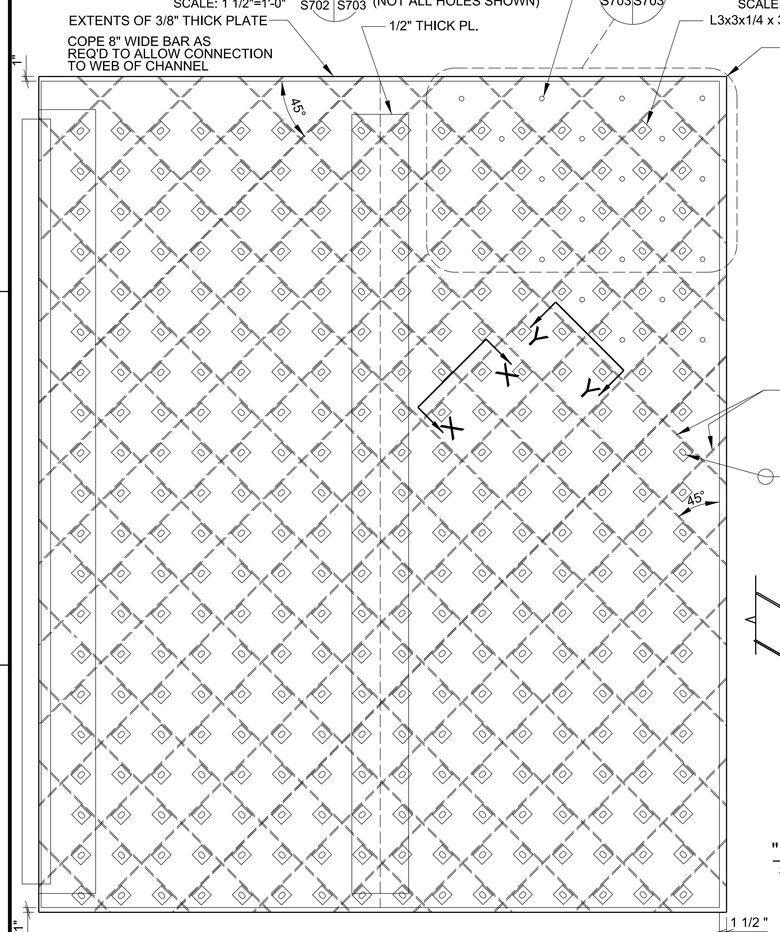
NOTE:
L3x2x 1/2" (LATCH STOP ANGLE) NOT SHOWN FOR CLARITY

SECTION A
SCALE: 1 1/2"=1'-0"
S702 S703

SECTION B
SCALE: 1 1/2"=1'-0"
S702 S703

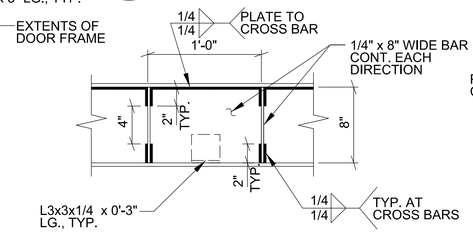
SECTION C
SCALE: 1 1/2"=1'-0"
S702 S703

SECTION D
SCALE: 1 1/2"=1'-0"
S703 S703

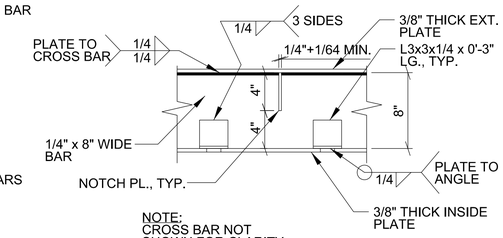


LEFT DOOR PLATE ELEVATION "INSIDE VIEW"
SCALE: 3/4"=1'-0"
E
S702 S703

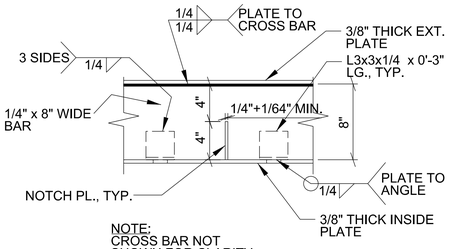
NOTE: RIGHT DOOR PLATE ELEVATION IS THE SAME AS THE LEFT



TYPICAL WELDED CONNECTION AT INTERSECTION OF CROSS BARS
SCALE: 1 1/2"=1'-0"



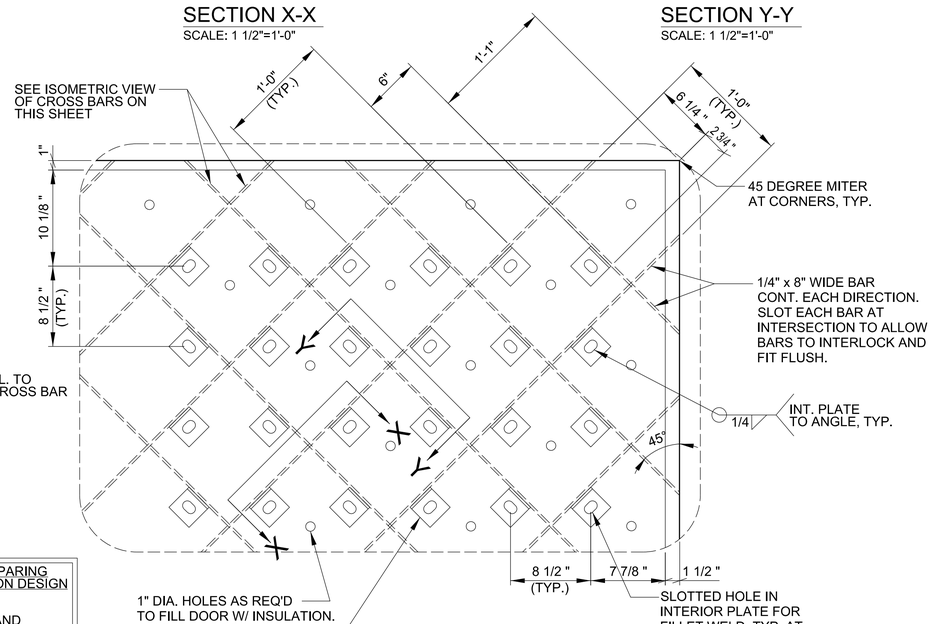
NOTE:
CROSS BAR NOT SHOWN FOR CLARITY

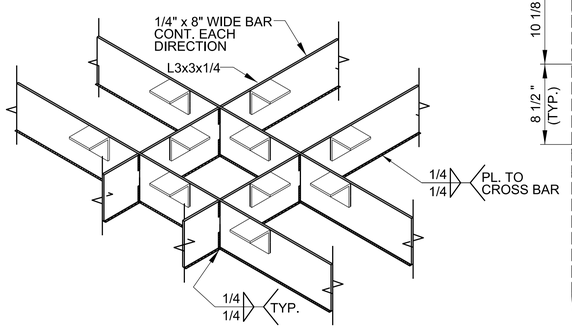


NOTE:
CROSS BAR NOT SHOWN FOR CLARITY

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

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





"ISOMETRIC VIEW" OF WELDS AT CROSS BARS
SCALE: 1 1/2" = 1'-0"

DESIGNER NOTE: TO BE REMOVED WHEN PREPARING CONSTRUCTION DRAWINGS FOR SITE ADAPTION DESIGN

SHEETS S701 - S705 (HIGH SECURITY HASPS) AND S701(A) - S705(A) (ILD) IDENTIFY TWO DIFFERENT LOCKING SYSTEMS. THE DESIGNER SHALL VERIFY WITH THE CONTRACTING OFFICER THE CORRECT LOCKING SYSTEM REQUIRED AND REMOVE THE REDUNDANT SHEETS FROM THE CONSTRUCTION CONTRACT DOCUMENTS FOR THE SYSTEM NOT USED.

DETAIL A
SCALE: 1 1/2"=1'-0"
S703 S703

1" DIA. HOLES AS REQ'D TO FILL DOOR W/ INSULATION. OMIT IF NOT REQUIRED. (NOT ALL HOLES SHOWN)

L3x3x1/4 x 3" LG., TYP.

US Army Corps of Engineers
Huntsville Center

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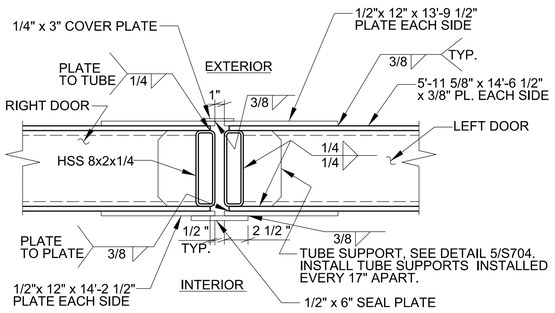
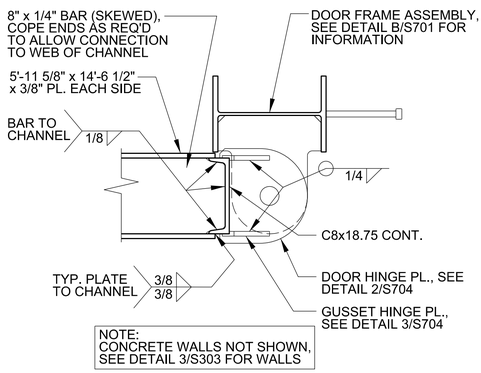
ENGINEERING AND SUPPORT CENTER, HUNTSVILLE, ALABAMA

MODULAR STORAGE MAGAZINE
BOX-TYPE, STD 421-80-08

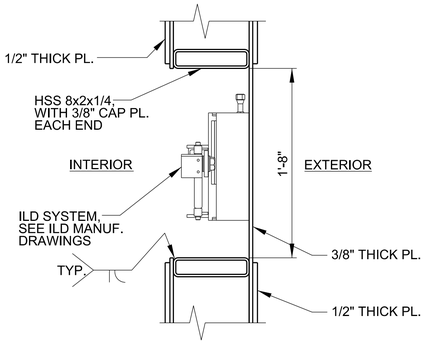
DOOR SECTIONS

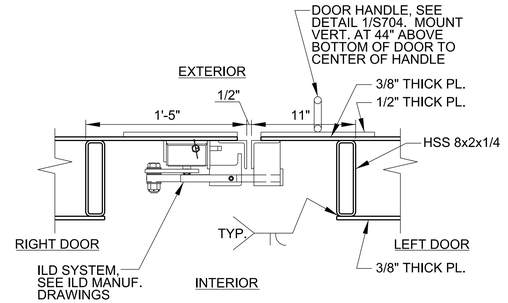
Sheet reference number:
S-703
Sheet 17 of 26



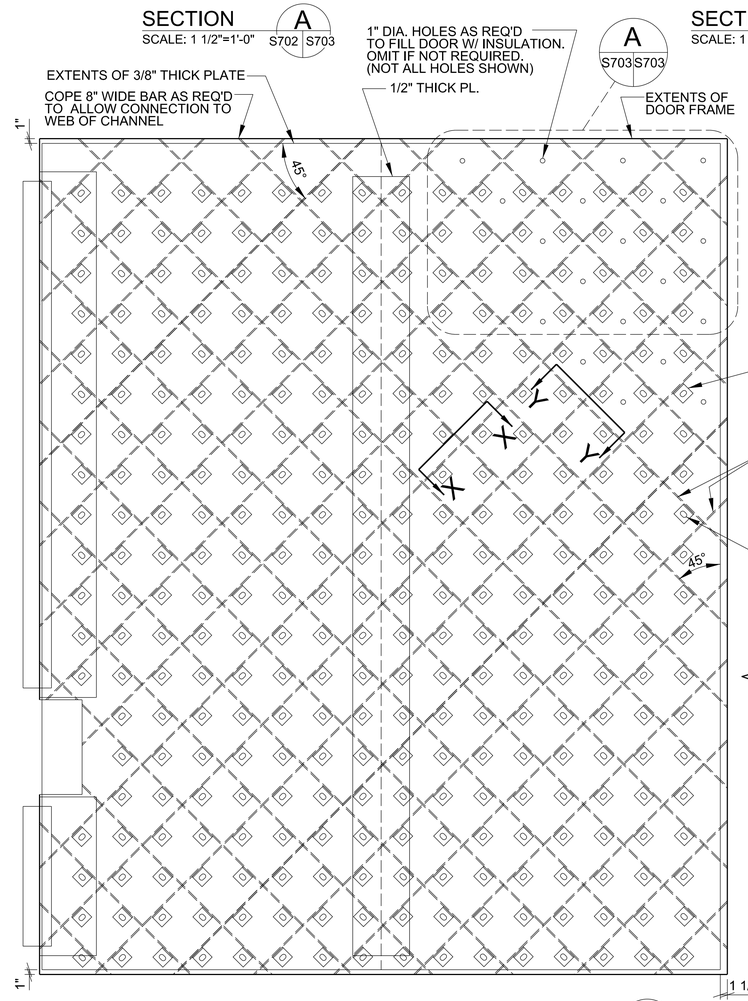


NOTE:
CONCRETE WALLS NOT SHOWN, SEE DETAIL 3/S303 FOR WALLS





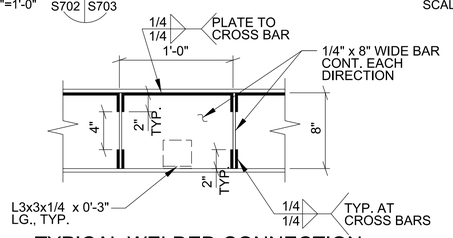
SECTION A
SCALE: 1 1/2"=1'-0" (S702 | S703)



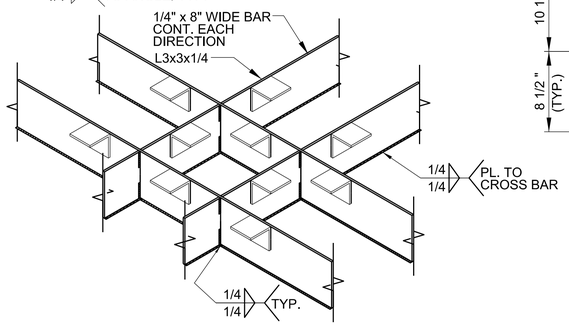
LEFT DOOR PLATE ELEVATION "INSIDE VIEW" (E)
SCALE: 3/4"=1'-0" (S702 | S703)

NOTE: RIGHT DOOR PLATE ELEVATION IS SIMILAR (DOOR NOTCH IS GREATER)

SECTION B
SCALE: 1 1/2"=1'-0" (S702 | S703)



TYPICAL WELDED CONNECTION AT INTERSECTION OF CROSS BARS
SCALE: 1 1/2"=1'-0"



"ISOMETRIC VIEW" OF WELDS AT CROSS BARS
SCALE: 1 1/2" = 1'-0"

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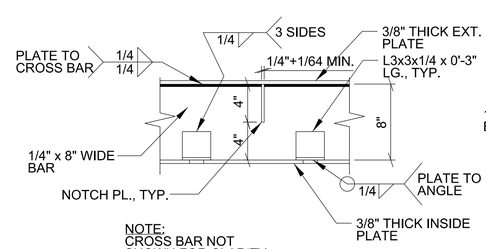
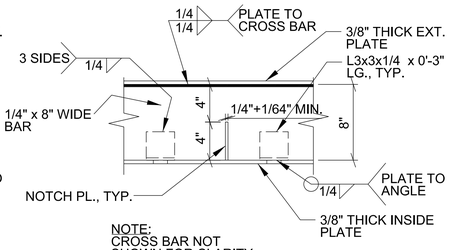
SECTION C
SCALE: 1 1/2"=1'-0" (S702 | S703)



NOTE:
CROSS BAR NOT SHOWN FOR CLARITY

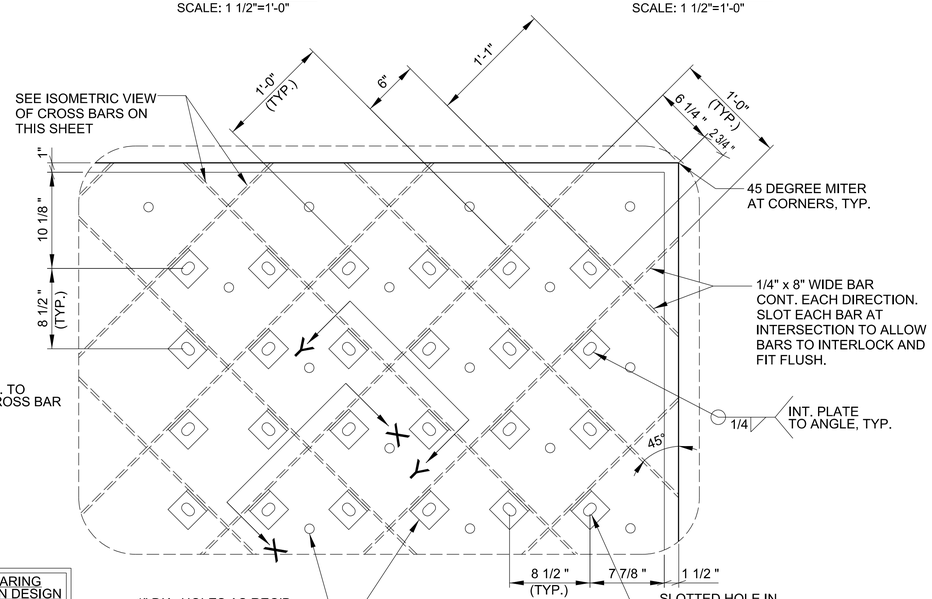
SECTION X-X
SCALE: 1 1/2"=1'-0"

SECTION D
SCALE: 1 1/2"=1'-0" (S702 | S703)



NOTE:
CROSS BAR NOT SHOWN FOR CLARITY

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



DETAIL A
SCALE: 1 1/2"=1'-0" (S703 | S703)

US Army Corps of Engineers
Huntsville Center

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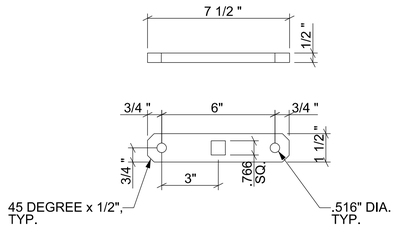
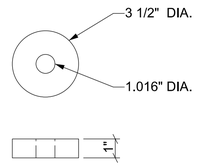
MODULAR STORAGE MAGAZINE
BOX-TYPE, STD 421-80-08

DOOR SECTIONS

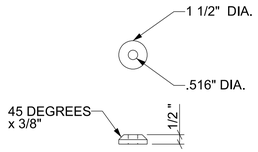
Sheet reference number:
S-703 (A)
Sheet 18 of 26



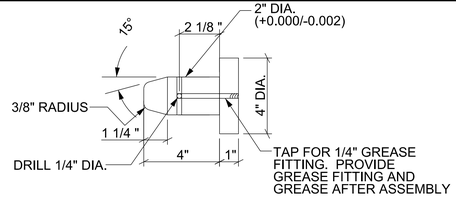
LATCH BAR DETAIL 1
SCALE: 3"=1'-0"
S702 S703 S704



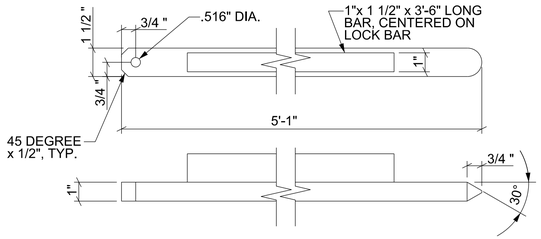
SPACER DETAIL 2
SCALE: 3"=1'-0"
S702 S703 S704



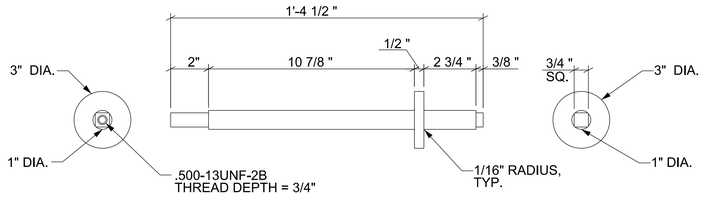
WASHER DETAIL 3
SCALE: 3"=1'-0"
S702 S703 S704



HINGE PIN DETAIL 4
SCALE: 3"=1'-0"
S702 S704

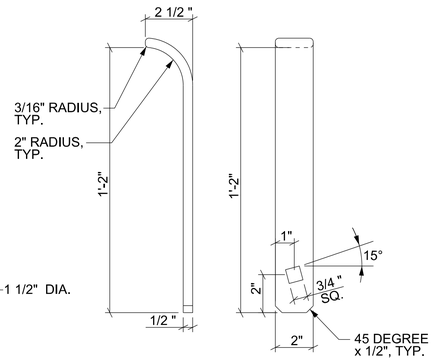


LOWER LOCK BAR DETAIL 5
SCALE: 3"=1'-0"
S702 S703

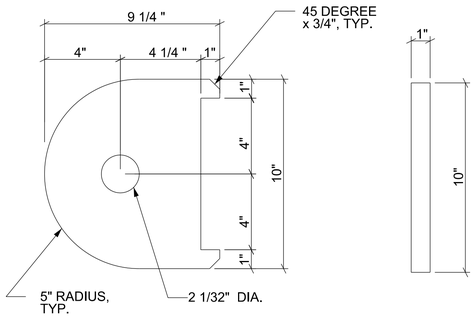


SHAFT DETAIL 6
SCALE: 3"=1'-0"
S703 S704

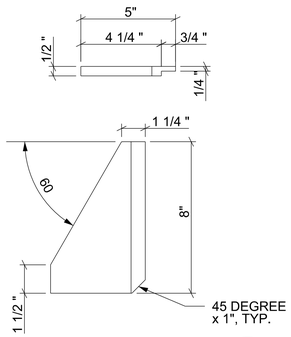
SLEEVE DETAIL 7
SCALE: 3"=1'-0"
S703 S704



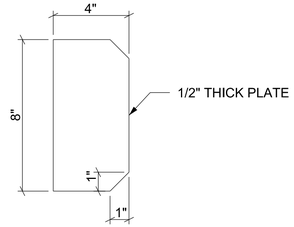
HANDLE DETAIL 8
SCALE: 3"=1'-0"
S201 S703 S704



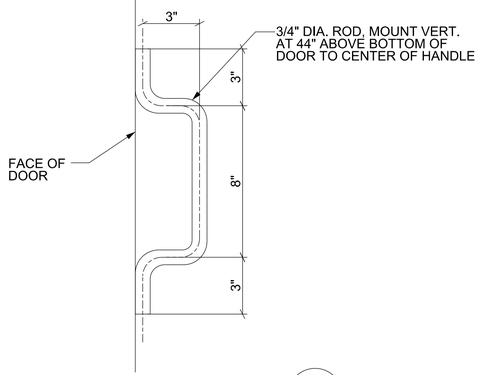
DOOR HINGE PL. DETAIL 9
SCALE: 3"=1'-0"
S702 S703 S704



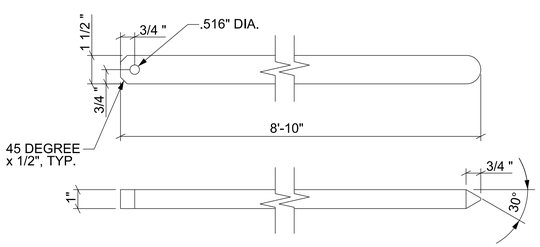
GUSSET HINGE PL. DETAIL 10
SCALE: 3"=1'-0"
S702 S703 S704



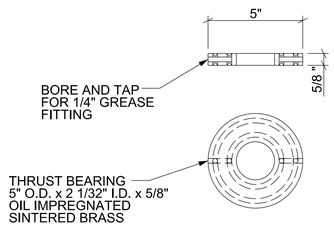
TUBE SUPPORT PL. DETAIL 11
SCALE: 3"=1'-0"
S703 S704



HANDLE DETAIL 12
SCALE: 3"=1'-0"
S201 S704



UPPER LOCK BAR DETAIL 13
SCALE: 3"=1'-0"
S702 S704



THRUST BEARING DETAIL 14
SCALE: 3"=1'-0"
S702 S704

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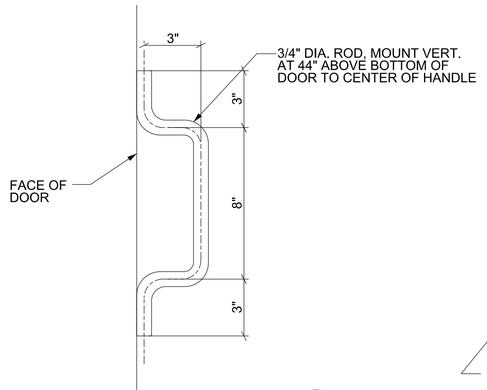
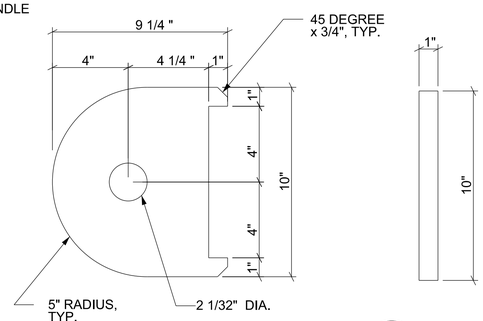
MODULAR STORAGE MAGAZINE
BOX-TYPE, STD 421-80-08

DOOR DETAILS

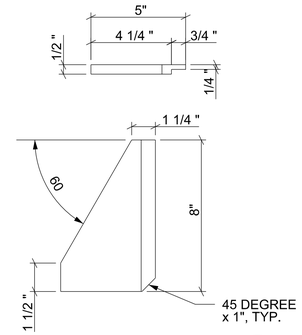
Sheet reference number:
S-704
Sheet 19 of 26



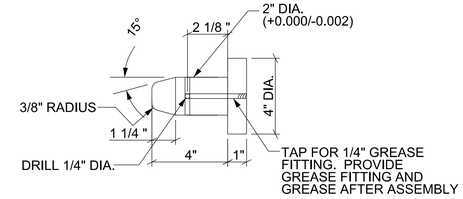
HANDLE DETAIL 1
SCALE: 3"=1'-0"
S201 S703 | S704



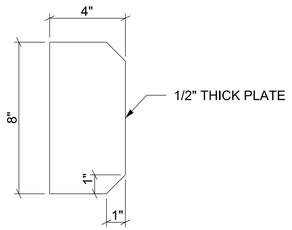
DOOR HINGE PL. DETAIL 2
SCALE: 3"=1'-0"
S702 S703 | S704



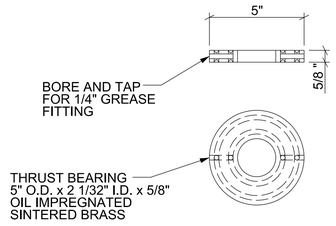
GUSSET HINGE PL. DETAIL 3
SCALE: 3"=1'-0"
S702 S703 | S704



HINGE PIN DETAIL 4
SCALE: 3"=1'-0"
S702 S704



TUBE SUPPORT PL. DETAIL 5
SCALE: 3"=1'-0"
S703 S704



THRUST BEARING DETAIL 6
SCALE: 3"=1'-0"
S702 S704

DESIGNER NOTE: TO BE REMOVED WHEN PREPARING CONSTRUCTION DRAWINGS FOR SITE ADAPTION DESIGN

SHEETS S701 - S705 (HIGH SECURITY HASPS) AND S701(A) - S705(A) (ILD) IDENTIFY TWO DIFFERENT LOCKING SYSTEMS. THE DESIGNER SHALL VERIFY WITH THE CONTRACTING OFFICER THE CORRECT LOCKING SYSTEM REQUIRED AND REMOVE THE REDUNDANT SHEETS FROM THE CONSTRUCTION CONTRACT DOCUMENTS FOR THE SYSTEM NOT USED.

US Army Corps of Engineers
Huntsville Center

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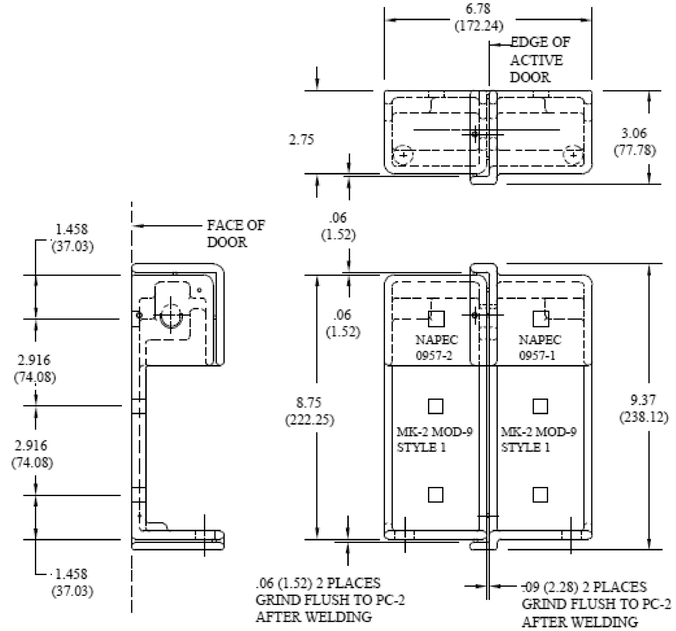
Drawn by: JMU
Checked by: RSW
Date: JUNE 2013
Scale: AS SHOWN
Drawing code:
Project Engineer/Architect: Jeff Coulston
Date:

U. S. ARMY CORPS OF ENGINEERS
ENGINEERING AND
SUPPORT CENTER,
HUNTSVILLE, ALABAMA

MODULAR STORAGE MAGAZINE
BOX-TYPE, STD 421-80-08

DOOR DETAILS

Sheet reference number:
S-704 (A)
Sheet 20 of 26

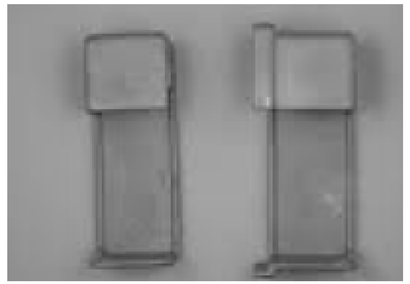


NOTES:

1. On back side of each half, machine or cast 3 holes to accept 0.375-inch (9.52 mm) square neck carriage bolts. Holes to be centered horizontally and vertically spaced 1.458-inch (37.03 mm) from top and bottom outside surface. Bolt hole centers 2.916 inches (74.08 mm) apart.

FIGURE 1. Style 1, MK 2 MOD 9.

HIGH SECURITY HASP A S705



HIGH SECURITY HASP B S705

HIGH SECURITY HASP NOTES:

1. HIGH SECURITY HASPS SHALL CONFORM TO MILITARY SPECIFICATION MIL-DTL-29181C, STYLE 1-HASP (M29181-01) FOR RIGHT HAND SWINGING DOOR AND STYLE 2-HASP (M29181-02) FOR LEFT HAND SWINGING DOOR. HIGH SECURITY PADLOCKS SHALL CONFORM TO MILITARY SPECIFICATION MIL-DTL-43607J.
2. NO MODIFICATIONS AND/OR DEVIATIONS TO THE DOOR CONSTRUCTION SHOWN IN THE STANDARD DRAWINGS IS PERMITTED TO ACCOMMODATE THE HIGH SECURITY HASP UNLESS APPROVED BY THE U.S. ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE (STRUCTURAL BRANCH).
3. DOOR MANUFACTURER WILL COORDINATE WITH THE GOVERNMENT ON INSTALLATION AND ATTACHMENT DETAILS OF THE HASPS AND PROVIDE THE NECESSARY STIFFENERS AND ADDITIONAL FRAMING (IF REQUIRED) TO ACCOMMODATE THE HIGH SECURITY HASPS.
4. SEE DOOR FRAME AND DOOR DETAILS ON SHEETS S701 - S704.

DESIGNER NOTE: TO BE REMOVED WHEN PREPARING CONSTRUCTION DRAWINGS FOR SITE ADAPTION DESIGN

SHEETS S701 - S705 (HIGH SECURITY HASPS) AND S701(A) - S705(A) (ILD) IDENTIFY TWO DIFFERENT LOCKING SYSTEMS. THE DESIGNER SHALL VERIFY WITH THE CONTRACTING OFFICER THE CORRECT LOCKING SYSTEM REQUIRED AND REMOVE THE REDUNDANT SHEETS FROM THE CONSTRUCTION CONTRACT DOCUMENTS FOR THE SYSTEM NOT USED.

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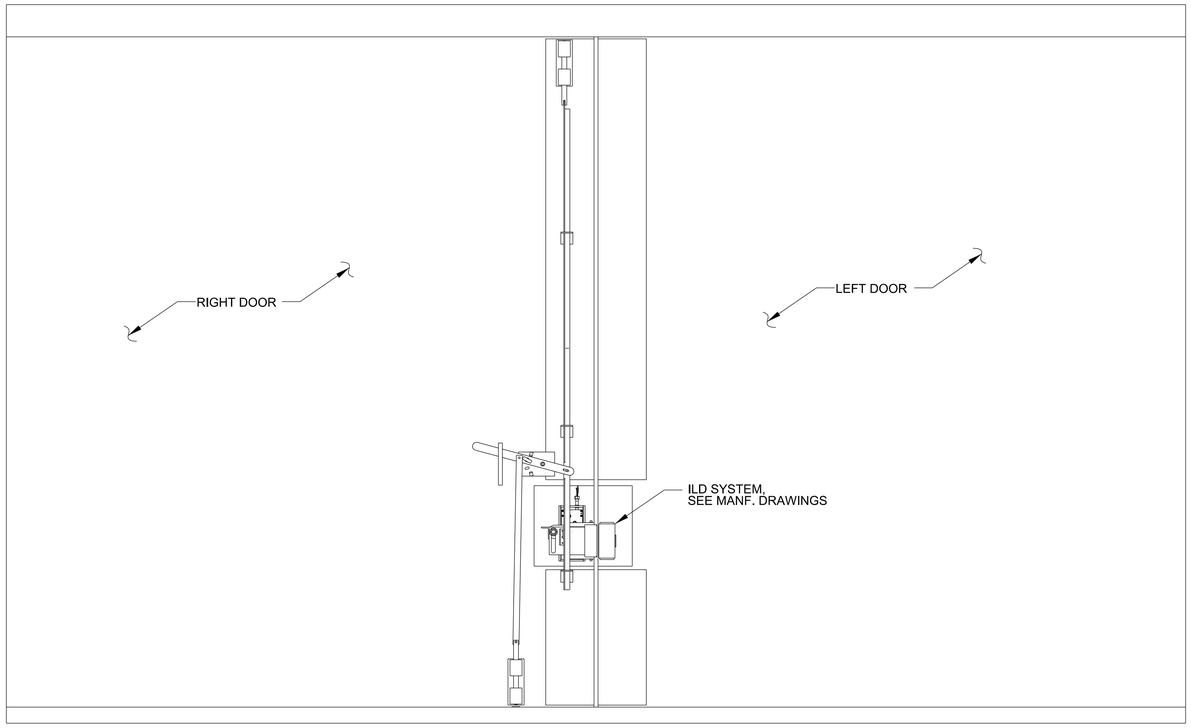
BOX-TYPE, STD 421-80-08

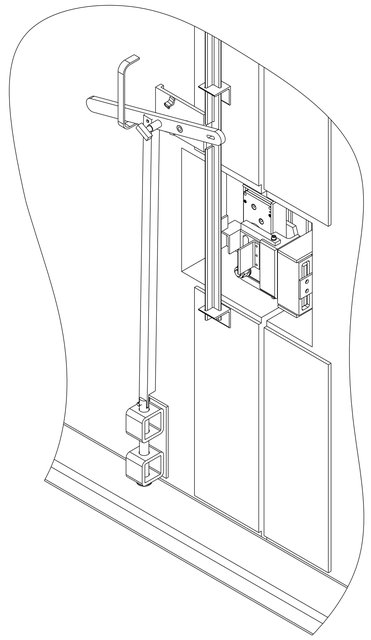
HIGH SECURITY HASP

Sheet reference number:
S-705
Sheet 21 of 26



INTERNAL LOCKING DEVICE (ILD) A
S705
SCALE: NTS
VIEW FROM INSIDE OF MAGAZINE
FOOT & HEAD BOLT SHOWN DISENGAGED

DETAILS ARE SHOWN FOR GENERAL INFORMATION ONLY. SEE ILD MANUF. DRAWINGS FOR A COMPLETE SET OF DETAILS AND REQUIREMENTS.



INTERNAL LOCKING DEVICE (ILD) B
S705
SCALE: NTS
VIEW FROM INSIDE OF MAGAZINE
FOOT & HEAD BOLT SHOWN DISENGAGED

INTERNAL LOCKING DEVICE (ILD) NOTES:

1. INTERNAL LOCKING DEVICE IS A U.S. GOVERNMENT DESIGNED AND PATENTED LOCKING SYSTEM. THE ILD SYSTEM SHALL BE PURCHASED FROM A GOVERNMENT APPROVED ILD MANUFACTURER WITH COORDINATION OF NAVAL FACILITIES ENGINEERING SERVICE CENTER (NAVFAC ESC) SECURITY ENGINEERING DIVISION. CONTACT CAN BE MADE VIA PHONE BY CALLING 805-982-1212 OR THEIR WEBSITE (https://portal.navfac.navy.mil/portal/page/portal/navfac/navfac_ww_pp/navfac_nfesc_pp/locks/) FOR ORDERING INFORMATION.
2. NO MODIFICATIONS AND/OR DEVIATIONS TO THE DOOR CONSTRUCTION SHOWN IN THE STANDARD DRAWINGS ARE PERMITTED TO ACCOMMODATE THE ILD UNLESS APPROVED BY THE U.S. ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE (STRUCTURAL BRANCH).
3. DOOR MANUFACTURER WILL COORDINATE WITH THE GOVERNMENT ON INSTALLATION AND ATTACHMENT DETAILS OF THE ILD AND PROVIDE THE NECESSARY STIFFENERS AND ADDITIONAL FRAMING (IF REQUIRED) TO ACCOMMODATE THE ILD.
4. SEE ILD MANUFACTURERS INSTALLATION DRAWINGS FOR ADDITIONAL INFORMATION NOT SHOWN IN THESE DRAWINGS.
5. SEE DOOR FRAME AND DOOR DETAILS ON SHEETS S701(A) - S704(A).

DESIGNER NOTE: TO BE REMOVED WHEN PREPARING CONSTRUCTION DRAWINGS FOR SITE ADAPTION DESIGN

SHEETS S701 - S705 (HIGH SECURITY HASPS) AND S701(A) - S705(A) (ILD) IDENTIFY TWO DIFFERENT LOCKING SYSTEMS. THE DESIGNER SHALL VERIFY WITH THE CONTRACTING OFFICER THE CORRECT LOCKING SYSTEM REQUIRED AND REMOVE THE REDUNDANT SHEETS FROM THE CONSTRUCTION CONTRACT DOCUMENTS FOR THE SYSTEM NOT USED.

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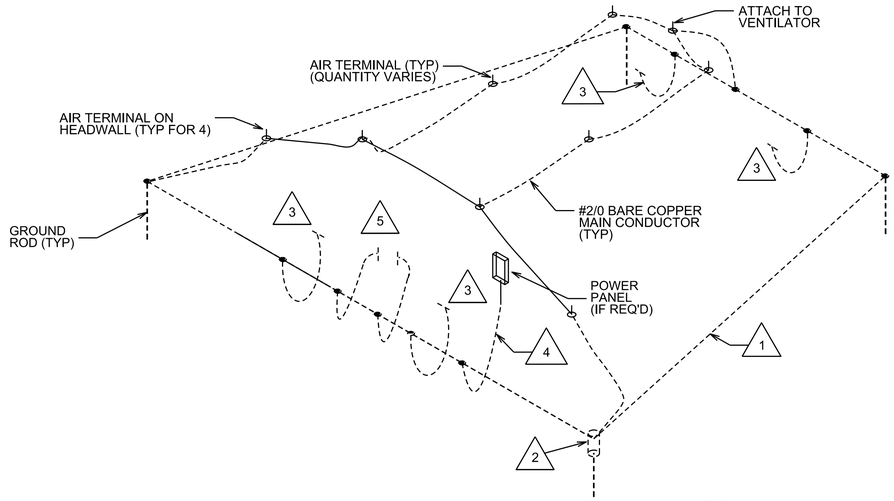
HUNTSVILLE, ALABAMA

MODULAR STORAGE MAGAZINE
BOX-TYPE, STD 421-80-08

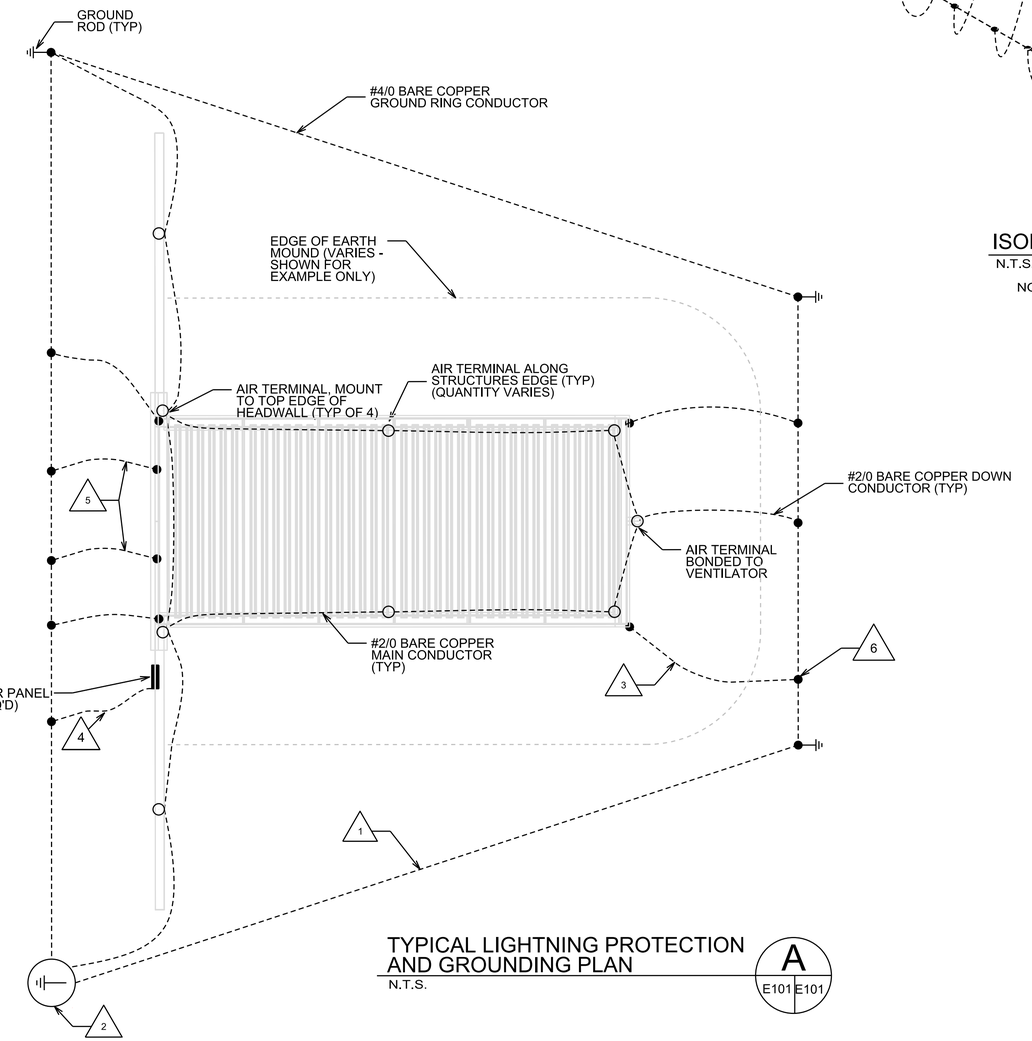
INTERNAL LOCKING DEVICES

Sheet reference number:
S-705(A)
Sheet 22 of 26

SEE 01 10 10 FOR REQUIREMENTS REGARDING LIGHTNING PROTECTION AND ELECTRICAL DESIGN. 01 10 10 SUPERSEDES SHEETS E-101, E-102, E-103, E-104 WITHIN THIS MSM BOX-TYPE STANDARD 421-80-08 HAYMAN IGLOO DRAWING SET.



ISOMETRIC VIEW OF LPS
N.T.S.
NOTE: STRUCTURE NOT SHOWN FOR CLARITY.
B E101 E101



TYPICAL LIGHTNING PROTECTION AND GROUNDING PLAN
N.T.S.
A E101 E101

NOTES: (APPLICABLE TO DRAWINGS E-101, E-102, E-103, E-104)

1. DRAWINGS E-101, E-102, E-103, AND E-104 ARE US ARMY CORPS OF ENGINEERS (USACE) STANDARD GUIDANCE FOR LIGHTNING PROTECTION SYSTEM (LPS) DESIGN APPLICABLE TO EARTH COVERED MAGAZINES (ECM). THESE DRAWINGS DO NOT CONSTITUTE A COMPLETE LPS DESIGN. DESIGNER SHALL ADAPT THE STANDARDS TO UNIQUE SITE CONDITIONS, AND CONSULT THE BELOW LISTED CRITERIA TO ENSURE A COMPLETE AND FUNCTIONAL DESIGN. THE COMPLETED LPS INSTALLATION SHALL RECEIVE A UL MASTER LABEL CERTIFICATE OR EQUIVALENT.
2. THE LPS MUST PROVIDE A ZONE OF PROTECTION BASED ON A 100FT. RADIUS STRIKING DISTANCE (ds). THE ZONE OF PROTECTION MUST BE DOCUMENTED USING THE ROLLING SPHERE METHOD (RSM) ANALYSIS OF 100FT. RADIUS. SEE DRAWING E-103 AND E-104 FOR TYPICAL RSM ANALYSIS.
3. THE LPS SHALL BE MADE OF MATERIALS ACCEPTABLY PROTECTED AGAINST CORROSION AS SPECIFIED IN UL 96.
4. MINIMUM AIR TERMINAL HEIGHT IS AS SHOWN IN INCHES, ABOVE THE PROTECTED OBJECT.
5. REINFORCING STEEL IN WALLS, FLOOR SLAB, AND ARCH OR BOX STRUCTURE MUST ALL BE INTERCONNECTED THRU BONDING, AND MUST HAVE A CONTINUOUS PATH TO THE PRIMARY GROUNDING SYSTEM. MINIMUM REBAR OVERLAP IS 20x DIAMETER (20D). METAL VENTILATORS, STEEL DOORS AND DOOR FRAMES SHALL BE BONDED TO THE PRIMARY GROUNDING SYSTEM. PHOTO DOCUMENTATION OF THE REINFORCING STEEL BONDING AND PRIMARY GROUND BONDING IS MANDATORY.
6. INCOMING POWER AND COMM. MUST ENTER THE GROUND AT LEAST 50FT FROM FACILITY. CABLES AND WIRE MUST BE SHIELDED OR BE INSTALLED IN METALLIC PIPING THAT IS BONDED TO THE PRIMARY GROUNDING SYSTEM AT THE POINT OF ENTRY.
7. INTERIOR ELECTRICAL SYSTEMS SHALL BE DESIGNED BY USER ACCORDING TO SITE CONDITIONS AND USER REQUIREMENTS. USER SHALL DEFINE HAZARDOUS CLASSIFICATION, WHEN REQ'D.
8. PROVIDE SURGE PROTECTIVE DEVICES (SPD) FOR POWER, COMM, AND INSTRUMENTATION PER NFPA 780.
9. CONSIDER ALL MASSES FOR SIDEFLASH POTENTIAL. METAL MASSES WITHIN THE SIDEFLASH DISTANCE SHALL BE BONDED TO THE LPS, OR BE MOVED OUTSIDE THE SIDEFLASH SEPARATION DISTANCE.
10. THE LPS SHALL BE TESTED PER THE BELOW LISTED CRITERIA.
11. EXOTHERMIC WELD ALL GROUNDING CONDUCTOR BONDS AND TERMINATIONS, EXCEPT IN TEST WELLS WHICH REQUIRE BOLTED CONNECTIONS.
12. GROUNDING AND BONDING CABLES MUST BE COPPER.
13. WHERE CONFLICTS EXISTS BETWEEN THESE DRAWINGS AND THE BELOW CRITERIA, THE MOST STRINGENT REQUIREMENT SHALL APPLY.
14. CRITERIA:
    a. DOD 6055.09 - M, VOL.2 - AMMUNITION AND EXPLOSIVES SAFETY STANDARDS
    b. DA PAM 385-64 AMMUNITION AND EXPLOSIVES SAFETY STANDARDS
    c. NFPA 780 STANDARD FOR THE INSTALLATION OF LIGHTNING PROTECTION SYSTEMS
    d. UL 96A INSTALLATION REQUIREMENTS FOR LIGHTNING PROTECTION SYSTEMS
    e. UL 96 STANDARD FOR LIGHTNING PROTECTION COMPONENTS
    f. NFPA 70 NATIONAL ELECTRICAL CODE (NEC)

KEYED NOTES

1. #4/0 BARE COPPER CONDUCTOR (BCC) GROUNDING SYSTEM ENCIRCLING STRUCTURE'S PERIMETER. INSTALL IN DIRECT CONTACT WITH EARTH, 30"MIN. BELOW GRADE AND 3' FROM EDGE OF EARTH MOUND.
2. GROUND TEST WELL WITH GROUND ROD. ALL BONDS WITHIN THE TEST WELL SHALL BE BOLTED-TYPE CONNECTIONS. SEE DETAIL B, DWG E-102.
3. BOND FOUNDATION REBAR TO GROUNDING SYSTEM WITH #4/0 BCC. INSTALL CABLE IN PLASTIC CONDUIT WHERE IT PASSES THROUGH CONCRETE (TYP EACH CORNER AND DISTANCES NOT TO EXCEED 60 FT). SEE DETAIL C, DWG E-102.
4. WHEN POWER IS REQUIRED, PROVIDE GROUNDING ELECTRODE CONDUCTOR SIZED PER NEC IN PVC CONDUIT.
5. BOND DOOR FRAME TO GROUNDING SYSTEM (1 EACH SIDE). BOND DOOR TO DOOR FRAME WITH BRAIDED COPPER STRAP, EQUAL TO #1/0 COPPER CONDUCTOR (2 EACH DOOR, TOP & BOTTOM).
6. EXOTHERMIC BOND (TYP).

US Army Corps of Engineers Huntsville Center

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Drawing code:
Date:
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Drawn by: WJC
Checked by: WLS
Project Engineer/Architect: Jeff Coulston

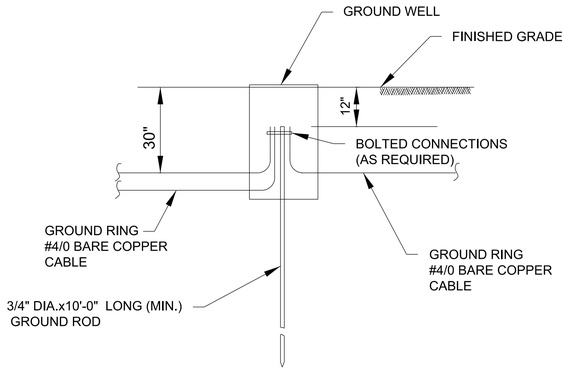
U. S. ARMY CORPS OF ENGINEERS ENGINEERING AND SUPPORT CENTER, HUNTSVILLE, ALABAMA

MODULAR STORAGE MAGAZINE BOX-TYPE, STD 421-80-08

LIGHTNING PROTECTION SYSTEM

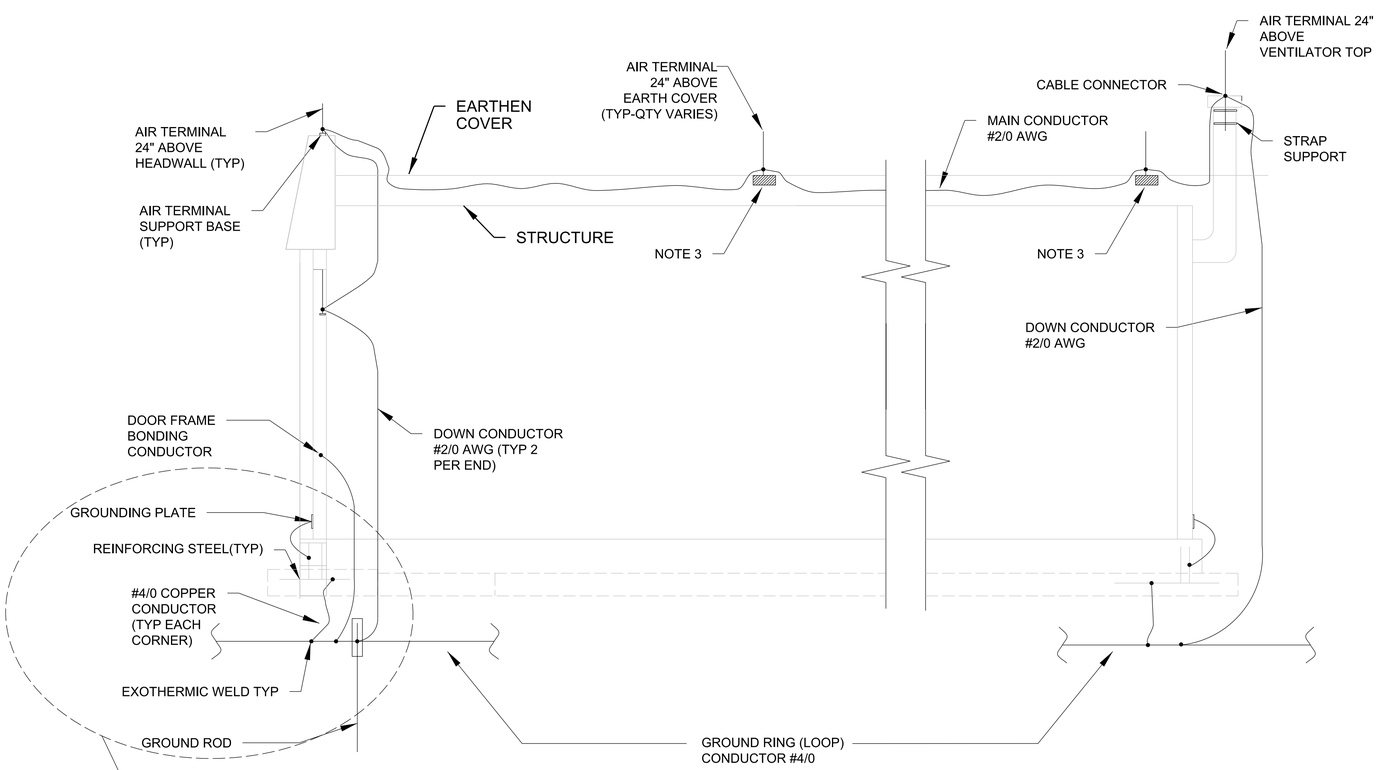
Sheet reference number: E-101

Sheet 23 of 26



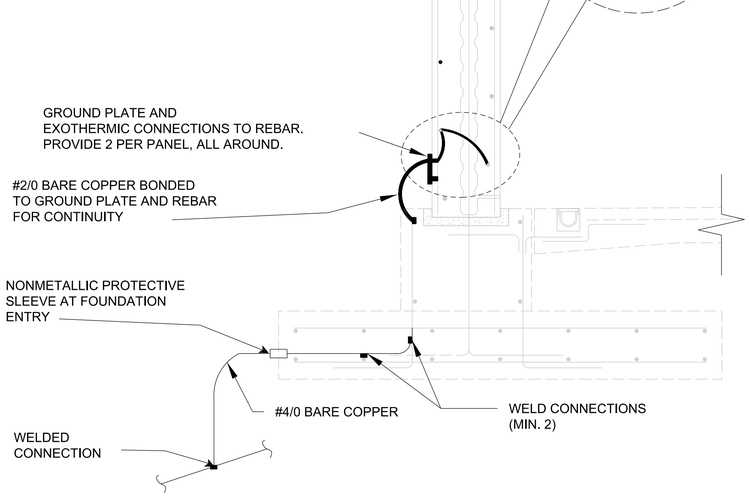
GROUND ROD TEST WELL DETAIL — B — E102 E102

N.T.S.



TYPICAL ECM GROUNDING SECTION — A — E102 E102

N.T.S.



TYPICAL REBAR BONDING — C — E102 E102

SCALE: N.T.S.

NOTE: REBAR AND CABLE WELDS SHALL BE >1 1/4"

NOTES:

1. ALL VENTILATORS MAY NOT BE SHOWN FOR CLARITY. ANY VENTILATORS OR OTHER METALLIC BODIES WHICH RISE ABOVE FINISHED GRADE WITHIN MUNITIONS STORAGE SHALL HAVE AN AIR TERMINAL ATOP AND BONDED TO NEAREST GROUNDING ELECTRODE SYSTEM SIMILARLY AS SHOWN.
2. CONDUCTORS SHALL BE MINIMUM #2/0 AWG UNLESS OTHERWISE NOTED.
3. PROVIDE SOLID CONCRETE BLOCK ON WHICH TO SECURE AIR TERMINAL BASE. PLACE BLOCK AT TOP OF EARTH COVER.
4. SEE STRUCTURAL DRAWINGS FOR REBAR BONDING DETAILS, THAT ESTABLISH ELECTRICAL CONTINUITY BETWEEN STRUCTURAL PANELS.

SEE 01 10 10 FOR REQUIREMENTS REGARDING LIGHTNING PROTECTION AND ELECTRICAL DESIGN. 01 10 10 SUPERSEDES SHEETS E-101, E-102, E-103, E-104 WITHIN THIS MSM BOX-TYPE STANDARD 421-80-08 HAYMAN IGLOO DRAWING SET.

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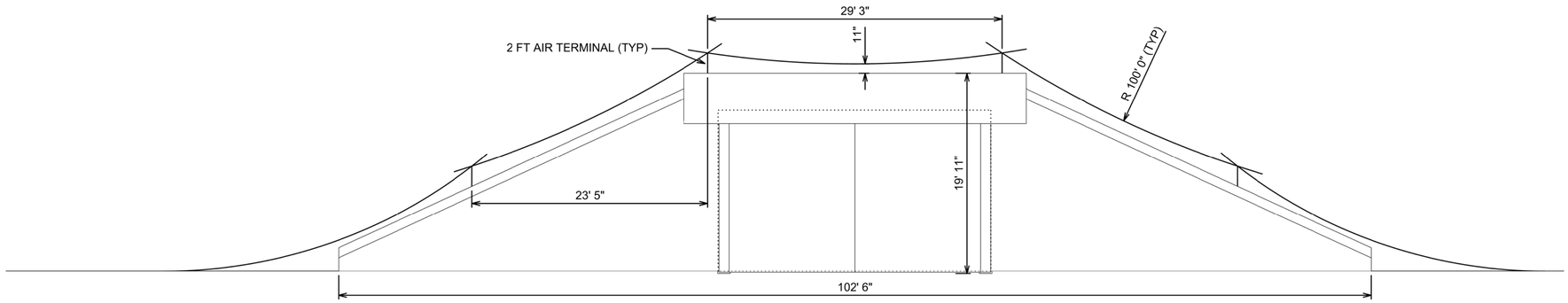
MODULAR STORAGE MAGAZINE
BOX-TYPE, STD 421-80-08

LIGHTNING PROTECTION SYSTEM

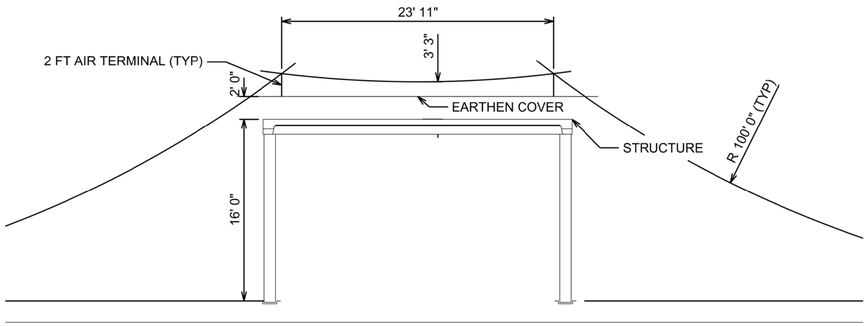
Sheet reference number:
E-102
Sheet 24 of 26



TYPICAL FRONT HEADWALL DETAIL WITH ROLLING SPHERE ANALYSIS

N.T.S

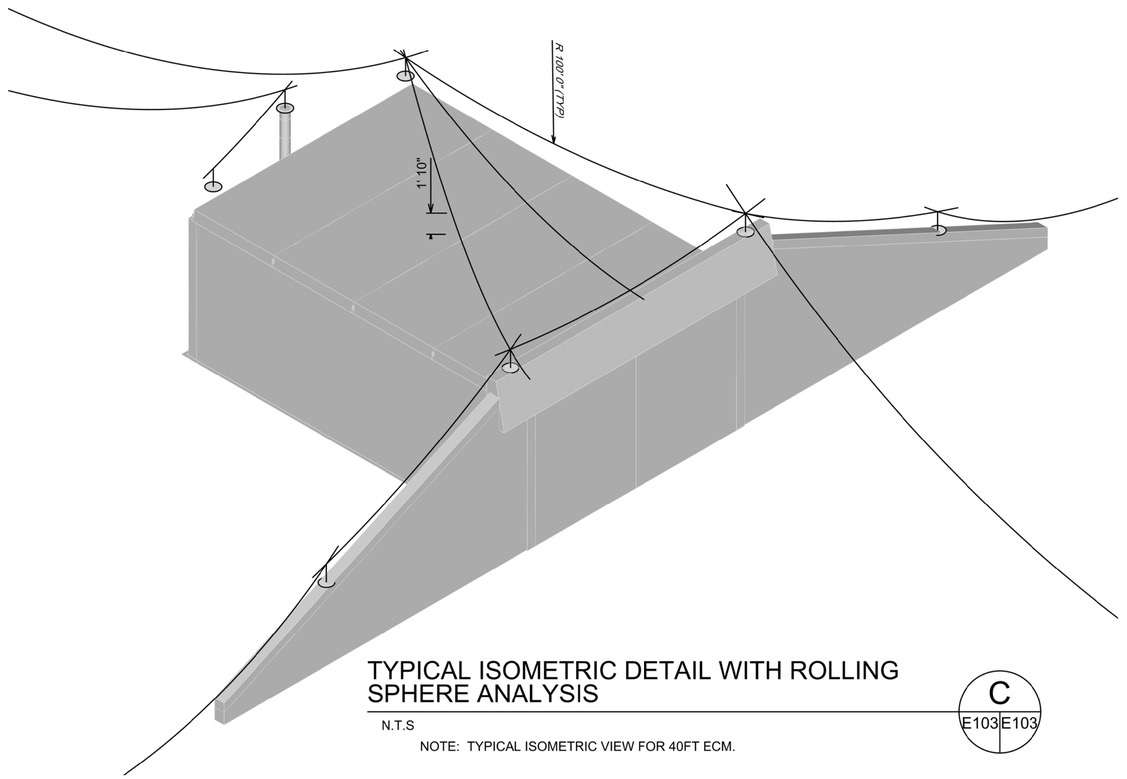
A E103|E103



TYPICAL CROSS-SECTION DETAIL WITH ROLLING SPHERE ANALYSIS

N.T.S

B E103|E103



TYPICAL ISOMETRIC DETAIL WITH ROLLING SPHERE ANALYSIS

N.T.S

NOTE: TYPICAL ISOMETRIC VIEW FOR 40FT ECM.

C E103|E103

SEE 01 10 10 FOR REQUIREMENTS REGARDING LIGHTNING PROTECTION AND ELECTRICAL DESIGN. 01 10 10 SUPERSEDES SHEETS E-101, E-102, E-103, E-104 WITHIN THIS MSM BOX-TYPE STANDARD 421-80-08 HAYMAN IGLOO DRAWING SET.

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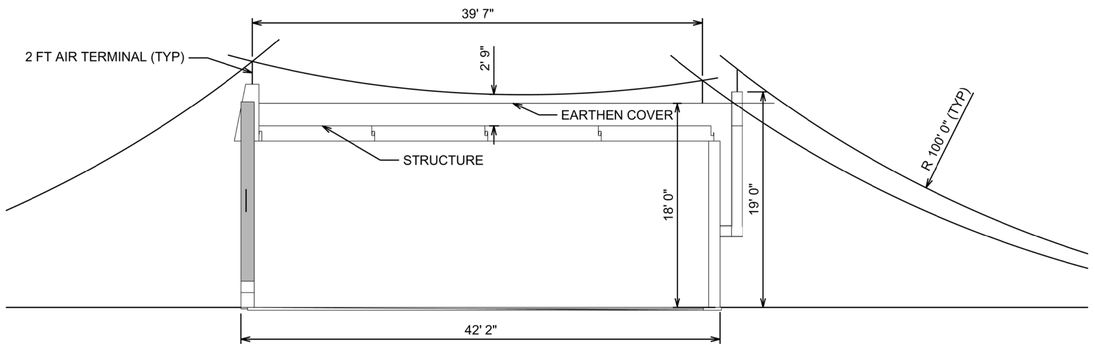
MODULAR STORAGE MAGAZINE
BOX-TYPE, STD 421-80-08

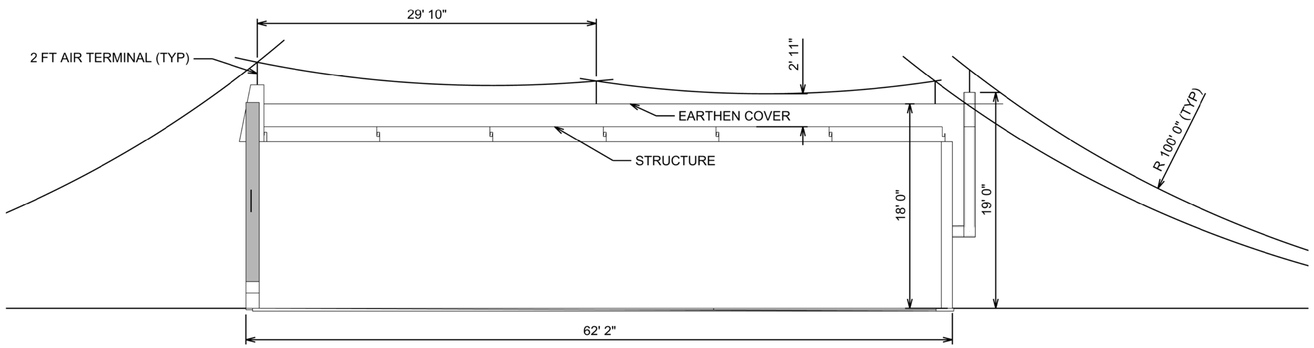
LIGHTNING PROTECTION SYSTEM

Sheet reference number:
E-103
Sheet 25 of 26



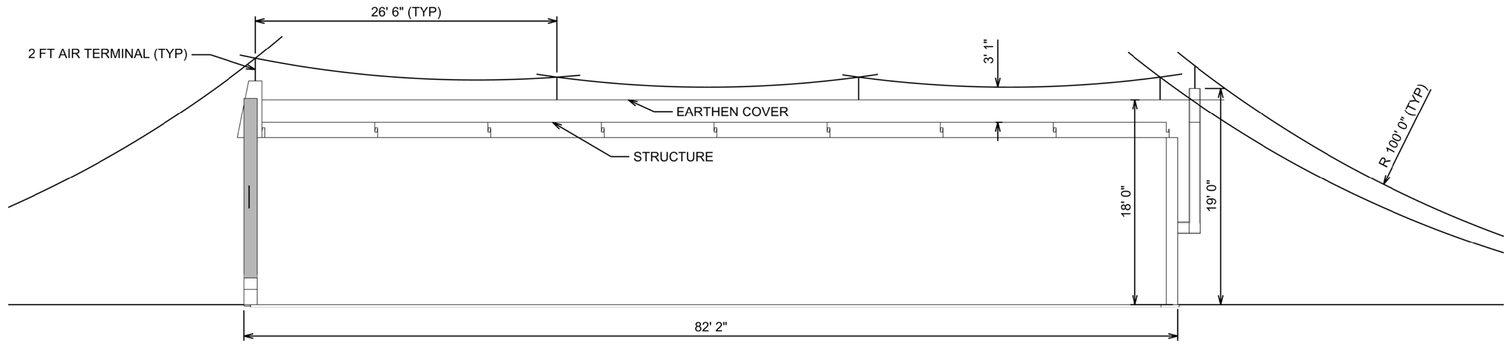
TYPICAL RSM ANALYSIS DIAGRAM - 40 FT ECM (A, E104 E104)

N.T.S



TYPICAL RSM ANALYSIS DIAGRAM - 60 FT ECM (B, E104 E104)

N.T.S.



TYPICAL RSM ANALYSIS DIAGRAM - 80 FT ECM (C, E104 E104)

N.T.S.

TYPICAL AIR TERMINAL PLACEMENT FOR EARTH COVERED MAGAZINES

NOMINAL ECM LENGTH	HEADWALL	SPACED ALONG EDGE	ON/NEAR REAR VENT STACK	MINIMUM AIR TERMINAL QUANTITY
40 FT. OR LESS	4	2	1	7
MORE THAN 40 FT. LESS THAN 80 FT.	4	4	1	9
80 FT. OR MORE	4	6+	1	11+

NOTE: 24" AIR TERMINALS UNLESS OTHERWISE NOTED.

NOTES:

1. ALL VENTILATORS MAY NOT BE SHOWN FOR CLARITY. ANY VENTILATORS OR OTHER METALLIC BODIES WHICH RISE ABOVE FINISHED GRADE WITHIN MUNITIONS STORAGE SHALL HAVE AN AIR TERMINAL ATOP AND BONDED TO GROUND SIMILARLY AS SHOWN.
2. GROUNDING CONNECTIONS NOT SHOWN FOR CLARITY.

SEE 01 10 10 FOR REQUIREMENTS REGARDING LIGHTNING PROTECTION AND ELECTRICAL DESIGN. 01 10 10 SUPERSEDES SHEETS E-101, E-102, E-103, E-104 WITHIN THIS MSM BOX-TYPE STANDARD 421-80-08 HAYMAN IGLOO DRAWING SET.

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BOX-TYPE, STD 421-80-08

LIGHTNING PROTECTION SYSTEM

Sheet reference number:
E-104
Sheet 26 of 26

ATTACHMENT 08

MUNITIONS STORAGE MAGAZINE GEOTECHNICAL REPORT

A Cache Corp.

Engineering a Firm Foundation

Geotechnical Investigation
for a proposed
HAYMAN TYPE IGLOO #2591
Hill Air Force Base
Davis County, Utah

PREPARED FOR:
HAL HAYS CONSTRUCTION, INC.
Care of:
Tom Bailey
4181 Latham Street
Riverside, CA 92501

PREPARED BY:
A Cache Corp.
PROJECT NO. 1130002

April 22, 2013

April 22, 2013

Attn. Tom Bailey
Hal Hays Construction, Inc.
4181 Latham Street
Riverside, CA 92501

Subject: **Geotechnical Investigation for the proposed HAYMAN TYPE IGLOO #2591 on Hill Air Force Base Davis County, Utah**

A Cache Corp. Project No. 1130002

Mr. Bailey

It is with great pleasure that A Cache Corp. presents this report of our findings for the subject site. It contains the results of our findings and an engineering interpretation of the results with respect to the available project characteristics.

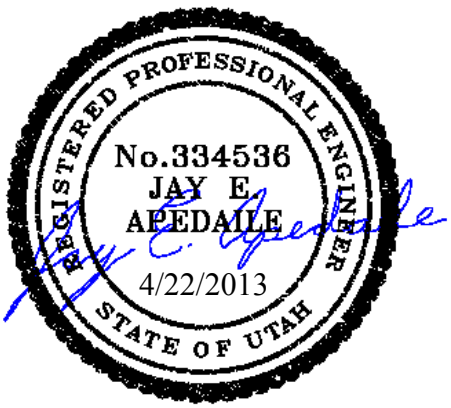
Soil samples were obtained during our investigation. Please note that we will store these samples for 60 days after the signed date on this report, at which time they will be discarded unless you request otherwise.

We are recommending the site be treated as a Site Class **D** with an **allowable bearing capacity of 1.5 kips/ft^2 for continuous** wall and **spot** foundation design, provided the recommendations in this report are observed. The site appears to be adequate for the construction of the proposed facility. No deleterious soils or other conditions were observed that would indicate problem in the performance of a normally constructed facility. Some native fill material was observed in the apron area.

We appreciate the opportunity of working with you on this project and look forward to future projects with you. If you have questions regarding this project, or any other, please do not hesitate to contact us at **(435)-760-3103**.

Sincerely,

A Cache Corp.



Jay E. Apedaile, P.E. M.S.
President

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APPENDIX A.

Figure 1: Vicinity Map
Figure 2: Site Map
Figure 3: Symbol Legend
Figures 4-5: Borehole Logs
Figure 6: Soil Test Data Summary

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1.0 GENERAL PROJECT INFORMATION

1.1 Project Authorization

A Cache Corp. (ACC) was retained by Dan Gonzalez of Hal Hays Construction, Inc. (Hal Hays) to conduct a Geotechnical Subsurface Investigation for the proposed Hayman Type Igloo to be constructed on Hill Air Force Base in Davis County, Utah (see **Figures 1 and 2** in the Appendix).

1.2 Project Purpose and Description

The purpose of this study was to obtain design level soil information to be used in the design of the proposed structures. Based on the information provided by Hal Hays the proposed construction will consist of a 27-foot by 82-foot concrete munitions storage building, on grade single story buried structure.

This report and the recommendations here in are based on the available project information. If this information is incorrect, then ACC shall be informed, preferably in writing, so ACC can evaluate the validity of this report.

2.0 SITE AND SUBSURFACE CONDITIONS

2.1 Site Investigation

The site is located adjacent to an existing munitions storage building on pine road on Hill Air Force Base in Davis County Utah (see **Figures 1 and 2** in the Appendix).

The general subsurface conditions at the site were investigated by drilling 3 boreholes ranging in depth from 9.5-feet to 16.5-feet below the current site grade. See the approximate location of each borehole on **Figure 2** in the Appendix. Soil samples were obtained at significant change of strata and in general accordance with ASTM D-420 and ASTM 2488. The subsurface conditions observed in the field investigation are discussed in Section 3.4 and in the Boring Logs.

Logs of the boreholes including a description of all soil strata encountered are presented in the Appendix as **Figures 4-5**. Sampling information and other pertinent data and observations are also included in the logs. A legend of the symbols used in the boring logs is presented in the Appendix as **Figure 3**.

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2.2 Laboratory Investigation

Samples obtained during the field investigation were returned to the laboratory and inspected and classified in accordance with the Unified Soil Classification System (ASTM 2487). Selected laboratory tests were performed on representative soil samples to determine their classification and characteristics with respect to engineering design. The following list indicates typical laboratory tests which may have been conducted on some of the samples retrieved from the site:

Test	Standard	To Determine
Moisture Content	ASTM D 2216	% moisture representative of field conditions
Atterberg Limits	ASTM D 4318	Plasticity and workability
% Pass #200 Sieve	ASTM D 1140	% fines in sample
Dry Density	ASTM D 2937	Dry unit weight representative of field conditions.
Consolidation	ASTM D 2435	Maximum past pressure, collapse, swell and consolidation Potential,

The testing results and the soil classifications are illustrated in the Borehole logs contained in the Appendix (**Figures 4-5**).

3.0 FINDINGS

3.1 Site Conditions

At the time of this investigation the site consisted of an open area adjacent to existing munitions storage buildings. Historically the site has been an open undeveloped area. According to USGS maps of the site the Elevation is at approximately 4780 feet above mean see level.

3.2 Surface Drainage

Currently, the majority of any surface runoff would drain to the west. The soil conditions appear to be adequate in keeping the surface soils from eroding. The site soil appear to be well drained.

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3.3 Geology

The site was mapped by Davis (1985) as have been formed from post-Lake Bonneville deltaic deposits related to the Provo and younger shore line consisting of sand, and gravels in beach deposits, bars, spits, and deltas. The observed soils at the site were generally consistent with the mapped geological unit.

3.4 Soil Profile

The soil profile at the site appeared to be somewhat consistent, silty fine sands, poorly graded with lenses of silt and trace of clay. The sands appeared to be loose to medium dense from the surface to the maximum depth explored (16.5 feet below current grade).

For detailed observations of the sub-soils, the location they were observed, the characteristic observed, and any other pertinent information observed in the field or in the laboratory, see the Boring Logs in the Appendix.

3.5 Fault and Seismicity

The site is located in a seismically active region. It is approximately 4-miles west an active section of the Wasatch Fault. During the life of the project seismic activity caused by active faults in the area, have the potential of causing moderate to strong shaking. According to the findings of our subsurface investigation, and according to the guidelines of the International Building Code (IBC, 2009), the Site Class would be **D** (IBC, 2006; section 1613.5.2). Using the U.S. Geological Survey Ground Motion Parameter Calculator the following recommendations are provided, Recommended design acceleration for short periods are (S_S=1.25, F_a=1.00, S_{MS}=1.25, S_{DS}=0.83). For a design acceleration of 1-second period they are (S_1=0.79, F_v=1.50, S_{M1}=0.79, S_{D1}=0.53).

3.6 Liquefaction Evaluation

The site is mapped as having a low liquefaction potential by Anderson and others (1990). A site specific liquefaction assessment was conducted by obtaining SPT-N values and samples for laboratory analysis of the sub-soils to a depth of only 16.5-feet below the current site grade. Liquefaction potential analysis was conducted following the procedures by Seed and Idriss (1982), Seed, et. Al, (1983; 1985), and Youd and Idriss (1997), using Standard Penetration Test (SPT), and laboratory results. **According to the analysis, the site soils are not susceptible to liquefaction during a large seismic event**. This is only because of the lack of ground water. If by some means ground water was to rise and a large seismic event occurred then we would expect settlement do to liquefaction of the soils to occur.

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3.7 Ground Water and Piezometer Installation

There was no evidence of ground water observed in any of the boreholes explored (maximum depth 16.5'). It is likely that the groundwater fluctuates during the year according to rainfall and other climatic and manmade (irrigation) influences. A detailed evaluation of the groundwater is beyond the scope of this investigation.

3.8 Site Subsurface Variations

It is our experience that variations in continuity and nature of subsurface conditions should be anticipated. Due to the nature and depositional characteristics of soils encountered at the site, care should be taken in interpolating or extrapolating subsurface conditions beyond the exploratory borings. Seasonal fluctuations in ground water conditions are likely to occur.

4.0 RECOMMENDATIONS

Recommendations have been developed on the basis of the previously described project characteristics and subsurface conditions observed in the field and laboratory, as well as common engineering practice. Prudence and common engineering practices should be followed in conjunction to the recommendations of this report.

4.1 Site Preparation and Grading

All topsoil, vegetation, unsuitable soils, fill and any other deleterious materials, should be removed from beneath the planed building and pavement areas. This material shall not be used as structural fill. After striping and excavation to the proper subgrade elevation, the exposed subgrade should be proof-rolled with a tandem axle dump truck or similar rubber tiered vehicle. Soils that rut or tend to deflect excessively should be removed and replaced with properly compacted fill. Proof rolling and removal of pumping material should be witnessed by the geotechnical engineer or his approved representative. This should take place during a period of dry weather. Some subsoil may require a period of drying out before they are suitable for compacting. The subgrade soils should be compacted to a minimum of 95 percent Modified Proctor maximum laboratory density (ASTM D 1557) at a moisture content ranging from -2 to +6 percentage point of optimum.

Fill placement may begin after the subgrade preparation and observations are completed. Fill material shall be free of organic or other deleterious materials and should have a maximum particle size no greater than 3 inches in diameter any given direction. Layers shall be placed in a relatively uniform horizontal manner with maximum lifts of 8 inches of loose material.

If on-sit soils are used as fill it should be compacted as discussed above, maximum of 8 inch loose lifts. If water is added it should be uniformly applied and thoroughly mixed into

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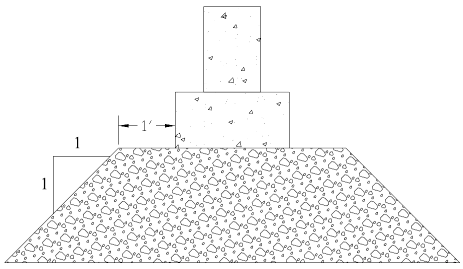
the soil by disking or scarifying. Each compacted lift of fill shall be tested by a credible testing agency approved by the geotechnical engineer before another lift is applied.

If allowed to become wet, the native subgrade may become unstable for rubber tired construction vehicles. This could be noted as pumping and rutting. Great effort shall be taken to avoid exposing native soils to excess moisture. Unstable soils should be stabilized or replaced with an adequate material.

4.2 Foundation Recommendations

Conventional spot and continuous wall foundations may be used for the support of the proposed structure at the subject site. Based on field and laboratory data an **allowable bearing capacity of 1.5 kips/ft^2** may be used **for continuous** wall and **spot** foundation design, provided the following recommendations are observed:

- Foundations shall be placed on native compacted or compacted structural fill (conforming to Sections 5.2 and 5.3).
- Onsite soils shall be examined by a qualified geotechnical engineer from this office, to verify that all topsoil, fill, construction debris, soft spots, and any other deleterious materials have been removed prior to the placement of footings or structural fill.
- Structural fill shall be a well-graded granular soil, free of organics, debris, or other deleterious materials as outlined in Section 5.3.
- Fill shall be compacted as outlined in Section 5.3.
- Fill shall extend as a minimum 1-foot past the edge of the footing, and then for every 1-foot of fill (vertically) placed below the footing, it shall extend a minimum of 1-foot horizontally.
- Continuous footing width shall be maintained at a minimum of 24 inches.
- Spot footings shall be a minimum of 24 inches in width.
- Exterior footings shall be placed a minimum of 36 inches below final grade, and interior footing shall be placed a minimum of 18 inches below grade for frost protection.



Allowable bearing capacity may be increased to 2.0 kips/ft^2 provided that a minimum of 16-inches of compacted structural or native fill is properly placed below the footing (>95% Modified Proctor Maximum Laboratory Density).

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Allowable bearing pressure may be increased by 1/3 for temporary loads such as wind or seismic forces. Foundations designed and constructed in accordance with our recommendations could experience some settlement. If the recommendations provided herein are observed, we estimate settlement should not exceed one inch, with differential settlements on the order of one-half inch. We anticipate approximately 75 percent of initial settlement to take place during construction.

4.3 Lateral Soil Pressures

Lateral soil pressures are dependent on a number of factors, the soil type, the slope of the backfill, the age and compactness of the soil. For the native sands and silts the following lateral soil pressures shall be used for design:

4.3.1 Non-sloping Back Fill

1. An equivalent fluid pressure of 50 pounds per cubic foot (pcf) for the active case. (That is when the structure is allowed to yield, that is to say the structure is allowed to move away from the soil. This requires a minimum movement or rotation at the top of the wall of 0.001H, where "H" is the height of the wall (bottom of footing to top of wall).)
2. 70 pcf for the at-rest case. That is when the wall is not allowed to yield. **If the wall is braced during the placement of the fill for the retaining walls, an at-rest pressure of 55 pcf may be used for the long term design.**
3. 300 pcf for the passive case. That is when the wall exerts pressure on the soil.
4. A coefficient of friction of 0.35 shall be used for the interface between the native silty sands and the cast-in-place concrete.

4.3.2 Down Sloping Back Fill (2 horizontal to 1 vertical down from the top of the wall)

1. An equivalent fluid pressure of 35 pcf for the active case.
2. 37 pcf for the at-rest case. **The walls should be braced during the placement of the fill for the retaining walls.**
3. 120 pcf for the passive case.

4.3.3 Front Cantilevered Retaining Wall

1. An equivalent fluid pressure of 40 pcf for the active case.
2. 360 pcf for the passive case.

4.3.4 Seismic Concerns

For the at grade stiff structure with the sloping backfill away and down from the structure using the native soils and an equivalent fluid pressure, the pressures on the wall should be less than 55 pcf. This value is for the Seismic case, it is a stand alone value, it is not added to any other value.

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These recommendations are based on drained backfill conditions. A drainage system behind walls is recommended to limit the build-up of hydrostatic pressures.

4.4 Drainage

For constructability, adequate surface drainage should be provided at the site to minimize any increase in moisture content of the foundation supporting soils during and after construction. Foundation soils shall be protected from any increase in moisture.

For final grade we recommend all areas around the structures be generously sloped to provide drainage away from these areas. We recommend a minimum slope of 6 inches in the first 10 feet away from the structure.

4.5 Floor Slabs

All topsoil and deleterious materials shall be removed (typically about 2 to 6-inches of topsoil at this site). We recommend a minimum of 6 inches of free draining structural fill, free from organic material and debris, be used just below floor slabs as a vapor barrier. If grade is required to be re-established or raised above current grade a structural fill shall be used and placed in accordance with Sections 5.2 and 5.3. The site shall be compacted prior to the placement of gravel as discussed in Section 4.1. A subgrade modulus of 150 pounds per cubic inch (pci) may be used for design purposes.

4.6 Pavement Design

We expect site traffic on the proposed apron to consist of heavy and lightly loaded vehicles. The following minimum recommended pavement sections are based on an estimated CBR of 12.0%:

	Rigid Pavement Design Section Thickness (in)	
Material	**Pedestrian Traffic**	**Apron**
Concrete Pavement	**4**	**8**
Road-Base Material	**-**	**6**
Sub base	**6**	**10**
Total Thickness	**10**	**24**

The concrete shall have a minimum compressive strength of 3,500 psi. at 28 days. It should also have 5 $\pm$ 1 percent entrained air for durability and workability. A fiber mesh is also recommended to enhance the durability of the concrete. To reduce the potential for cracking, appropriate construction joints are required. Joints shall be designed in accordance with current Portland Cement Association guidelines. Joint shall be sealed to infiltration into pavement joints.

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It is further recommended that all topsoil and fill materials are removed prior to the placing of base material, and structural fill. The native soils shall be proof rolled as outlined in Section 4.1. If any areas appear soft, they should be removed and replaced with structural fill. **All structural fill materials overlying native soil should be compacted in accordance with Section 5.2 of this report.**

5.0 GENERAL CONSTRUCTION CONSIDERATIONS

The guidelines and recommendations outlined below address the geotechnically related construction considerations for this project.

5.1 Foundation Excavations

All areas that will support foundation loads shall be inspected by the geotechnical engineer, or his approved representative, to insure that all loose, soft, or otherwise undesirable material is removed, and that the structure will bear on satisfactory material. This shall occur prior to the placement of any structural fill or concrete. All topsoil shall be removed prior to the placement of foundations or pavements. (We recommend giving this office a few days notice for scheduling.) Any loose or deleterious material should be replaced with a free draining granular fill as outlined in **Sections 5.2 and 5.3**.

If unsatisfactory material pockets are encountered in the excavation, the undesirable material should be removed, and the elevation re-established by backfilling. This backfilling can be done with a lean concrete, or a well-compacted structural fill as define in **Section 5.3**.

All structural fill supporting footing loads should be compacted to at least 95 percent of the Modified Proctor Maximum Density (ASTM D 1557), provided the foundation is designed as outlined in **Section 4.2**. Compaction tests should be taken on each lift to insure the required compaction is being achieved.

Foundation excavations shall be protected against any harmful change in condition such as disturbance, rain, and freezing. Surface runoff should be directed away from the excavation and not allowed to pond. All footing concrete should be poured the same day as the excavation is made. If this is not practical, the foundation excavation should be adequately protected, and foundation placement should take place as soon as possible. For best construction results we recommend that earth work be conducted during the dry months of the year, typically June through October.

Excavation slopes shall maintain a maximum slope of 1.5 horizontal to 1 vertical. If it is required that slopes are steeper, it is necessary that excavation shoring/bracing be used.

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5.2 Fill Compaction

All fill material should be compacted in accordance to the following criteria based on the Modified Proctor Maximum Laboratory Density (ASTM D 1557):

1. Structural fill, supporting foundations.	95%
2. Structural fill, below floor stabs	94%
3. Backfill of trenches	
a. Below foundations	95%
b. Below floor stabs	94%
c. Below pavements	95%
d. Others	90%
4. Beneath Pavements	95%

Compaction should be accomplished by placing the fill in a maximum of 8-inch loose lifts, and mechanically compacting each lift to the specified minimum density. Field density tests should be performed on each lift as necessary to insure that compaction is being achieved. As a minimum 33% of all spot footings, and one test for every 50 lineal feet of continuous wall footings shall be tested for each lift.

5.3 Types of Fill

5.3.1 Structural Fill: Sub-base (pit-run)

Well-graded granular soils free of organics, debris, or other deleterious materials are recommended for use as structural fill at this site. We recommend a well-graded sandy gravel material with no less than 5%, and no more than 10% passing the #200 sieve, and no particles greater than 4 inches in maximum dimension. Structural fill shall be compacted at a moisture content ranging from -2 to +6 percentage point of optimum in accordance to the Modified Proctor Maximum Laboratory Density (ASTM D 1557).

5.3.2 Structural Fill: Roadbase

Granular soils free of organics or other deleterious materials and debris. We recommend a sand and fractured gravel material with between 5 and 12 percent passing the #200 sieve, and no particles greater than approximately 1 inch in maximum dimension.

5.3.3 Non-Structural Fill

On-site soils appear to be suitable for non-structural site grading and landscaping fill. All fill material shall be approved by the engineer prior to placement.

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5.4 Quality Control

Our recommendations are based on the assumption that adequate quality control testing and observations will be conducted during construction to verify compliance. This may include but is not necessarily limited to the following:

5.4.1 Field observations

Observations during all phases of construction should occur. Observations such as site preparation, foundation excavation, structural fill placement, and concrete placement.

5.4.2 Fill Compaction

Compaction testing is required for all Structural supporting fill materials. Maximum Dry Density (Proctor-ASTM 1557) tests should be requested by the contractor immediately after delivery of any granular fill materials. The maximum density information should then be used for field density tests on each lift as necessary to insure that the required compaction is being achieved.

5.4.3 Concrete Quality

We recommend that freshly mixed concrete be tested in accordance with ASTM designations as follows:

- Slump, Temperature, Unit Weight, and Yield testing should be conducted on every delivery truck (ASTM C 138 and C 143).

- Entrained Air testing should also be conducted on every delivery truck for exposed concrete or concrete placed above the frost line (ASTM C 231).

- Test cylinders should be taken a minimum of every 50 cubic yards. Cylinder compressive strength tests should be conducted at 7 and 28 days from the placement date (ASTM C 31).

6.0 LIMITATIONS

The recommendations submitted in this report were based on evaluating the information obtained from the borings and site investigation, and the design details furnished by Hal Hays Construction, Inc. for the proposed project. The borehole data reflects the subsurface condition only at the specific location at the particular time designated on the borehole logs. Soil and ground water conditions may differ from conditions encountered at the actual borehole location. The nature and extent of any variation in the borehole may not become evident until construction begins. If variations do appear, it may become necessary to re-evaluate the recommendations of this report after we have observed the variation. If A Cache Corp. is not notified of changes to the project or

variations of the soils, A Cache Corp. will not be responsible for the impact of those changes on the project.

The Geotechnical Engineer warrants that the findings, recommendations, specification, or professional advice contained herein, have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

Once the plans and specifications are more complete, the Geotechnical Engineer shall be retained to review the final design plans and specifications to check that our engineering recommendations have been properly incorporated into the design documents. At this time, it may be necessary to submit supplementary recommendations. If A Cache Corp. is not retained to perform these functions, A Cache Corp. will not be responsible for the impact of those conditions on the project. This report has been prepared for the exclusive use of Hal Hays Construction, Inc. for the specific use on the proposed HAYMAN TYPE IGLOO #2591 located just north of #2590 on Pine Rd. on Hill Air Force Base in Davis County, Utah.

7.0 REFERENCES

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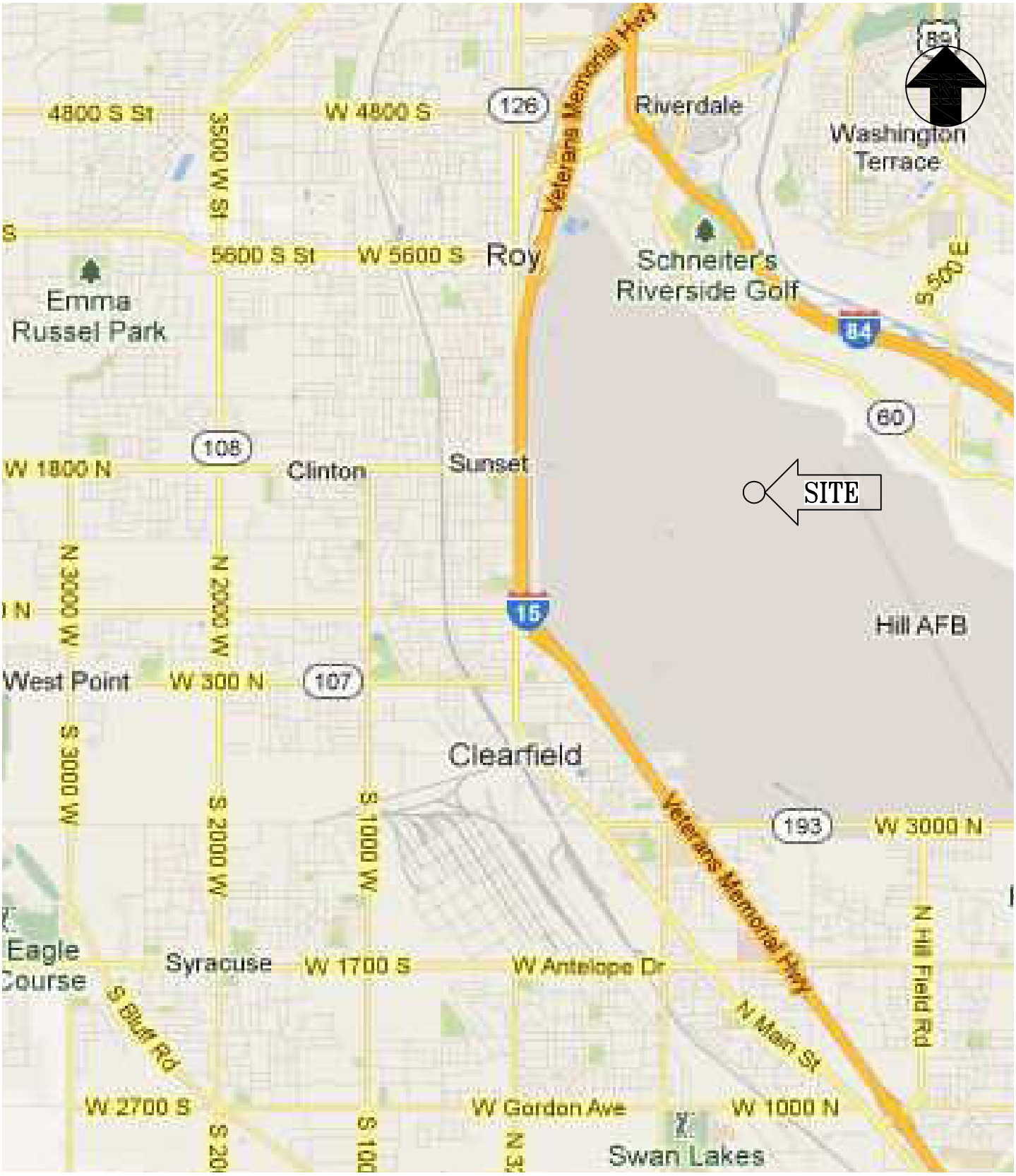
Appendix



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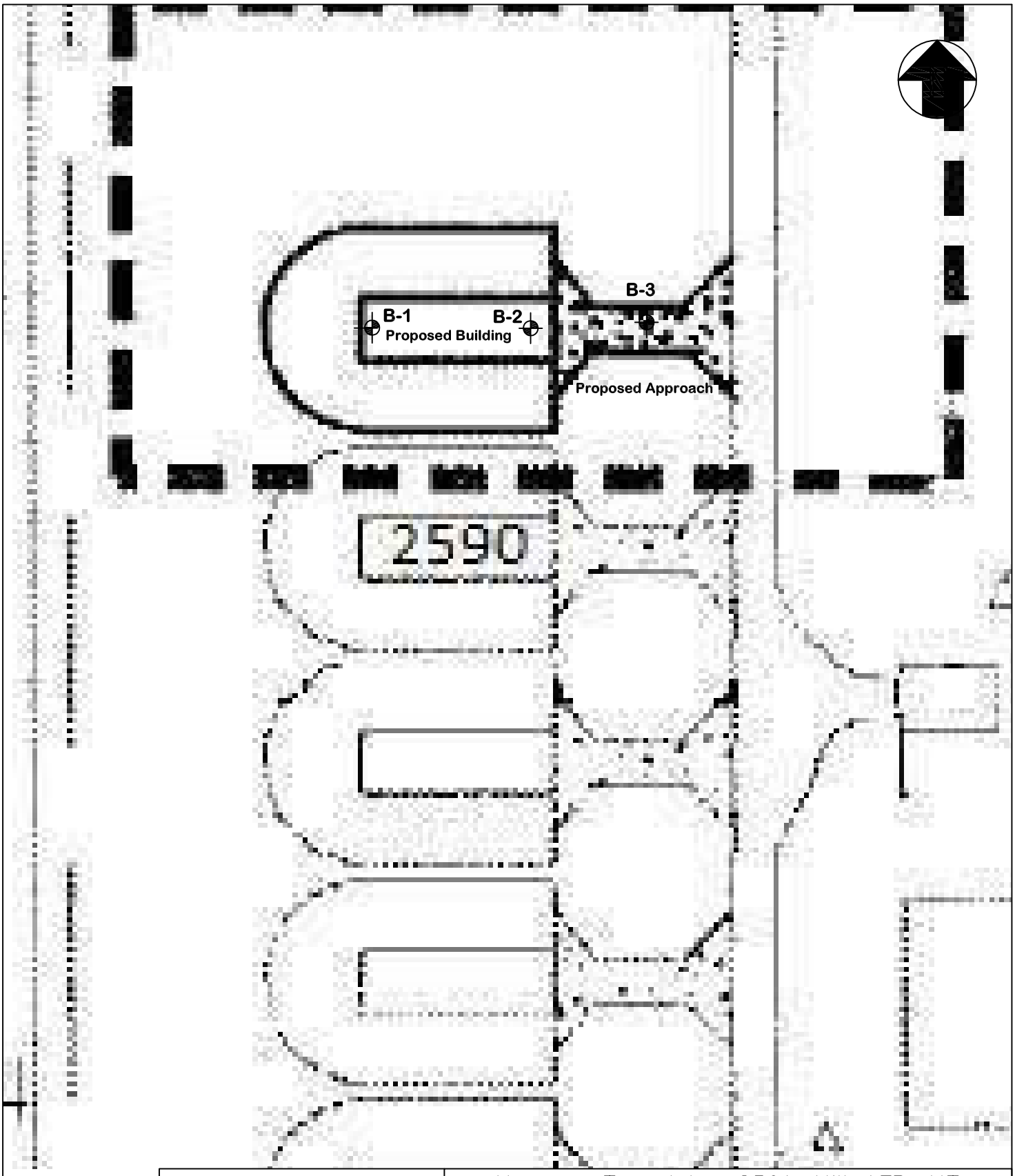
Hayman Type Igloo 2591, Hill AFB, UT

Pine Rd. HAFB, UT

TITLE:	Vicinity Map		
SCALE:	No Scale	ENGINEER: J. Apedaile	DRAWN BY: J. Apedaile
DATE:	4/19/2013		
DRAWING NO.	1130002 Figures.dwg		

FIGURE 1



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Hayman Type Igloo 2591, Hill AFB, UT

Pine Rd. HAFB, UT

TITLE:	Site Map		
SCALE:	No Scale	ENGINEER: J. Apedaile	DRAWN BY: J. Apedaile
DATE:	4/19/2013		
DRAWING NO.	1130002 Figures.dwg		

FIGURE 2

Created in DoubleCAD XT,
(www.DoubleCAD.com)

UNIFIED SOIL CLASSIFICATION SYSTEM

FIELD IDENTIFICATION PROCEDURES				GRAPH SYMBOL	LETTER SYMBOL [1]	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS More than half of material is larger than No. 200 sieve size. [2] (The No. 200 sieve size is about the smallest particle visible to the naked eye)	GRAVELS More than half of coarse fraction is larger than No. 4 sieve size. (For visual classifications, the 1/4" size may be used as equivalent to the No. 4 sieve size.)	CLEAN GRAVELS (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes.		GW	Well graded gravels, gravel-sand mixtures, little or no fines.
			Predominantly one size or a range of sizes with some intermediate sizes missing.		GP	Poorly graded gravels, gravel-sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below).		GM	Silty gravels, poorly graded gravel-sand-silt mixtures.
			Plastic fines (for identification procedures see CL below).		GC	Clayey gravels, poorly graded gravel-sand-clay mixtures.
	SANDS More than half of coarse fraction is smaller than No. 4 sieve size. (For visual classifications, the 1/4" size may be used as equivalent to the No. 4 sieve size.)	CLEAN SANDS (Little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate particle sizes.		SW	Well graded sands, gravelly sands, little or no fines.
			Predominantly one size or a range of sizes with some intermediate sizes missing.		SP	Poorly graded sands, gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below).		SM	Silty sands, poorly graded sand-silt mixtures.
			Plastic fines (for identification procedures see CL below).		SC	Clayey sands, poorly graded sand-clay mixtures.
FINE GRAINED SOILS More than half of material is smaller than No. 200 sieve size. (The No. 200 sieve size is about the smallest particle visible to the naked eye)	IDENTIFICATION PROCEDURES ON FRACTION SMALLER THAN No. 40 SIEVE SIZE					
		DRY STRENGTH (CRUSHING CHARACTERISTICS)	DILATANCY (REACTION TO SHAKING)	TOUGHNESS (CONSISTENCY NEAR PLASTIC LIMIT)		
	SILTS AND CLAYS Liquid limit less than 50	None to slight	Quick to slow	None	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sand with slight plasticity.
		Medium to high	None to very slow	Medium	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
		Slight to medium	Slow	Slight	OL	Organic silts and organic silt-clays of low plasticity.
	SILTS AND CLAYS Liquid limit greater than 50	Slight to medium	Slow to none	Slight to medium	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
		High to very high	None	High	CH	Inorganic clays of high plasticity, fat clays.
		Medium to high	None to very slow	Slight to medium	OH	Organic clays of medium to high plasticity.
HIGHLY ORGANIC SOILS		Readily identified by color, odor, spongy feel and frequently by fibrous texture.			Pt	Peat and other highly organic soils.

[1] Boundary classifications: —Soils possessing characteristics of two groups are designated by combinations of group symbols. For example GW—GC, well graded gravel—sand mixture with clay binder.
[2] All sieve sizes on this chart are U.S. standard.

GENERAL NOTES

1. In general, Unified Soil Classification Designations presented on the logs were evaluated by visual methods only. There rore, actual designations (based on laboratory testing) may differ.

2. Lines seperating strata on the logs represent approximate boundaries only Actual transitions may be gradual.

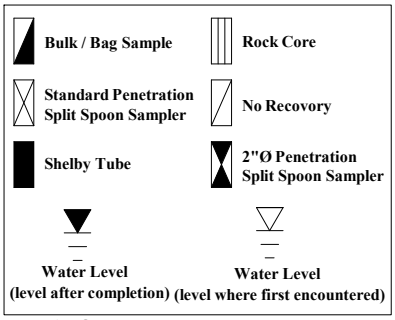
3. Logs represent general soil conditions observed at the point of exploration on the date indicated.

4. No warranty is provided as to the continuity of soil conditions between individual sample locations.

FINE - GRAINED SOIL

CONSISTENCY	SPT (blows/ft)	TORVANE UNDRAINED SHEAR STRENGTH (tsf)	POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH (tsf)	FIELD TEST
Very Soft	<2	<0.125	<0.25	Easily penetrated several inches by Thumb. Squeezes through fingers.
Soft	2 - 4	0.125 - 0.25	0.25 - 0.5	Easily penetrated 1 " by Thumb . Molded by light finger pressure.
Medium Stiff	4 - 8	0.25 - 0.5	0.5 - 1.0	Penetrated over 1/2 " by Thumb with moerate effort. Molded by strong finger pressure.
Stiff	8 - 15	0.5 - 1.0	1.0 - 2.0	Indented about 1/2 " by Thumb but penetrated only with great effort
Very Stiff	15 - 30	1.0 - 2.0	2.0 - 4.0	Readily indented by Thumbnail
Hard	>30	>2.0	>4.0	Indented with difficulty by Thumbnail

LOG KEY SYMBOLS



COARSE -GRAINDE

SOIL APPERENT DENSITY	SPT (blows/ft)	RELATIVE DENSITY (%)	FIELD TEST
Very Loose	<4	0 - 15	Easily penetrated with 1/2 " reinforcing rod pushed by hand
Loose	4 - 10	15 - 35	Difficult to penetrated with 1/2 " reinforcing rod pushed by hand
Medium Dense	10 - 30	35 - 65	Easily penetrated a foot with 1/2 " reinforcing rod driven with 5-lb hammer
Dense	30 - 50	65 - 85	Difficult to penetrated a foot with 1/2 " reinforcing rod driven with 5-lb hammer
Very Dense	>50	85 - 100	Penetrated only a few inches with 1/2 " reinforcing rod driven with 5-lb hammer

STRATIFICATION

DESCRIPTION	THICKNESS
SEAM	1/16 - 1/2 "
LAYER	1/2 - 12 "

DESCRIPTION	THICKNESS
Occasional	One or less per foot of thickness
Frequent	More than on per foot of thichness

CEMENTATION

DESCRIPTION	DESCRIPTION
Weakely	Crumbles or breaks with handling of slight finger pressure
Moderately	Crumbles or breaks with considerable finger pressure
Strongly	Will not crumbles or breaks with finger pressure

MODIFIERS

DESCRIPTION	%
Trace	<5
Some	5 - 12
With	>12

MOISTURE CONTENT

DESCRIPTION	FIELD TEST
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible water, usually soil below Water Table

FIGURE 3

A Cache Corp.
Engineering a Firm Foundation

BORING LOG

Hayman Type Igloo 2591, Hill AFB, UT

BORING No. : B–1	JOB No. : 1130002	DATE : 4/16/2013	SHEET 1 OF 1
PROJECT : Hayman Type Igloo 2591, Hill AFB, UT Clearfield, UT	SURF. EL. :	BORE DIA. : 8.0"	DEPTH : 16.5'
	WATER EL. :	COORDINATES:	
BORING TYPE : Hollow Stem Auger	CAD FILE : 1130002 Figures.dwg		

DEPTH, Ft.	SOIL DESCRIPTION	% FINER No. 200 SIEVE	BLOWS/Ft.	LIQUID LIMIT	PLASTIC LIMIT	MOISTURE CONTENT, %
	Surface~8": Brown SAND and SILT (SM–ML); medium dense, moist, trace organics, trace gravle near surface.		14			8.3
			9			13.2
5	18"~9': Redish brown layered Silty fine SAND (SM); loose to medium dense, moist, some silt and trace of clay in lenses.		25			4.2
10	9"~16.5': Brown layered Silty Poorly graded fine SAND (SM–SP); loose to medium dense, moist, some silt and trace of clay in lenses.		11			14.0
15			14			12.3
	End at 16.5'					
20						
25						
30						
35						

SHEAR STRENGTH, TSF
- MINIATURE VANE
- RESIDUAL MINIATURE VANE
- POCKET PENETROMETER
- UNCONFINED COMPRESSION(UU)
- TORVANE

(OPEN SYMBOLS REPRESENT REMOLDED TESTS.)

1.0 2.0

WET/DRY UNIT WT.,lb/cu.ft.

REMARKS :

REMARKS : Blows/Ft. obtained using a Standard Penetration Test (SPT) sampler driven with a 140 pound automatic hammer dropped 30 inches

WTR DEPTH @ COMPL. : no water encountered

FIELD ENG.: Jay Apedaile

COMPLETION DATE : 4/16/2013

FIGURE 4

A Cache Corp.
Engineering a Firm Foundation

BORING LOG

Hayman Type Igloo 2591, Hill AFB, UT

BORING No. : B–2 & 3	JOB No. : 1130002	DATE : 4/16/2013	SHEET 1 OF 1
PROJECT : Hayman Type Igloo 2591, Hill AFB, UT Clearfield, UT	SURF. EL. :	BORE DIA. : 8.0"	DEPTH : 11.5'
	WATER EL. :	COORDINATES:	
BORING TYPE : Hollow Stem Auger	CAD FILE : 1130002 Figures.dwg		

DEPTH, Ft.	GRAPHIC LOG	SAMPLE	SOIL DESCRIPTION	% FINER No. 200 SIEVE	BLOWS/Ft.	LIQUID LIMIT	PLASTIC LIMIT	MOISTURE CONTENT, %	SHEAR STRENGTH, TSF (● MINIATURE VANE; ⊖ RESIDUAL MINIATURE VANE; ⊗ POCKET PENETROMETER; ◒ UNCONFINED COMPRESSION(UU); ⊕ TORVANE; (OPEN SYMBOLS REPRESENT REMOLDED TESTS.) 1.0 2.0)	WET/DRY UNIT WT.,lb/cu.ft.
			B–2							
			Surface~12": Brown SAND and SILT (SM–ML); loose, moist, trace organics, trace gravle and cobles near surface.		17			7.6		
			12"~5.0': Redish brown layered Silty fine SAND (SM); loose to medium dense, moist, some silt and trace of clay in lenses.		7			18.7		
5					9			9.0		
			5"~11.5': Brown to light brown layered Poorly graded fine Silty SAND (SP–SM); loose to medium dense, moist, some lenses of silt and clay.							
10					13			4.9		
			End at 11.5'							
15										
			B–3							
			Surface~4': Brown mixed silty sand and sitl native FILL: loose, moist, trace organics, trace gravle.		17			9.7		
					5			11.6		
5			4'~11.5': Brown to light brown layered Poorly graded fine Silty SAND (SP–SM); loose to medium dense, moist, some lenses of silt and clay.		11			12.1		
					10			5.0		
10			End at 9.0'							
15										

REMARKS :

REMARKS : Blows/Ft. obtained using a Standard Penetration Test (SPT) sampler driven with a 140 pound automatic hammer dropped 30 inches

WTR DEPTH @ COMPL. : no water encountered

FIELD ENG.: Jay Apedaile

COMPLETION DATE : 4/16/2013

FIGURE 5

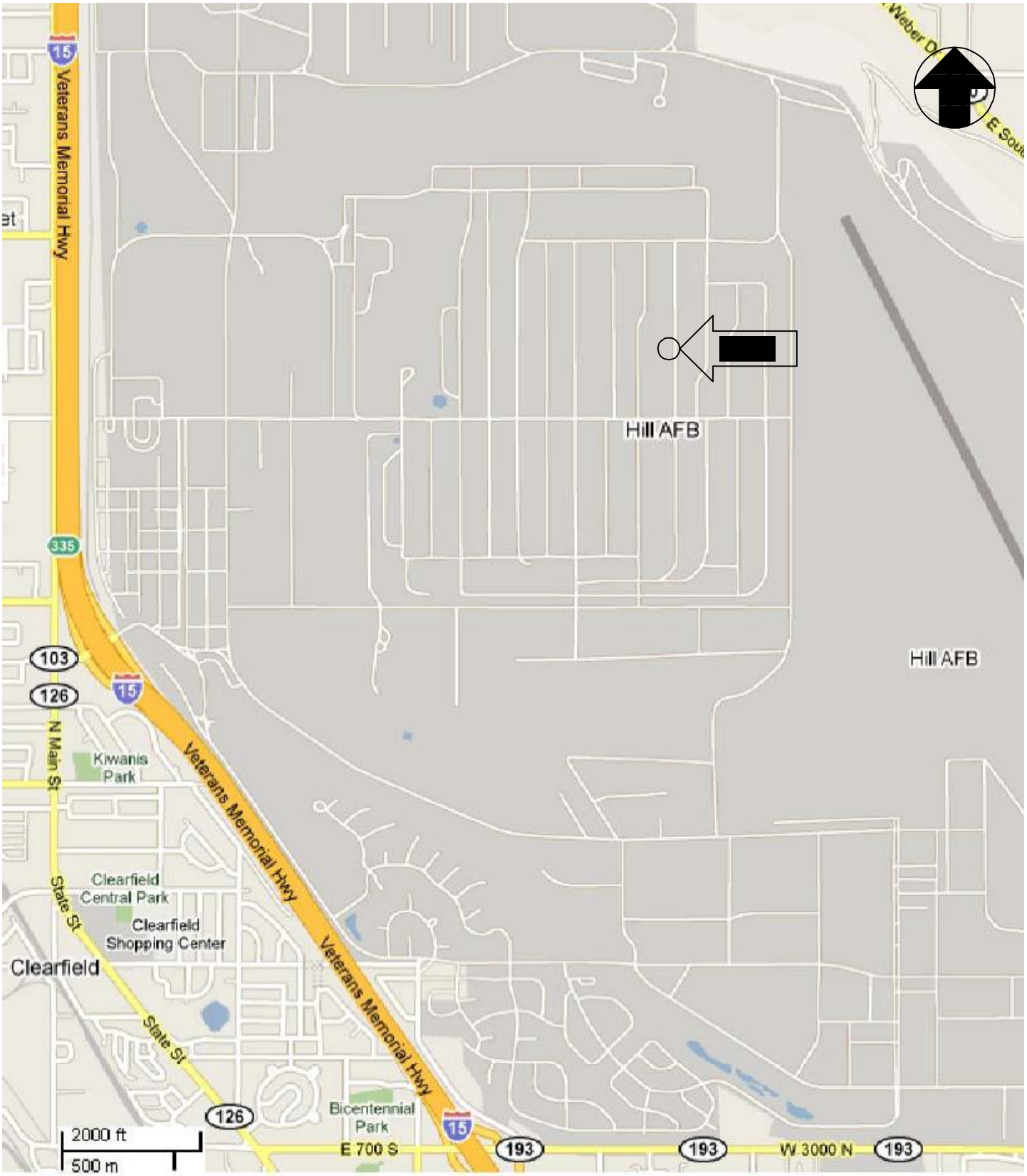
Test Data Summary

HOLE NO./ SAMPLE NO.	DEPTH (ft) BELOW GROUND SURFACE	STANDARD PENETRATION BLOWS PER FOOT	IN-PLACE DENSITY UNIT WEIGHT Dry / Wet LB./FT.^{3}	MOISTURE PERCENT	GRADATION % SAND	GRADATION % GRAVEL	% PASSING NO. 200 SIEVE	TORVANE SHEAR TONS/FT.^{2}	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.L.	ATTERBERG LIMITS P.I.	SOIL CLASSIFICATION UNIFIED SYSTEM
1/1	1	14 (MC)		8.3								SM-ML
1/2	3	9		13.2								ML-SM
1/3	6	25		4.2								SM
1/4	11	11		14.0								ML-SM
1/5	16	14		13.3								SP-SM
2/6	1	17 (MC)		7.6								SM
2/7	3	7		18.7								ML-SM
2/8	6	9		9.0								SM
2/9	11	13		4.9								SP
3/10	1	17 (MC)		9.7								SM
3/11	3	5		11.6								SM
3/12	6	11		12.1								SM
3/13	8	10		5.0								SP

A Cache Corp.
Engineering a Firm Foundation

(HAFB) Hayman Igloo

FIGURE 6



UTAH

Yahoo 2010

A Cache Corp.
Engineering a Firm Foundation

89 S. 100 E. P.O.Box 393 Mendon, Utah 84325
Voice: (435) 760-3103 Fax: ()
email: japedalle@yahoo.com

Copyright © 2004 A. Cache Corp.

Hayman Type Igloo, Hill AFB, UT

Pine Rd. HAFB, UT

TITLE:	Vicinity Map		
SCALE:	No Scale	ENGINEER: J. Apedaile	DRAWN BY: J. Apedaile
DATE:	6/22/2010		
DRAWING NO.	1100006 Figures.dwg		

FIGURE 1

UTAH

Google 2010

A Cache Corp.
Engineering a Firm Foundation

89 S. 100 E. P.O.Box 393 Mendon, Utah 84325
Voice: (435) 760-3103 Fax: ()
email: japedalle@yahoo.com

Copyright © 2004 A. Cache Corp.

Hayman Type Igloo, Hill AFB, UT

Pine Rd. HAFB, UT

TITLE:	Site Map		
SCALE:	No Scale	ENGINEER: J. Apedaile	DRAWN BY: J. Apedaile
DATE:	6/22/2010		
DRAWING NO.	1100006 Figures.dwg		

FIGURE 2

UNIFIED SOIL CLASSIFICATION SYSTEM

FIELD IDENTIFICATION PROCEDURES				GRAPH SYMBOL	LETTER SYMBOL [1]	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS More than half of material is larger than No. 200 sieve size. [2] (The No. 200 sieve size is about the smallest particle visible to the naked eye)	GRAVELS More than half of coarse fraction is larger than No. 4 sieve size. (For visual classifications, the 1/4" size may be used as equivalent to the No. 4 sieve size.)	CLEAN GRAVELS (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes.		GW	Well graded gravels, gravel-sand mixtures, little or no fines.
			Predominantly one size or a range of sizes with some intermediate sizes missing.		GP	Poorly graded gravels, gravel-sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below).		GM	Silty gravels, poorly graded gravel-sand-silt mixtures.
			Plastic fines (for identification procedures see CL below).		GC	Clayey gravels, poorly graded gravel-sand-clay mixtures.
	SANDS More than half of coarse fraction is smaller than No. 4 sieve size. (For visual classifications, the 1/4" size may be used as equivalent to the No. 4 sieve size.)	CLEAN SANDS (Little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate particle sizes.		SW	Well graded sands, gravelly sands, little or no fines.
			Predominantly one size or a range of sizes with some intermediate sizes missing.		SP	Poorly graded sands, gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below).		SM	Silty sands, poorly graded sand-silt mixtures.
			Plastic fines (for identification procedures see CL below).		SC	Clayey sands, poorly graded sand-clay mixtures.
FINE GRAINED SOILS More than half of material is smaller than No. 200 sieve size. (The No. 200 sieve size is about the smallest particle visible to the naked eye)	IDENTIFICATION PROCEDURES ON FRACTION SMALLER THAN No. 40 SIEVE SIZE					
		DRY STRENGTH (CRUSHING CHARACTERISTICS)	DILATANCY (REACTION TO SHAKING)	TOUGHNESS (CONSISTENCY NEAR PLASTIC LIMIT)		
	SILTS AND CLAYS Liquid limit less than 50	None to slight	Quick to slow	None	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sand with slight plasticity.
		Medium to high	None to very slow	Medium	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
		Slight to medium	Slow	Slight	OL	Organic silts and organic silt-clays of low plasticity.
	SILTS AND CLAYS Liquid limit greater than 50	Slight to medium	Slow to none	Slight to medium	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
		High to very high	None	High	CH	Inorganic clays of high plasticity, fat clays.
		Medium to high	None to very slow	Slight to medium	OH	Organic clays of medium to high plasticity.
HIGHLY ORGANIC SOILS		Readily identified by color, odor, spongy feel and frequently by fibrous texture.			Pt	Peat and other highly organic soils.

[1] Boundary classifications: —Soils possessing characteristics of two groups are designated by combinations of group symbols. For example GW—GC, well graded gravel—sand mixture with clay binder.
[2] All sieve sizes on this chart are U.S. standard.

GENERAL NOTES

1. In general, Unified Soil Classification Designations presented on the logs were evaluated by visual methods only. There rore, actual designations (based on laboratory testing) may differ.

2. Lines seperating strata on the logs represent approximate boundaries only Actual transitions may be gradual.

3. Logs represent general soil conditions observed at the point of exploration on the date indicated.

4. No warranty is provided as to the continuity of soil conditions between individual sample locations.

FINE - GRAINED SOIL

CONSISTENCY	SPT (blows/ft)	TORVANE UNDRAINED SHEAR STRENGTH (tsf)	POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH (tsf)	FIELD TEST
Very Soft	<2	<0.125	<0.25	Easily penetrated several inches by Thumb. Squeezes through fingers.
Soft	2 - 4	0.125 - 0.25	0.25 - 0.5	Easily penetrated 1 " by Thumb . Molded by light finger pressure.
Medium Stiff	4 - 8	0.25 - 0.5	0.5 - 1.0	Penetrated over 1/2 " by Thumb with moerate effort. Molded by strong finger pressure.
Stiff	8 - 15	0.5 - 1.0	1.0 - 2.0	Indented about 1/2 " by Thumb but penetrated only with great effort
Very Stiff	15 - 30	1.0 - 2.0	2.0 - 4.0	Readily Indented by Thumbnail
Hard	>30	>2.0	>4.0	Indented with difficulty by Thumbnail

LOG KEY SYMBOLS

- Bulk / Bag Sample
- Rock Core
- Standard Penetration Split Spoon Sampler
- No Recovory
- Shelby Tube
- 2"Ø Penetration Split Spoon Sampler
- Water Level (level after completion)
- Water Level (level where first encountered)

COARSE -GRAINDE SOIL

APPERENT DENSITY	SPT (blows/ft)	RELATIVE DENSITY (%)	FIELD TEST
Very Loose	<4	0 - 15	Easily penetrated with 1/2 " reinforcing rod pushed by hand
Loose	4 - 10	15 - 35	Difficult to penetrated with 1/2 " reinforcing rod pushed by hand
Medium Dense	10 - 30	35 - 65	Easily penetrated a foot with 1/2 " reinforcing rod driven with 5-lb hammer
Dense	30 - 50	65 - 85	Difficult to penetrated a foot with 1/2 " reinforcing rod driven with 5-lb hammer
Very Dense	>50	85 - 100	Penetrated only a few inches with 1/2 " reinforcing rod driven with 5-lb hammer

STRATIFICATION

DESCRIPTION	THICKNESS
SEAM	1/16 - 1/2 "
LAYER	1/2 - 12 "

DESCRIPTION	THICKNESS
Occasional	One or less per foot of thickness
Frequent	More than on per foot of thichness

CEMENTATION

DESCRIPTION	DESCRIPTION
Weakely	Crumbles or breaks with handling of slight finger pressure
Moderately	Crumbles or breaks with considerable finger pressure
Strongly	Will not crumbles or breaks with finger pressure

MODIFIERS

DESCRIPTION	%
Trace	<5
Some	5 - 12
With	>12

MOISTURE CONTENT

DESCRIPTION	FIELD TEST
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible water, usually soil below Water Table

FIGURE 3

A Cache Corp.
Engineering a Firm Foundation

BORING LOG

Hayman Type Igloo, Hill AFB, UT

BORING No. : B–1	JOB No. : 1100006	DATE : 6/16/2010	SHEET 1 OF 1
PROJECT : Hayman Type Igloo, Hill AFB, UT Clearfield, UT	SURF. EL. :	BORE DIA. : 8.0"	DEPTH : 16.5'
	WATER EL. :	COORDINATES:	
BORING TYPE : Hollow Stem Auger	CAD FILE : 1100006 Figures.dwg		

DEPTH, Ft.	GRAPHIC LOG	SAMPLE	SOIL DESCRIPTION	% FINER No. 200 SIEVE	BLOWS/Ft.	LIQUID LIMIT	PLASTIC LIMIT	MOISTURE CONTENT, %	SHEAR STRENGTH, TSF (● MINIATURE VANE; ⊖ RESIDUAL MINIATURE VANE; ⊗ POCKET PENETROMETER; ◒ UNCONFINED COMPRESSION(UU); ⊕ TORVANE; OPEN SYMBOLS REPRESENT REMOLDED TESTS.) 1.0 2.0	WET/DRY UNIT WT.,lb/cu.ft.
			Surface~18": Brown SAND and SILT (SM–ML); medium dense, moist, trace organics, trace gravle near surface.	44	16			11.7		
				74	4			18.6		
5			18"~9': Redish brown layered Silty fine SAND (SM); loose to medium dense, moist, some silt and trace of clay in lenses.		6			16.1		
10			9"~16.5': Brown layered Silty Poorly graded fine SAND (SM–SP); loose to medium dense, moist, some silt and trace of clay in lenses.	5	9			6.6		
15					16			20.5		
			End at 16.5'							
20										
25										
30										
35										

REMARKS :

REMARKS : Blows/Ft. obtained using a Standard Penetration Test (SPT) sampler driven with a 140 pound automatic hammer dropped 30 inches

WTR DEPTH @ COMPL. : no water encountered

FIELD ENG.: Jay Apedaile

COMPLETION DATE : 6/16/2010

FIGURE 4

A Cache Corp.
Engineering a Firm Foundation

BORING LOG

Hayman Type Igloo, Hill AFB, UT

BORING No. : B–2 & 3	JOB No. : 1100006	DATE : 6/16/2010	SHEET 1 OF 1
PROJECT : Hayman Type Igloo, Hill AFB, UT Clearfield, UT	SURF. EL. :	BORE DIA. : 8.0"	DEPTH : 16.5'
	WATER EL. :	COORDINATES:	
BORING TYPE : Hollow Stem Auger	CAD FILE : 1100006 Figures.dwg		

DEPTH, Ft.	SOIL DESCRIPTION	% FINER No. 200 SIEVE	BLOWS/Ft.	LIQUID LIMIT	PLASTIC LIMIT	MOISTURE CONTENT, %
	B–2					
	Surface~12": Brown SAND and SILT (SM–ML); loose, moist, trace organics, trace gravle and cobles near surface.		9			5.9
	12"~5.5': Redish brown layered Silty fine SAND (SM); loose to medium dense, moist, some silt and trace of clay in lenses.		9			16.1
5		27 4	10			17.6 4.4
	9"~16.5': Brown to light brown layered Poorly graded fine Silty SAND (SP–SM); loose to medium dense, moist, some lenses of silt and clay.					
10		14	11			5.9
15		3	11			2.7
	End at 16.5'					
	B–3					
	Surface~6": Brown silty SAND (SM); loose, moist, trace organics, trace gravle and cobles near surface.	19	24			5.5
	12"~4': Redish brown layered Silty fine SAND fine sandy SILT(SM–ML); loose to medium dense, moist.	41	11			12.1
5		16	8			6.8
	9"~11.5': Brown to light brown layered Poorly graded fine Silty SAND (SP–SM); loose to medium dense, moist, some lenses of silt and clay.					
10		4	11			3.1
	End at 11.5'					
15						

SHEAR STRENGTH, TSF
- ● MINIATURE VANE
- ⊖ RESIDUAL MINIATURE VANE
- ⊗ POCKET PENETROMETER
- ◒ UNCONFINED COMPRESSION(UU)
- ⊕ TORVANE

(OPEN SYMBOLS REPRESENT REMOLDED TESTS.)

1.0 2.0

WET/DRY UNIT WT.,lb/cu.ft.

REMARKS :

REMARKS : Blows/Ft. obtained using a Standard Penetration Test (SPT) sampler driven with a 140 pound automatic hammer dropped 30 inches

WTR DEPTH @ COMPL. : no water encountered

FIELD ENG.: Jay Apedaile

COMPLETION DATE : 6/16/2010

FIGURE 5

Test Data Summary

HOLE NO./ SAMPLE NO.	DEPTH (ft) BELOW GROUND SURFACE	STANDARD PENETRATION BLOWS PER FOOT	IN-PLACE DENSITY UNIT WEIGHT Dry / Wet LB./FT.^{3}	MOISTURE PERCENT	GRADATION % SAND	GRADATION % GRAVEL	% PASSING NO. 200 SIEVE	TORVANE SHEAR TONS/FT.^{2}	ATTERBERG LIMITS L.L.	ATTERBERG LIMITS P.L.	ATTERBERG LIMITS P.I.	SOIL CLASSIFICATION UNIFIED SYSTEM
1/1	1.0	16 (MC)	108.8	11.7	56.0		44.0					SM-ML
1/2	3.0	4	98.2	18.6	26.0		74.0					ML-SM
1/3	6.0	6		16.1								SM
1/4	11.0	9		6.6	95.0		5.0					SP
1/5	16.0	16		20.5								SP-SM
2/6	1.0	9 (MC)		5.9								SM
2/7	3.0	9		16.1								SM
2/8	6.0	10	103.2	17.6	73.0		27.0					SM
2/8	6.0	10		4.4	96.0		4.0					SP
2/9	11.0	11		5.9	86.0		14.0					SM
2/10	16.0	11		2.7	97.0		3.0					SP
3/11	1.0	24 (MC)		5.5	81.0		19.0					SM
3/12	2.0	11		12.1	59.0		41.0					SM-ML
3/13	6.0	8		6.8	84.0		16.0					SM
3/14	11.0	11		3.1	96.0		4.0					SP

A Cache Corp.
Engineering a Firm Foundation

(HAFB) Hayman Igloo

FIGURE 6

Pavement Thickness Report
U.S. Army Corps of Engineers
PCASE Version 2.09.05
Date : 1/17/2017

Design Name :	IGLOO APRON
Design Type :	Roads
Pavement Type :	Rigid
Road Type :	Road
Terrain Type :	Flat
Analysis Type :	K
Depth of Frost (in) :	35
Wander Width (in) :	33.35
% Load Transfer :	0
Effective K (pci) :	277
Reduced Sub Effective K (pci) :	72
Joint Spacing :	10 to 15 ft
Dowel Spacing :	12.00 in
Dowel Length :	16.00 in
Dowel Diameter:	.75 in

Use 8" Portland Cement concrete over 18" Aggregate Base Course

NOTE: Frost depth of 35 inches was manually entered.
NOTE: Moisture content of 5% was used for base course and moisture content of 13% was used for natural subgrade.
NOTE: The subgrade surface should be cleared and graded to remove all topsoil, weak, and organic soils, to expose the subgrade surface. Pavement areas may require placement of backfill materials.

Layer Information

Layer Type	Material Type	Frost Code	Flexural Strength (psi)	% Steel	Analysis	Non frost Design Thickness (in)	Reduced Subgrade Strength (in)	Limited Subgrade Penetration (in)	K Strength (pci)
PCC	N/A	NFS	650	0	Compute	7.97	10.31	7.97	0
Base	Unbound Aggregate	NFS	0	0	Manual	12	12	17.97	0
Natural Subgrade	Cohesive Cut	F3/F4	0	0	Manual	0	0	0	165

Traffic Information

Pattern Name : IGLOO APRON

Vehicles	Weight (lb)	Passes per Life Span	Equivalent Passes
CMP 60 FORKLIFT	33050	26880	1800401271
TRUCK, 5 AXLE	80000	26880	26880
TRUCK, LARGE PICKUP OR SUV	7500	26880	1
TRUCK, 5 AXLE	80000		1800428152
PCASE Equivalent Single Axle Loads			3006658893

ATTACHMENT 09

HAZARDOUS MATERIALS DATA

DEPARTMENT OF THE AIR FORCE
75 CIVIL ENGINEERING (CEOHA)
HILL AIR FORCE BASE, UTAH

Hill Air Force Base

LIMITED ASBESTOS INSPECTION REPORT, HILL AFB BUILDINGS, 1460 AND 1461 DEMOLISH IGLOOS

Date Requested: July 2016
Inspection Date: 25 July 2016
Requester: Jacob Reid
Organization: 649 MUNS
Inspector: Raudel Arteaga (Utah Certified Asbestos Inspector ASB#-5863)
Location & Building: HILL AFB BUILDINGS, 1460 AND 1461
Work Order: 58356

Affected Area: Entire Igloos
Statement of Work: Demolish igloos.

This inspection was performed in accordance with the Utah Division of Air Quality (DAQ) requirements as found in the Utah Air Quality Rule R307-801-10. This inspection report is required to be on site during all abatement, renovation, and demolition activities. Samples referenced in this report were analyzed by polarized light microscopy (PLM) utilizing method 600R-93-116 by The Science and Engineering laboratory at Hill Air Force Base, Utah.

Civil Engineering personnel also reviewed previous asbestos inspection reports of suspect asbestos containing building materials (ACM) that could potentially be encountered in this area. The information gathered from all current and previous inspections is shown below by homogenous area.

SUMMARY OF ASBESTOS CONTAINING MATERIALS FOUND

MATERIAL TYPE	ASBESTOS	FRIABILITY (During Removal)*	*RACM *Category I *Category II	QUANTITY	*LOCATIONS FOUND
Waterproofing, Black	21% Chrysotile	Non Friable	Category I	1,000 Square Feet	Building 1461
Sealant, Black	15% Chrysotile	Non Friable	Category I	1,000 Square Feet	Building 1461

***Per UDAQ definition.**

RACM: Regulated Asbestos-Containing Material (RACM)" means friable ACM, Category I non-friable ACM that has become friable, Category I non-friable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading, or Category II non-friable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation project operations.

Category I Non-Friable ACM: Asbestos-containing packings, gaskets, resilient floor coverings, or asphalt roofing products containing more than 1% asbestos as determined by using the method specified in 40 CFR Part 763, Subpart E, Appendix E, Section 1, Polarized Light Microscopy (PLM).

Category II Non-Friable ACM: Any material, excluding Category I non- friable ACM, containing more than 1% asbestos as determined by using the methods specified in 40 CFR Part 763, Subpart E, Appendix E, Section 1, Polarized Light Microscopy (PLM) that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

Locations found: Locations of building materials as described in this report indicate where they were found, but do not necessarily mean that these are the only locations where these materials may be encountered during the project.

Summary of materials containing ≤1% was identified via "Point Counting". ≤1% is not considered to be an asbestos containing material, but special handling/packaging requirements are necessary per OSHA 29CFR 1926.1101 and 29CFR 1910.1001

MATERIAL TYPE	ASBESTOS	QUANTITY	*LOCATIONS FOUND
N/A	N/A	N/A	N/A

The following is a list of the "Suspect Materials" that were sampled as part of this inspection:

Duct Sealant, White	Thermal System Pipe Fitting Insulation, White
Waterproofing, Black	Thermal System Pipe Fitting Insulation, Brown
Sealant, Black	
Thermal System Pipe Insulation, White/Yellow	

A total of 30 samples reference the 6 suspect materials assesses as part of the inspection.

The following table summarizes the sampling data.

Homogenous Building Material, Description, Location, Quantity.	Sample #	Sample Location	Results
Building 1460			
Duct Sealant, White, Bay and Exterior, 100 Linear Feet	GM162312	Northwest, Bay	None Detected
	GM162313	North Center, Bay	None Detected
	GM162314	Northwest, Exterior	None Detected
Waterproofing, Black, Exterior, 1,000 Square Feet	GM162315	Northwest, Exterior	None Detected
	GM162316	Southwest, Exterior	None Detected
	GM162317	North Center, Exterior	None Detected
Sealant, Black, Exterior, 1,000 Square Feet	GM162318	Northwest, Exterior	None Detected
	GM162319	Northwest, Exterior	None Detected
	GM162320	Southwest, Exterior	None Detected
Thermal System Pipe Insulation, White Over Yellow, Exterior, 500 Linear Feet	GM162321	Northwest, Exterior	None Detected
	GM162322	Northwest, Exterior	None Detected
	GM162323	North Center, Exterior	None Detected
Thermal System Pipe Fitting Insulation, White, Exterior, 10 Linear Feet	GM162324	Northwest, Exterior	None Detected
	GM162325	Northwest, Exterior	None Detected
Thermal System Pipe Fitting Insulation, Brown, Exterior, 10 Linear Feet	GM162326	Northwest, Exterior	None Detected
Building 1461			
Duct Sealant, White, Bay and Exterior, 100 Linear Feet	GM162327	Northwest, Bay	None Detected
	GM162328	Northwest, Bay	None Detected
	GM162329	Northwest, Exterior	None Detected
Waterproofing, Black, Exterior, 1,000 Square Feet	**GM162330**	**West Center, Exterior**	**18% Chrysotile**
	GM162331	**Southwest, Exterior**	**16% Chrysotile**
	GM162332	**Southwest, Exterior**	**21% Chrysotile**
Sealant, Black, Exterior, 1,000 Square Feet	**GM162333**	**Northwest, Exterior**	**13% Chrysotile**
	GM162334	**North Center, Exterior**	**15% Chrysotile**
	GM162335	**Northwest, Exterior**	**12% Chrysotile**
Thermal System Pipe Insulation, White Over Yellow, Exterior, 500 Linear Feet	GM162336	Northwest, Exterior	None Detected
	GM162337	Northwest, Exterior	None Detected
	GM162338	North Center, Exterior	None Detected
Thermal System Pipe Fitting Insulation, White, Exterior, 10 Linear Feet	GM162339	Northwest, Exterior	None Detected
	GM162340	Northwest, Exterior	None Detected

Thermal System Pipe Fitting Insulation, Brown, Exterior, 10 Linear Feet	GM162341	Northwest, Exterior	None Detected

Per EPA requirements, all materials analyzed as containing ≤10% asbestos are point counted utilizing EPA method 600/R-93/116.

POTENTIAL FOR ADDITIONAL MATERIALS:

This inspection report only encompasses the areas/materials designated within this report. Should the scope of the project be altered in any way or any materials found that are not identified in this report shall require additional assessment. This report cannot be used for any other projects within the building.

This report was inspected by:

Raudel Arteaga (Utah Certified Asbestos Inspector ASB#-5863)
of the 75 CES/CEOHA Asbestos/LBP Shop.

Any questions or concerns regarding this inspection report or if any new suspect asbestos containing material (ACM) is encountered, stop work and contact the personnel listed below for further assistance.

CONTACT INFORMATION

Asbetsos/LBP Shop 75 CES(CEOHA)

Supervisor: Traver Andreasen: DSN: (801)777-8006
Cell: (801)430-3976

Asbestos/LBP Shop (801)777-8006

DEPARTMENT OF THE AIR FORCE
75TH CIVIL ENGINEERING (CEOHA)
HILL AIR FORCE BASE, UTAH

REQUESTER: Jacob Reid
ORGANIZATION: 649 MUNS
FROM: 75TH CES/CEOHA

DATE: 08-August-2016

SUBJECT: Lead Based Paint (LBP) Survey, Building 1460 and 1461
WORK ORDER: 58356
SCOPE OF WORK: Demolish Igloos

Inspection Date: 25-July-2016

Inspector: Traver Andreasen (Utah Certified Lead Inspector #PB-2085)

Niton used for this inspection: XRF Analyzer XL2 600 (Serial #56999)

Building 1460 and 1461
Built in: 1939

Limited lead-based paint identification has been completed for, Building 1460 and 1461

1-The table below summarizes the building components in building Building # that tested positive for LBP. These components should be segregated or abated prior to renovation or demolition, and a composite TCLP taken of the waste before disposal. (See attached results for further detail).

Component	Color	Lead Reading	Condition
Building 1460			
Metal Hoist	Yellow	2.1	Good
Metal Door Jamb	Grey	4.84	Good
Metal Door	Grey	12.02	Good
Metal Door	Brown	6.06	Good
Impeller Bracket	Yellow	1.34	Good
Metal Angle	Red	2.5	Good
Building 1461			
Metal Hoist	Yellow	2	Good
Metal Door Jamb	Grey	4.57	Good
Metal Door	Grey	8	Good
Metal Door	Brown	10.69	Good
Impeller Bracket	Yellow	1.75	Good
Metal Angle	Red	2.42	Good

2-The U.S. Department of Housing and Urban Development defines Lead-based paint as any paint, varnish, stain, or other applied coating that has 1mg/cm² as measured by an X-ray Fluorescence (XRF) Analyzer or laboratory analysis or 0.5 percent by weight (5,000µg/g by dry weight) by laboratory analysis, or more of lead. All other components tested were less than 0.80 mg/cm².

3-Any effort to disturb lead paint can create lead dust. Please ensure that appropriate abatement, cleanup, and

disposal will be accomplished and that the appropriate safety measures are taken IAW 29 CFR 1926.62. If you have any questions please feel free to call Traver Andreasen at 777-8006.

Inspector: Traver Andreasen (Utah Certified Lead Inspector #PB-2085)

Niton: XRF Analyzer XL2 600 (Serial #56999)

Note:

Refer to "Readings" tab for all readings.
In order to print the entire LBP report select: "File", "Print", then select "Entire Workbook", "OK".

ATTACHMENT 10

HAFB FACILITY DESIGN STANDARDS

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1. INTRODUCTION

This Facility Design Standard is intended to alert designers, design-build contractors, facility users, and others the facility design requirements that are peculiar to Hill Air Force Base including remote sites under the base jurisdiction. This standard supplements or emphasizes established design criteria in government and industry publications including standards, codes, regulations, policies, directives, etc. This standard is being continuously revised and updated as regulations and policies change. Caution must be taken to ensure the latest edition is used. Many governmental jurisdictions have adopted statutes, administrative rules, and/or ordinances that set standards regulating professional practices within their jurisdictions. In addition to the standards set forth herein, said professionals shall also conduct their services in accordance with applicable jurisdictional requirements and standards of practice. Where level of effort differs between the standards set forth herein and any such jurisdictional requirements and/or standards of practice occur, the more stringent requirement(s) shall apply. However, if there are conflicting requirements the government standard will govern.

2. SPECIAL CONSIDERATIONS:

2.1 Base Location:

Hill Air Force Base is located near Ogden Utah approximately 30 miles north of Salt Lake City at an elevation of 4700 Ft above sea level.

2.2 Construction Season Limitations:

Earthwork can normally only be accomplished from 15 March to 15 November. Paving is normally accomplished from 15 May through 1 October. Structural work may generally be accomplished on a year round basis, but it must be protected from temperature extremes. Built-up roof construction is generally limited to the period from 15 May through 15 October.

2.3 Soil and Foundation Considerations:

Typical soils range from sand to silty sand with thin discontinuous layers of silty clay and clayey silt being common. Potable wells have a static water level of approximately 500 feet below the surface. However, the perched water may be encountered at more shallow depths. The average soil pH is approximately 7.8. The soil resistivity ranges from 2,000 to 15,000 ohms/cm. Spread footings are the typical structural foundation. All footings shall be at least 3 feet below grade.

2.4 Surveying:

2.4.1 Purpose: These standards are written to provide the Hill Air Force Base Contractors a guideline for producing adequate and accurate topographic and record drawings. These standards do not generally apply to architectural, mechanical, or electrical detail data inside of a building or structure. Definitions used in these requirements refer first to Definitions of Surveying and Associated Terms as published by the American Congress on Surveying and Mapping and second to Black's Law Dictionary. It is the intent of these requirements to:

2.4.1.1 Assist in the implementation of Hill Air Force Base's Geographic Information System through the inclusion of new base transportation systems (roads, railroads, airfields, canals); utility systems (water supply, sanitary sewer, fuel, communication, electrical, mechanical); residential, commercial, recreational and industrial structures and facilities; and other similar base improvements.

2.4.1.2 To provide data that meets accuracy standards required for new improvements consistent with Hill Air Force Base's Geodetic Control Network and Geographic Information System.

2.4.1.3 To provide information necessary to maintain current building and infrastructure data for end users (airmen, base employees, contractors, planners, designers, constructors, emergency personnel, ext.).

2.4.1.4 To provide a means of schematic verification that the intent of the approved engineering design has been met, thereby substantiating that the health, safety and welfare aspects of the engineering design have been adequately provided for by the construction of the project.

2.4.2 Geodetic Control / Monuments: Hill Air Force Base will make available all unrestricted Geodetic Control information to be used for survey purposes. All coordinate values for survey points shall be reported in:

Universal Transverse Mercator coordinates (UTM), Zone 12 North. The horizontal datum shall be the North American Datum 1983 reference frame, GRS 80 ellipsoid, 2011 realization, otherwise known as NAD 83 (2011). The basis for all elevations shall be the North American Vertical Datum of 1988 (NAVD 88). GPS derived orthometric heights shall be calculated using the Geoid 09 model. The EPOCH shall be defined by the user at time of survey. The basis for all units of measure shall be meters.

For more documentation, including station descriptions, of Hill Air Force Base's Geodetic Control Network, contact the base Installation Geospatial Information & Services (IGI&S) (GeoBase) office.

All base geodetic control monuments disturbed by construction shall be replaced by the contractor. Furthermore, one additional geodetic control monument shall be set for every 20000 square meters of construction area or land area otherwise disturbed for construction. The contractor will set all required geodetic control monuments under the direction and supervision of the Base IGI&S (GeoBase) office. All observation data sheets or other similar solution reports shall be submitted by the contractor.

2.4.3 Positional Tolerance: The following relative positional accuracies are provided as a guide for Hill Air Force Base record drawings. Positional accuracy shall be stated at the 95 percent confidence level. The preparer shall select the equipment and procedures necessary to obtain the horizontal and vertical positional accuracy required.

HPT= Horizontal Positional Tolerance; VPT= Vertical Positional Tolerance

Buildings or Structures: HPT 0.20', VPT 0.05'

Airfield Pavements: HPT 0.10', VPT 0.05'

Hard Surface Roads, Drainage, Curbs, Gutters ext..: HPT 0.50', VPT 0.05'

Unfinished Surface (Ground) Elevations: HPT 1.00', VPT 0.20'

All sewer invert locations: HPT 0.50', VPT 0.05'

Other Surface/Subsurface Utilities: HPT 0.50', VPT 0.20'

Recreational Sites, Athletic Fields, Golf Courses, ext…: HPT 2.00', VPT 2.00'

Training Sites, Ranges, and Cantonment Areas: HPT 5.00', VPT 5.00'

2.4.4 Data Formats: The following submittal requirements shall be required for all topographic or final record plats, plans and drawings:

2.4.4.1. One full size set of bond copies printed at a legible scale to illustrate all required information.

2.4.4.2. One set of plats, plans and as-built drawings submitted in PDF form on CD-ROM.

2.4.4.3. In addition to the final plats, plans and as-built drawings submitted in hard copy and PDF form, a digital data file shall be provided to Hill Air Force base in one of the following formats:

DWG (AutoCAD drawing file) – contact the base IGI&S (GeoBase) office for version required

SHP (ESRI shape file)

DXF (AutoCAD drawing exchange file)

2.4.4.4 ASCII point file on CD-ROM containing all survey points. Include a narrative detailing the format, projection, datum and units used on the project.

2.4.4.5 Contractor shall accomplish the following options unless specifically noted as not required. Contractor shall request confirmation during design and installation to validate requirement:

Building Information Model (BIM), Digital elevation model (DEM), Digital terrain model (DTM) or other comparable file.

Survey raw data file and a report containing a narrative of the equipment and the procedures used to meet the specified requirements.

All digital files must be mapped to scale and submitted to the Hill Air Force Base IGI&S (GeoBase) office on CD-ROM. Each CD must have an external label indicating the format, density, company /organization name and creation date. All pertinent information used in constructing and managing said topographic and record drawings and database shall be included.

2.4.5 Layering, CAD and GIS Standards: In order to evaluate the accuracy and promote the efficient use of the data in Hill Air Force Base's GIS, digital file layering has been standardized. The digital data shall use the Hill Air Force Base CAD standard file layering and was developed in accordance with the A/E/C CADD Standard and the Spatial Data Standards for Facilities, Infrastructure and Environment (SDSFIE). The standards are available at: https://cadbim.usace.army.mil/CAD.

2.4.6 Required Information: The survey shall be performed on the ground to obtain the information required in this standard and any additional information requested by the contracting officer. The surveyor or engineer preparing the plans shall "tie" the improvements into at least two of the above mentioned survey control network monuments. The following items are required to be shown on said topographic or record drawings:

2.4.6.1 The Basis of Bearing for the plans.

2.4.6.2 Location and elevation of all control network monuments used to prepare the plans.

2.4.6.3 Spot elevations covering the entire survey limits showing high points, low points, grade changes, and at sufficient intervals to represent the general character of the terrain.

2.4.6.4 Dimensions of curb, sidewalk, and gutter lines or ditch lines and all streets, alleys or roads indicating the type of paving surface and condition.

2.4.6.5 Electric Utilities – Location of power poles, guy wires, anchors, vaults, junctions, switches, transformers, meters, pedestals, generators, above/below grade lines, ext. Include elevations of the top and bottom of manholes.

2.4.6.6 Storm and/or Sanitary Sewers – the location of all manholes and other structures such as culverts, headwalls, catch basins, inlets, drains, cleanouts, flow controls, separators, tanks, ejectors, traps, ext. Include elevations of the top and bottom of manholes, inlets and catch basins. Show type, size, and direction of flow and invert elevations of all pipes and/or culverts.

2.4.6.7 Water – Show type, size and location of any water valves, manholes, vaults, standpipes, regulators, fire hydrants, tanks, and ext. Include rim elevations of all vaults, valves, manholes and top of pipe elevations where applicable. Show type, size and location of all lines including all horizontal and vertical changes in alignment.

2.4.6.8 Gas- Show type, size and location of all valves, meters, and gas line markers. Show type, size and location of all lines including all horizontal and vertical changes in alignment. Show elevation on top of any valves.

2.4.6.9 Industrial wastewater – show type, size and location of all junctions, manholes, boxes, cleanouts, valves, meters, inlets, separators, pumps, ext. Show type, size and locations of all lines including all horizontal and vertical changes in alignment. Include elevations of the top and bottom of manholes. Show type, size, and direction of flow and invert elevations of all pipes.

2.4.6.10 Fuel – show type, size and location of all junctions, manholes, valves, vents, regulators, tanks, ext. Show type, size and location of all lines including all horizontal and vertical changes in alignment. Include elevations of the top and bottom of manholes. Show type, size, and direction of flow and invert elevations of all pipes.

2.4.6.11 Telephone – the location of all poles, manholes, boxes, ext…. Show type, size and location of all lines. Include elevations of the top and bottom of manholes.

2.4.6.12 Street lighting – the location of all lamp poles, boxes, ext…

2.4.6.13 Heating – the location and elevation of all steam manholes, vaults and lines.

2.4.6.14 Location, description, dimensions, and main floor elevations of all buildings and structures.

2.4.6.15 Define location and measured elevation of the highest point on all structures and buildings.

2.4.6.16 Location and dimensions of any existing tanks, fences, miscellaneous structures, driveways and other improvements.

2.4.6.17 Location and description of any building or structures within 50 feet outside the limits of the proposed or as-built construction. Provide main floor elevations of buildings and slab elevations of garages.

2.4.6.18 Location and top elevation of soil borings and monitoring wells.

2.4.6.19 Airfield Items – Location and description of all airfield paving, striping, lighting, navigation aids, ext… Include spot elevations of all pavements at not less than one inch (1") map intervals based at the final map scale.

2.4.6.20 A narrative detailing the format, projection, datum and units used on the project together with a statement certifying that all survey points and geospatial data complies with the aforesaid criteria.

2.4.6.21 Digital or wet signature and current contact information of the individual responsible for the plan preparation.

2.4.6.22 Contractor shall accomplish the following options unless specifically noted as not required. Contractor shall request confirmation during design and installation to validate requirement:

Contours at defined intervals.

Location of all drainage ditches and swales.

Location, elevation and volume of all ponds, detention areas, ext.

Location, diameter and species of all trees over a _____ inch breast height diameter.

Perimeter outline only of thickly wooded areas unless otherwise directed.

Location and elevation of the 100 year floodplain.

Location and elevation of swamps or wetland limits.

Location of visible rock formations.

2.4.7 Topographic and Record Drawing Plan Review: Within twenty business days upon completion of substantial exterior construction, the contractor shall submit (through the contracting officer), a preliminary topographic or record drawing to be reviewed by the base IGI&S office. The purpose of the review is to ensure all required topographic and site improvement information is correctly displayed and that the positional tolerances have been met as outlined in Section 2.4.3. The base IGI&S (GeoBase) office shall have fifteen business days to review the preliminary topographic or record

drawing. If the base IGI&S office finds that the regulations of this section are not in full compliance, the base IGI&S office shall detail for the contractor the reasons for this determination and describe the type of additional information that may be necessary to demonstrate compliance. The base IGI&S office through the contracting officer shall direct the contractor on the procedure for continuing with the review, and shall decide, based on the nature of the outstanding comments and concerns, whether or not the contractor shall be required to provide a revised topographic or record drawing set. Upon acceptance by the base IGI&S (GeoBase) office of a compliant, complete and accurate topographic or record drawing, the contractor shall submit to the contracting officer the final topographic or record documentation to include all drawings, documents and files as required under Section 2.4.4.

2.4.8 Adjustments to these requirements: The Hill Air Force Base IGI&S (GeoBase) office may waive or adjust requirements specified herein upon a finding that the strict adherence to the requirements does not apply or is contrary to the long-term interest of Hill Air Force Base or the maintenance of the Geographic Information System. This standard is intended to be updated and enhanced as appropriate over time. Recommended additions and suggested changes are to be directed in writing to the Hill Air Force Base IGI&S (GeoBase) office.

2.5 General Security Requirements:

2.5.1 Design and construction contractors must coordinate with the Contracting Officer concerning obtaining the paperwork for identification badges (AFMC Form 496).

2.5.1.1 In order to gain access to restricted area contractors must submit the necessary paper work for a security clearance, through prescribed channels. If additional information is necessary contact your contracting officer for further guidance.

2.5.1.2 In order to gain access to controlled area contractors must undergo a local files check as a minimum. Some areas will require more stringent checks. Request for access should be submitted through the contracting officer or Air Force Project manager who will forward it on to 75 SFS/S5.

2.5.2 All privately owned vehicles entering the installation must comply with State of Utah inspection, emission standards, and insurance requirements.

2.5.3 Any proposed work affecting communication lines or security systems, must be reviewed and approved by 75th CES Electric/Electronic Shop, Base Civil Engineering, 777-0075 and 75 SFS/S4E, Security Forces, 777-5532.

2.5.4 All renovations and new construction of must be designed to adhere to current standards set forth for resource protection, antiterrorism, information security and industrial security requirements in:

a. AFI 31-101, *Integrated Defense*, (OPR: 75 SFS/S5)

b. AFI 10-245, *Antiterrorism*, which references UFC 4-010-01, *DoD Minimum Antiterrorism Standards For Buildings*, (OPR: 75 ABW/AT)

c. AFI 31-401, *Information Security Program Regulations*, (OPR: 75 ABW/IPI)

d. AFI 31-601, *Industrial Security Program Management* respectively, (OPR: 75 ABW/IPD)

e. Military Handbook 1013/1A, *Design Guidelines for Physical Security of Fixed Land-Based Facilities or the Civil Engineering Facility Manuals* (OPR: 75 Security Forces and Civil Engineering)

f. Department of Defense Manual 5205.07v3/Air Force Manual 16-703V3, Special Access Program (SAP) Security Manual: Physical Security

g. IC Tech Spec-For ICD/ICS 705, Technical Specifications for Construction and Management of Sensitive Compartmented Information Facilities

2.5.5 Any buildings, which will house assets, which are classified, contain funds, Arms, Ammunition or Explosives or controlled substances must have an initial and follow-up security standard inspection by the applicable government office prior to operation. (Resource Protection: 75 SFS/S5SR, 777-6155; Physical Security: 75 CEG/CEPM, 777-0584 or 777-4235; Information Security: 75 ABW/IPI, 777-7811; Industrial Security: 75 ABW/IPD, 777-6617)

2.5.6 If the project will be inside of or on the boundary of a restricted or controlled area, a free zone may be necessary. Contact with the 75 SFS Resource Protection Office during the initial design phase is critical to ensure proper design, execution, and approval of the free zone. Free zones will be established and approved IAW AFI 31-101 as supplemented and a copy of the free zone security procedures provided to the contractor prior to beginning work.

2.5.7 Any special security requirements needed for the contractor should be coordinated through 75 SFS/S5, 777-6155.

2.5.8 Foreign Nationals employed by the contractor must obtain clearance through the Foreign Disclosure Office, ext. 7-6858 before being allowed access to the installation. Foreign Nationals are not allowed to work in Controlled or Restricted areas.

2.5.9 Locks and Hasps:

Padlocks: Key Actuated

Low Security: MIL SPEC P-17802

Medium Security: MIL SPEC 43951

High Security: MILSPEC MIL-P-43607

Hasp: High Security Hasp, MILSPEC MIL-H-29181

Built In Combination Locks, Authorized Group 1R:

Mas-Hamilton, Electronic Lock (For doors: CDX-10; For safes: X-10)

NOTE: Built in combination locks and mechanical/digital cipher locks shall not be installed on any doors.

2.5.10 Intrusion Detection & Access Control Systems: See section 14.12 and 14.13 for further guidance.

2.6 Construction Permits:

2.6.1 No excavation shall be done prior to receiving a Base Civil Engineering Excavation Permit. If excavation is started without obtaining a permit, the Contractor shall be held liable for repairs to any broken utility lines and for other damage resulting from the broken lines. The Contractor shall request a permit 14 calendar days prior to scheduled start of digging. Hand digging shall be required to locate utilities shown on the contract drawings, Excavation Permit or 3 feet (1 meter) on either side of locations identified by Base Maintenance Shops.

2.6.2 Contractors must obtain a Utah Pollutant Discharge Elimination System (UPDES) storm water permit or waiver if the project disturbs more than 1 acre of soil surface area. To obtain the permit a contractor must prepare a Stormwater Pollution Prevention Plan and then submit a Notice of Intent (NOI), and the required fee to the State of Utah, Department of Environmental Quality, Division of Water Quality. Contractor shall submit and receive approval of the UPDES permit before starting construction.

2.6.2.1 Projects disturbing a soil surface area greater than one acre will require submission of a sediment and erosion control plan to the project manager for subsequent review and approval by the Environmental Compliance Office 75 CEG/CEIE. The contractor must receive approval of the plan and implement approved best management practices before starting construction.

2.6.2.2 Projects disturbing more than one acre of soil surface area will also submit a plan for permanent stabilization of disturbed area to the project manager for subsequent review and approval by the Environmental Compliance Office 75 CEG/CEIE. The contractor shall receive approval of the plan and implement approved best management practices before contract closeout. Examples of best management practices are available at the following web sites:

http://cfpub.epa.gov/npdes/stormwater/menuofbmps/con_site.cfm
http://cfpub.epa.gov/npdes/stormwater/menuofbmps/post.cfm

2.6.2.3 Projects with a footprint greater than 5,000 square feet must maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow. Use of LID techniques in accordance with EISA Section 438 Guidance shall be implemented. Comply with UFC 3-210-10.

2.7 Borrow and Disposal:

Unless otherwise designated, all borrow shall be obtained off base at the contractor's expense. Clean excavation including soil/concrete, asphalt and wood may be separated and disposed of in one of the appropriate cells in the government landfill at the north end of Hill AFB. All other building demolition materials shall be legally disposed of by the contractor at an off-base landfill.

2.8 Utility Line Identification:

2.8.1 Contractor shall provide and install a tracer wire of 10 gage insulated copper within one foot of all new utilities (except metallic or electrical lines) placed underground at Hill Air Force Base. Utility shall be defined as, but not limited to: electric systems; storm, sanitary and subsurface drainage systems including French drains, rain gutter collection and distribution systems, and other water collection systems; potable and non-potable water systems; natural gas systems; industrial waste systems; fuel systems; communication systems; street lighting systems; heating and cooling systems; airfield associated systems; environmental systems; other objects designed for future use such as buried conduits and pipes; and other comparable items, objects or systems. The determination and definition of a utility requiring tracer wire shall be at the sole discretion of the United States Air Force. The contractor may be required to place tracer wire on other utility items and systems at the request of the US Air Force.

2.8.2 If length of new utility is 500 feet or less contractor shall install one terminal box of 2" diameter pipe at each end of the wire marking the utility location.

2.8.3 If length of new utility is greater than 500 feet, contractor shall place terminal boxes at 500 feet intervals.

2.8.4 Terminal boxes shall have a metal screw-on type lid mounted flush with pavement or raised above the existing ground elevation, as determined by the project manager. (Handley Industries or approved equal).

2.8.5 Contractor shall provide a 21-day notice to the Civil Engineering project manager of all utility line installations to allow the Air Force to survey and map all new utility lines. Contractor shall not backfill utility trenches until the lines have been surveyed and approval given.

2.9 Construction Identifications signs:

Construction signs are required for all Military Construction (MILCON) Projects. Construction signage shall comply with UFC 3-120-01 except as specified below. All construction identification signs, including those on the Corps of Engineers (COE) projects, shall have "Dakota Brown" lettering on an adobe "Greystone" background. For COE jobs, a red castle on the sign is acceptable.

2.10 Explosive Site Plan Compliance:

For projects within the Quantity Distance (QD) zone and in other hazardous areas, an Explosive Site Plan (ESP) is developed to ensure that the proposed project is compatible with the other operations within the area. The design of the project must comply with the required separations shown on the ESP and other criteria determined by the Weapons Safety Office (SEW). Any changes to the criteria set forth on the approved ESP must be resolved by the Base Master Planner, (CEAO, Mr. Chris Rose) and the Weapons Safety Office prior to completion of the design.

2.11 Asbestos and Lead-Based Paint (LBP):

An asbestos containing material (ACM) and lead-based paint (LBP) surveys will be required for any project that requires renovation or demolition. Any ACM or LBP removal will be coordinated with Civil Engineering's Abatement Operations Officer who will in turn coordinate with Bioenvironmental Engineering and Environmental Management ACM and LBP Program Managers as necessary. Removal shall be done by qualified Civil Engineering personnel, the IDIQ contract (75 CES/CEOHA contractors) or through the base ACM and LBP qualified contractors. A list of approved contractors may be obtained from base abatement shop.

Division of Air Quality rule R307-801-9: The asbestos project operator shall ensure that the structure or facility to be demolished or renovated is inspected for ACM by an inspector certified under the provisions of R307-801-6. An asbestos survey report shall be generated according to the provisions of R307-801-10. The asbestos project operator shall make the asbestos survey report available on site to all persons who have access to the site for the duration of the renovation or demolition activities. If no asbestos inspection is conducted, the operator shall ensure that all resulting demolition debris is disposed of as asbestos waste. "Asbestos project operator" means any asbestos contractor, any person responsible for the persons performing an asbestos project in an area to which the general public has unrestrained access. Project managers will perform responsibilities of the asbestos project operator listed above.

2.12 Testing:

Design specifications shall require the contractor to engage an independent testing for all testing that is required including soils, asphalt, concrete, welding, etc. unless such testing is required by regulation to be performed by the government.

2.13 Bird Aircraft Strike Hazard (BASH):

Design shall eliminate and not contribute to BASH conditions in accordance with AFPAM 91-212 and the Hill AFB BASH Plan 91-212. For seeding recommendations see paragraph 3.9.

2.14 Missile Maintenance and Storage Facilities:

Facilities built or converted for maintenance or storage of intercontinental ballistic missile components. Any new building, modification, or major renovation must be reviewed for compliance with weapon system interface control standards. Hill Air Force Base Point of Contact is AFNWC/NIES, Patricia Rose. (801) 775-2858.

3. CIVIL ENGINEERING CONSIDERATIONS:

3.0 Applicable Standards: All utilities shall comply with applicable DoD and Base Standards and American Public Works Association (APWA) Manual of Standard Plan and Specifications. If these standards conflict then the government standards will take precedence. However, water and sanitary sewer segments/appurtenances which will become ownership of the system owner, American Water, shall comply with their design guide, specifications and details for Hill AFB available at their web site http://www.amwater.com/products-and-services/Military-Services/Bases-we-serve/Hill-Air-Force-Base/. These specifications generally take precedence over other standards. It is recommended that prime contractor contract with American Water to construct water and sewer lines that will be owned by them. If not constructed by American Water then the contractor shall pay American Water for compliance inspections and connection fees for the applicable water and sewer lines during construction.

Utility line placement in new roads shall comply with the Base standard utility corridor detail currently on file.

3.1 Airfields:

3.1.1. General: Airfield pavements shall be designed in conformance with current Air Force Instructions and directives. Airfield pavements shall be designed for Air Force medium aircraft loading unless specific circumstances dictate.

3.1.2. Design Parameters:

3.1.2.1 Air Field Type: Air Force Medium

3.1.2.2 Sub grade soil group: F2 (CBR 8-15).

3.1.2.3 Frost Depth Design: 35 inches

3.1.2.4 Freezing index: 595 degree days.

3.1.2.5 Portland cement concrete pavement flexural strength: 650 psi at 90 days.

3.1.2.6 Portland Cement concrete slab size 15 feet X 15 feet minimum, 20 feet X 20 feet maximum except where matching existing structures.

3.1.2.7 Asphalt cement ductility: 50 at 32.9 degrees F.

3.1.2.8 Fuel proofing- Rubberized coal tar shall be placed over all bituminous concrete where fuel spills are anticipated.

3.1.2.9 Slurry seals- Slurry seals shall not be used on asphalt pavement runways (ETL 11-26).

3.1.2.10 Shoulder areas- Follow Air Force criteria per UFC 3-260-02.

3.1.2.11 Miscellaneous- All airfield design and construction must comply with Unified Facilities Criteria (UFC) 3-260-01 *Airfield and Heliport Planning and Design*, UFC 3-260-02, *Pavement Design for Airfields*, AFI 32-1042, *Standards for Marking Airfields*, and Engineering Technical Letter (ETL) 04-2 (Change 1): *Standard Airfield Pavement Marking Schemes*.

3.1.3 Recycling: Demolished bituminous concrete pavement shall be recycled. Demolished Portland cement concrete pavement shall be recycled. All recycled materials shall be reported to project Manager.

3.2 Roads and Parking Lots:

3.2.1 Typical Maintenance Work:

3.2.1.1 Crack Filling: Rubberized asphalt crack sealing will normally be accomplished by in house forces.

3.2.1.2 Cold planning: Cold planning shall be used to correct surface irregularities and to match curb and gutter elevations prior to overlaying.

3.2.1.3 Heat scarifications: Heat scarification will be used to insure bonding of bituminous overlays where considered necessary by the Pavements Engineer, especially for thin overlays.

3.2.1.4 Slurry seals: Slurry seals will be used as one option to seal low volume surface roads after sealing all cracks.

3.2.1.5 Open graded plant mix seal coat: This seal coat will be used as one option to seal all roads and parking lots.

3.2.1.6 Coal tar treatment: Coal tar seals will be used to seal bituminous concrete in fuel spillage areas.

3.2.1.7 Overlays: Bituminous overlays will be used to rehabilitate bituminous concrete. It will normally be placed a minimum of 1 inch thick. It will be the option of the Government's pavement Engineer as to whether any existing bituminous concrete will be removed prior to placing the overlay.

3.2.1.8 Traffic control in construction areas: The contractor shall provide and maintain all construction traffic control devices. These devises and their layout shall conform to Part VI of the Manual of Uniform Traffic Control Devises or the Utah State Department of Transportation equivalent. The traffic control plan shall be submitted to the Base Traffic Engineer prior to implementation.

3.3 Potable Water:

3.3.1 Well drilling: All future wells shall be drilled by using the reverse rotary drilling method.

3.3.2 Pipe: Water pipe 4inch through 12 inch diameter shall be PVC AWWA C 900. All pipe 12 inch diameter and greater shall be AWWA C 901. Tracer wire and warning tape shall accompany any new water pipe installed.

3.3.3 Pipe depth: Water piping shall be installed a minimum of 4 feet below grade. Fire protection lines shall be installed a minimum of 5 feet below grade.

3.3.4 Pressure gages: Pressure gages shall be placed at the outlet of all well pumps; at the inlet and outlet of all pressure reducing valves, pressure sustaining valves and altitude valves; and at any other location where knowledge of pressure would be beneficial.

3.3.5 Valves: Valves shall be placed at all locations where it would be desirable to isolate the system for maintenance and repair. The number of valves shall not be kept to a minimum as a cost cutting measure. Valves will be placed in conjunction with fire hydrants. Air release valves shall be used at high points to allow the discharge of air in the water distribution system.

3.3.6 Standards: All new water lines and appurtenances shall comply with the standards set forward in the Utah Safe Drinking Water Regulations.

3.3.7 Connections: To avoid pipe shaving residue in building and water distribution systems all connections to existing lines shall be accomplished with a standard tee fitting. Hot tap connections are prohibited unless special permission is granted by the Civil Engineering water shop.

3.4 Non-Potable Water:

3.4.1 General: The Base has the right to utilize 139 acre-feet of non-potable irrigation water every year. This water is available for use from 15 April to 15 October each year. It is piped part way across the south boundary of the Base, entering at the southeast corner of the Base. A booster pump has been provided.

3.4.2 Available pressure: The available pressure ranges from 40 to 50 psi without the booster pump and between 60 to 80 psi with the booster pump operating. Approximately 400 gpm must be flowing before the booster pump can be operated to prevent cycling.

3.4.3 Place of use: This non-potable irrigation water shall be used wherever possible along the south border of the Base, especially in large areas that can be irrigated with high flowing heads, such as athletic field and parks. Housing area lawns and the Child Care Facility shall not be irrigated with this water because of the possibility that children will ingest the water.

3.4.4 Irrigation systems: Design and construction of irrigation systems shall comply with the 75th Civil Engineer Squadron OI 99-2 entitled Sprinkler System Installation, Operation and Maintenance.

3.6 Industrial Waste Treatment:

The industrial waste treatment plant decontaminates waste from the aircraft maintenance areas of the Base. The contaminants include toxic metals, complexing agents, and organic compounds. The entire system is approved by the Environmental Protection Agency. No new toxicants can enter the system and the system cannot be enlarged or expanded without notification and approval. All structural load assumptions shall be noted on the first sheet of the structural drawings. Drawings are seldom lost or destroyed but calculations often are misplaced.

3.7 Structural:

3.7.1. Soil Bearing Capacity: Major structures at Hill Air Force Base, Little Mountain Test Facility, or the Utah Test and Training Range shall have specific foundation studies performed. Minor structures at Hill AFB may use an allowable soil bearing pressure of 3000 psf. Check with the Base Civil Engineer for allowable pressures at Little Mountain Test Facility or Utah Test and Training Range.

3.7.2. Stair Tread Minimum Live Loads: The minimum live loads shall be 100 psf and a 300 lb concentrated load at the location of maximum stress (not simultaneous with the uniform live load.) The minimum concrete depth shall be 2 inches if filled pans are used. Design of metal stairs shall conform to the Metal Stair Manual published by the National Association of Architectural Metal Manufacturers.

3.7.3. Design Frost Penetration: The design frost penetration shall be 36 inches for structures unless a geotechnical report allows a more shallow depth.

3.7.4. Concrete compressive strength: A minimum concrete compressive strength of 3000 psi at 28 days shall be for all applications except exterior slabs, which shall have a minimum compressive strength of 4000 psi at 28 days.

3.7.5. Reinforcing Steel Strength: A minimum yield strength (Fy) of 60,000 psi shall be used for reinforcing steel.

3.7.6. Floor slab joints: Joints for slabs on grade shall be located so that the area between joints is square. If a square area between contraction joints is not possible, the length of the rectangular area shall not exceed one and one fourth (1 ¬) times the width. The saw depth for the contraction joints shall be as recommended by ACI standards but in no case less than one-fourth (1/4) of the slab thickness. For reinforced slabs the reinforcement bars shall be discontinued through slab joints and not used for load transfer. Load transfer shall be accomplished with dowel bars, keyed joints, thickened edge, or a combination thereof.

3.7.7. Procedure for attaching equipment and other objects to existing roof trusses, joints, beams, and other members of the roof structure: Use clamps instead of drilling or welding. The Base Structural Engineer prior to installation of these loads will give approval for attachment of equipment or other object from the existing roof structures.

3.7.8. Compaction: For cohesive soil under structures, building slabs, steps and paved areas, compact to a minimum of 95% of maximum density determined in accordance with Method 106 of MIL-STD-621 using CE55 compaction effort. For cohesion less soil, compact to a minimum of 100% of maximum density.

3.7.9. Steel Fabrication and Erection: Drill or punch all holes in steel members. Never allow holes to be burned with a torch.

3.7.10. Structural design loads for buildings and other structures shall be developed using Unified Facilities Criteria (UFC) 1-200-01 *General Building Requirements* and the International Building Code (IBC) Chapter 16 as modified by UFC 3-301-01, *Structural Engineering*. *Use* IBC Chapter 16 and UFC 3-310-04 for seismic design.

3.8 Traffic Engineering:

3.8.1 Speed Limit: The Base Speed limit is set at 25 mph on the main arteries unless otherwise noted.

3.8.2 Lane Widths: All traveled lanes will be 12 feet in width. Where curb and gutter is not provided, a 3 foot wide paved shoulder will be provided. Storm drain grates will be selected to avoid presenting a hazard to narrow tires. Car pool and bus stop drop off lanes will be included were needed.

3.8.3 Parking: Parking stalls will be 9 feet wide measured normal to the vehicle and 13 feet wide for a handicapped stall. Allow 30 feet of road width between rows of parking stalls and 18 feet for stall depth. All new parking lots shall have curb and gutter placed around the perimeter. A 30-inch wide curb and gutter section will be used. Curbed islands and landscape planters will not be used if they make snow removal too difficult.

3.8.4 Traffic signs and striping: All traffic signs and striping shall conform to the standards contained in the Manual of Uniform Traffic Control Devises. Striping will be included in all new projects and included when restriping is required. Signposts will be constructed of a 2-inch by 2-inch Dakota Brown steel tube section. The tubing will be mated with steel tube section that is driven into the ground. This will allow for the rapid repair of damaged signposts. The backside of all signs shall be Dakota Brown.

3.09 Building Demolition:

Demolition of buildings shall include all elements of the superstructure and substructure including footings and foundations. Utility lines may be abandoned in place if properly cleaned of domestic and hazardous waste.

4. ARCHITECTURAL:

4.1 Architectural Compatibility:

4.1.1 General: The Hill Air Force Base Architectural Compatibility Standards Brochure shall be followed as a guide.

4.1.2 Colors: All exterior building finish colors shall conform to the above standard. The colors are taken from the Federal Standard 595B, Colors Used In Government Procurement. All exteriors shall be Federal Paint number 30099, Dakota Brown; or 23617, Greystone. No building shall have more than one color trim unless allowed by the Architectural Compatibility Officer. Factory pre-finished siding and roofing can match the manufacturer's standard, available color selection as longs as the color matches the above colors as closely as possible. All selections are subject to the approval of the Base Architectural Compatibility Officer.

4.1.3 Facades: The majority of the permanent facilities at Hill AFB are brick. This standard should be maintained. Any other materials used shall complement the brick in making an aesthetically pleasing, traditional statement. Choices should conform to the Base Architectural Compatibility Standards. All new and remodeled facades shall blend with and complement the permanent construction of the installation.

4.2 Definitive Design:

Refer to the AFMC Facility Quality Program Manual as a guideline for Air Force Standards.

4.3 Interior Design:

4.3.1 Carpets: Comply with AF ETL 07-4. Carpets will contain a definite pattern and shall be suitable to the function area. All carpeting will meet the flame spread rating required in the Life Safety Code.

4.3.2 Sound Attenuation: Any building design requiring reduction of exterior generated noises shall be done in accordance with the Uniform Building Code, Chapter 35. Also consult the Hill Air Force Base Air Installation Compatible Use Zone Report, amended April 1982, for further sound attenuation guidance. Any penetrations through an STC rated wall shall utilize flexible couplings within 12" of each side of the wall.

4.3.3 Noncombustible material: The installation of exterior finish material shall comply with the requirement that at least 75 percent of the total interior wall surface of any one room must be of non-combustible material, Class B. This material must have a flame spread of 75 or less. Wood paneling will not be used. Wall carpeting will have a smoke development rating of 25 or less.

4.3.4 Concealment: All wiring, piping, and ductwork will be concealed whenever possible.

4.3.5 Interior Graphics Systems: An interior graphics system will be used where appropriate to control message size and complexity, to establish a specific lettering style, establish a color scheme, and enhance the overall interior environment.

4.3.6 Systems Furniture: Systems furniture should be considered for installation in large open areas to condense personnel and optimize space utilization. It should not be used to cover window spaces or exterior fin tube heating. For Right-Sizing requirements comply with AFH 32-1084. The cubicles should be appropriately for the use intended but under no circumstances should be less than 48 square

feet. The electrical designer, the architect, and the interior designer must coordinate during the design process. Systems furniture is typically specified and ordered when construction is nearing completion; therefore, if proper coordination has not occurred earlier in the design process, field interface problems will occur. Specify an 8-wire harness consisting of 4 circuit conductors, 1 oversized neutral conductor, 1 full sized neutral conductor and 2 separate equipment grounding conductors. Provide oversized neutrals to match the harness configuration and balance loads between circuits and phases. A single circuit must not serve more than 4 cubicles under any circumstances.

4.3.7 All suspended acoustical ceilings shall have a recessed-grid with drop (tegular) edge tile. Tile shall be a 2 by 2 grid or 2x4 grid scored in the center so the 2x4 appears like a 2x2 grid."

4.3.8 All paper towel and toilet paper dispensers shall comply with the Custodial Contractor requirements. Use Georgia-Pacific model numbers 52109 or 58201 for paper towel dispensers and model numbers 56783 or 56784 for toilet paper dispensers.

4.4 Accessibility design:

ABA Accessibility Standard for Department of Defense Facilities. Any new building, addition or major renovation shall comply with this new Standard. Hill Air Force Base Point of Contact is Richard Nehring. (801) 775-3369.

4.5 Keying and Hardware:

4.5.1 Padlocks: Key Actuated

Low Security: MIL SPEC P-17802
Medium Security: MIL SPEC 43951
High Security: MILSPEC MIL-P-43607

Hasp: High Security Hasp, MILSPEC MIL-H-29181

Built In Combination Locks, Authorized Group 1R:

Mas-Hamilton, Electronic Lock (For doors: CDX-10; for safes: X-10)

NOTE: *Built In Combination Locks shall not be installed on exterior doors.*

4.5.2 Card Access: Manufacturer of Hill AFB card access system is Vindicator utilizing the V5 Network Security Appliance with the Access Control Server w/ UHS/TDEA. The system server terminal (SST) will either be the WYSE terminal or Security Archive Workstation (SAW)

4.5.2.1 All exterior doors will be equipped with electronic strikes that fail safe “locked” upon extended power failures that exceed the battery backup capability; no magnetic locks will be allowed on exterior doors. Interior doors can/may be equipped with strikes as long as the means of egress utilize a “crash bar.”

4.5.2.2 Hill AFB utilizes standards for all Card Access components and this list is made available by the 75 CES Electronics Flight.

4.5.3 Keying: Master keying shall be ASSA model # V80600IC-626 SUB 595-95 Yale with 1210 core. All locks shall be furnished with removable core cylinders. The cylinder will be capable of being removed through the face of the knob by means of a control key. All cores and keys will be purchased by the contractor but must be shipped either through Clark Security Products Inc or directly to HAFB Lock Shop. A key schedule and plan is required. The purchasing contractor must allow 6 weeks for

shipment. All cores will be pinned by the Base Lock Shop. All locks will be grand master keyed into the base system and shall be sub-mastered by the BCE locksmith.

4.5.4 Hardware: Locksets and latches shall comply with (ANSI/BHMA A156.13, Series 1000, Operational Grade 1, Security Grade (l) (2) (and) (ANSI/BHMA A156.2, Series 4000, Grade l). Latches shall be Yale lever arm, Model 5407-LN, 626 finish, with 2 ¾ backset, and Augusta handles that accept ASSA removable core #V-80600. Provide trim of wrought construction and of commercial plain design.

4.6 Sign Policy:

All signs shall be in accordance with UFC 3-120-01 *Air Force Sign Standard* and the base Architectural Compatibility Standards. All parking and traffic signs must be installed on a 2 by 2 quick punch type signpost installed in sleeves. All sign posts must be finished Dakota Brown. The back of all signs must be painted or covered Dakota Brown.

4.7 Insulation:

Steel-Frame Walls and Roofs shall be constructed in a manner compliant with ASHRAE Standard 90.1 Tables A2.3 or A3.3. U-values used for energy analysis shall be as shown and will require continuous insulation, (uninterrupted by framing) as required by those tables. Minimum steel frame wall construction is a 3.5 inch stud depth, 16 inches on center with R-11 in the stud cavity and an additional R-10 continuous insulation for a total adjusted wall assembly of R-17 (U-value .057)

4.7.1 As required under ASHRAE 90.1 2004, Insulation shall not be installed resting upon removable suspended ceilings. Nor shall it be installed in a manner which can contaminate clean rooms.

4.8 Painting:

All large exterior equipment shall be painted unless a screen is provided for the equipment. Heat-generating electrical equipment such as transformers or switches shall be painted Federal Paint Number 23617, Greystone. The color of other mechanical and miscellaneous equipment shall be on a case by case basis and be painted either Federal Paint Number 23617, Greystone or 30099; Dakota Brown,. This includes, but is not limited to HVAC units, including exterior conduit systems. All architectural coatings must comply with the VOC limits established by the EPA in the Architectural Coatings Rule published under the authority of the Clean Air Act.

4.8.1 General: Painting for new surfaces will consist of a prime coat and two topcoats. Semi-gloss paint will be used in high traffic, interior areas. Treat any waste associated with removal of lead paint will be treated as a hazardous material. Removal of red lead on structures shall comply with the procedures detailed in local, state and federal regulations and procedures. If repainting is required, the surface will be spot primed and one finish coat will be applied. Spray painting is limited to water tanks; fuel tanks; interiors of unoccupied buildings; the underside of docks; overhangs of 800 series buildings or any other job where the massiveness and intricacy precludes brush or roller application. Any spray painting will be done with an airless spray gun. Do not specify spray-painting if over-spray will damage aircraft, vehicles, equipment or other facilities. Post indicator valves, bollards, etc., shall be painted Dakota Brown. Fire hydrants that are supplied with potable water will have their barrels and caps painted

Dakota brown and bonnets painted IAW proper flow test data, National Fire Protection Association (NFPA) Standard 291. Additionally, fire hydrants supplied within a high pressure loop or supplied by a fire pump will have their barrels and caps painted red and bonnets painted IAW proper flow test data, NFPA Standard 291. All fire hydrants barrels will have factory finish reflective-type paint to ensure rapid identification during night operations. All hydrants will be classified and have bonnets painted a specific color based on their rated capacities (at 20 psi residual pressure) as follows:

Class AA — Rated capacity of greater than 1500 gpm — Light Blue
Class A — Rated capacity of 1000–1499 gpm — Green
Class B — Rated capacity of 500–999 gpm — Orange
Class C — Rated capacity of less than 500 gpm — Red

4.8.2 Concrete Exterior Surfaces: These surfaces shall not be painted except to prevent water penetration, unless specifically approved by the Base Civil Engineer.

4.8.3 Floor Coating:

4.9 Canopies:

Canopy designs shall be approved for Architectural Compatibility.

4.10 Windows:

4.10.1 General: Because unique conditions at Hill Air Force Base all new windows must meet the Antiterrorism Force Protection explosion protection requirements provided in UFC 4-010-01, *DoD Minimum Antiterrorism Standards for Buildings.* In addition the following applies:

4.10.1.5 All window air leakage shall not exceed 1.0 cfm/SqFt and shall be determined in accordance with the National Fenestration Rating Council and shall be so labeled and certified by the manufacturer.

4.10.2 Windows in administrative areas: Other than facilities with Historic Preservation concerns, all windows will be “projected in” tilt sash style with bronze glass and a bronze anodized finish.

4.10.3 Dormitory windows: Provide single hung, non-tilt windows with bronze tinted glass and bronze anodized finish.

4.10.4 Housing Areas: These windows will be sliders, single hung style or projected in windows with clear glass and a white anodized or white vinyl finish.

4.10.5 Window thermal performance shall meet or exceed minimum energy standards for federal buildings. Spectrally selective coatings must be chosen for performance in the particular application and be factory applied. Low-e coatings and solar reflective coatings perform distinctly different functions and are not interchangeable. Selective coatings must be properly placed on the correct glazing surface in order to perform properly.

4.11 Dormitories and Billeting Facilities:

The design of these facilities shall follow the guidance provided by AFMC, Guidelines for Facilities Excellence, 1996.

4.12 Roof Drainage:

Provide gables at all entrances unless it is specifically unfeasible or has a canopy. Metal roofs shall be equipped with a snow management system. Use rain gutters only when gutters are the only feasible method available to channel runoff to the storm drain system or for safety considerations. Provide heat tape system with rain gutters.

4.13 1200 Zone Rest rooms: Alterations of 1200 Zone buildings will standardize the location of the rest rooms in the center of the buildings.

4.14 Roofs:

4.14.1 General: Roofing shall utilize the methods described below.

4.14.1.1 All projects when utilizing conventional membrane roofing materials for new projects or complete reroofing shall meet the following criteria. Roofing system at HAFB shall be designed and installed to be a true SBS (ASTM D6162, D6163 and D6164) polymer modified bituminous system (MB), no VOC (LEED points available), highly recycled (LEED points available), high tensile and tear strengths and include the roofing manufacturer's detailed inspection with reporting documentation of compliance with the UFC 3-110-03 "Roofing" and UFC 3-330-02A Commentary on Roofing Systems".

4.14.1.2 Conventional BUR systems per the UFC 3-110-03 will be acceptable for repairs of existing BUR roofs.

4.14.1.3 Refer to UFC 3-110-03 "Roofing" and UFC 3-330-02A "Commentary on Roofing Systems" for all other roof systems that may be repaired such as Asphalt shingles and standing seam metal roofs. Other roofing systems will be entertained on a case-by-case basis prior to award of any contract unless the SOW specifically delineates a system.

4.14.2 Drainage: Sloped roofs shall be used in lieu of flat roofs when possible. To avoid snow sliding into door entryways roof gables will be used to the maximum extent possible. Hill AFB is located in a cold region, and because of past experience with ice and snow damage, the use of external gutters shall be limited to entryways where a roof gable is not possible. Drainage will be provided with a roof designed to slope away from personnel activity. The use of roof overhangs that extend over sidewalks is encouraged. Metal roofs shall not have internal guttering. Horizontal roof drains in unheated attic spaces shall be kept to a minimum to prevent freeze-ups.

4.14.3 Corrugated Cement Asbestos Roofs: These type roofs exist on a considerable number of roofs in the West area of Hill AFB. When it necessary to repair this type roof consideration should be given to replace the entire roof; however, it may be overlaid with plywood and asphalt shingles. The majority of the asbestos roofs have been encapsulated. If the contractor needs to mount new equipment or disturb the roof, great care should be taken to not disturb the asbestos.

4.14.4 Heat Tape: Heat tape is to be avoided whenever possible. It creates a maintenance problem and most often does not receive routine maintenance due to the lack of funds and maintenance personnel. When heat tape is absolutely necessary the use of an EMCS monitored system shall be used that includes an on/off moisture sensor to detect snow and ice, a thermostat which disables operation were ambient temperature will allow melt to occur and an analog amp sensor to verify the heat is working. Together, these devices limit energy use to only what is needed. This system will notify occupants via EMCS that the system is working and when the system has failed or in need of repair.

4.14.5 Plywood Decking: Fire retardant treated plywood (FTR) is banned on all new and re-roofing projects. This type of plywood deteriorates when used as roof decking. Untreated exterior glued plywood will be used for decking.

4.14.6 Roof Penetrations: All roof penetrations will be kept to a minimum. The Base roofing engineer will be consulted prior to calling for penetrations in new and existing roofs. This coordination will answer questions on existing roof warranties and recommended penetration details for both new and existing roofs.

4.14.7 Fall Protection: Where feasible permanent anchor points for horizontal lifelines for entire roof coverage shall be provided for future building maintenance, etc. Anchorage to which personal fall arrest equipment is attached shall be capable of supporting at least 5,000 pounds per employee attached, or shall be designed, installed, and used as part of a complete personal fall arrest system which maintains a safety factor of at least two, under the supervision of a qualified person. The designer shall p*rovide* calculations which certify that the building can structurally support the loads imposed by all fall protection systems to be installed. The kind of personal fall arrest system selected should match the particular work situation, and any possible free fall distance should be kept to a minimum. Fall protection systems shall comply with applicable AFOSH, OSHA, and ANSI rules and regulations. Applicable standards include, but are not limited to; AFOSH 91-501, OSHA 29 CFR 1910, ANSI Z359.1-2007 and ANSI Z359.2-2007.

4.15 Landscaping:

4.15.1 General: All new construction and major renovation projects, (facility construction, site design, and landscape construction) will follow best management practices and the following requirements.

4.15.2 Xeriscape Landscapes. Xeriscape landscaping will be the primary comprehensive approach to landscaping for water conservation and pollution prevention for all installation landscape projects. Xeriscape uses native, naturally occurring plant material in the landscape design to convey a sense of regional context while embracing sustainable landscape design and preservation of native and endangered species. Native plants are more acclimated to the climate and require less irrigation. The xeriscape methodology is relevant to planning and design, soil analysis, selection of suitable plants, practical turf areas, efficient irrigation, use of mulches, and appropriate maintenance choices. An emphasis will be given to a desert motif using water resistant plantings. Landscaping will emphasize the architectural lines and features of adjacent buildings and areas, and will be designed to require little or no pruning. Landscaping will be designed with year-around consideration for human comfort. Passive solar cooling methods will be considered such as deciduous tree shading on the east, south and west exposures.

4.15.3 The intent is to limit or eliminate the use of potable water for landscape irrigation. Irrigation typically uses potable water, although lower quality water is equally effective for irrigating landscapes. Sources of non-potable water include: captured rainwater from roof and parking lot runoff; gray water from building systems; and municipal recycled water supply systems.

4.15.4 Water efficiency design strategies will be applied to landscape irrigation by the use of cycle irrigation methods to improve penetration and reduce runoff. For optimal growth, cycle irrigation provides the right amount of water at the right time and place. Designs/retrofits will include the use of low-precipitation-rate sprinklers (better distribution uniformity), bubbler/soaker systems, or drip irrigation systems. For technical information related to irrigation, see UFC 3-420-01, *Plumbing Systems;* UFGS 32 84 23, *Underground Sprinkler Systems;* and UFGS 32 84 24, *Irrigation Sprinkler Systems*.

4.15.5 Shrubs and Trees: Shrubs and trees will be the most drought resistant varieties, and where possible will be placed without irrigation sprinklers. Large trees will be planted with enough space to facilitate growth and trimming, which will normally dictate that they be planted at least 20-feet apart. Tree removal or replacement shall be coordinated with the Natural Resources Manager in 75 CEG/CEV. An evaluation of the proposed action will be analyzed, and a determination made as to the need for removal or replacement and the mitigation requirements for live, dead or dying trees.

4.15.6 Slopes: All slopes shall be no steeper than 3 to 1. Provide slope protection using recent technology for all slopes.

4.15.7 Where lawn grass is used, it shall be provided with irrigation sprinklers, and will be sodded not begun from seed, except for dry land seeding applications. Irrigated lawns shall consider incorporation of a river-run rock or lava rock perimeter to preclude water over spray of sidewalks and pavements.

4.15.8 Restoration of Native Ground Cover: All native ground cover that is disturbed by construction and not scheduled for landscaping shall be re-seeded with drought resistant grasses and legumes. Mixtures of dry land alfalfa, fairway crested wheat grass and Indian rice grass will be used in good sandy, loam soils. Use sand drop seed with fairway crested wheat grass in gravely soil. Machine drilling on generally level to mildly sloping ground is preferable. Hydro seeding should only be used on 3 to 1 slopes. This native ground cover seeding should take place in April, May, September and the first half of October only. For MAMS and airfield areas the following seed mixture and application rates shall be used to prevent BASH conditions. For soil preparation an application procedures see 75 CEG/CEIE memorandum dated 25 February 2014.

Common Name	**Variety**	Rate (lbs./acre)
Western Wheatgrass	**Rosana**	2.5
Intermediate Wheatgrass	**Oahe**	2.0
Streambank Wheatgrass	**Sodar**	4.0
Crested Wheatgrass	**Hycrest, Roadcrest, or Ephraim**	2.0
Sand Drop Seed		0.12
Bluebunch Wheatgrass		2.5
Sheep Fescue		2.0
Total		15.12

5. SUSTAINABLE DESIGN AND DEVELOPMENT.

5.1 Policy:

Air Force Sustainable Design and Development (SDD) Policy memorandum requires that MILCON vertical new construction and major renovations projects (with climate control) are able to achieve LEED Silver level certification. In the case of building additions, this applies to portions of the facility within the scope of the project only. The policy further requires that other MILCON projects (horizontal, utility, and industrial) achieve a benchmark level of LEED credits, guidance for which is provided in the *Air Force Sustainable Design and Development (SDD) Policy* memorandum. In both instances, the LEED rating system referenced is LEED for New Construction and Major Renovations (LEEDNC). USGBC has other rating systems within its portfolio, including Existing Buildings (LEED-EB), Core and Shell (LEED-CS) and Commercial Interiors (LEEDCI). It is recognized that, in some instances, LEED-NC has little relevance to a project and that another LEED rating system may more closely align itself with the scope. In those instances, coordinate with AFCEE/TDB on a case-by-case basis to determine if another rating system should be used for the project. If another LEED rating system is used with the project, the checklist review and evaluation must still be accomplished in accordance with the *Air Force Sustainable Design and Development (SDD) Policy* memorandum and must be submitted electronically to AFCEE/TDB at afcee.tdbwkflorgbox@brooks.af.mil.

5.2 Sustainable Design.

5.2.1 The facility design process can take one of several paths towards construction; however, meeting sustainable development objectives shall always be a primary concern regardless. Concept design is typically developed through an intensive, cross-disciplinary session called a "charette." This is led by the design agent and A/E contractor and attended by the full Air Force team (AFCEE PM, MAJCOM representative, installation PM, architects, engineers, landscape architects, interior designers, planners, facility managers, and energy managers) and all other design consultants, including a LEED AP. It is the responsibility of the design agent, working with the Air Force PM, to determine the source organization for the project LEED AP. The LEED AP will ensure the intent of the LEED rating system is understood and will document, using the LEED checklist, the sustainable goals of the project. The project designers shall prepare a separate “Project Sustainable Design Analysis” chapter as part of the RD; a LEED checklist alone does not meet this requirement. Using the LEED checklist as a guide, the project sustainable design analysis shall fully address each sustainable design feature and incorporate them into the project; shall discuss why other features were not included; shall discuss the cost of sustainable features; shall discuss synergies between sustainable features; and shall clearly describe assumed construction-phase sustainable design features. The project designers shall prepare a LEED checklist that is reflective of the employed design strategies. This checklist will be used in documenting and reporting progress on meeting sustainable design goals.

5.2.2 At a minimum, at the design charette and 100 percent design for design-bid-build and 100% request for proposal (RFP) for design-build, the checklist shall be reviewed and verified by the team LEED AP and shall be reported on the Website using the database developed by AFCEE/TDB in accordance with the *Air Force Sustainable Design and Development (SDD) Policy* memorandum.

Tracking LEED status of a project can be simplified by registering with USGBC at http://www.usgbc.org/.

5.2.3 New buildings and major renovations to existing buildings which exceed 25% of the replacement value, shall be designed specified and constructed in accordance with US EPA Recovery Materials Advisory Notice (REMAN) for Comprehensive Procurement Guideline (CPG) 9/2007, Federal Green Construction Guide Sec 04-20-00, DoD Green Procurement Program Strategy GPPS, and the partial list of current applicable Federal Regulations below:

- Executive Order 13423
- RCRA 6002
- C.F.R. 247.1-247.17
- FAR 23.4

Hill AFB is an active participant in the recycling of post-consumer waste derived from facility and production operations. The recycling of post-consumer waste program requires that products produced by the process be manufactured utilizing a minimum of 10% of these qualified recycle component materials and the products to meet all applicable current product specifications. Many products meeting these guidelines are readily available at comparable cost and therefore shall be incorporated according to the referenced Executive Order 13423 to the maximum extent of product availability. Products manufactured from facility and production waste available for construction purposes include but are not limited to concrete masonry units and cultured marble bath panels & fixtures.

5.3 Sustainable Construction.

5.3.1 The Air Force PM and construction contractor shall review with the project sustainable design goals, strategies, and/or materials at the preconstruction meeting.

Upon completion of the project, at beneficial occupancy date (BOD), a final report shall be generated including a LEED checklist showing credits, including prerequisites obtained for each functional area sufficient to qualify for, at a minimum, LEED Silver certification. The report, reviewed and verified by a LEED AP, shall define what level of certification could have been obtained and whether the project was LEED registered and/or -certified and shall be reported on the Website using the database developed by AFCEE/TDB in accordance with the *Air Force Sustainable Design and Development (SDD) Policy* memorandum.

5.4 Documentation and Reporting Requirements.

5.4.1 For all MILCON projects (vertical, horizontal, utility, and industrial), LEED checklists must be reviewed and verified by the LEED AP and reported on the Website using the database developed by AFCEE/TDB a minimum of four times, as described above and in AF ETL 08-13.

5.4.2 For projects not selected for registration and certification through USGBC, documentation supporting reported LEED credits shall be maintained at the MAJCOM or installation. Documentation shall include contract documents, the project sustainable design analysis, submittals, plans, receipts, reports, and all other items reviewed by the LEED AP during the LEED status validation process.

5.4.3 Selecting projects for LEED registration and certification through USGBC will be done in a collaborative manner between the MAJCOM and AFCEE.

5.4.4 Documentation for projects selected for LEED registration and certification is the responsibility of the design agent; however, this effort may be contracted to the A/E, contractor, or other acceptable

entity. Upon USGBC certification, the design agent shall notify the MAJCOM and AFCEE/TDB and provide a final accounting of point status and energy efficiencies achieved.

5.4.5 As a matter of convention and to provide ease of use of the USGBC projects database, all projects submitted to USGBC for registration shall follow the instructions below when entering information in the following fields:

5.4.6 “General Project Information” section, “Project Title, FY” field, enter the location or installation followed by the facility name (e.g., Hill AFB Fitness Center; Hill AFB Dormitory).

5.4.7 **“**General Project Information” section “Is Project Confidential” field, enter “No” unless project is classified.

5.4.8 **“**Project Owner Information” section, “Organization Name” field, enter “USAF”.

5.4.9 FOAs and MAJCOMs are highly encouraged to submit their success stories for inclusion in the Department of Energy (DOE) -sponsored High Performance Federal Buildings Database, http://www.eere.energy.gov/femp/highperformance/index.cfm.

5.5 Construction and Demolition Waste Diversion.

The Contractor is required to develop a comprehensive Solid Waste Management Plan detailing how the contractor will achieve 54% (by weight) waste diversion for each project as implemented by the Office of the Under Secretary of Defense memorandum dated 1 Feb 2008 in reference to EO 13423. For required non-hazardous solid waste management, a project adapted Construction and Demolition Waste Management Plan similar to UFGS 01 74 19 will be used. In order to track C&D waste diversion, accountability and documentation must be initiated prior to actual work in the field. The Contractor's Non-hazardous Solid Waste Diversion Report must be submitted on the first working day after the first quarter that non-hazardous solid waste has been disposed and/or diverted and each quarter thereafter until the end of the project. The report must indicate the type and amount of waste generated, type and amount of waste diverted, type and amount of waste sent to waste-to-energy facility and alternative daily cover, destinations of all diverted materials, in tons, and the percent that was diverted.

6. ENERGY AND WATER CONSERVATION REQUIREMENTS.

6.1 Facility Energy Policy:

6.1.1 New buildings (excluding single family and low rise multi-family residential buildings), new building additions, and major renovations to existing buildings which exceed 25% of the replacement value, shall be designed and constructed in accordance with latest Federal Energy Regulations or Air Force and DoD policy whichever is more stringent. A partial list of current applicable Federal Energy Regulations are:

1. Energy Policy Act 2005 as codified in 10 CFR Parts 433, 434 and 435. (EPACT 2005)
2. Energy Independence and Security Act of 2007. (EISA 2007)
3. Executive Order 13693: Planning for Federal Sustainability in the Next Decade

A partial list of Dept of Defense and Air Force energy regulations are:

1. UFC 3-400-01 *Energy Conservation*
2. AF ETL 08-13 *Incorporating Sustainable Design and Development and Facility Energy Attributes in the Air Force Construction Program.*

Specifically, new buildings, building additions, and major renovations exceeding 25% of replacement value, shall be designed and constructed in compliance with ANSI/ASHRAE/IESNA Standard 90.1 - 2004 *Energy Standard for Buildings Except Low Rise Residential Buildings.*

New construction, building additions, and major renovations, of single family housing and low rise (3 stories or less) multifamily residential buildings shall be designed and constructed in compliance with the *International Energy Conservation Code*. ICC

In addition to compliance, design and construction shall achieve an energy consumption level that is at least 30 percent better than the level achieved through compliance under ASHRAE 90.1 or ICC as applicable. If the 30 percent energy consumption savings cannot be achieved in a life cycle cost effective manner, the maximum savings level that is cost effective shall be achieved. Energy consumption levels for both the baseline building and the proposed building shall be determined by using the Performance Rating Method in ASHRAE 90.1 Appendix G with the following correction to paragraph G1.2

Percent improvement = 100 x (Baseline building consumption - Proposed building consumption) / (Baseline building consumption - receptacle and process loads.)

6.1.2 All energy consuming products shall be either ENERGY STAR qualified or FEMP-recommended. These products are in the upper 25 percent of energy efficiency in their class.

6.1.3 Both recovered and renewable energy shall be used in each design to the maximum extent that is life cycle cost effective. Solar hot water shall be used in each design to furnish a minimum of 30 percent of the hot water demand if life cycle cost effective.

6.1.3 For buildings less than 20,000 SqFt. the designer may choose to meet or exceed the minimum requirements listed in the prescriptive table below in lieu of the extensive computer modeling required by the Performance Rating Method in ASHRAE 90.1 Appendix G.

6.1.3.1. This table is based upon: *Advanced Energy Design Guide for Small Office Buildings* for climate zone 5B. However, modifications have been made to comply with additional Federal Energy Policy Act requirements.

Item	Component	Minimum Requirement
Roof	Insulation entirely above deck	R-20 Continuous Insulation
	Metal Building	R-13 + R-19
	Attic and other	R-38
	Single Rafter	R-38 + R-5 Continuous Insulation
	Surface Reflectance/Emittance	See Notes Below
Walls	Mass	R-13 Continuous Insulation.
	Metal Building	R-13 + R-13
	Steel Frame	R-13 + R-10.0 Continuous insulation
	Wood Frame and Other	R-19 + R-3.8 Continuous Insulation
	Below Grade	R-7.5 Continuous Insulation
Floors	Mass	R-10.4 Continuous Insulation
	Steel Frame	R-30
	Wood Frame and Other	R-30
Slabs	Unheated	No Recommendation
	Heated	R-10 for 36 inches
Doors	Swinging	U .70
	Non-Swinging	U .50
Vertical Glazing	Window to Wall ratio	20% to 40% Maximum
	Thermal Resistance	U .42
	Solar Heat Gain Coefficient	.46

	Window Orientation	(An*SHGCn + As*SHGCs) > (Ae*SHGC e + Aw SHGC w)
	Exterior Sun Control (S, E, W only)	Projection factor .5
Skylights	Maximum percent of roof area	3%
	Thermal Resistance	U .69
	Solar Heat Gain Coefficient	.39
Interior Lighting	Lighting Power Density	0.9 Watts/SqFt
	Light Source	90 Mean Lumens/Watt
	Ballast	Electronic Ballast
	Dimming Controls for daylight	Dim fixtures within 12 Ft of N/S window or 8 ft of skylight edge
	Occupancy controls	Auto-off all unoccupied rooms
	Interior room surface reflectance	80% + on Ceilings, 70% + on walls and partitions
HVAC	Air conditioners (0-65,000 Btuh)	Energy Star Rated
	Air conditioner (66,000 – 135,000 Btuh)	Energy Star Rated
	Air conditioner (136,000 – 240,000 Btuh)	Energy Star Rated
	Air conditioner (> 241,000 Btuh)	Energy Star Rated
	Gas furnace (0 – 225,000 Btuh - SP)	Energy Star Rated
	Gas furnace(0-225,000 Btuh – Split)	Energy Star Rated
	Gas furnace(> 225,000 Btuh)	Energy Star Rated
	Heat pump (0 – 65,000 Btuh)	Energy Star Rated
	Heat pump (0 – 65,000 Btuh)	Energy Star Rated
	Heat pump (65,000 – 135,000 Btuh)	Energy Star Rated
	Heat pump (> 135,000 Btuh)	Energy Star Rated

Economizer	Air conditioners & heat pumps –SP	
Ventilation	Outdoor Air dampers	Dedicated Outdoor Air with Motorized control
	Demand Control	CO2 Sensors
Ducts	Maximum Friction loss Rate	.08 in W.C./100 feet
	Sealing	Seal Class B
	Location	Interior only
	Insulation Level	R-6
Service Water	Gas Storage	90% Et
	Gas Instantaneous	Energy Star Rated
	Electric Storage 12 KW	EF>.99 - .0012 x Volume
	Pipe Insulation d < 1.5 inch	1 inch
	Pipe Insulation d < 1.5 inch	1.5 Inch

Metal Building: A pre-fabricated structure with metal panels attached directly to purlins.

Mass: Concrete or masonry wall or floor providing the main structural support (not veneers) and having a heat capacity greater than 7 Btu/SqFt.

Steel Frame: Walls, roofs, and floors with metal framing members similar to traditional wood framing.

Heated Slab: Slab floors with heating elements either within or below the slab.

Et: Thermal Efficiency.

EF: Energy Factor.

Roof Flectance Shall meet or exceed "Cool Roof Rating Council" Solar Reflectance Index (RFI) of ≥ 78 for low-slope roofs (Pitch 2:12 or less) and ≥ 29 for high-slope roofs (Pitch greater than 2:12).

6.1.3 Energy Compliance Analysis and Life Cycle Cost Analysis Calculation Methods. All calculations shall be based on expected conditions including anticipated occupancies, scheduled hours of operation and weather history. Calculations shall be performed using professionally recognized and proven energy analysis programs capable of simulating the features, systems and loads used in the proposed design. Programs shall perform full 8760 hourly calculations using TMY2 or TMY3 weather data for Salt Lake City, Ogden, or Hill Air Force Base. Preferred modeling program is Energy Plus available free from Dept of Energy. Other acceptable programs are DOE2.1E, BLAST and E Quest.

6.1.4 Utility incentives and rebates for work done on Hill AFB shall only be coordinated through the Energy Management Office. Contractor shall provide invoices and other information needed to obtain rebates upon the request of the Energy Office.

NOTE. COMcheck and REScheck are acceptable for demonstrating minimum compliance but are not acceptable alone for demonstrating compliance with requirements to exceed the minimum standard by 30% as required under Federal Energy Policy Act (EPACT 2005).

6.2 Energy Code Compliance Documentation:

6.2.1 The Lead Project Architect, Lead Project Mechanical Engineer, and the Lead Project Electrical Engineer, shall each prepare separate narratives listing the energy conservation measures considered, the impact of each measure on the total energy consumption, and a listing of each energy conservation measure adopted.

6.2.2 Signed Energy Compliance Analysis forms and all other compliance documentation listed in Appendix G of ASHRAE 90.1 shall be provided to the Government for Approval (unless the design follows exactly, the prescriptive approach listed above). Spreadsheet and pdf versions of the Energy Compliance Analysis forms are available from Hill AFB engineering office. Alternate forms may not be used.

6.3 Energy Requirements for Building Renovations:

6.3.1 Where renovation costs are equal to or greater than 25% of the replacement cost of the building, the entire building shall brought up to compliance with the requirements for new construction listed above as required by UFC 3-400-01 *Energy Conservation.*

6.3.2 Where renovation costs are less than 25% of the replacement value the entire building shall be brought into compliance with requirements for new construction to the maximum extent practical. All new work shall comply with requirements for new construction.

6.3.3 In accordance with Executive Order 13423 and UFC 3-400-01, sustainable design shall be an integral part of every project. This requires an integrated and coordinated approach to the planning, design and construction of facilities and extensive use of environmentally preferable products, recovery and recycling of materials and waste reduction as well as an emphasis on the long-term quality and productivity of the built environment. Energy and water conservation are primary goals of sustainable design and development and are major requirements in complying with Executive Order 13123. Appliances, HVAC equipment and other energy consuming equipment shall have an energy efficiency rating in the upper 25 percent of that available as long as these efficiency requirements are nonproprietary and life cycle cost effective. In general, the Department of Energy and Federal Energy Management Program recommendations from the Buying Energy Efficient Products Guide and the Environmental Protection Agency Energy Star products program meet these requirements. The DOE recommendations are available on the web at www.eren.doe.gov/femp/procurement.

6.3.4 Interpretation of terms used in ASHRAE Standard 90.1 is as follows:

Adopting Authority: The US Air Force.
Authority Having Jurisdiction (AHJ): US Air Force - HQ AFCESA/CES. US Army - HQ USACE/CECW-CE as appropriate.
Building Official: The Contracting Officer's Representative.

Owner: Hill AFB.
Permit Holder: The Contractor.
Residential Spaces Not Excluded from this Standard: Dwelling units, hotel/motel guest rooms, dormitories, temporary lodging facilities, hospitals, prisons, and fire stations.
Residential Spaces Excluded from this Standard and therefore covered under the ICC Energy Code: Single-family houses, multi-family houses of three stories or less, mobile homes, and modular houses.

6.4 Economic Analysis:

6.4.1 Designers may choose one of four methods listed in 10 CFR 436 to demonstrate life-cycle cost effectiveness. These methods include lower life-cycle costs, positive net savings, savings-to-investment ratio that is estimated to be greater than one, and adjusted internal rate of return that is estimated to be greater than the discount rate as listed by OMB Circular Number A-94 Guide to Discount Rates for Benefit-Cost Analysis of Federal Programs. Additional information is available at http://www.access.gpo.gov/nara/cfr/waisidx_o4/10cfr436_04.html

6.3.3 The Life Cycle Costing in Design (LCCID) program is in full compliance with these regulations and is periodically updated to include the latest differential escalation rates, energy cost projections and similar economic factors. LCCID is available from the Building Systems Laboratory at the University of Illinois, http://www.bso.uiuc.edu, and from the Construction Criteria Base distributed by the National Institute of Building Science. Another life cycle costing program in full compliance with the Federal Regulation and updated with the latest economic factors is the Building Life Cycle Costing (BLCC) program available from the National Institute of Standards and Technology. The Department of Energy's building energy tools web site has a link to BLCC (under Energy Economics) and it can also be found at http://www.eren.doe.gov/femp/techassist/softwaretools/softwaretools.html. The appropriate cost and savings associated with the utilization of recovered energy, solar heat, solar photovoltaic energy and other renewable or waste heat applications shall be included.

6.5 Meters:

6.5.1 All new construction and all major renovations or additions to existing buildings shall include utility meters for each utility serving the building. Design and installation of all meters shall be capable of communicating with the Energy Management Control System (EMCS).

6.5.2 All utility meters shall comply with the EPACT 2005 requirements for advanced metering, be capable of 15 minute interval measurements, 30 days of internal parameter storage, and be 100% compatible with existing systems for remote collection of data. Recorded values for Electricity (kWh consumption, kW demand, kVAR reactive power, PF power factor), Natural Gas (cubic feet), Steam (klbs), Water (kgal). Memory for recording interval readings shall be ANSI C12.19 compliant. Meter shall provide time-stamped readings for every measured parameter.

6.5.3 The data shall be transmitted to the EMCS system in Building 593. All communication connections will be made by the Contractor to include all wiring, conduit, radios, and/or antennae required to support transmission of data to the EMCS server interface.

6.5.4 The EMCS integration shall include complete installation of all hardware, connection to system, and verification of pulse weight or meter multiplier. Each meter point shall record all relevant parameters with time-date stamp.

6.5.5 The Contractor must be required to perform a complete point-to-point test of the completed meter Installation. The test shall be conducted by validating the readings measured at the meter and those transmitted to and received by the EMCS server.

6.5.6 Questions regarding the AMS installation should be directed to the Base Utility Manager (Mr. Dave Abbott). He can be reached at (801) 777-5944.

6.5.7 Steam distribution and condensate lines shall be located above ground when possible. When the lines must be placed in an underground system, they should be installed in a utility trench.

6.5.8 AMR compatible gas meters and pressure regulators shall be installed for all new and renovated facilities or when gas service to existing facilities is installed, replaced, or upgraded and connected to the EMCS system. Meters shall be Dresser Roots rotary style meter or equivalent and meet the requirements of UFGS 33 51 13.00 30, Natural Gas Metering.

6.5.9 AMR compatible watt hour meters shall be installed on all facilities requiring new electric service or modifications to existing service and facility power requirements and connected to the EMCS system. Meter shall be a Shark 200 v2 or equivalent and meet the requirements of UFGS 26 27 13.10 30, Electric Meters.

6.5.10 AMR compatible water meters shall be provided for potable water entry/service points and base water well facilities.

6.6 Water Conservation.

6.6.1 All new construction and major renovation projects, (facility construction, site design, and landscape construction) will follow best management practices and the following requirements.

6.6.1.1 Xeriscape Landscapes: Xeriscape landscaping will be the primary comprehensive approach to landscaping for water conservation and pollution prevention for all installation landscape projects. Xeriscape uses native, naturally occurring plant material in the landscape design to convey a sense of regional context while embracing sustainable landscape design and preservation of native and endangered species. Native plants are more acclimated to the climate and require less irrigation. The xeriscape methodology is relevant to planning and design, soil analysis, selection of suitable plants, practical turf areas, efficient irrigation, use of mulches, and appropriate maintenance choices. Certain LEED credits are linked to proper application of xeriscape concepts.

6.6.1.2 Landscape Irrigation Systems.: The LEED rating system does include credits for water-efficient landscaping practices. The intent is to limit or eliminate the use of potable water for landscape irrigation. Irrigation typically uses potable water, although lower quality water is equally effective for irrigating landscapes. Sources of non-potable water include: captured rainwater from roof and parking lot runoff; graywater from building systems; and municipal recycled water supply systems.

6.6.1.3 Water efficiency design strategies will be applied to landscape irrigation by the use of cycle irrigation methods to improve penetration and reduce runoff. For optimal growth, cycle irrigation provides the right amount of water at the right time and place. Designs/retrofits will include the use of low-precipitation-rate sprinklers (better distribution uniformity), bubbler/soaker systems, or drip irrigation systems. For technical information related to irrigation, see UFC 3-420-01, *Plumbing Systems*; UFGS 32 84 23, *Underground Sprinkler Systems*; and UFGS 32 84 24, *Irrigation Sprinkler Systems*.

7. MECHANICAL SYSTEMS DESIGN REQUIREMENTS.

7.1 Purpose and Scope:

The purpose of this part of the standard is to provide technical guidance and outline technical requirements for the more typical aspects of the mechanical engineering design on Hill Air Force Base. The information provided shall be utilized by mechanical designers in the development of the plans, specifications and calculations, and shall serve as the minimum mechanical design requirements. Project conditions may at times dictate the need for designs that exceed these minimum requirements.

7.1.1 Refrigerant Management. When any work is conducted on a refrigerant containing appliance, whether moving, repairing, replacing, or installing new, the designer will include the following Refrigerant Management practices as part of the contract requirements:

7.1.1.1 Technicians performing any work that might result in refrigerant containing equipment must be EPA certified.
7.1.1.2 All refrigerants remain property of the Air Force and must be recovered.
7.1.1.3 Prior to removing or relocating existing equipment the remaining refrigerant must be evacuated from the equipment and all associated piping by a certified recovery or recycling machine. Reclaimed refrigerant will be returned to the government in containers supplied by the Air Force for that purpose.
7.1.1.4 Designers will list, on the project drawings and in the specifications, the type of refrigerant and the working charge of the equipment specified.
7.1.1.5 The plans and specifications shall require the installing contractor to update these drawings to show the actual size and type of equipment installed and the final total installed refrigerant charge.
7.1.1.6 The plans must state that the contractor is not permitted to purchase any refrigerant on behalf of the government. If additional refrigerant required beyond the pre-charge will be provided by the government.

7.2 Energy Supply

7.2.1 **Fuel Source and HVAC System Selection. The use of electric resistance heating is not permitted without prior approval from base civil engineering office. Solar hot water shall be used in each design to furnish a minimum of 30 percent of the hot water demand if life cycle cost effective.**

7.2.1.1 New facilities and facilities undergoing major and minor renovation as defined in UFC 3-400-01, *Energy Conservation*, are required to be analyzed to determine the most cost effective and practical fuel source(s) and heating and cooling system types. Both recovered and renewable energy shall be used in each design to the maximum extent that is life cycle cost effective. Provide energy analysis in accordance with UFC 3-400-01.

7.2.2 All new facilities and major renovations where the HVAC system is to be upgraded will consider the use of Ground Source Heat Pumps (GSHP) as the first choice. Provide mechanical system based on lowest life cycle cost. Provide completed compliance forms provided in ASHRAE 90.1 User's Manual, any additional documentation to support compliance with this Standard, and applicable state government required forms.

7.2.3. Facility Energy Conservation. The Energy Policy Act of 2005 (EPACT05) and The Energy and Independence and Security Act of 2007 (EISA 2007) have increased the energy conservation

requirements. New facilities shall be designed to achieve energy conservation levels that are at least 30% below the levels established by ASHRAE Standard 90.1-2004 or the International Energy Code (for residential buildings).

7.2.4 ENERGY STAR: All HVAC equipment, appliances, related electrical equipment, and water saving fixtures shall meet or exceed the minimum efficiencies listed by Energy Star and Federal Energy Management Program (FEMP). The FEMP website lists all Energy Star and FEMP rated products and provides recommended efficiencies and life cycle data. The FEMP website is at http://www.eren.doe.gov/femp/. For product groups where Energy Star labels are not yet available, select products that are in the upper 25% of energy efficiency as designated by FEMP.

7.2.5 Sustainable Design. Integrate sustainable development principles into the mechanical system selection and design. Utilize the U.S. Green Building Council's LEED Green building Rating System as a tool to apply sustainable development principles and as a metric to measure the sustainability achieved through the planning, design, and construction processes.

7.2.6 Indoor Environmental Quality and Mold. Provide outside air ventilation as prescribed by the latest edition of ASHRAE Standard 62. Consider the factors of "Multiple Spaces", "Ventilation Effectiveness", and "Intermittent or Variable Occupancy" as specified in ASHRAE Standard 62. The building and mechanical system must be designed and constructed to prevent the growth of mold. Air Force facilities must comply with AF ETL 04-3.

7.2.7 Economizer Cycles. Economizer cycles should be considered even when not specifically required under ASHRAE 90.1. Air side economizers shall not be utilized in areas requiring humidification without being specifically designed for humidified spaces. Such systems will require special design approval. Other energy saving measures may be used in their stead. Contact the Government Project Manager for direction.

7.2.8 Building Pressurization. Maintain the building under positive pressure in order to negate infiltration.

7.3 Heat Generating Systems:

7.3.1 Boilers. Install boiler(s) and associated hot water pumps in a mechanical room inside the facility unless otherwise noted in the Project Program. Passageways around all sides of boilers shall have an unobstructed width of 1 meter (3 feet), or the clearances recommended by the boiler manufacturer, whichever is greater.

7.3.1.1 Multiple Boilers. In multiple boiler installations, the lead boiler should operate up to full capacity prior to starting the next boiler. During heating season, multiple boilers should be kept warm and ready should the lead boiler fail to operate.

7.3.1.2 Boiler Procurement. All boilers will be ASME certified as required by Dept of Defense.

7.3.1.3 Boiler Emissions. Boilers must comply with regulatory requirements under the Clean Air Act regarding Title V and New Source Review permits programs as well as requirements under New Source Performance Standards and National Emissions Standards for Hazardous Air Pollutants (NESHAP). Contact the local or regional Public Works Department or Base Civil Engineering Branch for specific requirements.

7.3.1.4 Draft Hoods. Provide for each gas-fired piece of equipment, except power vented and condensing type equipment.

7.3.1.5 Barometric Dampers. Provide barometric dampers for all boilers requiring negative draft.

7.3.1.6 Steam Boilers. On boiler start-up, the condensate in a gravity system may not return quick enough to maintain the boiler water level. Contact the boiler manufacturer for boiler feed system tank size and location.

7.3.1.7 Condensing Boiler Systems. Provide hydronic systems with condensing gas-fired boilers with a water volume equal to five (5) minutes of water flow through the system pump (minimum), or as required by the boiler manufacturer. This insures there is sufficient water volume to prevent short cycling of the burner. If there is insufficient water volume, an inertia tank must be installed to attain the minimum system volume required. Non-condensing boilers do not require this minimum.

7.3.2 Combustion Air. Provide combustion air for gas and oil-fired equipment in accordance with International Mechanical Code (IMC) and NFPA requirements.

7.3.3 Steam Heating. Steam heat should not be used except on rehabilitation projects where budget constraints preclude conversion of an existing steam heating system to hot water.

7.3.4 Infra-Red Gas Radiant Heaters. Infra-Red heating system designs shall be reviewed and approved by the equipment manufacturer and submitted designs shall include a letter so certifying. When using non-condensing gas infrared heaters, the length of the exhaust flue should be minimized. To minimize condensation, run the flue horizontally with a slight pitch down from the heater to a sidewall exit. Heaters should be properly braced where excessive movement, such as by wind through an open hangar bay door, may cause separation of radiant pipe sections and rupture of gas connections. Consider condensing type IR heaters for larger applications. Provide sufficient overhead ventilation for condensing type IR heaters to carry water vapor out of the building.

7.4 Cooling Generating Systems:

7.4.1 Condensing Temperatures. The design condensing temperature for air-cooled condensers, chillers, etc must be ambient design temperature plus 2.8 degrees C (5 degrees F) dry bulb.

7.4.2 Chilled Water Systems. Chiller manufacturers recommend minimum system volumes to prevent short-cycling of the chiller(s) to promote long chiller life and good chilled water temperature control, especially in smaller chilled water systems. In small systems it may be necessary to install an inertia tank in the chilled water loop to achieve the required minimum system volume. Check the requirements of the chiller manufacturer and provide an insulated, inertia tank of sufficient volume when required. Install the chilled water storage tank downstream of the chiller and upstream of the cooling coils. Provide calculations to demonstrate compliance with this requirement. Volumes for components may be estimated where manufacturer's data is not available.

7.4.3 Chillers. When multiple chillers serve a common central chilled water system, install a flow control balancing valve on the leaving side of the chilled water and condenser water (where applicable) of each chiller. Flow orifices with butterfly valves should be provided for larger pipe sizes. On multiple chiller systems, design pumping and piping systems to prevent water flow through chillers that are not in operation. Avoid the use of reciprocating compressors when possible. Utilize roof mounted chillers only as a last resort. If located on the roof, mount the chiller on a steel skid with isolators supported from the structural roof framing.

7.4.4 Cooling Towers. Provide a butterfly or 3-way diverting valve in the by-pass line for all cooling towers that are specified to have a condenser water by-pass for regulating the condenser water supply temperature. Provide automatic isolation valves on inlet and outlet of each cell for multi-cell or multi-tower applications. Size condenser water flow to chiller for the design flow rate, not the oversized tower flow rate. Cooling tower piping shall by-pass to the cooling tower’s sump.

7.4.5 Ground-Coupled Heat Pump (GCHP) System Design Guidance The guidelines that follow are intended to complement the guidance and requirements of ASHRAE and recognized consortiums, such as the International Ground Source Heat Pump Association (IGSHPA). Nonresidential, commercial scale ground source heat pump systems require the utilization of computer design software. Such software should consider the interaction with adjacent loops and long-term buildup of rejected heat in the soil.

7.4.5.1 Provide a bypass line around the condenser of each heat pump unit to facilitate flushing and purging the condenser loop without subjecting the condenser coil to residual construction debris.

7.4.5.2 Provide isolation valves and valved tee connections for flushing and purging of the well field independently from the building condenser water system.

7.4.5.3 Do not provide automatic water makeup in residential GCHP systems. Reserve the added complexity and cost to larger, non-residential systems of 10 tons or larger. Utilize cupronickel refrigerant-to-water heat exchangers in open condenser loops only.

7.4.5.4 Provide test ports (sometimes referred to as “Pete’s plugs”) on the inlet and outlet to each heat pump unit, circulating pump and desuperheater, if incorporated.

7.4.5.5 Utilize reverse return headers in large well fields. For heat pumps with reduced flow requirements of 2 GPM/ton or less, consider series return in order to maintain fluid velocities necessary to foster good heat transfer. Base the decision to commit to reverse return on installed cost, pumping costs and the system flow requirements. Consult ASHRAE and IGSHPA Design documentation for additional information.

7.4.5.6 Regulatory requirements for vertical wells vary widely among States. Some regulations require partial or full grouting of the borehole. Confirm with the Government Project Manager and consult current state and federal regulations, as well as relevant building codes.

7.4.5.7 The thermal conductivity of grouting materials is typically low when compared to the conductivity of native soils. Grout acts as an insulator and will, thus, hinder heat transfer to the well field. When governing regulations permit, consider the following alternatives:

a. Reduce the quantity of grout to an absolute minimum. Fine sand may be used as backfill where permitted, but caution must be exercised to ensure the interstitial space between pipe and borehole is filled to enhance conductivity.

b. Utilize thermally enhanced grout. Consult ASHRAE, Commercial/Institutional Ground-Source Heat Pump Engineering Manual. Reduce the borehole diameter as much as possible to reduce the insulating effects of grout or backfill.

7.4.5.8 Antifreeze solution is required if condenser loop temperatures are expected to drop below 5 degrees C (41 degrees F). Avoid use of antifreeze, but if necessary, keep concentrations to a minimum. Utilize condenser water circulating pumps with high efficiency motors. Design them to operate near their peak of maximum efficiency.

7.4.6 Refrigerants. The use of Ozone Depleting Substances (ODS) as well as the qualifications and credentials of personnel servicing equipment that contains ODS is restricted. Refrigerants shall have an Ozone Depletion Factor (ODF) of 0.055 or less. The ODF shall be in accordance with the "Montreal Protocol on Substances That Deplete the Ozone Layer", September 1987, sponsored by the United Nations Environment Program.

7.4.7 Refrigerant Piping. Avoid refrigerant piping runs longer than 15 meters (50 feet) unless specifically allowed by the equipment manufacturer. Size refrigerant piping in accordance with the manufacturer's recommendations.

7.5 Distribution Systems:

7.5.1 Air Distribution.

7.5.1.1 Locker Room HVAC Systems. Draw conditioned air into locker rooms from adjacent spaces, and provide additional supply air as required. This uses the outside air required for human occupancy in the adjacent spaces for secondary air conditioning of the locker space and maintains locker spaces at a negative pressure with respect to adjacent spaces. No air shall be returned from the locker space to the building HVAC system.

7.5.1.2 Outside Air Ducts. Size outside air ducts for velocities a minimum of 4.1 m/s (800 fpm) for accurate flow measurement. Provide a straight duct of suitable length to facilitate an airflow measurement traverse. Provide an air flow measuring station for VAV systems to verify proper outside air quantities. Equipment layout shall allow for the straight duct length requirements of the air flow measuring station in accordance with the manufacturer's recommendations.

7.5.1.3 Variable Speed Drives. Select system equipment following AFPAM 32-1192 Energy *Efficient Motors and Adjustable Speed Drives.* Select to deliver design flows so that maximum operational flexibility is maintained. Verify fan performance at minimum and maximum operating points.

7.5.1.4 Vibration and Noise Isolation. Where vibration and/or noise isolation is required, provide a vibration isolator schedule on the drawings indicating type of isolator, application, and deflection in mm (inches).

7.5.1.5 Access Panels. Provide access panels in floors, walls, and ceilings (except in lay-in tile applications) as required to access valves, smoke dampers, fire dampers, balancing dampers, balancing valves, air vents, drains, duct coils, filters, equipment, etc. Indicate location and size on drawings. Verify that the dimensions will yield reasonable accessibility.

7.5.1.6 Equipment Supports. Provide for vibration isolation where required and schedule the vibration isolation components on the drawings. Coordinate with and provide hardware required to meet Anti-terrorism requirements in **UFC 4-010-01** and seismic requirements in accordance with UFC 3-310-04, Seismic *Design For Buildings*. All equipment mounted on a roof must be fastened to the building as recommended by the structural engineer.

7.5.1.7 Space Noise Levels. Design and install systems to maintain noise levels below those recommended in the ASHRAE Handbooks.

7.5.1.8 Variable Air Volume (VAV) HVAC System Design Guidance The guidelines that follow are intended to complement the guidance and requirements of ASHRAE.

7.5.1.8.2 Utilize computerized load calculations based on the ASHRAE Transfer Function Method, the Heat Balance Method, or the Radiant Time Series method. Select all central air handling equipment and central plant equipment for "block" loads. Spread diversity through the supply ducts, taking full diversity at the air handling unit, and lessening diversity when moving away from the air handling unit toward the VAV terminal units, until no diversity is taken at the distant VAV terminal run outs.

7.5.1.8.3 Design for both peak and part load conditions (minimal wall transmission load, low occupancy, etc.). VAV Systems shall provide acceptable air circulation and proper outside air for all conditioned spaces regardless of the loading conditions.

7.5.1.8.4 Address the psychrometric performance of the cooling coils, with full consideration of the method of capacity control and its limitations, during part load conditions when the sensible heat ratio can be significantly reduced. Submit part load design calculations. Check the fan operating characteristics throughout the range from the minimum to the maximum flow conditions that will be experienced. Evaluate the off-peak turndown requirements for the main air handler VAV fan. Do not utilize discharge dampers or inlet vanes for air flow modulation. Provide variable frequency drives for air volume modulation.

7.5.1.8.5 Design a positive means of maintaining ventilation rates during part load conditions. Select the minimum primary air requirements of the VAV terminal units to maintain at least the minimum outside air ventilation requirements. The Direct Digital Control (DDC) system shall comply with the requirements of ASHRAE 62 for polling of boxes to maintain proper ventilation levels. Provide an air flow monitoring station in the outside air duct controlling the outside and return air dampers or a constant volume outside air fan to maintain the minimum outside air requirements. Constant volume outside air fans are the most reliable method of maintaining outside air rates and are preferred. When using airflow measuring stations (AFMS) for monitoring and maintaining constant outside air ventilation rates, avoid placement of the AFMS in the outside air duct unless a minimum of 12 duct diameters of straight duct downstream of the outside air louver can be provided. Turbulence generated by the outside air intake louver will generate high turbulence and a highly unstable control loop. For large systems using a constant air volume (CAV) fan use a pressure independent velocity controller in the outdoor air intake to keep outdoor airflow constant as the VAV air handler fan modulates. Provide a low velocity filter module upstream of the air injection fan to prevent dust/dirt build up that may clog the pitot tubes associated with the volume regulator. Provide a duct access door at the inlet to the CAV terminal box for periodic inspection and cleaning.

7.5.1.8.6 Utilize the static regain method in design of the supply ductwork. Design return ductwork using the equal friction method.

7.5.1.8.7 Provide control for a constant cooling supply air temperature. Resetting the supply air temperature upwards increases the coil sensible heat ratio and results in elevated space relative humidity.

7.5.1.8.8 Provide electronic controls; pneumatic controls present problems with repeatability and maintenance.

7.5.1.8.9 Locate the static pressure sensor for modulating fan capacity two-thirds to three-quarters the distance from the supply fan to the end of the main trunk duct. Locate in straight run of ductwork. Provide static pressure reset in accordance with ASHRAE Standard 90.1. Provide protection against over pressurization of the supply duct system. Utilize pressure independent (PI) terminal units. Do not use light troffer return units. Light troffers reduce room sensible loads with undesirable effects on room air changes and outdoor ventilation distribution. Control the cooling coil capacity, especially in the more humid climates. VAV is inherently one of the best of the chilled water systems for air conditioning in tropical climates.

7.5.1.8.10 Do not utilize DX VAV systems without prior approval of the Government Project Manager. Direct expansion equipment shall be specifically designed and manufactured for VAV applications. The same manufacturer shall provide central air handling units, VAV boxes/zone dampers and zone controls. Airflow through the evaporator coils shall not be modulated. Provide duct mounted zone control damper units with integral control box, designed for use with DX VAV packaged systems. Self-modulating air diffusers will not be allowed.

7.5.1.8.11 Provide round or flat oval duct systems for primary air on all VAV supply systems. Utilize round ducts wherever space availability permits.

7.5.1.8.12 Proper VAV box primary air entry conditions are critical for achieving stable, accurate airflow delivery. Every effort must be made to avoid high turbulence in the proximity of the VAV terminal flow sensor. Design the primary air duct branches to the VAV terminals with a straight duct section of at least 6 to 8 duct diameters (more if required by specific manufacturers). Reducer and increaser duct fittings installed immediately upstream of the VAV terminal connection collars are prohibited. If the branch duct size is other than the VAV terminal connection collar size, install the reducer or increaser fitting upstream of the aforementioned straight duct section.

7.5.1.8.13 Primary air connections to VAV terminals should always be with a rigid duct. If a section of flexible duct, or a flexible connection, is required for vibration control, limit the length to no more than 305 mm (12 inches), and ensure that it is placed at least 6 to 8 duct diameters upstream of the VAV box collar connection/flow sensor.

7.5.1.8.14 VAV terminal boxes have minimum primary air velocity limitations imposed by the volume regulators utilized. Though many manufacturers claim their VAV boxes can deliver minimum primary air at flow rates resulting in inlet velocities of 189 L/s (400 fpm) and a velocity pressure of 2.48 Pa (0.01 inch w.g.), the lack of a certifying agency to test the manufacturer's claims support a more conservative approach. Minimum primary airflow rates shall be established to attain minimum velocity pressures of no less than 7.45 Pa (0.03-inch w.g.). Do not utilize system-powered (also called "pressure dependent") terminal units.

7.5.1.8.15 Special consideration must be given when fan-powered VAV boxes are specified and when it is necessary to specify a VAV box fan CFM in excess of the specified maximum primary air CFM. When used with a dropped ceiling return plenum, the excess VAV box CFM will introduce secondary air into the conditioned space. This has the effect of transferring return side coil cooling loads to room-side sensible loads. Always make sure the transferred sensible heat is taken into account in the calculated room-side sensible heat. Failure to do so may result in inadequate primary airflow rates to satisfy the room sensible heat loads.

7.5.1.8.16 Discharge dampers shall be installed on all series fan-powered VAV boxes (SFPVAV), regardless of the type of fan speed control utilized (3-speed fan switch or solid state speed control).

7.5.1.8.17 When it is necessary to install VAV terminals at high elevations above finished floors, service and maintenance accessibility must be carefully analyzed. Where mounting heights are in excess of 3.6 m (12 feet) above finished floors, special accommodations are necessary:

a. Do not use fan-powered VAV boxes in such locations, since there are many serviceable components involved. Instead, consider using non fan-powered terminal boxes for use in high mounting height locations to eliminate the need for fan servicing and filter change access.

b. When DDC controls are installed, specify the installation of the DDC digital controller to facilitate ease of access.

c. If scaffolding, scissor lifts, ladders or other means is required to access VAV units, special considerations must be made. Be sure clear floor area is available below the VAV boxes to facilitate the means of access (i.e. scaffolding, etc) and in an area that will be likely to remain clear of permanent or semi-permanent equipment or furnishings.

d. When DDC controls are provided for VAV boxes, specify the ability to monitor VAV box hot water control valve position (if provided with hot water coils), control damper position, primary airflow, flow sensor pressure differential, and box leaving supply air temperature. The means to monitor VAV box function will maximize the means to troubleshoot remotely, thus reducing the frequency for above ceiling access by maintenance personnel.

e. Utilize electronic controls for VAV boxes mounted in high areas.

f. Specify the integral mounting of communication ports for the VAV box digital controllers to the room zone temperature sensor. When occupied/unoccupied modes of control are required of the VAV system, specify remote momentary override switch mounted integral to the room zone temperature sensors to permit non-standard schedule operation during unoccupied modes.

7.5.1.8.18 Fan-powered VAV terminal boxes can be noisy. Perform an acoustic analysis to ensure designs are within acceptable NC criteria noise levels. Pay particular attention to noise attenuation in locations where the boxes are installed in spaces without dropped ceilings. Analyze potential for sound breakout from main supply air ducts. Provide attenuation as required. Do not provide acoustical duct liner for attenuation.

7.5.1.9 Duct Lining. Duct lining shall only be used for room to room transfer applications. Increase the duct dimensions as required. Acoustical duct lining shall not serve as thermal insulation for duct.

7.5.1.10 Fire Dampers. Provide fire dampers and access panels in ductwork penetrating fire rated walls and floors in accordance with NFPA 90A.

7.5.1.11 Flexible Connections. Provide flexible connections in ductwork at equipment. Support duct at flexible connections to ensure proper alignment.

7.5.1.12 Flexible Duct. Flexible duct lengths shall not exceed 1829 mm (6 feet) in length and shall not be used to make right angle bends.

7.5.1.13 Louvers. Provide rain or storm proof louvers at wall intakes and exhausts. Indicate dimensions, airflow rate, and air pressure drop. Consider the potential for carry-over of wind driven rain.

7.5.1.14 Screens. Provide insect or bird screens, as applicable, at all building intakes and exhausts.

7.5.1.15 Door Louvers. Size for minimal pressure drop.

7.5.2 Water Distribution.

7.5.2.1 Variable Speed Drives. Select system equipment to deliver design flows so that maximum operational flexibility is maintained. Verify pump performance at minimum and maximum operating points.

7.5.2.2 Chilled Water Pumps. Provide a dedicated primary pump and condenser water pump for each chiller. Provide piping and valve configuration that allows each chiller to operate with any primary pump and with any condenser water pump. Provide back-up or standby pumps so that the total system capacity is available with any one pump out of service.

7.5.2.3 Hot Water Pumps. Provide back-up or standby pumps so that the total system capacity is available with any one pump out of service.

7.5.2.4 Piping systems. When terminal equipment loads are relatively equal in percentage of total load, design closed system piping using reverse return method.

7.5.2.5 Pressure and Temperature Taps. Provide pressure and temperature taps ("Pete's Plugs") on the inlets and outlets of all coils, pumps, chillers, heat exchangers, and other equipment.

7.5.2.6 Expansion and Compression Tanks. Utilize diaphragm type expansion tanks. Size the expansion tank according to the latest edition of the ASHRAE Systems Handbook. Indicate the acceptance volume, nominal dimensions, configuration (i.e. horizontal or vertical) and pre-charge air pressure.

7.5.2.7 Expansion Loops and Devices. Provide expansion loops and/or devices as required for proper piping protection. Detail and dimension loops and schedule joints indicating minimum total traverse and installed expansion traverse. Indicate guide spacing. Avoid the use of expansion joints where possible due to the high resultant thrust. Instead utilize geometry and ball joints where possible.

7.5.2.8 Cold Water Make-up. Provide for make-up to each water system. Provide pressure gauges up and downstream of the PRV. Provide bypass line with a globe valve for each PRV. Provide hose bibs in the make-up water line to cooling towers and evaporator condensers for wash down of equipment.

7.5.2.9 Drain Lines. Provide drain lines from air handling units, fan coil units, etc. Provide a water seal on drains as required. Terminate condensate drain lines in accordance with the IMC.

7.5.2.10 Backflow Preventers. Backflow preventers are required at all connections to the potable water system. Design shall comply with AFI 32-1066, Backflow *Prevention Program*. Note this document requires compliance with the backflow prevention portions of the Uniform Plumbing Code, not the International Plumbing Code. The State of Utah also has regulations regarding backflow prevention. Where conflicts exist the more stringent shall apply.

7.5.2.11 Chemical Feeders. Fill openings should be no higher than 1.2 meters (4 feet) above the finish floor for ease of filling.

7.5.2.12 Air Vents. Provide in locations as required in the IMC. Provide manual type vents where possible. Use of automatic air vents is discouraged and should be minimized. Pipe the drains from automatic vents away from concealed areas for visual inspection and to prevent damage to ceilings, etc. Provide manual shut-off valves or stop-cocks for automatic air vents.

7.5.2.13 Drain Valves. Provide manual drain valves at all low points and at each strainer in piping systems. Ball valves and strainers shall be a combination type assembly. Plumb drain valves to floor drains where possible. Where not possible, provide hose connection with hose cap.

7.5.2.14 Check Valves. Provide check valves to prevent backflow and at the discharge of most pumps. When used in drain lines, verify sufficient head to open flap to regain flow. Provide non-slam type on high head applications. Provide damping type on air compressor discharges.

7.5.2.15 Freeze Protection. Design pipe temperature maintenance systems (i.e. heat trace) to the lowest recorded temperature in UFC 3-400-02, *Engineering Weather Data.*

7.5.2.16 Underground Piping Systems. Underground piping systems for steam, condensate and chilled and hot water must be factory-prefabricated, pre-insulated, and direct bury type. The Underground Heat Distribution System manufacturer is the company responsible for the design and manufacture of the pre-engineered system. The manufacturer directs the installation of their system, and provides a representative on the job site.

7.5.2.17 Legionella Disease. Design waterside systems to avoid potential exposure to Legionella Disease.

7.5.3 Building Exhaust System.

Provide exhaust system for removal of heat, fumes, dust, and vapors in various spaces in accordance with ASHRAE. If natural ventilation is proposed, provide calculations to support its use as a reliable means of ventilation.

7.5.3.1 Equipment Room Ventilation. Provide mechanical and electrical equipment rooms with 10 air changes per hour or an exhaust rate to limit room temperature rise to 5.6 degrees C (10 degrees F) above the outdoor summer design dry bulb, whichever is greater. Ventilate equipment rooms with a thermostatically controlled exhaust fan and a weather tight inlet air louver or hood. To ensure that

equipment rooms containing combustion burners for boilers, water heaters, or furnaces do not operate as negative pressure areas, utilize supply fans rather than exhaust fans for ventilation. For design heating temperatures less than 4.4 degrees C (40 degrees F), provide motor operated, normally closed dampers at air inlet and exhaust openings. Equipment rooms containing refrigeration equipment shall be ventilated in accordance with IMC and ASHRAE Standard 15.

7.5.3.2 Exhaust/Intake Locations. Provide adequate separation between outside air intakes and exhaust outlets, waste vents and boiler stacks. Consider prevailing winds and force protection requirements. Outside air intakes must be 3.0 m (10 ft) minimum above ground elevation to satisfy Anti-Terrorism (AT) requirements.

7.5.3.3 Roof Fans. Roof exhaust fans should be avoided due to maintenance access restrictions and roof leak potential. If provided and where feasible, utilize direct drive fan motors with speed controllers to reduce maintenance requirements.

7.5.4 Fire Station Diesel Exhaust.

Provide an engineered fire apparatus exhaust removal system. Refer to Interim Technical Guide (ITG) # FY00-06 for additional information. The system should include an overhead sliding track mechanism to permit a flexible exhaust hose to travel with the fire apparatus into and out of the apparatus bays. The fire apparatus exhaust hose shall automatically disconnect from the vehicle as it exits the bay.

7.5.5 Maintenance Bay Vehicle Exhaust.

Provide an engineered vehicle exhaust removal system. The system shall include an overhead or under floor system. Overhead ductwork system shall be provided with a retractable flexible exhaust hose to travel from the vehicle exhaust into and out of the ductwork. The exhaust fan for all systems shall be specifically designed and manufactured for vehicle exhaust.

7.6 Kitchen HVAC Systems:

Check project documentation to determine if air conditioning of kitchens is allowed. No air shall be returned from the kitchen to the HVAC system. Design dining facilities in accordance with UFC 4-722-01 *Design: Dining Facilities*, and so that air flows from dining areas to kitchen areas to provide make-up air for kitchen exhausts. Maximize the use of dining area make-up air to the kitchen as this will provide secondary cooling for the kitchen staff. If additional make-up air is required for kitchen exhausts, provide push-pull kitchen hoods with built-in heated make-up air supply. Design kitchen hoods in accordance with UFC 4-722-01. Kitchen hoods with built-in make-up air shall be of the horizontal face discharge type. "Short circuit" hoods are prohibited. Provide control interlocks for supply and exhaust fans to ensure that the HVAC system balance is maintained and that the proper direction of airflow is maintained during normal operations. Utilize evaporative coolers on kitchen supply air where appropriate. Analyze application carefully to insure increased humidity of the ventilation air does not negate any cooling affect. Provide fire suppression system for hoods in accordance with UFC 3-600-01, *Fire Protection Engineering.*

7.7 Industrial Ventilation:

7.7.1 General. Design industrial ventilation systems in accordance with the latest edition of Industrial Ventilation, A Manual of Recommended Practice, published by American Conference of Government Industrial Hygienists (ACGIH). Air Force projects shall comply with UFC 3-410-04N*, Industrial Ventilation.* and AFMAN 48-155 Occupational *and Environmental Health Exposure Controls.*

7.7.2 Design Guidelines. Research the process or operation before design starts (i.e. find out contaminants, toxicity, process temperature, etc.).

7.7.3 Provide hoods designed for effective capture of contaminants while minimizing air flow for energy conservation. Do not specify or provide a canopy hood unless process is nontoxic.

7.7.4 Specify the appropriate fan for the application. When selecting a fan, consider noise generation, material handled through the fan (e.g., corrosives, flammables, etc.), and future expansion or flexibility of the system.

7.7.5 Provide tempered make-up air for all ventilation systems. Ensure that make-up air does not cause turbulence at the exhaust hood. Interlock make-up air fan to exhaust fan. Do not recirculate exhaust air.

7.7.6 Provide an offset discharge stack, with drain, for exhaust systems. Do not utilize a "conical cap" exhaust stack. Provide at least 7.5 m (25 feet) between exhaust outlets and outside air inlets to prevent circulating contaminated exhaust air back into the building.

7.7.7 Provide an air cleaning device when required by state and federal regulations. Obtain clear guidance and direction from the Government Project Manager. Select air cleaning devices that will maximize contaminant removal and ease of maintenance while minimizing cost.

7.7.8 Provide air flow and static pressure calculations with each design following the methods in the latest edition of the ACGIH Ventilation Manual.

7.8 Indoor Air Quality Standards:

7.8.1 Ventilation Air. Supply ventilation air to satisfy ASHRAE 62, *Ventilation for Acceptable Indoor Air Quality*, for the number of occupants, or as required to meet the continuous exhaust air requirement (excludes intermittent exhaust) plus 15 percent for pressurization, whichever is larger. Ventilation air must be 110 to 120 percent of exhaust air for all spaces with direct mechanical exhaust. Systems will be equipped to separately dehumidify and precondition ventilation air if the latent cooling load at the 1 percent humidity ratio and corresponding coincident mean dry bulb design weather condition causes a system reheat requirement to maintain space conditions. Systems must provide the capability to condition ventilation air and maintain space relative humidity less than 60 percent over the full range of cooling loads.

7.8.2 Design Analysis. The HVAC design analysis for new facilities or renovation of existing facilities must include a psychrometric analysis documenting that the system meets design criteria. The analysis must provide calculations of system cooling load, energy/mass transfer through conditioning equipment and fans, and a system schematic indicating state point dry bulb and wet bulb temperatures (or humidity ratios) of outside air, mixed air, supply air, and return air flow streams. The cooling load for this analysis must be based on the load conditions identified in section 6.13 Design conditions.

7.8.3 Dormitories and Visitors Quarters.

7.8.3.1 Ventilation. In addition to meeting the requirements above, new facilities must employ separate, dedicated, central ventilation air constant-volume supply systems that supply dehumidified and tempered 100 percent outside air to all occupied spaces. The design intent of these systems is not to provide total space heating and cooling; systems must continuously condition and deliver ventilation air to each occupied space. The ventilation air must be tempered to within room comfort conditions. Ventilation air room supply conditions must not be at or below room dew point. Humidification of ventilation air during periods of low ambient humidity is not required. Facility central ventilation air supply systems must not be subject to intermediate season (no-heat/no-cool) shutdown. (Individual

room heating/cooling equipment must have occupant control, but may be subject to intermediate season heating/cooling curtailment as directed by local command.) Systems must be designed to minimize the transmission of sound between quarters. The designer will perform a psychometric analysis documenting that the system is designed to maintain space humidity with ambient condition of ventilation air at the 1 percent humidity ratio design weather condition. The system must provide the capability to condition ventilation air and maintain space relative humidity less than 60 percent over the full range of cooling loads. Use only metal ductwork for the central ventilation systems. Duct insulation must be external, and duct board or internal duct liner is not allowed.

7.8.3.2 Exhaust Systems. A central ducted bathroom exhaust system will be used instead of individual exhaust fans for each space. The exhaust system must run continuously and be interlocked with the building supply air system. The exhaust duct for each space must have a manual volume damper accessible from the space for proper balancing. Install an exhaust grille constructed of corrosion-resistant material just outside each shower stall and bathtub. Exhaust systems must be designed to minimize the transmission of sound between quarters. Exhaust from moisture-producing equipment (i.e., clothes dryers) must be vented to the exterior.

7.8.3.3 Heat Recovery. Use heat recovery from exhaust air to reduce the energy consumption necessary to condition ventilation air where savings from heat recovery results in a life cycle cost payback for the heat recovery equipment.

7.8.4 Filtering. Filter ventilation air before it enters an air handler, heat recovery equipment, or preconditioning equipment. Use extended media filters with a Minimum

Efficiency Reporting Value (MERV) of 7 or greater, in accordance with ASHRAE 52.2-1999, *Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size*.

7.8.5 System Selection Criteria. Do not utilize room fan coil units or packaged terminal units, such as individual through-wall heat pumps, for facilities such as office buildings and Bachelor Quarters or for any facility larger than 465 square meters (5000 square feet), unless conditioned make-up air is provided to each space through a central, continuously operating, dedicated make-up air system. Conditioned make-up air shall be ducted to each room or to the return side of each fan coil or terminal unit.

7.9 Controls and Instrumentation:

7.9.1 General Controls. Provide the simplest HVAC controls that will accomplish the intended function. Two EMCS front ends are currently utilized at Hill AFB, Alerton and Dorsett. If EMCS monitoring points are required, the existing Alerton and Dorsett front ends may be used, or an entirely new front end must be provided including server, screens and applicable programming. Control screens shall include a labeled mechanical floor plan. The commissioning agent shall verify functional operation of EMCS screens during testing.

7.9.2 Control Dampers. Provide parallel blade dampers for two-position, on/off control. Provide opposed blade dampers for modulating applications, but for best performance, their pressure drop should be between 5% and 20% of the total system pressure drop. They are effective for two-position, on/off applications as well, but are more expensive than parallel dampers.

7.9.4 DDC Systems. Provide DDC equipment which is compatible with Hill Air Force Base policy concerning competition and non-proprietary protocol. Where use of a specific manufacturer of the DDC system is mandatory, a Justification and Authorization (J&A) for the utilization of proprietary DDC equipment must be provided by the Government.

7.9.4.1 For new buildings, DDC systems shall utilize all electric or electronic actuators. On rehab projects, eliminate pneumatics whenever possible. Actuator positions or responses shall be based on position sensors or position feedback indicators and not on controller output signals.

7.9.4.2 For new installations, provide DDC equipment which is user-friendly and which maximizes compatibility with other manufacturers' equipment. ASHRAE's BACnet standard (ANSI/ASHRAE 135) provides guidance on DDC system compatibility. Provide an operator programmable DDC system as a distributed control system.

7.9.4.3 Unless combined with a larger control system, DDC controls for small HVAC systems (i.e. - DX systems of less than ~10 tons) are not cost-effective. Utilize programmable electronic thermostats for these smaller facilities

7.9.4.4 Require the DDC installer to provide training for government facility personnel on all new DDC equipment. Provide training as required by the RFP for Design/build projects, and request guidance from the base Public Works or USAF Base Civil Engineering Office where the project is located for number and type of personnel to attend.

7.9.4.5 Provide Silicon Control Rectifiers (SCRs) when precise control is required.

7.9.4.6 Provide hardware equipment utilizing the latest technology which will accomplish the desired control with a processor speed of not less than 1.1 GHz.

7.9.4.7 Where direct drive fan packages are not available for rooftop fan applications, provide current sensing devices on fan motors to alarm for broken drive belts.

7.9.5 Multiple Chillers. When multiple chillers are provided, control the chillers by a single central chiller control panel provided by the chiller manufacturer. This is to ensure that the chillers are loaded and unloaded optimally for best performance, reliability, and energy efficiency. Provide connection and communication between the chiller panel and the DDC system.

7.10 Systems Testing and Balancing:

7.10.1 Balancing Valves and Cocks. Provide calibrated balancing valves for hydronic balance. The designer shall specify the size of the balancing valves required in each application, cognizant of the required differential pressure requirements in the pipe systems; do not assume line size valves as appropriate for the application. A balancing device is required in coil bypasses only when coil drops are in excess of 6 kPa (2 feet w.g.).

7.10.2 Flow Control Balancing Valves. Provide flow control balancing valves in the discharges of all closed circuit pumps and at all hydronic terminals. For pipe sizes larger than 80 mm (3 inches), a flow orifice combined with a butterfly valve shall be specified. Install all flow control balancing valves in accordance with the manufacturer’s recommendations regarding the minimum straight lengths of pipe up and downstream of the device. Designers shall select the proper size flow control-balancing valve for each application to ensure the devices are not oversized; valves shall be selected using the median flow rating indicated in the manufacturer’s published performance data. Oversized flow control balancing valves yield inaccurate flow readings.

7.10.3 Balancing Dampers. Provide manual volume dampers for all main and branch ducts; these should include all supply, return, and exhaust ducts. Do not use splitter dampers or air extractors for air balancing; neither are endorsed by SMACNA for balancing applications. Provide opposed blade manual balancing damper for outside air. Indicate opposed blade manual balancing dampers for both

the main supply and return duct and the main relief duct on all return air fans; dampers shall be in close proximity to the automatic return and relief dampers.

7.10.4 Duct Leakage and Testing. All new duct systems, except ducts under 1 inch static pressure, shall be leak tested, unless the requirement is waived by the Government.

7.10.5 Variable Speed Drives. Variable speed drives on pumps or fans shall not be manually adjusted to achieve system balance. Balance systems to deliver design flows with variable speed drives operating at between 55 and 60 Hz so that maximum operational flexibility is maintained. Replace or adjust fan drive sheaves and throttle pump discharges to achieve system balance. Consider trimming pump impellers on larger systems.

7.11 Other HVAC Systems and Equipment:

7.11.1 Antiterrorism. Design all inhabited buildings to meet the requirements of UFC 4-010-01, DoD *Minimum Antiterrorism Standards for Buildings.*

7.11.2 Conflicts. Avoid conflicts with other disciplines and building features. Most common are: electric lights and diffusers; electric duplex outlets and fin radiation; rain leaders or soil stacks and ductwork; bond beams or joists and ducts, etc.

7.11.3 Clearances and Equipment Service Space. Ensure that all equipment will fit allotted space with manufacturers' recommendations for service and maintenance space adopted. Indicate on drawings filter and tube or coil pull areas for all major equipment, including chillers, boilers, converters, etc. Verify adequate door dimensions to permit passage of equipment into mechanical spaces.

7.11.3.1 Electrical Rooms. No pipes (pressure or gravity) shall be installed within, or pass through, electrical or communication rooms.

7.11.4 Seismic. Seismic Restraint of all equipment shall comply with UFC 3-310-04 *Seismic Design for Buildings.* Provide details to structural engineer for support verification and sizing.

7.12 Design Analysis and Design Documentation:

7.12.1 Field Investigation. Conduct detailed field investigation and interview the appropriate field personnel. Do not rely solely on the as-built drawings.

7.12.2 Energy Studies. The design A&E shall satisfy the energy conservation requirements in accordance with UFC 3-400-01, *Energy Conservation.*

7.12.3 Energy Standard. All new facilities shall exceed ASHRAE/IESNA Standard 90.1 by 30% if cost effective. Note that compliance with this Standard imposes Architectural, Mechanical, and Electrical requirements on the design of the facility. In addition, all renovation projects where the programmed amount exceeds the building replacement value by 25% or more, shall also meet the 30% better requirement.

7.12.3.1 Energy Analysis and Compliance Form. Provide Energy Analysis and Compliance Forms. The number and type of alternatives to be analyzed shall be based on project information provided in the scope of work. The Energy Analysis Forms shall be submitted with the proposed alternatives and zones and shall be accompanied with the best available floor plan clearly depicting the zones. Upon submission to the Government by the design agent at the project concept stage, the Government will review the recommendations and return the form to the agent marked: "Approved", "Approved as

Noted", or "Disapproved". Contact the Government Project Manager prior to submitting Forms if you have any questions.

7.12.3.2 Solar Analysis. When required by the Scope of Work, the economic feasibility of incorporating an active solar domestic water preheating system will be evaluated by the Government with building information provided by the A&E via submission of the Solar Analysis Form (Form S-1) at the project concept stage.

7.12.4 Computerized Energy Analysis. After receiving the approved forms from the Government, the A&E shall perform a computerized energy analysis and a life cycle cost analysis in accordance with the Scope of Work and UFC 3-400-01 Energy Conservation.

7.12.5 Units: List equipment sizes in Watts or Btu/h. The symbol k may be used for thousands as in kBtu/h or kWatts.

Do not use MBTU or MBTUH.
The symbol "M" in this use is ill defined and easily confused.

7.13 Design Conditions:

7.13.1 Outside Design Temperatures. Utilize the Unified Facility Criteria document, UFC 3-400-2, *Design Engineering Weather Data*, and utilize the Design Criteria Data available from the referenced Air Force Combat Climatology Center website. For Design/Build projects, the data may be defined in the RFP documents.

7.13.1.1 Cooling Systems:

7.13.1.1.1 Mission-Critical Facilities, where equipment failure due to high heat would be unacceptable: For design utilize the "0.4% Occurrence" value for outside air Dry Bulb Temperature (T) Design Value (F) and the "Mean Coincident (Average) Values" Wet Bulb Temperature (F) for the Design Cooling Day.

7.13.1.1.2 Humid Area Facilities, Specialized De-humidification Systems, and 100% Outside Air Systems: For design, utilize the "1% Occurrence" value of outside air Dry Bulb Temperature (T) Design Value (F) and the "Mean Coincident (Average) Values" Wet Bulb Temperature (F) for the Design Cooling Day. Also, design for Maximum Humidity conditions, using the "1.0% Occurrence" value of outside air Humidity Ratio (HR) Design Value (gr/lb) and the "Mean Coincident (Average) Values" Dry Bulb Temperature (F).

7.13.1.1.3 Other Typical Facilities and Systems: For design, utilize the "1% Occurrence" value of outside air Dry Bulb Temperature (T) Design Value (F) and the "Mean Coincident (Average) Values" Wet Bulb Temperature (F) for the Design Cooling Day.

7.13.1.1.4 Cooling Towers or Evaporative Cooling Equipment: For sizing, utilize the "Median of Extreme Highs" value for outside air Wet Bulb Temperature (T) Design Value (F)" and the "Mean Coincident (Average) Values" Dry Bulb Temperature (T) for the Design Cooling Day.

7.13.1.2 Heating Indoor Design Conditions. Space Design conditions shall be 21.1 Cdb (70 Fdb) & a minimum of 30% RH, during the Design Heating Day outside air conditions. At all other than design day, occupied times, maintain the space within the Winter conditions shown in ASHRAE Handbook of Fundamentals 2001, Chapter 8, Figure 5, but not more than 21.1 Cdb (70 Fdb).

7.13.1.2.1 Heating Equipment: For design, utilize the "99% Occurrence" value for outside air "Dry Bulb Temperature (T)" "Design Value (øF)."

7.13.1.2.2 Heating Inside Design Conditions for Laboratories, Shops, Warehouses, etc: Space Design conditions shall be 18.3 Cdb (65 Fdb) during the Design Heating Day outside air conditions for areas with moderate activity employment, 15.5 Cdb (60 Fdb) for areas with heavy activity employment, and 10 Cdb (50 Fdb) for storage areas.

7.13.1.3 Cooling Indoor Design Conditions. Space Design conditions shall be 24.4 Cdb (76 Fdb) & 50% RH, during the Design Cooling Day outside air conditions. At all other than design day, occupied times, maintain the space within the Summer conditions shown in the latest edition of ASHRAE Handbook of Fundamentals, but not less than 24.4 Cdb (76 Fdb). 100% Outside Air systems shall operate continuously in Humid Areas, to prevent mold growth.

Process cooling conditions are determined by the respective process requirements.

Note: Spaces authorized comfort cooling shall be designed for inside temperatures no lower than 24.4 C db (76 F db). During unoccupied hours, cooling systems shall be secured where appropriate.

7.14 Basis of Design:

7.14.1 Mechanical Basis of Design. Address the following:

7.14.1.1 Design Criteria. Identify the governing codes and criteria, including federal and military handbooks, being utilized for the design. Include the titles and the date of the latest edition or publication. References to codes and criteria should be made in the narratives of the “Basis of Design”.

7.14.1.2 Design Conditions. Provide a tabulation of the design indoor and outdoor heating and cooling conditions for all occupied and unoccupied areas.

7.14.1.3 Base Utilities. Describe the source of thermal energy that will be used (i.e. extension of central high pressure steam, hot water, natural gas, or stand-alone heat source with the type of fuel utilized). Where more than one source of thermal energy is considered economically feasible, or where a facility is deemed appropriate for study as defined under the heading entitled “Energy Computations”, include a computerized Life Cycle Cost Analysis to justify the selection.

7.14.1.4 Heating System. Provide a description of the heating system proposed, including an explanation of why this system is preferred over others. Indicate locations of major components of the system. Resistance electricity and L.P. gas are not allowed for space comfort heating, except with approval of the mechanical branch head.

7.14.1.5 Ventilation System. State what type of system is to be used and provide a brief description of the ventilation system proposed. Indicate the outside air ventilation rates in cfm/person (L/s/person) for various room types. The prescribed rates must be in compliance with the latest edition of ASHRAE 62. Describe the operation of the ventilation system in summer and winter modes. Indicate the number of outside air changes per hour in various areas, the type of infiltration, and whether OSHA requirements are applicable.

7.14.1.6 Cooling System. Provide a description of the cooling system proposed including an explanation of why this system is preferred over others. Indicate locations of major components of the system. Identify special humidification or dehumidification requirements. Indicate ASHRAE Standard filter efficiencies and any other special filtration requirements.

7.14.1.7 HVAC Control System. Briefly describe the HVAC control system type and its functions. If applicable, indicate a requirement to tie into an existing Base-wide EMCS.

7.14.1.8 Sustainable Design. Briefly describe all energy and water conservation features, systems, and components used in the project and the expected energy savings. Describe all features being utilized for lead credits and include the completed LEED forms.

7.14.1.9 Energy Conservation. Provide mechanical system based on lowest life cycle cost. Provide completed and signed compliance forms provided in attachment 1. Provide all documentation required by ASHRAE 90.1 Appendix G for all new construction. Provide any documentation to support basic compliance with appropriate sections of this Standard for renovation and repair projects including a narrative describing the method of compliance, descriptions of building systems and components to be incorporated. Provide a signed statement by a registered mechanical engineer indicating compliance with ASHRAE Standard 90.1.

7.15 Mechanical Calculations:

7.15.1 The following calculations are required as a minimum:

7.15.1.1 "U" Factor Calculations. Utilize the latest edition of ASHRAE Standard 90.1 to determine the minimum U factors. Calculate U factors for all composite wall and roof systems using the latest edition of ASHRAE Fundamentals. Include cross sections drawings of all wall and roof systems to supplement the calculations. For Wood frame structures, U factors shall be calculated using the Parallel Path Method. For steel frame structures the U factors shall be calculated using the Modified Zone Method. Alternatively the average result of the Series Method, and Parallel Path Method may be used.

7.15.1.2 Building Exhaust Calculations. Calculate exhaust requirements for removal of heat, fumes, dust, and vapors in various spaces in accordance with ASHRAE. Provide a building exhaust summary.

7.15.1.3 Outside Air Requirements Calculations. Calculate the outside air ventilation requirements as prescribed by the latest edition of ASHRAE Standard 62. Calculations must consider the factors of "Multiple Spaces", "Ventilation Effectiveness" and "Intermittent or Variable Occupancy" as specified in ASHRAE Standard 62. Provide a summary showing compliance with the ventilation requirements.

7.15.1.4 Building Air Balance Calculations. Provide air balance calculations addressing the relationship between supply, return, outside air, and exhaust air quantities and indicating pressurization. Special requirements for space pressurization shall be reflected and referenced in the air balance calculations.

7.15.1.5 Heating and Cooling Load Calculations. Use of professionally recognized, nationally used computerized load calculating program is required. Load calculations are required for each room or zone by the ASHRAE method indicated in the latest edition of the Fundamentals Handbook. Copies of input and output data are required. Psychometric calculations shall be illustrated on psychometric charts and submitted with the 100% submittal. Computer disks may also be requested (see 100% submittal requirements).

7.15.1.6 Duct Pressure Drop Calculations. Provide pressure drop calculations for all supply, return, outside and exhaust air systems. All Variable Air Volume (VAV) supply duct systems shall be sized by the static regain method. Equal friction method shall be used for VAV return ducts. The static regain, equal velocity or equal friction methods may be performed on non-VAV supply duct systems.

7.15.1.7 Hydronic System Pressure Drop Calculations. Provide pressure drop calculations for all supply and return piping systems.

7.15.1.8 Pipe Expansion Calculations. Provide pipe stress calculations for all low-pressure 103 kPa (15 psi) steam, condensate and hot water piping systems where pipe diameters exceed 100 mm (4 inches)

and/or the length exceeds 30 m (100 linear feet) without a directional change. Provide pipe stress calculations for all medium and high-pressure steam and high temperature hot water systems.

7.15.1.9 Equipment Sizing Calculations. Provide equipment sizing calculations and psychometric calculations and charts, if applicable, to justify the selection of equipment, including the following:

a. Terminal equipment including VAV boxes, fan coil units, etc.
b. Pumps.
c. Control valves and dampers.
d. Meters and metering devices.
e. Fans.
f. Air Handling Units.
g. Chillers.
h. Boilers.
i. Closed Circuit Coolers and Cooling Towers.

7.15.1.10 Heat Gain Calculations. Perform heat gain calculations for duct systems using 90% insulation efficiency. Include heat gain from chilled water pumps on the chilled water system. Size terminal cooling coils with the effects of pump heat gain considered.

7.15.1.11 Duct Leakage Calculations. Provide for high pressure systems 746 Pascals or greater (3 inches of water column or greater). Calculate the expectant duct leakage based on the designer's requirements for the duct, seal, and leakage classes for each duct system using the latest edition of the SMACNA *HVAC Air Duct Leakage Test Manual*.

7.16 Mechanical Drawings:

Drawings shall be sufficiently complete to indicate all aspects of installation. Where alternate methods or systems are intended, drawings must detail both alternatives. Judgment should be exercised to avoid overly congested drawings.

7.16.1 Seismic. Show all pertinent seismic detailing on the contract drawings.

7.16.2 Plumbing Drawings

7.16.3 Legend. Provide legends to clarify all symbols and abbreviations used on the plumbing drawings.

7.16.4 Enlarged Plans. Enlarged plans shall be drawn at no less than ¬1/2" = 1'-0'.

7.16.5 Riser Diagrams. Provide separate waste and water riser diagrams for all fixture groupings. All riser diagrams shall be drawn 3-dimensional (flat, 2-dimensional risers are unacceptable) and shall account for all pipe directional changes indicated on the floor plans.

7.16.6 Plumbing Fixture Schedule. Provide a fixture schedule utilizing fixture designations coordinated with the contract specifications.

7.16.7 Mechanical Drawings

7.16.7.1 Demolition. "Demolition" plans must be separate and distinct from "new work" plans.

7.16.7.2 Orientation. Provide north arrows an all building and site plans. The orientation of mechanical drawings shall be arranged with the north arrow toward the top of the plotted sheets, unless overriding circumstances dictate otherwise. The orientation of all partial building or site plans shall be identical to

that of the larger plan from which it is derived or referenced. Consistency in drawing orientation shall be maintained with all disciplines.

7.16.7.3 Legend. Provide legends to clarify all symbols and abbreviations used on the mechanical drawings.

7.16.7.4 Design Conditions. Provide a schedule indicating indoor and outdoor design temperatures for each room type.

7.16.7.5 Floor Plans. Exercise judgment to avoid overly congested drawings. When drawing congestion is likely, ductwork and piping should not be shown on the same plan.

7.16.7.6 Sections and Elevations. Provide as required to supplement plan views.

7.16.7.7 Enlarged Plans. Mechanical rooms should be drawn at no less than ¼ "= 1'-0". Congested mechanical rooms shall be drawn at no less than ½" = 1'-0". Mechanical room plans should be supplemented by at least one section; at least two sections for more complex, congested applications.

7.16.7.8 Schematic Diagrams. Provide a 3-dimensional isometric diagram representing the mechanical room piping or a 2-dimensional diagram indicating the entire system.

7.16.7.9 Kitchen Hood Diagram. Provide a detailed air balance diagram on the drawings for every kitchen/dining facility design to show compliance with the ventilation requirements. Indicate required capture velocities and capture distances for all hoods on the drawings. Provide notes and contractor instructions on plans indicating that fan airflows shown for hoods are approximate and requiring the contractor to balance the system to achieve the capture velocities indicated. The scheduled fan and motor size shall allow for adjustment of the airflow.

7.16.7.10 Details. Details shall be edited to reflect the configurations and construction materials shown on the plans.

7.16.7.11 Pipe Identification. Indicate the flow direction of pipe on the drawings. Show slope direction and rate of slope on all piping systems. As required by code some piping systems required pressure identification.

7.16.7.12 Duct Construction Classifications. Indicate duct static pressure, seal and leakage classifications on the drawings in accordance with SMACNA-HVAC Air Duct Leakage Test Manual.

7.16.7.13 Guides for Piping. Show pipe guide locations on all aboveground anchored piping.

7.16.7.14 Pipe Anchors. Show anchor locations on plans. Provide anchor detail(s).

7.16.7.15 Lining. Indicate acoustical duct lining where required on the drawings. Drawings shall indicate the inside clear dimensions of ducts with acoustical duct lining.

7.16.7.16 Door Louvers. Show location or coordinate with architectural drawings.

7.16.7.17 Roof Fans. Details of roof exhaust fans shall include a requirement for airtight seals between the fan frame and the wood nailer of the roof curb. The details shall require the duct of ducted exhaust fans to extend up through the fan curb to a flanged and sealed termination at the top of the curb.

7.16.7.18 Equipment Supports. Show hanger rods and structural supports for all ceiling or roof-mounted air handling units, heating/ventilating units, fan coil units, exhaust or supply fans, expansion tanks, etc in drawing details.

7.16.7.19 Pressure Gauges. Indicate pressure gauge ranges; system operating pressures should be midrange on the graduated scale.

7.16.7.20 Cold Water Make-up. Detail all accessories, to include pressure reducing valves (PRV), relief valves, and backflow preventers. Show pressure reducing and relief valve pressure settings.

7.16.7.21 Air Vents. Show location of automatic and manual air vents required in piping systems.

7.16.7.22 Drain Lines. Show drain lines from air handling units, fan coil units, etc.

7.16.7.23 Fouling Factors. Indicate fouling factors for all water-to-air and water-to-water heat exchangers (i.e. coils, converters, chillers, etc). Indicate in the appropriate equipment schedule. Fouling factors shall be accompanied with their appropriate English or SI units.

7.16.7.24 Equipment Schedules. The HVAC equipment actually installed on a project may be different from that used as your basis of design. Therefore, mechanical equipment schedules shall reflect actual required equipment capacities as calculated, not capacities provided by manufacturers' catalog data. This helps ensure that the installed equipment is optimally sized for the application.

7.16.7.25 Motor Starters. Indicate motor starter NEMA sizes in the mechanical equipment schedules.

7.16.7.26 Control Valves. Indicate flow rates, minimum Cv or maximum pressure drop, nominal valve size, service (i.e. steam, hot water, etc), configuration (i.e. 2-way or 3-way), and action (i.e. modulating or 2-position). Use a “Control Valve Schedule”.

7.16.7.27 Metric Valve Coefficient. The metric version of the valve coefficient, Kv, is calculated in cubic meters per second at 1 kPa pressure drop. Do not use Cv, the English version, on a metric project.

7.16.7.28 Balance Valves. Contract drawings shall specify the valve size and flow for each application. When an existing system is modified, provide all information required for re-balancing in the construction documents. Detail installation of all flow control balancing valves.

7.16.7.29 Balance Dampers. All dampers and their intended locations shall be clearly delineated on the floor plans.

7.16.7.30 Control Diagrams. Provide for all HVAC systems. Show controller functions, such as normally open (NO), normally closed (NC), common (C), etc. Indicate all set points.

7.16.7.31 Thermostats. Show thermostat locations on the plans. Identify heating, cooling, heating/cooling and ventilation thermostats. Indicate thermometer temperature ranges; system operating temperature should be midrange on the graduated scale.

7.16.7.32 Humidistats. Show locations on drawings, when required.

7.16.7.33 Controls. Show system control schematics and a detailed written sequence of controls on the drawings for each mechanical system. Describe all controlled equipment operating modes, sequence of events, set points, and alarms. For Direct Digital Control (DDC) systems, include an input/output points list and a system architecture schematic. UFC-3-400-10N Table 3-1 indicates a minimum points list per system (to be used as applicable).

7.16.7.34 Ductwork Testing. Indicate those HVAC duct systems to be leak tested on the contract drawings. Specify the test type and test pressure for each duct system (supply air, return air, exhaust air, and outside air ductwork) subject to testing. See “Duct Construction Classifications”.

7.16.7.35 Site Work. Show the type and routing of the heat source conveyance system on the drawings. Exterior above and below grade steam and condensate distribution and below grade chilled and hot water distribution plans shall be accompanied by profile drawings. Profile drawings shall clearly depict all other utilities in the proximity of the new work.

8. PLUMBING:

8.1 Plumbing Design General:

Comply with UFC 3-420-01FA, P*lumbing Systems*. The International Plumbing Code and other Federal, State and local regulations pertaining to safe drinking water laws also apply where they are more stringent. Acceptable materials for service connections shall be ductile iron, type K copper, and PVC plastic pipe. Acceptable material for interior piping is type L copper. A back-flow preventer shall be installed on all systems where cross contamination is possible, and before any industrial process plumbing except for non-potable water systems. Water lines shall be inside the buildings thermal envelope. Piping and drinking fountains shall not be placed in or on outside walls to prevent freezing. Avoid placement near outside air vent opening.

8.2 Fixtures:

Determine Plumbing fixture requirements by number of occupants using UFC 3-420-01FA. For new facility construction, waterless urinals will be considered; additionally, FAR Subpart 23.2, *Energy and Water Efficiency and Renewable Energy*, requires that agencies acquire/purchase water-saving products designated by FEMP as being among the highest 25 percent for equivalent products as directed by EPAct 2005 and E.O. 13423. The FEMP Website provides performance requirements for all federal purchases: http://www1.eere.energy.gov/femp/procurement/eep_faucets.html.

8.3 Roof Drains:

Horizontal roof drains shall be kept at a minimum to prevent freezing. Roof drains shall not be less than 3 inches diameter.

8.4 Cross Connections:

8.4.1 Cross connections (any connection or arrangement of piping between two otherwise separate piping systems, one of which contains potable water and the other non-potable water or industrial fluids of questionable safety) may cause non-potable fluid to enter the potable water system by either backflow, backpressure, or back-siphonage, and shall not be allowed without implementation of an adequate approved method of protection by means of internal plumbing controls. The internal plumbing control method involves the installation of the appropriate device at the point of EACH potential cross connection. This requires the use of air gaps, vacuum breakers, etc., at each plumbing fixture, equipment, tank, sink, etc., to protect the potable water system from backflow.

8.4.2 Water injecting trap primers shall not be installed on Hill AFB. Experience has shown the tendency for these devices to be improperly installed. This creates an unchecked cross-connection with potential water contamination. If a sewer gas problem exists, installation of a waterless trap device with a self-coiled internal rubber hose mechanism (equal to a Trap Guard) is allowed to seal off sewer gas but permits water to drain.

8.5 Clearance:

Provide sufficient space and access, 24 inches where possible, for maintenance of fixtures, valves, and piping.

8.6 Water Treatment:

If a current water analysis is not available, obtain a sample of the raw water and have the sample tested. Provide test results in project specifications. Design water treatment systems for boilers in accordance with UFC 3-430-02FA *Central Steam Boiler Plants*. Provide appropriate water treatment for steam generators, humidifiers, and cooling towers for prevention of excessive scale, corrosion and biological formations. In most cases water treatment is required for closed loop systems as well like hot water and chilled water distribution systems.

8.7 Plumbing Basis of Design:

Address the following:

8.7.1 Design Criteria. Identify the governing codes and criteria, including federal and military handbooks, utilized for the design. Include the titles and the date of the latest edition or publication. References to codes and criteria should be made in the narratives of the Basis of Design.

8.7.2 Estimated Water Demand. Estimate the water demand in L/s (gpm) based on the type and number of fixtures required for each building.

8.7.3 Water Pressure. Indicate the minimum and maximum water pressure in kPa (psi) at each building. Indicate if booster pumping will be required.

8.7.4 Domestic Hot Water. Indicate the type, size and design water temperature of the domestic water heater and the distribution system. Indicate the extent of domestic hot water recirculation within the building. If shown economically feasible by life cycle cost analysis, state whether heat recovery will be utilized.

8.7.5 Special Mechanical Systems. Provide a description of special mechanical systems such as compressed air, hydraulic, nitrogen, lubrication oil, etc.

8.7.6 Backflow Prevention. Identify the systems and fixtures requiring backflow preventers.

8.8 Plumbing Calculations

Plumbing system design shall comply with the requirements of UFC 3-420-01, *Plumbing Systems.* The following calculations are required:

8.8.1 Domestic Hot Water Heating. Calculate the hot water storage and demand requirements of the facility. Indicate the basis for the calculations including the incoming and storage water temperatures, the facility type, fixture types, fixture quantities, and the demand and storage factors.

8.8.2 Domestic Water Pressure Calculations. Determine the sufficiency of the water pressure available at the building to meet the required minimum fixture outlet pressure. Provide detailed pressure loss calculations including losses attributed to meters, fittings, pipe, backflow preventers, and pipe risers.

8.8.3 Domestic Hot Water Recirculation. Reference the plumbing code by which the domestic hot water recirculation rate is calculated. Calculate the recirculation rate and the recirculation pump head.

9. FIRE PROTECTION:

9.1 Fire Suppression Systems:

9.1.1 All sprinkler systems shall be hydraulically designed. Pipe sizes, sprinkler locations, and data for hydraulic calculation sign shall be shown on the drawings.

9.1.2 The design shall be in compliance with Unified Facilities Criteria UFC 3-600-01, *Fire Protection Engineering for Facilities*, Engineering Technical Letter (AF ETL) 02-15; Fire Protection Engineering Criteria - Electronic Equipment Installations, AF ETL 01-18; Backflow Prevention Program; and National Fire Protection Association (NFPA 13) Installation of Sprinkler Systems.

9.1.3 The project specifications shall include a copy of the appropriate UFGS. The UFGS needs to be edited and modified, by the designer, to meet the specific local requirements found in this design guide.

9.1.4 All new dry/wet fire suppression systems connected to potable water supplies and using water only as a fire suppressant shall have an approved double check valve backflow preventer and test station. All new dry/wet fire suppression systems connected to potable water supplies and using water with antifreeze or other chemical as a fire suppressant shall have an approved reduced pressure principle backflow preventer and test station. Installation of a backflow preventer in a vertical position shall be approved by the by the State of Utah. Install valves and piping as needed to allow the backflow preventer to be forward flow tested (piping sized for sprinkler system demand flow) on a periodic basis. Piping shall be directed to the building exterior in an area where pavement exists to minimize erosion during flow testing. Piping at the exterior wall shall terminate with a threaded hose connection(s) and a threaded cap that has labeling to identify the port function as flow testing of the backflow assembly.

9.1.5 All aboveground sprinkler piping shall be Schedule 40 black steel pipe or Type “K” copper tubing. All trim on alarm valves will be Type “K” copper tubing only.

9.1.6 All fire suppression control valves including post indicator valves (PIV’s) require tamper switches. Control valves associated with the riser shall be butterfly type with integral tamper switch; OS & Y type valves are not to be used at the riser. Fire suppression risers located in a suppression room having direct exterior access shall not have a PIV unless specifically required by code. Fire riser valves will work as control valves. Riser rooms that do not have a direct access exterior door, but are located adjacent to an exterior wall, shall use a wall mounted indicating valve if the wall will support it. PIVs shall only be used when the other options are not available.

PIVs shall only be used when the other options are not available

9.1.7 Each riser shall have a separate flow switch for each floor level and each riser.

9.1.8 Fire sprinkler piping shall be located in a heated area or in an insulated attic where temperatures are assumed not to drop below 40 degrees F.

9.1.9 HALON and CO2 type fire suppression systems shall not be used.

9.1.10 Location of inspector test valves, as required by NFPA 13, shall be coordinated with the architectural requirements of the building including but not limited to concealed access boxes of adequate size with cover plates painted to match surroundings and located in a manner compatible with the architectural and furniture configuration of the building. Code required signage shall be provided. Additional piping and finishes on both the exterior and interior may be required. Details shall be

coordinated through the shop drawing process. Wet-type sprinkler systems shall have the inspector test valves installed at the riser, downstream of the flow switch.

9.1.11 Fire Extinguishers shall only be installed when required by Air Force Instruction, National Fire Protection Association (NFPA) 101 Life Safety Code; Unified Facilities Criteria (UFC) or Engineering Technical Letter (ETL). If required, NFPA STD 10 will be enforced for spacing, height and location. Semi-recessed fire extinguisher cabinets are required for all required fire extinguishers except in Industrial, storage occupancies and were authorized by the fire department.

9.1.12 High Expansion Foam Generator systems require inspection or maintenance to be performed IAW UFC 3-601-02. Systems shall be equipped with platforms, walkways, or access ways as applicable to facilitate this requirement.

9.2 Water Supply:

9.2.1 Install a 5 inch Storz type adaptor and cap on the 4-1/2 inch steamer port of every new fire hydrant installed. Bollards are required to protect hydrants from vehicle and aircraft traffic.

9.2.2 Buried fire protection water service lines shall be buried at least 5 1/2-feet below grade

9.3 Fire Alarm Detection System:

9.3.1 Fire Alarm system designs shall be in compliance with UFC 3-600-01, UFC 4-021-01, NFPA 72, AF ETL 01-18 & 02-15, ADA and this Base Facility Design Standard. The system designer shall be a certified NICET level III/IV. New fire alarm systems with less than 25 devices and appliances shall include an analysis per UFC 3-600-01, Para 1-4. A Fire Protection Engineer shall provide an analysis per UFC 3-600-01 Para 1-5 and shall sign and stamp construction/shop drawings when the new system includes 25 or more devices and appliances. Determination of required acoustically distinguishable spaces (ADS) shall be determined by this analysis and shall be approved by the fire department. Designs shall be submitted to the CE project manager for review by the 75th CES Electric/Electronic Shop and fire department prior to construction notice to proceed. The installation and programming shall be accomplished by a factory certified fire alarm system installer and be at least a NICET level II or higher.

9.3.2 All new systems shall use Class B initiating device circuits, signaling line circuits and notification circuits. Signaling Line Circuits (SLC) shall be Class B, Style 6 or Style 7. Initiating Device Circuits (IDC) shall be Class B, Style D. Notification Appliance Circuits (NAC) shall be Class B, Style Z.

9.3.3 New systems shall be analog-intelligent only. Where a mass notification system is supervised and/or functions as the fire alarm occupant notification, the mass notification system shall be considered to be a part of the facility fire alarm system.

9.3.4 The contractor shall provide all new wiring, conduit, and devices. All devices and ancillary panels shall be monitored separately. Conduit and wiring shall be consistent with style Z and style D for detection and notification and perform as required per applicable standards. All Fire Alarm conduit shall be properly identified by a continuous red coating or properly spaced labeling. Exposed fire alarm cable (rope) shall not be used.

9.3.5 Install relays and system controls for Monaco interface, maintenance bypass switches for Fan Shutdown, NAC, and SLC circuits were required. All devices and ancillary panels shall be monitored separately.

9.3.6 The contractor shall provide a lockable disconnecting means along with surge protection on all separate power circuits at or within a reasonable distance of the equipment that it services. The preferred Surge Protection model is Ditek DTK-120HW. Dedicated circuits are required and shall not be shared with other general purpose equipment.

9.3.7 Audio notification appliances shall have a 3 pulse temporal pattern (90-99dB), or voice speaker systems in accordance with NFPA 72. Visual notification appliances shall be capable of providing 75-100 candelas. All visual appliances in a single room shall be synchronized. The preferred method of installation is ceiling mount only.

9.3.8 Install addressable duct detectors with sample tubes, visual indicator lights and fan shutdowns "ONLY" were required per current Base, NFPA 72 and NFPA 90A guidelines. Detectors shall be resettable via the fire alarm panel. Remote test switches shall be installed if detectors are not readily accessible.

9.3.9 Ultrasensitive Smoke Detection (air aspirating system) shall be installed in areas where very early warning detection has been suggested (typically IT rooms). This must be monitored by the FACP. This system shall be consistent with and integrated into the current systems main control panel and shall have readily accessible test ports for all zones. The preferred system is VESDA, manufactured by Xtralis.

9.3.10 Upon completion of a new system installation in a remodeled facility, the old system shall be removed before a final acceptance can be completed. The old system can be removed only after the new system has been 100% tested and a Record of Completion has been signed by the factory certified fire alarm system installer. This document must remain in the new FACP.

9.3.11 Provide digital and hard copies of panel programming, system installation drawings and O&M manuals to the Project Manager and 75th CES Electric/Electronic Shop upon final inspection. A hard copy set shall be placed at the FACP in an approved documentation cabinet. Provide also an additional 10% of devices used during project (minimum of 1 each type) for spare equipment.

9.4 Fire Alarm and Ancillary Control Panels:

9.4.1 Fire Alarm Control Panels, ancillary control panels and Monaco Transceivers will only be installed in dry, temperature controlled environments such as communications rooms or electrical rooms. Under no circumstances will they be installed in mechanical rooms with a chance of exposure to steam, condensation, etc.

The following Control Panels are approved for installation at Hill AFB:

Fire Control Instruments (FCI) Model E3
Siemens Model XLS
Edwards Systems Technologies (EST) Model III
Notifier Model NFS2-640
Det-tronics Eagle Quantum Premier high expansion foam releasing panel
Det-tronics X3301 triple IR flame detector
Monaco BT2-8NBTransceiver
VESDA air aspirating system

9.4.2 Panel and remote annunciator locations shall be coordinated with 75th CES Electric/Electronic Shop during site walk.

9.5 Fire Alarm Reporting Systems:

9.5.1 The radio fire alarm transceiver shall be a Monaco BT2-8NB (16/32 zone) compatible with the existing Monaco D-21 Radio Fire Alarm Monitoring Systems. The transceivers shall operate on a frequency of 141.000 MHz for HAFB and Little mountain and at 141.3625 MHz for UTTR. The contractor shall provide and install a new antenna system per manufactures recommendations. Antenna location shall be approved by the 75th CES Electric/Electronic Shop. Request for Unit number and Position descriptors shall be routed thru 75th CES Electric/Electronic Shop for approval. The installed system must communicate to the appropriate central receiving station for a minimum of 7 days before being accepted. At Hill AFB the Monaco D-21 central receiving stations are located in Bldg. 408 & Bldg. 1151. At UTTR the central receiving station is located in Bldg. 40030.

10. NATURAL GAS AND LPG

10.1 General Gas Pipe Design:

Natural Gas distribution systems design and installation shall follow NFPA 54 National Fuel Gas Code. Distribution pressures at HAFB will vary with location but are typically 35 psi.

10.2 Line Location:

Gas distribution system lines shall never be installed or allowed to remain under buildings. They shall not be laid in the same trench with other utilities to preclude the possibility of leaking gas following along or collecting in other pipe lines or conduits. For the same reason, gas lines will be placed above other utilities whenever they cross, if practicable. Gas lines shall not be laid under paved streets or in other locations subject to heavy traffic whenever practicably avoidable. Whenever it is necessary to locate gas lines in such locations, the lines must be protected by suitable casing and by burying to a depth to provide at least 2 feet of cover over the top of the pipe. Sufficient clearance must be maintained between plastic mains and steam, hot water, power lines, and other sources of heat, to avoid temperatures in excess of 60 degrees C (140 degrees F) for thermoplastics or 66 degrees C (150 degrees F) for thermo-setting epoxy resin pipe. Natural gas lines should be buried deep enough to provide no less than 30 inches of cover and shall have an insulated 10 Gage wire placed 6 inches above the pipe and a warning tape 12 inches above that or no more than 24 inches above the pipe.

10.3 Inspection:

All new pipe must be inspected before concealment.

10.4 Gas Meters:

Gas meters shall be installed for each building with pressure regulators. Gas meters serving dormitories or other residential type structures shall have earthquake sensitive automatic shut off valves or excess gas flow shut off valves. Earthquake valves shall comply with the American Society of Civil Engineers Standard ASCE 25-97, Earthquake Actuated Automatic Gas Shutoff Devices. The manifold assembly must be designed with supports and appropriate barriers to isolate the valve. Recommended manufacturer is KOSO. In addition to the pressure regulating devices, all newly installed meters regardless of location shall have suitable protective devices to prevent accidental over pressurizing. Suitable protective devices are as follows:

(a) Spring-loaded relief valves conforming to ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.

(b) Pilot-loaded back pressure regulators used as relief valves and designed so that pilot system or control line failure will open the regulator.

(c) Weight-loaded relief valves.

(d) A monitoring regulator installed in series with the primary pressure regulator.

(e) A series regulator installed upstream from the primary regulator and set to continuously limit the pressure on the inlet of the primary regulator to the maximum allowable operating pressure of the distribution system, or less.

(f) An automatic shutoff device installed in series with the primary pressure regulator and set to shut off when the pressure on the distribution system reaches the maximum allowable operating pressure, or less. This device must remain closed until reset manually. It should not be used where it might cause an interruption in service to a large number of mains or service lines.

(g) Spring-loaded diaphragm type relief valves.

10.5 Pressure Regulators:

Controlling and limiting pressure in low pressure gas distribution systems. Each low pressure distribution system or low-pressure main supplied from a gas source which is at a higher pressure than the maximum allowable operating pressure for the low-pressure system will be equipped with pressure regulating devices of adequate capacity. Other devices will be designed to meet the pressure, load, and other service conditions under which they will have to operate. In addition to the pressure regulating devices, a suitable protective device to prevent accidental over pressurizing must be provided and may include:

(a) A liquid seal relief device that can be set to open accurately and consistently at the desired pressure.

(b) Weight-loaded relief valves.

(c) An automatic shutoff device as described above.

(d) A pilot-loaded back pressure regulator as described above.

(e) A monitoring regulator as described above.

10.6 Liquefied Petroleum Gas:

LPG usually includes butane, propane or mixtures of both which can be stored as liquids under moderate pressures of 80-250 psig at ambient temperature. Use of LPG gas systems is discouraged and must be preapproved. LPG gas distribution systems when used will be designed to comply with the requirements of NFPA 58 instead of ANSI B31.8. Polyethylene and fiberglass pipe will not be used in LPG systems.

11. COMPRESSED AIR

11.1 Economic Analysis:

Use life cycle economic analysis to select between multiple individual compressors at each work site or a single centrally located compressor.

11.2 Moisture and Contaminant Removal:

The design of a compressed air system shall include a means to properly remove moisture and contaminants from the system. This includes after coolers, air dryers, filters, automatic drains on the storage receiver, drain valves at all points, etc.

11.3 Other Considerations:

Additional items which will be Considered for a compressed air system are: The compressor should be sized for anticipated future expansion. Provide noise suppression to keep compressor noise within Occupational Safety and Health Administration (OSHA) limitations. Reclaim exhausted heat to supplement space or water heating.

11.4 Piping:

Piping used for compressed air systems shall be schedule 40 black steel or copper pipe. If the piping is to be placed underground it shall have a factory installed 50-mil polyethylene coating, and shall be cathodically protected.

12. CORROSION CONTROL:

12.1Cathodic Protection: Comply with UFC 3-570-02A, *Cathodic Protection*, UFC 3-570-02N, *Electrical Engineering Cathodic Protection*, and UFC 3-570-06 O&M, *Cathodic Protection Systems.* Cathodic protection is required for the following items as a minimum: Any ferrous material that comes in contact with the earth. This includes but is not limited to the exterior surface of underground pipes. The interior surface of water storage tanks.

12.2 Water Treatment: The following items shall be included as part of water treatment for HVAC facilities: Conductivity meters and chemical feed equipment for condenser water systems on chillers (Open loop system with cooling tower). A pot feeder for closed loop hydronic systems (both hot and chilled water systems). Conductivity metering and chemical feed equipment for boiler water. A bleed-off line with an adjustable flow meter on evaporative coolers. This includes direct as well as multiple stage evaporative cooling units. Sampling ports for the analysis of water conditions.

13. LIQUID FUELS STORAGE AND DISTRIBUTION.

13.1 Tanks:

Fuel storage tanks shall comply with applicable standards of American Petroleum Institute and be aboveground with a concrete lined containment area. Exceptions to the above ground installation must be approved by 75 CEG/CEV. If tanks must be placed underground they shall be double walled Plasteel (steel inner wall and fiberglass-coated steel for the outer wall) and have leak monitoring equipment installed, which meets all Environmental Protection Agency (EPA) and State of Utah requirements.

13.2Piping:

All underground fuel piping shall be double walled pipe. The carrier pipe shall be schedule 40 black steel and the outer layer shall be fiberglass.

13.3 Valves:

All valves in liquid fuel systems shall have fire rated seals to shut off bubble tight in case of fire.

13.4 Grounding:

Fuel system grounding shall comply with the National Fire Protection Association (NFPA) 30, Flammable and Combustible Liquids Code.

13.5 Tank Cleaning:

Cleaning of fuel storage tanks shall comply with American Petroleum Institute API Standard 2015.

14. ELECTRICAL:

14.1 General:

14.1.1 Applicable Design Criteria: All installations shall comply with the following criteria as applicable including but not limited to UFC 3-501-01, *Electrical Engineering* which provides minimum requirements for design analyses and calculations, UFC 3-550-01 *Exterior Electrical Power Distribution* which provides minimum requirements for underground distribution system design (AF ETL 11-10: *Electrical Manhole Design Considerations* clarifies these requirements and provides additional recommendations), NFPA 70 *National Electric Code* (NEC), NFPA 70E *Standard for Electrical Safety in the Work Place*, the *Lineman's and Cableman's Handbook* and City Light & Power (CL&P) *Electric Service Connection Standards Manual*. Note that CLP specifications take precedence over UFC requirements. UFC 3-550-01 Section 1-6 states, "This UFC does not apply to … Military installations that have privatized their electrical distribution system."

14.1.2 Coordination Requirements: Prior to the installation or modification of any existing exterior electrical service the system owner, CLP, and75th CES Exterior Electrical shop shall be consulted. CLP will also be the authority having jurisdiction (AHJ) on all exterior/outdoor electrical installations. All temporary power will be run at the expense of the contractor that is performing the work. CLP will be notified by the project manager and a location will be determined. When required by the 75th Exterior Electrical section, bollards will be installed to protect exterior electrical services. It is recommended that prime contractor contract with CLP to construct transformers, switches, electrical lines, etc that will be owned by them. If not constructed by CLP then the contractor will have to transfer the real property via the DD1354 to the government. Furthermore, if the applicable utility is not constructed by the CLP then the contractor will have to pay for compliance inspections and other fees as required by the CLP.

14.2 Hill AFB Exterior Distribution:

14.2.1 Primary Voltage: The Primary voltage at Hill AFB is 12,470 volts.

14.2.2 Transformers: All new transformers shall be 3-phase pad mounted. Primary voltage is 12470 volts delta. Primary case shall be grounded by a ground conductor back to the source switch. Transformers shall have loop feed with elbow arrestors, dead front, bushing wells with inserts installed, 4 hole spades, 3-phase gang operated on/off loadbreak switch, bayonet fusing, top level oil temperature gages, liquid level & pressure vacuum gages, drain valve with sampler, copper windings and two each 2-1/2% taps above and below normal. This will assure that the user voltage can be regulated within proper limits. All transformer manufacturers selected will have an authorized rewind shop within 50 miles of Hill Air Force Base. Lightning arrestors will be installed on all unused high voltage well bushings. No Parking stands or Y splitters will be installed unless deemed necessary by 75th CES Exterior Electrical section. All high voltage exterior transformers and switches will be turned over to the 75th CES Exterior Electrical section unless deemed unserviceable by the 75th CES Exterior Electrical section.

14.2.3 High Voltage Conductors: All high voltage primary and secondary conductors will be copper only.

14.2.4 Buried High Voltage Cable: All buried high voltage cable (over 600 volts) shall be placed in conduit with a minimum of 3-inches of concrete encasing around the conduit. Depth of burial shall be 36 inches below grade. All high voltage conductor installations will be 36 inches deep minimum to the top of the conduit and they will be encased in concrete to include airfield runway lighting circuits. A 6-inch wide, red plastic marker tape with the words "Danger-Buried High Voltage Cable" shall be placed directly over the high voltage line at a depth of 12 inches below finished grade or 6 inches below the top of sub grade whichever is deeper. Any change of direction that is more than 5 degrees will require the installation of a manhole. Maximum spacing between manholes or equipment shall not exceed 500 feet.

14.2.5 Buried Conductors Below Traffic: All conduit containing conductors of any voltage including communication circuits that run under streets or parking lots shall be concrete encased 3 inches thick on all sides.

14.2.6 Only Rigid Galvanized Steel (RGS) 90 degree elbows and Rigid Galvanized Steel (RGS) conduit or fiberglass sweeps for high voltage shall be used when making the transition from underground to overhead high voltage power lines. Only one high voltage riser in rigid galvanized steel per utility pole will be installed.

14.2.7 Support Structures: All power poles, steel support structures and their foundations shall be rated for a 100 mph wind load. The minimum dimensions for crossarms will be 8-ft long by 3 ¼-inchs wide by 4 ½-inches deep.

14.2.8 All new high voltage cable shall be 15 KV, 133 percent insulation, shielded, with E P insulation.

14.2.9 Watt-hour meters shall be installed on all facilities requiring new service and modifications to existing facility power requirements. AMR compatible watt hour meters shall be used and be connected to the EMCS system. Meter shall be a Shark 200 v2 or equivalent and meet the requirements of UFGS 26 27 13.10 30, Electric Meters and ASHRAE Standard 90.1.

14.2.10 Exterior equipment shall not be placed-near the drip lines of roof overhangs or rain gutters.

14.3 Hill AFB Interior Distribution: Do not use aluminum conductors or bus bars inside any facility at Hill AFB. Only copper conductors and bus bars should be used. All dry type transformers shall have copper windings.

14.3.1 All new building wiring systems shall be designed using 277/480 volts unless uneconomical to accomplish and shall be in rigid conduit or central open raceways.

14.3.2 Lighting shall be installed using 277 volts if available.

14.3.3 Do not use any polystyrene lenses in light fixtures.

14.3.4 Comply with federal energy requirements when designing lighting systems. See section 5 Mandatory Energy and Water Conservation Requirements above.

14.2.5 In office buildings or other buildings that will have a considerable amount of computer equipment installed, or will have systems furniture:

a. Run oversized neutral conductors from the transformer to service equipment, and from service equipment through the distribution panels to the branch circuit panels (double sized neutral conductors are recommended).

b. From the branch circuit panel boards, run eight conductor circuits (three hot conductors, three neutral conductors one ground conductor, and one isolated ground conductor) to all receptacle outlets, including those receptacle outlets in pre-wired systems furniture.

c. Run all other circuits as per the National Electric Code requirements.

14.3.6 All installed electrical gear placed on mechanical room floors will be placed on a 4-inch tall concrete maintenance pad.

14.4 Exterior Lighting:

14.4.1 Light Poles: All light poles and foundations shall be rated for a 100 mph wind load.

14.4.2 Comply with federal energy requirements when designing lighting systems. See Section 6, Mandatory Energy and Water Conservation Requirements above. Use white LED lights for exterior lighting when economically viable.

14.4.3 Photoelectric Controls: Use photoelectric controls on exterior lighting where possible to save energy. Where practical fixtures shall be grouped together using contactors, which are controlled by a single photocell.

14.5 Interior Lighting:

14.5.1 Lighting power levels shall comply with ANSI/ASHRAE/IESNA Standard 90.1

14.5.2 Interior Lighting Calculations: Computer-generated photometric plans for each space are required to verify proposed luminaires and locations meet the required performance criteria of the design using a light loss factor (LLF) of 0.7. Photometric plan submittals must include:

- Horizontal illuminance measurements at workplane or other designated height above finished floor.
- Minimum and maximum illuminance levels.
- Average maintained illuminance level.
- Average to minimum and maximum to minimum ratios for horizontal illuminance
- Lighting power density (Watts per square foot or per square meter)

14.5.3 Use a color rendering index (CRI) of no less than 80 for interior applications.

14.5.4 Use a correlated color temperature (CCT) of no greater than 4100K as stated on the manufacturer's cut sheet for all interior spaces.

14.5.5 Do not mix source CCTs within a single building with the purpose of minimizing maintenance staff from having to keep track of specific CCTs.

14.5.6 Daylighting Controls- Control the electric lighting in response to daylight.

- Continuously dim electric light in task oriented areas such as offices, conference rooms, classrooms, or turning it off in non-task areas such as circulation and lounge areas.

- Control primary and secondary daylight zones separately. Refer to Daylighting Best Practices in APPENDIX C of UFC 3-530 for additional information

14.6 Permitted Lighting Technology:

14.6.1 Solid State Lighting (SSL):

- LED luminaires must be dimmable or capable of multi-level control according to the control strategy.
- LED light source replacements (screw base) are only permitted for the replacement of incandescent or compact fluorescent light sources.
- IES LM-79, LM-80, and TM-21 testing reports must be supplied from manufacturer and include all relevant information.
- Consistent with industry standard, all LED luminaires require a 10-year warranty.
- Ballasts, Drivers, Generators and Power Supplies
    - Total current harmonic distortion (THD) less than or equal to 20%.
    - Power factor (PF) greater than or equal to 0.9
    - For current and future dimming requirements (i.e. smart grid, curfew, adaptive), use dimmable or bi-level drivers compatible with standard dimming control circuit of 0-10V. Other dimming protocols must comply with Network Certification requirements.

Note: For LED applications, provide built in failure detection in the luminaire or include labor costs to measure light levels (baseline and 70% output - before the end of the warranty) in the LCCA.

14.6.2 Compact Fluorescent Light (CFL):

- Do not use CFL sources less than 13 watts.
- Do not use u-bent fluorescent light sources.
- Do not use in cold temperature environments (colder than 50 degrees Fahrenheit), except where alternatives such as SSL are unavailable
- Ballasts, Drivers, Generators and Power Supplies
    - Provide dimmable ballasts.
    - Provide programmed start ballasts for compact fluorescent light sources that include end of life protection

14.6.3 Linear Fluorescents:

- Do not use LED linear fluorescent light source replacements.
- Do not use T12 light sources.
- Do not use in cold temperature environments (colder than 50 degrees Fahrenheit), except where alternatives such as SSL are unavailable.
- Ballasts, Drivers, Generators and Power Supplies

- Provide dimmable or bi-level ballasts in spaces
- Use programmed start ballasts with end of life protection.
- NEMA premium electronic ballasts must be specified where applicable.
- Do not use instant start ballasts.

14.6.4 Induction (Electrodeless Fluorescent)

- All induction light sources must be dimmable.

14.6.5 Metal Halide

- No restrictions.

14.6.6 Mercury Vapor

- Do not use mercury vapor light sources.

14.6.7 High and Low Pressure Sodium

- Do not use for interior applications.

14.6.8 Incandescent and Tungsten Halogen

- Do not use incandescent or tungsten halogen light sources, except where alternatives such as SSL are unavailable.

14.6.9 High Intensity Discharge

- Power factor (PF) greater than or equal to 0.9.
- Provide electronic ballasts for all available wattages.

14.7 Additional Lighting Guidelines:

14.7.1 A new design must ensure reduced energy consumption, reduced maintenance, and improved lighting quality at the lowest life cycle cost. A lighting redesign is required when a renovation involves changing lighting technologies such as fluorescent to LED and when renovation involves changing lighting with more efficient lighting within the same technology.

14.7.2 Lighting control requirements must meet ASHRAE 90.1, ASHRAE 189.1 and UFC 3-530-01. Refer to UFC 1-200-02 for publication year of ASHRAE. Refer to CHAPTER 3 (Interior Applications) of UFC 3-530-01 for control requirements. Provide commissioning per ASHRAE requirements. Refer to IES DG-29 for commission guidance for specific applications.

14.7.3 Select light sources, power supplies, and controls that are rated and warranted for long useful lives to increase the amount of time between maintenance cycles. Minimize light source types on an individual project. Locate luminaires in locations to improve access for regular servicing such as light source replacement.

14.7.4 Reference UFC 3-530-01 for further instruction on control strategies, project specific design guides, and design specific performance requirements.

14.8 Communications:

Comply with Air Force AF ETL 02-12 *Communications and Information System Criteria for Air Force Facilities*, except as indicated by the 75 CS supplement to the AF ETL. Comply also with the 75th CS Telecommunications Installation Criteria (Tab K) available at https://hillnet.hill.af.mil/itms/Bob/.

For all HVAC system installations that require EMCS monitoring the contract shall require the contractor to run and terminate the CAT5e cable(s) from the HVAC monitoring device to the designated comm. room.

14.9 TEMPEST:

All Electromagnetic Interference related problems should be referred to the Base Electromagnetic Emissions Security Officer, Lori Prendergast, 75 CS/SCBS, 777-0362.

14.10 Special Protection for Rotating Electrical Equipment:

Three-phase electrical motors shall have phase failure and ground fault-protection when such protection costs are equal to or less than one-fourth the cost of the motor. This protection will be in addition to all protective devices required by the National Electric Code. Where there are a number of smaller three-phase motors within a particular building, the building will be protected at the service entrance with phase failure protection.

14.11 Lightning, Static & Surge Protection

14.11.1 Provide a complete lightning protection system as required by NFPA 70, NFPA 780, Mil-HDBK-419, AFMAN 91-201 *Explosive Safety Standards*, DOD 6055.9, *Ammunition and Explosives Safety Standards*, AFI 32-1065 *Grounding Systems*, LPI-175, and UL 96A. The system shall be installed by a certified lightning protection installer who is listed with the National Recognized Testing Laboratory (NRTL) and is actively engaged in the installation of UL Master Labeled lightning protection systems or who is certified by the Lightning Protection Institute (LPI) as a master Installer/designer and be so listed by the Lightning Protection Institute and by Underwriters Laboratories, Inc. For the complete scope of the installation of a lightning protection system the installer shall provide a UL certification stating compliance with AFI 32-1065 *Grounding Systems*, and if applicable a UL Master Label. All antennae installations will be bonded to the lightning protection system. A complete drawing showing connections and initial test results will be forwarded to the 75th CES Exterior Electrical section. All lightning protection system installations and modifications shall be of copper materials. The exception will be the use of connections with dissimilar metals, and then aluminum may be used. All lightning protection systems will have surge protection at all points where electrical or electronic system conductors enter or exit a facility.

14.12 Intrusion Detection Systems (IDS)

14.12.1 If an Intrusion Detection System (IDS) is necessary it must include sufficient levels of protection as per AFI 31-101, AFI 31-401, AFI 31-601, DEPARTMENT OF DEFENSE MANUAL 5205.07V3/AIR FORCE MANUAL16-703V3 or TECHNICAL SPECIFICATIONS FOR CONSTRUCTION

AND MANAGEMENT OF SENSITIVE COMPARTMENTED INFORMATION FACILITIES VERSION 1.3 for the respective asset. See section 2.5 General Security in this document for further guidance.

14.12.2 Prior to system design the following offices shall be consulted for their requirements: 75th CES Electric/Electronic Shop; 75 ABW/IP; and 75 SFS/S4E. All IDS system requirements MUST have a letter of authorization on file.

14.12.3 The alarm system must be compatible with the existing base alarm system. The authorized IDS system for Hill AFB is a Honeywell/Vindicator V5 w/TDEA. All connections must be completed by a Honeywell/Vindicator certified installer prior to the final survey. After verification by 75th CES Electric/Electronic Shop that the system is ready, a 72-hour acceptance test must be accomplished with 75 SFS/S4E. A final survey of the building will be accomplished at this time prior to normal operation starting.

14.12.4 Hill AFB utilizes standards for all IDS components and this list is made available by the 75th CES Electric/Electronic Shop.

14.12.5 In the event that Intrusion Detection (IDS) and Card Access are required in the same facility both systems will be completely independent of one another; they must not share wiring, conduits, junction boxes, power supplies or enclosures.

14.13 Access Control System (ACS)

14.13.1 The authorized ACS system for Hill AFB is a Honeywell/Vindicator utilizing the V5 Network Security Appliance with the Access Control Server UHS/TDEA option. The system server terminal (SST) will either be the WYSE terminal or Security Archive Workstation (SAW).

14.13.2 All doors will be equipped with electronic strikes that fail safe “locked” upon extended power failures that exceed the battery backup capability. No magnetic locks will be allowed. All strikes will be 12v dc and all doors will have mechanical crash bars/handsets.

14.13.3 Hill AFB utilizes standards for all ACS components and this list is made available by the 75th CES Electric/Electronic Shop.

NOTE: Built in combination locks and mechanical/digital cipher locks shall not be installed on any doors.

15. PROJECT DOCUMENTATION.

15.1. As Built Drawings:

A minimum of one set of Record Drawings in bound AutoCAD dwg format must be provided on all new construction and all major renovations. Drawings must be complete, accurate and comply with current Hill AFB CAD standard.

15.2 Basis of Design:

At least one electronic set of all design and construction related information shown in the record drawings must be provided. As a minimum include engineering calculations, structural load assumptions and calculations, energy calculations, equipment sizing, test reports, including HVAC test and balance reports, commissioning reports, and any other related similar information. As a minimum, Mechanical drawings shall include the following information.

15.2.1 Narrative Description of System

A. System type(s), location, control type, efficiency features, outdoor air ventilation strategy, indoor air quality features, noise reduction features, environmental benefits, other special features

B. Describe how system meets any special requirements listed in the Project Requirements document.

15.2.2 Reasons for System Selection

A. Reasons that the selected system is a better choice than other possible alternatives. E.g. comfort performance, efficiency, reliability, flexibility, simplicity, cost, owner preferences, site constraints, climate, availability of maintenance, acoustics.

15.3 Equipment Operations and Maintenance Manuals:

At least two hard copy sets and one electronic set in Adobe pdf format must be provided. Requirements for O&M manuals will be detailed in project specifications and must require as a minimum:

(a) A complete parts list and source of supply for each piece of equipment, and marked with model, size and plan symbol.

(b) Performance curves for all pumps and fans marked with model, size and plan symbol.

(c) Wiring diagrams

(d) Maintenance checklists provided by the manufacturer or- if not available then checklists adapted from those in the Federal Energy Managers Program (FEMP) O&M Best Practices Guide.

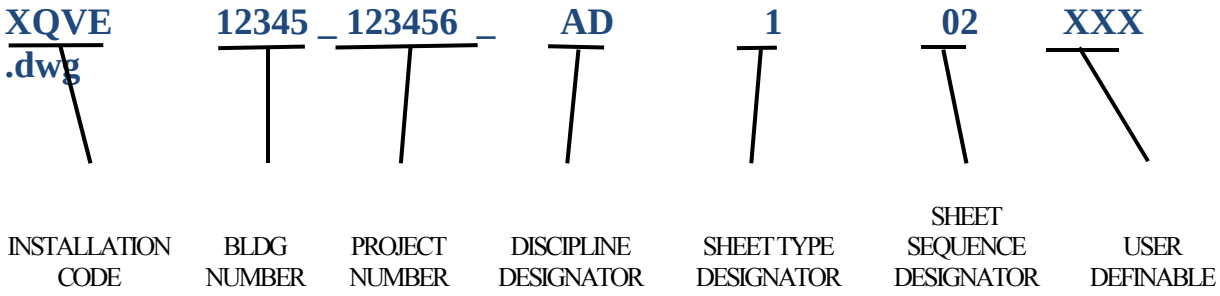
16. COMPUTER AIDED DRAFTING AND DESIGN (CADD)/ GEOGRAPHICAL INFORMATION SYSTEM (GIS):

16.1 CADD File Naming Convention

The purpose of this standard is to set a basic file naming convention to ensure consistent electronic deliverables for information created and stored using Computer Aided Design and Drafting (CADD) software. This will ensure contract records, project deliverables, and As-Built and record drawings can be retained and archived as required by Federal Statute and remain easily retrievable. When following this convention, only uppercase alpha numeric characters should be used. No spaces or special characters are allowed. The three character suffix defining the file type may be lower case.

DESCRIPTION

The following is the description of a complete file name. It is composed of five parts. This naming convention is an extension of the A/E/C CADD Standard, Release 6.0 (Aug 2015) Sheet File Naming Convention and is in compliance with that document. Discipline Designators and Sheet Type Designators are as defined in that standard.



FILE NAME FORMAT DESCRIPTION

1. INSTALLATION CODE - XQVE

Use the four alpha character installation code. Use KRSM for buildings at Hill AFB, XQVE for buildings at UTTR North, PGTL for buildings at Little Mountain, etc.

2. BUILDING NUMBER - 12345

Do not precede building number with zeros. For example, project drawings for Building 1 at Hill Air Force Base would begin with KRSM1. While projects for Building 501 at Little Mountain would begin with PGTL501, etc.

3. PROJECT NUMBER - _123456_

Use the assigned 6-digit project number preceded and followed by a _ to separate it from the building number and the Discipline Designator. For projects with more than one project number, use the most recent. For example, KRSM992345 would be less recent than KRSM082345. Use extensions A B or C only if these are actual designations for projects awarded separately.

4. DISCIPLINE DESIGNATOR - AB

As defined in the A/E/C CADD Standard, Release 6.0 (Aug 2015) Sheet File Naming Convention Table 2-3.

5. SHEET TYPE DESIGNATOR - 1

As defined in the A/E/C CADD Standard, Release 6.0 (Aug 2015) Sheet File Naming Convention Table 2-4.

1 = Plans, 2 = Elevations, 3 = Sections, etc.

6. SHEET SEQUENCE NUMBER - 02

Self-Explanatory.

7. USER DEFINABLE XXX

If the sheets for an individual disciple such as Architectural are included in a single file then use SET as the three characters. In this case the discipline designator would be A- and the sheet type designator and sheet sequence number would be blank.

16.2 General:

CADD drawings shall be developed in accordance with the A/E/C CADD Standard which was produced by the CADD/GIS Technology Center. The CADD standard is available at https://cadbim.usace.army.mil/CAD and GIS standard is available at http://www.sdsfie.org/. Development and manipulation of drawings and reference files shall follow the standard. All drawings shall be digitized and must be delivered in printed form and on machine-readable media. The number, and type of materials for printed copies required for construction documents as-built and other uses will be specified by Hill AFB. All changes made to the design during construction must be posted in the electronic files. File names must comply with the Hill AFB CADD naming convention described above.

16.3 Drawing Format:

Drawings shall be produced and bound in AutoCAD format and be geo-referenced to Universal Transverse Mercator coordinates (UTM), Zone 12 North. The horizontal datum shall be the North American Datum 1983 reference frame, GRS 80 ellipsoid, 2011 realization, otherwise known as NAD 83 (2011). The basis for all elevations shall be the North American Vertical Datum of 1988 (NAVD 88). GPS derived orthometric heights shall be calculated using the Geoid 09 model with the EPOCH clearly defined. All units of measure shall be meters. Any drawings or drawing sets not complying with the aforesaid parameters will be rejected.

16.4 Media Format:

15.4.1 Compact Disk. Machine-readable data may be submitted on a Compact Disk. Must be compatible with latest CD writers and readers. Each CD must have an external label indicating the format, density, company/organization name, and creation date.

16.5 Documentation and Metadata:

16.5.1 A documentation handbook must be submitted with the machine-readable media. This handbook shall contain the specifics of the database, the file names, reference file names, stroked plotter files, and cell library names. All other pertinent information used in constructing and managing the drawings and database, shall also be included. Metadata allows the CADD files overlay the GIS data and be easily incorporated into the database.

17. COST ESTIMATING:

17.1 General:

All cost estimates shall be based on recent documented bid data or the latest edition of Building Construction Cost Data as published by the Robert Snow Means Company, Inc. All estimates for the Military Construction Program (MCP) shall be based on the latest edition of the Military Pricing Guide or as directed by the Civil Engineer. Use 15 percent overhead and 10 percent profit.

17.2 Procedures:

All estimates shall be based on unit costs. Single line item estimates shall not be used. All estimates for change orders and the 8(a) Program shall be prepared in detail on an Air Force Fore 3052, and shall include labor hours, material, and bonding costs.

18. OTHER CONSIDERATIONS:

18.1Space Allocations:

For Right-Sizing requirements comply with AFH 32-1084.

18.2 Ban on Use of OLDs:

Effective 01 July 1992, the Air Force banned the use of ozone layer depletion substances. These are generally found in HALON type fire suppression systems and in air conditioning refrigerants.

18.3 Pest Management Mitigations:

Ensure that pest management mitigation measures are taken into effect, including but not limited to bird screens, rodent proofing, and chemical pre-treatment of wood to prevent termite infestation.

ADDENDUM OF CHANGES

1. 15 April 2008. Paragraph 9.1.2 Transformers. Altered by Ray Worthen to read: "12470 volts delta. Primary case shall be grounded by a ground conductor back to the source Switch."

2. 18 April 2008. Paragraph 8.4. Altered by Ray Worthen to read: "Earthquake valves shall comply with the American Society of Civil Engineers Standard ASCE 25-97, Earthquake Actuated Automatic Gas Shutoff Devices."

3. 25 August 2008. Section 6. Mechanical Systems Design Standard - revised by Ray Worthen to align with UFC 3-400-10N Mechanical Engineering.

4. 25 August 2008. Section 5.5 Meters revised by Ray Worthen to comply with new directions from Base Energy Office.

5. 4 Dec 2008. Appendix A on Security Requirements Revised in accordance with email from Gary Cordon 25 Sept 2008. Edited text highlighting shows changes. Removed requirement for Maintenance Contract Paragraph 10e. Added the following to paragraph 10 f. Depending on resource protected the motions will either be dual-tech or PIR or both. Removed first sentence of paragraph 10g. and removed paragraph 10.h.i. Added paragraphs to end of 11.

6. 3 Dec 2008. Added CADD file naming convention to section 15. Ray Worthen.

7. 3 Dec 2008 Added requirement to use Hill AFB Energy Compliance Forms to paragraph 5.2.2. Removed the option to use alternate energy forms. Ray Worthen.

8. 9 Dec 2008. Reformatted entire document and add interactive index for ease of use. Ray Worthen

10. 16 Jan 2009 Changed lock section to require cores to be purchased by contractor and shipped to Lock shop. Ray Worthen as directed by Jonathan Ramras. Further refinement still due from lock shop.

11. 16 Jan 2009 Corrections to prescriptive table to comply with latest AF ETL 08-13 and most recent Federal Guidance Energy Star Rated equipment. Ray Worthen.

12. 16 Jan 2009 Corrected wording on the window section to require ATFP film laminated safety glass. Per Paul Waite. Ray Worthen

13. 26 Jan 2009. Corrected acoustical ceilings to agree with Arch Comp Stand. All suspended acoustical ceilings shall have a recessed-grid with drop (tegular) edge tile. Tile shall be a 2 by 2 grid or 2x4 grid scored in the center so the 2x4 appears like a 2x2 grid. Per Dave Murray. Ray Worthen.

14. 26 Jan 2009 Corrected Landscaping section to comply with AF ETL 08-13. Ray Worthen

15. 26 Jan 2009 Added Sustainable Design and Development Section to comply with AF ETL 08-13 Ray Worthen.

16. 26 Aug 2009. Changed handicap access design requirements to ABA from UFAS Ray Worthen

17. 26 Aug 2009. Changed Energy Policy to clarify applicable energy code for low rise residential construction. Ray Worthen.

18. 26 Aug 2009 Changed Mechanical Design Requirements for ventilation to reference AF ETL 04-3 on Mold Growth. Ray Worthen

19. 26 Aug 2009 Added section on Indoor Air Quality (IAQ) standards and section for dorms and VOQ's Ray Worthen.

20. 15 April 2010 Extensive changes made to Fire Protection section. By Ray Worthen

21. 15 April 2010 Rearranged some sections to make the whole more consistent. By Ray Worthen

22. 15 April 2010. Major changes to the section on exterior locks and door hardware. By Ray Worthen

23. 15 April 2010. Moved section on security into the document rather than as an attached appendix A. By Ray Worthen

24. 15 April 2010. Included reference to AF ETL 10-2 *Light Emitting Diodes* 18 March 2010 in section 14 which disallows use of LEDs except in very limited applications.

25. 12 October 2010 Changed paragraph 14.1.8 "*Watt-hour meters shall be installed on all facilities requiring new service and modifications to existing facility power requirements. ASHRAE Standard 90.1 2004. Recommend using model "Sentinal" manufactured by Itron*." By Ray Worthen at direction from Harold Gulso.

26. 12 October 2010 Changed paragraph 14.2 to include: *All dry type transformers shall have copper windings.* Ray Worthen at direction from Robert Miller

27. 29 November 2010 Changed paragraph 14.7 to require contractor to run CAT5 cable from HVAC to comm. room. Ray Worthen at direction from Gary Cordon.

28. 4 Feb 2011 Changed paragraph 14.0 to reference new AF ETL 11-10 published 19 Jan 2011 on Electrical Manhole Design and to reference UFC 3-501-01, *Electrical Engineering Design*.

29. 22 Feb 2011. Corrected conflict with Natural Gas pipe line location wire in paragraphs 2.8 and 10.2. Ray Worthen

30. 9 March 2011. Changed paragraph 3.7.10 to require structural design to comply with IBC and UFC 3-301-01 with seismic design complying with IBC chap 16 and UFC 3-310-04. Ray Worthen at direction from Dave Murray.

31. 9 March 2011. Added clarification to definition of single family residential units excluded from ASHRAE 90.1 in paragraph 6.3.4. Ray Worthen.

32. 1 April 2011 Added" All strikes will be 12v dc only. Single exterior doors will have mechanical crash bars/handsets; double exterior doors will have 12vdc electronic crash bars." Per direction Gary Cordon.

33. 13 April 2011 changed reference in paragraph 7.6 to read correctly UFC 3-600-01. Ray Worthen.

34. 13 April 2011 changed reference in paragraph 7.7.1 to delete old AFOSH standard and replace with reference to replacement regulation AFMAN 48-155 Occupational and Environmental Health Exposure Controls. Ray Worthen

35. 13 April 2011. Removed reference to Gas Piping standard that is no longer available. UFC 3-430-05FA Replaced with NFPA 54 National Fuel Gas Code. Ray Worthen.

36. 14 April 2011 Removed reference to AFM 88 -11 and AFM 88-5 and replaced with UFC 3-230-17FA. Ray Worthen

37. 14 April 2011 Removed reference to ETL 90-2 form paragraph 4.3.6 because it was not relevant to that paragraph. Ray Worthen.

38. 14 April 2011 Removed reference to AFPAM 32-1097 replaced with UFC 3-120-01. Ray Worthen

39. 8 July 2011 Added requirement to place Fire Alarm Control Panels in dry and temperature controlled environments. Dave Murray

40. 14 Dec 2011 Modified the naming convention for CADD drawings. Dave Murray

41. 6 Jan 2012 Added a requirement for tanks to also comply with State of Utah requirements, Para 13.1. Dave Murray

42. 18 Jan 2012 Changed requirements for drawing format in Para 16.3. Dave Murray

43. 20 Jan 2012 Construction and Demolition Waste Diversion Para 5.5. Dave Murray

44. 31 Jan 2012 Updated Airfields Section 3.1. Dave Murray

45. 23 Feb 2012 Modified Surveying Section 2.4. Dave Murray

46. 22 Mar 2012 Added UFC-3-400-10N, Section7.16.7.33. Dave Murray

47. 28 Mar 2012 Revised CADD File Naming Convention, Section16.1. Dave Murray

48. 18 May 2012 Cipher locks prohibited, Section 2.5.7. Dave Murray

49. 11 June 2012 Fall Protection Section 4.14.7. Dave Murray.

50. 12 June 2012 Included CE shops requirements Section 14. Dave Murray.

51. 14 June 2012 Added design criteria, Sections 3.1.2.11, 3.1.3, 3.2.1.4 and 3.7.10. Dave Murray

52. 15 June 2012 Updated Metering requirements, Section 6.5. Dave Murray
53. 18 June 2012 Metal halide lights specified, Section14.4.2. Dave Murray.
54. 19 June 2012 Updated Stormwater Pollution Prevention requirements, Section 2.6.2. Dave Murray
55. 3 August 2012 LED exterior lighting specified, Section 14.4.2, Dave Murray
56. 30 August 2012 Roofing Criteria updated Section 4.14.1, Dave Murray
57. 4 Sep 2012 Accessibility clarified Section 4.4, Dave Murray
58. 12 Sep 2012 Introduction updated to clarify order or precedence Section 1, Dave Murray
59. 14 Sep 2012 Foreign Nationals work area restrictions defined, Section 2.5.10, Dave Murray
60. 18 Sep 2012 Fire hydrant color specified, Section 4.8.1, Dave Murray
61. 28 Nov 2012 Introduction revised. Dave Murray
62. 12 Dec 2012 Revised heat tape requirements, Section 4.14.4, Dave Murray
63. 12 Mar 2013 Revised fire hydrant specifications, Section 9.2.1, Dave Murray
63. 29 Mar 2013 Revised fire hydrant specifications, Section 9.2.1, Dave Murray
64. 15 April 2013 Revised Control Systems, Section 7.9.1, Dave Murray
65. 25 April 2013 Added utility line corridor information, Section 3.0, Dave Murray
66. 11 June 2013 Revised design criteria, Section 3.7.10, Dave Murray
67. 1 Aug 2013 Revised system furniture criteria, Section4.3.6 Dave Murray
68. 16 Sep 2013 Revised electric meter criteria requested by Dave Abbott, Section 14.2.9 Dave Murray
69. 16 Sep 2013 Revised the specification for system furniture, Section 4.3.6 Dave Murray
70. 6 Nov 2013 Revised the seeding mixture. Section 4.15.8 Dave Murray
71. 31 Jan 2014 Hot tap water connections prohibited. Section 3.3.7 Dave Murray
72. 14 Feb 2014 CDX-09 change it to CDX-10. Sections 2.5.9 and 4.5.1 Dave Murray
73. 18 Feb 2014 Utility outages changed to 21 days. Section 2.8.5 Dave Murray
74. 19 Mar 2014 Added utility privatization standards. Section 3.0 Dave Murray
70. 16 Jun 2014 Revised the seeding mixture. Section 4.15.8 Dave Murray

71. 20 Nov 2014 Revised fire extinguisher requirements. Section 9.1.11 Dave Murray

72. 11 Dec 2014 Revised fire alarms systems. Sections 9.3, 9.4 and 9.5 Pat Quinn

73. 11 Dec 2014 Revised IDS and ACS. Sections 14.12 and 14.13 Pat Quinn

74. 23 Jan 2015 Added EMCS screens requirement. Section 7.9.1 Dave Murray

75. 19 Feb 2015 Clarified the applicability of remote sites. Section 1 Dave Murray

76. 17 Mar 2015 Specified Augusta handles for Yale latches. Section4.5.4 Dave Murray

77. 31 Mar 2015 Changed requirements for emergency lights, exit signs and LED lighting. Section 14.5. PIVs minimized. Section 9.1.6. Class B wire specified. Section 9.1.6. Eliminated galvanized steel pipe. Section 9.1.5 Dave Murray

78. 6 Apr 2015 Utility system defined. Section 2.8.1 Dave Murray

79. 29 Apr 2015 Added Missile Maintenance and Storage Facilities. Section 2.14 Dave Murray

80. 26 May 2015 Added requirement for STC rated wall penetrations. Section 4.3.2 Dave Murray

81. 29 Jun 2015 Added manual drain valve to strainers. Section 7.5.2.13 Dave Murray

82. 3 Sep 2015 Added Executive Order 13693 and utility incentives in Sections 6.1.1.3 and 6.1.4 respectively. Also updated LED lighting specifications in Sections 14.4 – 14.7 Dave Murray

83. 7 Jan 2016 Added security documents in Sections 2.5.4f and 2.5.4g Dave Murray

84. 7 Jan 2016 Updated IDS standards in Section 14.12.1 Dave Murray

85. 17 Feb 2016 Updated CADD File Naming Convention to A/E/C CADD Standard, Release 6.0 Section 16.1 Dave Murray

86. 5 Apr 2016 Update the Introduction Section 1 Dave Murray

87. 12 Apr 2016 Updated the fire alarm detection system in Sections 9.3.4, 9.3.6, 9.3.8, 9.3.11 and 9.4.1 Dave Murray

88. 29 Apr 2016 Updated interface requirements with utility privatization contractors. Sections 3.0 and 14.1.2 Dave Murray

89. 29 Apr 2016 Added paper towel and toilet paper dispensers. Section 4.3.8 Dave Murray

90. 5 May 2016 Clarified Sections 3.0 and 14.1.2 Dave Murray

91. 5 Jul 2016 Added requirement for inspection platforms for HEX Foam systems. Section 9.1.12 Dave Murray

92. 3 Nov 2016 Revise interaction with American Water. Section 3.0 Dave Murray

93. 22 Nov 2016 Revise interaction with American Water. Section 3.0 Dave Murray

94. 19 Jan 2017 Revised CL&P requirements. Section 14.1.1 Dave Murray

ATTACHMENT 11

HAFB ARCHITECTURAL COMPATIBILITY STANDARDS (DRAFT)

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INTRODUCTION

The Architectural Compatibility Plan (ACP) defines a clear design vocabulary to be used throughout the base, providing specific standards for all aspects of exterior design. Compatible architecture is accomplished with similar buildings, using common design forms, details, materials, site features, landscaping, and streetscapes. Quality and compatibility are achieved through creating a unified visual environment that is based on an Architecture of Community, similar to a campus or small town. The principal design goal is to direct development at Hill AFB toward a livable, attractive, and cohesive installation. The ACP provides the design standards that will help to build compatible facilities and a quality environment. Implementation of the standards will result in the creation of community.

BACKGROUND

Hill Air Force Base is named in honor of Major Ployer Peter Hill (1894–1935), the Chief of the Flying Branch of the U.S. Army Air Corps Material Division of Wright Field, Dayton, Ohio. Major Hill died as a result of injuries he received from the crash of the Boeing Aircraft Company's experimental aircraft Boeing Model 299 at Wright Field, the prototype airplane for what became the famous B-17 Flying Fortress.

Hill Air Force Base traces its origins back to the ill-fated U.S. Army's Air Mail "experiment" of 1934, when the idea originated for a permanent air depot in the Salt Lake City area. In the following years, the Army Air Corps surveyed the region for a suitable location for the permanent western terminus of the air mail. Several sites in Utah were considered, and the present site near Ogden emerged as the clear favorite.

In July 1939, Congress appropriated $8.0 million for the establishment and construction of the Ogden Air Depot. Hill Field officially opened on 7 November 1940. Following American entry into World War II in December 1941, Hill Field quickly became an important maintenance and supply base, with round-the-clock operations geared to supporting the war effort. Battle-worn warplanes like the 26, B-17, B-24, B-29, P-40, P-47, P-61, and others depended on the men and women of Hill Field for structural repairs, engine overhauls, and spare parts. The peak wartime employment at Hill Field was reached in 1943 with a total of just over 22,000 military and civilian personnel. These dedicated men and women rehabilitated and returned thousands of warplanes to combat.

Hill Field became the Hill Air Force Base on 5 February 1948, following the 1947 transition of the new U.S. Air Force away from the U.S. Army and the United States Army Air Forces, into an independent service, as called for by the National Security Act of 1947. This transition actually took place in October 1947, but it took many months to fully implement.

During the Korean War, Hill AFB was assigned a major share of the Air Materiel Command's logistical effort to support the combat in Korea. Hill AFB personnel quickly removed needed warplanes from storage, renovated them, and added them to active-service USAF flying squadrons.

Then during the 1960s, Hill AFB began to perform the maintenance support for various kinds of jet warplanes, mainly the F-4 Phantom II during the Vietnam War, and then afterwards, the more modern F-16 Fighting Falcons, 10 Thunderbolt IIs, and C-130 Hercules, air combat missile systems and air-to-ground rockets. Hill AFB continues to carry out these tasks to the present day.

In this decade Hill AFB is still the sixth-largest employer in the state of Utah, and the third-largest one excluding the State Government and Higher Education. Hill AFB is the home of the Air Force Materiel Command's (AFMC) Ogden Air Logistics Complex which is the worldwide manager for a wide range of aircraft, engines, missiles, software, avionics, and accessories components. The Ogden Air Logistics Complex is part of the Air Force Sustainment Center. With its headquarters at Tinker Air Force Base, Oklahoma, the Air Force Sustainment Center is one of five specialized centers assigned to the Air Force Materiel Command. The host unit at Hill AFB is the Air Force Material Command's 75th Air Base Wing (75 ABW), which provides services and support for the Ogden Air Logistics Complex and its subordinate organizations. Additional tenant units at Hill AFB include operational fighter wings of the Air Combat Command (ACC) and the Air Force Reserve Command (AFRC). Ogden Air Logistics Complex provides worldwide engineering and logistics management for the F-16 Fighting Falcon, F-35, F-22, 10 Thunderbolt II, and Minuteman III intercontinental ballistic missile and a myriad of other aircraft types.

PURPOSE

The purpose of the Architectural Compatibility Plan (ACP) is to define design standards for buildings, site development, and streetscapes that serve to integrate the visual character throughout the base. The ACP will help ensure consistent

quality design decisions by commanders, planners, architects, engineers, maintenance staff, and residents. It promotes clear, concise communication between the Hill AFB personnel and design professionals. This plan applies to self-help initiatives, small projects, and operations and maintenance activities as well as large construction efforts. The ACP is referenced from and supports the Hill AFB General Plan as a key component plan.

This Architectural Compatibility Plan sets a minimum standard for quality control, and is intended as a baseline, or beginning point, for the built environment on Hill Air Force Base. All structures, regardless of size, typology, or placement must adhere to the standards set forth in this ACP. However, architects and designers are encouraged to further explore design options within the framework of this ACP.

VISION

Although budgets are generally conservative, in response to tax payer funding, buildings should strive to have strong sense of design, reflect the Architectural Mission and Vision of the United States Air Force and Hill Air Force Base.

United States Air Force Mission:

To fly, fight and win...in air, space and cyberspace.

United States Air Force Vision:

The United States Air Force will be a trusted and reliable joint partner with our sister services known for integrity in all of our activities, including supporting the joint mission first and foremost. We will provide compelling air, space, and cyber capabilities for use by the combatant commanders. We will excel as stewards of all Air Force resources in service to the American people, while providing precise and reliable Global Vigilance, Reach and Power for the nation.

Hill Air Force Base Architectural Mission:

To provide a physical, functional and visionary support to the Mission of the United States Air Force.

Hill Air Force Base Architectural Vision:

- Provide structures that reflect strength, integrity, safety and respect to surroundings, users and the general public
- Define a process and Plan that will create a minimum standard, but allow for flexibility and diversity in design.

The mission and vision statements above should be referenced and used at all times when a project is being developed.

HOW TO USE THIS GUIDE

This document shall be used in conjunction with the current International Code Council publications, ADA Accessibility Plans (ABA), Anti-Terrorism/Force Protection, and other publications as noted under references. It shall be used in combination with Whole Building Design Plans (wbdg.org) focusing on:

- Accessibility
- Aesthetics
- Cost Effectiveness
- Functional/Operational
- Historical Preservation (where applicable)
- Productivity
- Security/Safety
- Sustainability

The ACP defines six architectural settings, or Groups: Industrial Complex, Administration/Support, East Side Development, Falcon Hill Nation Aerospace Research Park, UTTR (Oasis Compound) and Little Mountain. Maps showing the extent of these areas are provided. Groups may contain one or more building types, listed below, sometimes adjacent to one another. Designs for all buildings within a Group must be compatible to nearby adjacent building, site characteristics and context, regardless of building type.

The Installation Development Plan (separate document) refers to Planning Districts on base, which closely correlates with some of these groups. The Group descriptions reference the Planning Districts that relate to the particular Group.

General and specific design standards for all buildings are included in the Building Types section. There are 5 types of buildings generally found on base: Industrial Buildings, Office/ Support Buildings, Storage Buildings, Ancillary Buildings and Housing (Dormitories).

Specific guidance is given in the Design Standards section and provides specific guidance on design elements, materials, fenestrations, interior design, sustainability and landscaping.

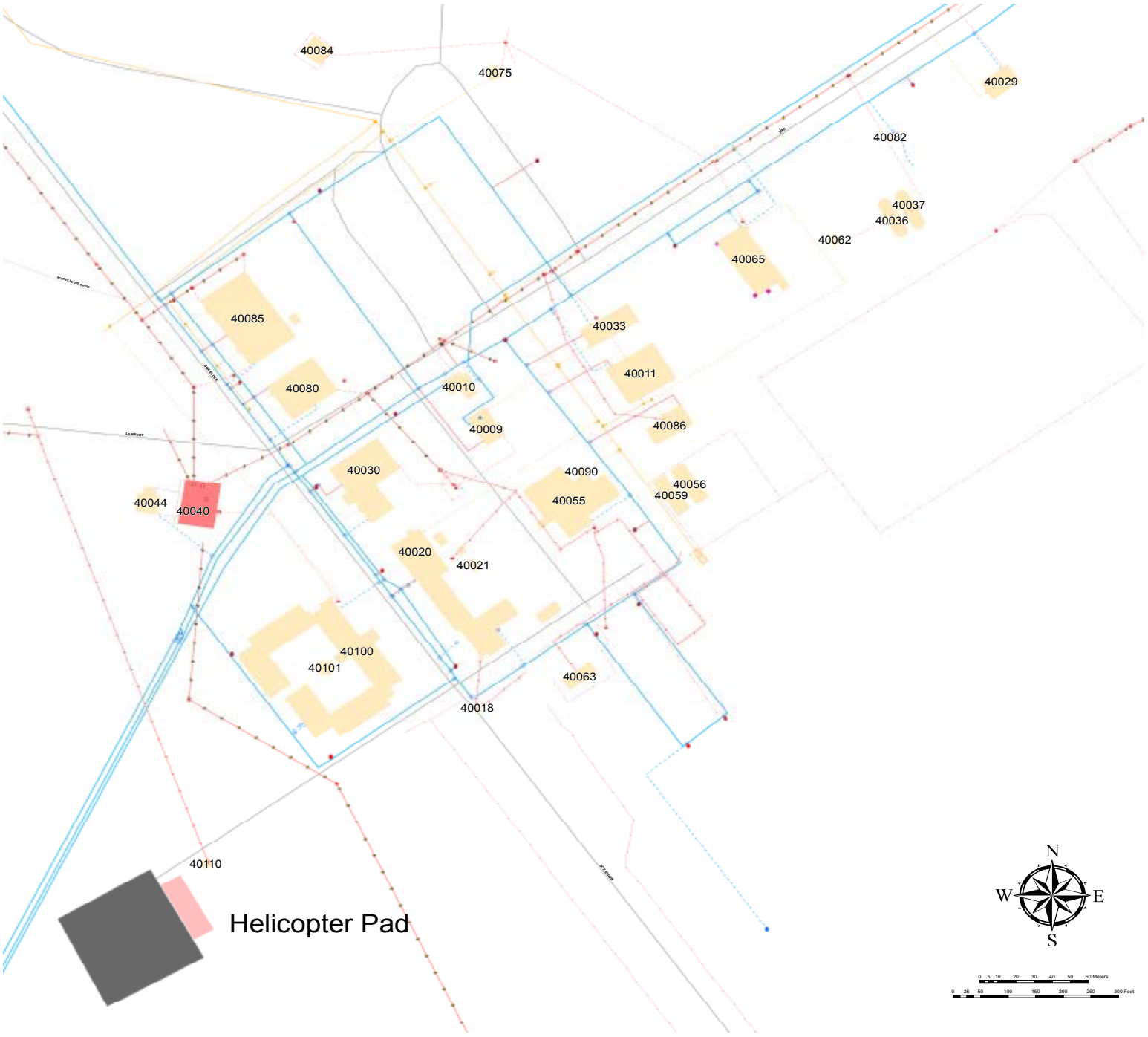
The Implementation Section defines methods to facilitate the coordination and approval of design submittals. It outlines key elements to ensure success in designing and constructing excellent facilities. It discusses the traditional design process, highlights the importance of site analysis, and describes the role of the Architectural Review Board (ARB).

The Appendices provide additional information including acceptable building materials and colors, landscape materials, Architectural Conceptual Details, examples of acceptable vs. unacceptable designs and examples of Architecturally Significant Buildings. Use the Appendices in conjunction with the general text of the ACP as a quick reference to specific materials and color specifications.

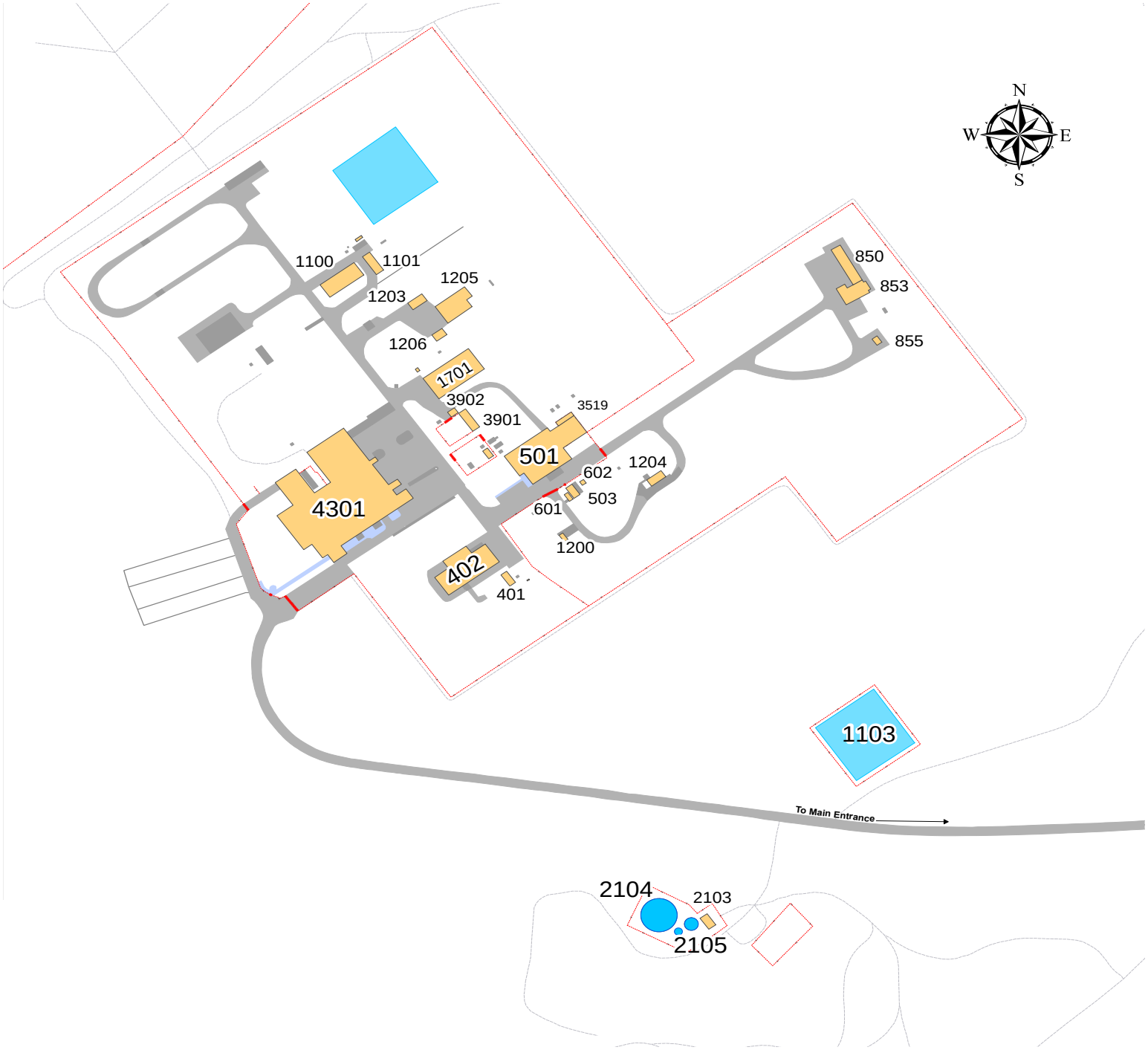
ARCHITECTURAL SETTINGS

THERE ARE 6 ARCHITECTURAL SETTINGS, OR GROUPS OF BUILDINGS ON THE BASE:

Group 1: Industrial Complex / MAMS
Group 2: Administration/Support
Group 3: East Side Development
Group 4: Falcon Hill National Aerospace Research Park (Falcon Hill)
Group 5: UTTR (Oasis Compound)
Group 6: Little Mountain



ARCHITECTURAL SETTINGS (UTTR)



ARCHITECTURAL SETTINGS
(LITTLE MOUNTAIN)

GROUP 1: INDUSTRIAL COMPLEX

The Industrial Complex of buildings encompasses aircraft hangars and maintenance facilities, on the west side of the flight line, north of Wardleigh Road, and the warehouse facilities west of F Avenue, incorporating the MAMS area. These areas are identified in the Installation Development Plan as the Industrial, Air Field and Munitions Districts.

Group consists of existing and new facilities directly related to mission functions:

- Aircraft and vehicle maintenance buildings
- Aircraft hangars
- Administrative facilities
- Warehousing
- Munitions Maintenance and Storage Buildings
- New buildings and renovations shall conform to the standards for Industrial Type buildings.
- Other building types are also occasionally located in this Group, such as Administration Types and Ancillary Types. These types of buildings shall conform to the standards for their respective buildings, but shall also be sensitive to the adjacent architecture and context.
- Buildings in the MAMS area are industrial buildings and primarily shall be designed to the standards for industrial buildings and also for MAMS standards.

GROUP 2: ADMINISTRATIVE/SUPPORT

The Administrative/Support Group of buildings is located in the heart of the base, near its southern edge. It is bounded by 3rd Street on the north, Southgate Road on the east, the base boundary on the south, and F Avenue on the west. The area totals approximately 174 acres. This area includes most of the major Commercial and Community Service facilities related to support functions and base personnel, such as the Fitness Center, Medical Clinics, unaccompanied Housing and Visitor Quarters, and the Education Center. The commissary, theater, dorms, chapel, and other such buildings are also included in this group. This area is identified in the Installation Development Plan as the Community District.

Group consists of existing and new facilities directly related to mission support functions:

- Community support buildings (.e.g. libraries, theatres, retail, worship, fitness facilities)
- Dormitories, firefighting facilities
- Administrative facilities

- New design must comply with the standards set forth in the Office/Support Building Types.
- The goal of the Administrative/Support Group is to provide grouped, accessible community facilities in an efficient arrangement with associated centralized parking and pedestrian walkways.
- Other Building Types are also occasionally located in this Group, such as Industrial and Ancillary Types. These types of buildings shall conform to the standards for their respective buildings, but shall also be sensitive to the adjacent architecture and context.

GROUP 3: EAST SIDE DEVELOPMENT

The East Side is bordered on the north by the old alert area, on the east by the base eastern perimeter, on the south generally by Hubbard Golf Course, and on the west by the main runway and its associated imaginary surface. The eastern perimeter may be expanded to include off-base land to accommodate new requirements. The East Side is planned to accommodate a number of functions in the future years, although its primary focus is and will be depot-level aircraft repairs/maintenance and upgrades. This area is identified in the Installation Development Plan as the East Side District.

- Group consists of existing facilities directly related to mission functions:
  - Aircraft maintenance buildings
  - Aircraft hangars
  - Aircraft Support Buildings
  - Administrative facilities
  - Warehousing & Storage
- Other building types are also occasionally located in this Group, such as Administration Types and Ancillary Types. These types of buildings shall conform to the standards for their respective buildings, but shall also be sensitive to the adjacent architecture and context.

GROUP 4: FALCON HILL NATIONAL AEROSPACE RESEARCH PARK

In response to the installation's need to replace 1.5 million Square Feet of inadequate facilities, Hill Air Force Base leased 550 acres of land to a private developer as part of the Enhanced Use Leasing (EUL) project known as the Falcon Hill National Aerospace Research Park (Falcon Hill). The Falcon Hill EUL is the first Air Force commercial office and retail EUL. It is also anticipated to be the largest and most financially successful office EUL project in Department of Defense history.

During the development of the EUL site, the existing Air Force tenants in the 1200 zone buildings will remain in place until new facilities can be constructed. Personnel will be relocated into new office space on a building-by-building basis, at which time 1200 zone buildings will be demolished.

New buildings in the Falcon Hill architectural setting of the base shall match the architecture, style, materials, glazing & colors of the new privatized multi-story buildings in this area. Design may not conform with the compatibility standards for the rest of the base, as much as it needs to reflect the state -of-the-art architecture for commercial design, innovations and sustainability. Although the scale of the building may be reduced, it is still required to match this architecture. This area is identified in the Installation Development Plan as the EUL District.

- Other Building Types may also occasionally be located in this Group, such as Administrative, Industrial and Ancillary Types. These types of buildings shall conform to the standards for their respective buildings, but shall also be sensitive to the adjacent architecture and context of the Falcon Hill Development.

Group consists of existing and new facilities directly related to mission support functions:

- Primarily administrative buildings

The Falcon Hill Group also includes Historical Residential Buildings.

- Refer to Historical Preservation for requirements related to these buildings.

GROUP 5: UTTR (OASIS COMPOUND)

The Oasis Compound and its adjacent Missile Storage Area (MSA) are located on the northern portion of the Utah Test and Training Range (UTTR). The 75th Civil Engineer Group manages the Air Force portion of the UTTR, which is nearly one million acres. The entire UTTR consists of 1.8 million acres of restricted land and almost 13,000 square nautical miles of airspace west of the Great Salt Lake. It is approximately 48 air miles west of Hill AFB.

- The UTTR is a primary test site of advanced strategic weapons systems and provides extensive capability to support aerial training exercises. It is also the site at which missile motors are destroyed under the START I treaty.
- The main Oasis Compound area comprises approximately 124 acres. It has a daily population of approximately 70 personnel, totaling 4,612 acres, including 2,858 acres in the Missile Storage Area (MSA) and its associated Explosive Clear Zone arcs.
- The built environment at Oasis was constructed from 1960 to 1998. The MSA and most industrial facilities date from the period 1964 to the mid-1980s.
- The built-up area is located at an altitude of 4,425 feet and surrounded by slightly higher UTTR ground in all directions.
- Access to the Oasis Compound is via the paved, Air Force-maintained Box Elder County road, exiting north off I-80 approximately 50 miles west of Salt Lake City.
- New design, construction additions, renovations must comply with the standards set forth for the specific Building Type required - in general: industrial and administrative support.

Group consists of existing and new facilities directly related to mission functions:

- Administrative facilities
- Warehousing
- Munitions Maintenance/storage
- Storage

GROUP 6: LITTLE MOUNTAIN

The Little Mountain Test Annex is situated on 740 acres northwest of Hill AFB on the shore of the Great Salt Lake 13 miles west of Ogden, Utah, at the end of S.R. 39. Little Mountain sits at the base of a small bowl and almost all its unoccupied, open space is moderately to severely sloped. It is owned by the Air Force and operated in conjunction with defense contractors.

- The Survivability and Vulnerability Integration Center at Little Mountain is a state-of-the-art AFMC laboratory dedicated to simulation testing of nuclear hardness, survivability, reliability, and electromagnetic compatibility of defense systems.
- Test laboratories simulate environments for nuclear radiation, air blast, shock and vibration, electromagnetic pulse and electromagnetic interference, and compatibility testing.
- The majority of the facilities at Little Mountain lie at an altitude of approximately 4,275 feet. Surrounding land rises to an altitude of more than 4,660 feet along the installation eastern boundary and 4,400 feet to the south of the occupied area.
- New design, construction additions, renovations must comply with the standards set forth for the specific Building Type required - in general: industrial and administrative support.

Group consists of existing and new facilities directly related to mission functions:

- Administrative facilities
- Warehousing
- Munitions Maintenance/storage
- Storage

BUILDING TYPES

INDUSTRIAL BUILDINGS:

These are typically large hangar buildings and their support structures, as well as maintenance, missile and munitions facilities. Primarily located in the Industrial setting of the Base and the East Side Development, but could occur anywhere.

- Design will primarily address and reflect the functional aspects of the building, but be smartly attractive in a military fashion.
- These buildings shall be a combination of masonry, metal wall panels or concrete panels. Typically, the administration portion of these type facilities shall be full height masonry. Masonry shall typically be split face CMU, or Atlas jumbo brick or a combination thereof. See Appendix 2 for Conceptual Details.
- Masonry or concrete wainscot shall be a minimum of 4'-0 height, but otherwise be proportional to the overall height of the building by 1/3 of the building height.
- Do not use metal panels or concrete panels as the sole material for any structure for this type.
- Use accents such as wainscots, smooth face CMU architectural accents, and/or columns, to help with scale, proportions and improve massing. Smooth face CMU may be used for accent. See Appendix 3 for examples.
- Provide building contrasting accent by way of door and window trim, as well as by roof flashing components - including gutters, downspouts, fasciae and soffits.
- Materials and Colors shall comply with Appendix 1: Materials and Colors.
- Consider using non-reflective, light colored walls and roofs to reduce solar gain.
- Light color roofs are preferred, although, dark may be considered.
- Landscaping - see Appendix 4: Landscape Plants, materials and Irrigation for types of plants suitable for this area.
- Structure may be steel or concrete for wide span structures.
- Canopy shall be designed and integrated into the building, for sense of entry. See Appendix 3 for appropriate/acceptable canopy types.

OFFICE/ADMINISTRATIVE/SUPPORT BUILDINGS:

Primarily located in but not limited to the Administration Support setting. Includes Community Facilities such as the commissary, theater, dorms, fitness facilities, chapels, and other such buildings.

Exception: New buildings in the Falcon Hill architectural setting of the Base shall match the architecture, style, materials, glazing & colors of the new privatized multi-story buildings in this area. Although the scale of the building may be reduced, it is still required to match this architecture.

- Consider massing, scale and proportions befitting of a human scale.
- Design shall be aesthetic looking, reflect the function of the building, be welcoming and inviting.
- Buildings shall be brick, and/or split-faced CMU or a combination thereof. Use full-height solid masonry.
- Use accents, by way of brick profile coursing (soldier et.al.), honed CMU, door and window trim, and glazing; as well as by roof flashing components - including gutters, downspouts, fasciae and soffits.
- Concrete wainscots, accents, columns are encouraged for architectural definition of the building.
- Colors shall comply with Appendix 1: Materials and Colors.
- Earth berming (3:1 slope maximum) is encouraged for these buildings, both for aesthetics and energy savings. Refer to Appendix 3 for examples.
- Buildings shall have an aluminum storefront main entry, associated sidelights, air lock vestibule, walk off mat and accompanying canopy.
- Landscaping - see Appendix 4: Landscape Plants, materials and Irrigation for types of plants suitable for this area.
- Provide a strong sense of entry by the use pathways, canopies, landscape and exterior furnishings.
- Standard bronze or clear anodized aluminum window frame with insulated clear or bronze tinted windows shall be used.
- Daylight shall be maximized in all office buildings.
- Sun control shall be considered as part of the design of the building.
- Roofing and roofline design in this group shall have a higher level of articulation than simply utilitarian. See Appendix 3 for acceptable/unacceptable examples.

STORAGE BUILDINGS

Primarily located in, but not limited to the Industrial complex setting of the Base.

- Design shall reflect the function of the building, but be smartly attractive in a military fashion.
- These buildings shall be split-faced CMU; metal wall panel siding; tilt-up concrete panels, or a combination thereof.
- CMU Wainscot on metal wall panel buildings shall be minimum of 4'-0 height, but otherwise be proportional to the overall height of the building by 1/3 the building height.
- Provide contrasting building accent by way of doors, windows, louvers and associated trim; as well as by roof flashing components- including gutters, downspouts, fasciae and soffits.
- Colors shall comply with Appendix 1: Materials and Colors.
- Landscaping - see Appendix 4: Landscape Plants, materials and Irrigation for types of plants suitable for this area.

ANCILLARY STRUCTURES

These buildings are located in all Architectural settings of the Base.

These structures include, but are not limited to: pavilions, bus shelters, smoking shelters, small storage buildings, temporary trailers.

- Designs for these structures shall be consistent in color, material, shape, form and proportion – all across the Base in order to provide continuity in the outdoor spaces and reduce visual clutter.
- See Appendix 3: Acceptable vs. Unacceptable Designs for good/bad examples of these type structures.
- All proposed ancillary structures shall be reviewed and approved by the Architectural Review Board – 75 CEG/CEN (ARB) before procurement and installation. Typical procedural approval is through the Base AF 332 review process.

Coordinate the siting of all ancillary structures with each other and adjacent buildings.

- Use of non-weatering, corrosion resistant permanent materials
- Landscape ancillary structures consistent with larger structures.

- Integrate the structure with landscaping, and other site elements.
- Temporary facilities are prohibited unless special approval is granted as specified in AFI 32-1021 Chapter 6.
- Minimize the use and number of storage buildings, and consolidate in low-visibility areas.
- Colors shall comply with Appendix A1: Materials and Colors.

PAVILIONS

- Locate pavilions centrally among several facilities to create multipurpose use.
- Construct new pavilions with brick columns and low-sloped gable, standing seam metal roofs at high-visibility locations.
- Use manufactured pavilions in low visibility locations with ARB approval only.
- Wood gazebos are not allowed.

PASSENGER WAITING AND SMOKING SHELTERS

- Provide a combination of pre-finished metal, glass and standing seam metal roof
- Provide glazing front and back to allow for views and wind protection for the user.
- Use brick pavers or scored pavement patterns as accent.

KIOSKS

- Locate kiosks at high public use areas such as shopping areas, housing areas, and recreation areas.
- Design kiosks with metal roofs, brick, wood and precast concrete details compatible with surrounding architecture.

TEMPORARY STRUCTURES

Temporary Structures include trailers or temporary storage spaces – Consult Architectural Review Board (ARB) for temporary structures.

Tough sheds (or temporary storage – small usually 10’ x 10’) are a frequent occurrence across the Base.

- Tough sheds shall be designed and detailed in accordance with Appendix 2: Architectural Conceptual Details. No other alternatives shall be acceptable.
- Locate temporary structures\ among several facilities to create multipurpose use.

HOUSING (DORMITORIES):

Housing dormitories are located in the Administration/ Support setting of the Base.

- These are mid-density buildings that house enlisted personnel.
- Dormitories should include community spaces.
- Designs for these structures shall match dormitory Building #341 in style, detailing, shape & organization.
- This Building Type is considered to be “Architecturally Significant“. See Appendix 5: Architecturally Significant Buildings.
- Carefully consider using forms and proportions to create an inviting structure that relates to the human scale.
- Every unit shall have natural daylight.
- Brick shall be the primary exterior material.
- Provide contrasting building accent by way of doors, windows, louvers and associated trim; as well as by roof flashing components- gutters, downspouts, fasciae and soffits.
- Colors shall comply with Appendix 1: Materials and Colors.
- Roofs shall be standing seam metal.
- Landscaping - see Appendix 4: Landscape Plants, materials and Irrigation for types of plants suitable for this area.

HISTORICAL:

These buildings are located primarily in the Administration/ Support setting of the Base, as well as in the Falcon Hill setting of the Base.

- Designs for these structures shall match the adjoining adjacent structures in style, detailing, shape & form. See Photos this page for typical matching architecture..

DESIGN STANDARDS

Design standards for buildings and supporting elements are outlined in this section. These standards encourage architectural compatibility using common forms, materials, colors, and architectural details. The goal is to design excellent facilities that satisfy all of these priorities.

- The first priority is to achieve architectural compatibility for Hill Air Force Base as a whole.
- The second priority is compatibility within an architectural setting or Group.
- Outstanding designs for individual buildings or facilities are the third priority.

Hill AFB has a foundation for architectural unity. The existing architecture depicts a predominant materials palette and a consistency of material detailing.

- The following design standards are applicable to the entire installation, to both host and tenant organizations.
- Site planning and site development issues contribute significantly to the architectural context.
- Building setbacks and the scale and definition of space are as fundamental to creating architectural compatibility as consistent façade designs.
- Develop exterior spaces to promote pedestrian use and activity and to connect buildings and the landscape.
- Use the landscape with other visual elements to create greater continuity.
- Develop a strong relationship between buildings and exterior spaces.
- From parking lots to front entry a clear pedestrian path should be considered, use of delineated pathways, sufficient lighting and accessible routes should be provided.
- Providing Pedestrian connections between buildings is also imperative.
- Buildings should be oriented to meet the best solar orientation possible.
- Attention to views, neighboring structures should influence the orientation of the building.

ARCHITECTURALLY SIGNIFICANT BUILDINGS

Buildings of significance require a higher level of design articulation in the exterior look of the building than simply meeting the Base Architectural Design Standards. The Base Architectural Design Standards are required to be met as a minimum baseline. However, the architectural features described in this book are to be combined, articulated, accentuated and taken to a higher level of overall design pronunciation or expression—in order to meet what would be considered to be an "Architecturally Significant Building".

Metal buildings, in and of themselves, are not buildings of significance, nor are simple rectangular buildings with gable roof designs.

Buildings of significance shall be defined by building angles, recesses, roof overhangs, varying roof line and façade elevations, earth berms, incorporated daylighting, clerestories, large window expanses (floor to ceiling), articulation in varying wall façade facing materials (split face, smooth face, honed, coursing), use of metal wall panel in selected locations and pronounced major entry with associated landscaping. Not all of the above may be required or necessary, but enough of the above shall be used to make the building befit an "Architecturally Significant Building." See Appendix 5 for examples.

designs

The ARB (Architectural Review Board) shall review all "Architecturally Significant Building" design at the 35% design review meeting. Submittal requirements shall be as follows:

- Site plan showing parking, sidewalks and landscape design intent—
- Rendered (colored) exterior elevations—minimum of two sides (front major entry and secondary)
- Bird's eye perspective showing the best overall view of the building looking at the main entry area
- Color board—having actual material samples of all proposed exterior facing materials

ANTI-TERRORISM / FORCE PROTECTION

Anti-Terrorism design must be incorporated into and

coordinated with the Architectural design of buildings as required. Refer to UFC 4-010-01 and UFC 4-010-02. Contact James Hagemeir and or TSgt. Carlin Ruiz for further information @ 801 777 6155 or 801 777 1868.

BUILDINGS

Achieving compatibility among buildings is essential in creating an Architecture of Community.

- Develop facilities with a common design theme and character to enhance architectural compatibility.
- Unity is the goal, not conformity.
- Observe all horizontal and vertical safety restrictions along the flight line.

Style / Form

- Emphasize horizontal proportions on building elements.
- Use clean, simple, contemporary forms and avoid curves or angular elements in plan.
- Develop a strong relationship between buildings and exterior spaces.
- Articulate building façades to create areas of shade and shadow. Create shadow lines at overhang and window sills.
- Use masonry detailing as accents in walls combined with sloped roofs and modest eaves.

Scale / Massing

- Reduce the monumental appearance of large structures by developing smaller massing components.
- Combine functions whenever possible to avoid a proliferation of small independent structures.
- Break up the mass of large structures to allow for slope roofs to the maximum extent.
- Lower the apparent height of hangars and warehouses by modulating building elevations with sub-masses, clerestories, openings, material changes, and architectural detailing.
- Avoid large, flat façades.

Existing Buildings

- Match the existing materials for addition / alteration projects unless a significant change to the exterior envelope is included.
- Whenever possible bring existing facilities into compliance.

WALL SYSTEMS

Walls provide the principal details and architectural features for buildings. These contribute significantly to the character of the base. Limit the palette of materials that is to be used and integrate landscape berming when it is appropriate. Consistent use of colors and materials will bind the base together and reduce visual clutter caused by too much diversity.

- Split face CMU with honed CMU or brick for accent. Brick accent shall be used as a soldier, header, rowlock, sailor or similar brickwork pattern to achieve accent.
- On large facilities such as storage or industrial type facilities use a combination of masonry and flat metal sandwich panels. Simple corrugated metal wall panels may be used (where authorized – see Building Types)
- Locate visible vents and louvers as planned design elements; avoid random placement.
- Vents and louvers are to match the color of adjacent surfaces or shall otherwise be Dakota brown.
- See Appendix A1: Materials and Colors for base standard colors for wall materials.
- See section on Sustainability, especially as related to Air Barriers.

Concrete:

- Concrete can be used as an emphasis on foundation & grounding of a building.
- Concrete may extend to window sills – especially with the use and employment of bermed walls. See Appendix 3 for acceptable examples.
- Where tilt panel concrete is used as full height walls, employ the use of reveals or other textural elements to differentiate the wall.

Brick:

Brick is a sturdy material that is widely used in Utah as an exterior material.

- A standard running bond brick with standard tooled joints is recommended in most cases. However, a stacked bond is acceptable for accent purposes.
- Provide accent features in the brick with slight reveals in the wall plane surface, or by use of a brick profile (soldier, rowlock et.al.)
- Header, rowlock and soldier coursing over openings are encouraged.

- Joint sealants in brick shall match mortar color. When adjacent surfaces are the same color use a darker joint sealant in the same color.
- Efflorescence is unacceptable; designers must apply appropriate attention to detail and specification to avoid efflorescence.

Three conditions must exist before efflorescence can occur. If these conditions are controlled, there should be no efflorescing of masonry walls.

1. Reduce all soluble alkali sulfates.
2. Use good details to prevent water from entering the masonry.
3. Use good construction practices to eliminate migratory paths for moisture.

Thin Brick:

- Thin brick may be considered for use w/ARB (Architectural Review Board) approval only.
- Thin brick shall be detailed according to Appendix 2: Architectural Conceptual Details.

CMU Block:

- Split-faced, honed and regular faced block are acceptable.
- All CMU shall have an integral water repellent admixture mixed into the manufacture of the CMU.
- Regular face block may only be used as an accent – see Appendix 3: Acceptable vs. Unacceptable Designs.
- Provide accent features with slight reveals in the wall plane surface, or by use of bands of color or texture to add scale and proportion to the wall.

Metal Panel:

Insulated metal panel and un-insulated metal panels are permitted on base as follows:

- Insulated metal sandwich panels shall be used on major industrial buildings, such as hangars and major repair facilities. Major facilities are defined as buildings which are occupied daily on a regular basis for the purpose of conducting business, either repair, logistical, administrative or similar.
- Metal panel with batt insulation backup with interior liner panel is acceptable on buildings considered less than “major,” typically industrial buildings non occupied most of the time and located in low visibility areas of the Base. Shall be with ARB approval only.

- See section on Sustainability for Air Barrier requirements.
- Un-insulated metal panels are only acceptable where no interior heating or cooling or otherwise interior environmental control is required - typically storage buildings which are not occupied.on a regular basis.
- Proportions, scale, direction of metal panels, etc. shall be discussed and approved by the ARB.
- Exposed fasteners (screws) are not acceptable for either roof or wall panels except by ARB approval only.
- All exposed metals shall be factory finished with a fluoropolymer coating baked on enamel finish—Kynar 500. Silicone applications are not acceptable.
- Do not use metal panels as the sole material for any structure – refer to Building Types.

Exterior Insulation Finish System (EIFS):

EIFS is not acceptable as a skin system for buildings on Hill AFB, unless specifically authorized by MILCON, RFP, MACC contract or otherwise with ARB approval in writing where it is specifically called for to be used. If used, the following materials shall be provided:

- Primer/Sealer: to protect substrates from moisture penetration and to improve the bond between substrate and insulation adhesive
- Insulation Adhesive: Factory-mixed non-cementitious formulation designed for adhesive attachment of insulation to substrates
- Molded,(Expanded)RigidCellularPolystyreneBoard Insulation (EPS)
- Reinforcing Mesh
- Base-Coat Materials: Factory-mixed non-cementitious formulation of polymer emulsion adhesive and inert fillers that is ready to use without adding other materials.
- Primer: EIFS manufacturer's standard factory mixed, elastomeric-polymer primer for preparing base-coat surface for application of finish coat.
- Finish-Coat Materials: Factory-mixed formulation of polymer-emulsion binder, colorfast mineral pigments, and fillers used with stone particles for embedding in finish coat to produce an applied-aggregate finish.
- Provide reveals, control joints (for crack control) and other similar delineation features in EIFS to break up large wall expanses.
- Refer to Appendix 2: Architectural Conceptual Details for specific details for EIFS systems These details are required to be used for all EIFS systems.

Stucco:

This material in and of itself is not acceptable. Stucco must be used in conjunction with a "system" such as EIFS. See Appendix 2: Architectural Conceptual Details. This system is not a Base Standard and is only authorized by MILCON, RFP, MACC contract or otherwise with ARB approval in writing, where it is specifically called for to be used.

Architectural Precast Concrete/Glass Fiber Reinforced Concrete (GFRC):

- Precast is permitted in the context of earth berm structures or as a knee wall (4'-0 max height typical but proportional to overall building height – see Building Types) in the context of masonry or metal as the case may be.
- Precast is appropriate for lintels, sills,

belt courses, friezes and earth berm structures.

- Other façade elements made of precast should be used sparingly, to ensure that brick, CMU and/or metal - as the case may be - remains the prominent material.
- Natural is the standard color for precast concrete.
- Detailed designs and patterns shall be cast into the pieces to create an individual character for a single facility or complex.
- Site-cast components require ARB approval.
- GFRC is an acceptable material system, with ARB approval, including color selection, finish and detailing.
  - Proportions, scale, direction of panels shall be discussed and approved by project managers on base.
  - GFRC to be installed in a rain screen type system.
  - Consideration shall be given to detail around windows and doors.

Other Materials

- Trespa, a high performance laminate, will be considered with ARB approval only.

Accents / Detailing

- Major facilities in high visibility areas shall demonstrate a greater application of detailing. High visibility areas are the Administrative/Community group, Falcon Hill (EUL) and the Eastside Development.
- Architectural accents such as lintels, sills, belt courses, pilasters, and columns or other contextual details are encouraged to break up flat façades and add visual interest.

Wall Components

- Organize and coordinate placement of all mechanical, electrical, lighting, communication and other building components.
- Integrate vertical components such as downspouts and control joints into the overall organization.
- Do not expose conduits, cables, and piping on walls. Provide Architectural details of how to incorporate these elements into the wall architecture..
- Electrical / communication boxes shall match the wall surface color on which the equipment is mounted

ROOF SYSTEMS

In Utah it is not uncommon to see pitched roofs as a dominant form of the built environment. The pitch is a result of heavy snow loads and a simple solution to shed such loads. Pitched roofs work well at a certain scale. Architectural roof slopes & shapes shall be discussed very early on in the design process (35% design stage or before) with the specific Project Manager and the ARB.

Roof form, material, and color are promominent features and play a significant role in architectural compatibility across the Base Architecture.

Roof submittals shall include calculations for wind uplift and associated fastening details. Roof submittals shall be coordinated for gutter, fascia and the roof and demonstrate an integral design/assembly, which in the field shall be executed as a holistic effort.

Roof Configuration:

- Gable, cross gable, hip, cross hip, saltbox, shed or low slope roofs or a combination thereof are acceptable for all facility types. All roof configurations, low slope (3:12 or less) or otherwise, are required to have a defining roof fascia and soffit trim to better articulate the building and reduce the utilitarian appearance that characterizes some many buildings on Base, especially in the case of metal buildings.
- The standard pre-engineered metal gable and eave trim finish is not acceptable, except by ARB approval only. See Appendix 3 for what is considered acceptable and what is considered unacceptable for roof fascia & soffit trim. Also, see Appendix 2 Standard Conceptual Details for acceptable fascia and soffit trim depictions. This level of detail is especially required in the Administration/Support, Eastside Development, Falcon Hill and portions of the industrial Complex.
- Membrane roofs are preferred for roof slopes 1:12 or less, unless there is a good justifiable reason to do a metal roof and with ARB approval only. Acceptable membrane types are Modified Bitumin, EPDM & PVC. Thermo Plastic Olefin (TPO) is not acceptable. Typical bituminous built up roofs w/ multiple felt layers and gravel topping are not acceptable.
- Membrane roofs shall not be less than ½ in 12.
- Roofing for large industrial buildings shall be membrane roofing where the roof slope is 1:12 or less.
- All roofing details for all roof systems shall comply with NRCA (National Contractor's Roofing Association) standards.
- Provide screening for rooftop mounted equipment (See Appendix 3: Acceptable vs. Unacceptable Designs for acceptable configurations)
- Provide fall protection on all sloped roofs
- Divert water away from building entrance and pedestrian walkways.
- Protect entrances from falling snow, ice and rain.
- Provide snow guards at entrances and when sidewalks are next to a building. Snow guards shall be mechanical compression type only. Adhered, or tape-applied, guards are not allowed. No roof penetrations are allowed for snow guards.

Materials and Color

- For metal roofs, 16" wide panels with a 1-1/2" high seam is the Base Standard.
- Roofing color shall be Base Standard (See Appendix A1: Materials and Colors).
- Fasciae and soffits shall match the roof color.
- Roof flashing shall match the roof material and color.
- Stepped flashing at the intersection of roofs and walls shall match roof color.
- Metal roofs less than 3:12 shall be standing seam metal - machine seamed with a mechanical seamer.
- Membrane roofing is preferable for low-sloped roofs.. Refer to building types. A typical 20 year manufacturer warranty + a 2 year installation warranty is required

Fasciae, Gutters and Downspouts

- It is preferable to design buildings without the need for gutters and downspouts. Where roofs are designed without gutters and downspouts, water shall be directed away from the building by roof overhangs and landscape river rock at the base of the building perimeter - see Appendix 3: Acceptable vs. Unacceptable Designs
- Provide properly proportioned, continuous turn-down standing seam metal fasciae or fascia panels for all roofs. See Appendix 2 Standard Details and Appendix 3: Acceptable vs. Unacceptable Designs for acceptable examples.
- Façade finish shall match the roof material and color.
- Gutters and downspouts on sloped roofs are required

for all entrances where roof water would otherwise drop on pedestrian walkways, regardless of building size.

- Provide calculations for gutter and downspout sizing and associated structural support details. Provide calculations with 35% design submittal.
- For design not requiring gutters and downspouts, provide a minimum of 5'-0" wide river rock all around the perimeter of the building. Refer Appendix 4: Landscape Plants for definition/ parameter of river rock.
- All gutters & downspouts shall be designed in accordance with the Sheet Metal and Air Conditioning Contractors National Association (SMACNA) standards – latest edition.
- Provide heat cable, routed in the gutter and downspout for the entire length.
- Heat tape shall be self-regulating heat cable, and UV stabilized, with a weatherproof outer jacket.
    - Heat cable system shall incorporate a control panel with integral contractors accessible inside the building.
    - The control panel can be activated manually, or with a snow / ice sensor.
    - All systems shall conform to the requirements of Underwriters Laboratories (UL).
    - All systems shall be installed in conformance with Article 426 of the National Electrical Code

Roof Vents, mechanical equipment roof curbs and Elements

- Minimize, consolidate, and organize roof penetrations on the least visible side of the building.
- Ridge vents are preferred. Louver grilles at gabled end walls are acceptable.
- PVC pipes and other utility elements shall be screened or finished to match the roof color.

- Use rooftop mechanical units only with ARB approval. When required, minimize the negative visual effects with screening to match the roof color. Mechanical roof pits are not allowed.
- Consider the use of dormer vents to conceal and screen exhaust fans.
- Make mechanical vent sizes and shapes consistent with architectural elements.
- Avoid roof-mounted antennas.
- Mechanical equipment curbs (roof mounted) shall be prefabricated, one piece construction. Seamed curbs with exposed joints are not acceptable.

ENTRANCES

Entrances act as a transitional element from exterior to interior and provide opportunities to create a focal point on a façade. They establish a user's first impression and delineate the importance of the building by the size and architectural detailing of the entrance structure.

General

- Ensure the building entrance is clearly visible and highlighted as a prominent feature.
- Projected entrance features with gabled or hipped roof forms are preferred.
- Create enclosed vestibules and weather protected transition spaces at entrances.
- Integrate handicapped ramps into designs.
- Integrate indirect lighting at building entrances.

Primary Entrances

- Shall be clearly visible and highlighted as a prominent feature of the building. See Appendix 3: Acceptable vs. Unacceptable Designs for examples of acceptable primary entrances. Primary entrances shall be highlighted with lighting and landscaping as well as to provide overhead enclosure for weather protection.
- Locate newspaper, vending machines, and similar elements out of view to avoid visual clutter.

Secondary Entrances

- Reflect subtly the character of the primary entrances, but with lesser detail.
- Recessed entries are acceptable to provide areas of shade and weather protection.

- See Appendix 3 for Acceptable/Unacceptable examples.

Service Entrances and Emergency Egress

- Minimize visual impact with proper siting and access.
- Provide unobtrusive service entrances that are physically and visually separated from primary and secondary entrances.
- Integrate egress structures such as stair towers into design.
- Use landscaping and screen walls to screen and separate loading docks.

Arcades

- These may be used as an extension of the building's entrance with ARB approval only.
- Integrate arcades with the building's form, materials, and detailing.

Drop-offs and Porte-cocheres

- Limit to special, high profile facilities and embellish corresponding amenities, design accents, and landscaping.
- Design as an integral part of the building entrance using the same style, form, and materials.

Handrails and Guard Rails

- Finish railings shall be Base Standard (See Appendix 1: Materials and Colors) typically Dakota brown, but otherwise shall be stainless steel.
- Integrate handrail designs with the facility design.
- Guard rails shall be horizontal parallel to each other. Picket type guardrails are not acceptable. Coordinate guardrail spacing and compliance with NFPA 101.

Plazas and Courtyards

- The use of plazas and courtyards is encouraged at primary and secondary entries.
- Use concrete surfacing with special joint patterns and/or brick.
- Incorporate landscaping and lighting into the design.

WINDOWS AND DOORS

Windows and doors create a complement in the façade and must be considered as individual details and for overall arrangement, order, and scale.

Openings

- Use window type, size, placement and mullion pattern to emphasize overall architectural design.
- Ensure a pattern for openings. Random fenestration is not acceptable
- Set windows back at least 3" from the building façade.
- Incorporate operable windows with screens where possible.
- Transom windows / elements above doors / windows are encouraged.

Doors and Frames

- Use anodized aluminum storefront systems with thermal-break construction Provide door sidelights (minimum 2'-0 width) both sides of door at all primary entrances.
- Door, frame, and hardware colors shall match and be Base Standard.
- Limit hollow metal frames to security doors,utility rooms, non-main entry doors and outlying sites.
- All emergency egress and service doors and frames shall be accent.
- Sealants applied adjacent to windows and doors shall match frame color.

Hanger Doors

- Hangar doors shall be white, fabric
- Fabric shall be translucent starting at 12'-0 above finished floor.
- Acceptable manufacturers: MegaDoor, Para-Port Door, International Door, Inc. Sprung
- Metal hangar doors are unacceptable, except by ARB approval only

Glazing

- Use clear or bronze tinted, dual-pan low-e insulated glass.
- Mirrored and plastic glazing shall not be used.
- Translucent fiberglass insulated panels are acceptable in certain applications where daylighting is desired and views are not required. Use clear glazing on outside and white glazing on inside with frames to match Base Standard frame color.
- Ribbon windows may be used beneath eaves as an architectural feature.

Clerestories and Skylights

- Ensure that there is no air leakage or break in insulation.
- Clerestory windows are encouraged to increase natural light and to break up the mass of the façade.
- Integrate clerestories or low-profile skylights with building design.
- Clerestory windows shall be either glass or translucent insulated panels.
- Refer to LEED® requirements for daylighting.

CANOPIES

- Canopies shall be used at main and secondary entrances.
- The main entry shall have a formal canopy that easily identifies it as the main entrance.
- Canopies shall be incorporated as much as possible into the design language of the building.
- If a gabled canopy is used, gutters and downspouts must be adequately positioned to direct water away from the entry and pedestrian paths.
- Provide adequate lighting in the soffit of the canopy.
- Materials and construction should match the language and pallet of the building. (See Appendix 3: Acceptable vs. Unacceptable Designs)

SCREENS AND ENCLOSURES

Screens and enclosures help to minimize the visual impact of undesirable features and provide separation and security where necessary. Both architectural and landscape screens – separately and in combination – can be applied to achieve visual continuity throughout the Base.

General

- Where possible, use landscaping, and landscape berming instead of walls, for screening.
- Use landscaping to soften walls, fences, and screen dumpsters.
- Locate utility components in the least visible area with adequate access to minimize the need for screening and enclosures.
- Ensure screens are high enough to conceal equipment, vending machines, and utilities.
- Screen walls and fences shall comply with Anti Terrorism Force Protection standards.

Walls

- Use brick or split face CMU with metal or pre-cast cap units when adjacent to, or within 30 feet of, a building.
- Generally, do not attach screen walls to buildings.
- Do not place screen walls immediately adjacent to roadways or sidewalks where possible.
- Walls adjacent to building shall match the building wall material.

Fences

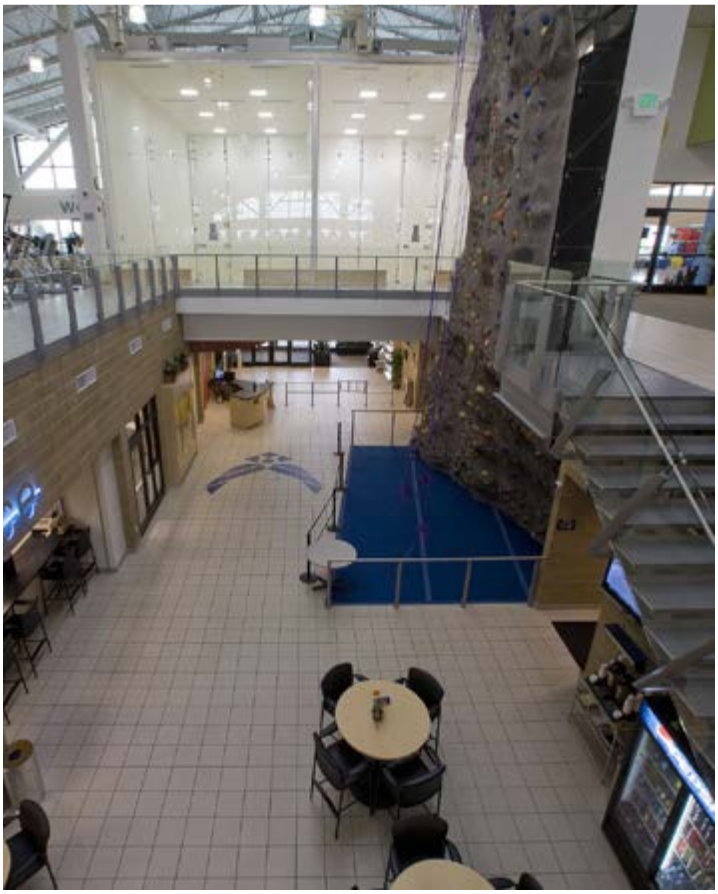
- Wrought iron fence may be used in high visibility areas with ARB approval.
- Vinyl covered chain link fence is preferred in industrial and low-visibility sites. See Appendix 3 for acceptable and unacceptable fences.
- Perimeter fencing shall be chain link – vinyl covered – color: black.
- Wood or white vinyl is allowed only in the Family Housing setting
- In the main part of the Base (high visibility areas), aluminum fixed louver type fences shall be used. Chain link fences shall not be used in high visibility areas of the Base or along major avenues of the Base such as Wardleigh Drive or Southgate Drive. Consult the ARB (Architectural Review Board) for the use of chain link fence.

Dumpster Enclosures

- Locate dumpsters to minimize visual impact; follow base design standards. (See Appendix 3: Acceptable vs. Unacceptable Designs)
- Use masonry with a metal or pre cast concrete cap unit for wall construction.
- In high-visibility locations provide dark brown metal gates to screen dumpsters.
- Provide 6” concrete filled dark brown protective bollards.
- Provide concrete pads and access aprons.
- Include landscaping areas and provisions for pedestrian access.

Force Protection

- Integrate security walls with the building architecture.
- Use a combination of walls, bollards, and tension cables with landscape beds.
- Minimize the visibility of all force protection devices with landscaping and integral designs.
- Use screen walls and defined roadways in selected locations to direct and limit facility access.



INTERIORS

Interior Materials

All selected materials must comply with the Federal Acquisitions Regulation (FAR) Subpart 25 – Buy American

General Performance Requirements

All wall and ceiling finishes must comply with ASTM E84 for Flame Spread Index as follows:

- Class A: Flame spread 0-25; smoke developed 0-450.
- Class B: Flame spread 26-75; smoke developed 0-450.
- Class C: Flame spread 76-200; smoke developed 0-450

Carpet Tile Dimensions

Suitable for private offices, open office areas, corridors and conference rooms. Lobby areas will be approved on a case by case basis.

- All carpet tiles shall be composed of Type 6,6 nylon for greater durability
- Textured loop, multi-level loop or cut and loop pile types are acceptable.
- Multi-directional and linear patterns are acceptable.
- Minimum two colors per tile.
- Solid color carpet tiles are acceptable on a case-by-case basis and in low traffic areas only.

Walk Off Carpet Tile

Suitable for all moderate to heavy traffic entrance vestibules.

- All carpet tiles shall be composed of Type 6,6 nylon for greater durability
- Textured loop, multi-level loop or cut and loop pile types are acceptable.
- Minimal patterning
- Minimum two colors per tile.

Metal Grille Entrance Mat

Suitable for heavy duty use in vestibules that experience the highest traffic loads. For example, frequent deliveries, moving of equipment, etc. to prevent water collection and tracking.

- Surface mounted grille mats are suitable for locations where one or more sides do not abut with wall or need to be easily removed.
- Acceptable insert materials include heavy-duty carpet, corrugated vinyl, abrasive carbide grits and serrated aluminum.
- 400 lb minimum rolling load capacity per wheel
- Refer to appendix 2 for conceptual details

Recessed Grill Mat

- Refer to appendix 2 for conceptual details

Surface Mounted Grill Mat

- Refer to appendix 2 for conceptual details

LVT (Luxury Vinyl Tile)

Suitable for break rooms, kitchens and corridors.

- Tile shall be a Class III, printed film vinyl tile.
- Wearlayer shall have a UV cured urethane, 20 mil minimum wear-layer.
- Glue down installation method only. Loose lay will not be accepted.
- Plank or tile
- Colors and patterns to be approved on a case-by-case basis.

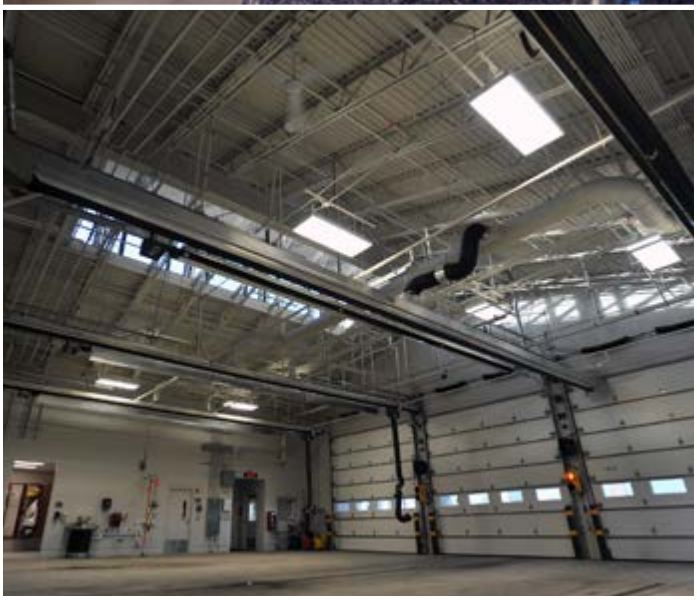
Floor Tiling

Floor tile is standard for restrooms where a sealed concrete floor is not suitable.

- Refer to TCNA handbook for standards and installation - https://www.tcnatile.com/
- Mesh mounted mosaic tile to be used where tile must slope to a drain.
- Stone thresholds are required at all door thresholds where water fixtures are present. Must be ADA compliant.
- Tile shall be set with a crack isolation membrane and a waterproof membrane to prevent tile damage and cracking.

Epoxy Floor Covering

Sealed Concrete



Wall Tiling

For use in restrooms and as a backsplash in all other areas with a sink.

- Refer to TCNA handbook for standards and installation - https://www.tcnatile.com/
- Ceramic wall tile should be glazed with cushioned edges
- Field tile shall be neutral in color
- Accent colors and patterns are acceptable and will be approved on a case-by-case basis
- 5'-0" high minimum wainscot at all restroom walls.
- Sanitary coved base tiles and bullnose tile at the top of a wainscot are the standards.

Wall Coverings

Wall coverings are suitable for use in facilities that require a higher level of finish and will be approved on a case-by-case basis.

- Vinyl wall coverings are the standard.
- Type II – Medium Duty is acceptable in private or open office areas
- Type III – Heavy Duty is acceptable in corridors and stairways
- Wall covering to have a stain resistant coating
- Shall be neutral in color.
- Textures and subtle patterning are preferred.

Interior Paint

- Ceiling: Gloss Level 1 (Flat)
- Gypsum board walls: Gloss level 3 or 4 (Egg-Shell or Satin)
- Paint grade wood trim: Gloss level 5
- VOC content limits
  - Flat paint and coatings: 50 g/L. - Nonflat paints and coatings: 50 g/L.
  - Primer, sealers and undercoaters: 100 g/L.
  - Pretreatment wash primers: 420 g/L.
  - Shellacs, clear: 730 g/L.
  - Shellacs, pigmented: 550 g/L.

Corner Guards

Suitable for use at all moderate to high traffic areas.

- Plastic, PVC-free or stainless steel corner guards are permitted.
- Stainless steel corner guards are required in all industrial facilities.
- Flush mount or snap on at 5'-0" high minimum at all outside corners
- Shall have a 1- 1/ 2" minimum profile

Chair Rails

- Suitable for high traffic corridors and will be approved on a case-by-case basis.

- Shall be a surface mounted assembly consisting of a continuous retainer with snap on cover and shock absorbing cushions. End caps shall be fastened with concealed fasteners to match.

Rubber Base

Suitable for all dry areas including, but not limited to, private offices, open office areas, break rooms, conference rooms lobbies and vestibules.

- Acceptable types include Type TS – rubber, vulcanized thermoset, Type TPR – rubber, thermoplastic and Type TV – vinyl, thermoplastic
- Standard profile is a cove base, Group 1
- Base shall be a minimum of 4" high.

Window Treatments

To be used at all exterior windows in administrative and community facilities.

- White vertical vinyl blinds, with 3-1/2" vertical vanes, are the standard for all windows.
- Deco shades may be considered, with ARB approval. If shades are approved and used, the following shall apply:
- Manual roller shade with chain operator.
- Motorized window shades are acceptable where height is greater than 8' and also at skylights.
- Dual Roller Shades at all skylights and south and west facing windows where extra light and heat control is required. One light filtering fabric (inside) and one light blocking fabric (outside)
- Single Shades with light filtering fabric at all other exterior windows.
- Light filtering fabric shall be PVC coated have between 5% and 7% openness and be a mesh or basket weave construction
- Light blocking shade band shall be fiberglass with a vinyl backing.
- Bottom, or hem bar, to be extruded aluminum. Exposed with endcaps.

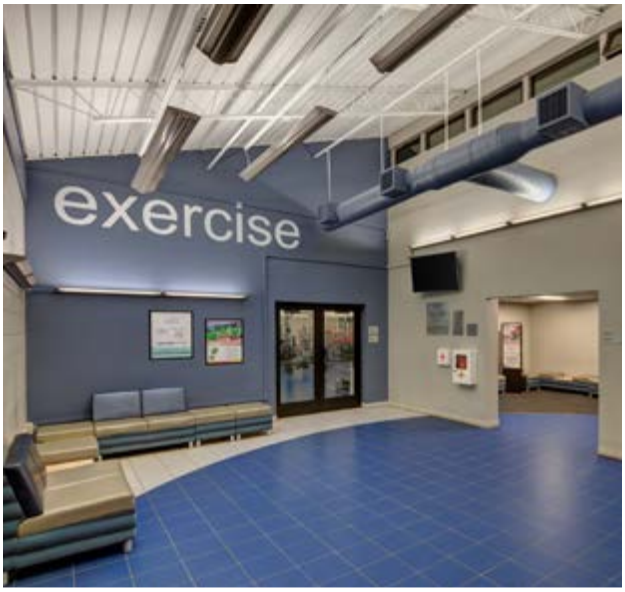
Ceiling Tile

Suitable for all administrative areas

- 2'-0" x 2'-0" - square tegular profile with fissured texture (Type XII, Form 2, Pattern E, Fire Class A)
- 2'-0" x 2'-0" tegular is the standard. 2'-0 x 4'-0 scored tegular may be considered for special applications.
- Color to be white.
- 2' x 4' scored tegular may be considered

Ceiling Suspension Systems

- 15/16" exposed tee suspension system, color: white is the standard.
- Hot dipped galvanized coating to prevent rusting.
- Baked polyester painted or powder coated; white.



Architectural Cabinets

- Frameless, or Euro Style, with full overlay doors to maximize storage and stainless steel concealed cabinet hinges are the standard.
- Countertops shall have square eased or bullnose edge with a 1" overhang and a 4" backsplash.
- Door and drawer edges shall have PVC edge banding to match drawer / door fronts.
- Conform to AWI standards - http://www.awinet.org/
- Plastic laminate is suitable for use in workrooms, copy rooms and general use.
- Only HPDL (High-Pressure Decorative Laminates) are acceptable.

  Solid surfacing (such as Corian) shall be used at all bathrooms and break room countertops
- Horizontal General purpose Surface (HGS) is produced for both horizontal and vertical interior applications.
- Vertical General Purpose surface (VGP) is intended for vertical applications.
- Solid surface is suitable for use at all restroom countertops, break rooms and window sills.
- No integral solid surface sinks will be permitted.
- Provide continuous lavatory countertops at all bathrooms.
- Quartz agglomerate counters are suitable for use in facilities that require a higher level of finish.

Toilet Partitions

- High density polymer, color-thru phenolic or solid phenolic where color is solid throughout are the standard.
- Stainless steel partitions to be approved on a case-by-case basis for facilities requiring a higher level of finishes.
- Painted enamel metal is not allowed
- Floor and ceiling mount and overhead braced are the preferred installation method in most areas. Ceiling hung is preferred for high traffic restrooms, such as fitness areas and industrial restrooms where cleaning will be more frequent.

Urinal Screens

- High density polymer, color-thru phenolic or solid phenolic where color is solid throughout are the standard.
- Stainless steel to be approved on a case-by-case basis for facilities requiring a higher level of finishes.
- Painted metal will not be allowed
- Wall hung or wall hung with stainless steel wing bracket or stirrup bracket are preferred.

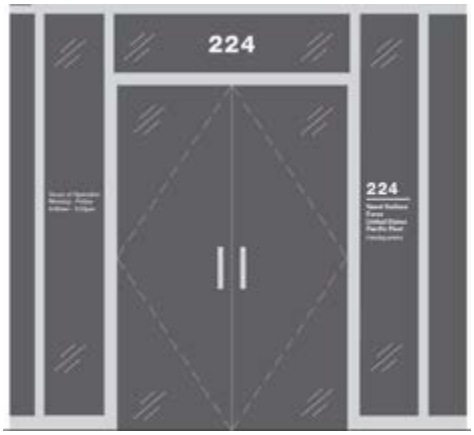
Toilet Accessories and Fixtures

- All tissue and towel dispensers to be Georgia Pacific
- Side by side double roll bathroom tissue dispenser shall be Georgia Pacific GP 56783
- Center pull toilet tissue dispenser shall be Georgia Pacific GP 52109
- All other toilet accessories, soap dispenser, waste receptacles, seat cover dispensers, etc., to be approved on a case-by-case basis.
- Shower controls and shower heads shall be heavy-duty, vandal-proof (prison-like) fixtures.

\2\ Figure 3-13 Building Entrance Sign Layouts. /2/

Figure 3-14 Building-Mounted Entry Sign Placement.

Figure 3-15 Building Identification for Glass Entrances.



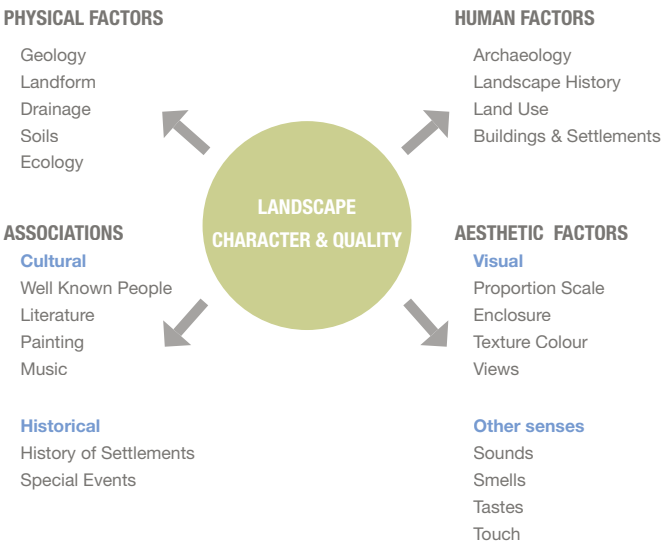
3-3.4 Building-Mounted Identification.

Minimize the use of building identification signs to only high-profile buildings, except where building identification numbers are used. Signs mounted on prominent buildings may include the building name, primary function, and/or building identification number when the facility needs identification from long distances. Building number signs may be used in addition to the primary facility identification sign where required.

3-3.4.1 Materials and Colors.

Individual dimensional letters applied directly to the surface of the wall are discouraged. The preferred fabrication details should include an aluminum sign panel mounted to the building with letterforms applied to the panel. Use the Helvetica Neue 85 Heavy font for typical building identification letters or numbers where required. Provide a dark bronze painted finish for the background of the message panels or other background color that is consistent with the installation standards. The color or finish of the letters should complement the predominant color of the building while providing enough contrast with the background for visibility. Use light-colored letters on dark sign panels and dark-colored letters on light sign panels. Use these standard materials and colors unless there are specific requirements established in the IPS. Minor deviations from these

LANDSCAPING



LANDSCAPING

Use landscaping to enhance facilities and to unify the base. Organize landscape features to connect individual facilities to walkways, roadways, and open spaces. Landscaping themes include planting treatments, site elements, barriers and screening and open space. These contribute to the environmental and visual quality of Hill AFB. Landscaping shall be used as a buffer between buildings and roads, parking areas and adjacent building. Designs shall strive to maintain uniform building setbacks. Landscape setbacks should be consistent to develop continuity.

- The landscape shall be organized and designed to safely connect individual facilities and distinct Architectural Groups within the Base through the use of sidewalks, roadways, and open space by providing an aesthetic uniformity of design and construction quality. An emphasis shall be given to a desert motif using water resistant plantings.
- Landscaping will emphasize the architectural lines and features of adjacent buildings and areas, and shall be designed to require little or no pruning.
- Landscaping shall be designed with year-around consideration for human comfort.
- All slopes shall be no steeper than 3 to 1. Provide slope protection using recent technology for all slopes.

Shrubs and trees

Use the drought resistant varieties, native or acclimated species. Provide temporary(2-3 years) irrigation system for Xeriscape type plants to facilitate plant establishment. Permanent or semi-permanent irrigation shall incorporate the use of microclimate weather stations, rain and moisture sensors, efficient heads and nozzles, central control, and drip systems.

- Large trees shall be planted with enough space to facilitate growth and trimming, normally 20-feet apart, minimum.
- Tree removal or replacement shall be coordinated with the Natural Resources Manager in 75 CEG CEV. An evaluation of the proposed action shall be analyzed, and a determination made as to the need for removal or replacement and the mitigation requirements for live, dead or dying trees. Consult Mr. Russell Lawrence in the Environmental Branch to discuss tree removal and replacement @ 801 775 6972.

Lawns

- Where lawn sod is used, it shall be provided with efficient distribution irrigation sprinklers. See Appendix 4 for approved list of acceptable parts. Dry land seeding applications and Hydro seeding may occur in designated locations only with ARB approval
- Irrigated lawns shall incorporate river-run rock perimeter (minimum 5'-0) to preclude water over spray of sidewalks, pavements and building structures.
- See Appendix 4: Landscape Plants, Materials and Irrigation for grass types.

Restoration of Native Ground Cover

- All native ground cover that is disturbed by construction and not scheduled for landscaping shall be re-landscaped with like plant materials to match the pre-existing.
- Reseed with drought resistant grasses and legumes.
- Mixtures of dry land alfalfa, fairway crested wheat grass and Indian rice grass shall be used in good sandy, loam soils.
- Use sand drop seed with fairway crested wheat grass in gravely soil.
- Machine drilling - on generally level to mildly sloping ground is preferable.
- Hydro seeding should only be used on 3 to 1 slopes. This native ground cover seeding should take place in Spring and fall only. Provide temporary sprinkler system for hydro-seed applications in order to establish the grass.
- For MAMS and airfield areas, use "Airfield" mix to prevent BASH conditions. Refer to Base Design Standards..

Maintenance

- Establish a maintenance program.
- Use only approved planting materials as specified in Appendix A4: Landscape: Plants, Materials and Irrigation.
- Allow shrubs to mass naturally and avoid ornamental pruning.
- Use organic or mineral mulch at a minimum depth of 3”, over landscaping fabric to increase moisture retention and control weed growth.
- Provide sprinkler systems in planting areas.

Edging

- Provide metal edging at planting beds as the standard.
- Raised planting beds constructed of concrete or CMU/ brick may be used in pedestrian areas.

Landscape Screens

- Where possible, use landscaping and berming instead of walls for screening.
- Reduce the negative visual impacts of parking areas and unsightly features with landscape screening – combined with landscape berming.
- Use a three-tier landscaped screen that combines ground covers, shrubs, and small trees. (See Appendix 4)

Roadways

- Primary roadways use same species, deciduous and coniferous street trees equally spaced to coordinate with light standards.
- Secondary and access roadways use a more random spacing of mixed species in clusters and / or groupings at focal points.
  - Plant street trees on the building side of sidewalks.

Parking Areas

- Reduce the visual impact of large parking areas with landscape buffers, berming, and parking islands.
- Use street trees in medians and islands to create shade and interest.
- Fill in between trees with low shrubs, flowers, and ground covers. Allow areas for pedestrian cross circulation.
- Use shrubs in groupings around the perimeter of parking areas to soften views from the street.
- Avoid the use of hedges outlining parking areas.
- Use shrubs and landscaped berms to soften the impact of parking areas.

Facility

- Use landscaping elements that complement building architectural features and proportions.
- Provide a soft transition from the horizontal ground plane to the plane of the building.
- Highlight building entries and architectural features and screen unattractive building features such as utility risers or service areas.
- Mix evergreen and deciduous palette of shrubs for seasonal interest.
- Design randomly spaced plantings and tree massing to fill areas between facilities.

Open Spaces

Open spaces are spaces adjacent around buildings & associated structures as well lawns, recreation areas, parade grounds and vacant spaces. Typically, spaces around buildings shall be attractively xeriscaped - meaning a mix of hardscape (river rock) and xeriscape type plants - see Appendix 4. Grass or turf areas around buildings shall be kept to a absolute minimum or with ARB approval only. Any turf areas around buildings shall typically be be sod and provided with an automatic underground sprinkler system. Any areas/spaces which receive hydroseed shall also be provided with an underground irrigation drip or sprinkler system to insure the establishment of the grass. Provide an underground drip system for xeriscape plants to insure the establishment of the xeriscape plants. Consult the ARB for parade ground, recreation type areas for extent and type of turfgrass application requirements. For Airfield, consult the Environmental Branch, Mr. Russell Lawrence @ 801 775 6972.

- Use turf for all recreation areas, parade grounds and lawns

- Create undeveloped natural areas using native grasses.
- Incorporate maintenance-free ground cover materials in areas of steep slope or areas that are difficult to maintain.

Sustainable Landscaping

Xeriscape landscaping shall be the primary comprehensive approach to landscaping for water conservation and pollution prevention for all installation building and landscape projects.

- Xeriscape uses native, naturally occurring plant material in the landscape design to convey a sense of regional context while embracing sustainable landscape design and preservation of native and endangered species.
- Native plants require less irrigation.
- The xeriscape methodology is relevant to planning and design, soil analysis, selection of suitable plants, practical turf areas, efficient irrigation, use of mulches, and appropriate maintenance choices.
- Passive solar cooling methods shall be considered, such as deciduous tree shading on the east, south and west exposures.
- Drought tolerant, acclimated ornamental shrubs, or native shrubs and trees should be used to the maximum extent possible, with appropriate spacing to allow for growth and maintenance, and reduce overcrowding and disease.
- Lawn sod shall be the standard and seeded areas can be specified on a limited use or in special areas.

See Appendix 4: Landscape Plants, Materials and Irrigation, for suitable xeriscape plants.

WALKWAYS AND PATHS

Develop a consistent pedestrian circulation system of walkways and paths to enhance the community. Connect passenger waiting shelters, outdoor plazas, parks, and other pedestrian gathering sites into the overall circulation network.

Sidewalks

- Provide walkways a minimum of 4'-0" feet wide along all primary, secondary, and access roadways.
- Maintain a minimum 3-foot wide landscaped parkway between curb and sidewalk.
- Provide curvilinear walks for dormitory and housing areas.
- Size sidewalks appropriately for the visual scale of the facility and the amount of pedestrian traffic volume.
- Use natural colored concrete with a broom finish and troweled edges.

Crosswalks and Ramps

- Ensure that all paths lead to the safest crossing point possible, and cross roadways at 90-degree angles.
- Incorporate ADA accessible curb ramps and crosswalk markings into all crosswalks.
- Crosswalks should be designated with striping.
- Construct all concrete curb ramps with a waffle stamp pattern and flared curb ramps.
- Provide for adequate drainage away from the ramp or by drainage grates.

Recreation Trails

- Provide a minimum 6-foot paved width in a free form configuration that follows the contours or other natural features.
- Separate the trail system from vehicular traffic by a minimum of 10 feet.
- Take advantage of natural environments such as the natural wildlife area.

- Incorporate activity generators, interpretive signs, and recreation opportunities.
- Provide a 5-foot by 10-foot paved rest area approximately every mile. Include a bench and litter receptacle at each location.
- Use asphaltic concrete for the trail system. In highly natural settings use compacted, crushed fines.

Plazas and Courtyard Paving

- Use standard brick pavers or colored concrete as a unifying theme for plazas and courtyard paving.
- Concrete may be stamped to accent the design.
- Use manufacturer standard patterns for concrete pavers.
- Brick pavers shall be red.

ROADS

Develop the transportation network to provide a consistent experience throughout the base. An organized system of primary, secondary, and tertiary arteries must provide sequential order with each hierarchy of roadway being designed consistently.

Primary

- Primary roadways are developed as boulevards and contain two lanes of traffic in each direction often with planted medians.
- Minimize stops and turns, and eliminate on-street parking.
- Parking and service access curb cuts are discouraged.
- Keep parking areas and buildings away from the road edge.

Secondary

- Secondary roadways are feeder streets from access roads to primary roads.
- On-street parking is discouraged.
- Keep off-street parking areas away from the road edge.
- Minimize the number of curb cuts from driveways and area entrances.

Tertiary

- Tertiary roadways are the narrowest and slowest public streets and provide access to individual sites or parking areas.
- On-street parking and curb-cuts for driveways, parking lot entrances, and services drive entrances are allowed.
- Maintain capability for large vehicles such as fire trucks and moving vans.

Service Drives

- Service drives provide access for service vehicles to certain parts of a building or site.
- Combine service drives for several facilities where possible.
- Sidewalks can double as service drives; size and design accordingly.
- Maintain a setback between the building and service drive.
- Minimize the visual impact of service drives through correct placement of drives and landscape screening.

Paving

- Use asphalt paving for all primary, secondary, and access roadways.
- Use concrete paving in loading areas, dumpster enclosures, and sites used by heavy vehicles.
- Gravel surfacing may be used on patrol roads and outlying sites only.
- Incorporate a concrete apron where gravel roads meet paved roads.
- All patching shall match adjacent materials.

PARKING

Develop functional lots with clear circulation and a positive appearance that complements the facility. Provide a pleasant transition from the parking area to the facility. Comply with Anti-Terrorism Force Protection Standards for parking.

General

- Reduce large parking areas with landscaped islands and planting strips.
- Combine parking areas for adjacent facilities.
- Parking layout must address accessibility, maintenance, snow removal, and safety issues.
- Avoid parking directly in front of primary building entrances.
- Provide spacing between parking lots and buildings in compliance with force protection standards.
- Avoid parking on roads or within 40 feet of an intersection.
- Use the 90-degree parking configuration when possible.
- Provide 4” wide white striping for all pavement markings.

Medians and Islands

- Provide planting medians for every four rows of vehicles and paver islands for every 20 stalls. Coordinate with snow removal operations.
- Coordinate layout for light poles with the islands and minimize their number to provide the required illumination.
- Provide designated areas for pedestrian cross traffic.

Reserved Parking

- Minimize number of reserved spaces.
- Designate spaces by rank or title with curb-mounted signs.

Paving

- Asphalt paving is the standard.
- Use concrete where required for heavy vehicles, motorcycle parking, and where fuel spills may occur.

Curb and Gutter

- Use concrete curbs and gutters for parking areas.
- Asphalt curbs, wood timbers, and precast wheel stops are prohibited. Verify.
  - Do not paint concrete curbs.

SIGNS

Signs are an important and positive element in the overall base appearance. Their purpose is to clearly communicate necessary or helpful information for directions, identification, and customer service without adding visual clutter. Comply with UFC 3-120-01, March 2014 for all signs.

General

- Use concise, clear signing in accordance with UFC 3-120-01.
- Minimize the number of signs used for each facility.
- Signs must be consistent in style, placement, color, and language.
- Avoid mottoes, super graphics, or individual titles on buildings or identification signs.

Color

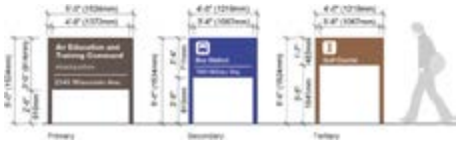
- Comply with UFC 3-120-01
- Use dark brown square metal posts.
- Finish back of sign and fastening devices dark brown.

Figure 3-4 Primary Installation and Gate Sign Layout Details.

Figure 3-5 Primary Joint Installation and Gate Identification Signs.

The appropriate sign type required is based upon the importance of the building or tenant identification required. Place primary identification signs as close as possible to the building entrance and perpendicular to the roadway to permit viewing by traffic moving in both directions. If the building is set back from the roadway and is not visible or is only partially visible from the roadway, place the sign next to the entrance driveway and on the side of the driveway closest to the building. Provide one sign for each building unless additional signs are required due to unique site conditions. Consider intersection sight distances provided in AASHTO *A Policy on Geometric Design of Highways and Streets* (Green Book), in addition to the lateral offsets included in the MUTCD.

Figure 3-10 Freestanding Building Identification Signs.



general specifications are permitted where needed to align with installation-specific standards and pre-existing sign programs.

3-3.4.2 Placement.

Building-mounted identification signs should be coordinated and compatible with the building's design and applied consistently across the installation. They are often most effective near the main building entrance or on a covered drop-off canopy. Signage may be required on the back or side of the building to provide better visibility and wayfinding cues for visitors or customers. The installation engineer should select the most appropriate solutions for the architectural style of the buildings and apply them consistently.

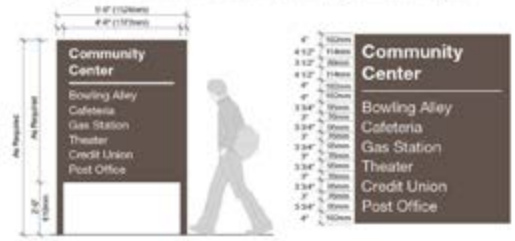
3-3.5 Commercial Signs.

Many commercial entities on military installations have standard image symbols or unique logos that may be used to provide identifiable images and/or wording that is easily recognizable to potential users. Commercial organizations, such as the base exchange, Defense Commissary Agency (DeCA) stores, and restaurants may display their registered trademark logos. The size, placement, and material composition of these signs must be consistent with installation-specific standards. The use of neon signs is prohibited.

3-3.6 Centralized Facilities Freestanding Identification Signs.

Centralized facilities signs may be designed to address multiple buildings or services that use a common roadway entrance or parking area. Set the sign to permit viewing by traffic moving in both directions. The size, placement, and material composition of these signs must be consistent with installation-specific standards. See Figure 3-16.

Figure 3-16 Centralized Facilities Freestanding Identification Signs.



Facility Identification Signs

- Limit the use of monument signs to entry gates, headquarters buildings, housing neighborhoods, and special use areas / facilities with ARB approval.
- Limit the use of mottoes, individual titles, or insignia.
- Incorporate landscaping, accent lighting, and / or paving.
- Facility identification signs with street addresses are generally free standing and not applied to facility façades.
- Display facility numbers in one location - at the back or side corner of buildings, coordinated with architectural features.
- Building-mounted signs or individual letters with corporate logos are allowed for commercial facility signs only with ARB approval.
- Comply with UFC 3-120-01

Direction Signs

- Use to identify highly frequented or special interest destinations and street names.
- Comply with UFC 3-120-01

Regulation Signs

- Use for traffic control, parking, and base warnings.
- Traffic control signs must follow the Manual on Uniform Traffic Control Devices administered by the Federal Highway Administration for color and display requirements.

SITE FURNISHINGS

The common use and style of site amenities will further unify the base, providing a recognizable theme of continuity throughout. Reflect the base wide standard regardless of where site furnishings are placed.

General

- Select site furnishings from the list in Appendix 4: Landscaping Plants, Materials and Irrigation.

Seating / Benches

- Provide seating along walkways, near building entries, and in courtyards and plazas.
- Place benches within a paved area.

Litter / Ash Receptacles

- Place surface-mounted or portable litter and ash receptacles at building entrances, pathways, outdoor seating, and picnic areas.
- Locate these to be functional, yet visually unobtrusive.

Planters

- Minimize the use of freestanding planters.
- When used, locate planters in conjunction with other exterior elements and in compliance with Anti-Terrorism Force Protection requirements.
- Use planters that match ash and litter receptacles design.

Bike Racks

- Provide bicycle-parking areas for all facilities. Combine areas for densely sited buildings.
- Place bike racks on concrete pads in accessible locations near established bike routes and near secondary building entrances.
- Increase the numbers of available bike racks in residential and recreational areas.
- Screen bicycle parking areas with landscaping or screen walls.
- Align bollards at sites having multiple racks.

Barbecue Grills

- Limit built-in grills to recreational areas, dormitories, and fire stations.
- Use materials that complement adjacent facilities.
  - Placement and design of built-in grills must be approved by the ARB.

Picnic Tables

- Use factory finished, recycled plastic picnic tables with metal frames.
- Provide mid-morning to late afternoon shade for all picnic tables.
- Limit tables to outdoor picnic or dining areas; and group to allow for large parties or individual family outings.

Bollards

- Use bollards to protect buildings, equipment, and people from vehicle impact and to restrict access.
- Where called for, provide a 6-inch diameter, concrete-filled, rounded top steel pipe bollard at building corners and overhead door locations, typical. Use a 4-inch diameter, concrete-filled, at all other locations, with ARB approval.
- Use same style bollard with single function luminaire at pedestrian areas, pathways, and entrances.
- For bollards protecting equipment or buildings from vehicle damage, paint to match adjacent surfaces.
- Use reflective beads in paint on bollards used in auto traffic areas.
- All bollards shall have 3” wide yellow reflective tape, 2” down from the top.
- Provide sealant with backer rod at the base. Slope concrete slab around bollard up to sealant.

Tree Grates

- Use natural cast iron tree grates at all formal plazas and courtyards set into concrete paving. Accent with brick pavers.

Playground Equipment

- Provide consistent-style pre-manufactured play equipment at parks, family housing areas, child development centers, community centers, and recreational areas.
- Place equipment with safe ground surfacing, benches, litter receptacles, and landscaping for shade.
- Provide adequate pedestrian circulation paths to play areas.

Flag Poles

- Shall be used only with ARB approval.
  - Use a brushed aluminum pole, mounted on a concrete base.
  - Create a sense of place at flag pole locations with landscape or plaza design.

LIGHTING

Exterior lighting is a system that directly impacts the visual qualities of the base. By day, the fixtures and poles add visual character and rhythm to the streetscape. By night these amenities contribute to the perception of safety and comfort. Use common components throughout the base.

General

- Exterior light fixtures shall be standardized on all buildings.
- Building canopies shall be illuminated with recessed, lensed, LED luminaires, or, architecturally compatible ornamental wall sconces mounted to structural columns.
- Metal halide, halogen, with ARB approval.
- Building perimeters shall be illuminated with architecturally compatible, full cut off wall sconces.
- Use underground utility service to all site lighting fixtures.
- All luminaires shall be full cutoff type. Light trespass shall be minimized, especially in residential areas. Up-lighting shall not be used.
- All exterior lighting shall comply with UFC 3-530-0, unless contrary to Hill Air Force Base specific standards listed here.
- Exterior lighting shall be LED sources to comply with the High Efficiency Exterior Lighting Memorandum.

Streets

- Street lighting shall be 4000 Kelvin, LED. Lights shall have photocell control.
- Light pole, arm, and fixture shall withstand winds up to 100 mph with a 1.3 gust factor.
- Light fixture type shall be die cast aluminum horizontal type or “cobra head”.
- Power to lights is typically 480 volts but power source at each location needs to be verified.
- Light poles will be 30-feet tall, tapered aluminum, with 6-foot aluminum arm, bronze anodized.
- Pole will have access hand hole within 2 feet of base.
- Poles shall be mounted a round, 24” diameter concrete base with 4” above grade for a mow strip.
- Pole located on roadways with a speed limit over 40 mph shall be provided with a breakaway base.

Parking Areas

- Parking lot lights and fixtures shall be 4000 Kelvin, LED mounted on 30-foot poles.
- Lower poles will be acceptable at entry areas and drop off zones near buildings.
- Lights shall have photocell control.
- Light pole, arm, and fixtures shall withstand winds up to 100 mph with a 1.3 gust factor.
- Poles shall be tapered aluminum, bronze anodized.
- Pole height and fixture type will be determined by area and lighting study specific to the project.
- Power source will be determined for each location.
- Pole will have access hand hole within 2-feet of base.
- Poles shall be mounted a round, 24” diameter concrete base with 30” above grade for protection of the pole from vehicular damage.
- Pole locations shall be coordinated with planter areas, asphalt striping and vegetation.

Walkways and Paths

- Exterior walkway lighting shall be 4000 Kelvin, LED.
- Lights shall be bollard type with indirect lighting. The bollard shall be approximately 42-inches tall and about 7-inches square or round. Bollard will be painted Dakota Brown or Bronze anodized aluminum.
- Optical assembly will provide symmetrical distribution.
- The walkway light will have a remotely located photocell control. Bollards shall be mounted to a 4" height minimum, concrete base.
- Equally space light fixtures for sidewalks on same side of walk.

Mounting Heights

- Control spillover light near residential areas by locating, shielding and aiming fixtures adequately on site.
- Keep mounting heights low and consistent. Any lights mounted over 30 feet high require special review by the ARB.

Architectural and Accent

- Historical light fixtures shall be maintained on all historical buildings.
- Incorporate recessed, wall-mounted luminaries to wash light across plaza, paving, and stairs.
- Minimize and integrate into the building design the use of building mounted fixtures for general illumination of service yards and outdoor spaces.
- Provide architectural uplight landscaping, and building entrance features to emphasize importance and hierarchy.

UTILITIES

Use consistent utility components and place electrical services and building feeds underground to reduce overhead visual clutter.

Utility Lines

- Place all utility lines underground, where possible.
- Minimize, or eliminate pavement cuts to install utilities.

Utility Structures

- Avoid free standing utility structures where possible.
- Use underground vaults for equipment where possible.
- Locate pad-mounted equipment in less visible areas and

screen with landscaping or screen walls. (See Appendix 3: Acceptable vs. Unacceptable Designs)

Fire Hydrants

- Locate fire hydrants at least 5 feet away from other structures. Maintain a 30-inch clear area. Verify.
- Paint hydrants

Utility Components

- Carefully place and organize equipment and services.
- Locate mechanical equipment on the least public side of the building.
- Screen mechanical equipment with landscaping materials or screen walls.
- Minimize the use of all externally attached meters and control devices. If used, paint to match the wall color.
- Exterior surface-mounted utility conduits, lines, or equipment are NOT allowed (except meters and control devices). See Appendix 3: Acceptable vs. Unacceptable Designs.

Communications

- Collocate coaxial and telephone exterior components and entry points.
- Align all communication components with one another on the horizontal and vertical plane.

Air Force Fire Hydrant Color-Coding Guidance

All hydrant barrels will be color-coded based on the type of distribution system to which they are connected.

The distinctive hydrant barrel color-code must be formally established locally or the following hydrant barrel colors will be used in the absence of a locally adopted color code: yellow [public (potable) distribution], red [fire protection (non-potable) distribution], and purple [reclaimed (non-potable) distribution].

All hydrant bonnets will be color-coded in accordance with NFPA 291.

Hydrant cap colors may be the same as the bonnet, the same as the barrel, or an architecturally complementary color which does not conflict with the barrel or bonnet color codes.

Installations not currently in compliance with this guidance should correct hydrant barrel color-coding by attrition during their next regularly scheduled hydrant paint maintenance cycle.

SUSTAINABILITY

SUSTAINABILITY

All buildings shall meet LEED® Silver Certification requirements. The LEED® Checklist must be filled out and fully justified. All documentation for LEED® Certification shall be compiled and submitted. A USGBC LEED® Certificate will not be pursued, unless otherwise required.

Sustainability is based on a simple principle: Everything that we need for our survival and well-being depends, either directly or indirectly, on our natural environment. Sustainability creates and maintains the conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations. Sustainability is important to making sure that we have and will continue to have, the water, materials, and resources to protect human health and our environment.

Studies have proven that sustainable buildings create a more productive environment. Use of daylight, views, and fresh air demonstrate significantly better work conditions. Sustainable buildings also provide for lower utility bills and lower cost of operations. Orienting a building correctly can help with existing natural site conditions such as view and light. Simple uses of sunshading devices can control the amount of direct sunlight that penetrates the building.

Sustainable buildings include a tight, well-insulated skin. Proper location of air barriers, vapor barriers and insulation must be considered. Dew point calculations are required to prove proper locations of vapor barriers.

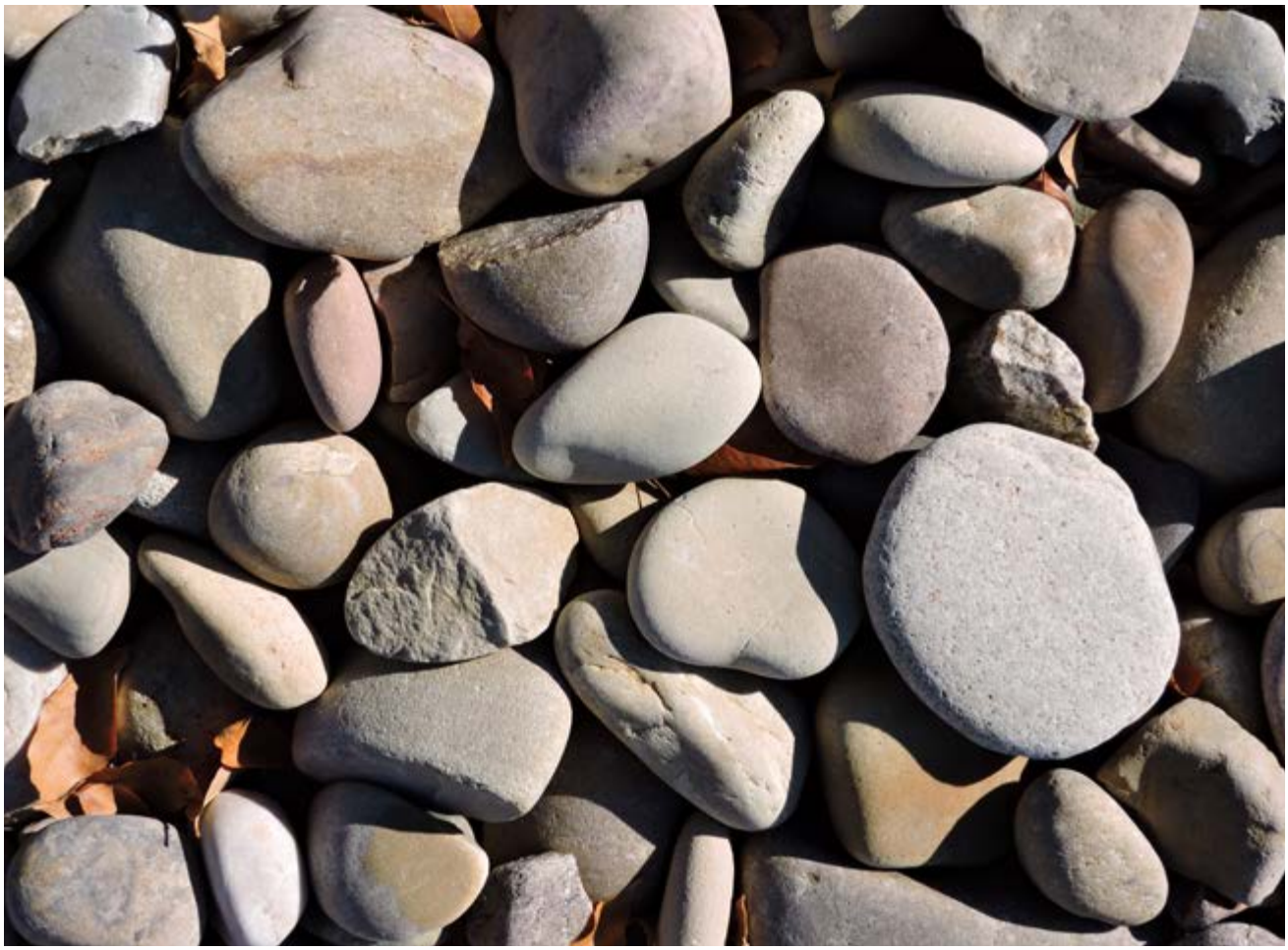
To prevent the uncontrolled formation of condensation within the wall cavity which can lead to increased energy use and to keep materials dry enough to reduce the risk of microbial growth or sick building syndrome or both, design and install a continuous air barrier that is contiguous over the entire building envelope.

1. Carefully design joints and fenestration interfaces.
2. If there is a potential of condensation on the room side of the air barrier, consider using closed cell foam (2.0 lbs/ft2 or greater) or closed cell rigid insulation for the room side insulation.

3. To reduce cooling loads and provide superior air barrier, consider using concrete (precast or tilt-up) or concrete masonry unit (fully grouted or sealed).
4. Design and install vestibules that are equipped with temperature controls that uses heat to only prevent the freezing of fire sprinkler system (if used).
5. Specify fenestration products (including sectional garage doors) that have superior air infiltration ratings.
6. Consider self-adhere air barriers (if used) over other types.

The following proposed design strategies shall be used as energy strategies for the building envelope.

- Improve the building envelope performance according to the table below, the Percent Energy Cost Savings should be from 5% to 10%.
- The Baseline Design is based on ASHRAE 90.1-2010 requirements (Utah Energy Codes), except for infiltration which is based on PNNL-18898: Infiltration Modeling Guidelines for Commercial Building Energy \ Analysis.
- The Proposed Design is based on ASHRAE Advanced Energy Design Guides with the following exceptions:
  - Skylight performance values are from Firestone's product data
  - Infiltration rate is reduced by 30%



	ITEM	BASELINE DESIGN	PROPOSED DESIGN
Architecture			
	Exterior Walls		
	U-factor (Btu / h * ft^2 * °F) and/or R-value (h * ft^2 * °F / Btu)	ASHRAE 90.1 Requirements Nonresidential; Walls, Above-Grade, Steel-Framed R-13+R-7.5 c.i.	Advanced Energy Design Guide for Small to Medium Office Building Nonresidential; Walls, Above-Grade, Steel-Framed R-13+R-15.6 c.i.
	U-factor (Btu / h * ft^2 * °F) and/or R-value (h * ft^2 * °F / Btu)	ASHRAE 90.1 Requirements Nonresidential; Walls, Above-Grade, Metal Building R-13+R-5.6 c.i.	Advanced Energy Design Guide for Medium and Big Box Retail Nonresidential; Walls, Above-Grade, Metal Building R-19 c.i.
	Roof		
	U-factor (Btu / h * ft^2 * °F) and/or R-value (h * ft^2 * °F / Btu)	ASHRAE 90.1 Requirements Nonresidential; Roofs, Insulation entirely above deck R-20 c.i.	Advanced Energy Design Guide for Small to Medium Office Building Nonresidential; Roofs, Insulation entirely above deck R-30 c.i.
	U-factor (Btu / h * ft^2 * °F) and/or R-value (h * ft^2 * °F / Btu)	ASHRAE 90.1 Requirements Nonresidential; Roofs, Metal Building R-13 + R-13	Advanced Energy Design Guide for Medium and Big Box Retail Nonresidential; Roofs, Metal Building R-19 (between the perlins) + R-11 c.i. (over the top perlins)
	Windows		
	U-factor (Btu / h * ft^2 * °F) SHGC (all)	ASHRAE 90.1 Requirements Nonresidential; Vertical Glazing (curtainwall/storefront) U-0.45 + SHGC-0.40	Advanced Energy Design Guide for Small to Medium Office Building Nonresidential; Vertical Glazing (curtainwall/storefront) U-0.39 + SHGC-0.38
	Visible transmittance	Non-Rated	Advanced Energy Design Guide for Small to Medium VT/SHGC=1.10 Exterior Shading: PF-0.5 on E, W, S, Facade
	Skylight		
	Dimensions	Skylight with curb, plastic 2.1%-5%	Skylight with curb, plastic 2.1%-5%
	Glass-Type and Frame U-factor (Btu / h * ft^2 * °F) SHGC (all) Visible transmittance	ASHRAE 90.1 Requirements U-1.1 + SHGC-0.62 VLT (Non-Rated)	U-0.64 + SHGC-0.45 + VLT-0.62
	Foundation		
	Foundation Type	Slab-on-grade Floors (unheated)	Slab-on-grade Floors (unheated)
	Thermal properties for ground level floor U-factor (Btu / h * ft^2 * °F) and/or R-value (h* ft^2 * °F / Btu)	ASHRAE 90.1 Requirements Nonresidential; Slab-on-Grade Floors, unheated Non-Rated	Advanced Energy Design Guide for Small to Medium Office Building Nonresidential; Slab-on-Grade Floors, unheated R-15 for 24 inches
	Air Barrier System		
	Infiltration	PNNL-18898: Infiltration Modeling Guidelines for Commercial Building Energy Analysis Peak: 0.2016 cfm/sf (when fans turn off) Off Peak: 25% of peak infiltration rate (when fans turn on)	Peak: 0.14 cfm/sf (when fans turn off) Off Peak: 25% of peak infiltration rate (when fans turn on)

HISTORICAL PRESERVATION

Hill AFB and the Air Force Material Command comply with all federal legislation pertaining to the preservation of historic facilities. Careful coordination between the Base and the State Historic Preservation Officer (SHPO) is essential.

All facilities 50 years of age or older must be considered as candidates for the National Register of Historic Places. Hill AFB has approximately 400 facilities being considered. Of these buildings, Area 1100 provides the best collective examples of historic preservation. A current list of these buildings is available through EMC.

There are several buildings on the HAFB campus that are historical. Historical Preservation strategies should be met to maintain the design intent of the original building. Strategies for the type, extent and nature of historical preservation shall be discussed with the team prior to design.

There are four types of approaches to be considered as stated in the Whole Building Design Guide:

- Preservation focuses on the maintenance stabilization, and repair of existing historic materials and retention of a property's form as it has evolved over time.
- Rehabilitation acknowledges the need to alter or add to a historic property to meet continuing or changing uses while retaining the property's historic character.
- Restoration depicts a property at a particular period of time in its history, while removing evidence of other periods.
- Reconstruction re-creates vanished or non-surviving portions of a property for interpretive purposes.

Façade repairs should be done carefully. Replacement of windows, doors when necessary should maintain the historical nature of the building. Where possible buildings shall be insulated and brought to current energy codes via new MEP systems. New roofs should match the original type and intent of the building. Ornamentation should be restored and repaired as necessary.

Cultural Resource Program Manager (CRPM)

Environmental Management is responsible for assuring an individual who meets the Secretary of the Interior's Standards coordinates all historic preservation issues with the Utah State Historic Preservation Office (SHPO) and all appropriate agencies pursuant to Section 106 of the National Historic Preservation Act and it's guiding regulation 36 CFR 800.

Cultural Resource Program Manager is:

75 CEG/CEIE

Anya Kitterman 586 -2464

7290 Weiner Street

Bldg 383

HILL AFB UT 84056-5003

DSN 586-2646

All potential candidates for the National Register of Historic Preservation at Hill AFB shall be determined by the CRPM and concurred by the SHPO. All projects which may have an adverse effect on an eligible, potentially eligible or unevaluated historic property must be reviewed by the CRPM to determine effect and initiate consultation with the SHPO's office.

State Historic Preservation Officer (SHPO)

- Throughout the state of Utah, the Office of the State Historic Preservation Officer (SHPO) is responsible for validating candidates for the National Register of Historic Places. The SHPO acts in conjunction with the Federal Advisory Council on Historic Preservation and is the sole authority in the approval of candidates for the National Register of Historic Places.

- Once a facility has been identified as "eligible," a potentially eligible, or nominated to the National Register, all potential designs to maintain, repair or alter the facility in any way whatsoever must be concurred on by the SHPO.

- Design documents for potential construction projects must be sent to the SHPO for concurrence. The state of Utah has 30 days to coordinate on proposed construction projects. The National Advisory Council must be informed if Hill AFB Cultural Resources or the SHPO deems any adverse effects and a memorandum} of agreement entered into to mitigate these adverse effects.

IMPLEMENTATION

The Architectural Compatibility Plan (ACP) is a multipurpose tool that shall be used throughout the entire planning, programming, and design process, from inception to project completion for any project on Base. The ACP is implemented by the Base Civil Engineer (BCE). While architectural designers are the primary users of the plan, it must also be used by project managers, programmers, planners, engineers, maintenance and operations personnel, self-help personnel, SABER personnel and the Architectural Compatibility Review Board (ARB). Key elements in the implementation process are highlighted below.

Establish the ARB (Architectural Compatibility Review Board)

The ARB is the installation approval authority for all designs and visual features on the installation.

The ARB is organized by the Base Civil Engineer (BCE).

- The chair person as appointed.
- Members include the base architect, community planner, engineering flight chief, operations flight chief, project manager, and others as determined by the chair person.
- Most projects, regardless of size, must be approved by the ARB. (The chairperson makes the final determination on the review evaluation requirements).
- Design projects are submitted to the ARB by the base-assigned project manager.

SUBMITTAL REQUIREMENTS:

New Construction: (new in their entirety)

- Site plan: show parking, sidewalks, ABA compliance, landscape design intent
- Building floor plan
- Rendered (colored) exterior elevations – minimum of two sides (front major entry and secondary)
- Bird's eye perspective showing the best overall view of the building typically looking at the main entry area. Submit 2 perspective views of the proposed new building design.
- Color board – having actual material samples of all proposed exterior facing materials including glass

Additions: (additions to existing buildings)

- Site plan: show parking, sidewalks, landscape design intent –
- Building floor plan
- Rendered (colored) exterior elevations – minimum of two sides (front major entry and secondary)
- Color board – having actual material samples of all proposed exterior facing materials including glass

Major Renovations: (where exterior elevation changes occur)

- Building floor plan and to extent exterior – where exterior site changes occur
- Rendered (colored) exterior elevations – minimum of two sides (front major entry and secondary)
- Color board – having actual material samples of all proposed exterior facing materials including glass

Buildings of Significance: (see page 129)

Design Process:

Requirements Documents, RFP Design Build:

Requirements documents, typically MILCON or CCD (customer concept designs), RFP design build written scope(s) of work shall include:

- Project description
- Programming requirements
- Site analysis (traffic, environment, utilities, views, sunlight
- Spatial relationship to site (topo)
- Adjacent facilities, site photos

The designer (A/E) and or the Base PM shall engage the ARB early on in the design process to explore potential solutions to meet the requirements of the Architectural Compatibility Plan objectives for these types of projects.

Charrette Design phase or Concept design phase:

This design phase effort shall include adequate enough information and architectural depiction to describe the project design intention –

allowing customers and the ARB to see and comprehend the proposed solution. Typically, this effort shall include a site plan, floor plan and exterior elevation(s) to illustrate the design intent. If the task is for a entire new building, then a three dimensional rendering shall be provided at this phase.

The goal is to achieve Air Force customer understanding and approval early in the design process.

35% Design Phase:

This is where the formal submittal shall be submitted to the ARB for final review and approval. See submittal requirements above for applicable design. The design at this phase shall clearly indicate the proposed exterior design and look. The design at this stage should also include the design intent for interior design finishes as well. A one page narrative should be submitted as part of the architectural basis of design, site plan, building elevation(s), mechanical/electrical equipment locations and appropriate screening and a minimum of two three dimensional color renderings if – new construction. The ARB shall review and approve or disapprove or approve as noted. If disapproved, then a re-submittal shall be required. Notification shall typically be by email and shall be submitted back the designer A/E no later than at conclusion of the 35% design review. A re-submittal & response back from the A/E designer is required within 7 days for the exterior design portion.

Small projects (canopies, smoking shacks, exterior signs, small storage buildings, et.al.).

These type projects typically do not require a full design such as above. The project author for these type projects shall submit an electronic 332 for initial consideration/evaluation by the Work Order Request Board (WORB), which in turn shall forward the request onto a CE staff Architect for further evaluation and recommendation. The 332 should include site plan for the proposed location and manufacturer cut sheets depicting the look of the proposed building item.

Review Board

The review board will consist of at least three CE staff, two are staff architects; one is the PM for the project. The review board shall be chaired by the

division chief. Other individuals may participate at the BCE's discretion.

Concept Design or 35% design

This submittal must include adequate information to fully describe the project design, allowing customers / clients to easily comprehend the proposed solution. The goal is to achieve AF customer understanding and approval early in this process.

Multiple submittals may be required for large or complex projects. The initial submittal provides a conceptual approach to the solution, while the final submittal presents a refined and more detailed design. These submittals shall be design presentation documents rather than construction documents.

Develop site plans, floor plans, roof plans, and building elevations concurrently to ensure the proposed solution is a comprehensive design. Floor plans must be developed with consideration of the site and building massing.

The ARB will review concept submittals. If the initial submittal is rejected, or if there are significant concerns or comments, a resubmission is required prior to proceeding to the next design stage.

For Each submittal package shall include:

- Concise Verbalized Design Concept (1 page maximum)
- Adjacent Facilities and Site Photos, if in close proximity
- Site Plan(s)
- Composite Elevations (with color and shadows)
- Mechanical / Electrical Equipment Locations, Configurations and Screening
- Perspective Sketches (minimum of 2 for new construction)

Final Design

The final design shall remain consistent with the approved concept design. It includes highly developed drawings that further refine and detail the visual and functional quality of the design.

APPENDIX 1

MATERIALS & COLORS

MATERIALS AND COLORS

Concrete Masonry Units (CMU Block)

The following Block colors are acceptable:

- Photo 1 & 5: Tumbleweed split face (favor % wise "white fleck"). Block shall have integral water repellant admixture. Surface sealers are not acceptable in and of themselves only.
- Photo 1: Tumbleweed honed CMU – color shall match above. Shall be used for accent only. Provide water repellant admixture.
- Plain-face CMU is acceptable as accent. See Photo 3 on this page. provide water repellant admixture.

The following manufacturers are acceptable (if the manufacturer is not available a custom color must be submitted to match one of the colors as mentioned above):

- Beuhner Block
- Lehi Block
- Amcor Masonry

Metal Siding

All metal building manufacturers have their own particular names and colors for the typical Base Design Standard colors. The following listed manufacturers have been determined to best typify an acceptable color range for the intended Base Design Standard colors for Hill AFB for metal wall panels, metal roofs and accompanying metal accessories, such as, but not limited to, flashing and other sheet metal components. The old "Greystone" is no longer an acceptable color. Consult the ARB for precise color range before bidding a project to insure compatibility. Non-compliance, after the fact, will not be accepted. All metal shall be pre-finished Kynar 500 (spec). Silicone finish is not acceptable.

The following metal colors are acceptable: Sierra Tan

- Medium Bronze to Dark Bronze
- Sandstone

The following manufacturers are acceptable (if the manufacturer is not available a custom color must be submitted to match one of the colors as mentioned above):

- Garland Company
- MBCI
- Firestone
- Centria
- Englert

PHOTO 1

PHOTO 2

PHOTO 3

shall primarily be used for accent, but will consider for field application on case by case basis.

PHOTO 4

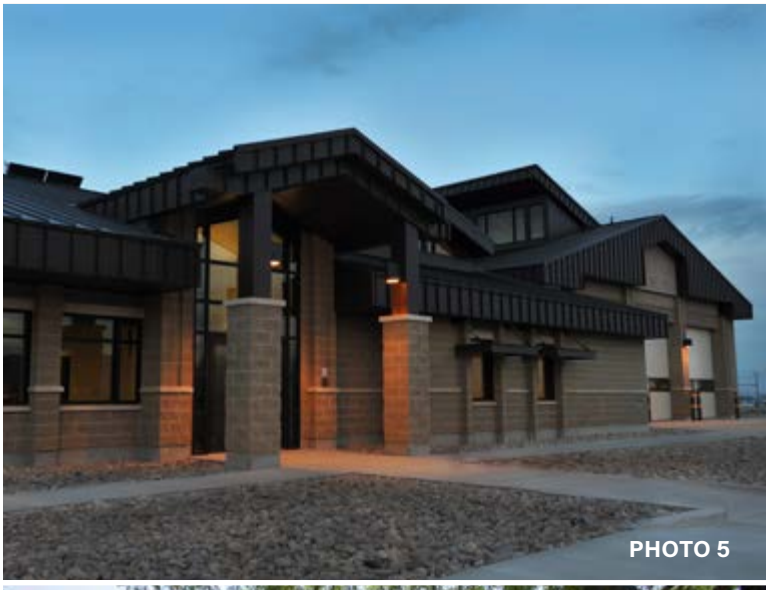


PHOTO 5

PHOTO 6

Brick

The following brick colors are acceptable

- Tumbleweed Atlas Brick (dimensions: 4”x4”x12”) (Photo 2).
- Dark brown modular or nominal brick – consider for accent purposes. See Photo 4, this section.

The following manufacturers are acceptable (if the manufacturer is not available a custom color must be submitted to match one of the colors as mentioned above):

- Interstate Brick
- Beehive Brick and Stone

Glazing

The following glass colors are acceptable, used in context.

- Clear – acceptable for Industrial and Administration/ Support settings
- Bronze Tint – acceptable for Industrial and Administration/Support settings
- Green or Blue Tint.- as stated below:
- Use blue (match Falcon Hill building 1575) if in Falcon Hill setting.
- Use green if in Eastside Runway setting (match F-22 System Support Facility, Building 6XX)

688

Standing Seam Metal Roof

The following metal color is acceptable:

- Medium Bronze

The following manufacturers are acceptable (if the manufacturer is not available a custom color must be submitted to match one of the colors as mentioned above):

- Garland Company
- MBCI
- Firestone
- Centria
- Englert

Fascia:

Low slope metal roofs shall have accompanying fascia and soffit and shall match the color of the roof.

Incorporate continuous metal fasciae that are proportional to match the scale of the roof reference parapet detail in appendix.

Soffits, Gutters and downpouts

Match color of roof

Exterior Handrails/Guradrails:

Exterior Handrails and guardrails to be stainless steel, or powder coated steel. Color to be medium bronze or dark bronze.

Door Frames & Doors

Storefront door frames will be either clear anodized or bronze. Hollow metal frames will be painted medium bronze or dark bronze.

Window Frames

Storefront window frames will be either clear anodized or bronze. Hollow metal frames shall be painted Medium Bronze.

Exposed Structural Elements

Exposed structural elements exterior shall be painted either dark bronze or medium bronze. Exposed structural elements indoors - interior shall be painted white or black depending upon the setting and application.

APPLIED COLOR GUIDELINES

Each color application will require some interpretation; however, each should generally follow these principles. Specific exceptions are allowed with ARB approval.

- Older facilities are normally the only ones requiring paint.
- All new facilities shall use integrally colored or factory-applied finishes.
- Reduce visual clutter by simplifying the application.
- Painting or applied artificial fasciae, bases, details, etc. on facilities and painting of masonry or concrete architectural features such as quoins, lintels, bases, or capitals is prohibited, except with ARB approval only.
- Paint equipment on painted buildings to match adjacent surface.
- Painting stripes around buildings is prohibited, except with ARB approval only.
- Support and service buildings should have simplified, subtle paint schemes.
- Variations are subject to ARB approval.
- Primary door entries are to be painted dark brown with ARB approval.
- Secondary doors are to be painted to match the wall color to prevent calling attention to them.
- Do not arbitrarily change paint colors.

APPENDIX 2

ARCHITECTURAL CONCEPTUAL DETAILS

APPENDIX 2 INDEX - ARCHITECTURAL DETAILS:

Metal Fascia 74
Thin Brick 74
EIFS & Stucco 74
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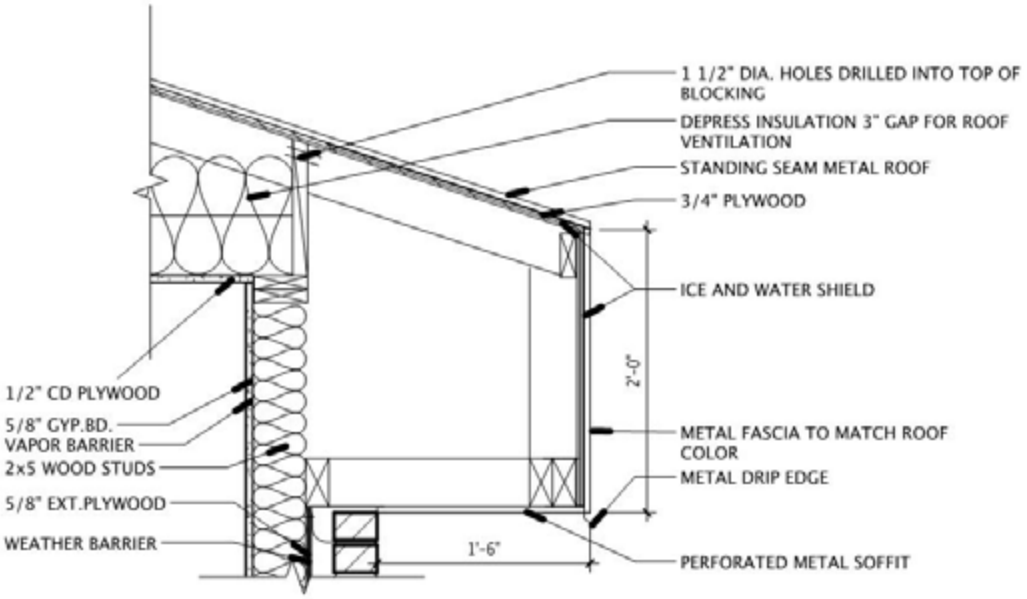
243 74
Brick 74
Metal Siding 81
Composite Metal Panel 84
Thin Brick Detail 86
Metal Grille Entrance Mat 92
Toilet Partitions 93

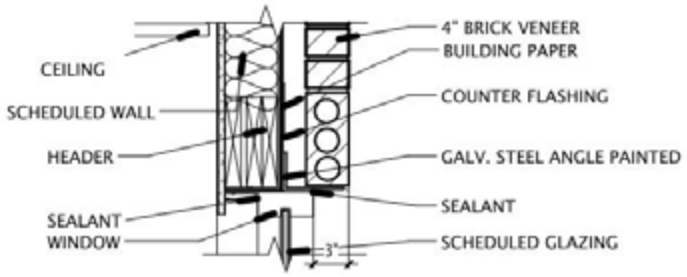
APPENDIX 2

Architectural Details

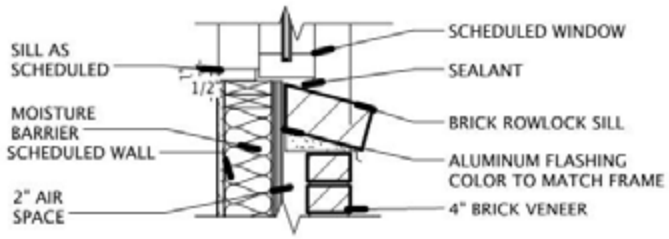
Brick



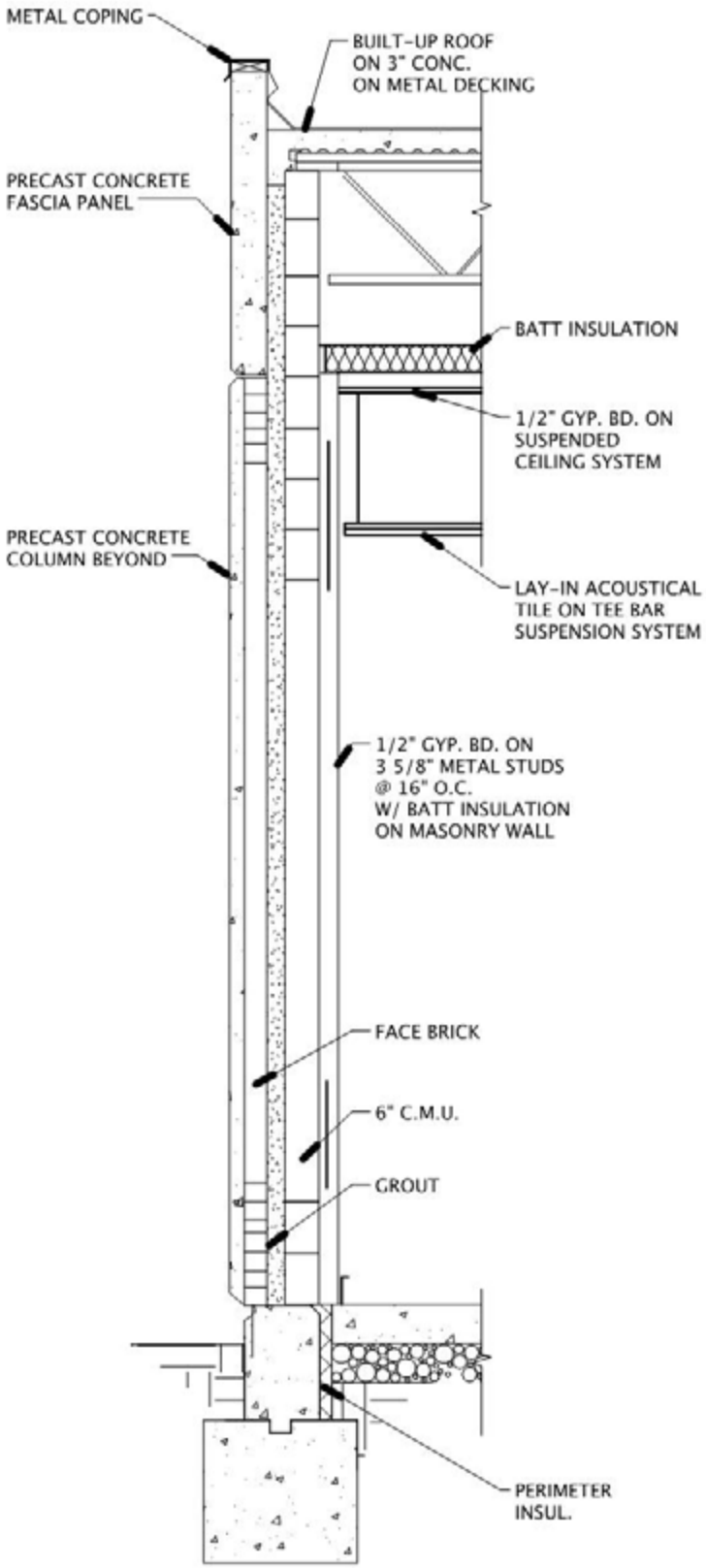
FASCIA DETAIL



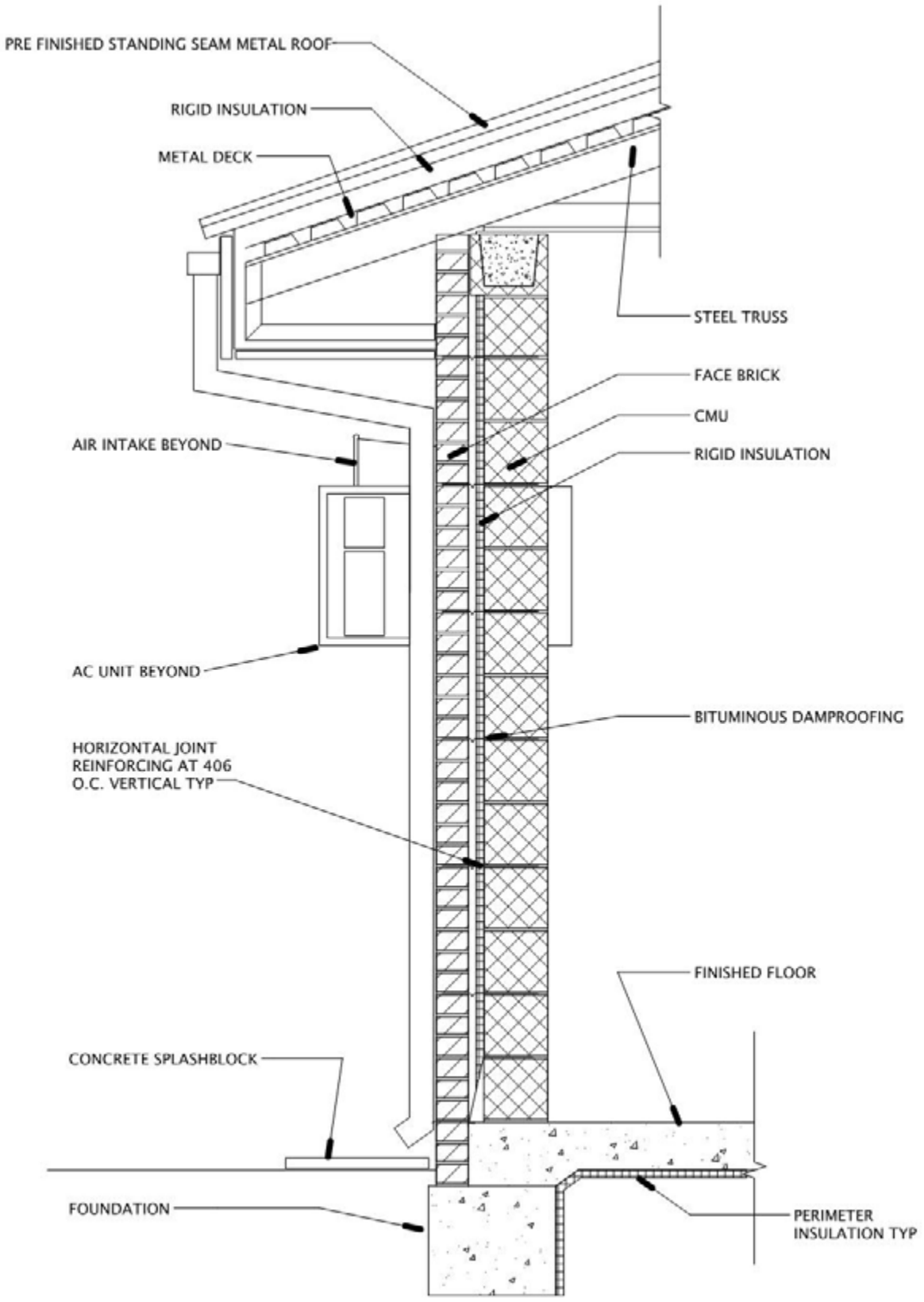
BRICK HEAD DETAIL



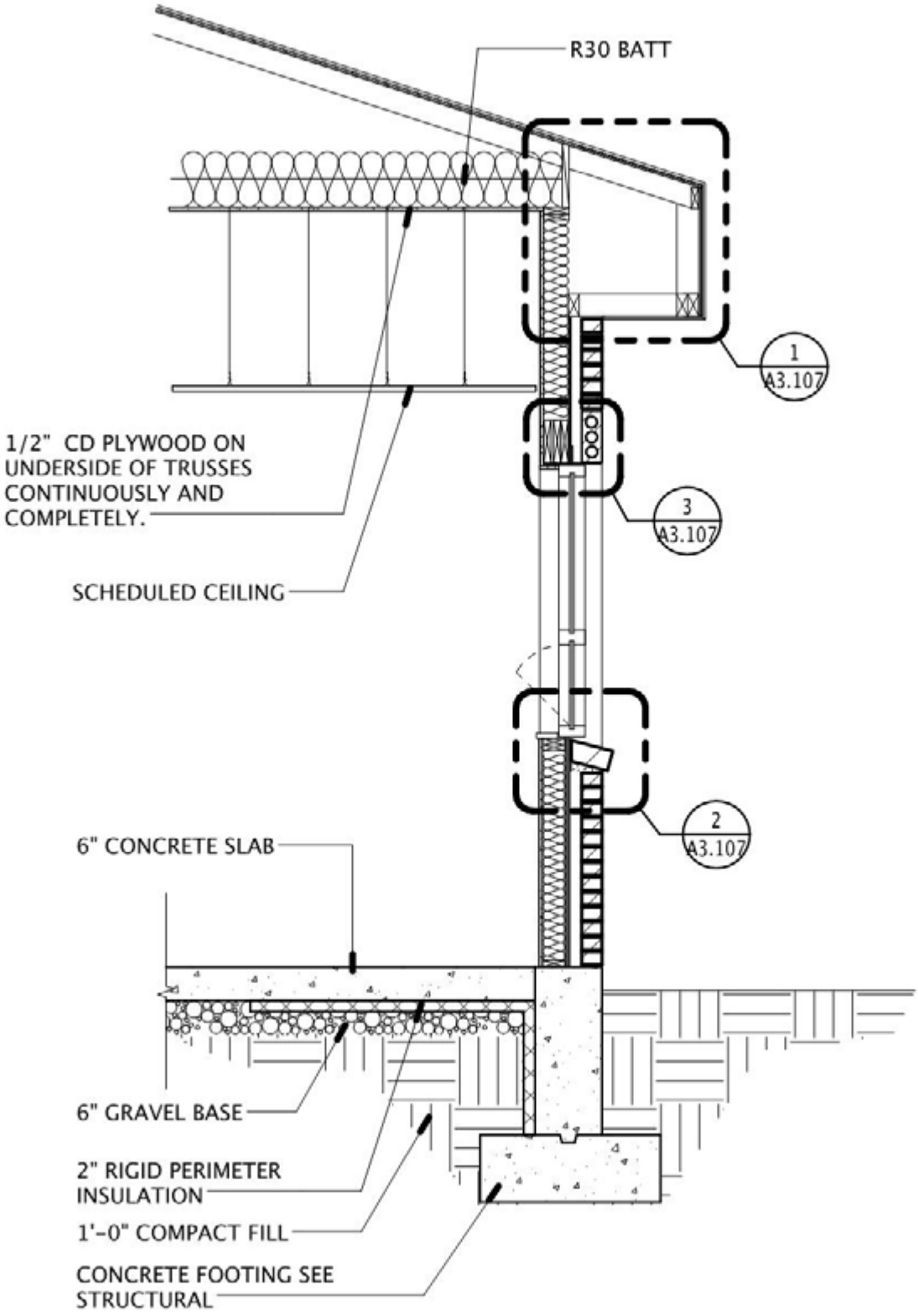
BRICK SILL DETAIL



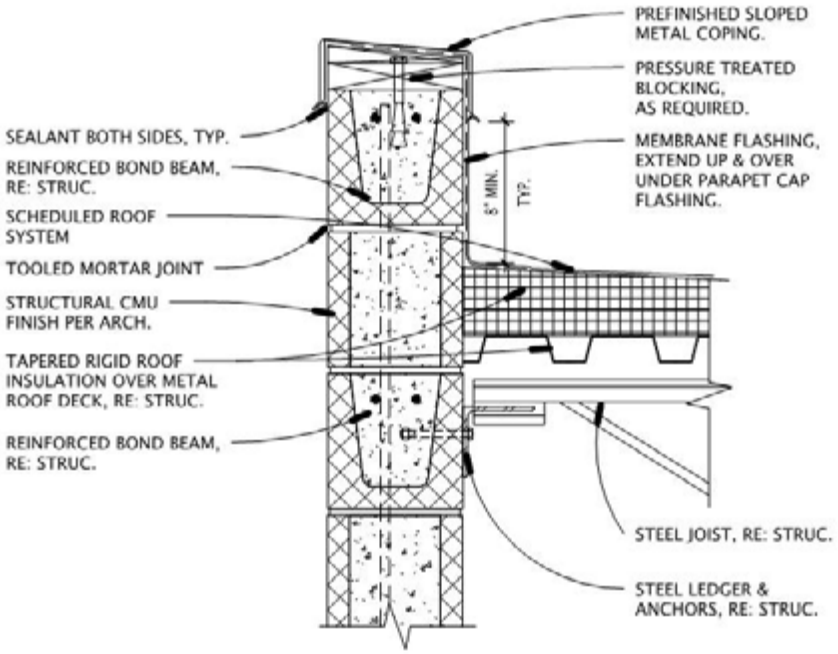
WALL SECTION 4

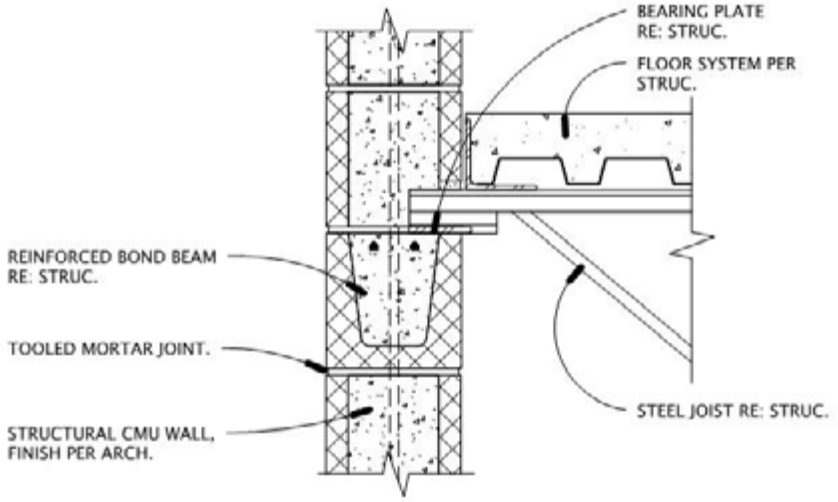


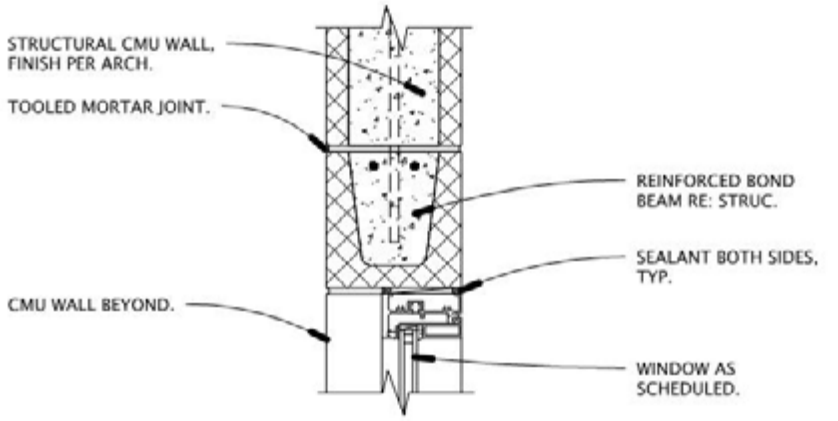
BRICK OVER CMU

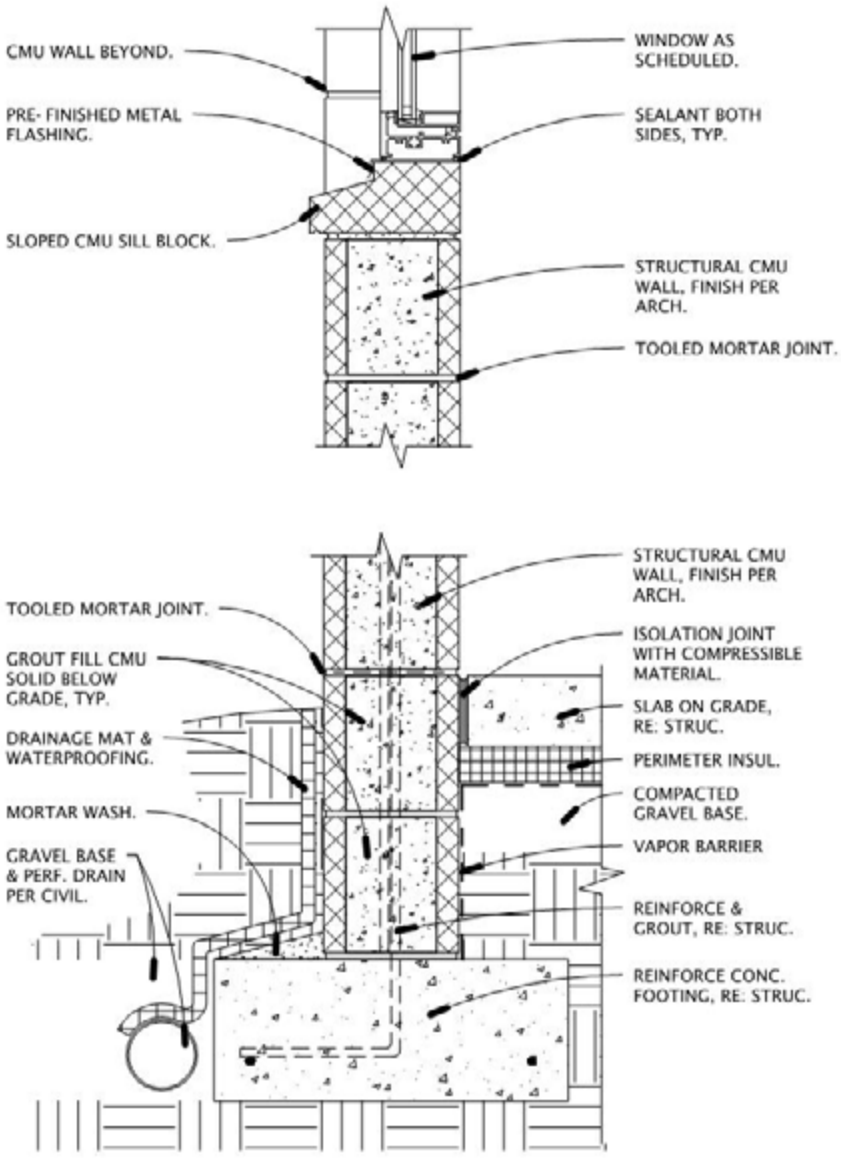


BRICK WALL SECTION

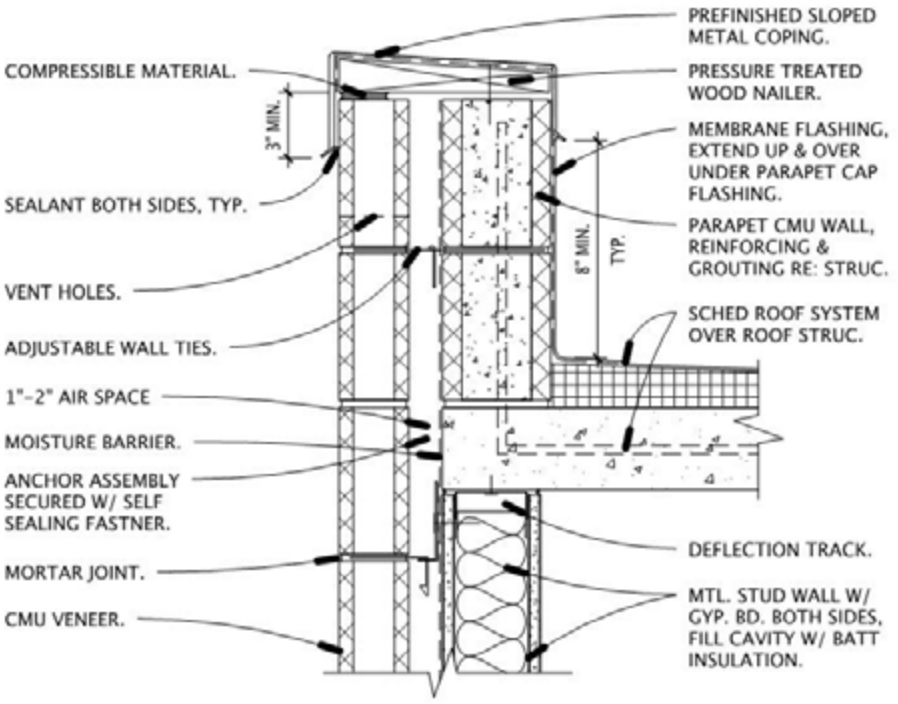

PREFINISHED SLOPED METAL COPING.
PRESSURE TREATED BLOCKING, AS REQUIRED.
SEALANT BOTH SIDES, TYP.
REINFORCED BOND BEAM, RE: STRUC.
SCHEDULED ROOF SYSTEM
TOOLED MORTAR JOINT
STRUCTURAL CMU FINISH PER ARCH.
TAPERED RIGID ROOF INSULATION OVER METAL ROOF DECK, RE: STRUC.
REINFORCED BOND BEAM, RE: STRUC.
MEMBRANE FLASHING, EXTEND UP & OVER UNDER PARAPET CAP FLASHING.
8" MIN.
TYP.
STEEL JOIST, RE: STRUC.
STEEL LEDGER & ANCHORS, RE: STRUC.


BEARING PLATE RE: STRUC.
FLOOR SYSTEM PER STRUC.
REINFORCED BOND BEAM RE: STRUC.
TOOLED MORTAR JOINT.
STRUCTURAL CMU WALL, FINISH PER ARCH.
STEEL JOIST RE: STRUC.

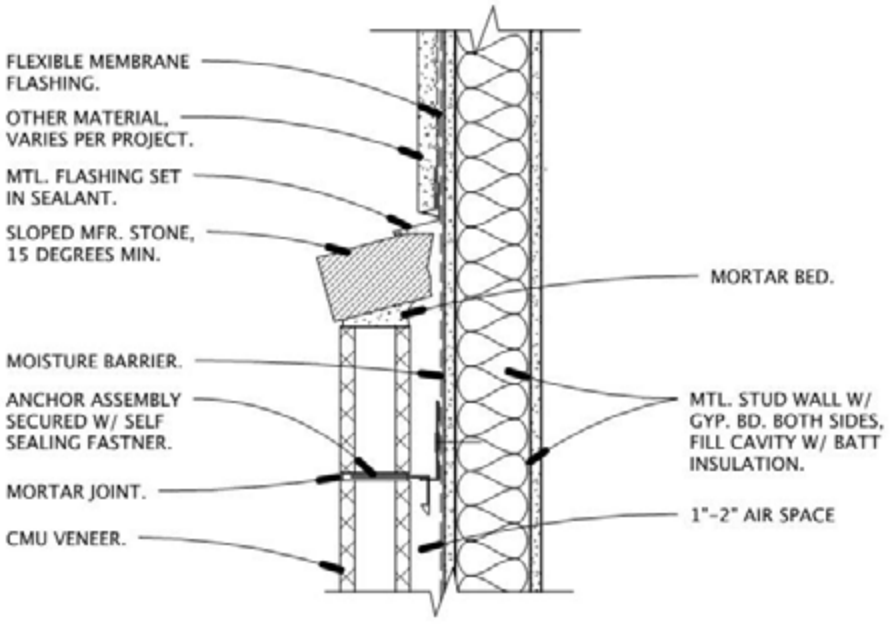

STRUCTURAL CMU WALL, FINISH PER ARCH.
TOOLED MORTAR JOINT.
CMU WALL BEYOND.
REINFORCED BOND BEAM RE: STRUC.
SEALANT BOTH SIDES, TYP.
WINDOW AS SCHEDULED.



CMU WALL DETAILS

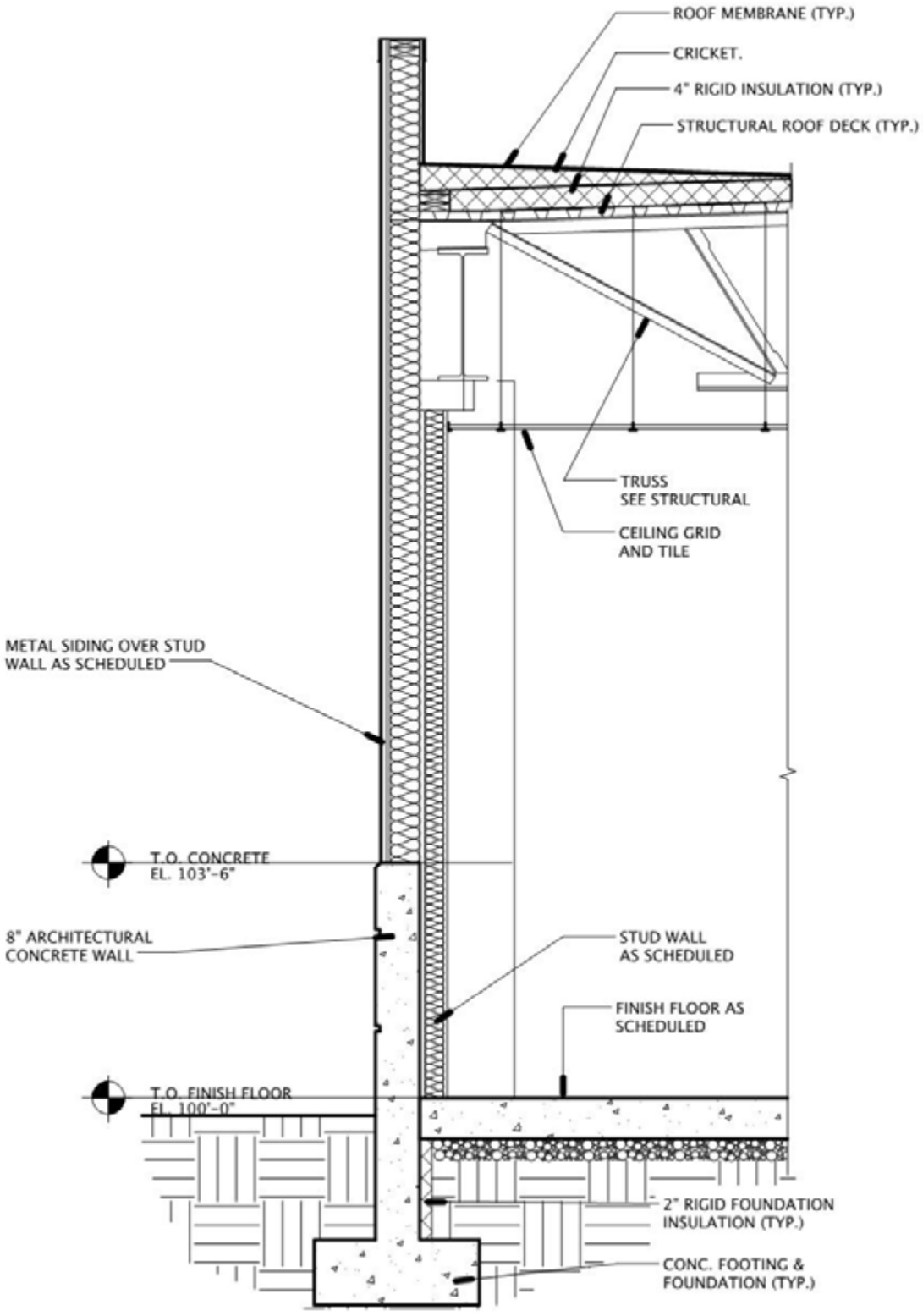


TYP-CMU ON MTL STUD PARAPET DTL

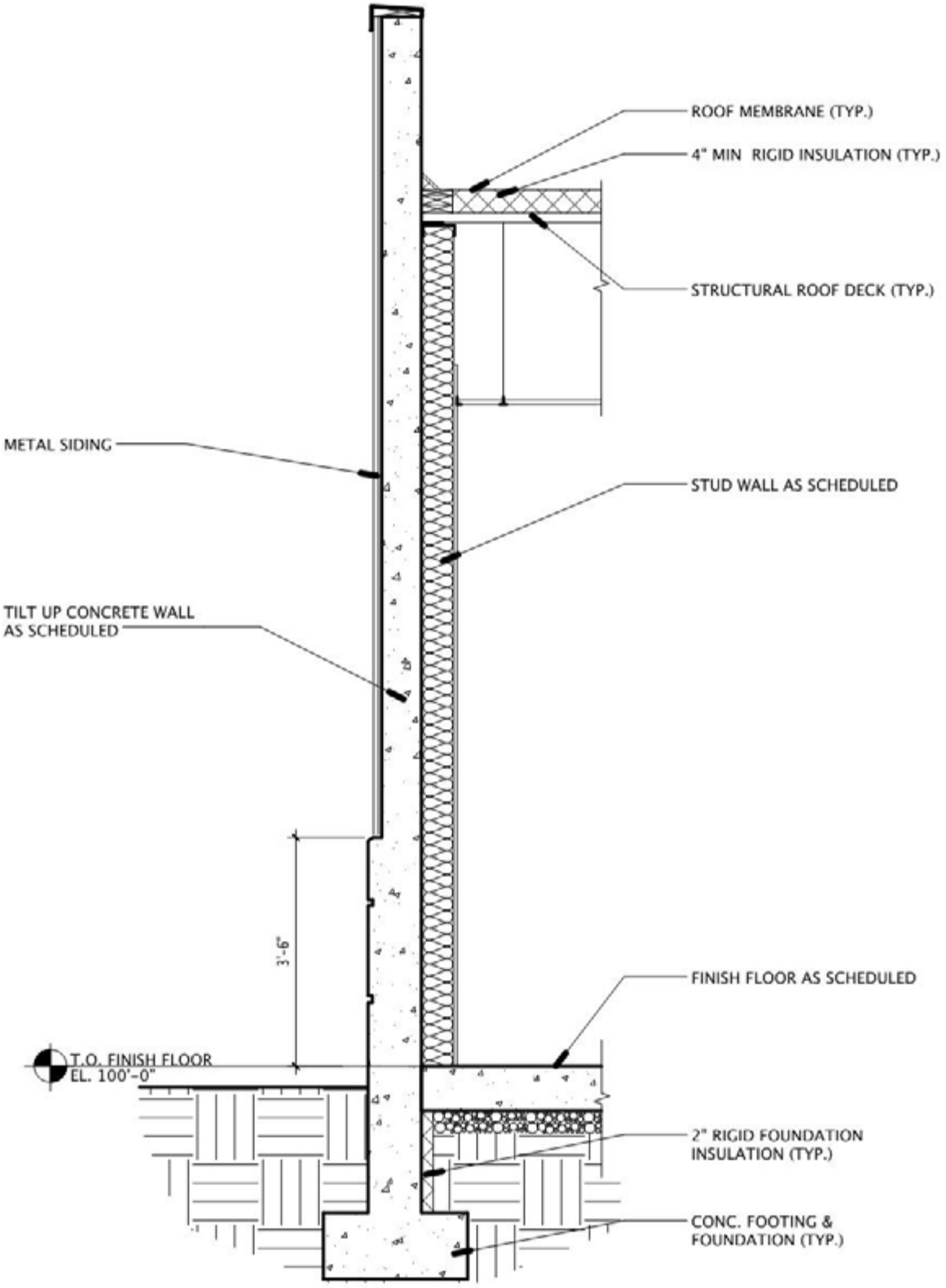


TYP-CMU ON MTL STUD TRANS DTL

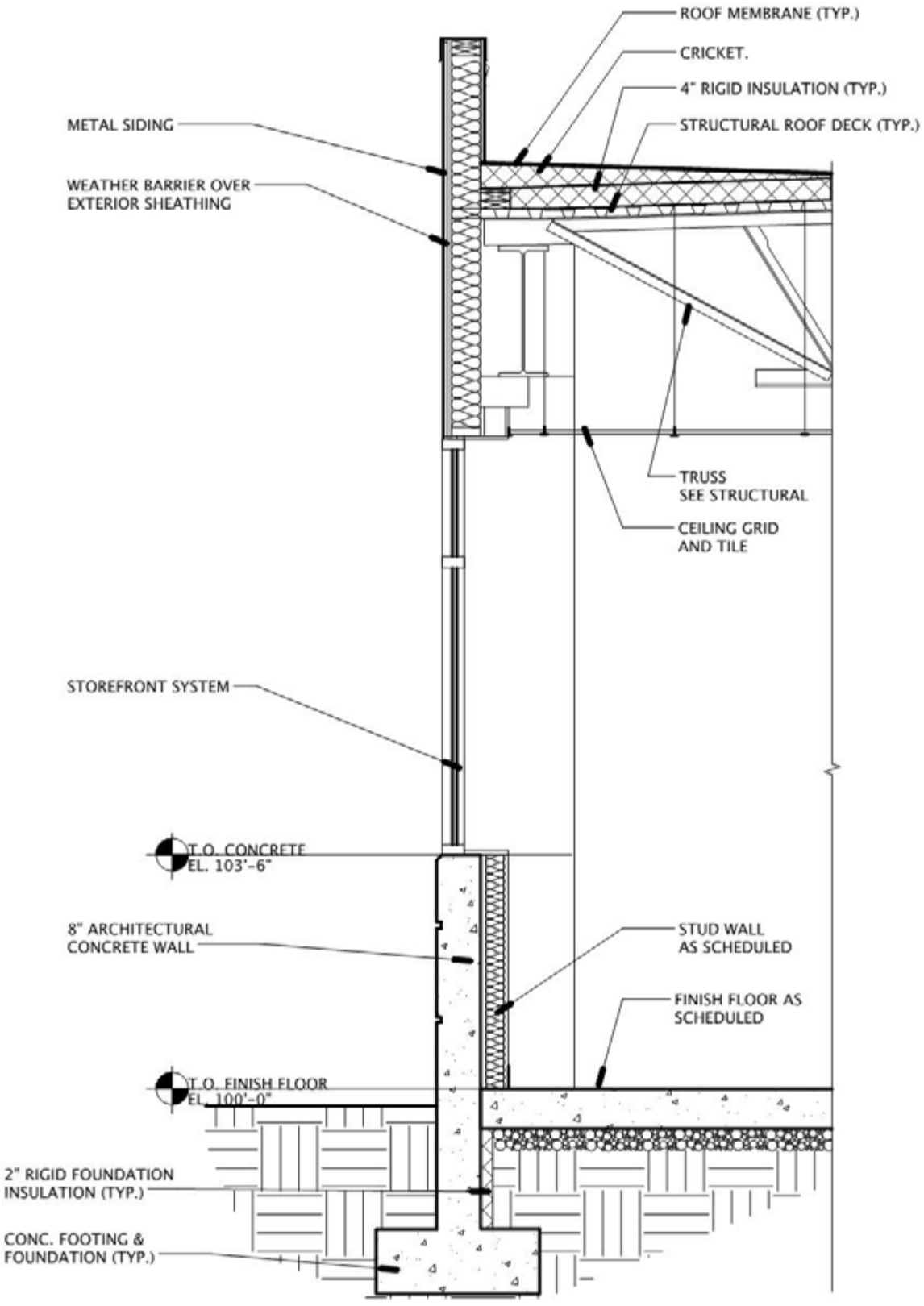
Metal Siding



METAL SIDING WALL SECTION 3

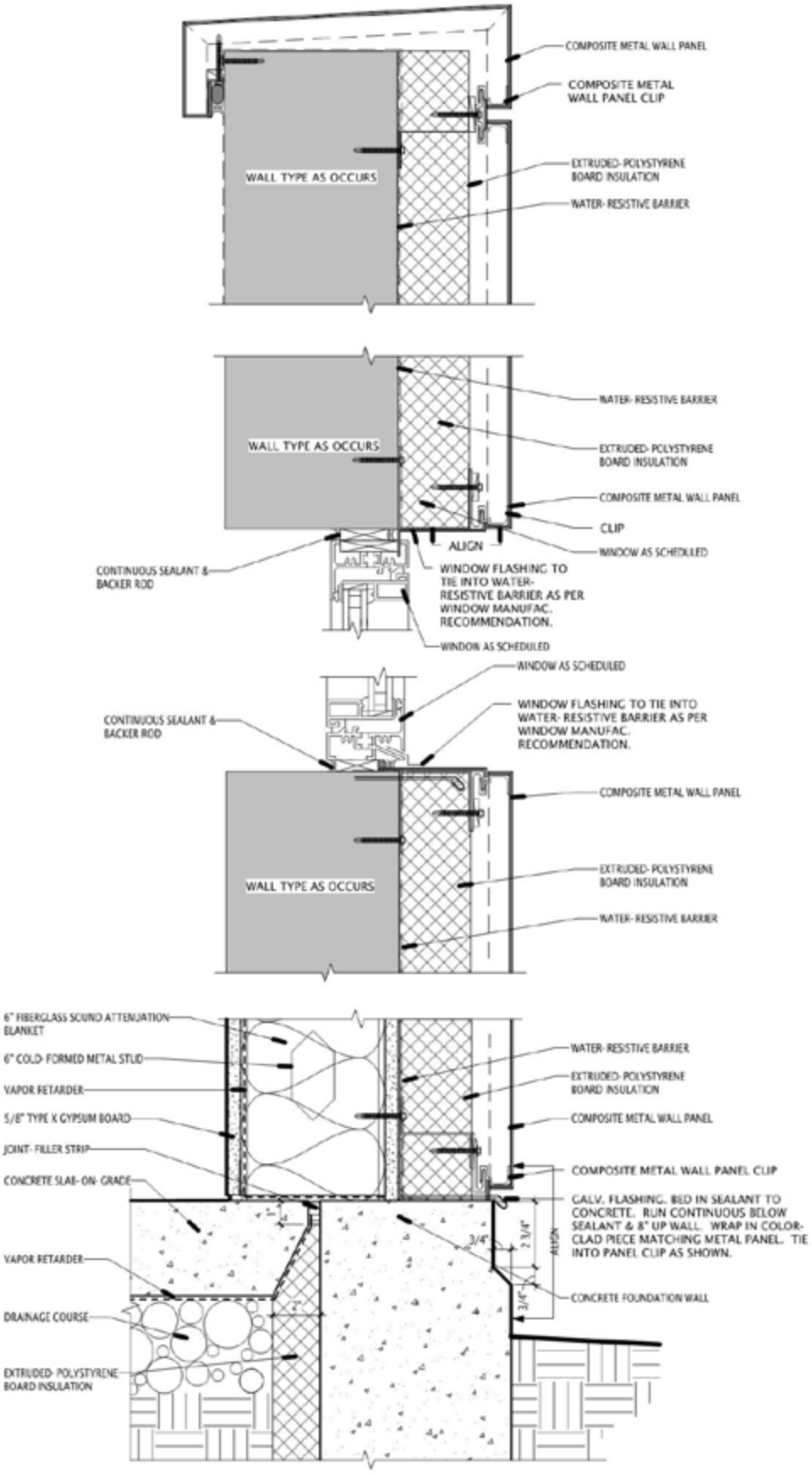


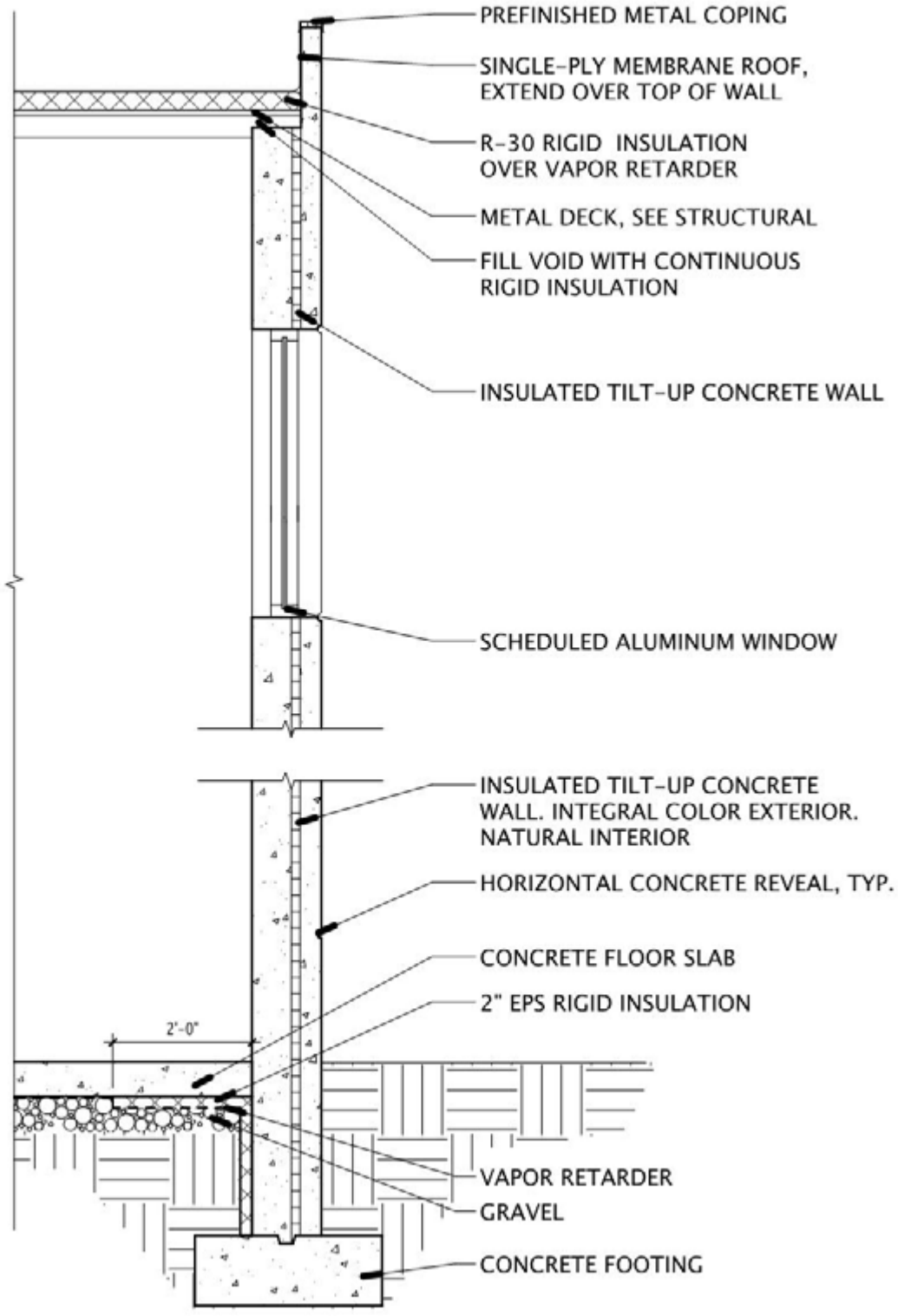
METAL SIDING WALL SECTION 1



METAL SIDING WALL SECTION 4

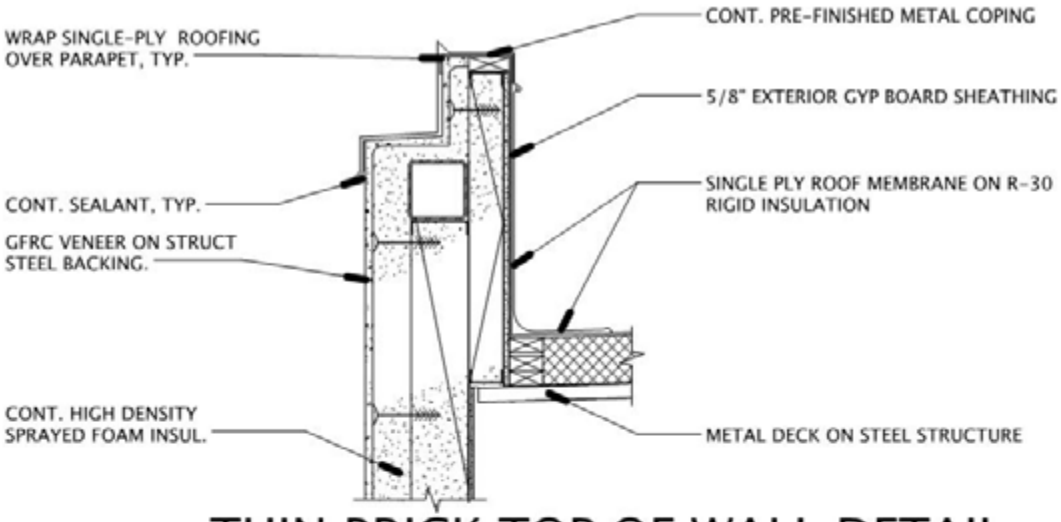
Composite Metal Panel



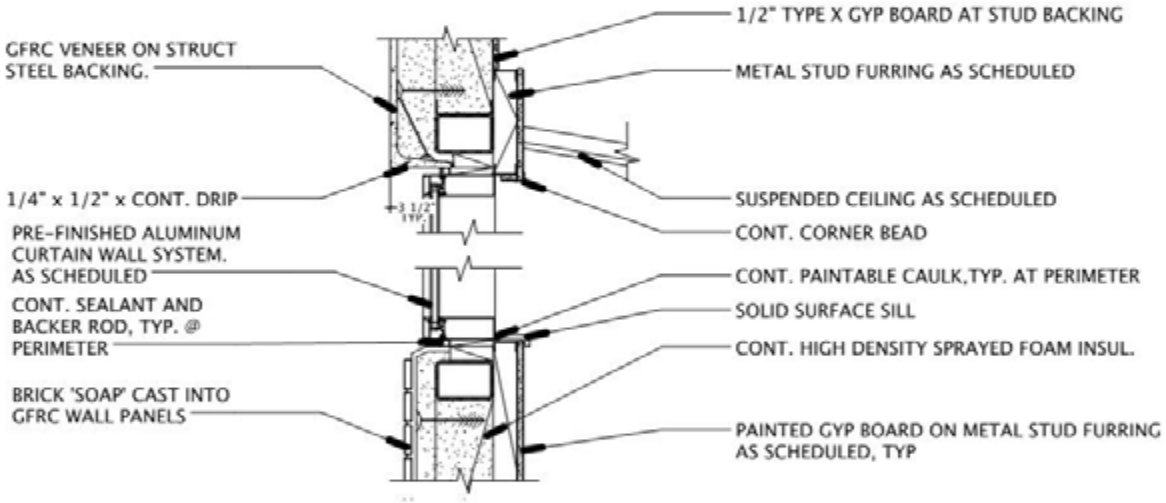


INSULATED CONCRETE WALL SECTION

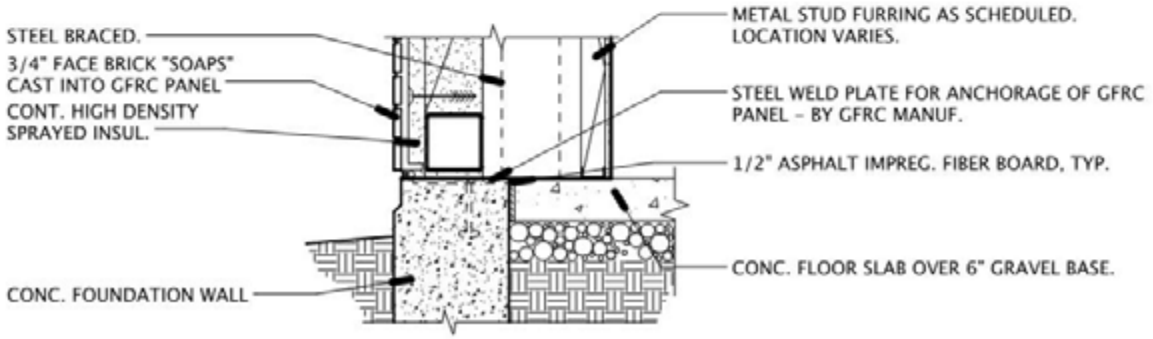
Thin Brick Details



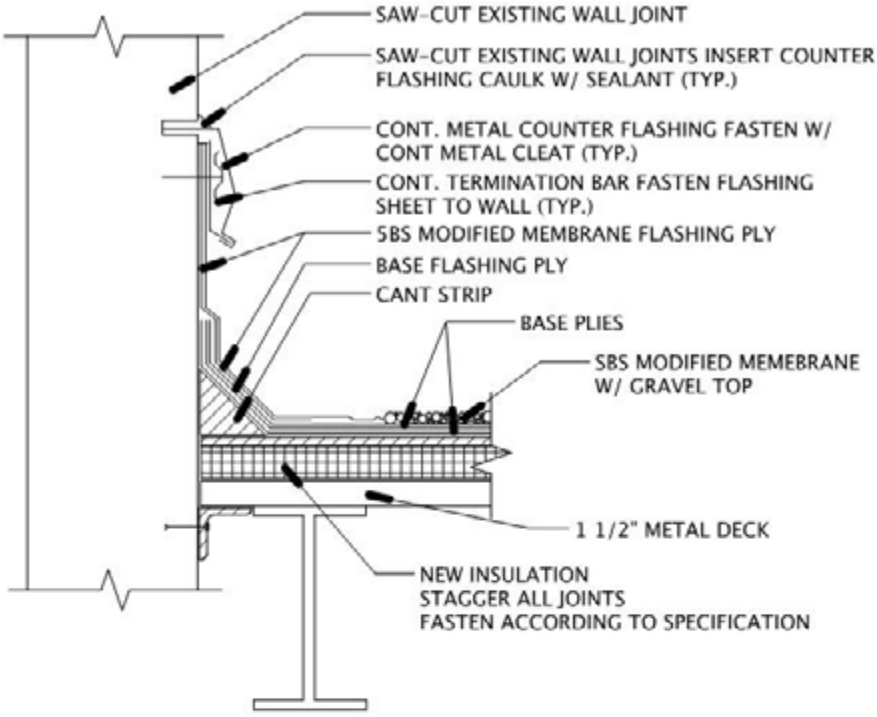
THIN BRICK TOP OF WALL DETAIL



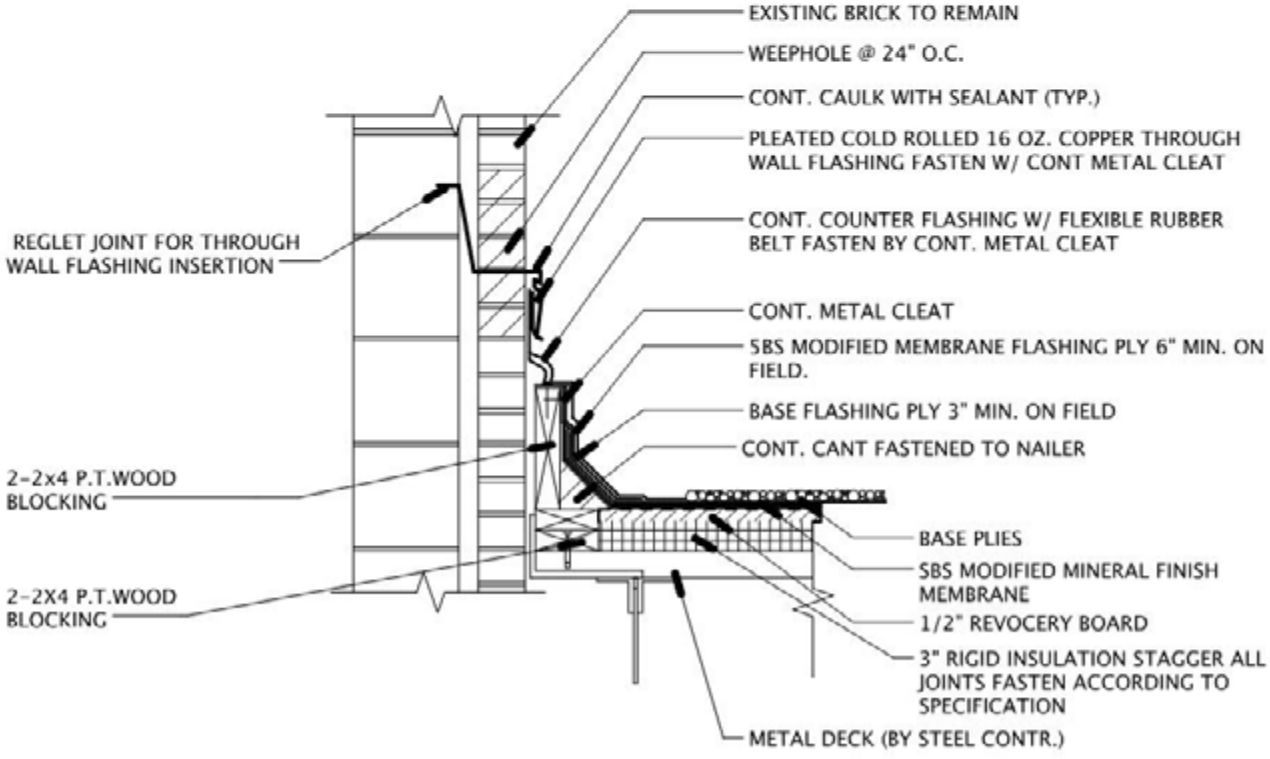
THIN BRICK WINDOW DETAIL



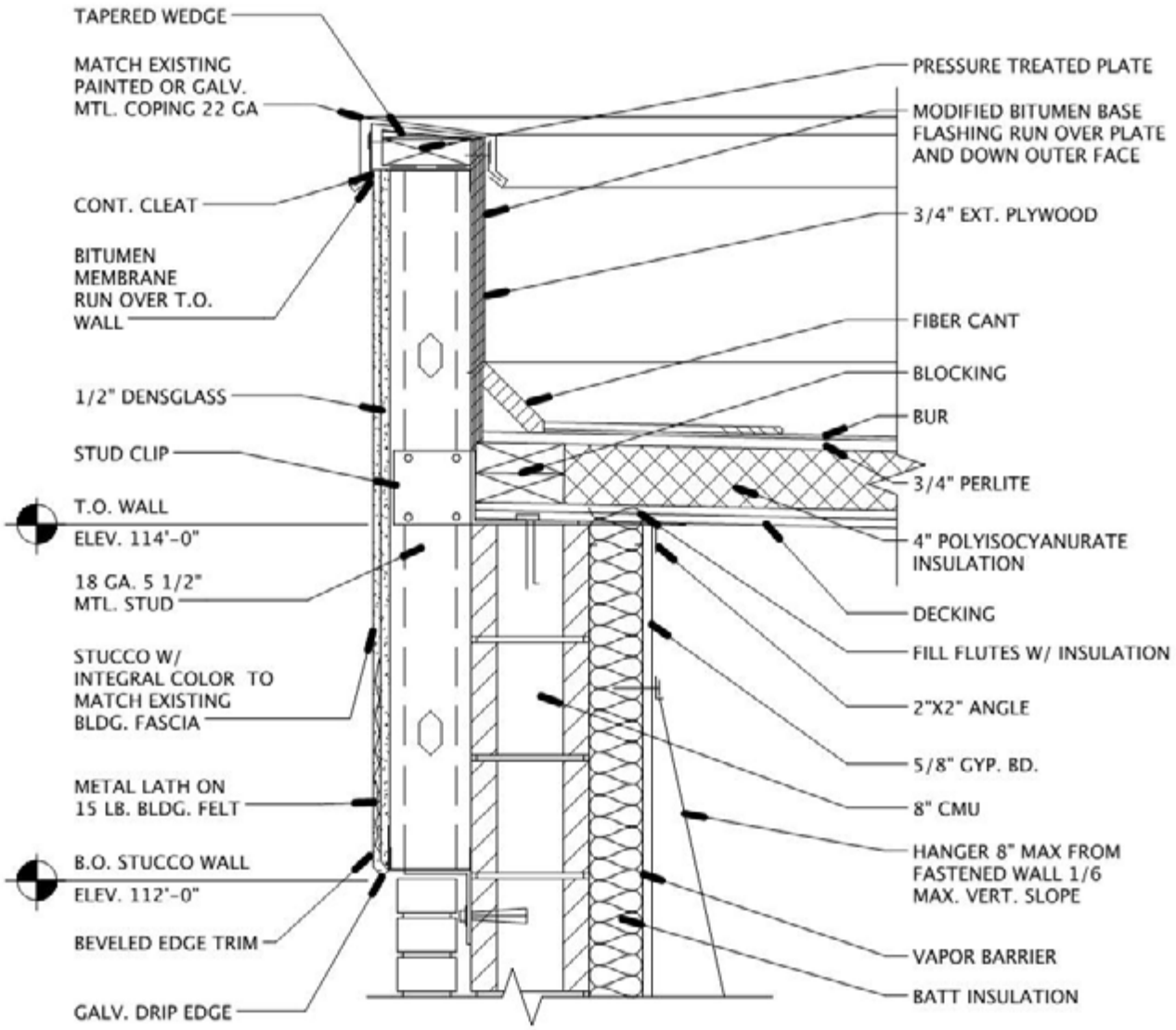
THIN BRICK BASE DETAIL



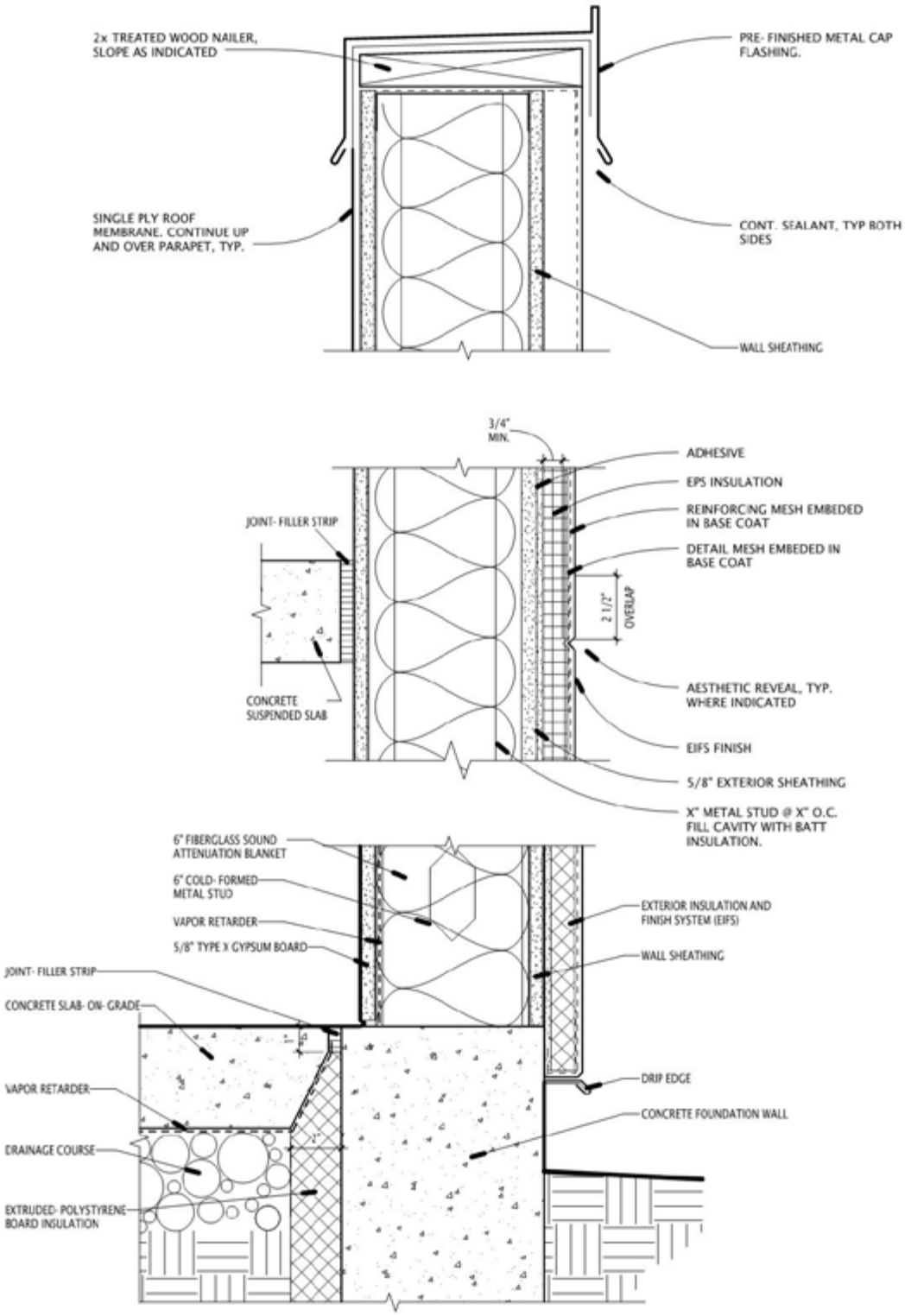
REGLET MOUNTED COUNTERFLASHING



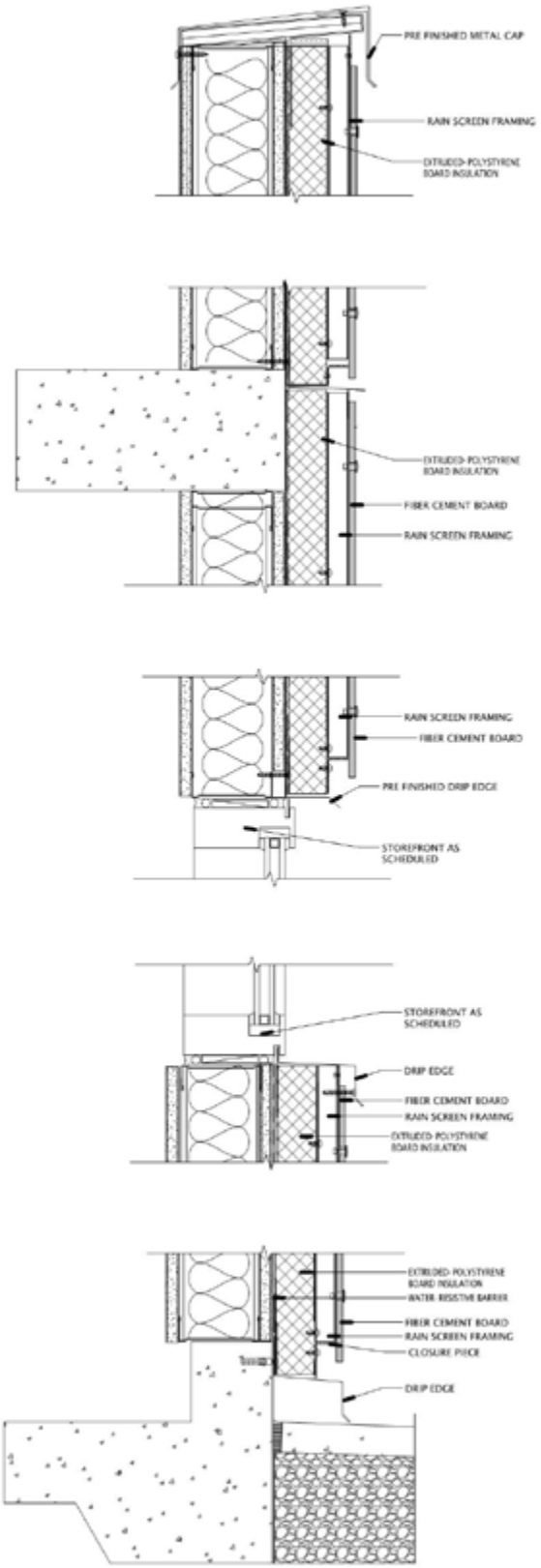
ROOF DETAIL @ WALL FOR RAISED FLASHING



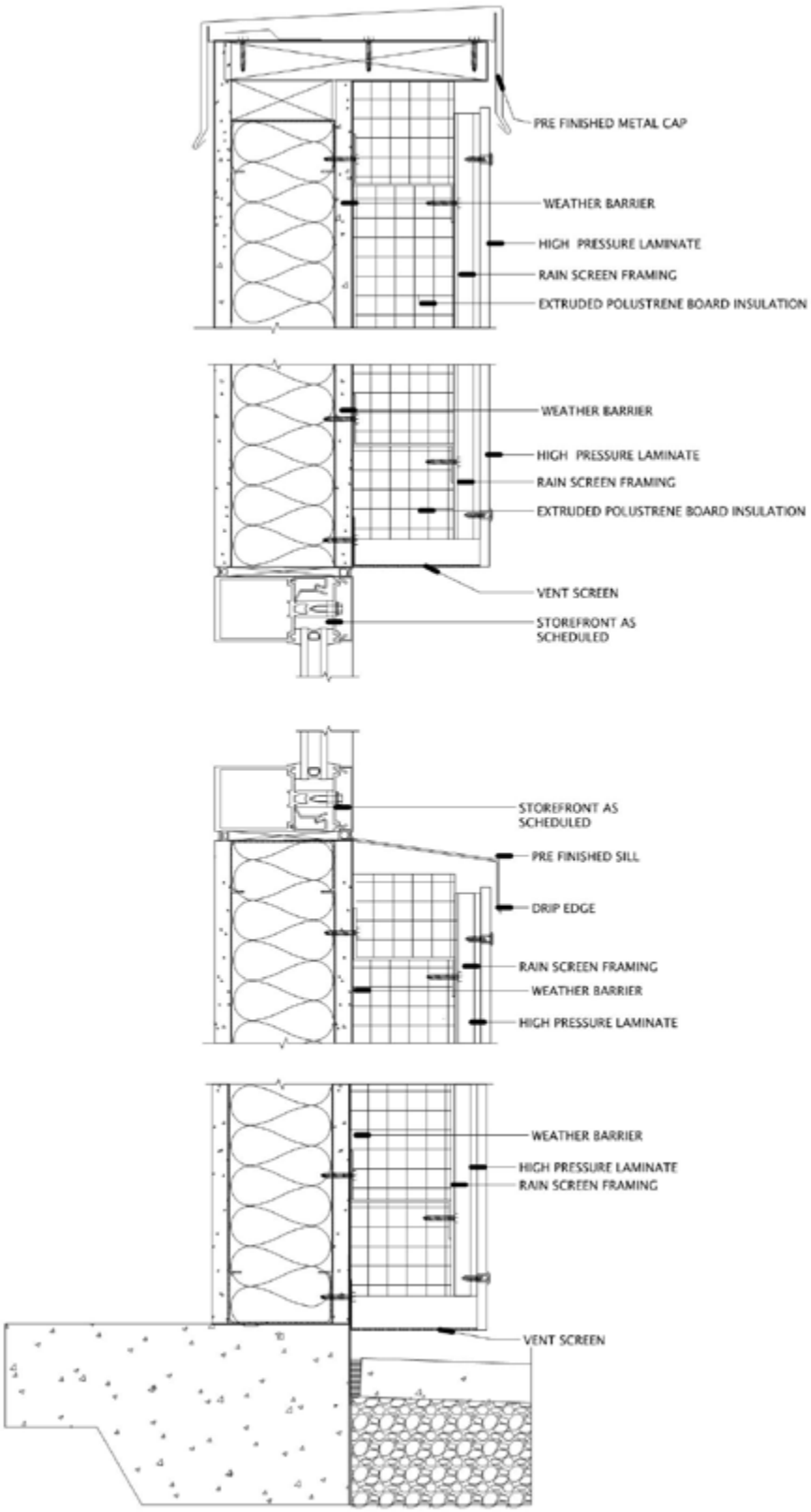
STUCCO FASCIA



EIFS WALL DETAILS

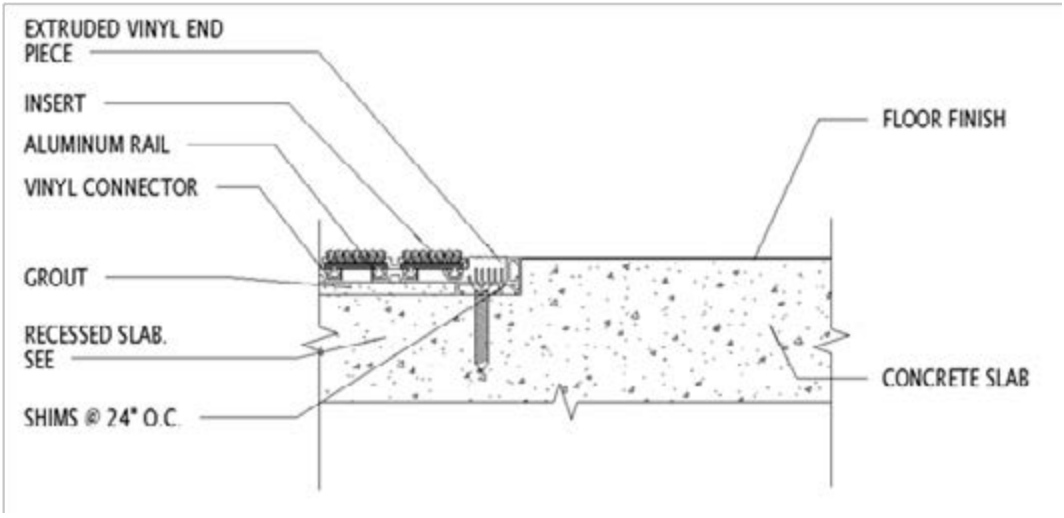


FIBER CEMENT BOARD (HARDIE BOARD)

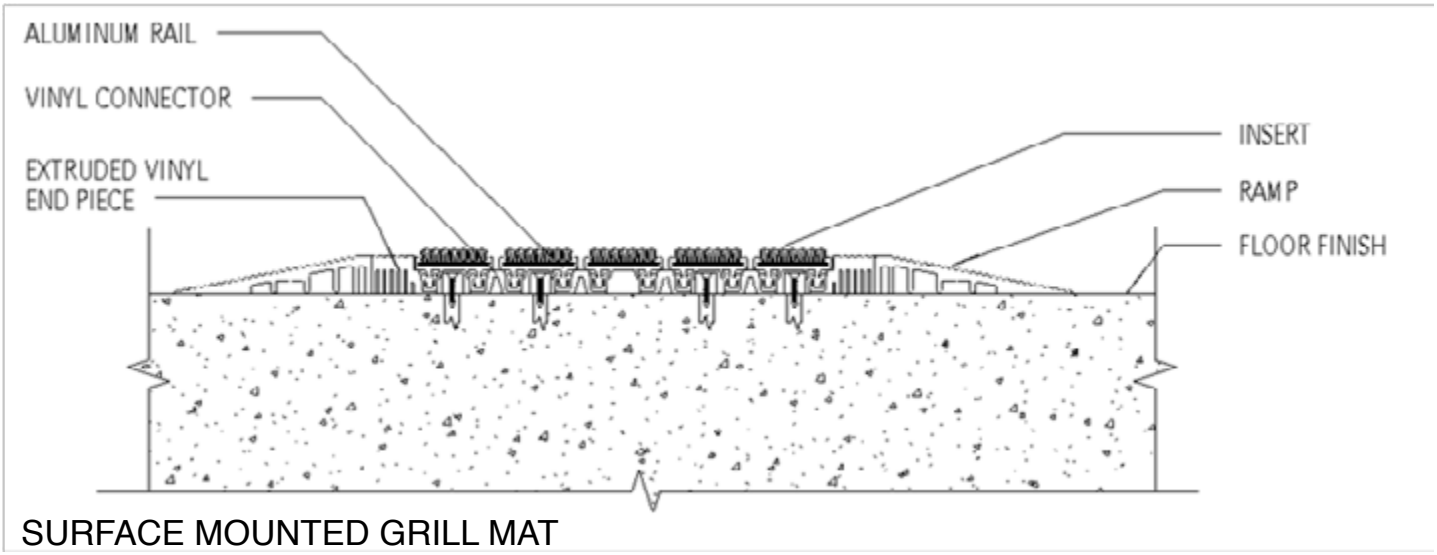


HIGH PRESSURE LAMINATE (TRESPA)

Metal Grill Entrance Mat



RECESED GRILL MAT



SURFACE MOUNTED GRILL MAT

Toilet Partitions

FLOOR AND CEILING MOUNTED

FLOOR MOUNTED

CEILING MOUNTED

URINAL SCREENS

APPENDIX 3

ACCEPTABLE VS. UNACCEPTABLE DESIGNS

Tough Sheds

Acceptable: Proportions: Sturdy construction materials

Unacceptable: Location is not acceptable
Wood is not an acceptable material

Fences

Acceptable: Sturdy construction
Strong vertical or horizontal patterns

Unacceptable: Lack of sturdy base to create a level fence
Poor construction and choice of materials

Trash Enclosures

Acceptable: Sturdy materials, with clean Kynar finish

Unacceptable: Trash receptacles are not received by enclosure

Mechanical Equipment Screens

Acceptable: Provide screens for unseeingly mechanical equipment

Unacceptable:

Rooftop Mechanical Equipment Screens

Acceptable:

Unacceptable: Although the equipment is screened, the access is not Functional and is not aesthetically pleasing.

CMU Buildings

Acceptable:

Unacceptable:

Metal Buildings

Acceptable: although the color is not per standards.There is a rhythm to the façade. The roof has a relief and creates an interesting form

Unacceptable: Highlighting the edges and corners creates awkward proportions.

Brick buildings

Acceptable:

Unacceptable:

Entries Canopies

Acceptable: Form and proportion of entry is incorporated into the architecture.

Unacceptable: Material of Canopy has not withstood the weather. Form of canopy is tacked on and not integrated into the building.

Acceptable: Form and proportion of entry is incorporated into roof form.

Unacceptable: Form of canopy is tacked on and not integrated into the building.

Roofs

Acceptable:

Unacceptable:

Interiors

Acceptable:

Unacceptable:

Landscape Screens

Acceptable:

Unacceptable:

Lighting

Acceptable:

Unacceptable:

Utilities

Acceptable:

Unacceptable:

APPENDIX 4

LANDSCAPE MATERIALS & IRRIGATION AND PLANT LIST

MATERIALS & IRRIGATION

The primary focus on irrigation systems will be the efficient use of potable water and minimizing burdens on storm sewer systems, secondary water providers, micro-climate conditions, maintenance and replacement, and compliance with security standards.Efforts should be made to capture existing sources of secondary water and provide ways for recharging subsurface water or aquifers. Current technology should be utilized in managing water resources. These may include rain shut off devices,two wire control wires,central controller, mini weather stations to monitor wind, solar, rain, humidity, temperature, evapo-transpiration, run time, cycle soak programs, surge protectors, leak detection, soil water sensor, landscape water meters, to name a few monitoring options. Additionally, the use of evaporation reduction methods should be used in all landscape work. These methods include the use of both organic and inorganic mulches.

The efficient design or irrigation systems will improve percolation, plant growth,weed reduction,reduce run-off,

Reduce slip/fall potential, and free/thaw problems. It will enhance the water distribution uniformity thus increasing water efficiency.

Standard Irrigation equipment used for Hill AFB Sprinkler systems may include:

Pipe:

- PVC pipe - Schedule 40 for ¾” to 2 ½”. Schedule 80 for 3” - 6”
- Poly Pipe 125 PSI
- Funny Pipe

Valves:

- Irritrol
- Hunter
- Rainbird

Sprinkler Heads:

- Rainbird 2”-4” Popup with Radius 15’-10’ (mainly building areas and mow strip smaller than 10’)
- Hunter Pro Series 2”-4” with Radius 17’-10’
- Hunter PGP Gear driven (mainly for larger areas)
- Rainbird Falcon gear driven rotors
- Rainbird 700/750 Golf head at Soft ball Fields.

Emitter Heads:

Emitter heads shall be self-cleaning, pressure compensating diaphragm with one or six self-piercing barbed outlets; each capable of emitting from 1/4 to 2 gallons/hour flow.

Emitter body shall be ultraviolet stabilized, algae, and heat resistant plastic construction.

Bubbler Sprinkler Heads

Heads shall be multiple-spray bubbler with adjustable flow and designed for permanent aboveground mounting on risers.

Installation of Drip Irrigation System

Emitter Hose

Emitter laterals shall be buried 6 inches deep. Connections shall be:

- Solvent welded in accordance with manufacturer’s recommendation to standard.
- Weight Schedule 40 PVC fittings and bushings. Hose shall be installed in a serpentine manner. When cutting hose, shearing tool such as a pipe cutter, knife, or shears shall be used. Manufacturer’s recommended tool and procedures when punching hose for emitters shall be followed.

Emitter Heads

Emitters shall be installed in a plastic emitter box. Emitter on a rigid PVC nipple shall be connected to PVC drip lateral with a tee or elbow.

Tubing shall be attached to barbed fitting and daylight distribution tubing at root ball secured with stake, with bug cap at end of secured distribution tubing. After installing emitters and before operating system, end of drip lateral shall be opened and flushed clean. The number of emitters on a line shall not exceed manufacturer’s recommendations for that hose or distribution tubing size and length.

Controllers:

- Maxi-Com Rainbird ESP-Commercial
- 12 SAT
- 16 SAT
- 24 SAT
- 32 SAT
- 40 SAT

Wire nuts:

- Silicone line

Solenoids:

- 811 (universal 24 volt 60 hz)
- Rainbird EZ bleed for all rainbird valves
- Rainbird AB for 700/750 Golf Head

PLANT LIST

Plants listed in the following sections are low-water use, drought tollerant, are Utah Native plant species, and are suitable for the HAFB environment.

PERENNIALS

ACHILLEA MILLEFOLIUM - COMMON YARROW

Maintains dried golden flowers throughout winter months.

TYPE	Perennial
HARDY RANGE	4B to 8B
HEIGHT	18” to 36” / 45cm to 90cm
SPREAD	4” to 6” / 10cm to 15cm
GROWTH RATE	Fast
FORM	Upright or erect
EXPOSURE	Partial shade or partial sun to full sun

AQUILEGIA CAERULEA - ROCKY MOUNTAIN COLUMBINE

Spring leaf green, summer purple/light blue flower color.

TYPE	Perennial
HARDY RANGE	3A to 8A
HEIGHT	16” to 36” / 60cm to 90cm
SPREAD	4” to 6” / 10cm to 15cm
GROWTH RATE	Average
FORM	Rounded
EXPOSURE	Partial shade or partial sun to full sun

ASTER X ‘PINK BOUQUET’ - ASTER

Long lasting pink flowers into late fall.

TYPE	Perennial
HARDY RANGE	3A to 8A
HEIGHT	8” to 12” / 20cm to 30cm
GROWTH RATE	Average
FORM	Upright or erect
EXPOSURE	Full Sun

ASTER X ‘WHITE OPAL’ - ASTER

Long lasting pink flowers into late fall.

TYPE	Perennial
HARDY RANGE	3A to 8A
HEIGHT	8” to 10” / 20cm to 25cm
GROWTH RATE	Average
FORM	Upright or erect
EXPOSURE	Full sun

ASTER ALPINUS 'ROSEUS' - ALPINE ASTER

Maintains pink/purple flowers into late fall/early winter.

TYPE	Perennial
HARDY RANGE	4A to 8B
GROWTH RATE	Average
FORM	Spreading or horizontal
EXPOSURE	Full sun

COREOPSIS VERTICILLATA 'MOONBEAM' - MOONBEAM TICKSEED

Maintains yellow flowers into late fall/early winter.

TYPE	Perennial
HARDY RANGE	3B to 10A
HEIGHT	18" to 24" / 45cm to 60cm
SPREAD	8" to 24" / 45cm to 60cm
GROWTH RATE	Fast
FORM	Irregular or sprawling
EXPOSURE	Partial shade or partial sun to full sun

ECHINACEA PURPUREA - PURPLE CONEFLOWER

Maintains pink/purple flowers into early fall.

TYPE	Perennial
HARDY RANGE	3A to 10A
HEIGHT	24" to 4' / 60cm to 1.2m
SPREAD	18" to 24" / 45cm to 60cm
GROWTH RATE	Average
FORM	Upright or erect
EXPOSURE	Full sun

GAILLARDIA X GRANDIFLORA - BLANKET FLOWER

Maintains red/orange flowers into early fall.

TYPE	Perennial
HARDY RANGE	4A to 8A
HEIGHT	12" to 36" / 30cm to 90cm
SPREAD	20" to 24" / 50cm to 60cm
GROWTH RATE	Average
FORM	Upright or erect
EXPOSURE	Full sun

GAURA LINDHEIMERI - WHIRLING BUTTERFLIES BEESBLOSSOM

Long lasting white flowers into late fall.

TYPE	Perennial
HARDY RANGE	6A to 9A
HEIGHT	24” to 4’ / 60cm to 1.2m
GROWTH RATE	Average
FORM	Upright or erect
EXPOSURE	Full Sun

GAURA LINDHEIMERI ‘SISKIYOU PINK’ - SISKIYOU PINK BEESBLOSSOM

Long lasting pink flowers into late fall.

TYPE	Perennial
HARDY RANGE	6A to 9A
HEIGHT	12” to 18” / 30cm to 45cm
GROWTH RATE	Average
FORM	Upright or erect
EXPOSURE	Partial shade or partial sun to full sun

GAURA LINDHEIMERI ‘WHIRLING BUTTERFLIES’ - WHIRLING BUTTERFLIES BEESBLOSSOM

Long lasting pink flowers into late fall.

TYPE	Perennial
HARDY RANGE	6A to 9A
HEIGHT	24” to 36” / 60cm to 90cm
SPREAD	12” to 36” / 30cm to 90cm
GROWTH RATE	Average
FORM	Upright or erect
EXPOSURE	Full sun

GERANIUM ‘JOHNSON’S BLUE’ - BLUE GERANIUM

Purple/blue flowers into late summer.

TYPE	Perennial
HARDY RANGE	4A to 8A
HEIGHT	12” to 24” / 30cm to 60cm
SPREAD	20” to 24” / 50cm to 60cm
GROWTH RATE	Average
FORM	Rounded
EXPOSURE	Full sun

HEMEROCALLIS 'PARDON ME' - DAYLILY

Cranberry red flowers into late fall.

TYPE	Perennial
HARDY RANGE	4A to 9A
HEIGHT	12" to 18" / 30cm to 45cm
SPREAD	24" to 4' / 60cm to 1.2m
GROWTH RATE	Average
FORM	Irregular or sprawling
EXPOSURE	Partial shade or partial sun to full sun

HEMEROCALLIS 'STELLAD'ORO' - DAILILY

Yellow/golden flowers into late fall

TYPE	Perennial
HARDY RANGE	4A to 10A
HEIGHT	16" to 20" / 40cm to 50cm
GROWTH RATE	Average
FORM	Irregular or sprawling
EXPOSURE	Partial shade or partial sun to full sun

HEUCHERA MICRANTHA 'PALACE PURPLE' - CORAL BELLS PALACE PURPLE

Reddish purple foliage.

TYPE	Perennial
HARDY RANGE	4A to 9A
HEIGHT	8" to 12" / 20cm to 30cm
GROWTH RATE	Average
FORM	Rounded
EXPOSURE	Partial shade or partial sun
PERSISTENCE	Semi-evergreen

LIATRIS SPICATA - DENSE BLAZING STAR

Maintains red/purple flower throughout summer.

TYPE	Perennial
HARDY RANGE	4A to 9B
HEIGHT	36" to 5' / 90cm to 1.6m
SPREAD	12" to 18" / 30cm to 45cm
GROWTH RATE	Average
FORM	Upright or erect
EXPOSURE	Full sun

LUPINUS POLYPHYLLUS - BIG LEAF LUPINE

Maintains red to purple flower throughout summer.

TYPE	Perennial
HARDY RANGE	5A to 9A
HEIGHT	24” to 5’ / 60cm to 1.6m
SPREAD	24” to 36” / 60cm to 90cm
GROWTH RATE	Average
FORM	Upright or erect
EXPOSURE	Partial shade or partial sun to full sun

NEPETA X FAASSENII - CATMINT

Maintains red to purple flower into early fall.

TYPE	Perennial
HARDY RANGE	3A to 10A
HEIGHT	12” to 24” / 30cm to 60cm
SPREAD	12” to 24” / 30cm to 60cm
GROWTH RATE	Average
FORM	Irregular or sprawling
EXPOSURE	Full Sun

PENSTEMON DIGITALIS ‘HUSKER RED’ - FOXGLOVE BEARDTOUNGE

Maintains pink to white flower into early fall.

TYPE	Perennial
HARDY RANGE	3A to 9A
HEIGHT	30” to 36” / 75cm to 90cm
GROWTH RATE	Average
FORM	Upright or erect
EXPOSURE	Full sun

PENSTEMON GLOXINOIDES ‘RUBY’ - BORDER PENSTEMON

Maintains pink to red flower into early fall.

TYPE	Perennial
HARDY RANGE	4A to 7A
HEIGHT	24” to 36” / 60cm to 90cm
GROWTH RATE	Average
FORM	Upright or erect
EXPOSURE	Full sun

PEROVSKIA ATRIPLICIFOLIA 'LITTLE SPIRE' - RUSSIAN SAGE

Maintains blue/purple into early fall.

TYPE	Perennial
HARDY RANGE	3A to 9A
HEIGHT	24" to 4' / 60cm to 1m
SPREAD	36" to 4' / 90cm to 1.2m
GROWTH RATE	Average
FORM	Irregular or sprawling and upright or erect
EXPOSURE	Partial shade or partial sun to full sun

RUDBECKIA FULGIDA VAR. SULLIVANTII 'GOLDSTURM' - BLACK-EYED SUSAN

Maintains yellow/golden flower through summer.

TYPE	Perennial
HARDY RANGE	3A to 9A
HEIGHT	24" to 30" / 60cm to 75cm
GROWTH RATE	Average
FORM	Rounded
EXPOSURE	Partial shade or partial sun to full sun

SALVIA NEMOROSA 'MAINACHT (MAYNIGHT)' - MAY NIGHT SAGE

Maintains purple flower through summer.

TYPE	Perennial
HARDY RANGE	4A to 8B
HEIGHT	16" to 18" / 40cm to 45cm
GROWTH RATE	Average
FORM	Upright or erect
EXPOSURE	Full sun
PERSISTENCE	Semi-evergreen

SALVIA X SUPERBA - WOODLAND SAGE

Maintains purple flower through summer.

TYPE	Perennial
HARDY RANGE	4A to 7A
HEIGHT	18" to 30" / 45cm to 75cm
GROWTH RATE	Average
FORM	Upright or erect
EXPOSURE	Full sun
PERSISTENCE	Semi-evergreen

PERENNIALS *CONTINUED FROM PREVIOUS PAGE*

GRASSES

ANDROPOGON GERARDII - BIG BLUESTEM

Maintains golden grass stems and flowers throughout winter

TYPE	Perennial, grass
HARDY RANGE	4A to 7A
HEIGHT	4’ to 6’ / 1.20m to 1.80m
SPREAD	36” to 4’ / 90cm to 1.20m
GROWTH RATE	Fast
FORM	Upright or erect
EXPOSURE	Partial shade or partial sun to full sun
PERSISTENCE	Deciduous

BOUTELOUA GRACILIS - BIG GRAMMA

Maintains gray/green leaves and minor florescence throughout winter

TYPE	Perennial, grass
HARDY RANGE	5A to 9B
HEIGHT	9” to 24” / 23cm to 60cm
SPREAD	18” to 24” / 45cm to 60cm
GROWTH RATE	Average
FORM	Upright or erect
EXPOSURE	Partial shade or partial sun to full sun
PERSISTENCE	Deciduous

CALAMAGROSTIS X ACUTIFLORA ‘KARL FOERSTER’ - FEATHER REED GRASS

Maintains golden grass stems and flowers throughout winter

TYPE	Perennial, grass
HARDY RANGE	4A to 9A
HEIGHT	4’ to 5’ / 1.20m to 1.60m
SPREAD	16” to 18” / 40cm to 45cm
GROWTH RATE	Average
FORM	Columnar and upright or erect
EXPOSURE	Partial shade or partial sun to full sun
PERSISTENCE	Deciduous

HELICTOTRICHON SEMPERVIRENS - BLUE OAT GRASS

Maintains gray green grass stems and minor florescence throughout winter

TYPE	Annual, perennial, grass
HEIGHT	18” to 30” / 45cm to 75cm
SPREAD	12” to 30” / 30cm to 75cm
GROWTH RATE	Slow
FORM	Rounded
EXPOSURE	Partial shade or partial sun to full sun
PERSISTENCE	Deciduous and evergreen

MISCANTHUS SINENSIS - MAIDEN GRASS

Maintains green grass stems and minor florescence throughout winter.

TYPE	Perennial, grass
HARDY RANGE	4A to 9A
HEIGHT	6’ to 8’ / 1.80m to 2.40m
SPREAD	6’ to 10’ / 1.80m to 3.00m
GROWTH RATE	Fast
FORM	Upright or erect
EXPOSURE	Partial shade or partial sun to full sun
PERSISTENCE	Deciduous

MISCANTHUS SINENSIS ‘GRACILLIMUS’ - EULALIA GRASS

Maintains green grass stems and feathery florescence throughout winter.

TYPE	Perennial, grass
HARDY RANGE	6A to 9A
HEIGHT	36” to 4’ / 90cm to 1.20m
SPREAD	6’ to 10’ / 1.80m to 3.00m
GROWTH RATE	Fast
FORM	Irregular or sprawling, upright or erect and vase shaped
EXPOSURE	Partial shade or partial sun to full sun
PERSISTENCE	Deciduous

MISCANTHUS SINENSIS ‘YAKU JIMA’ - DWARF MAIDEN GRASS

Maintains gray green grass stems and feathery florescence throughout winter.

TYPE	Annual, perennial, grass
HARDY RANGE	5A to 9B
HEIGHT	36” to 4’ / 90cm to 1.20m
FORM	Upright or erect
EXPOSURE	Partial shade or partial sun to full sun

PANICUM VIRGATUM ‘HEAVY METAL’ - HEAVY METAL BLUE SWITCH GRASS

Maintains gray green grass stems and feathery florescence throughout winter

TYPE	Perennial, grass
HARDY RANGE	5B to 9A
HEIGHT	4’ to 5’ / 1.20m to 1.60m
SPREAD	24” to 30” / 60cm to 75cm
GROWTH RATE	Average
FORM	Upright or erect
EXPOSURE	Full sun

GRASSES *CONTINUED FROM PREVIOUS PAGE*

PENNISETUM ALOPECUROIDES - FOUNTAIN GRASS

Maintains green grass stems and feathery florescence throughout winter

TYPE	Perennial, grass
HARDY RANGE	5A to 9A
HEIGHT	36” to 4’ / 90cm to 1.20m
SPREAD	36” to 6’ / 90cm to 1.80m
GROWTH RATE	Fast
FORM	Rounded
EXPOSURE	Full sun
PERSISTENCE	Evergreen and semi-evergreen

SORGHASTRUM NUTANS ‘INDIAN STEEL’ - BLUE INDIAN GRASS

Maintains gray/green grass stems and feathery florescence throughout winter

TYPE	Perennial, grass
HARDY RANGE	4A to 9A
HEIGHT	24” to 36” / 60cm to 90cm
GROWTH RATE	Fast
FORM	Upright or erect
EXPOSURE	Full sun

GROUND COVERS

POA PRATENSIS - KENTUCKY BLUEGRASS

Maintains dark green color to late fall.

TYPE	Perennial, grass
HARDY RANGE	3A to 9A
HEIGHT	1” to 35” / 3cm to 90cm
GROWTH RATE	Fast
FORM	Upright or erect
EXPOSURE	Full sun

VINCA MINOR - PERIWINKLE

Maintains dark green color through winter.

TYPE	Perennial
HARDY RANGE	4A to 9A
HEIGHT	6” to 12” / 15cm to 30cm
GROWTH RATE	Fast
FORM	Prostrate, spreading or horizontal and variable spread
EXPOSURE	Full shade to full sun
PERSISTENCE	Evergreen

SHRUBS

BERBERIS THUNBERGII 'CRIMSON PYGMY' - DWARF BARBERRY

Maintains dark red/purple color year round.

TYPE	Shrub, woody plant
HARDY RANGE	4A to 7B
HEIGHT	18" to 24" / 45cm to 60cm
SPREAD	36" to 4' / 90cm to 1.20m
GROWTH RATE	Slow
FORM	Rounded
EXPOSURE	Partial shade or partial sun to full sun
PERSISTENCE	Semi-evergreen

CARYOPTERIS X CLANDONENSIS - BLUEBEARD

Maintains green leaf and blue flower through fall.

TYPE	Shrub, woody plant
HARDY RANGE	6A to 9B
HEIGHT	24" to 36" / 60cm to 90cm
SPREAD	24" to 36" / 60cm to 90cm
GROWTH RATE	Average
FORM	Rounded
EXPOSURE	Partial shade or partial sun to full sun
PERSISTENCE	Deciduous

CARYOPTERIS X CLANDONENSIS 'HEAVENLY BLUE' - BLUE MIST SIRAEA

Maintains green leaf and blue flower through fall.

TYPE	Shrub, woody plant
HARDY RANGE	6A to 9B
HEIGHT	24" to 36" / 60cm to 90cm
SPREAD	24" to 36" / 60cm to 90cm
GROWTH RATE	Average
FORM	Rounded
EXPOSURE	Full sun
PERSISTENCE	Deciduous

CORNUS STOLONIFERA - RED-TWIG DOGWOOD

Maintains red (or yellow) bark throughout winter.

TYPE	Shrub, woody plant
HARDY RANGE	2B to 7A
HEIGHT	8' to 10' / 2.40m to 3.00m
SPREAD	8' to 10' / 2.40m to 3.00m
GROWTH RATE	Average
FORM	Oval, rounded and upright or erect
EXPOSURE	Partial shade or partial sun to full sun
PERSISTENCE	Deciduous

EPHEDRA VIRIDIS - MORMON TEA

Maintains gray green leaf year round.

TYPE	Shrub, groundcover, woody plant
HARDY RANGE	6B to 11
HEIGHT	36” to 5’ / 90cm to 1.60m
SPREAD	36” to 5’ / 90cm to 1.60m
GROWTH RATE	Average
FORM	Upright or erect
EXPOSURE	Full sun
PERSISTENCE	Evergreen

EUONYMUS ALATUS ‘COMPACTUS’ - DWARF WINGED EUONYMUS

Brilliant red fall color.

TYPE	Shrub, woody plant
HARDY RANGE	4B to 8B
HEIGHT	4’ to 6’ / 1.50m to 2.00m
SPREAD	4’ to 6’ / 1.50m to 2.00m
GROWTH RATE	Average
FORM	Rounded
EXPOSURE	Partial shade or partial sun to full sun
PERSISTENCE	Deciduous

LAVANDULA ANGUSTIFOLIA - ENGLISH LAEVNDER

Gray/green leafs and lavender flowers through most of year.

TYPE	Shrub, woody plant
HARDY RANGE	5A to 8A
HEIGHT	24” to 36” / 60cm to 90cm
SPREAD	36” to 4’ / 90cm to 1.20m
GROWTH RATE	Slow
FORM	Rounded
EXPOSURE	Full sun
PERSISTENCE	Deciduous and semi-evergreen

MAHONIA AQUIFOLIUM - OREGON GRAPE

Purple/green leaves throughout year. Fall and winter blue berries.

TYPE	Shrub, woody plant
HARDY RANGE	4B to 8A
HEIGHT	3’ to 4’ / 1.0m to 1.5m
SPREAD	3’ to 4’ / 1.0m to 1.5m
GROWTH RATE	Average
FORM	Rounded
EXPOSURE	Sun to part shade
PERSISTENCE	Evergreen

SHRUBS *CONTINUED FROM PREVIOUS PAGE*

POTENTILLA FRUTICOSA - SHRUBBY CINQUEFOIL

Gray/green leaves throughout year, yellow flowers through fall.

TYPE	Shrub, woody plant
HARDY RANGE	2A to 6B
HEIGHT	12” to 4’ / 30cm to 1.20m
SPREAD	24” to 4’ / 60cm to 1.20m
GROWTH RATE	Slow
FORM	Rounded, spreading or horizontal and vase shaped
EXPOSURE	Partial shade or partial sun to full sun
PERSISTENCE	Evergreen

PRUNUS BESSEYI - WESTERN SAND CHERRY

Purple leaves through fall.

TYPE	Shrub, woody plant
HARDY RANGE	3A to 6B
HEIGHT	36” to 6’ / 90cm to 1.80m
SPREAD	36” to 6’ / 90cm to 1.80m
GROWTH RATE	Average
FORM	Rounded
EXPOSURE	Partial shade or partial sun to full sun
PERSISTENCE	Deciduous

PRUNUS X CISTENA - PURPLELEAF SAND CHERRY

Purple leaves through fall.

TYPE	Shrub, woody plant
HARDY RANGE	3B to 7A
HEIGHT	6’ to 8’ / 1.80m to 2.40m
SPREAD	6’ to 10’ / 1.80m to 3.00m
GROWTH RATE	Average
FORM	Rounded
EXPOSURE	Full sun
PERSISTENCE	Deciduous

RHUS AROMATICA ‘GRO-LOW’ - GROW-LOW SUMAC

Red/orange leaves through fall.

TYPE	Shrub, woody plant
HARDY RANGE	3A to 9A
HEIGHT	24” to 36” / 60cm to 90cm
SPREAD	4’ to 10’ / 1.20m to 3.00m
GROWTH RATE	Slow
FORM	Rounded and spreading or horizontal
EXPOSURE	Partial shade or partial sun to full sun
PERSISTENCE	Deciduous

RHUS GLABRA - SMOOTH SUMAC

Red/orange leaves through fall.

TYPE	Shrub, woody plant
HARDY RANGE	3A to 9B
HEIGHT	10’ to 15’ / 3.00m to 4.60m
SPREAD	10’ to 15’ / 3.00m to 4.60m
GROWTH RATE	Average
FORM	Rounded and upright or erect
EXPOSURE	Partial shade or partial sun to full sun
PERSISTENCE	Deciduous

RHUS TYPHINA - STAGHORN SUMAC

Red/orange leaves through fall

TYPE	Tree, woody plant
HARDY RANGE	4A to 8B
HEIGHT	15’ to 25’ / 4.60m to 7.60m
SPREAD	15’ to 25’ / 4.60m to 7.60m
GROWTH RATE	Average
FORM	Oval and upright or erect
EXPOSURE	Partial shade or partial sun to full sun
PERSISTENCE	Deciduous

VIBURNUM LANTANA - WAYFARING TREE

Orange/red leaves through fall.

TYPE	Shrub, woody plant
HARDY RANGE	4A to 7A
HEIGHT	10’ to 15’ / 3.00m to 4.60m
SPREAD	10’ to 15’ / 3.00m to 4.60m
GROWTH RATE	Average
FORM	Rounded
EXPOSURE	Partial shade or partial sun to full sun
PERSISTENCE	Deciduous

VIBURNUM RHYTIDOPHYLLUM - LEATHER-LEAF VIBURNUM

Dark green leaves and dark purple berries year round.
White flowers and red berries in spring and summer.

TYPE	Shrub, woody plant
HARDY RANGE	5B to 7B
HEIGHT	8’ to 15’ / 2.40m to 4.60m
SPREAD	6’ to 10’ / 1.80m to 3.00m
GROWTH RATE	Average
FORM	Oval and upright or erect
EXPOSURE	Full shade to full sun
PERSISTENCE	Evergreen and semi-evergreen

VIBURNUM TRILOBUM - AMERICAN CRANBERRY BUSH

Red/orange fall leaves.

TYPE	Shrub, woody plant
HARDY RANGE	2A to 7B
HEIGHT	8' to 12' / 2.40m to 3.60m
SPREAD	8' to 15' / 2.40m to 4.60m
GROWTH RATE	Average
FORM	Rounded and upright or erect
EXPOSURE	Partial shade or partial sun to full sun
PERSISTENCE	Deciduous

TREES

ACER GLABRUM - ROCKY MOUNTAIN MAPLE

Orange/red leaves through fall.

TYPE	Tree, woody plant
HARDY RANGE	3A to 8A
HEIGHT	10’ to 30’ / 3m to 9.2m
SPREAD	8’ to 20’ / 2.4m to 6m
GROWTH RATE	Slow
FORM	Rounded
EXPOSURE	Full shade to full sun
PERSISTENCE	Deciduous

ACER GRISEUM - PAPERBARK MAPLE

Orange/red leaves through fall.

TYPE	Tree, woody plant
HARDY RANGE	4A to 8B
HEIGHT	15’ to 30’ / 4.6m to 9.2m
SPREAD	15’ to 30’ / 4.6m to 9.2m
GROWTH RATE	Slow
FORM	Oval, ronded and upright or erect
EXPOSURE	Full shade to full sun
PERSISTENCE	Deciduous

ACER PALMATUM DISSECTUM ‘ATROPURPUREUM’ - JAPANESE MAPLE

Deep red/purple fall foliage.

TYPE	Tree, woody plant
HARDY RANGE	3B to 7A
HEIGHT	8’ to 10’ / 2.4m to 3m
SPREAD	7’ to 10’ / 3m to 3.5m
GROWTH RATE	Average
FORM	Canopy
EXPOSURE	Sun to part shade
PERSISTENCE	Deciduous

ACER X FREEMANII JEFFERSRED ‘AUTUMN BLAZE’ - AUTUMN BLAZE MAPLE

TYPE	Tree, woody plant
HARDY RANGE	3A to 7A
HEIGHT	40’ to 55’ / 12m to 17m
SPREAD	30’ to 40’ / 9m to 12m
GROWTH RATE	Average
FORM	Rounded
EXPOSURE	Sun to part shade
PERSISTENCE	Deciduous

TREES *CONTINUED FROM PREVIOUS PAGE*

CELTIS OCCIDENTALIS

TYPE	Tree, woody plant
HARDY RANGE	3A to 9A
HEIGHT	50’ to 75’ / 15.2m to 22.8m
SPREAD	35’ to 50’ / 10.6m to 15.2m
GROWTH RATE	Fast
FORM	Ronded and vase shaped
EXPOSURE	Partial shade or partial sun to full sun
PERSISTENCE	Deciduous

GINKGO BILOBA

TYPE	Tree, woody plant
HARDY RANGE	4A to 8A
HEIGHT	50’ to 75’ / 15.2m to 22.8m
SPREAD	40’ to 50’ / 12.2m to 15.2m
GROWTH RATE	Fast
FORM	Pyramidal and rounded
EXPOSURE	Partial shade or partial sun to full sun
PERSISTENCE	Deciduous

GLEDITSIA TRIACANTHOS F. INERMIS ‘SHADEMASTER’

TYPE	Tree, woody plant
HARDY RANGE	5A to 8A
HEIGHT	50’ to 75’ / 15.2m to 22.8m
SPREAD	45’ to 55’ / 13.8m to 16.8m
GROWTH RATE	Fast
FORM	Oval and vase shaped
EXPOSURE	Partial shade or partial sun to full sun
PERSISTENCE	Deciduous

KOELREUTERIA PANICULATA

TYPE	Tree, woody plant
HARDY RANGE	5A to 8A
HEIGHT	25’ to 40’ / 7.6m to 12.20m
SPREAD	35’ to 50’ / 10.6m to 15.20m
GROWTH RATE	Average
FORM	Rounded and vase shaped
EXPOSURE	Full sun
PERSISTENCE	Deciduous

MALUS X 'SPRING SNOW'

TYPE	Tree, woody plant
HARDY RANGE	4A to 8A
HEIGHT	20' to 25' / 6m to 7.6m
SPREAD	12' to 15' / 3.6m to 4.6m
GROWTH RATE	Average
FORM	Oval and upright or erect
EXPOSURE	Full sun
PERSISTENCE	Deciduous

PICEA ABIES 'GLAUCA' - BLUE SPRUCE

TYPE	Tree, woody plant
HARDY RANGE	2B to 7A
HEIGHT	60' to 80' / 18.20m to 24.40m
SPREAD	25' to 35' / 7.60m to 10.60m
GROWTH RATE	Slow
FORM	Pyramidal
EXPOSURE	Full sun
PERSISTENCE	Evergreen

PINUS NIGRA

TYPE	Tree, woody plant
HARDY RANGE	3B to 7A
HEIGHT	25' to 40' / 7.60m to 12.20m
SPREAD	25' to 35' / 7.60m to 10.60m
GROWTH RATE	Average
FORM	Oval and pyramidal
EXPOSURE	Full sun
PERSISTENCE	Evergreen

PSEUDOTSUGA MENZIESII - ROCKY MOUNTAIN DOUGLAS FIR

TYPE	Tree, woody plant
HARDY RANGE	3B to 6A
HEIGHT	40' to 80' / 12.20m to 24.40m
SPREAD	25' to 30' / 7.60m to 9.20m
GROWTH RATE	Average
FORM	Pyramidal
EXPOSURE	Full sun
PERSISTENCE	Evergreen

TREES *CONTINUED FROM PREVIOUS PAGE*

PLATANUS ACERIFOLIA 'BLOODGOOD' - SYCAMORE

Tan/yellow fall foliage.

TYPE	Tree, woody plant
HARDY RANGE	5B to 10A
HEIGHT	70' to 86' / 21m to 26m
SPREAD	50' to 70' / 15m to 21m
GROWTH RATE	Average
FORM	Rounded
EXPOSURE	Sun to part shade
PERSISTENCE	Deciduous

QUERCUS MACROCARPA

TYPE	Tree, woody plant
HARDY RANGE	3A to 8A
HEIGHT	50' to 75' / 15.20m to 22.80m
SPREAD	50' to 80' / 15.20m to 24.40m
GROWTH RATE	Average
FORM	Rounded and spreading or horizontal
EXPOSURE	Full sun
PERSISTENCE	Deciduous

QUERCUS ROBUR 'FASTIGIATA'

TYPE	Tree, woody plant
HARDY RANGE	5A to 8A
HEIGHT	50' to 75' / 15.20m to 22.80m
SPREAD	10' to 15' / 3.00m to 4.60m
GROWTH RATE	Average
FORM	Columnar and upright or erect
EXPOSURE	Full sun
PERSISTENCE	Deciduous

TILIA CORDATA

TYPE	Tree, woody plant
HARDY RANGE	3B to 7A
HEIGHT	50' to 75' / 15.20m to 22.80m
SPREAD	35' to 50' / 10.60m to 15.20m
GROWTH RATE	Average
FORM	Oval and pyramidal
EXPOSURE	Partial shade or partial sun to full sun
PERSISTENCE	Deciduous

ZELKOVA SERRATA ‘GREEN VASE’

TYPE	Tree, woody plant
HARDY RANGE	5B to 8A
HEIGHT	50’ to 75’ / 15.20m to 22.80m
SPREAD	35’ to 50’ / 10.60m to 15.20m
GROWTH RATE	Fast
FORM	Vase shaped
EXPOSURE	Full sun
PERSISTENCE	Deciduous

TREES *CONTINUED FROM PREVIOUS PAGE*

APPENDIX 5

ARCHITECTURALLY SIGNIFICANT BUILDINGS

ATTACHMENT 12

HAFB COMMUNICATION AND INFORMATION DIRECTORATE

TAB K
01 August 2011
Supersedes previous editions

75 ABW/SC
Communications & Information Directorate
Hill Air Force Base, Utah
Telecommunications Installation Criteria For Facility Design and Renovation

OPR: Mr. Robert Richardson
75 ABW/SCXPP
7879 Wardleigh Rd
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PURPOSE

This document supplements UFC-3-580-1 and the Air Force Civil Engineer Support Agency (AFCESA) Engineering Technical Letter (ETL) 02-12, which identifies the minimum telecommunication requirements, and to provide design criteria for telecommunications cabling and distribution system requirements unique to Hill Air Force Base. The AFCESA ETL 02-12 states pre-wiring shall be included in all military facility construction projects accomplished with 3300 series funding. IAW AFI 33-101, *COMMUNICATIONS AND INFORMATION MANAGEMENT GUIDANCE AND RESPONSIBILITIES*, the Communications-Computer Systems Officer (CSO) has mandated that all pre-wiring must comply with ETL 02-12, BISCI Telecommunications Distribution Methods Manual and this document. Compliance with this document improves maintenance by establishing a standard for communication systems. Department of Defense (DOD) publications direct the use of commercial standards whenever they meet DOD needs.

The guidance in this document will be followed by all base and tenant agencies and their contractors.

To minimize the long-term cost of the infrastructure, ensure interoperability and interface capability, local standards are established and may only be changed when approved in writing by the CSO. These standards are intended to promote common skills among maintenance personnel throughout the base and to minimize the necessity for excessive spare parts and variations in telecommunications equipment.

Revisions to this document will be prepared and distributed by 75 ABW/SC when higher headquarters guidance, USAF communications standards, or other contributing agency standards warrant changes. Additionally, 75 ABW/SC recognizes the inherent need to maintain close interaction with Base Civil Engineering (BCE) and the Army Corp of Engineers on all project issues and we invite comments or recommendations for changes to this document.

1.0 TECHNICAL REFERENCES

The following documents are referenced within this document and are hereby recognized as the standards of good practice to be followed during the performance of the work.

National Fire Protection Association	NFPA 70 National Electrical Code
Underwriters Laboratories	UL Standards for Cat 5 UTP Wire
Rural Utility Service	PE-39 Specifications for Filled Telephone Cable
	PE-80 Specifications for Gas Tube Surge Arrestors
	PE-89 Specifications for Filled Telephone Cable with Expanded Insulation
National Electrical Manufacturer's Association (NEMA)	
Air Force Documents	AFR 88-15 Criteria for AF Construction

	BICSI Telecommunications Distribution Methods Manual
	AFSSI 7010 Emission Security Assessment
	AFSSM 7011 Emission Security Countermeasures Review
	ETL 02-12 Communications and Information System
	Criteria for Air Force Facilities
	Criteria and Standards for Construction
	TO 31-W-3-10-22 Telecommunications Engineering OPT
	TO 31-W-3-10-12 Outside Plant Cable Placement
ANSI/EIA/TIA Standards	TIA 472E000 Standard for Indoor-Outdoor Optical Fiber Cable
	EIA/TIA 568 Commercial Building Wiring
	EIA/TIA 569 Pathways and Spaces
	EIA/TIA 570 Light Commercial/Residential Wiring
	EIA/TIA 606 Documentation Standards
	EIA/TIA 607 Grounding & Bonding Digital Systems
	TSB 36 Cable Requirements for Digital Systems
	TSB 40 Termination Components
	TSB 67 Cable Testing
	SP2840 Category 5 Component Specifications
International Electrical and Electronics Engineers Association	IEEE 802.6 MAN System requirements
	IEEE 802.8 Fiber Optic Advisory Board Standards
	IEEE 802.9 Integration of Voice and Data Systems
	IEEE 802.10 LAN Security Measures
	IEEE 802.3U 100BaseT and 100BaseX Standards

Additional information may be obtained from 75 ABW/SC or the applicable Engineering and Installation activity.

2.0 GENERAL SCOPE

a. Project design packages will comply with criteria documented herein for:
   (1) Concealment of wiring and cabling.
   (2) Space for installation and maintenance.
   (3) Flexibility of office layout in administrative areas.
   (4) Standardization of user requirements.

b. The base CSO or designated authority should be contacted for approval/disapproval for any deviations to the criteria defined in this document.

c. The design package OPR shall:

   (1) Submit all required Communication Service Requirement Documents (CSRD) needed in support of the project.
   (2) Present all communications requirements to 75 ABW/SC prior to the 10% level of design review.

(3) Present 75 ABW/SC a complete design package for review to include a draft Requirements and Maintenance Plan (RAMP), draft drawings, DD FORM 1391, *MILITARY PROJECT CONSTRUCTION DATA*, and a list of any deviations from the 75 ABW/SC criteria, which must be approved by the base CSO.
(4) Allow 10 business days for the Communications & Information Directorate personnel to review all design packages.
(5) Provide a project support agreement (PSA) identifying all requirements and the dates when support will be required.

d. 75 CS/SCX Project Manager(s) will:

(1) Coordinate design packages/PSA's with all appropriate communications agencies.
(2) Receive and maintain comments on design packages. Ensure design packages comply with DOD and local standards and support the current base blueprint document.
(3) Forward comments to the OPR and attend design meetings as required.
(4) Ensure the most efficient wire or cable distribution system is in the design package.
(5) Check design packages to ensure current and projected communication requirements are considered for flexibility to accommodate future additions or changes.
(6) Ensure appropriate 75 ABW/SC personnel are involved in all phases of the project.

3.0 PERSONNEL CERTIFICATION REQUIREMENTS

Personnel involved in design and construction shall be certified in engineering and installation of telecommunications, cabling and distribution systems. Contract personnel and affiliated organizations shall provide adequate proof of skills upon CSO request.

4.0 LOCAL MINIMUM STANDARDS

4.1. FIBER

4.1.1. For Base Fiber Optic *Backbone* Building Connections (Information Transfer Nodes-ITN's), use 36 Strand Single Mode (SM) Fiber 9/100 micron –Consistent with long distance transport via ATM or Gigabit Ethernet protocol transmission equipment.

4.1.2. For Base Fiber Optic *Satellite* Building Connection (End Building Node-EBN's), 12 Strand SM Fiber 9/100 micron – Consistent with Switched Ethernet, Gigabit Ethernet, or Switched Gigabit Ethernet protocol transmission equipment.

4.1.3. For Horizontal cable connections between the main communications equipment rooms (CER) and other telecommunications rooms (TR) within the same building, a minimum of 6 Strand Single Mode (SM) Fiber will be used.

4.1.4. All interior fiber connections will use ST (Straight Tip) type connectors.

4.2. COPPER

4.2.1. The number of copper cable pairs needed for new installations will be determined during design reviews or when a requirement has been identified.

4.2.2. All cable used for telecommunications outlets shall be four pair, 24 AWG, solid copper conductor, Category 5E, UL tested and certified. Each Data cable shall be dedicated to one device or outlet only.

4.2.3. Only plenum rated cable may be used whenever cable is installed and exposed within air circulation areas. Contact CSO for any deviations.

4.2.4. All outside cable splices for 26 AWG copper wire shall be spliced using modular splicing methods.

4.2.5. All outdoor metallic Twisted Pair (TP) Cable will be gel filled core type, and meet Rural Utility Service (RUS) PE-39 or PE-89 specifications.

4.2.6. Pedestals used to provide service shall have protected terminal blocks. (See Atch 1).

4.3. COMMUNICATION JACKS

4.3.1. All telecommunications outlets shall contain 3 RJ45 type jacks utilizing TIA 568B wiring configuration. (See Figure 3 and Attachment 1)

4.3.2. Place phone/data/LAN outlet jacks every 12 LF along every wall space or one for each 50 square foot of floor space; whichever provides a higher outlet density. All other locations will be provided with an outlet density as determined by the CSO. (See also Para. 10)

5.0. BUILDING COMMUNICATIONS DISTRIBUTION SYSTEM

5.1. For new construction or remodeling, the design, installation, and related costs necessary to extend the conduit and manhole system to the new location shall be included in the project package in accordance with ETL 02-12. Multiple service entrance locations will be required for all facilities housing command and control systems to provide redundant, survivable service.

5.2. CONDUITS (EXTERIOR)

5.2.1. All outside plant communications cable installation shall adhere to the technical specifications set forth in AFTO 31W3-10-3 thru 31W3-10-22, the TIA/EIA, the ETL, and the NEC

5.3. CONDUITS/CABLE TRAYS (INTERIOR)

5.3.1. For new installations, and renovations, circuit connectivity from the telecommunications outlet jacks to the TR or the CER will be routed through conduit sufficient in size as not to exceed the 40% rule as stipulated in the National Electrical Code (NFPA 70). Conduits will be installed 12" above the finished ceiling, using the most direct route. Cable trays when used shall be installed no higher than 14 feet in industrial areas. In administrative areas, the cable

tray/raceway will run no higher than 6 inches above the ceiling tile grid, using an independent support structure, and using the most direct route between the TR and the CER. Ground on each end (one end to telecommunications main ground bus bar/telecommunications ground bar (TMGB/TGB) and at intervals not to exceed 18m (60 feet). Use a #6 AWG cable with green/yellow stripe to jumper between discontinuous segments on both side rails. The jumper shall be made with 2-hole compression lugs terminated on both ends. (TMGB/TGB: Minimum dimensions of 0.25 inch thick by 4 inches wide by 10 inches long for TMGB and TGB. Perform and provide TMGB/TGB ground bus resistance test results (5 ohms or less) in accordance with ETL 02-12, paragraph 8.3.3.2.4; NEC art 501-510; MIL-STD-188-124B, paragraph 5.1.1.1.7. Telecommunications grounding bus bars shall be installed to maintain clearances as required by NEPA 70 and shall be insulated from its support. A minimum of 50 mm (2 inches), using non-conductive standoffs, separation from the wall to allow access to the rear of the bus bar and the mounting height shall be adjusted to accommodate overhead and under floor cable routing. Label near point of connection at panel board and each TMGB and TGB in accordance with TIA J-STD-607-A; "If this connector or cable is loose or must be removed, please call the building telecommunications manager." "J" hooks may also be used for distribution of wiring. In existing buildings, plenum jacketed cables may be used, where allowed by national building codes, without the noted conduits, if properly supported.

5.4. MANHOLES/HANDHOLDS

5.4.1. All manholes shall be designed and constructed to meet the requirements of T.O. 31-W-3-10-22, and provide a clear floor space of 8'x 10' measured inside the manhole. An alternate size of 6'x 8' may be used when no primary backbone cable passes through the manhole (lateral or dead end service only). All manholes shall provide a clearance height of not less than 7 feet. Mandatory items include a grounding bus bar and rod and related conductors and wiring, a ladder or steps, cable rack supports (galvanized), a sump (French drain), pull in irons, frame and a manhole cover cast with the word "COMMUNICATIONS" exposed to the surface. Manhole covers will be a minimum of 36" in diameter. The manhole ring/collar shall be labeled with the MH#. CONTACT 75 ABW/SCOIVC for proper MH designation. Conduits shall enter the manholes 4 to 5 feet from floor on the end and be perpendicular to the wall in approximate location as shown on attached sketch (Figure 1).

5.4.2. A manhole with a minimum of 2 four inch conduit/duct bank lateral system with tracer and pull rope will be used for required service and distribution cables, plus 100 percent spare ducts (not less than 1 spare) for expansion and maintenance in all primary duct banks.

5.4.3. Manholes shall be installed for all connections to the existing cable plant as required to maintain a maximum manhole spacing of 500 feet, center to center. Additional manholes may be required to provide adequate control of connection and distribution of the cable plant. See Figure 1 for specific manhole construction criteria.

5.4.4. Handholds, when needed, will have a nominal inner dimension of 4' x 4' x 4' and have a grounding rod, cable rack supports, sump drain and pulling irons installed.

6.0 TELEPHONE ENTRANCE CABLE

6.1. The contractor will provide underground exterior service gel filled cable, IAW Rural Electrical Association (REA) standard PE-39 or PE-89, from main communications Building Entrance Terminal (BET) to the nearest manhole tie in point or splice case, which can provide sufficient vacant pairs to accommodate each facility with required circuits, plus 100 percent spare pairs, as determined by the CSO or designated authority.

6.2. From the nearest manhole, stub up 2 continuous, 4" lateral conduits 6" above the finished floor level to a location in the CER, and adjacent to the telephone punch down board.

7.0 COMMUNICATION ROOMS

7.1. COMMUNICATION EQUIPMENT ROOM (CER)

7.1.1. A CER will be provided to house all necessary communications equipment needed to terminate the building's interior wiring with the exterior base cable system. The quantity and size of the building CER shall comply with the standards and guidelines set forth in ETL-02-12, paragraph 8.3.3.3. Adequate installation and maintenance space (see Figure 3), shall be included to support this equipment and any necessary cable entry requirements. If equipment racks/cabinets will be installed, they must be seismically braced, and have a minimum of 3 feet of clearance along all sides to facilitate equipment installation and maintenance. Cabinets/racks that are placed side by side must maintain the clearance as outlined above, around the row of cabinets/racks. Type 630B-8 wall jacks will be provided for wall mounted telephones in the CER, electrical/mechanical rooms and communications closets and mounted 60" above the finished floor. Ceilings will be either opened air or installed with a hard-lid ceiling. If hard-lid ceiling is installed, a minimum of 12" must be maintained between the top of the cable tray or ladder rack and the lowest point of the ceiling. All incoming cable trays shall be installed below the hard-lid ceiling.

NOTE: Special attention will be given to the space allocation required for placement of classified systems IAW AFSSI 7010 and AFSSM 7011 to ensure security countermeasures are met.

7.1.2. Backboards: All required BET or block terminations shall be mounted on an 8' x 4' x ¾" AC plywood backboard. The backboard will be installed vertically, 9 inches above the finished floor, and use 4 inch standouts between the wall and the backboard with smooth side out in the TR and CER.

7.1.3. No other equipment, such as mechanical and plumbing equipment and electrical panels, will be placed in the CER unless pre-approved by the 75 ABW/SC designated approving authority. Exception: electrical panels may be installed in the CER if they directly affect the power outlets in the room and no others. The CER will be free and clear of all obstructions to a height of 8'0" to provide adequate ventilation and cooling. General purpose storage is prohibited in the CER and Telecommunications Rooms (TR).

7.1.4. Category 5E Data wiring (see Atch 1 and Figure 4) will be terminated in a 110 style, 48 port, 19 inch, rack mounted, category 5E patch panel, located in the CER and situated in a centralized location within the building, unless the cable distance exceeds 300 ft. (90M) from the CER to the desktop/wall jacks. If the cable distance exceeds 300ft (90M), the LAN cable will terminate in a TR patch panel and provisions will be made to interconnect each TR to the primary CER via 4" steel conduit, cable tray or inner-duct.

7.1.5. Outside Plant cables feeding from the nearest manhole will not have a maintenance coil on the backboard in the Communication Equipment Room (CER). These cables will exit the conduit and run directly to the Building Entrance Terminal (BET) or the Fiber Termination Tray.

7.2. TELECOMMUNICATION ROOMS (TR)

7.2.1. TR's will be provided with space as required for CER rooms (See Figure 2) and will be located so that the distance, measured along the routing path of the cable, will not exceed 300' (90M), including vertical distances to wall telecommunications/data outlets. This will maintain the integrity of the digital data signal as stipulated by Category 5E wiring requirements. Where multiple TR rooms are required, attention must be given to their strategic placement to support interconnection via 4" conduits or 6"x 2" cable trays between each room as well as to the primary CER, where the cable head/fiber connections are to be located. If it is necessary to interconnect more than one remote CER or TR to the primary CER, a minimum of 6 strands of single mode fiber optical cable will be used. A smooth walled 1" plenum inner-duct will be provided inside a 4" conduit or conduit raceway, with pull cord, as a direct path between each TR and the primary CER. For telephone interconnection, a 24 AWG or better copper wire cable between the TR and the CER (of adequate quantity to provide 125% connectivity for all voice circuits located within the CER or TR) to accommodate data grade services (fax and modems) and phone connections.

7.2.2. All doors for TR and CER must be installed so the door will open out, must be solid core, and directly accessible.

8.0. SECURITY

8.1. Secured interior or exterior access to the CER/TR will be provided to allow 24-hour access. Locking door knobs shall be utilized with ASSA key to match the 75 CE Master Key System. Only personnel with authorization from the CSO may possess CER/TR keys.

8.2. Classified requirements may vary and shall be taken on a case-by-case basis. Customers must identify classified message traffic or telephone requirements, and coordinate all requirements with the 75 ABW/SCXPP Plans & Program Branch and 75 ABW/ SCOOI Information Assurance Branch to ensure proper compliance measures are attained.

8.3. All CER/TR's will be as CER and or TR (TR1, TR2, etc).

9.0 OPERATIONAL ENVIRONMENT

9.1. Temperature/Humidity. A temperature controlled environment is required IAW ETL 02-12, Para. 8.3.3.2.3 in the CER and TR areas. Provide heating, cooling, and fresh air appropriate for the equipment housed. Maintain a positive pressure inside the room to reduce the entry of dust. Normal operating ranges should be as locally established for employee comfort (typically between 68 to 78°F [20 to 26°C]). There are no special relative humidity requirements. However, in order to minimize static discharge and condensation it is recommended that the relative humidity be between 20 to 60%.

9.2. Lighting**:** Switched lighting will be provided in all CER areas, adequate to promote work with small fiber items and miniature lettering devices. Maintain a minimum of 12" clearance between fluorescent (ballasted) light fixtures and all cable runs and cable devices. Provide a minimum of 538 lux (50 foot-candles) of illumination measured 1 meter (39 inches) above the finished floor.

10.0. POWER

10.1. A dedicated four-gang 115 V, 60Hz power outlets on a separate 20 Amp circuit with isolated ground, shall be installed on each wall for use to power telecommunications devices. An additional duplex convenience outlet will be located away from the telecommunications outlets to provide power to operate service and maintenance equipment.

10.2. CER's will require, 208V, 60Hz, 1ph, 20A service with isolated ground for each rack or cabinet that will house the uninterruptible power supplies (UPS). Outlets will be a NEMA L6-20R.

10.3. Grounding of all devices, cable sheaths, protectors and other equipment shall be in accordance with T.O. 31-W-3-10-22, ANSI/EIA/TIA 607, MIL –STD-188-124B and the National Electrical Code.

11.0. BUILDING ENTRANCE TERMINALS (BET)

11.1. Terminations and cables shall be numbered according to room and jack number. Pairing and color-coding shall be in accordance with EIA 568B standards.

11.2. All BET's shall be installed using Emerson gas tube protected, 710/66B terminals or equivalent, in accordance with manufacturer's instructions and the NEC. (See Atch 1)

11.3. All Building Entrance Terminals will be provided with 5-pin element plug in gas tube protective modules and will provide equal protection to REA-PE-80 specifications.

11.4. BET's used for the termination of outside twisted pair cables shall have a built in splice chamber with 710 type splice modules. Equipment side (House) of the BET shall use 25 pair Telco type connections to station equipment.

11.5. House cables will be installed between BET and 48 port patch panels.

12.0. WIRING

12.1. All data lines in administrative areas will be terminated on CAT 5E patch panels. See Figure 4.

12.2. Distribution frames and interior conduits/cable trays shall be of sufficient size to allow for 100% growth and shall not exceed the 40% fill rule stipulated in the National Electrical Code (NFPA 70).

12.3. Installation of all interior pre-wiring to include the CER and TR closets shall be performed to ensure termination as required back to the CER.

12.4. Each cable shall be marked with an adhesive type strip marker at both ends. Affix a permanent label to the outlet jack cover to clearly identify the outlet with the corresponding termination jack on the patch panel or termination block. Hand written or manual embossing labels are **NOT** permitted. Automated embossed labels are preferred, such as Brothers P-touch systems utilizing 1/4-inch labels, with 1/8-inch lettering.

12.5. Wiring for administrative telephones, office automation equipment and high speed networking (DATA), will be unshielded twisted pair, category 5E cable, 24 AWG, and compatible with Integrated Services Digital Network (ISDN) and installed by a category 5E certified technician/team. All installations require compliance with the Institute of Electrical and Electronic Engineers (IEEE) standard 802.3 for base band systems. DATA cable jacket shall be blue in color. Single mode fiber optic cable shall be provided between all TR and CER locations to support high speed multiplexing of all signals and be terminated in a properly sized Fiber Optic Distribution Panel (FODP) that allows room for 100% growth.

12.6. 75 ABW/SC personnel shall cross connect the interior blocks or patch panels. A minimum of five working days will be needed to complete the cross connects, install equipment and verify the system prior to occupancy by the tenant.

12.7. Areas with equipment items which can be easily moved, such as pre-wired workstations, systems furniture and modular walls/offices, shall be pre-wired during facility construction and shall provide sufficient flexibility and connectivity to enable rearrangement without modifications to the permanent TR or CER wiring system in the facility. The installer shall provide adequate quantities of suitable connectors and extension cables. Permanent splices/connections shall not be made.

13.0. TELECOMMUNICATIONS OUTLETS

13.1. In general office areas, use a modular telecommunications outlet, with three (3) 8-pin/8 position CAT 5E or better modular USOC RJ-45 Hubbell type jacks mounted in a single face plate (one for voice/two for data use) in a factory made assembly. Voice cable will be placed in

jack 3, data cables will be installed on jacks 1 & 2. All wall outlet components shall have a removable outer bezel with molded labeling to identify the outlet usage. (See Figure 3 and Atch 1). Communication jacks installed (in the floor for conference rooms) will have dust covers installed on the individual jacks and coaxial cable ends. Enclosure covers with seals will be used to prevent moisture and debris from entering the enclosure.

13.2. Where systems furniture and communications poles need to be installed, modular outlet jacks shall be installed in each work area and identified by the tenant unit for administrative use requiring automation equipment or telephone equipment, in such a way as to maintain the UL listing of the modular furniture. Each of the three outlet jacks shall be numbered by room and jack number and wired with four pairs (eight conductors) according to the wiring diagram located on the side of the jack. (See Figure 3 and Atch 1). Jacks will be wired and placed at desk top level of systems furniture to facilitate ease of installation, maintenance and repair; and to allow proper accessibility for connection to communication devices.

13.3. Telecommunication wall outlets shall be mounted 18" above the finished floor or same as power outlets to the centerline of the cover plate, unless noted otherwise.

14.0 PERIODIC, FINAL INSPECTIONS, TESTING AND DOCUMENTATION

14.1. All telecommunications cable shall be certified and tested in accordance with EIA/TIA standards with written test results provided to 75 ABW/SC. Where deficiencies of any type are discovered, the responsible installing organization shall make all necessary repairs, including replacement, at no additional cost to the government. All test results will be provided on electronic media (cd disc) in .PDF format.

14.2. Revised drawings, which reflect the actual "AS BUILT" conditions, shall be maintained by the installing activity throughout the construction phases. A copy of the "AS BUILT" drawings and cable certification records will be given to and reviewed by the designated 75 ABW/SCXP Project Manager upon project completion, but prior to project acceptance.

14.3. For conduit and direct bury installations, the contractor will also provide GPS plotted locations of any new manholes, handholds, posts, stubs, comm. closets, connecting manholes and any other information that is beneficial to aid in updating and maintaining the communication GEO-Base component. A GPS measurement must be taken every 100 feet or at every directional change.

14.4. The contractor shall provide geospatial data deliverables. All geospatial deliverables shall be submitted no later than 30 days after project completion date. All geospatial data shall conform to the following requirements.

14.5. All maps and associated data shall comply with the latest version of Spatial Data Standards for Facilities, Infrastructure, and Environment (SDSFIE) available from the CADD/GIS Technology Center at http://tsc.wes.army.mil/products/TSSDS-TSFMS/tssds/html/. This data shall be organized using SDSFIE 2.20 specifications or the latest available specification for file, class and attribute nomenclature. Information shall be collected at no less than 1:1200 scale for

base cantonment areas and 1:4800 for large undeveloped base areas. This data shall meet or exceed National Map Accuracy Standards at those scales and metadata using Federal Geographic Data Committee (FGDC) Content Standards for Digital Geospatial Metadata (CSDGM) for organization.

14.6. Geospatial data shall be delivered in a geo-referenced GIS (Geographic Information System) format (feature-based file structures including one-to-one cardinality between spatial records and attribute records) including attribute data and as specifically outlined in the specific task order contract. All geospatial data shall be delivered in the North American Datum 1983 (NAD83) projection, State Plane Coordinate System, using metric coordinate units.

14.7. Survey Grade Global Position Systems (GPS) or comparable traditional survey methods shall be used to collect geospatial data (e.g., northing, easting, and elevation above or below the Earth's surface) for all contract activities where geospatial data is involved. This data shall be obtained at the time of construction and prior to burial in the case of underground utilities. This data shall be delivered to the installation in an open Relational Database Management System (RDBMS) with the associated attribute data.

14.8. Electronic As-built Drawings. Drawings will be delivered in electronic format, via compact disc. Electronic drawings will be compatible with ArcGIS version 9.3.X or higher and delivered to 75 ABW/SCXP project manager within 30 days of completion of the installation. Electronic drawings will be obtained via GPS coordinates for MH location and conduit runs. Interior photos of installed manholes will also be provided in electronic format to include racking diagrams.

14.9. Paper Drawings. Not required when drawings are submitted in electronic **.pdf** format.

14.10. Test Results. Test results will be provided to 75 ABW/SCXP project manager no later than 10 days after completion of the installation. Test results will be submitted in electronic **.pdf** format. Acceptance of the installation will be dependent upon all installed cable testing at levels determined acceptable by the government.

14.11. All test results, documentation and records produced by the contractor under this PWS shall become the property of the U.S. Government, which shall have unlimited rights to all materials and determine the scope of publication and distribution.

14.4. In-progress inspections by 75 ABW/SC personnel are required during the construction phase. For example, trenches will not be covered prior to being inspected. This will ease verification of conduit size, quantity, cable type, earth cover compliance and the accuracy of "red line" cable records or contract drawings. The installation activity/contractor is solely responsible for requesting an inspection.

14.5. Installed cable (fiber and copper) shall be tested by the installer. Fiber and copper cable sample rate will be at the discretion of the 75 ABW/SC cable maintenance personnel. Baseline test records shall be provided for signed acceptance to the HAFB CSO in printed and digital format. All category 5E cable shall be tested and certified to 155 Mbps (100 MHz). UL

standards for new cable, including fiber optic testing of single-mode and multi-mode cable shall be followed.

Approved:

Barton C Clements

BARTON C. CLEMENTS, GS-15, DAF
Director, Communications & Information

Attachment 1 – Materials List
Figure 1 – Manhole Details
Figure 2 – CER Room Layout
Figure 3 - Comm Jack Layout & Labeling
Figure 4 – Wiring Configuration for data cables
Figure 5 – Standard Comm Room Wiring Diagram

ATTACHMENT 1
MATERIALS LIST

Interior Wiring:

1. Jacks. Manufacturer: Hubbell, 3 port jack with face plate.

2. Wire. Manufacturer: Beldin (or equivalent), CAT 5E, 3 BLUE cables for data at each jack location.

3. Patch Panels. Manufacturer: Hubbell, 48 port, P/N: P5E48B19E or equivalent or Panduit, 48 Port, (P/N: ITPAN-D485E88110U or equivalent).

4. Jack Enclosures. Manufacturer: Wire Mold, P/N: 2348 or equivalent.

5. Wire Management. Manufacturer: Chatsworth GVCS-Double Sided Wire Management.

Exterior Wiring:

1. Manufacturer: Pre-formed (or equivalent), stainless steel splice case.

2. Manufacturer: Corning (or equivalent), fiber enclosure for inside of building.

3. Manufacturer: Emerson (or equivalent), gas tube protected, 710/66B.

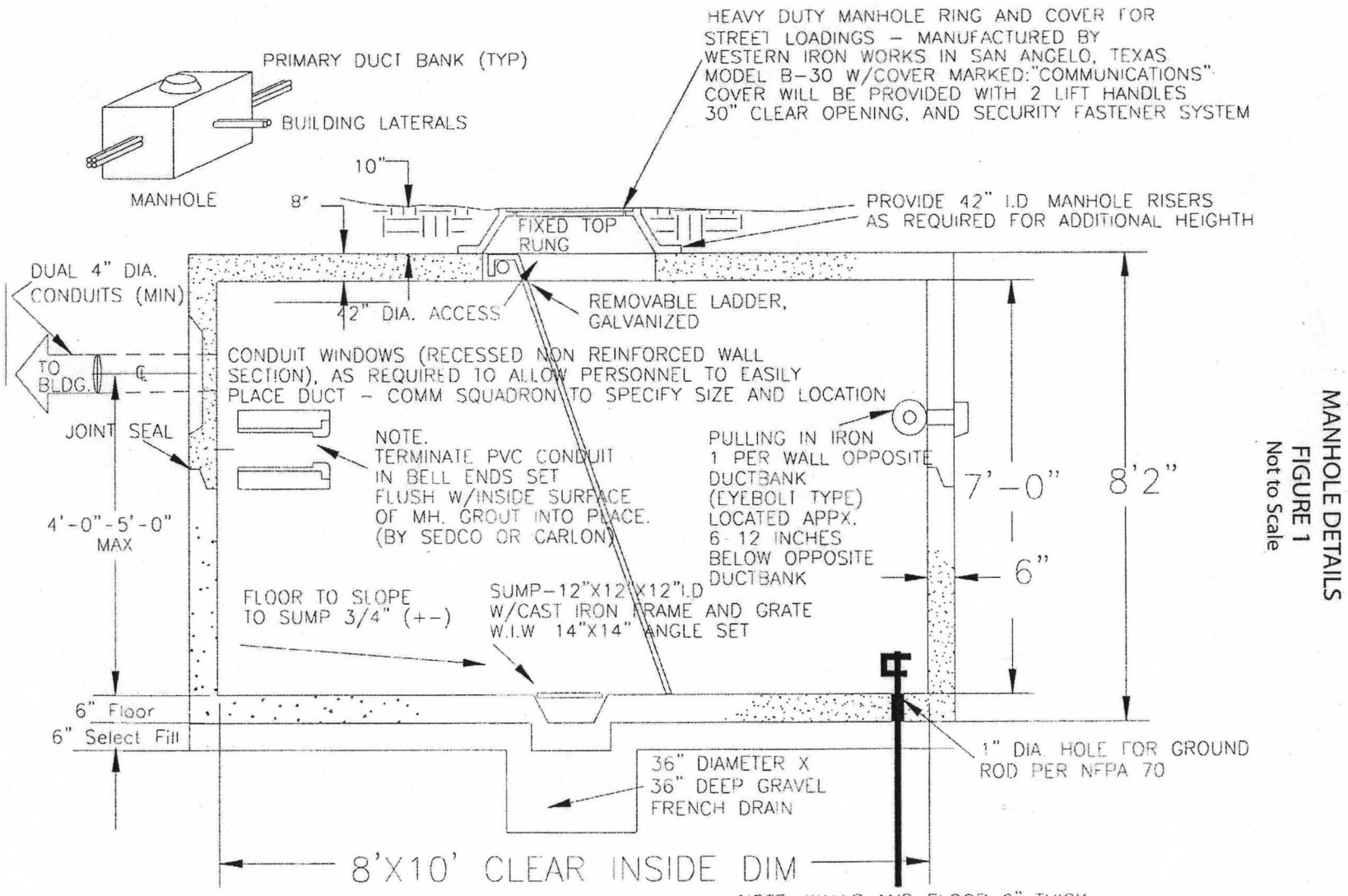
4. Handhole size: minimum 4' X 4' X 4'.

5. Conduit buried a minimum of 24". Slurry or steel pipe must be used in areas of vehicle traffic.

6. Open or unused conduits must have pull string installed and plugged.

7. Connectors shall be 710 modular.

8. Pedestal terminal blocks: DT2-PTP; protected with factory-sealed circuit protectors and 3 element gas tubes.



NOTE. WALLS AND FLOOR 6" THICK REINFORCED CONCRETE

REINFORCING TO SATISFY H-20 HIGHWAY LOADINGS.
TOP SECTION ACROSS 8 FOOT WIDTH- #6 @ 6" EXTENDING INTO SIDEWALLS, OTHERWAY #4 @ 12" O.C
VERTICALLY- #5 @ 12" O.C
HORIZONTALLY- #4 @12" O.C
BOTTOM SECTION. #4 @ 12" O.C.E.W. THROUGHOUT
SUMP SHALL BE MONOLITHIC

2 CABLE RACKS PROVIDED PER LONG WALL, JOSLYN 5125
INSIDE DIAMETER OF CONDUIT WILL BE MINIMUM OF 4 INCHES
DUCT BANK TOP WILL BE A MIN OF 36 INCHES BELOW FINISHED GRADE

MANHOLE DETAILS
FIGURE 1
Not to Scale

COMMUNICATIONS EQUIPMENT ROOM CRITERIA (CER)

1 Provide a duplex 110V service outlet on the unused wall.
2. Provide fourplex 110V outlets with isolated (Computer) ground on all walls adjacent to installed equipment.
3. Room shall be provided with environmentally controlled temperatures and lighting as required for office space.
4. Room access shall be lockable with access limited to the building custodian and comm personnel
5. Wiring shall be iterminated to EIA 568B standards. All installations shall comply with EIA/TIA 568, 569, 570
6. Grounding and bonding shall comply with EIA 607/NFPA 70 tested to 10 Ohms.
7 Documentation of installations shall comply with EIA 606
8. Provide 1EA-4'x8'x3/4" ACX Plywood sheeting, fire retardant treated,long dimension vertical, attached to the wall for each 100 connections.
9. Provide one EIA/TIA standard 19" LAN/MAN Rack with 12/24 threaded fasteners set at 5/8,5/8,1/2 pitch,floor mounted diretly adjacent to existing rack locations for each 100 nodes.
10. Extend 2 Ea-4" Diameter PVC/NMT entrance conduits 6" above the finished floor in the corner adjacent to the plywood panels, and extend each conduit to the nearest communications manhole system. Install new manholes at 475' maximum spacing to connect to the existing communications systems.
11 Floor shall be hard surfaced and be moisture resistant.
12 Brace all racks from the top to the nearest wall, with 12" wide x2" ladder type cable runway, braced to adjacent wall

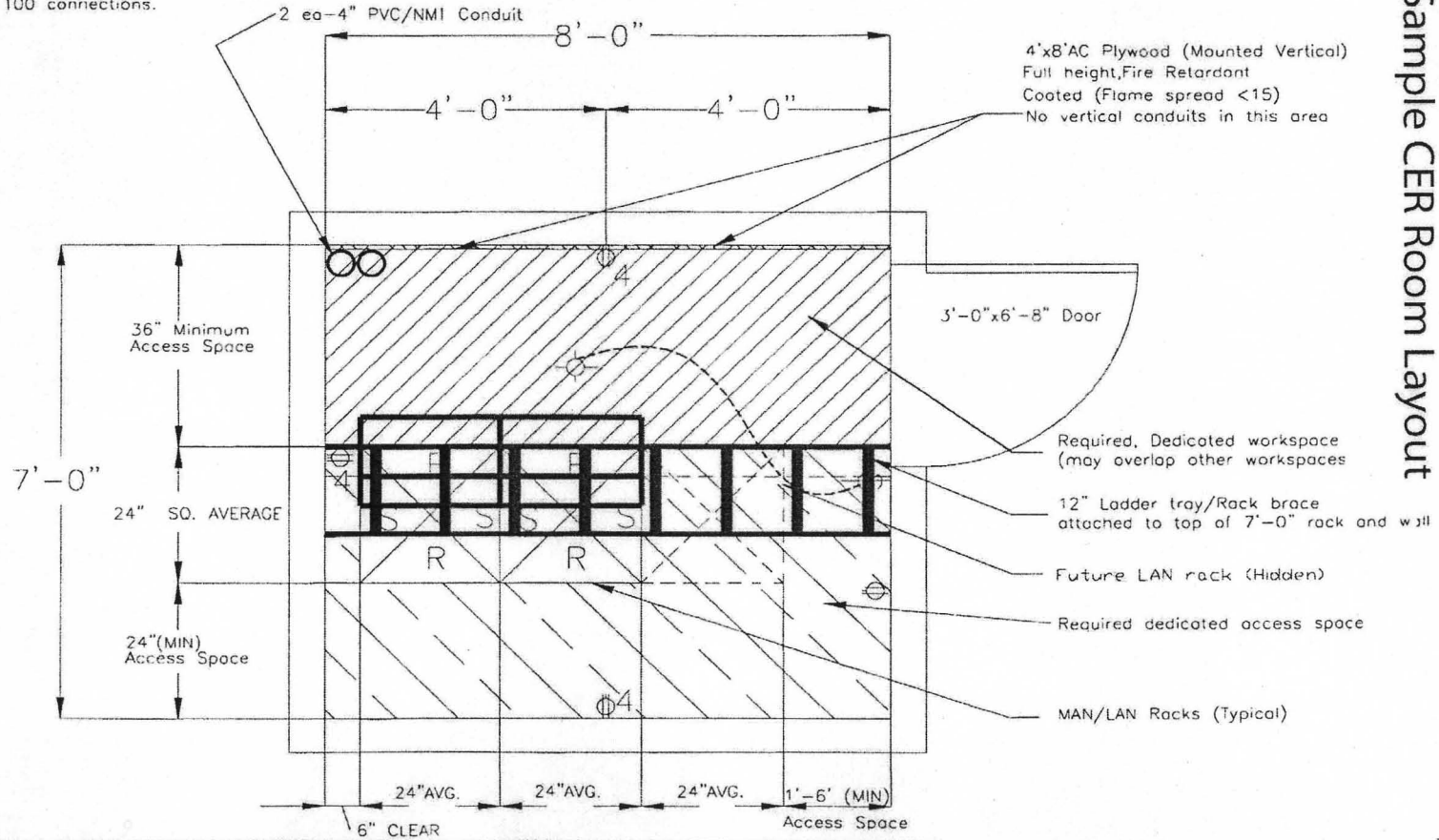


FIGURE 2

Sample CER Room Layout

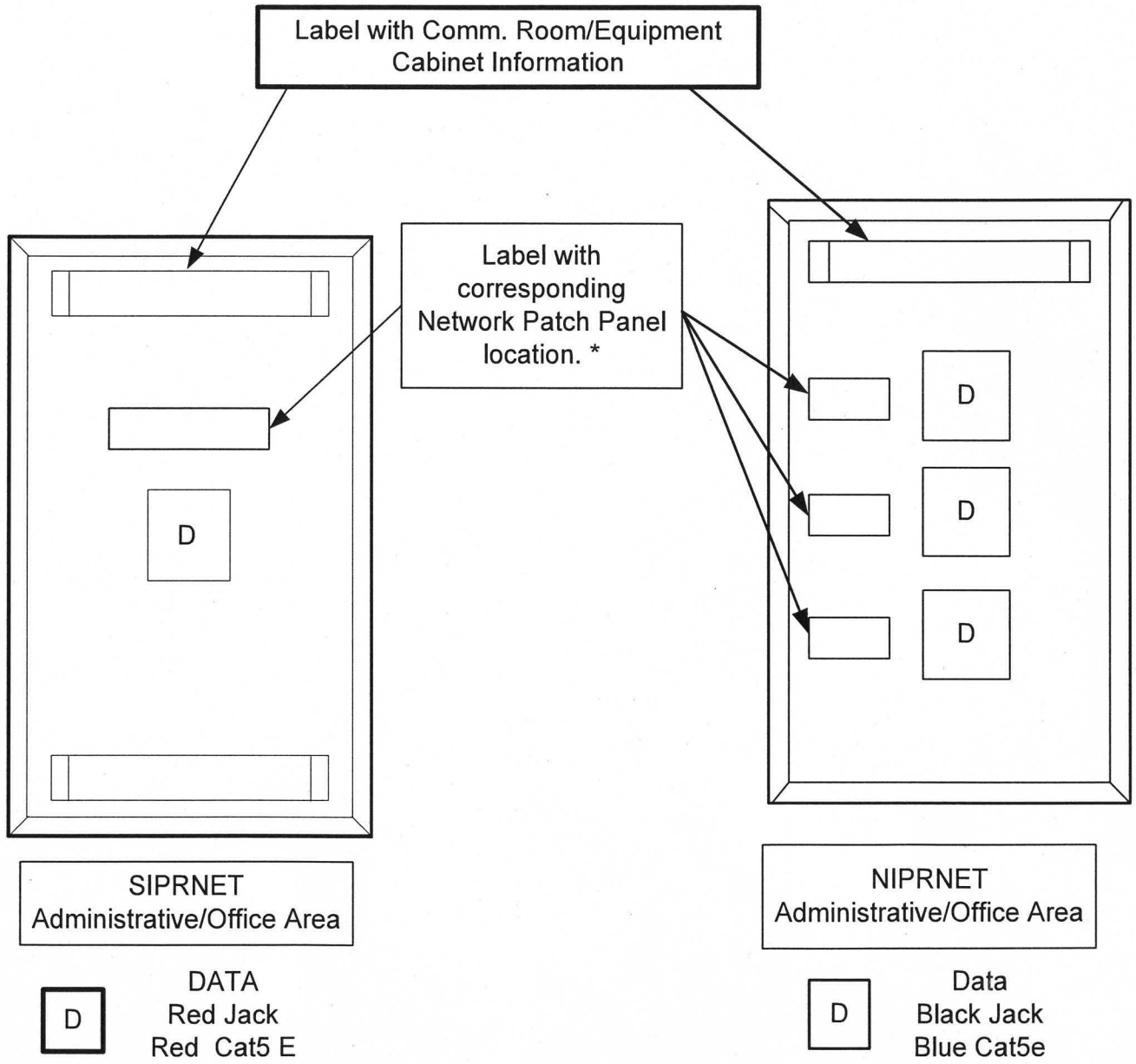


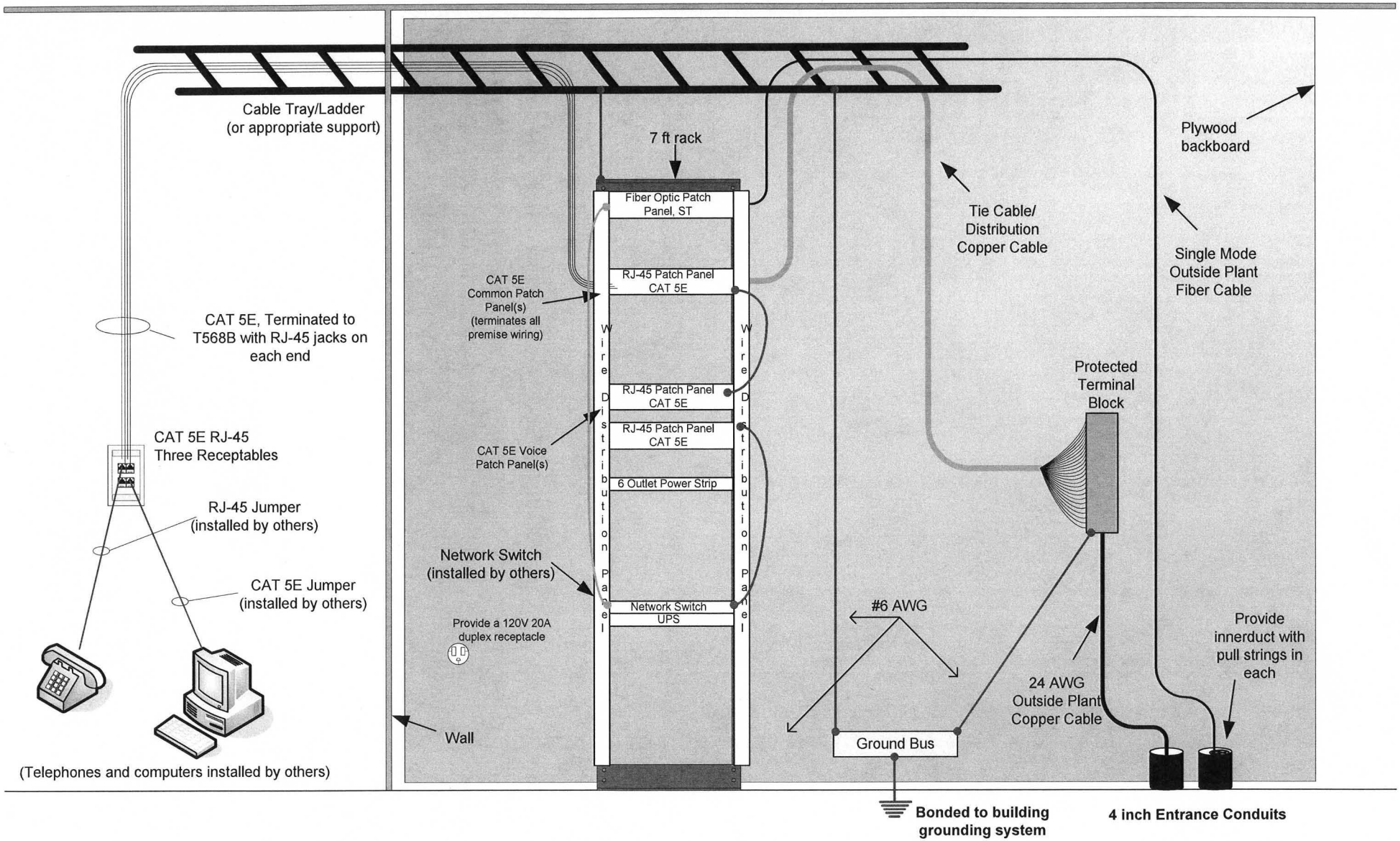
FIGURE 3
Communication Jack Layout & Labeling

Figure 4

Voice Frequency (VF) patch panels shall consist of RJ-45 8-pin modular jacks (front of patch panel), with rear-installation type 110 insulation displacement terminations. Install 24AWG Tie Cable from the back of VF patch panels to the Building Entrance Terminal (BET) on the telecommunications room plywood backboard. One pair of the Tie Cable shall be terminated to each RJ-45 8-pin modular jack on the VF patch panel. Patch panel termination shall follow the following color-to- jack scheme:

Jack #	First wire	Second wire
1	White	Blue
2		Orange
3		Green
4		Brown
5		Slate
6	Red	Blue
7		Orange
8		Green
9		Brown
10		Slate
11	Black	Blue
12		Orange
13		Green
14		Brown
15		Slate
16	Yellow	Blue
17		Orange
18		Green
19		Brown
20		Slate
21	Violet	Blue
22		Orange
23		Green
24		Brown

The 25th pair, Violet-Slate, shall be coiled up behind the patch panel and not terminated, or cut/shortened. Provide patch panel density to terminate number of telephone and other analog services identified in drawings plus 15 percent for expansion. All wiring and components shall be TIA/EIA-568-B compliant, wired to T568B wiring configuration. Label patch panels IAW TIA/EIA-606



UNCLASS – Standard Comm Room Wiring Diagram

Figure 5

ATTACHMENT 13

HAFB ENTRY ACCESS REGULATIONS

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 75th AIR BASE WING (AFMC)
HILL AIR FORCE BASE, UTAH

MEMORANDUM FOR WHOM IT MAY CONCERN

JUN 22 2007

FROM: 75 ABW/CC

SUBJECT: Installation Access Policy

1. The attached document implements interim guidance on controlling access to Hill Air Force Base, Utah. It is issued in accordance with AFI 31-101, *The Air Force Installation Security Program,* as supplemented, and The Internal Security Act of 1950 (50 U.S.C. 797).

2. This guidance will be incorporated as an attachment to the Hill Supplement to AFI 31-101 upon its next publication.

3. Questions regarding this policy should be directed to the Chief, Security Forces, at 777-7975.

Scott D. Chambers

SCOTT D. CHAMBERS, Colonel, USAF
Commander

Attachment:
Installation Access Program

INSTALLATION ACCESS PROGRAM GUIDELINES

These guidelines have been extracted from AFI 31-101, *The Air Force Installation Security Program,* as supplemented by Air Force Materiel Command and Hill Air Force Base. In the event of a perceived contradiction, dispute, or procedural question, the direction in the parent instmction takes precedence.

This document has been sanitized of sensitive information and is designed for release to the general public. Certain Air Force publication rules and standards have been suspended in the interest of making these guidelines more easily understood by the public. Additionally, a table of contents and list of acronyms used has been added for greater clarification and ease of use.

INSTALLATION ACCESS PROGRAM

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SECTION A -PURPOSE, POLICY AND SERVICES

1. Purpose. Hill Air Force Base (HAFB) is a closed installation and requires positive access control measures. This attachment implements and provides detailed instruction on the HAFB Installation Access Program. It was intentionally written to exclude any For Official Use Only or otherwise restricted information and, when removed from the rest of the instruction, can be made available to the public. Visitors, Contractors, Distinguished Visitors and employees on HAFB will find guidance on what processes, policies, and procedures to follow for access to HAFB.

2. HAFB Installation Entrv Policy. The installation commander is responsible for establishing base entry policy. Those requesting access to the installation must have a valid reason for access to the base and enter under authority of the Internal Security Act of 1950, Section 21, and 50 US Code 797. This policy applies to HAFB and Carter Creek Recreational Area. Employees, visitors, and those personnel residing on HAFB will enter or exit the installation only through approved entry/exit points. All personnel and their property on HAFB are subject to lawful search and seizure procedures as directed by the installation commander or other designated authority.

2.1 . Gates. The operating hours of the various gates to HAFB are posted at the gates and/or published on the installation web site. Changes to these operating hours will be pre-announced through official e-mails, websites, and Hilltop Times articles.

2.1.I . Roy Gate. This gate must be used by all commercial vehicles (excluding sedans) possessing enclosed compartments where the interior of the compartment is not readily viewable or the driver possesses a HAFB pass that dictates entry authorized only through the Roy Gate. Dump trucks, flatbed trailers, etc., must also use this gate even though they do not have enclosed compartments. This gate is inbound only Monday through Friday from 0400-0800.

2.1.2. School Pedestrian Gate. Due to the unique situation presented at this location, officer discretion permitting entry onto HAFB is paramount. If it appears the individual should not be utilizing that location for entry onto HAFB, the officer will contact the Security Forces Control Center (SFCC) and request guidance. The parent of the individual may be contacted to validate the child is indeed residing on HAFB.

2.2. Undefined Entry Situations. Any entry issues not specifically covered in this instruction shall be at the discretion of the 75th Security Forces Squadron, Chief, Installation Access or higher authority.

3. Pass and Registration Services.

3.1. The 75th Security Forces Squadron Pass and Registration Section manages two visitor centers. One visitor center is located at the South Gate entrance and one is located at the West Gate entrance. Pass and Registration is the primary focal point for all visitors requesting

entry onto HAFB. This office also issues the following media at the West and South Gate visitor centers:

3.2. South Gate Visitor Center Services:

3.2.1. Temporary Vehicle and Personal Visitor Passes.

3.2.2. Contractor Identifications.

3.2.3. Distinguished Visitor Identifications.

3.2.4. Long-Term Visitor Identifications.

3.3. West Gate Visitor Center Services:

3.3.1. Temporary Vehicle and Personal Visitor Passes.

3.3.2. Contractor Identifications.

3.3.3. Distinguished Visitor Identifications.

3.3.4. Long-Term Visitor Identifications.

3.3.5. Restricted and Controlled Area Access Credentials.

3.3.6. AF Form 354, Civilian Identification Card, for Retired and Dependent Civil Service Personnel.

3.3.7. DD Form 1934, Geneva Conventions Identification Card (military only).

3.3.8. Security Forces Investigator Credentials.

SECTION B -ACCESS CREDENTIALS

1. Authorized Base Entry Credentials. HAFB does not require vehicles to be registered on base. Official government approved credentials are required for entry onto HAFB. Installation Entry Controllers will conduct a hands-on inspection of credentials prior to granting entry. The pedestrian/operator of the vehicle must present the required personal credential free of any additional laminate or covering. The following identification credentials are accepted for access to HAFB:

1.1. DD Form 2 Series, Armed Forces of the United States Identification Card (Active-duty green cards, Reserve and National Guard pink cards, or Retiree blue cards). Permitted to sponsor.

1.2. Department of Defense (DOD) Common Access Card (CAC) (military, civilian, and contractor). Permitted to sponsor.

1.3. DD Form 1173, Uniformed Services Identification and Privilege Card (Dependent orange cards). Permitted to sponsor if age 16 or older.

1.4. AF Form 354. Permitted to sponsor if age 16 or older. See Section C for additional guidance.

1.5. Visitor identifications issued at HAFB will be honored for installation access. Only permitted to sponsor if so annotated on the ID Card.

1.6. Contractor identifications issued by Pass and Registration will be honored for installation access. Only permitted to sponsor if so annotated on the ID card.

1.7. Distinguished visitor (DY) identifications issued at HAFB will be honored for installation access. Permitted to sponsor.

1.8. Existing Integrated Video Imaging System (IVIS) IDs issued by Pass and Registration until superseded or replaced through attrition. Only permitted to sponsor if so annotated on the ID card.

1.9. Office of Personnel Management (OPM) Federal Investigator Credentials. Permitted to sponsor.

1.10. Air Force Office of Special Investigations (AFOSI) Credentials. Permitted to sponsor.

1.11. DD Form 2574, Army and Air Force Exchange Services Identification and Privilege Card. Not permitted to sponsor.

I .12. Air Force Materiel Command (AFMC) Form 387, AFMC Identification Credential, issued at HAFB until superseded by another authorized entry credential. Permitted to sponsor. *NOTE:* This ID is being phased out through attrition and will soon no longer be issued or accepted for installation access.

1.13. Other Federal Agency Identification Cards. Access to HAFB will only be permitted when the individual is on official government business. These individuals are not permitted to sponsor. See Section E, paragraphs 3 and 4, for additional information.

1.14. Valid visitor authorization credentials such as AF Form 75, Visitor Pass, HAFB Special Event Pass (SEP), or Visitor Authorization Letter (VAL) must be supported by a Federal or State issued picture identification card. Personnel holding an AF Form 75 or listed on a VAL are not authorized to sponsor and/or escort anyone onto the installation. In cases where SEPs are issued, additional guidance may be provided along with the SEPs as to accompaniment of personnel in a vehicle with the holder of the SEP. If additional guidance is not provided, the holder of the SEP is not authorized to sponsor and/or escort anyone onto the instalJation.

1.15. General/Flag Officers/Senior Executive Service (SES) Civilians. All visiting general or flag officers or SES civilians, active and retired, will be allowed installation entry after being properly identified. Identification may consist of personal recognition or DOD identification.

1.16. Personnel possessing an AF Form 3008, Supplement to Enlistment Agreement – United States Air Force, (or sister-service equivalent) shall be permitted access to the installation when presenting the original signed form in concert with a Federal or State issued photo ID. The individual noted on this form may be permitted entry onto the installation up to the extended active duty (EAD) date entered on the form. Personnel possessing this form are not permitted to sponsor other individuals onto the installation. *NOTE:* A valid passport is acceptable as a photo ID (butr not as an entry credential) anywhere in this instruction. A passport can be used as ID for a visitor, in conjunction with an entry list, etc., but cannot be used as a sole method of access to the installation.

1.17. Civilian Federal, State, County and City Law Enforcement Credentials allow access when on official business. These officials will notify the SFCC upon entry and exit. See Section E for further information.

SECTION C - SPONSORSHIP RULES AND RESPONSIBILITIES

1. General Rules. To provide sponsorship, the sponsor's identity must be verified. Additionally:

1.1. Sponsors are legally and administratively responsible for the conduct of their visitors.

1.2. Sponsors will ensure visitors have the needed information prior to the visitor's arrival at the base. At a minimum, visitors should know the full name of the person they are visiting, the phone number where the sponsor can be contacted, and the building number or address they will visit. Failure to provide this information may cause delay or denial of entry onto the installation.

1.3. Sponsors must accompany their visitors. Sponsors cannot sponsor a visitor onto the installation if the visitor will not be in the company of the sponsor for the duration of their visit. It is permissible for a visitor to independently transit directly to the sponsor's workplace/place of meeting and then directly off the installation by the most direct means. EXCEPTION: When the visitor is staying at the sponsor's residence on the installation, there is no requirement for the visitor to be in the presence of the sponsor at all times. For example, a service member's parents are visiting for a week and want to go for a walk on base; there is no requirement for them to be in the company of the sponsor. However, it remains the sponsor's responsibility to warn the visitors about sensitive areas including controlled and restricted areas, and the sponsor is responsible for any misconduct by the visitor.

1.4. The maximum number of people any one person may verbally sponsor onto the installation (in-person or telephonically) on any single day is limited to the number they can adequately control and be responsible for. This limit is restricted to 3 for "all-nighters" at the club. If more personnel need to be sponsored on the installation, a typed VAL requesting sponsorship will be sent to Pass and Registration no later than 3 full duty days prior to the date of the visit. The VAL must include all items in Section D, paragraph 7.5. Disputes will be resolved and exceptions to this policy approved by the Chief, Installation Access, on-duty 75 SFS Flight Chief or higher authority.

1.5. During FPCON Bravo, Charlie, and Delta sponsorship may only be accomplished in person at one of the visitor centers (or gates during non-duty hours for the visitor centers).

2. Who Can Sponsor:

2.1. Military Sponsorship. All military personnel may sponsor visitors onto the installation. Military dependents age 16 and older may also sponsor visitors onto the installation. Sponsors must be in possession of a valid identification card as specified in Section B.

2.2. Civil Service Sponsorship. All DOD civil service personnel may sponsor visitors onto the installation. Civil service dependent children 16 years of age and older, who have in their possession a valid dependent ID card, may only sponsor individuals onto the installation

who do not reside within the immediate area (within 250 miles radius of HAFB). Sponsors must be in possession of a valid identification card as specified in Section B.

2.3. Contractor Sponsorship. Contractors specifically designated as "authorized sponsor" by the ID requesting authority may sponsor subcontractors or other contractors from their company onto the installation. For example, a construction contractor may sponsor an electrical subcontractor. The sponsorship privilege must be documented in writing on the AFMC Form 496, Application for AFMC Identification Card, in order to have the ID issued with this privilege. The ID issued will specifically indicate thereon if the contractor is or is not authorized to sponsor other individuals onto the installation. The initial sponsorship request must be made in person at one of the visitor centers. Subsequent sponsorships may be made in accordance with (IAW) the below established procedures. Sponsorship is a privilege and is to be used only for official business.

2.4. Personnel who are no longer eligible for a valid ID card, and whose military spouse is deployed, deceased, or no longer living within the immediate area (within 250 mile radius of HAFB) may be sponsored onto the installation by his/her dependent child (of any age) when the child is eligible for a valid military dependent ID card permitting use of HAFB services. The duration of the pass will be limited to a maximum of 24-hours.

3. How To Sponsor:

3.1. In-person and hand-delivered sponsorship requests may be accomplished at either visitor center. The sponsor must present a valid JD (Section B) which permits sponsorship. In-person and hand-delivered sponsorship requests may be done for up to 30 days. If the individual needs to sponsor someone onto the installation for a longer period of time, they must request a Long-Term Visitor Identification Pass for the visitor.

3.2. Telephonic sponsorship may be initiated from an on-base truncated line. No other telephonic sponsorship numbers are authorized unless coordinated and approved by the Chief, Installation Access or higher authority (Exception: For residentfal sponsorship see below). The caller ID utilized at Pass and Registration permits validation that the phone being utilized is an on-base truncated number. Telephonic sponsorships will only be approved for a 72-hr period. If longer periods of time are needed, a written (must be hand delivered), in-person, or e-mail sponsorship request is required. The following numbers are the on-base truncated telephone numbers:

- 586-0001 through 586-9999
- 777-0001 through 777-9999
- 775-2000 through 775-6999
- 605-7000 through 605-7999

NOTE: Exceptions to this policy required approval by 75 SFS/S30 or higher authority.

3.3. E-mail Sponsorship. Sponsorship may be accomplished via e-mail from an official HAFB e-mail account by forwarding a request along with all pertinent information to 75SFS.SFOXI@Hill.AF.Mil.

3.4. Residential Sponsorship. Sponsorship may be accomplished from an on-base residence for a 72-hr period contingent upon the resident being listed in a base alpha or housing roster and the caller being able to validate information contained within the base housing roster. This form of sponsorship is not valid during Force Protection Condition (FPCON) Bravo, Charlie, and Delta.

3.5. Faxed sponsorship requests are not accepted.

SECTION D -VISITOR RULES AND RESPONSIBILITIES

1. General. Visitors include, but are not limited to, guests of base-affiliated personnel, contractors, delivery personnel, local government employees, bus drivers, non-DOD federal employees, and taxi drivers.

2.1. Visitors to HAFB may be may be checked through the National Crime Information Center (NCIC) for active warrants and current motor vehicle insurance. Those who have any outstanding Wants/Warrants may be detained and turned over to appropriate authorities. Any visitor with an outstanding Want/Warrant will be denied entry onto HAFB. If a warrant stipulates a brief and release procedure, the individual will be briefed on their responsibility to have the warrant cleared and denied entry onto the installation until the warrant is removed from the database.

2.2. All visitors requesting access to HAFB must be sponsored and have a pass or ID issued by Pass and Registration, be on a VAL authenticated by the 75 SFS, or have been issued a current SEP by Public Affairs or 75 SFS.

2.3. All visitor rules and procedures are subject to modification during periods of increased FPCON.

2. Temporary Visitor Pass.

2.1. To obtain an initial Temporary Visitor Pass (AF Form 75), a visitor must be properly sponsored onto HAFB (see Section C for sponsorship procedures) by an individual who holds a valid ID (Section B) permitting sponsorship of other individuals onto the installation.

2.2. Visitor Passes Requested In-Person, Hand-delivered Request, or via E-mail. Temporary Visitor Passes requested through these methods may be issued for a maximum of 30 days.

2.3. Temporary Visitor Passes requested telephonically must be requested on the date of required entry and are issued for a maximum of 72-hrs.

2.4. A consecutive pass is defined as a pass for the same person with a gap of less than 30 days between the old and new passes. Consecutive passes may only be authorized by the Pass and Registration Assistant Nonconunissioned Officer in Charge (NCOIC) or higher authority, or by accompaniment of a letter from the sponsor's supervisor approving this action. Normally, if a person requires access to HAFB for more than 30 days, the individual shall be instructed to obtain a Long-Term Visitor Identification pass through appropriate sponsorship application.

3. Long-Term Visitor Identification.

3.1. Long-Term Visitor Identification passes will not be issued to personnel who are otherwise eligible for another form of military identification.

3.2. The Long-Term Visitor Identification may be valid for any period from 31-365 days. However, under no circumstance will the IDs be valid for a period longer than 1 year, the date of expiration annotated on the sponsor's ID card, or the date noted on the request form, whichever is soonest.

3.3. Requests for these passes are made in person at the visitor centers. The proposed recipient of the pass and the sponsor must both be present. All requests for these identifications by military, civil service, and contractor employees, including their spouses, must have the request endorsed and approved by a supervisor with a three letter office symbol (i.e. 75 SFS/CCF) within the individual's chain-of-command. If this endorsement and approval are missing, the issuance of the ID will be denied. All other issuance requests (i.e. retirees, etc.) will be handled on a case-by-case basis and approved or denied by the Assistant NCOIC, Pass and Registration, or higher authority.

3.4. These passes permit non-base affiliated (NBA) personnel access to the installation 24-hrs a day, 365 days per year unless otherwise restricted. Therefore, strong written justification for approval of the pass must be presented. Appropriate justification does not include, for example, the desire for your friend, spouse, children, etc., to bring you lunch, use the base fitness center, visit you at your work/living quarters on-base, etc. Possible forms of appropriate justification may include, but are not limited to, in-home child care providers, in-home health care, non-dependant family members of on-base housed military members or recurrent (more than once a week) delivery personnel from local businesses (office supplies, repairmen, etc.). This justification must be hand-carried to one of the visitor centers by the sponsor and accompanied by the sponsor when requesting issuance of a Long-Term Visitor Identification. The letter of justification will be signed and dated by the sponsor.

3.5. Criminal History/Background Checks and Outstanding Wants/Warrants. Long-term visitors to HAFB may be required to undergo a criminal history background check. Individuals who have a criminal history meeting any of the criteria set forth by the installation commander may be denied a HAFB pass and/or identification for entry onto the installation.

3.5.1. The 75th Air Base Wing Staff Judge Advocate (75 ABW/JA) will develop a list of offenses for which an individual may be denied access to the installation. That list will be coordinated through the 75 SFS and approved by the 75 ABW Commander (75 ABW/CC).

3.5.2. An individual denied access for criminal history may appeal that denial by submitting a memorandum detailing the basis of their appeal to the 75 SFS who will coordinate the appeal through the 75 ABW/JA to the 75th Mission Support Group Commander (75 MSG/CC) for resolution.

3.5.3. If a warrant stipulates a brief and release procedure, the individual will be briefed on their responsibility to have the warrant cleared and denied entry onto the installation until the warrant is removed from the database.

4. Visitors Escorted by an Authorized Person.

4.1. During FPCON Normal and Alpha, a visitor pass must be issued to the visitor before the vehicle and personnel may proceed onto the installation. All personnel age 16 or over in the vehicle must have a Federal or State issued photo ID with them. If a visitor cannot produce one of the above types of identification, they will not be allowed access to the base. EXCEPTION: Family members that do not have their ID card and are accompanied by their sponsor or another family member with an ID may enter the installation.

4.2. During FPCON Bravo, Charlie and Delta, all visitors will be issued a visitor pass or Long-Term Visitor Identification. Those issued an AF Form 75 shall be accompanied by their sponsor during the entire time they are on the installation. Those issued a Long-Term Visitor Identification do not need to be accompanied by the sponsor.

5. Temporary Vehicle Pass for Visitors.

5.1. To request permission to drive on HAFB visitors must be properly sponsored onto HAFB (see Section C for sponsorship procedures) and present the documentation outlined below for issuance of a temporary visitor's Vehicle Pass. These documents must remain available to the driver at all times while operating a motor vehicle on HAFB and be presented upon demand by any security forces member.

5.2. The Temporary Vehicle Pass for Visitors is entered into the Security Forces Management Information System (SFMIS) Database.

6. Long-Term Visitor Vehicle Documentation Check.

6.1. If a long-term visitor will be driving a motor vehicle on HAFB, they must present the appropriate documentation to Pass and Registration. Failure to present this documentation will result in the issuance of an ID card that denies operation of a motor vehicle on HAFB. The following information is to be presented to Pass and Registration for motor vehicle operation on HAFB:

6.2. A valid state and/or international driver's license.

6.3. A valid certificate of state registration as required by the state or authority in which the vehicle is registered.

6.4. Proof of meeting m1mmum requirements for automobile insurance laws or regulations of the state in which the vehicle is registered. Insurance must identify vehicle being registered by year, make/model, vehicle identification number (VTN) and have an expiration date. An uninsured privately owned vehicle (POV) will not be operated on base under any circumstances.

6.5. Evidence of satisfactory completion of emission, safety, mechanical or other tests or evaluations required by local, state, or other jurisdictions in which the vehicle is licensed. Emissions must comply with Utah State Law. *NOTE:* Operating a vehicle on Federal property requires proof of emissions compliance at all times.

6.6. Motorcycle Safety Course completion is not required for motorcycle operators visiting HAFB or residing in the "FamCamp" on HAFB, unless this visitation exceeds 180 days. If the visit exceeds 180 days, the individual must present evidence of satisfactorily completing a certified Motorcycle Safety Foundation course.

7. Visitor Authorization Listings (VAL).

7.1. For multiple visitors needing one-time access or delivery companies with a high changeover of employees, HAFB will use a VAL. Units will ensure that sponsors submit VALs at least 3 full duty days in advance so that checks may be done and the VAL authenticated and posted at the appropriate entry gate. The list must include the items listed in Section D, paragraph 7.5.

7.2. Conditions where VALs are not valid:

7.2.1. Faxed VALs are not accepted.

7.2.2. A VAL will not be accepted from a contractor who is requesting to sponsor non-base affiliated personnel onto the installation for purposes not directly tied to his/her official duties.

7.2.3. VALs will not be accepted by e-mail during FPCON Charlie or Delta. During FPCON Charlie and Delta, all VAL requests must be hand-carried to the West Gate Visitor Center.

7.3. VALs are accepted when:

7.3.l. E-mailed to 75SFS.SFOXI@Hill.AF.Mil when originating from an on-base e-mail account.

7.3.2. When dropped-off in-person at the West Gate Visitor Center by an individual in possession of an ID card permitting sponsorship of other personnel.

7.4. The sponsor providing the VAL will submit the request with all required information (see below) to Pass and Registration no later than 3 full duty days prior to the event. Last minute additions to the list must be provided to the SFCC for authentication and distribution to the entry controllers. Personnel added as last minute additions to VALs may experience significant delays or denial of entry. Last minute additions to VALs will be prioritized in a manner contingent upon current on-going security force responses to other matters.

7.5. Required VAL Information:

- List of non-base affiliated (NBA) guests *(Alphabetical Order by La.st Name)*
- Location of Event
- Gate(s) of Entry
- Sponsor's First and Last Name
- Sponsor's Social Security Number (SSN)
- Sponsor's Work and Home Telephone Numbers. The telephone number must be one at which the sponsor can be contacted before, during, and after the event.
- Start Date for Event
- End Date for Event
- A signature/e-mail and statement from the sponsor accepting responsibility for guests while they are on HAFB
- A visitor's driver's license number or ID card number and two-digit state identifier (i.e. UT for Utah) or passport number may be required during periods of increased threat as directed by installation leadership.

7.6. The VALs shall be used in conjunction with a State or Federal issued picture ID for access to HAFB. The VALs will be authenticated by security forces and distributed to the security forces contract guard force supervisors. The contract guard force supervisor shall ensure the VALs are posted at the noted gates prior to the set time and date for implementation of the VAL. Only personnel appointed by the Chief, Installation Access (no grade requirement), or personnel assigned to security forces not within Pass and Registration, in the grade of E-6 and above or United States Air Force (USAF) Civil Service GS-09 and above may authenticate VALs.

7.7. All personnel on the VAL may be checked through the NCIC for active warrants and current motor vehicle insurance. If there is no proof of insurance, it will be so marked on the proposed VAL and documentation will be requested at the gate of entry. Those failing to provide proof will be denied entry. The individual will be directed to the closest open visitor center for assistance.

SECTION E - SPECIAL VISITOR RULES AND RESPONSIBILITIES

1. Distinguished Visitor Identification.

1.1. These passes will be issued to personnel at the request of the Ogden Air Logistics Center (00-ALC) Commander/Vice/Executive, wing commanders or their desjgnated representatives.

1.2. These passes will be issued for 3 years with sponsorship privileges unless otherwise stipulated by the requesting official.

1.3. The 75 ABW Protocol Office will forward a monthly updated Military Affairs Committee roster to Pass and Registration. This roster will be used as an approval source for issuance of a DY ID. Unless otherwise noted, all personnel on this roster will receive a 3-year DY ID with sponsorship privileges.

1.4. Criminal history background checks and Want/Warrants checks will not be accomplished on these individuals unless otherwise directed.

2. Special Event Passes (SEP).

2.1. The purpose of this type of entry credential is to allow guests attending special events on the installation "expedited entry." These events include, but are not limited to: weddings, large conferences, community meetings, and other instances where the visitors will remain on HAFB for only the duration of the event. While expedited entry through the gates is a matter of courtesy, the security of the installation shall not be jeopardized for the sake of convenience.

2.2. Special Event Passes are only valid for the day of the event. These passes will be stamped with an authentication stamp before issue.

2.3. The 00-ALC Commander, 75 ABW/CC, 75 MSG/CC (or their designated representatives) will approve functions or events where a list of guests cannot be obtained and expedited entry is still requested.

2.4. Upon arrival of the guest at the gate, the on-duty installation entry controller will verify the guests name using a State or Federal photo ID. If the guest is on the list of invitees, the entry controller will issue the operator a HAFB SEP. There is no requirement to verify all vehicle occupants.

2.5. The SEP shall be placed on the driver's side dashboard of the vehicle in clear view.

2.6. Visitors to HAFB may be checked through the NCIC for active warrants and current motor vehicle insurance. Those who have any outstanding Wants/Warrants will not be issued a SEP and may be detained and turned over to appropriate authorities. Any visitor with an outstanding Want/Warrant will be denied entry onto HAFB.

2.7. All SEP requests shall include, at a minimum, the full name, date of birth for each visitor. Driver's license number and state of issue may be required during increased FPCONs as directed. All SEP requests shall be submitted a full 3-duty days in advance of the proposed event unless this requirement is waived by competent authority.

3. Federal, Utah State, Utah Counties, and Utah City Officials (Non-Law Enforcement). The following procedures apply only to personnel employed by one of the above government agencies. All others shall follow normal sponsorship procedures.

3.1. Federal, State, County, and City Officials requiring access to HAFB in performance of their official duties shall forward a VAL to Pass and Registration consisting of the information required in Section D, paragraph 7.5 above. This listing shall be forwarded to Pass and Registration, Building 1219, Hill AFB, UT 84056 or e-mailed to 75SFS.SFOXT@hil l.af.mil. Only e-mails originating from a "dot mil" e-mail account will be accepted. The preferred method is to forward this request to the agency's on-base point of contact for forwarding to Pass and Registration. Pass and Registration will authenticate the listing and make it valid for a period not exceeding 180 days. After the 180-day period (or less), a new listing will need to be produced and presented for authentication and posting. Federal, State, County, and City Governments are responsible for notifying Pass and Registration any time an individual noted on the listing changes jobs, terminates employment, or no longer requires access to HAFB in performance of his/her official duties. The government officials requesting entry onto HAFB shall present their Federal, State, County or City issued government credentials and mention to the installation entry controller that he/she is on a VAL and the reason they need to gain entry onto the installation. After verification, the gate guard will permit entry. If the official is not on the current VAL, they will be denied entry and directed to the visitor center.

3.2. Federal officials not employed by *DOD* are authorized access to HAFB to use certain Services activities and programs on a space-available basis. The list of those services and programs authorized for use is published via policy letter signed by the Installation Commander. Non-DOD Federal employees (actively employed and retired) may be authorized a Long-Term Visitor Identification for a period of 31-365 days when formally requested in writing via VAL by the Services Directorate. The individual signing this request is administratively and legally liable for the actions of the visitor while they are on HAFB.

4. Civilian Law Enforcement Agents (Federal, State, County, and City). The following procedures apply only to actively employed Federal and Utah Law Enforcement personnel. All others shall follow normal sponsorship procedures.

4.1. Allow these personnel access to HAFB and Carter Creek Recreational Area when on official business. These officials will notify the SFCC prior to entry and upon exiting the installation. All agencies will present their government-issued law enforcement credentials to the installation entry controller. These officials may vouch for members in their party.

4.2. If an off-base marked emergency vehicle is responding to an on-base incident without prior notification, immediately contact SFCC before permitting the emergency vehicle access. Procedures for handling situations involving off-base police in Fresh Pursuit are published in 75 SFS operating procedures.

4.3. Law Enforcement Personnel with Warrants and Other Court Related Documents. Included are summons, complaints, subpoenas, writs of attachment, restraining orders, and other court related documents. Contact the 75 ABW/JA if there is a question regarding the document. Hill AFB Instruction (HAFBI) 5J-1001, *Service of Legal Process,* provides detailed guidance regarding process serving.

4.3.1. During duty hours, the entry controller shall direct any peace officer in possession of court documents to serve on Hill AFB to the 75 ABW/JA, Building 1278, for coordination. All court documents will be served at the SFCC, Building 1219 in the presence of the individual's supervisor or other unit representative.

4.3.2. During non-duty hours, the entry controller shall direct any peace officer in possession of court documents to serve on Hill AFB to the SFCC, Building 1219, for coordination with 75 ABW/JA.

4.4. Non-Law Enforcement Process Servers. The entry controller shall direct any non-law enforcement individual attempting to serve court documents to the West Gate Visitor Center. The documents to be served will be faxed from that location to the 75 ABW/JA for review. If the documents are in order, the server will be directed to call SFCC and make their request. The SFCC will contact the individual's supervisor or first sergeant and request that they privately ask the individual to report to that location. The procedures in HAFBI 51-1001 will be followed with the exception that process servers without law enforcement credentials will not be allowed unescorted access to the installation.

5. Students. Students enrolled in classes on base shall be granted access based upon a Federal or State issued photo ID verified against a VAL. The agency hosting the class is responsible for providing a current VAL to Pass and Registration. The VAL shall contain the information required in Section D, paragraph 7.5. In FPCON Charlie and Delta, entry will be denied.

6. Rod and Gun Club. For NBA Rod and Gun Club members, the 75 MSG, Services Division will provide Pass and Registration an alpha membership listing (by last name) containing the information noted in Section D, paragraph 7.5 every 180 days. The listing will be authenticated and turned into a VAL, and posted at the Roy Gate only. All NBA Rod and Gun Club members will only be permitted entry through the Roy Gate. All NBA members are to proceed directly to the shooting range/membership building and then directly off the installation. No deviations are authorized unless approved beforehand and coordinated with Pass and Registration. Rod and Gun Club NBA members are transporting weapons and ammunition, therefore stricter rules on their usage of the installation while transporting firearms is necessitated.

Weapons shall not be concealed or loaded and ammunition shall be separated from the weapon. Guards performing installation entry control duties will check weapons before allowing entry.

7. Golf Course. Personnel without a base affiliation shall be properly sponsored onto HAFB IAW Section C of this attachment Blind sponsorship (sponsoring without knowing the real identity of the individual) is prohibited. A tee time does not constitute the right to access the installation without the proper credentials (Section B) or sponsorship. Obtainment of a seasonal pass does not constitute automatic sponsorship for non-base affiliated personnel. See paragraph 3.2 above for further information.

8. Civil Air Patrol (CAP). The CAP military liaison shall provide Pass and Registration an alpha membership listing (by last name) containing the information noted in Section D, paragraph 7.5 every 180 days. The listing will be authenticated and turned into a VAL and posted at the requested gates of entry. For ease of entry, if the CAP member is underage to drive a vehicle, the CAP military liaison shall also provide the name of the parent/guardian transporting the individual onto and off of the installation.

9. Other Clubs. Members of clubs residing on HAFB shall have the proper credential for accessing the installation (Section B) or be properly sponsored onto the installation (Section C). Simply being a member of a club located on HAFB does not give NBA individuals the privilege of entering onto the installation. Club Managers/Presidents/Board Members, etc., shall ensure that NBA personnel are aware of installation access entry restrictions prior to accepting these individuals as club members.

10. Media Personnel. Deny entry unless escorted by Public Affairs (PA) personnel. Installation entry controllers and visitor center personnel will contact SFCC anytime news media personnel attempt to enter or approach a gate. The SFCC will then contact 75 ABW/PA. *NOTE:* Under no circumstances will news media personnel be admitted unescorted entry. Do not answer interview questions. Only designated PA personnel (75 ABW/PA, 388th Fighter Wing/PA, 419th Fighter Wing/PA) are authorized to make statements or give interviews to the media.

11. Foreign Military/Government Representatives:

11.1. Deny entry to foreign military/government representative personnel who have not been cleared for access to HAFB by the Foreign Disclosure Office (FDO). Contact the FDO and brief them on the situation. Do not permit entry until formally cleared by the FDO.

11.2. Normally, Foreign Military/Government representatives will be issued identification via other means; however, should a request be made of Pass and Registration for issuance of an ID to a foreign military/government representative, the pass to be issued is the Long-Term Visitor Identification photo pass. These passes will be issued for I year or length of stay, whichever is shorter. Sponsorship privileges will only be extended to these individuals when requested by a wing commander or higher authority or his/her representative. Certain foreign government representatives, dependent upon diplomatic position may be issued a DV pass for 3 years or length of stay, whichever is shorter.

11.3. Foreign Military/Government representatives holding a CAC or any other ID may not sponsor other foreign military/government personnel onto the installation unless specifically granted this privilege, in writing, by a wing commander or higher authority.

SECTION F - MISCELLANEOUS VEHICLE ACCESS RULES

1. Government Owned Vehicles (GOV). These vehicles may enter the installation at any operational gate. However, due to traffic calming/antiterrorism devices located at the South, South West, West, and Roy Gates, vehicles longer than 30 feet in length shall enter through the Roy Gate only. These GOVs do not need to be searched.

2. Motorcycle Operation. A motorcycle as defined by Utah State in the *"Utah Driver Handbook,"* 2004 Edition is *"every motor vehicle except farm tractors, designed to travel with not more than three wheels in contact with the ground."* Personnel requesting to operate a motorcycle on HAFB shall complete a certified Motorcycle Safety Foundation course IAW AFI 91-207, *The Air Force Traffic Safety Program.* Once they complete the course, riders must keep the safety card on them when operating a motorcycle on base. This card must be shown to 75 SFS patrol persons upon request. ff attending an on-base Motorcycle Safety Foundation Course, personnel residing in the local area may be authorized a temporary Vehicle Pass 30 days prior to the scheduled on-base course date after class verification enrollment date through the on-line *Motorcycle Course Record Lookup* (http://www .hill.af.mil/safety/moto/search .php). The temporary Vehicle Pass will expire I day after the scheduled course completion date.

3. Rental Vehicles. Permit access to HAFB when being operated by an individual who possesses a valid credential permitting entry onto HAFB. This includes "U-Haul" type rented moving vehicles and trailers . The operator does not need to produce a rental agreement at the gate. Rental vehicles longer than 30 feet must enter through the Roy Gate.

4. School and Utah Transit Administration (UTA) Buses. During FPCON Normal, Alpha, and Bravo, these vehicles shall be granted access based upon the driver's state ID and commercial driver's license verified against a VAL. It is recommended that all buses use the Roy Gate due to their size, but the driver may elect to enter at any gate with the understanding the bus may sustain damage from contacting barriers. School bus drivers shall vouch for all passengers . During FPCON Charlie and Delta, the entry controller will enter the UTA bus and check the credentials of all the passengers as well. Those passengers not having appropriate credentials for entry onto HAFB (Section B) will be asked to disembark or the bus shall be denied entry.

5. Taxies, Shuttle Buses (not UTA), Tow Trucks, and Wreckers with Passengers. These vehicles do not require vehicle passes to enter HAFB, however, prior to permitting entry to HAFB, the passengers will be checked for valid credentials. If the passenger does not possess a valid credential, the vehicle and occupants will be denied entry. During FPCON Charlie and Delta, these vehicles shall enter through the Roy Gate commercial vehicle lane and be searched.

6. Taxies, Shuttle Buses (not UTA), Tow Trucks and Wreckers without Passengers. These vehicles attempting entry onto HAFB to pick up a passenger or vehicle will be stopped and the on-duty entry controller will direct them to the closest visitor center for verification of entry. On-duty visitor center personnel will contact the requesting agent/agency to verify service. The vehicle will be denied entry unless the requested service can be verified. On-base residence/employees may call a visitor center to pre-announce the arrival of the taxi or

towing/wrecker service. Visitor center personnel validate sponsorship privilege via caller ID against the approved truncated telephone number listing, base housing roster, military/civilian alpha roster, or other approved methods. When the visitor centers are closed, the SFCC will accomplish the above requirements and validate the need for entry onto the installation. Once verified, they will be signed in on an approved installation entry log. During FPCON Charlie and Delta, these vehicles shall enter through the Roy Gate commercial vehicle lane and be searched.

6.1. A towing/wrecker service or individual requesting base access solely for the purpose of effecting the repossession of any type of vehicle must be escorted by 75 SFS Investigations (75 SFS/S2I) personnel. Any questions regarding this type of access should be directed to 75 SFS/S2I.

7. Unmarked Commercial Vehicles. Vehicles registered to a company are considered commercial vehicles, even if operated by a person holding a valid ID credential. Commercial vehicles (excluding sedans) possessing enclosed compartments where the interior of the compartment is not readily viewable are authorized only through the Roy Gate. Additionally, all other drivers possessing a HAFB pass that dictates entry authorized only through the Roy Gate shall also enter only through that gate. Entry at all other gates will be denied.

8. Marked Commercial Vehicles. Marked commercial vehicles, not contractually employed by the base, are required to enter through the Roy Gate only (excluding sedans). These vehicles normally consist of IBM, Xerox, food catering delivery personnel, Utah Power, UPS, FedEx, DHL, companies delivering household goods for military members who have recently arrived, etc. Allow access to marked commercial vehicles from off-base businesses if they have a current AF Form 75 or other approved entry credential. If the individual does not have a valid base identification, the sentry will inspect the bill of lading or delivery order indicating HAFB, search the vehicle IAW current policy and sign the delivery vehicle, driver, and passengers onto the installation using an approved installation entry log. If a household goods delivery arrives without a bill of lading, contact the 75th Logistics Readiness Squadron. During FPCON Charlie and Delta, a sponsor will meet the vehicle at the gate.

9. Small Delivery VehicleNendors. When properly sponsored, the drivers of these vehicles may be issued an AF Form 75 or a Long-Term Visitor Identification for periods of 1-365 days, dependent upon their need to conduct official business on HAFB.

9.1. The sponsoring organization will determine the required hours and days of the week when the pass is required in a letter to Pass and Registration.

9.2. On-base housing residents/employees may call the visitor center to pre-announce the arrival of a commercial food delivery service (i.e. pizza delivery, etc.). Visitor center personnel establishes sponsorship privilege via caller ID against the approved truncated telephone number listing, base housing roster, or military/civilian alpha/housing roster. Visitor center personnel will inform the installation entry controller of the expected commercial food delivery arrival and grant permission to the entry controller to permit entry of this vehicle. Upon arrival of the commercial food delivery, installation entry controllers shall verify delivery location and log the

delivery/driver in on an approved installation entry log. When the visitor center is closed, the SFCC shall perform the validation protocols noted above.

10. Explosive-Laden Vehicles:

10.1. Entrance Gate. Direct explosives-laden vehicles to the munitions (magazine) gate/holding area located next to the Roy Gate. Inform the driver that a telephone and number to Hill Consolidated Command Post (HCCP) is located at the munitions holding area. Vehicles with hazard class/division 1.4 explosives are authorized to enter through the Roy Gate but must be logged in on an approved installation entry log.

10.2. When vehicles arrive at the Munitions Gate the HCCP will be informed of the situation.

10.3. The HCCP will have a competent authority from the receiving agency and a security forces patrol respond to the Munitions Gate. The security forces member will verify the driver's information then a search of the vehicle will be conducted by security and receiving personnel. Once completed, authorization will be granted to enter the installation. The receiving authority will verify the vehicle is authorized on base (via bill of lading or other paperwork) and escort the vehicle on base and off base.

10.4. On-duty security forces personnel will not escort munitions-laden vehicles on base. *NOTE:* The only exception to this rule would be for mandatory or regulatory mission requirements (for example DOE SAFE HAVEN). Passes are not required since they will be under escort at all times.

SECTION G - CONTRACTOR ACCESS

1. Contractor ID Card:

I.I. The instructions that follow are applicable only for Contractor IDs issued by Pass and Registration.

1.2. Contract employees with contracts of 31 days or longer may be issued a Contractor TD Card.

1.3. Contractor ID Cards are issued for a maximum of 3 years or the length of the contract, whichever is less.

1.4. Criminal History and Outstanding Wants/Warrants. Contractors who do not have a current completed or ongoing background investigation on file with the Federal Government may be checked through the NCIC for active warrants.

2 Contractor Responsibilities. Contractors who do not have a current completed or on going background investigation on file with the Federal Government may be checked through the NCIC for active warrants. Individuals who have a criminal history meeting any of the criteria set forth by the installation commander will be denied a HAFB pass and/or identification for entry onto the installation. See Section D, paragraph 3.5.2 for the appeal process for base access denial based on criminal history. *NOTE:* All contractors who need computer access must have the appropriate investigation conducted by the Federal Government and be issued a CAC through the Military Personnel Flight.

2.1. If there are no active warrant<:>, the individual will be issued a 14-day Temporary Visitor Pass. If the Criminal History Background check returns any conviction record, the Contractor Identification will not be issued and contact will be made with the sponsor requesting immediate revocation of the AF Form 75. The sponsor will not be made privy to any of the information regarding the criminal history of the individual, only instructed to confiscate the AF Form 75. For warrants stipulating a brief and release procedure, the individual will be briefed on their responsibility to have the warrant taken care of and denied entry onto the installation until the warrant is removed from the database. Other warrants will be handled on a case-by-case basis and may result in the individual being detained and turned over to the proper authorities.

2.2. Upon award of a contract, the contractor will submit a list of names with personal data (see AFMC Form 496 for required information) to the contracting officer. The contracting officer will execute/sign an AFMC Form 496 for each contractor they deem to have a valid need for a base issued identification and will give that completed form to the contractor. The contract number and the contract completion date along with an expiration date for the requested Contractor ID Card (not to exceed 3 years or the contract completion date, whichever is shorter) shall be entered onto the AFMC Form 496. All forms must be turned in to the West Visitor Center.

2.3. It is the sole responsibility of the contractor to acquire an AFMC Form 496 from the government (contracting officer) to initially obtain or renew current contractor IDs for employees who require access to the installation.

2.4. Contractor personnel will hand carry the completed AFMC Form 496 to either the South or West Gate Visitor Center and request the identification.

2.5. The contractor must present a valid State or Federally issued photo identification to Pass and Registration when requesting the Contractor ID Card. A foreign passport is only acceptable when presented in conjunction with appropriate documentation permitting employment within the United States.

2.6. If the "Citizen" block on this form indicates citizenship of a country other than the United States, the individual is required to present proof of being permitted to work in the United States before an ID Card is issued. If proof cannot be piesented, issuance of the ID will be denied. If the information or the actions of the individual appear to be an attempt to circumvent security protocols, the SFCC or AFOSI will be contacted and requested to respond.

3. Contracting Activity Responsibilities. The installation Contracting Activity (CA) shall incorporate a criminal background screening requirement into the contract process. It is the CA's responsibility to explain the process to the contractor. Upon completion of the contract, the CA must collect installation entry credentials and turn them into the issuing activity. Return of all contractor entry credentials shall be a condition of final payment. A memorandum must be prepared and signed by the CA declaring any missing credential/pass.

4. Requesting Official Responsibilities. The individual requesting the issuance of an ID card from Pass and Registration must have a properly executed DD Form 577, Appointmentlf ennination Record – Authorized Signature, on file. The DD Forms 577 are valid for 2 years from the date of appointment. Any request for issuance of ID cards after that 2 year period will be denied until a newly and properly executed DD Form 577 is received authorizing the requester to perform this action.

4.1. The AFMC Form 496 is the sole instrument utilized to request issuance of a Contractor ID Card. This form must be filled out in its entirety to include the contracting number, the contract expiration date, and an expiration date for the ID card (not to exceed 3-years or length of contract, whichever is shorter). The signature authority shall also fill in the blocks under the title "Certificate of Requesting Official." Forms signed by any other individuals will be denied action.

4.2. If contractor personnel require sponsorship authority in performance of official duties, this privilege must be annotated on the AFMC Form 496 as *"Authorized to Sponsor."* The absence of *"Authorized to Sponsor"* defaults to the individual not being permitted to sponsor anyone onto HAFB.

4.3. If contractors need access to HAFB for times/dates outside the performance period of the contract (i.e., administrative issues, warranty issues, site visits, etc.), the contractor will need to be appropriately sponsored onto the installation by the customer or supporting agency.

4.4. Any other instance where contractors need access to **HAFB** will be dealt with on a case-by-case basis.

SECTION H - ADDITIONAL FORCE PROTECTION CONDITION GUIDELINES

1. FPCON Normal and Alpha. Between 0500 and 2100, only the driver is required to produce base entry credentials (Section B). Thorough 100% identification checks of all occupants are required from 2100-0500 and during Random Antiterrorism Measures. During these times all personnel (age 16 years or older) in the vehicle will be required to show proof of identity.

2. Increased FPCONs. During increased FPCONs, or by direction from the Chief, Security Forces or higher authority, 100% ID checks may be conducted on all personnel entering the base. If an individual claims to have forgotten or lost an appropriate credential, they must adhere to the following guidelines:

2.1. Live off base and forgot/lost ID card. During FPCON Normal, Alpha, and Bravo, if the active duty, reserve, guard military member, family member, or DOD personnel live off base and have forgotten/lost their ID card, approved alpha rosters may be utilized to verify the privilege to enter the installation. Visitor center personnel will check the alpha rosters against a valid Federal or State photo identification card prior to pennitting entry. Once authorized access is verified, the individual will be given a token that will be turned over to the entry controller on the way through the gate. This token will be produced by Pass and Registration and changed at least monthly If the individual consistently forgets his/her ID Card (i.e., more than once a week) he/she will be denied entry to the base until he/she retrieves his/her 10 card. When the visitor center is closed, the SFCC shall perform the above-noted validation procedures.

2.2. Lives on base and forgot/lost ID card. If the active duty member or family member resides on base and has forgotten/lost his/her ID card at his/her residence, visitor center personnel will check an approved alpha roster, call the residence (if someone is home) for verification, or contact the individual's first sergeant for verification. Visitor center personnel will check the alpha roster against another valid Federal or State issued photo identification card prior to permitting entry via the token noted above. If verification and contact cannot be accomplished, contact SFCC. At the earliest possible time, with established priorities, a patrol will be dispatched to escort the individual to his/her residence and validate the member's residential status. Do not turn the family member away from the base. Use an means available to verify the person's identity. When the visitor centers are closed, the SFCC will accomplish the above noted validation procedures.

2.3. During FPCONs Charlie and Delta, situations such as those above will be dealt with individually in accordance with standing FPCON procedures.

SECTION I - EXAMPLE REQUEST FOR VISITOR IDENTIFICATION

I hereby request the following individual be issued a Visitor Identification with the understanding that if this request is approved, this identification will permit the below individual unrestricted access to HAFB (except during increased FPCONs) 24-hours a day, 7-days a week, for the duration of the pass. Furthermore, I understand that as this individuals sponsor I can be held administratively and legally liable for the conduct of this person while they are on HAFB.

SPONSOR'S INFORMATION:

Last Name: _____ First Name: _____

SSAN: _____ Unit of Assignment: _____

Duty and Home Phone: _____

VISITOR'S INFORMATION:

Last Name: _____ First Name: _____

SSAN: _____ Date of Birth (DOB): _____

Address: _____

City/State: _____

Telephone: (_) _____

Driver License Number/State: _____

(Or other Local, State or Federally issued photo ID)

Vehicle Year: _____ Vehicle Make: _____

Vehicle Model: _____ Vehicle License/State: _____

Date Pass Begins: _____ Date Pass Ends: _____

(may not exceed 1-year)

JUSTIFICATION FOR REQUEST: _____

_____

_____

_____ _____

Date (Signature of Sponsor)

I concur/nonconcur with the justification annotated above for the issuance of this identification.

_____

Printed Name of 3-digit Supervisor

_____ _____

Date Signature of 3-digit Supervisor

Date Issued: _____ Issued By: _____ Gate: W S

THIS FORM MUST BE FILLED OUT IN ITS ENTIRETY

SECTION J - ACRONYMS AND PHONE NUMBERS

Acronyms

AFMC	Air Force Materiel Command
AFOSI	Air Force Office of Special Investigations
CA	Contracting Activity
CAC	Common Access Card
CAP	Civil Air Patrol
DOD	Department of Defense
DV	Distinguished Visitor
EAD	Extended Active Duty
FDO	Foreign Disclosure Office
FPCON	Force Protection Condition
GOV	Government Owned Vehicle
HAFB	Hill Air Force Base
HCCP	Hill Consolidated Command Post
IAW	In Accordance With
ID	Identification
IVIS	Integrated Video Imaging System
NBA	Non-Base Affiliated
NCIC	National Crime Information Center
NCOIC	Noncommissioned Officer In Charge
OPM	Office of Personnel Management
POV	Privately Owned Vehicle
SEP	Special Access Pass
SES	Senior Executive Service
SFCC	Security Forces Control Center
SFMIS	Security Forces Management Information System
SSN	Social Security Number
USAF	United States Air Force
UTA	Utah Transit Authority
VAL	Visitor Access List
VIN	Vehicle Identification Number

Phone Numbers

South Gate Visitor Center	777-8631	FAX	586-1551
West Gate Visitor Center	777-6614	FAX	586-2363
South Gate	777-2394		
West Gate	777-5636		
Southwest Gate	775-3031		
Roy Gate	777-4229		

ATTACHMENT 14

HAFB APPROVED SEED MIXTURE

DEPARTMENT OF THE AIR FORCE
75TH CIVIL ENGINEER GROUP (AFMC)
HILL AIR FORCE BASE UTAH

25 February 2014

MEMORANDUM FOR 75 CEG, and Airfield and MAMS contractors.

FROM: 75 CEG/CEIE

SUBJECT: Restoration of disturbed sites on the Hill AFB Airfield and the MAMS areas.

1. Restoration of areas impacted from runway and other construction projects is necessary to prevent noxious weed infestation and soil erosion in and around the airfield and MAMS due to airfield proximity. The following specifications outline the process to be used in re-establishing viable stands of dryland vegetation that meets the needs of AFI 91-212 and the approved Hill AFB BASH Plan.

a. Proper seedbed preparation is important to the successful outcome of dryland site restoration. After the construction project has been completed, use a ripper to rip the impacted areas to a depth of one foot to assure that compaction issues have been addressed. When ripping is complete, use a spike or chain harrow to prepare the seedbed for planting. The application of fertilizer is not needed or recommended.

b. Timing of the seed planting is critical when planting drought tolerant grasses. After 15 October (and no later than March 15), use a seed drill to plant the seed one half inch deep. Planting the seed deeper than one half inch will result in failure of seed germination. Likewise, drilling when the ground is frozen will also result in failure. Because most seed drillers plant seed at depths greater than one half inch, depth bands must be added to the double-disk openers or the driller must be equipped with hydraulic depth control. Agitation is also required to prevent seed from bridging over the seeder openings.

c. Use the following seed mixture and application rates to plant the impacted sites:

Common Name	Variety	lbs./acre
Western Wheatgrass	**Rosana**	2.5
Intermediate Wheatgrass	**Oahe**	2
Streambank Wheatgrass	**Sodar**	4
Crested Wheatgrass	**Hycrest, Roadcrest, or Ephraim**	2
Sand Drop Seed		.12
Bluebunch Wheatgrass		2.5
Sheep Fescue		2
	Total lbs./acre	**15.12**

d. When estimating seed costs, obtain quotes from many different sources as prices can vary as much as 50% between vendors. Purchase only certified seed when possible. Inquire about the purity and germination test results of the seed to ensure the highest quality and results. Current germination tests are those that have been completed by the appropriate state testing lab within ninety days. The following list includes a few of the possible sources of dryland grass seed:

- Utah Seed, LLC., 435-854-3720, 10220 W 11600 N, Tremonton, UT
- Granite Seed Co., 801-768-4422, 1697 W 2100 N, Lehi, UT
- Mountain Wildland Seed Co., 435-283-4701,Box 3201, Logan, UT
- Maple Leaf Co., 435-283-4400, 450 S 50 East, Ephraim, UT
- Stevenson Intermountain Seeds, 435-283-6639, 488 S 100 E, Ephraim, UT

e. Mowing is to be avoided during the establishment year due to the tenuous condition of young plants.

f. A light application of amine formulation 2,4-D may be required to control broad leaf weeds during the summer and fall establishment phase. No more than 1 pint of active ingredient per acre should be used.

2. By following this protocol the restoration will result in a well established stand of perennial grass, reduce erosion, and re-build the disturbed soil profile.

3. If you have any questions or need additional information, please contact Russ Lawrence, Natural Resource Manager, at 775-6972.

ATTACHMENT 15

INTRUSION DETECTION SYSTEM (IDS)

All lines 1 thru 7 are needed per panel.

QTY.	INTRUSION DETECTION OR ACCESS CONTROL
2	DDW-120 Ethernet SHDSL Extender 1x10/100 Base - TX: RJ-45 DINmodel WESTERMO MODEMS. P/N ID: DDW-120 3621-0110 WWW.WESTERMO.COM 847.619.6068
1	IDS PANEL: 24" X 36" CUSTOM ENCLOSURE OLS180/PD8/18AH_BAT. PART NUMBER: 550-33731-03
1	V5 NETWORK SECURITY SERVER PART NUMBER: 548-33300-10
1	V5 TDEA F/W Option (Requires Mandatory Hardware purchase): 508-33355-02
2	V5-FO SM PORT OPTION: 532-33302-02
1	POWER SUPPLY: 292-33801-01
1	POWER DISTRUBUTION PD8: 292-23216-00

ATTACHMENT 16

AF MINIMUM BIM REQUIREMENTS

U.S. AIR FORCE

BUILDING INFORMATION MODELING

MINIMUM REQUIREMENTS

VERSION 2.1

FOR:

AIR FORCE CIVIL ENGINEER CENTER

U.S. AIR FORCE

18 February 2015

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SECTION A: PURPOSE AND CONTACT INFORMATION

This document represents the minimum BIM requirements for Air Force facilities projects. Additional BIM requirements may be incorporated on projects where appropriate in support of definitive objectives.

Questions pertaining to an individual solicitation shall be directed to the advertising district's contracting specialist for that solicitation.

Questions pertaining to this document should be directed to AFCEC Workflow (afcec.cf.workflow@us.af.mil), Paul Womble (paul.womble@us.af.mil), or Jose Castro-Rodriguez (jose.castro-rodriguez@us.af.mil).

SECTION B: DESIGN AND CONSTRUCTION AGENT REQUIREMENTS

Design and Construction Agents shall ensure proper synchronization of the BIM requirements with the project acquisition strategy (delivery, contracting and procurement methods). As an example: for traditional project delivery methods, requirements for data synchronization during construction may be established during the design contract execution, and must be coordinated with the construction contract.

Design and Construction Agents shall ensure contracts are coordinated to align responsibility with the chosen acquisition strategy.

Design and Construction Agents shall ensure the BIM execution plan is in support of the U.S. Air Force BIM objectives prior to approval of the BIM Execution Plan.

It is preferable to the Air Force to have bidding firms accomplish a draft implementation plan to be used as a discriminator for possible award to the firms who propose maximum BIM use throughout the facility lifecycle. Whether the BIM Project Execution Plan is accomplished before or after award, the plan shall include using the BIM data for the minimum requirements delineated in SECTION I.

Design and Construction Agents shall coordinate contract requirements to ensure appropriate contractual controls exist to ensure timely and effective implementation of the BIM Execution Plan. Such controls may include withholding of payment for design and construction for unacceptable performance in executing the Plan.

SECTION C: U.S. AIR FORCE BIM MISSION STATEMENT

U.S. Air Force Strategic BIM Goals and Objectives are aligned to directly support the Air Force Civil Engineer (CE) mission identified in the 2011 CE Strategic Plan: "…provide, operate, maintain and protect sustainable installations as weapon-system platforms through engineering and emergency response services across the full mission spectrum."

The Civil Engineer Strategic Plan identifies three Goals as the foundation of the CE Strategy:

- Build Ready Engineers,
- Build Great Leaders, and
- Build Sustainable Installations.

The project goals and BIM Uses identified in Section D have been developed to support the CE Strategic Plan. Except for some minor modifications in Section D, the BIM Uses were previously developed for the National BIM Standard. The identified BIM Uses are selected to meet the USAF goals that were developed to support the CE Strategic Plan

SECTION D: BIM GOALS, OBJECTIVES AND USES

1. MAJOR BIM GOALS / OBJECTIVES:

BIM GOAL	DESCRIPTION
Integrate project-level BIMs with current and projected software tools.	Integrate BIM data with AF Facility Management and GeoBase geospatial tools. The current AF strategy for accomplishing this goal is to provide Construction Operations Building Information Exchange (COBie) data to populate Tririga and BUILDER databases and to geo-locate BIM models
Support the Total Force Civil Engineer team by providing NexGen IT integrated software tools	Project-level BIMs must utilize and integrate with approved AF software tools
Support sustainable installations and asset management	Provide BIM and software tools to support lifecycle-based program management aligned with other federal government entities and universally adopted standards. Implement BIM-based planning, design and construction and by delivering a BIM model that integrate with approved facility management tools/software Apply BIM-enabled FM systems to optimize management of RP resources. Implement BIM-based energy modeling during Programming/Requirements Development and Design phases and implement BIM-based EMCS sensor planning/monitoring
Eliminate conflicts	Clash Detection software is used during the design and construction phases to identify conflicts by comparing 3D models of building systems. The goal of clash detection is to eliminate the major system conflicts prior to installation. The information model is then used to create detailed control points to aid in assembly layout. An example of this is layout of foundations using a total station with points preloaded and/or using GPS coordinates to determine if proper excavation depth is reached.
Accurate 3D Record Model for FM Team	The Record Model shall, at a minimum, contain the culmination of all the BIM modeling throughout the project, including linking Operation, Maintenance, and Asset data to the as-built model (created from the Design, Construction, 4D Coordination Models, and Subcontractor Fabrication Models) to deliver an accurate Record Model to the Air Force asset manager. Additional information including equipment (computer racks, UPS, material handling; where applicable) and space planning system shall be included to ensure they interface properly with building systems. For D-B-B projects, the A-E will develop the Design Model and Specifications for the Construction Contractor for producing the Record Model

2. BIM USES:

The BIM Uses highlighted/shaded and checked with an (X) are required USAF BIM Requirements. Additional BIM Uses may be identified on a project as applicable. Contractors may identify additional BIM Uses for the project as Contractor Electives. Reference the BIM Project Execution Planning Guide at www.nationalbimstandard.org for BIM Use descriptions.

	PLAN (NIC)		DESIGN		CONSTRUCT		OPERATE (NIC)
	PROGRAMMING	X	DESIGN AUTHORING		SITE UTILIZATION PLANNING		BUILDING SYSTEM ANALYSIS
	SITE ANALYSIS	X	DESIGN REVIEWS		CONSTRUCTION SYSTEM DESIGN		ASSET MANAGEMENT
		X	3D COORDINATION - INTERFERENCE MANAGEMENT	X	3D COORDINATION - INTERFERENCE MANAGEMENT		SPACE MANAGEMENT / TRACKING
			ENGINEERING ANALYSIS - STRUCTURAL		DIGITAL FABRICATION		DISASTER PLANNING
			ENGINEERING ANALYSIS - LIGHTING	X	3D CONTROL AND PLANNING / DIGITAL LAYOUT		
			ENGINEERING ANALYSIS - ENERGY	X	RECORD MODELING		RECORD MODELING
			PROGRAM VALIDATION		FIELD / MATERIAL TRACKING		
			ENGINEERING ANALYSIS - MECHANICAL				
		X	3D CONTROL AND PLANNING (DIGITAL LAYOUT) - GEOLOCATING THE PROJECT				
			SUSTAINABILITY (LEED) EVALUATION				
			ENGINEERING ANALYSIS – OTHER (PER CONTRACT REQUIREMENTS)				
			CODE VALIDATION				
	PHASE PLANNING (4D)		PRELIMINARY CONSTRUCTION SCHEDULING (4D)		CONSTRUCTION SCHEDULING (4D)		BUILDING (PREVENTIVE) MAINTENANCE SCHEDULING (4D)
	COST ESTIMATION (5D)	X	COST ESTIMATION (5D)		COST ESTIMATION (5D)		COST ESTIMATION (5D)
	EXISTING CONDITIONS MODELING		EXISTING CONDITIONS MODELING		EXISTING CONDITIONS MODELING		EXISTING CONDITIONS MODELING
	CONSTRUCTION OPERATIONS BUILDING INFORMATION EXCHANGE (COBie)	X	CONSTRUCTION OPERATIONS BUILDING INFORMATION EXCHANGE (COBie)	X	CONSTRUCTION OPERATIONS BUILDING INFORMATION EXCHANGE (COBie) BUILDER and Omniclass as required		CONSTRUCTION OPERATIONS BUILDING INFORMATION EXCHANGE (COBie) BUILDER and Omniclass as required

BIM USE: CONSTRUCTION OPERATIONS BUILDING INFORMATION EXCHANGE

Description:

This is an interim process to achieve the Asset Management BIM Use by populating Record Model attributes and COBie spreadsheets to provide facility information to the USAF's NextGen IT Facilities Management system. Facility data shall include all information associated with the Design and Constructions worksheets as well as the Spares worksheet from the Operations and Maintenance worksheets.

Potential Value:

- Store operations, maintenance owner user manuals, and equipment specifications for faster access.
- Maintain up-to-date facility and equipment data including but not limited to maintenance schedules, warranties, cost data, upgrades, replacements, damages/deterioration, maintenance records, manufacturer's data, and equipment functionality

Resources Required:

- Record Model
- COBie database

COBie Data Formats: The USAF's Facility Management system is transitioning under the NextGen IT initiative to TRIRIGA and BUILDER. TRIRIGA is able to import COBie standard Omniclass formatted data via XML spreadsheets while BUILDER utilizes data formatted in Uniformat II. Facility asset data that will be maintained in BUILDER must first be uploaded into the BUILDER Remote Entry Database (BRED). Refer to the BRED Data Dictionary for data format requirements.

Team Competencies Required:

- Pre-design knowledge of which assets are worth tracking, whether the building is dynamic vs. static, and the end needs of the building to satisfy the end user
- Knowledge of the asset management system

Selected Resources:

- NIST (2007) General Buildings Information Handover Guide: Principles, Methodology, and Case Studies
- BUILDER Remote Entry Database (BRED) Data Dictionary

SECTION E: BIM FORMAT

Multiple BIM platforms will generally be used across the design specialties and trades taking advantage of the strengths of the various platforms, therefore no specific BIM platform shall be mandated. The Contractor's BIM Execution Plan shall define the BIM tools to be used in the execution of the project.

IFC Coordination View. The Contractor's selected BIM application(s) and software(s) shall be certified in the IFC (Industry Foundation Class) Coordination View (2x3 or better). Submit any deviations from or additions to the IFC property sets for any new spaces, systems, and equipment for Government approval.

Contractors will use the Model and Facility Data to produce accurate Construction Documents. BIM associated submittals shall conform to the standards described below.

SECTION F: BIM DELIVERABLES

1. GENERAL:

Develop all designs using Building Information Modeling (BIM) and Computer Aided Design (CAD) software.

The use of BIM does not negate the need for delivery of CAD files used for the creation of the Construction Documents Drawings. Specification of a CAD file format for these drawings submitted shall not be used to limit which BIM application(s) or software(s) may be used for project development and execution.

Deliver the Model, CAD files, and Facility/Site Data, Workspace in the native format, DWF and PDF format for project manager review using viewer software or Adobe Acrobat Reader. The BIM shall be in a native file format with linked performance based specifications (via e-SPECS for Revit with SpecsIntact integration or similar), interactive for the user, and the model shall be fully compatible with the Air Force standard platform (Autodesk Revit) and in an interoperable file format like the Industry Foundation Class (IFC).

Deliver COBie data extract in Excel spreadsheet format.

Provide a list of all submitted files in Excel spreadsheet format.

Electronic submittals shall be on digital media acceptable to the Government. The electronic submittals shall be organized and structured supportive of archival and retrieval. The electronic submittals shall have a “dash-board” type feature to assist viewers navigate through the digital media and associated files. Files not using names which readily identify their content shall have appropriate Meta data attached to include searchable short descriptions of the file’s content or relevance.

2. OWNERSHIP AND RIGHTS TO DATA:

The Government has ownership of rights at the date of Design Completion or Closeout Submittal (as applicable) to all CAD files, BIM Model, and Facility Data developed for the Project in accordance with FAR Part 27. The Government may make use of this data following any deliverable, including interim or final submittals.

3. DESIGN AND CONSTRUCTION REVIEWS:

Design submittal drawings shall be sized per contract requirements and suitable for A3 (11”x17”) legible scaled reproduction.

Provide Models and CADD files for design and construction review submittals in DWG DWF & PDF format for project manager review using viewer software or Adobe Acrobat Reader.

Provide a COBie spreadsheet based on the current COBie spreadsheet template in Excel format. Refer to The COBie Guide located on the National Institute of Building Sciences (NIBS) website. Include Manufacturer’s Product Data, Operations and Maintenance data, Warranty data, and spares data. Provide data formatted for BUILDER and Tririga.

Provide a list of Construction Documents (e.g., drawings, elevations, design sections and schedules, details) produced from the Facility Data and updated as necessary for each submittal.

Perform design and construction reviews at each submittal stage to test the Model. This model review shall correlate to the actual submittal provided to the Government. Minimum model reviews include:

Visual Checks: Check to ensure the design intent has been followed and that there are no unintended elements in the Model.

Interference Management Checks: Locate conflicting spatial data in the Model where two elements are occupying the same space. Log hard interferences (e.g., mechanical vs. structural or mechanical vs. mechanical overlaps in the same location) and soft interferences (e.g. conflicts regarding equipment clearance, service access, fireproofing, insulation) in a written report and resolve.

IFC Coordination View: Provide an IFC Coordination View in IFC Express format for all deliverables. Provide exported property set data for all IFC supported named building elements. Provide IFC export configuration text file illustrating BIM to IFC assignments.

Model Standards/ CAD Standards Check Reports: Provide a written report documenting that the BIM and AEC CADD Standard have been followed (fonts, dimensions, line styles, levels/layers, etc).

Model Integrity Validation: Provide a written report documenting the QC validation process used to ensure that the Project Facility Data set has no undefined, incorrectly defined or duplicated elements and the reporting process on non-compliant elements and corrective action plans.

Project Scope Validation Check: Provide report of comparison of programmed scope (from the project Requirements Document) to actual design scope. The comparison shall either be done within the model platform itself or an external project review program approved by the Government. Actual NSF for the design shall be automatically generated within the model and not manually entered. The project scope validation check shall have a minimum of the following data points listed: Room Number, Department or Functional Area, Space Type, Room Name, Target NSF, Design Actual NSF, Calculated Delta between Target and Actual NSF for room, and calculated exceeds critical delta (yes or no). The project team shall establish a target "critical" delta or allowable variance for rooms at the beginning of the project (e.g. 2%). The project scope validation report will indicate rooms that fall outside of these established criteria.

Project Room Contents (PRC) Validation Check: Provide report of comparison of approved PRC list by room (from the project Requirements Document) to actual design PRC. The comparison shall either be done within the model platform itself or an external project review program approved by the Government. The report shall provide a list of rooms where the design PRC does not match the approved PRC and the specific items that do not match. The non-matching items list shall include at a minimum the PRC equipment item approved and expected, and the designed PRC item not matching.

Gross Area Tabulation Calculation: The contractor shall calculate the departmental gross square feet / meters (GSF / GSM) and the building GSF / GSM using the model's automatic calculation attributes in accordance with gross square footage calculation guidance contained in AFI 32-1084 Facility Requirements. The total building Gross Area Tabulation report shall as a minimum identify total mechanical gross, circulation gross, electrical gross and overall building gross area factor.

A 3-D interactive review format of the Model in Bentley Navigator, Navisworks, Adobe 3D PDF 9.0 (or later), Google Earth KMZ or other format per Execution Plan requirements. The file format for reviews can change between submittals.

Change Tracking Report: The contractor shall provide documentation of changes made to the Model at each stage utilizing software tools such as the Revit Compare Tool.

During the Construction Submittal stages, the Contractor shall deliver the construction schedule with information derived from the Model.

4. Final Record Model and CAD Data:

The following shall be required of the construction contractor.

Submit the final Record Model, Facility, and CAD Data files reflecting as-built conditions for Government Approval prior to project closeout.

Record Models shall contain updated and accurate parameter data at the time of submittal.

The Record Model shall update the final design Model, Facility, and CAD Data files reflecting as-built conditions for Government Approval. Update the design model assemblies with actual manufacturer BIMs (when available) as part of the Record Model. Provide Operations and Maintenance, Product, and Warranty data within the as-built model. Include updates from all Field Changes and Contract Modifications.

Provide a COBie spreadsheet based on the current COBie spreadsheet template in Excel format. Refer to The COBie Guide located on the National Institute of Building Sciences (NIBS) website. Include Manufacturer's Product Data, Operations and Maintenance data, Warranty data, and spares data. Provide data formatted for BUILDER and Tririga.

SECTION G: QUALITY CONTROL

At each stage provide a Contractor-certified written report with each design submittal, confirming that consistency checks as identified in this Section have been completed for the design submittal. This report shall be discussed as part of the design review conference and shall address cross-discipline interferences, if any.

Visual Check: Ensure there are no unintended model components and the design intent has been followed

Interference Check: Locate conflicting spatial data in the Model where two elements are occupying the same physical space. Log hard interferences (e.g., mechanical vs. structural or mechanical vs. mechanical overlaps in the same location), and soft interferences (conflicts regarding service access, fireproofing, insulation), in a written report and document disposition.

Standards Check: Ensure that the BIM and A/E/C CADD Standard have been followed (fonts, dimensions, line styles, levels/layers, and other contract document formatting issues are followed per the A/E/C CADD Standard.)

Model Integrity Checks: Conduct QC validation processes to ensure that the Project Facility Data set has no undefined, incorrectly defined or duplicated elements and the report on non-compliant elements and corrective action. Provide justification acceptable to the Government of non-compliant elements if allowed to remain within the Model.

Version Updating Check: Ensure that all users are using the agreed upon version of the software and the method by which changing software version is completed

Revision Authority Check: Describe the method by which all users will be given access and extent of revision authority to versions of the model as updated.

Other QC Parameters: Develop such other QC parameters as Contractor deems appropriate for the Project and provide to the Government for concurrence.

Over-The-Shoulder Progress Reviews: Periodic quality control meetings or construction progress review meetings shall include quality control reviews on the implementation and use of the Model, including interference management and design change tracking information.

SECTION H: BIM PROJECT EXECUTION PLAN

Prior to the Initial Design Conference / design kick off and construction kickoff meeting, the contractor shall submit a BIM Project Execution Plan (PxP), documenting the BIM design and analysis technologies selected for the Project Model from concept development through the Record Model as a design, production, coordination, construction, and documentation tool and the collaborative process by which it shall be implemented. The Government shall confirm acceptability of the PxP or advise as to additional processes or activities necessary to be incorporated into the PxP. The PxP shall include the minimums defined herein. The PxP shall be synchronized with the project acquisition strategy applied.

The PxP shall describe BIM Uses during the design and construction phases. Additionally the PxP shall describe the handoff of BIM data and model to the Government over the course of the project execution and turn over.

The PxP shall identify how the BIM data will be managed and interoperate (data storage, sharing, viewing, quality control, and updating, as necessary) among all project team members.

Within thirty (30) days after the acceptance of the PxP, conduct a demonstration at the Initial Design (and Construction, if separate contracts) Conference to review the PxP for clarification, and to verify the functionality of Model technology workflow and processes. If modifications are required, the Contractor shall complete the modifications and resubmit the final PxP for Government acceptance.

SECTION I: USAF BIM REQUIREMENTS

1. CONTRACT PLANNING REQUIREMENTS:

Provide a Project Execution Plan (PxP) prior to the Initial Design Kick-Off Meeting, using this document.

Provide a PxP demonstration at the Initial Design Review Conference to review the Implementation Plan for clarification, and to verify the functionality of Model technology workflow and processes. The Government shall confirm acceptability of the Plan or propose additional processes or activities necessary to be incorporated into the Plan. If modifications are required, the Contractor shall execute the modifications and resubmit the final Implementation Plan for Government acceptance prior to payments for design or construction.

Use Air Force Standard Designs and templates provided at http://www.wbdg.org/references/afbim_tools.php.

2. GENERAL BIM REQUIREMENTS:

Provide BIM files using the Air Force Blanket Purchase Agreement (BPA) for Autodesk Revit BIM software.

Use BIM application(s) and software(s) compatible with International Alliance for Interoperability (IAI) Industry Foundation Class (IFC) standards 2x3 or newer.

Provide 3D graphic model(s) (the “Model”) and associated intelligent attribute data (“Facility Data”) to produce accurate Construction Documents.

Provide linked, interactive specifications utilizing e-SPECS for Revit with SpecsIntact integration.

Application and software(s) must be certified in the IFC Coordination View (2x3 or newer. See www.iai-tech.org). Deviations from or additions to the IFC property sets for any new spaces, systems, and equipment must be submitted for Government approval.

Facility data shall be compliant with Construction Operations Building Information Exchange (COBie); see http://www.wbdg.org/resources/cobie.php for more information.

3. DESIGN STAGE BIM REQUIREMENTS:

Develop a Project Execution Plan PxP. Conduct a BIM Requirements Kick-Off meeting to review the PxP and provide an overview of the use of BIM in the development and support of the project construction schedule.

Conduct quality control reviews as required in Section G.

Provide Files used for the creation of Construction Documents (drawings) per the Design Agent’s criteria and as noted herein. Non-BIM files used to create Conceptual, Schematic and Design Development items are excluded from this requirement.

Early-stage preliminary development of Model components and Facility Data. Review the Model with the Government for conformity to the program, massing, circulation, fire protection, and security and sustainability requirements consistent with the Project Execution Plan.

The Model shall include all disciplines and facility data, as applicable to the level of development.

Final design submissions shall include all required design elements. Secure Government acceptance of the Model from the Government before proceeding with commencement of construction.

Cost Estimating. Provide an overview of the use of BIM in the development and support of cost estimating, cost analysis, and estimate validation in the PxP.

Extracted Quantities. Use extracted quantities from the BIM for use within the cost estimate so that accurate costs can be developed. Tasks and their extracted quantities from the BIM shall be broken down by system, subsystem, or product as defined by the Level of Development in USACE's Minimum Model Matrix. Coordinate breakdown structure with the Design Agent's cost engineer. Since the BIM output will not generate all quantities necessary to develop a complete and accurate cost estimate of the project based on the design, estimators shall provide a gap cost to account for this granularity. Note that this requirement is primarily for D-B-B projects at this time.

4. CONSTRUCTION STAGE BIM REQUIREMENTS:

Note that for D-B-B projects, the A-E will produce the Design Model and provide specifications for the Construction Contractor to fulfill the requirements indicated below.

Develop a Project Execution Plan PxP. Conduct a BIM Requirements Kick-Off meeting to review the PxP and provide an overview of the use of BIM in the development and support of the project construction schedule.

Conduct periodic quality control reviews as required in Section G.

During the construction submittal stage, the Contractor shall deliver the construction schedule with information derived from the Model.

Model Driven RFIs and/or Change Orders. [Include in a future demonstration project]

Project Billing and cost loaded schedule developed from the Model. [Include in a future demonstration project]

5. GENERAL MODEL AUTHORING REQUIREMENTS:

Provide Project Specific BIM Facility Data consisting of a set of intelligent elements for the Model (e.g., doors, air handlers, electrical panels). This Facility Data shall include all material definitions, qualities, and attributes that are necessary for the project facility design. Data format must be compatible with the Facility Management software (BUILDER and Tririga) for subsequent database searches.

Model Granularity. Models may vary in level of detail for individual elements within a model, but at a minimum must include all features that would be included on a quarter inch (1/4" = 1'0") scaled drawing (e.g. at least 1/16th, 1/8th and 1/4th), or appropriately scaled civil drawings.

6. SPECIFIC BIM MODEL AUTHORING REQUIREMENTS:

The BIM Model Authoring Requirements described below generally conform to USACE's Minimum Modeling Matrix (M3). Contract language detailing the minimum BIM requirements, including the completed M3, should be reviewed to ensure that these Air Force requirements are included.

Architecture & Interior Design. The Architectural systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Additional minimum Model requirements include:

- Space Measurements. The Model shall include spaces defining accurate net square footage and net volume, and holding data for the room finish schedule for including room names and numbers. Include Programmatic Information provided by the Government or validated program to verify design space against programmed space, using this information to validate area quantities. The model shall provide accurate gross area tabulations for use in validating DD Form 1391 programmatic requirements and for use in generating the DD Form 1354.
- Walls and Curtain Walls. Each wall shall be depicted to the exact height, length, width and ratings (thermal, acoustic, fire) to properly reflect wall types. The Model shall include all walls, both interior and exterior, and the necessary intelligence to produce accurate plans, sections and elevations depicting these design elements
- Doors, Windows, Clearstories and Louvers. Doors, windows and louvers shall be depicted to represent their actual size, rating, type and location. Doors and windows shall be modeled with the necessary intelligence to produce accurate window and door schedules.

- Roof. The Model shall include the roof configuration, drainage system, major penetrations, specialties, and the necessary intelligence to produce accurate plans, building sections and generic wall sections where roof design elements are depicted.
- Floors. The floor slab shall be developed in the structural Model and then referenced by the architectural Model for each floor of the Project building.
- Ceilings. All heights and other dimensions of ceilings, including soffits, ceiling materials, or other special conditions shall be depicted in the Model with the necessary intelligence to produce accurate plans, building sections and generic wall sections where ceiling design elements are depicted.
- Vertical Circulation. All continuous vertical components (i.e., non-structural shafts, architectural stairs, handrails and guardrails) shall be accurately depicted and shall include the necessary intelligence to produce accurate plans, elevations and sections in which such design elements are referenced.
- Architectural Specialties and Woodwork. All architectural specialties (i.e., toilet room accessories, toilet partitions, grab bars, lockers, and display cases) and woodwork (i.e., cabinetry and counters) shall be accurately depicted with the necessary intelligence to produce accurate plans, elevations and sections in which such design elements are referenced.
- Signage. The Model shall include all signage and the necessary intelligence to produce accurate plans and schedules.
- Schedules. Provide door, window, hardware, sets using BHMA designations, flooring, and wall finish, and signage schedules from the Model, indicating the type, materials and finishes used in the design.
- Furniture/Fixtures/Equipment (FFE). 3D representation of FFE elements is preferred. For projects with an extensive systems furniture layout that may impact BIM system performance the Contractor will consult with the Government for consideration of 2D representation. The FFE systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4”=1’0”) scaled drawing. Additional minimum Model requirements include:
    - Furniture (INCLUDE AS REQUIRED) The furniture systems Model may vary in level of detail for individual elements within a Model, but at a minimum must include all features that would be included on a quarter inch (1/4”=1’0”) scaled drawing, and shall include all relevant office equipment and furniture system layouts, with necessary intelligence to produce accurate plans, sections, perspectives and elevations necessary to completely depict furniture systems locations and sizes.
    - Systems Coordination. Furniture that makes use of electrical, data, plumbing or other features shall include the necessary intelligence to produce coordinated documents and data.
    - Fixtures and Equipment Fixtures and equipment shall be depicted to meet layout requirements with the necessary intelligence to produce accurate plans, elevations, sections and schedules depicting their configuration.
    - Schedules Provide furniture and equipment schedules from the model indicating the materials, finishes, mechanical, and electrical requirements.

Structural. The structural systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4”=1’0”) scaled drawing. Additional minimum Model requirements include:

- Foundations. All necessary foundation and/or footing elements, with necessary intelligence to produce accurate plans and elevations.
- Floor Slabs. Structural floor slabs shall be depicted, including all necessary recesses, curbs, pads, closure pours, and major penetrations accurately depicted.
- Structural Steel. All steel columns, primary and secondary framing members, and steel bracing for the roof and floor systems (including decks), including all necessary intelligence to produce accurate structural steel framing plans and related building/wall sections.
- Cast-in-Place Concrete. All walls, columns, and beams, including necessary intelligence to produce accurate plans and building/wall sections depicting cast-in-place concrete elements.
- Expansion/Contraction Joints. Joints shall be accurately depicted.

- Stairs. The structural Model shall include all necessary openings and framing members for stair systems, including necessary intelligence to produce accurate plans and building/wall sections depicting stair design elements.
- Shafts and Pits. The structural Model shall include all necessary shafts, pits, and openings, including necessary intelligence to produce accurate plans and building/wall sections depicting these design elements.

Mechanical. The mechanical systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Additional minimum Model requirements include:

- HVAC. All necessary heating, ventilating, air-conditioning and specialty equipment, including air distribution ducts for supply, return, and ventilation and exhaust ducts, including control system, registers, diffusers, grills and hydronic baseboards with necessary intelligence to produce accurate plans, elevations, building/wall sections and schedules. All piping larger than 1.5" diameter shall be modeled.
- Mechanical Piping. All necessary piping and fixture layouts, and related equipment, including necessary intelligence to produce accurate plans, elevations, building/wall sections, and schedules. All piping larger than 1.5" diameter shall be modeled.
- Plumbing. All necessary plumbing piping and fixture layouts, floor and area drains, and related equipment, including necessary intelligence to produce accurate plans, elevations, building/wall sections, riser diagrams, and schedules. All piping larger than ½" diameter shall be modeled.
- Equipment Clearances. All HVAC and Plumbing equipment clearances shall be modeled for use in interference management and maintenance access requirements.
- Elevator Equipment. The Model shall include the necessary equipment and control system, including necessary intelligence to produce accurate plans, sections and elevations depicting these design elements.
- Schedules. The construction drawings shall include equipment schedules that are of the BIM native schedules. Equipment shall not be generated in third party software and inserted on the drawings as raster images, detail lines and text, AutoCAD line work and text, or other non -BIM format for aesthetic reasons. The data in the schedules as printed on the contract drawings shall be the exact same data as in the model.

Electrical/Telecommunications. The electrical systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Additional minimum Model requirements include:

- Interior Electrical Power and Lighting. All necessary interior electrical components (i.e., lighting, receptacles, special and general purpose power receptacles, lighting fixtures, panel boards and control systems), including necessary intelligence to produce accurate plans, details and schedules. Cable tray routing shall be modeled without detail of cable contents. Lighting and power built into furniture/equipment shall be modeled.
- Special Electrical Systems. All necessary special electrical components (i.e., security, Mass Notification, Public Address, nurse call and other special occupancies, and control systems), including necessary intelligence to produce accurate plans, details and schedules.
- Grounding Systems. All necessary grounding components (i.e., lightning protection systems, static grounding systems, communications, grounding systems and bonding), including necessary intelligence to produce accurate plans, details and schedules.
- Communications. All existing and new communications service controls and connections, both above ground and underground with necessary intelligence to produce accurate plans, details and schedules. Cable tray routing shall be modeled without detail of cable contents. Communications conduit larger than 1.5" shall be modeled.
- Exterior Building Lighting. All necessary exterior lighting with necessary intelligence to produce accurate plans, elevations and schedules. The exterior building lighting Model shall include all necessary lighting, relevant existing and proposed support utility lines and equipment required with necessary intelligence to produce accurate plans, details and schedules.

- Equipment Clearances. All lighting and communications equipment clearances and no-fly zones shall be modeled for use in interference management and maintenance access requirements. Include Original Model Based Schedules for all equipment. No fabricated or extraneously produced Schedules will be accepted.
- Schedules. The construction drawings shall include equipment schedules that are of the BIM native schedules. Equipment shall not be generated in third party software and inserted on the drawings as raster images, detail lines and text, AutoCAD line work and text, or other non -BIM format for aesthetic reasons. The data in the schedules as printed on the contract drawings shall be the exact same data as in the model.

Fire Protection. The fire protection system Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Additional minimum Model requirements include:

- Fire Protection System. All relevant fire protection components (i.e., branch piping, sprinkler heads, fittings, drains, pumps, tanks, sensors, control panels) shall be indicated with necessary intelligence to produce accurate plans, elevations, building/wall sections, riser diagrams, and schedules. All fire protection piping shall be modeled. In a D-B-B project where the suppression system is specified through a performance specification and designed by the Construction Contractor, the A-E will provide the Design Model with associated FPS components appropriate to the level of design, and provide specifications for the Construction Contractor to the final installed FPS in the Record Model.
- Fire Alarms. Fire alarm/mass notification devices and detection system shall be indicated with necessary intelligence to produce accurate plans depicting them.

Civil. The civil Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a one inch (1"=100') scaled drawing. Additional minimum Model requirements include:

- Digital Terrain Model (DTM). Model all relevant site conditions and proposed grading, including necessary intelligence to produce accurate Project site topographical plans and cross sections.
- Drainage. Model all existing and new drainage piping, including upgrades thereto, including necessary intelligence to produce accurate plans and profiles for the Project site.
- Storm Water and Sanitary Sewers. Model all existing and new sewer structures and piping, including upgrades thereto, on the Project site with necessary connections to mains or other distribution points as appropriate, including necessary intelligence to produce accurate plans and profiles for the Project site.
- Utilities. Model all necessary new utilities connections from the Project building(s) to the existing or newly-created utilities, and all existing above ground and underground utility conduits, including necessary intelligence to produce accurate plans and site-sections.
- Roads and Parking. Model all necessary roadways and parking lots or parking structures, including necessary intelligence to produce accurate plans, profiles and cross-sections.

SECTION J: REFERENCES

1. **USACE A/E/C CADD Standard:** https://cadbim.usace.army.mil/default.aspx?p=a&t=1&i=7
2. **USACE REVIT Template Guides:** https://cadbim.usace.army.mil/default.aspx?p=a&t=1&i=12
3. **Autodesk Revit BIM Template for US Air Force projects Version 2010:** http://www.wbdg.org/references/afbim_tools.php
4. **USACE Construction Operations Building Information Exchange (COBie):** http://www.wbdg.org/pdfs/erdc_cerl_tr0730.pdf
5. **BIM Project Execution Planning Guide:** http://www.bim.psu.edu/Project/resources/default.aspx
6. **BUILDER Remote Entry Database (BRED) Data Dictionary:** http://sms.cecer.army.mil/Support/SiteAssets/BUILDER%20Downloads/Forms/AllItems/BRED%20Data%20Dictionary%203.1%20v3.1.pdf

ATTACHMENT 17

AF BIM PXP TEMPLATE

U.S. AIR FORCE
BUILDING INFORMATION MODELING
PROJECT EXECUTION PLAN
(PxP)
VERSION 2.1

FOR:
AIR FORCE CIVIL ENGINEER CENTER
ON
[PROJECT TITLE]

[PROJECT LOCATION]
[USAF PROJECT NUMBER(S)]

DEVELOPED BY
[AUTHOR COMPANY]

U.S. AIR FORCE

DATE[XX/XXX/XX]

INSTRUCTIONS AND REFERENCE INFORMATION

This template is a tool that is provided to assist in the development of a BIM Project Execution Plan (PxP) as required per Awarded Contract or Proposal Submission Requirements. It was adapted from the National BIM Standard (NBIMS) – US Version 2, Section 5.4 BIM Project Execution Plan Content – Version 2.1, BIM Project Execution Plan Template. For Reference Information only on content in this template, such as BIM Use definitions please see the NBIMS Chapter 5 Practice Documents and related Section 5.3 BIM Project Execution Planning Guide at www.nationalbimstandard.org.

The U.S. Air Force is an Alliance Sponsor Member of the National Institute of Building Sciences (NIBS) http://www.nibs.org/?page=organizations. NBIMS is a product of the Building SMART Alliance which serves as a Council of NIBS http://www.nibs.org/?page=bsa.

Instructions and examples to assist with the completion of this guide are currently in red. The text can and should be modified to suit the needs of the organization filling out the template. If modified, the format of the text should be changed to match the rest of the document. This can be completed, in most cases, by selecting the normal style in the template styles.

Questions pertaining to an individual solicitation shall be directed to the advertising district's contracting specialist for that solicitation.

Questions pertaining to this template should be directed to AFCEC Workflow (afcec.cf.workflow@us.af.mil), Paul Womble (paul.womble@us.af.mil), or Jose Castro-Rodriguez (jose.castro-rodriguez@us.af.mil).

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SECTION A: PROJECT INFORMATION

Unless otherwise noted, text in black is a contract requirement and shall not be modified. Instructions and examples to assist with the completion of the PxP are in red. Red text shall be deleted from the final PxP. Additional text may be added to suit the needs of the USAF proponent. If modified, the format of the text should be changed to match the rest of the document. The PxP is primarily written from the point of view that the project will be executed as a Design-Build (D-B) contract since that is the USAF's preferred method of execution. The document should be modified for Design-Bid-Build (D-B-B) execution. Notes in red text discussing variations to the PxP for D-B-B execution are provided where appropriate. The D-B contractor or the D-B-B Architect-Engineer (A-E) shall complete the PxP, and submit it for Government review and acceptance. D-B projects should include a Section in the RFP that discusses the requirements for the BIM and require the completion of the PxP by the D-B contractor as a submittal. For D-B-B projects, the A-E shall complete the PxP. BIM requirements for the Construction Contractor should be included in the project Specifications, and include the PxP as an attachment. The D-B-B Construction Contractor should complete a PxP for the "as-built" Record BIM. One PxP should be completed for each contract describing the means and methods to be employed for that contract scope. As a living document, it shall be updated whenever implementation details change for Government review and acceptance. At final handover, the PxP shall reflect the delivered end products and provided as reference for future consumers of the BIM.

It is preferable to the Air Force to have bidding firms accomplish a draft implementation plan to be used as a discriminator for possible award to the firms who propose maximum BIM use throughout the facility lifecycle. Whether the BIM Project Execution Plan is accomplished before or after award, the plan shall include using the BIM data for the minimum requirements delineated in the **USAF MINIMUM BIM REQUIREMENTS**.

To successfully execute Building Information Modeling (BIM) on a project, [AUTHOR COMPANY] has developed this detailed BIM Project Execution Plan. The BIM Project Execution Plan defines uses for BIM on the project (e.g. design authoring, design reviews, 3D coordination, and record modeling), along with a detailed process for executing BIM on this project.

U.S. AIR FORCE BIM MISSION STATEMENT

U.S. Air Force Strategic BIM Goals and Objectives are aligned to directly support the Air Force Civil Engineer (CE) mission identified in the 2011 CE Strategic Plan: "…provide, operate, maintain and protect sustainable installations as weapon-system platforms through engineering and emergency response services across the full mission spectrum."

The Civil Engineer Strategic Plan identifies three Goals as the foundation of the CE Strategy:

- Build Ready Engineers,
- Build Great Leaders, and
- Build Sustainable Installations.

The project goals and BIM Uses identified in Section C have been developed to support the CE Strategic Plan. Except for some minor modifications in Section C, the BIM Uses were previously developed for the National BIM Standard. The identified BIM Uses are selected to meet the USAF goals that were developed to support the CE Strategic Plan

This section defines basic project reference information and will be conveyed to the to the AGENT PM from the USAF PM via Design Instruction..

1. **FACILITY INTENDED END USER:** E.G. US AIR FORCE, ETC.
2. **PROJECT NAME:** E.G. DORMITORY; MUST BE THE SAME AS SHOWN ON THE DD FORM 1391
3. **PROJECT LOCATION:** E.G. FAIRCHILD AFB, WA
4. **CONTRACT TYPE:** E.G. DESIGN-BUILD
5. **FACILITY TYPE:** LIST ALL FACILITIES IN THE CONTRACT; MUST BE THE SAME AS SHOWN ON THE DD FORM 1391

6. **BRIEF PROJECT DESCRIPTION:** NUMBER OF FACILITIES, GENERAL SIZE, ETC
7. **ADDITIONAL PROJECT INFORMATION:** UNIQUE BIM PROJECT CHARACTERISTICS AND REQUIREMENTS
8. **AGENT:** E.G. USACE, NAVFAC, AFCEC
9. **PROJECT NUMBERS:** E.G. AF PROJECT NUMBER AS SHOWN ON THE DD FORM 1391

PROJECT INFORMATION	NUMBER
AGENT CONTRACT NUMBER:	E.G. W9126G-08-D-0000
TASK ORDER:	E.G. 0001
AGENT PROJECT NUMBER:	E.G. PN055198
CONTRACTOR INFORMATION	**NUMBER**
AF PROJECT NUMBER(S):	E.G.SXHT123456

SECTION B: KEY PROJECT CONTACTS

The following is a list of the lead Designer of Record and BIM contacts for each organization on the project. Additional contacts can be included later in the document.

ROLE	ORGANIZATION	NAME	EMAIL	TIME ZONE	PHONE
Project Manager (DM/CM)	AFCEC	John Doe			
Project Manager (DA/CA)	AGENT				
Agent BIM Manager	AGENT				
Installation Project Manager					
Installation BCE POC					
Project Manager(s)	Company				
BIM Manager(s)	Companies				
Architecture Lead	Company				
Interior Design					
Structural Lead	Company				
Furnishings Lead	Company				
Equipment Lead					
Landscape Architect Lead					
Civil Lead					
Fire Protection Lead					
Mechanical Lead					
Plumbing Lead					
Electrical Lead					
Telecom Lead					
Other Project Roles					

SECTION C: PROJECT GOALS / BIM OBJECTIVES

Describe how the BIM Model and Facility Data are utilized to maximize project value (e.g. design alternatives, life-cycle analysis, energy analysis, sustainability analysis scheduling, estimating, material selection, pre-fabrication opportunities, site placement, etc.)

Reference www.nationalbimstandard.org for the BIM Goal & Use Analysis Worksheet.

1. MAJOR BIM GOALS / OBJECTIVES:

State the BIM Goals / Objectives. The USAF level goals are described below and should not be removed from the PxP. Additional project level BIM goals may be added.

BIM GOAL	DESCRIPTION
Integrate project-level BIMs with current and projected software tools.	Integrate BIM data with AF Facility Management and GeoBase geospatial tools. The current AF strategy for accomplishing this goal is to provide Construction Operations Building Information Exchange (COBie) data to populate Tririga and BUILDER databases and to geo-locate BIM models
Support the Total Force Civil Engineer team by providing NexGen IT integrated software tools	Project-level BIMs must utilize and integrate with approved AF software tools
Support sustainable installations and asset management	Provide BIM and software tools to support lifecycle-based program management aligned with other federal government entities and universally adopted standards. Implement BIM-based planning, design and construction and by delivering a BIM model that integrate with approved facility management tools/software Apply BIM-enabled FM systems to optimize management of RP resources. Implement BIM-based energy modeling during Programming/Requirements Development and Design phases and implement BIM-based EMCS sensor planning/monitoring
Eliminate conflicts	Clash Detection software is used during the design and construction phases to identify conflicts by comparing 3D models of building systems. The goal of clash detection is to eliminate the major system conflicts prior to installation. The information model is then used to create detailed control points to aid in assembly layout. An example of this is layout of foundations using a total station with points preloaded and/or using GPS coordinates to determine if proper excavation depth is reached.
Accurate 3D Record Model for FM Team	The Record Model shall, at a minimum, contain the culmination of all the BIM modeling throughout the project, including linking Operation, Maintenance, and Asset data to the as-built model (created from the Design, Construction, 4D Coordination Models, and Subcontractor Fabrication Models) to deliver an accurate Record Model to the Air Force asset manager. Additional information including equipment (computer racks, UPS, material handling; where applicable) and space planning system shall be included to ensure they interface properly with building systems. For D-B-B projects, the A-E will develop the Design Model and Specifications for the Construction Contractor for producing the Record Model

2. BIM USES:

The BIM Uses currently highlighted/shaded and checked with an (X) are required by USAF BIM Requirements. Contractor to identify with a (C) additional BIM Uses for the project selected as Contractor Electives. Reference BIM Project Execution Planning Guide at www.nationalbimstandard.org for BIM Use descriptions. Include additional BIM Uses as applicable in empty cells of Design and Construct columns. Do not complete Plan and Operate Columns.

	PLAN (NIC)		DESIGN		CONSTRUCT		OPERATE (NIC)
	PROGRAMMING	X	DESIGN AUTHORING		SITE UTILIZATION PLANNING		BUILDING SYSTEM ANALYSIS
	SITE ANALYSIS	X	DESIGN REVIEWS		CONSTRUCTION SYSTEM DESIGN		ASSET MANAGEMENT
		X	3D COORDINATION - INTERFERENCE MANAGEMENT	X	3D COORDINATION - INTERFERENCE MANAGEMENT		SPACE MANAGEMENT / TRACKING
			ENGINEERING ANALYSIS - STRUCTURAL		DIGITAL FABRICATION		DISASTER PLANNING
			ENGINEERING ANALYSIS - LIGHTING	X	3D CONTROL AND PLANNING / DIGITAL LAYOUT		
			ENGINEERING ANALYSIS - ENERGY	X	RECORD MODELING		RECORD MODELING
			PROGRAM VALIDATION		FIELD / MATERIAL TRACKING		
			ENGINEERING ANALYSIS - MECHANICAL				
		X	3D CONTROL AND PLANNING (DIGITAL LAYOUT) - GEOLOCATING THE PROJECT				
			SUSTAINABILITY (LEED) EVALUATION				
			ENGINEERING ANALYSIS – OTHER (PER CONTRACT REQUIREMENTS)				
			CODE VALIDATION				
	PHASE PLANNING (4D)		PRELIMINARY CONSTRUCTION SCHEDULING (4D)		CONSTRUCTION SCHEDULING (4D)		BUILDING (PREVENTIVE) MAINTENANCE SCHEDULING (4D)
	COST ESTIMATION (5D)	X	COST ESTIMATION (5D)		COST ESTIMATION (5D)		COST ESTIMATION (5D)
	EXISTING CONDITIONS MODELING		EXISTING CONDITIONS MODELING		EXISTING CONDITIONS MODELING		EXISTING CONDITIONS MODELING
	CONSTRUCTION OPERATIONS BUILDING INFORMATION EXCHANGE (COBie)	X	CONSTRUCTION OPERATIONS BUILDING INFORMATION EXCHANGE (COBie)	X	CONSTRUCTION OPERATIONS BUILDING INFORMATION EXCHANGE (COBie) BUILDER and Omniclass as required		CONSTRUCTION OPERATIONS BUILDING INFORMATION EXCHANGE (COBie) BUILDER and Omniclass as required

BIM USE: CONSTRUCTION OPERATIONS BUILDING INFORMATION EXCHANGE

Description:

This is an interim process to achieve the Asset Management BIM Use by populating Record Model attributes and COBie spreadsheets to provide facility information to the USAF's NextGen IT Facilities Management system. Facility data shall include all information associated with the Design and Constructions worksheets as well as the Spares worksheet from the Operations and Maintenance worksheets.

Potential Value:

- Store operations, maintenance owner user manuals, and equipment specifications for faster access.
- Maintain up-to-date facility and equipment data including but not limited to maintenance schedules, warranties, cost data, upgrades, replacements, damages/deterioration, maintenance records, manufacturer's data, and equipment functionality

Resources Required:

- Record Model
- COBie database

COBie Data Formats: The USAF's Facility Management system is transitioning under the NextGen IT initiative to TRIRIGA and BUILDER. TRIRIGA is able to import COBie standard Omniclass formatted data via XML spreadsheets while BUILDER utilizes data formatted in Uniformat II. Facility asset data that will be maintained in BUILDER must first be uploaded into the BUILDER Remote Entry Database (BRED). Refer to the BRED Data Dictionary for data format requirements.

Team Competencies Required:

- Pre-design knowledge of which assets are worth tracking, whether the building is dynamic vs. static, and the end needs of the building to satisfy the end user
- Knowledge of the asset management system

Selected Resources:

- NIST (2007) General Buildings Information Handover Guide: Principles, Methodology, and Case Studies
- BUILDER Remote Entry Database (BRED) Data Dictionary

SECTION D: ORGANIZATIONAL ROLES / STAFFING

For each BIM Use required and Contractor selected, identify the team within the organization (or organizations) who will staff and perform that Use. Staff members may fill multiple project roles.

DESIGN PHASE BIM USE	ORGANIZATION	LOCATION(S)	LEAD CONTACT
DESIGN AUTHORING	Contractor A		
PROGRESS REVIEWS	B		
DESIGN 3D COORDINATION	C		
3D CONTROL & PLANNING (GEOLOCATING THE PROJECT)	D		
COST ESTIMATION (5D)	E		
COBIE	F		

CONSTRUCTION PHASE BIM USE	ORGANIZATION	LOCATION(S)	LEAD CONTACT
CONSTRUCTION 3D COORDINATION	G		
3D CONTROL & PLANNING	H		
RECORD MODELING	I		
COBIE	J		

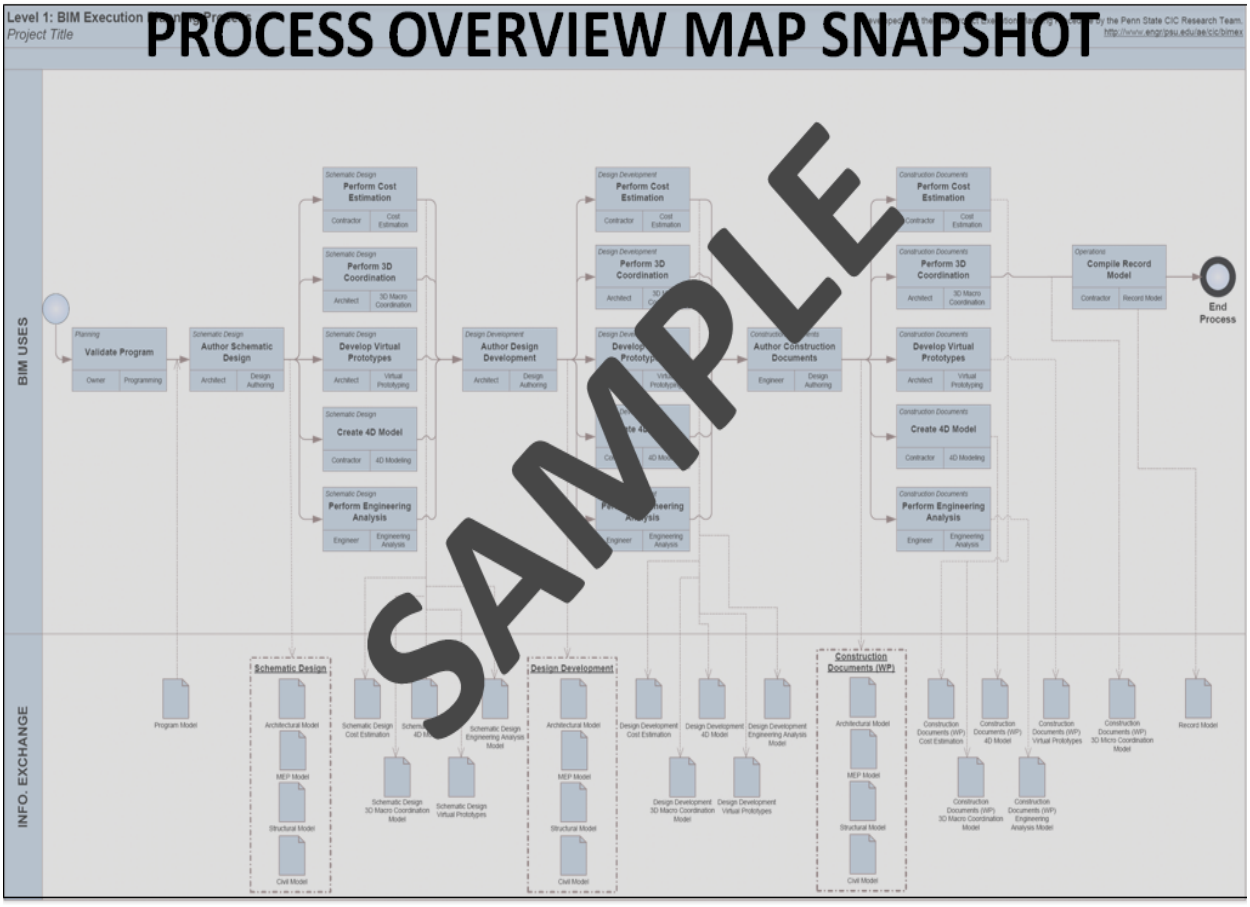
List enhancements from minimum BIM Uses as selected in Section C.2. **Note: Enhancements must exceed minimum Contract requirements BIM Uses.** (i.e. performing structural analyses on specific areas versus whole facility, performing cost / quantity take-off on specific floors versus whole facility, etc,) All documents and files related to the BIM uses shall be provided to the government as a submittal.

SELECTED BIM USE ENHANCEMENT	DESCRIPTION / ADDED VALUE

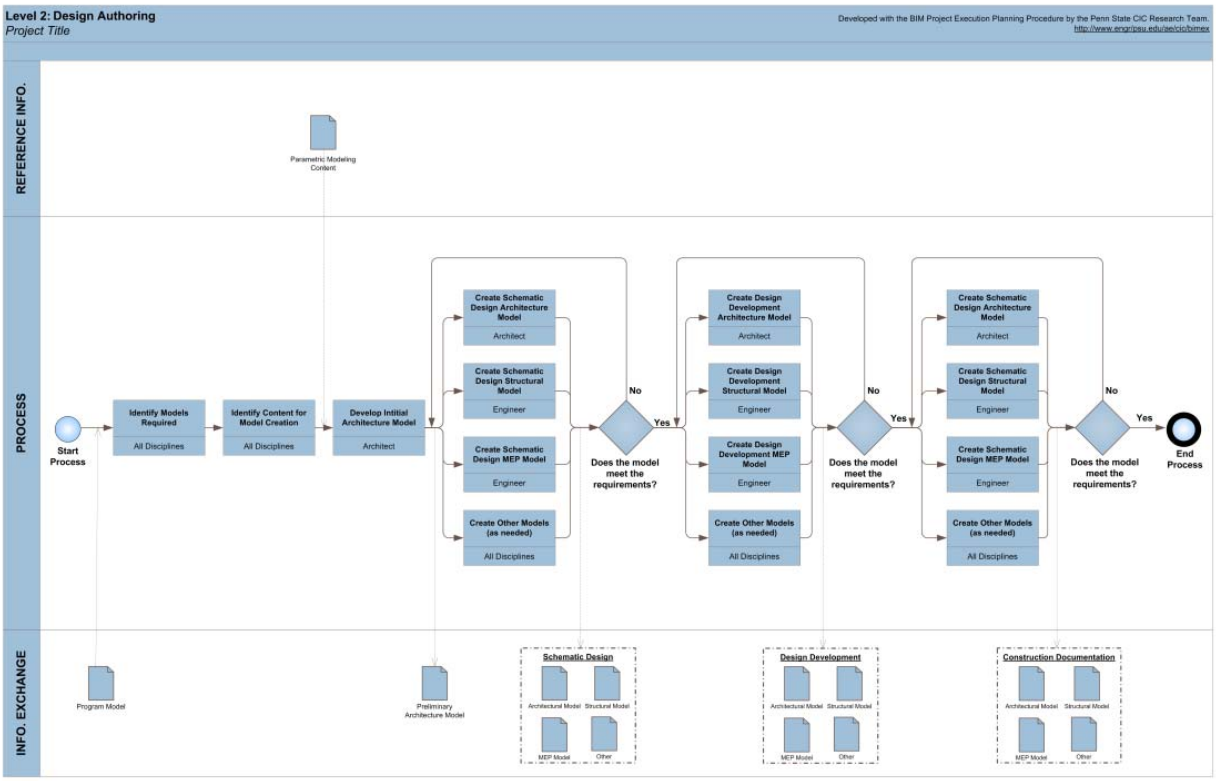
SECTION E: BIM PROCESS DESIGN

Provide an Overview Process Map for all BIM Uses (Level 1). Provide Detailed Process Maps for each REQUIRED (marked with X) and Contractor-Elected (marked with C) BIM Use in Section D (Level 2). Sample Process Maps may be downloaded from www.nationalbimstandard.org for your use. (Please note that these are sample maps and should be modified based on project specific information and requirements and contractor internal procedures and processes). Please reference the BIM Project Execution Planning Guide found at www.nationalbimstandard.org.

LEVEL ONE PROCESS OVERVIEW MAP: ATTACHMENT 1



LEVEL TWO DETAILED PROCESS MAP: ATTACHMENT 2



SECTION F: BIM INFORMATION EXCHANGE WORKSHEET

Model elements by discipline, level of detail, and any specific attributes important to the project are documented using information exchange worksheet. Reference Chapter Four: Defining the Requirements for Information Exchanges in the BIM Project Execution Planning Guide for details on completing this template. Submittal of these worksheets to the AGENT IS CURRENTLY NOT REQUIRED, however, it is suggested that the Contractor review and apply these worksheets with their Project Team.

1. LIST OF INFORMATION EXCHANGE WORKSHEET(S): ATTACHMENT 3

(The following are examples. **Modify for specific project**. Some Information Exchanges may need to be removed, while some information exchanges may need to be added.)

- Existing Conditions Modeling
- Programming
- Site Analysis
- Cost Estimation
- 4D Modeling
- Design / Progress Reviews
- Design Authoring
- Energy Analysis
- Structural Analysis
- Lighting Analysis
- 3D Coordination
- Site Utilization Planning
- 3D Control and Planning
- Record Modeling
- Maintenance Scheduling
- Building System Analysis
- Construction Operations Building Information Exchange (COBie)
- **[Delete unused and add additional information exchange worksheets from list]**

SECTION G: MINIMUM MODELING AND DATA REQUIREMENTS

1. MINIMUM MODELING MATRIX (M3): ATTACHMENT 4

Provide an M3 with Column 'F' filled to reflect the actual scope of work for the facility and site. Use the Minimum Modeling Matrix (M3) Template located at https://cadbim.usace.army.mil and submit as part of the PxP in Section M, Attachment 4.

Column 'F' of the M3 shall represent the actual scope of work and should not be filled out according to Contractor preference. The Contractor shall identify items in Column 'F' which are NOT included in the project scope for the facility and site.

2. ELECTIVE MODELING ENHANCEMENTS

List enhancements from minimum modeling requirements as specified in Contract. **Note: Enhancements must exceed minimum Contract requirements of the M3.** (i.e. using newer release of AEC CAD Standard or IFC Version, modeling all plumbing/HVAC system and not only 1.5" and above,)

ENHANCEMENT	JUSTIFICATION

SECTION H: COLLABORATION PROCEDURES

1. COLLABORATION STRATEGY:

Describe how the project team will collaborate in development and execution of modeling for the project. Include items such as electronic communication requirements and procedures, document management, transfer, and updating, and record storage, etc.

2. COLLABORATION ACTIVITIES:

The following activities are required. Add any additional meeting activities as determined by the Project Team.

ACTIVITY TYPE	REQUIRED PER CONTRACT	PROJECT STAGE	FREQUENCY	PARTICIPANTS	LOCATION
BIM REQUIREMENTS KICK-OFF	YES	D-B DESIGN KICK-OFF	ONCE	w/ USACE DISTRICT BIM MANAGER AND END USER REPRESENTATIVE	WEB MEETING OR AGREED LOCATION
BIM EXECUTION PLAN DEMONSTRATION	YES	D-B DESIGN KICK-OFF	ONCE	w/ USACE DISTRICT BIM MANAGER AND END USER REPRESENTATIVE	WEB MEETING OR AGREED LOCATION
DESIGN COORDINATION	YES	D-B DESIGN	WEEKLY	A-E	WEB MEETING OR AGREED LOCATION
OVER-THE-SHOULDER PROGRESS REVIEWS	YES	D-B DESIGN	MONTHLY	w/ AGENT	WEB MEETING OR AGREED LOCATION
DESIGN REVIEW CONFERENCE	YES	D-B DESIGN	EACH REVIEW CONFERENCE	w/ AGENT AND END USER REPRESENTATIVE	ON SITE
ANY OTHER BIM ACTIVITY THAT OCCURS WITH MULTIPLE PARTIES					

SECTION I: QUALITY CONTROL

1. OVERALL STRATEGY FOR QUALITY CONTROL

Describe the strategy to control the quality of the model.

2. QUALITY CONTROL CHECKS

The following checks shall be performed to assure quality.

CHECKS	DEFINITION	RESPONSIBLE PARTY	SOFTWARE PROGRAM(S)	FREQUENCY
VISUAL CHECK	Ensure there are no unintended model components and the design intent has been followed	Name here	Software here	AT EVERY SUBMITTAL
INTERFERENCE CHECK	Detect problems in the model where two building components are clashing including soft and hard	Name here	Software here	AT EVERY SUBMITTAL
STANDARDS CHECK	Ensure that the BIM and AEC CADD Standard have been followed (fonts, dimensions, line styles, levels/layers, etc)	Name here	Software here	AT EVERY SUBMITTAL
MODEL INTEGRITY CHECKS	Describe the QC validation process used to ensure that the Project Facility Data set has no undefined, incorrectly defined or duplicated elements and the reporting process on non-compliant elements and corrective action plans	Name here	Software here	AT EVERY SUBMITTAL
VERSION UPDATING CHECK	Ensuring that all users are using the agreed upon version of the software and the method by which changing software version is completed	Name here	Software here	AT EVERY SUBMITTAL
REVISION AUTHORITY CHECK	Describe the method by which all users will be given access and extent of revision authority to versions of the model as updated.	Name here	Software here	AT EVERY SUBMITTAL

SECTION J: TECHNOLOGICAL INFRASTRUCTURE NEEDS

1. SOFTWARE:

All submitted BIM Models and associated Facility Data shall be fully compatible with Autodesk Revit file format and the Autodesk Revit BIM Template for U.S. Air Force Projects. List software used to deliver BIM. Remove BIM Use and software that is not applicable. Describe procedure for changing the software version during project execution.

BIM USE	USER	SOFTWARE	VERSION
DESIGN AUTHORING	ARCHITECTURAL	XYZ DESIGN APPLICATION	
DESIGN AUTHORING	STRUCTURAL	XYZ DESIGN APPLICATION	
DESIGN AUTHORING	MECHANICAL	XYZ DESIGN APPLICATION	
DESIGN AUTHORING	ELECTRICAL/TELECOM	XYZ DESIGN APPLICATION	
DESIGN AUTHORING	PLUMBING	XYZ DESIGN APPLICATION	
DESIGN AUTHORING	FIRE PROTECTION	XYZ DESIGN APPLICATION	
DESIGN AUTHORING	CIVIL	XYZ DESIGN APPLICATION	
DESIGN AUTHORING	ANTI-TERRORISM FORCE PROTECTION	XYZ DESIGN APPLICATION	
DESIGN AUTHORING	INTERIOR	XYZ DESIGN APPLICATION	
SCHEDULING (4D)		SCHEDULING (4D) MODELING SOFTWARE	
COST ESTIMATION (5D)		COST ESTIMATION (5D) SOFTWARE	
EXISTING CONDITIONS MODELING		EXISTING CONDITIONS MODELING SOFTWARE	
SITE UTILIZATION PLANNING		SITE UTILIZATION PLANNING SOFTWARE	
CONSTRUCTION SYSTEM DESIGN		CONSTRUCTION SYSTEM DESIGN SOFTWARE	
DIGITAL FABRICATION		DIGITAL FABRICATION SOFTWARE	
3D CONTROL AND PLANNING		3D CONTROL AND PLANNING SOFTWARE	
3D COORDINATION		3D COORDINATION SOFTWARE	
DESIGN REVIEWS		DESIGN REVIEWS SOFTWARE	
STRUCTURAL ANALYSIS		STRUCTURAL ANALYSIS SOFTWARE	
LIGHTING ANALYSIS		LIGHTING ANALYSIS SOFTWARE	
ENERGY ANALYSIS		ENERGY ANALYSIS SOFTWARE	
SUSTAINABILITY EVALUATION		SUSTAINABILITY EVALUATION SOFTWARE	
CODE VALIDATION		CODE VALIDATION	
PROGRAMMING		PROGRAMMING	
SITE ANALYSIS		SITE ANALYSIS	
COBIE			

2. BIM AND CAD STANDARDS:

Identify items such as the BIM and CAD graphical, naming, and protocol standards, BIM Workspace version, and the version of IFC, etc.

The submitted BIM Model – The BIM shall be in a native file format with linked performance based specifications (via e-SPECS for Revit with SpecsIntact integration), interactive for the user, and the model shall be provided in the AF standard platform (Autodesk Revit) and interoperable file format like the Industry Foundation Class (IFC).

IFC Coordination View – The Contractor's selected BIM application(s) and software(s) must be certified in the IFC Coordination View (2x3 or newer. See www.iai-tech.org). Submit any deviations from or additions to the IFC property sets for any new spaces, systems, and equipment for Government approval.

Autodesk Revit BIM Template for US Air Force projects Version 2010 http://www.wbdg.org/references/afbim_tools.php

STANDARD	VERSION
BIM Workspace:	Insert BIM software and version here
CAD Standard:	AEC CAD Standard 5.0
Industry Foundation Class:	IFC2x3
COBie:	COBie 2.24

SECTION K: MODEL ORGANIZATION

1. **FILE NAMING STANDARD:**
   List examples of file names by discipline
2. **MODEL STRUCTURE:**
   Describe and diagram how the Model is divided up. For example, by building, by floors, by zone, by areas, and/or discipline
3. **MEASUREMENT AND COORDINATE SYSTEMS:**
   Describe the measurement system (Imperial or Metric) and coordinate system (geo-reference) used

SECTION L: PROJECT DELIVERABLES

In this section, list the BIM deliverables for the project and the format in which the information will be delivered.

During the Submittal stages, the Contractor shall deliver the construction schedule with information derived from the Model. Periodic quality control meetings or construction progress review meetings shall include quality control reviews on the implementation and use of the Model for project scheduling.

BIM SUBMITTAL ITEM	STAGE	FORMAT	NOTES
The Model, Facility/Site Data, Workspace in the native format and DWF format	ALL		
CAD files in the native format and DWF format	ALL		
COBie data extract in Excel format			
Interactive Review Format (Bentley Navigator, Autodesk Navisworks, Adobe 3D PDF 7.0 (or later), Google Earth KMZ, etc)	ALL		
Revit Compare Tool report	CONSTRUCTION		
QA/QC reports – Model Standards Check Report	ALL		
QA/QC reports – CAD Standards Check Report	ALL		
QA/QC reports – Model Integrity Validation	ALL		
QA/QC reports - Visual Check Report	ALL		
QA/QC reports - Interference Management Checks	ALL		
IFC Coordination View	ALL		
QA/QC reports - Other Design QA/QC Reports	ALL		
List of all submitted files (Excel spreadsheet preferred)	ALL		
Other BIM Deliverables	ALL		

SECTION M: ATTACHMENTS

Contractor/A-E shall complete and attached the required documents listed below to this Section of the PxP.

1. **LEVEL ONE PROCESS OVERVIEW MAP** FROM SECTION E
2. **LEVEL TWO DETAILED BIM USE PROCESS MAP(S)** FROM SECTION E
3. **INFORMATION EXCHANGE REQUIREMENT WORKSHEET(S)** FROM SECTION F
4. **MINIMUM MODELING MATRIX (M3) AND DATA REQUIREMENTS** FROM SECTION G
5. **FILE NAMING STANDARD** FROM SECTION L
6. **OTHER** AS APPLICABLE

SECTION N: REFERENCES

1. **LEVEL 1 PROCESS OVERVIEW MAP:** http://www.bim.psu.edu/Project/resources/default.aspx
2. **LEVEL 2 DETAILED BIM USE PROCESS MAP(S):** http://www.bim.psu.edu/Project/resources/default.aspx
3. **USACE A/E/C CADD Standard:** https://cadbim.usace.army.mil/default.aspx?p=a&t=1&i=7
4. **USACE REVIT Template Guides:** https://cadbim.usace.army.mil/default.aspx?p=a&t=1&i=12
5. **Autodesk Revit BIM Template for US Air Force projects Version 2010:** http://www.wbdg.org/references/afbim_tools.php
6. **USACE Construction Operations Building Information Exchange (COBie):** http://www.wbdg.org/pdfs/erdc_cerl_tr0730.pdf
7. **BIM Project Execution Planning Guide:** http://www.bim.psu.edu/Project/resources/default.aspx
8. **BUILDER Remote Entry Database (BRED) Data Dictionary:** http://sms.cecer.army.mil/Support/SiteAssets/BUILDER%20Downloads/Forms/AllItems/BRED%20Data%20Dictionary%203.1%20v3.1.pdf

ATTACHMENT 18

GUIDING PRINCIPLES ASSESSMENT HANDBOOK

Guiding Principles Assessment Handbook

FOR USE WITH THE FEDERAL HIGH PERFORMANCE AND SUSTAINABLE BUILDINGS POLICIES

Contents

Guiding Principles Assessment Handbook 1
Overview 1
Federal Agencies 2
Department of Defense 2
Eligibility 3
Register 4
Apply 5
Review 6
Compliance 7

OVERVIEW

From the EPA to NASA, federal agencies work to abide by the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings https://www.wbdg.org/references/fhpsb.php, a set of policies set by Executive Order 13423 and 13514[1] for building, renovating, and operating optimal, efficient buildings – as replaced by the Executive Order 13693: Planning for Federal Sustainability in the next Decade[2].

The Department of Defense (DoD) has incorporated the Guiding Principles requirements into their Unified Facilities Criteria High Performance and Sustainable Building Requirements (UFC 1-200-02[3]) The DoD initiated the Unified Facilities Criteria (UFC) program to unify all technical criteria and standards pertaining to planning, design, construction, and operation and maintenance of real property facilities.

The Green Business Certification Inc. (GBCI) has been working with these federal agencies to offer assessments of each agency's work to meet the Guiding Principles. GBCI can help you evaluate your

[1] Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding https://www.wbdg.org/pdfs/mouhighperfsustainfedfacs.pdf
[2] Federal Leadership on Climate Change and Environmental Sustainability - EXECUTIVE ORDER 13693 https://www.whitehouse.gov/administration/eop/ceq/sustainability
[3] UFC 1-200-02 with Change 3 http://www.wbdg.org/ccb/DOD/UFC/ufc_1_200_02.pdf

success, streamline reporting, and guide your efforts toward complying with the principles, using its deep knowledge of green building practices and certification.

This handbook coupled with the relevant Technical Guide will take you through the steps to show your projects' compliance with the following:

Federal Agencies

- The High Performance and Sustainable Buildings Guidance published December 2008[4] (2008 Guiding Principles) specifically for the Guiding Principles for Sustainable New Construction and Major Renovations.[5]
  - GP Assessment Technical Guide: New Construction & Major Renovations (Dec 2008)
- The Guiding Principles for Sustainable Federal Buildings published February 2016 (2016 Guiding Principles). Instructions published include, Guiding Principles for Sustainable Federal Buildings and Associated Instructions[6] and Determining Compliance with the Guiding Principles for Sustainable Federal Buildings.[7]
  - GP Assessment Technical Guide: New Construction or Modernization (Feb 2016)
  - GP Assessment Technical Guide: Existing Buildings (Feb 2016)

Department of Defense

- UFC 1-200-02 High Performance and Sustainable Building Requirements[8].
  - GP Assessment Technical Guide - Department of Defense: New Construction & Major Renovation
  - GP Assessment Technical Guide, Department of Defense: Existing Buildings

For simplicity the Guiding Principles and the UFC criteria will be referenced as the "Requirements" of the High Performance & Sustainable Buildings Guiding Principles.

[4] High Performance and Sustainable Buildings Guidance Final (12/1/08) http://www.wbdg.org/pdfs/hpsb_guidance.pdf
[5] Guiding Principles for Sustainable New Construction and Major Renovations https://www.wbdg.org/references/fhpsb_new.php
[6] Guiding Principles for Sustainable Federal Buildings and Associated Instructions https://www.whitehouse.gov/sites/default/files/docs/guiding_principles_for_sustainable_federal_buildings_and_associated_instructions_february_2016.pdf
[7] Determining Compliance with the Guiding Principles for Sustainable Federal Buildings https://www.whitehouse.gov/sites/default/files/docs/determining_compliance_with_the_guiding_principles_for_sustainable_federal_buildings_february_2016.pdf
[8] UFC 1-200-02 http://www.wbdg.org/ccb/DOD/UFC/ufc_1_200_02.pdf

ELIGIBILITY

Before beginning, make sure that your project meets all of the requirements, the minimum characteristics that make a project appropriate for pursuing the assessment. To clarify the correct offering for your project please contact us at GuidingPrinciplesAssessment@gbci.org.

As specified in Guiding Principles for Sustainable Federal Buildings and Associated Instructions, by the Council on Environmental Quality for Federal Agencies, a new building or modernization where project design was complete before February 2016 is eligible for assessment against the 2008 Guiding Principles for New Construction or Major Renovation. If your project design will be complete after this date your project should follow the 2016 Guiding Principles for New Construction or Modernization. All Existing Building assessment work will be done under the 2016 Guiding Principles.[5]

For Department of Defense, the UFC 1-200-01 DoD Building Code (General Building Requirements)[9] document provides clarification for projects eligible for assessment against the current version of the UFC 1-200-02 High Performance and Sustainable Building Requirements.

In order to be eligible to participate in the project building or space, all other real property within the project boundary, and all project work must comply with applicable federal, state, and local building-related environmental laws and regulations in place where the project is located. This condition must be satisfied from the date of project registration or the commencement of schematic design, whichever comes first, up and until the date that the building receives a certificate of occupancy or similar official indication that it is fit and ready for use.[10]

All projects must be designed for, constructed on, and operated on a permanent location on already existing land. Projects shall not consist of mobile structures, equipment, or vehicles. No building or space that is designed to move at any point in its lifetime is eligible. Projects must include the new, ground-up design and construction, or major renovation, of at least one federal building in its entirety; or at least one existing federal building in its entirety.

If questions arise as it relates to interpretation of the eligibility of the project GBCI will work with the agency and the agency will determine if any waivers are applicable.

Project Boundary

The project boundary must include all contiguous land that is associated with the project and supports its typical operations. This includes land altered as a result of construction and features used primarily by the project's occupants, such as hardscape (parking and sidewalks), septic or stormwater treatment equipment, and landscaping. The boundary may not unreasonably exclude portions of the building, space, or site to give the project an advantage in complying with requirements. The project must accurately communicate the scope of the project being assessed in all promotional and descriptive materials and distinguish it from any non-assessed space.

[9] UFC 1-200-01 DoD Building Code (General Building Requirements)http://www.wbdg.org/ccb/DOD/UFC/ufc_1_200_01.pdf

[10] A lapse in a project's compliance with a building-related environmental law or regulation that results from an unforeseen and unavoidable circumstance shall not necessarily result in non-compliance with this requirement. Such lapses shall be excused so long as they are remediated as soon as feasibly possible.

REGISTER

STEP 1:

Tell us about your project and complete the Interest Form

Teams begin the process by completing the Interest Form with information relevant to the building project. In order to optimize an integrated design process, which is a core part of the meet the Requirements, we encourage you to start the process as early as possible – ideally, during or prior to the design phase. Filling out the Interest Form is the first step in getting your project registered. After receipt of the Interest Form submittal, GBCI will make contact to support registration.

Project Team Roles

At this stage, you'll also assemble your project team, which includes at a minimum the owner (or owner's agent) and the project administrator.

The owner is the person (or entity) who holds and controls the real and personal property associated with the project and accepts the Assessment Agreement. If desired, the owner can grant authority to an agent to act on his or her behalf. The project administrator acts as a project manager, overseeing the project as well as which team members are responsible for certain tasks and measures.

Fees

Registration, review and other project fees are the same as LEED certification. Details available for review here: usgbc.org/cert-guide/fees. For projects pursuing both LEED certification and Guiding Principles Assessment, only one fee will be levied.

Once a project is registered, payment received and agreement signed, the team will have access to various tools including a dedicated contact from GBCI who will reach out to set up a conference call. The GBCI contact will be available throughout the process to provide clarification and answer questions.

APPLY

STEP 2:

Demonstrate Compliance and Document Your Project

The Project Information Form provides a framework for projects to indicate their compliance path for each Requirement. The form, coupled with the relevant Participant Handbook, provide necessary guidance for requirements and documentation needed for review. Teams also submitting their project for LEED certification can use the streamlined LEED credit compliance pathways by checking the boxes on the Project Information Form.

Each Requirement has multiple compliance paths available. There is a compliance path that supports the streamlined LEED submittal option, if available. There is a compliance path that offers detailed Step-by-Step guidance on how to meet the requirements, this path is available to project teams that are not leveraging a LEED submittal option. Additionally a compliance path is available to indicate that a Requirement is not applicable for the project. If this compliance pathway is selected GBCI will work with the project's agency to approve.

Outcome of assessment will indicate if project is either Compliant or Not Compliant. Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings require that each Requirement is assessed and determined to either meet or not meet the guidelines set for in the Executive Orders.

STEP 3:

Submit your Application to GBCI

Prior to submitting, confirm that your registration and review fees have been paid. When your application is ready to be submitted, contact GBCI and you will be granted access to a folder specific to your project in the file sharing platform where your application will be saved and submitted.

Upload general documents, such as project drawings, plans, and narratives (that may be referenced in multiple credits) to the "General Submittals" folder. Upload other required documentation within the appropriate folders for each Requirement. Ensure that each file is clearly labeled. It is helpful to include a short narrative describing the approach the project took for each Principle.

Contact GBCI when your application is complete and ready for review and indicate whether you would like a Standard review or a Split review. The Standard review path is for buildings whose construction is complete; the entire application will be submitted at once. Such projects undergo a Preliminary Review and a Final Review. The Split review path is for buildings that have been designed and may have started construction, but are not yet fully constructed, and will include both a Design Review phase and a Construction Review phase, each with its own Preliminary and Final Reviews.

For many federal agencies data security is an issue; if you need a secure submittal please work with GBCI. Additional fees apply.

REVIEW

STEP 4:

Participate In the Review of Your Application

After the review fee has been paid, GBCI will conduct the review. Note that if the submittal is concurrent with a LEED review, any issues hindering the LEED review would also affect this review's timeline and vice versa.

Preliminary Review

GBCI conducts a technical review of the project application. Throughout this and subsequent reviews GBCI may request clarifications during the review.

GBCI will email the project administrator the preliminary review report within 25 business days of receiving the assessment fee. The report will indicate those aspects of the Guiding Principles that are "Awarded", as well as those for which GBCI requires additional information to make a determination. Technical guidance for those not awarded will be provided. The preliminary review may be accepted as final if the results are satisfactory.

Amend Application and Resubmit

After the Preliminary Review, you may amend the project application with additional information and clarifications. GBCI recommends that the amended application is submitted within 25 business days of receiving the preliminary review report.

Once all application materials are finalized and uploaded to the project folder, contact GBCI and indicate that the application is ready for review.

Final Review

GBCI will review the updated application and respond to the project administrator with a final review report within 25 business days of receiving the amended application. The final review report will indicate those aspects of the Guiding Principles that are "Awarded" and provide technical guidance for those that were attempted but not awarded. The review results may be accepted or the application may be revised and an appeal maybe be submitted.

If the application is undergoing a Split review, you would then resubmit for the Construction Review phase (Preliminary and Final as outlined above) when ready.

Appeal Review (optional, additional fees apply)

You may amend you application with additional information and clarifications and re-submit it to GBCI as an appeal. Appeals are specific to each aspect of each Principle and multiple appeals may be submitted concurrently; a separate fee is required for each appeal.

Once all application updates are complete, you may request an appeal by contacting GBCI. The appeal request must indicate specifically which aspect of which Principle you would like to appeal. You will be emailed an invoice for the appeal shortly after the request.

Once submitted, GBCI will review the amended sections of the application and provide a review report within 25 business days of receiving payment. The appeal results may be accepted or an additional appeal may be filed. There is no limit to the number of appeals a project team can pursue. After the appeal review is completed, email GBCI to accept the results.

COMPLIANCE

STEP 5: Finalized Assessment

Once the assessment is complete and the review is accepted, compliant projects will receive an official GBCI certificate, which can be used to demonstrate compliance and promote this achievement.

STEP 6: Celebrate and Communicate

Your work toward demonstrating compliance with the High Performance & Sustainable Buildings, Guiding Principles is something to be celebrated and communicated. The USGBC.org and/or GBIG.org public project directories provide the opportunity to share your success, educate and motivate. Simply sharing limited information regarding the address, size of the project, and the identity of the agency that occupies the space. The public directory will not disclose the underlying information from the High Performance & Sustainable Buildings, Guiding Principles review application. Here's a full list of the project data that may be listed in the project directory:

Project directory information

- Project name
- Project ID
- Physical address
- Date of registration
- Date of determination
- Compliant, In Progress or Not Compliant
- GP system and version
- Owner type
- Owner name
- Owner organization
- Gross square footage
- Total property area
- Project type

All "public" projects also benefit from publicity opportunities: we may utilize your project data to create case studies highlighting your project's features, reference your project on our website or to the media, or create other derivative works.

Information that may be used for articles, project profiles, other features:

- Service providers
- Project team members
- Promotional or other project photographs
- Project strategies for certification
- Quotations from team members

You are free to opt-out of the project directory and publicity opportunities as a "private project" at the time of registration: specific instructions on how to do so are available in LEED Online. All private projects that earn certification will be prompted once more to transition to public status (we can't help ourselves, we love sharing good news!). You will need to re-confirm your "private" status at that time, if you wish to retain it.

ATTACHMENT 19

HAFB CL&P ELECTRIC SERVICE CONNECTION STANDARDS MANUAL

CITY LIGHT & POWER

ELECTRIC

SERVICE CONNECTION

STANDARDS MANUAL

FOR

HILL AIR FORCE BASE, UT

2016 Edition R0

CLP Site Points of Contact

Hill Air Force Base (HAFB)
Rich Houghton, Installation Manager
7814 North Drive
Hill AFB, UT 84056
Coordinates: 41.158686, -112.010875
Office: (801) 660-2255
Mobile: (385) 239-0181

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Revision Table

Date	Section	Title	Revision Description
12/1/2016		Rev 0 – Initial Issue	

Section 1.0 THREE STAGES OF CLP'S SERVICE CONNECTION PROCESS

The electrical distribution utility systems at Hill AFB and the Utah Test and Training Range were sold to City Light & Power ("utility system owner") as part of the USAF Utilities Privatization (UP) effort. Therefore, the utility system owner is the sole provider of these utility services to the installation and should be viewed just like any other local utility. This manual contains guidance and tips for transparent and successful interactions with the system owner.

City Light & Power is proud to be part of the Hill AFB engineering team. We strive to help deliver successful construction projects. We established procedures to facilitate that project delivery.

Newly installed system infrastructure and modifications of or connections to existing system infrastructure identified in the specifications and drawings must be coordinated with the utility owner prior to the contract start date. The utility owner must be integrated into the design, inspection of construction, tie-in to existing utilities and conveyance of any exterior utilities. The preferred process for connecting facilities is to request that the utility owner install the required connecting facilities up to a point of demarcation to be identified by the Government, as a connection charge. Any fees associated with connecting contractor-constructed infrastructure to the utility owner's system must be negotiated with the utility owner. All work on the system or facilities expected to connect to the system shall comply with the utility owner's specifications and construction standards. In no event shall a contractor cap, connect to, or otherwise touch the utility owner's infrastructure without the utility owner's express written permission.

The utility owner can be contacted at:

City Light & Power, Inc.
7814 North Drive (Bldg 2726)
Hill AFB, UT 84056
rhh@clpinc.com
(801) 660-2255 (Office)
(385) 239-0181 (Mobile)

In order to install a service connection efficiently, CLP recommends organizing the project into three distinct phases:

I. Initiation–Getting started.
II. Design–Preparing a detailed work plan.
III. Construction–CLP facility installation and site restoration.

Each phase of the process includes requirements that will enable the project to advance to the next step. As with any construction project, informing CLP promptly of any changes to the requirement will allow our representatives to keep our customers informed if there are related scope changes.

1.1 INITIATION

1.1.1 INITIATING A SERVICE CONNECTION

The service connection request begins with a **completed** service application. (See Appendix A) In order for CLP to meet the service date, submit the service application as early as possible in your planning process. Allow up to 21 days for CLP to review and respond to a service application.

Copies of the Service Application form are available at the CLP office.

Definition: Point of Demarcation (POD) is a point on the utility system where ownership changes from the utility SO to the facility owner. It is the physical point where CLP responsibility to maintain ends and the service of the customer begins – this is usually where the secondary cable is physically terminated.

For pre-planning purposes, CLP is typically responsible for all transmission and distribution lines on base. CLP owns the electrical distribution infrastructure, including poles, switches and transformers. PODs are normally located at the secondary terminals on service transformers.

Note: Special point of demarcation rules apply to unique areas of the base. Please, consult with the CLP point of contact at each location to identify proper points of demarcation.

Submit Site/Building drawings along with the service application. The Site/Building drawings shall include, at a minimum, the following information:

- A site plan showing water, sewer, storm drain, building line and preferred transformer location. Include driveways and street names.
- Quantity and Size(s) of transformer(s) requested.
- Planned load (maximum load) requirement of the new installation.
- Single-line drawing of the primary power (existing and new) within the project site.
- Secondary voltage requirement. Following is the list of typical secondary voltage available in CLP systems:
    - 1- Phase, 120/240V
    - 1- Phase, 240/480V, 3-wire
    - 3- Phase, 208Y/120V, 4-wire
    - 3- Phase, 480Y/277V, 4-wire

- Contact Information.

1.1.2 PLANNING THE SERVICE CONNECTION

The formal planning process will begin after receipt of a **completed** service application.

The information obtained in your service application provides CLP an accurate description of the project, including the anticipated electrical requirements.

Step 1: Scoping

- **Perform Utility Locate**—to avoid utility conflicts as soon as possible in the process.
- **Outline Scope of Work**—to ensure we understand the project and have all necessary information.
- **Verify Application Information**—which should include a complete set of plans (site and architectural), load information, billing information, and any existing CLP facilities which may require relocating.
- **Specify Transformer**—as marked on the site plan. Preferred locations will be considered.
- **Develop preliminary Schedule**—to ensure CLP can meet your requested service date as proposed.

Step 2: Evaluating

CLP will evaluate and determine if the existing electrical infrastructure is adequate to meet the request. CLP will then develop an engineering plan or preliminary routing sketch proposing the work plan to meet your request for service.

- A site visit may be required to discuss equipment details.

Step 3: Connection Cost Estimating

CLP will estimate the job costs, labor and materials required to complete the service connection. CLP will then determine the appropriate charges for the installation and contact the service connection request representative with a final job cost.

Step 4: Publishing Connection Fee

CLP will send an estimate and preliminary routing sketch to the customer project representative. The estimate will reflect the connection fee for the service request.

The preliminary routing sketch will reflect the agreed upon transformer and the proposed route for construction.

Step 5: Signing Agreement

After the submittal review process, return the signed estimate/Purchase Order and approved preliminary routing sketch along with the service connection fee. This step will need to be completed before CLP can move forward. *Please note that anytime CLP is required to deviate from CLP's standard practices and procedures, the service connection requestor will be responsible for all additional costs. For example: design revisions, multiple designs, job scope changes, etc.*

1.2 DESIGN

1.2.1 DESIGN STEPS

Step 1: Validating

After CLP receives the signed contract and payment, a CLP Representative will contact the requestor to confirm that the initial information is still accurate.

- **Transformer size**—if it has changed, make sure CLP has the correct transformer size (kVA).
- **Transformer locations**—let CLP know if the proposed transformer location has changed.
- **Detailed utility site plans**—confirm that CLP has the final project site plans with all the other on-site utility lines located: fuel, water, sewer, telephone, electric, geothermal systems, etc. **Please notify CLP immediately if any detail of the plan requirements change.**

Step 2: Performing Initial Design

If required, CLP will prepare a detailed electric installation design, including the specific plans needed for our construction crews to perform the work. CLP may attend customers design review meetings for Design/Build and Design/Review/Build projects.

Step 3: Coordinating Design Documents

If required, CLP will send a copy of the final CLP design drawing to the requestor.

Step 4: Delivering Final Design

Return the signed design drawing (if applicable) and any remaining payment due.

Partial payment may be required before construction work will be scheduled if transformers, switches or other hardware is to be installed.

Step 5

CLP will apply for necessary permits required for the installation of the new service connection as applicable. The time this takes varies, depending on the location and type of permit. Any changes subsequent to the execution of the contract, such as significant changes in connected load, voltage class, transformer location, or inadequate site conditions will delay our work and **may result in additional costs** for re-engineering, design, and/or construction and will have a negative impact on the planned service date.

1.3 CONSTRUCTION

All personnel working on the installation of CLP electrical service lines are trained and certified. If a CLP-approved contractor does the construction work, a CLP inspector will monitor quality control on the site.

1.3.1 CONSTRUCTION STEPS

Step 1: Scheduling

Once the site is ready, notify CLP to schedule construction of your project or to monitor quality control over the electric installation. Contact the local CLP Base Installation Manager or Representative. Please have the Job Number and job address ready.

Step 2: Prepping Site

CLP will complete a Dig Permit if required.

Step 3: Verifying Site Conditions

After all existing underground utilities are marked prior to CLP starting construction, **CLP may need to dig test holes** to verify the depth and location of underground lines to avoid damage during construction.

Step 4: Constructing and Installing

CLP will install the electrical lines. Expect heavy equipment to be working around your facility. Crews from CLP or CLP subcontractor crews will install the service connection.

Construction equipment may be left overnight. Holes and trenches may be open during construction for connections and safety testing. All trenches and holes will be clearly marked with safety cones and/or safety fencing.

1.3.2 SITE RESTORATION

CLP will restore your property and will minimize the disturbance of established lawns and pavement wherever practical. While CLP puts much effort not to disturb any existing paving, shrubbery, trees, plants, or lawn, it is not always possible.

Once construction is complete, CLP will restore the affected areas of your property as promptly as possible.

- If sidewalk or roadway sections have to be removed, temporary paving may be necessary. It may take several weeks before permanent paving is completed.
- During winter months, permanent paving may be postponed until the weather is warmer.

The time required for restoration will depend on weather conditions and the extent of the disturbed area.

For any questions please call the CLP Base Installation Manager or Representative (Page i).

Section 2.0 RESPONSIBILITIES FOR ELECTRIC SERVICE

CLP utilizes Design and Construction Standards based off of the latest Institute of Electrical and Electronics Engineers (IEEE), National Electrical Safety Code (NESC), and National Electrical Code (NEC) requirements. These standards and requirements are followed to decrease the likelihood of loss-of-life and/or equipment damage. CLP requires all contractors/subcontractors to adhere to these standards.

2.1 STANDARDS GOVERNING INSTALLATION

Follow industry recognized standards set forth by IEEE, NESC, and NEC for all electrical installations.

The NESC requires specific distances between utility facilities, such as overhead lines, and other structures. The distances vary based on the type of utility facilities and the type of structures being put up. It is the contractor/subcontractor's responsibility to determine the distance requirements. Failing to do so creates a dangerous situation that can also be costly to the responsible party to remedy later.

CLP has an open-door policy for any questions customers, contractors, or subcontractors may have. The ultimate goal for CLP is to install an electrical system safe for everyone and will continue to operate many decades from now.

2.2 ADDITIONS AND ALTERATIONS

CLP's electrical system has definitely capacity limitations and can be damaged by overloads. Therefore, it is everyone's responsibility to notify CLP before increasing the load requirements or making alterations to the service entrance equipment. CLP will provide the proper equipment on the electrical system to serve the increased capacity.

2.3 WORKING AROUND HIGH VOLTAGE OVERHEAD LINES

The approach distance and working around high voltage overhead lines the requirements to the activities of utility or non-utility construction personnel are governed by the Occupational Health and Safety Administration (OSHA), National Electrical Safety Code (NESC), federal, state, or local statutes or regulations. Call the CLP Base Installation Manager or Representative (Page i) if work needs to be performed that meets the above qualification.

If work must be performed on an overhead utility line, with prior notice and approval, CLP will initiate proper safety measures, which may include the following:

- Relocating the lines.
- Installing physical barriers to prevent any contact with the lines.
- De-energizing and grounding the lines.
- Other proactive safety steps as necessary.

- Compliance with safety requirements governed by the Occupational Health and Safety Administration (OSHA)

Minimum OSHA requirements are as follows:

For lines rated 50 kV or below, minimum clearance between the lines and any part of the crane or load shall be 10 feet for lines rated over 50kV; Minimum clearance between the lines and any part of the crane or load shall be 10 feet plus 0.4 inch for each 1 kV over 50 kV or twice the length of the line insulator but never less than 10 feet; In transit with no load and boom lowered, the equipment clearance shall be a minimum of 4 feet for voltages less than 50 kV, 10 feet for voltages over 50 kV up to and including 345 kV and 16 feet for voltages over 345 kV up to and including 750 kV in accordance with the CLP Safety Manual.

It is your responsibility to know and abide by all OSHA and local regulations when working in the vicinity of electrical lines.

2.4 COMMON STANDARDS FOR ELECTRICAL DISTRIBUTION WORK ON HILL AFB

2.4.1 PRIMARY VOLTAGE:

The Primary voltage at Hill AFB is 12,470 volts.

2.4.2 TRANSFORMERS:

All new transformers shall be 3-phase pad mounted, unless a single phase transformer is necessary. Primary voltage is 12470 volts delta. Primary case shall be grounded. Transformers shall have loop feed with elbow arrestors, dead front, bushing wells with inserts installed, 4 hole spades minimum, 4 position T-blade load break switch, bayonet fusing, top level oil temperature gages, liquid level & pressure vacuum gages, drain valve with sampler, copper or aluminum windings meeting current DOE specifications and two each 2-1/2% taps above and below normal. This will assure that the user voltage can be regulated within proper limits. Lightning arrestors will be installed on all unused high voltage well bushings. No Parking stands or Y splitters will be installed unless deemed necessary by City Light & Power. In accordance with the utility privatization contract, all high voltage transformers and switches will be inspected by City Light & Power before being connected to the Hill AFB electrical distribution system. Color of transformers shall be Greystone (AKA AF tan).

2.4.3 BURIED HIGH VOLTAGE CABLE:

All buried high voltage cable (over 600 volts) shall be placed in conduit with a minimum of 3-inches of concrete encasing around the conduit. Depth of burial shall be 36 inches below grade. All high voltage conductor installations will be 36 inches deep minimum to the top of the conduit and they will be encased in concrete to include airfield runway lighting circuits. A 6-inch wide, red plastic marker tape with the words "Danger-Buried High Voltage Cable" shall be placed directly over the high voltage line at a depth of 12 inches below finished grade or 6 inches below the top of sub grade whichever is deeper. Any change of direction that is more than 5 degrees will require the installation of a manhole unless coordinated and approved by City Light & Power. Maximum spacing between manholes or equipment shall not exceed 500 feet.

2.4.4 BURIED CONDUCTORS BELOW TRAFFIC:

All conduit containing conductors of any voltage including communication circuits that run under streets or parking lots shall be concrete encased 3 inches thick on all sides.

2.4.5 RISERS:

Rigid Galvanized Steel (RGS) conduit or fiberglass sweeps for high voltage shall be used when making the transition from underground to overhead high voltage power lines. Only one high voltage riser in rigid galvanized steel or Intermediate Metal Conduit per utility pole will be installed.

2.4.6 SUPPORT STRUCTURES:

All power poles, steel support structures and their foundations shall be rated for a 100 mph wind load. The minimum dimensions for crossarms will be 8-ft long by 3 ¼-inches wide by 4 ½-inches deep. Unless otherwise specified by City Light & Power.

2.4.7 CONDUCTORS:

All new high voltage cable shall be aluminum or copper 15 KV, 133 percent insulation, 220 mil, EPR with 1/3 concentric neutral.

Section 3.0 SERVICES NOT RELATED TO PERMANENT SERVICE CONNECTIONS

CLP will perform requested services that are not part of the Permanent Service Connections section. These services are covered here but are not limited to the below.

3.1 TEMPORARY ELECTRIC SERVICE

A temporary service connection can be provided that is either overhead or underground where facilities are available for a non-permanent period. That period will be defined by Base Representatives, Contractors, and CLP. Costs will be the responsibility of the requestor to install and remove the services. CLP is flexible and understands temporary services are project specific.

Please contact the CLP Base Installation Manager or Representative (Page i) for any further questions.

3.2 RELOCATION OF CLP LINES AND EQUIPMENT

Projects requiring underground or overhead electrical infrastructure to be relocated should follow Section 1 of this manual.

Please contact the CLP Base Installation Manager or Representative (Page i) for any further questions.

Section 4.0 ELECTRICAL SAFETY AND CODE CLEARANCES

4.1 GENERAL

It is the policy of CLP to operate the electric transmission and distribution system with the highest degree of care for the safety to the public and CLP employees. To ensure the care and safety needed for an electric distribution system, the National Electric Safety Code is used for design, construction, maintenance, and operation of the electric system by CLP as well as any applicable practices by the public and private industry. The applicable National Electric Safety Code in effect at the time will apply to new installations and extensions. Existing installations may be altered, replaced for maintenance, or additions made to comply with either the current edition or original requirements of the applicable National Electrical Safety Code in effect at the time of original installation as allowed in NESC Rule 013B.

- CLP reserves the right to temporarily disconnect service when a hazardous condition is discovered.

4.2 MINIMUM CLEARANCE FROM OVERHEAD LINES

- For the purpose of this section, the term “clearance” means the shortest distance between any two surfaces.

- Minimum clearance between any building or other structure and any overhead transmission line, overhead distribution facility, or electric utility pole will be maintained in accordance with the provisions of the National Electrical Safety Code.

- Minimum clearance between signs, chimneys, radio and television antennas, storage tanks and other structures, and any overhead transmission line, overhead distribution facility, or electric utility pole will be maintained in accordance with the provisions of the National Electrical Safety Code.

- Minimum clearance over streets, alleys, parking lots, rights-of-way, easements, etc., of overhead transmission & distribution facilities, will be maintained in accordance with provisions of the National Electrical Safety Code.

- Minimum clearance between over-height vehicles, including house moving, and any overhead transmission line, overhead distribution facility, or electric utility pole of CLP will be maintained in accordance with the provisions of the National Electrical Safety.

4.3 EQUIPMENT OPERATION AROUND ENERGIZED FACILITIES

4.3.1 REQUESTS FOR SYSTEM OUTAGES

CLP on a case-by-case basis may allow individual system elements to be removed from service in order to accommodate construction or maintenance activities. CLP complies with the outage planning policies of the Base

host installations, which include various forms and scheduling requirements. Under these circumstances, the outage must be planned well in advance, and every effort must be made to minimize the duration of the outage. If at all possible, the construction or maintenance activity shall be conducted in such a manner that the facility can be returned to service immediately in the event of a loss of another system element.

Outages lasting longer than one-week may require the construction of a temporary facility to minimize the required outage time. Outages on system elements that will leave a load serving facility vulnerable under a single additional contingency will require plans to mitigate the next contingency. These plans should restore the load serving capability of the system as soon as possible. All time and material necessary to develop the contingency plan will be paid for by the requesting party. In the event the contingency plan is executed, the requesting party will pay all time and materials associated with service restoration.

Electric transmission systems present a unique challenge in that outage and restoration times will typically require several weeks. On a case-by-case basis, planned outages for the modification of transmission systems may be granted. However, due to the extended nature of these outages, contingency plans for the restoration of load must be in place prior to the planned outage. In some cases, an outage may not be granted, and new facilities may need to be constructed before existing facilities may be abandoned.

4.3.2 OVERHEAD

When working near or operating equipment around overhead electrical lines, Federal OSHA standards require that unqualified persons maintain the electrical distances listed in Column B of Table 4.1 between energized lines/parts and themselves, their tools, their equipment, and all conductive materials. Contacting the line can result in severe injury or death. If work must be accomplished near an overhead electrical line, call the CLP Base Installation Manager (Page i) for assistance as needed to identify line-operating voltage, do not rely on proximity warning devices such as hook insulators or boom guards, because each has its limitations or otherwise avoid contact with these energized facilities. If distribution lines must be de-energized, the customer shall provide a written request to CLP and allow 10 business days for CLP to respond to the request. It is the responsibility of the contractor to apply safety grounds to safely perform work on the de-energized line. CLP does not ground for others to work on the system or assume responsibility for their workers. CLP will de-energize, test and issue a clearance. Requests to de-energize overhead lines should be submitted early in the requester's planning process and will be reviewed on a case by case basis by CLP and the respective Base Leadership. Transmission outages require a significant level of preplanning and could take weeks to coordinate.

4.3.3 TABLE 4.1: MINIMUM APPROACH DISTANCE TO ANY ENERGIZED OVERHEAD LINE OR PART BY UNQUALIFIED PERSONS (GENERAL PUBLIC, GENERAL INDUSTRY, CONSTRUCTION EQUIPMENT) ADAPTED TO CLP SYSTEM FROM OSHA 1910.333 AND 1926.1408

A: Voltage Phase to Phase (kV)	B: Minimum Clearance Distance (feet-inches)	C: Electrical Distance With Temporary Warning Devices Installed Phase to Ground (feet-inches)
up to 50	10' - 0"	10' - 0"
Over 50 to 200	15' - 0"	15' - 0"
Over 200 to 350	20' - 0"	20' - 0"
Over 350 to 500	25' - 0"	25' - 0"

4.3.4 UNDERGROUND

Grading, excavation, ground rod, stake or post installation work will not be started until an underground facilities location has been completed. Digging into or damaging underground power lines can result in severe injury or death to the operator and others, and can cause interruption of service to wide areas. Complete a Base Dig Permit before digging or excavating. Trained personnel from CLP will locate electrical facilities at no cost.

The National Electric Safety Code requires the protection and separation of underground electric supply lines from other structures, including other utilities. Below are typical clearances for parallel utilities, and crossings of utilities.

TABLE 4.3: TYPICAL PARALLEL UNDERGROUND UTILITIES

(All dimensions are in feet) Clearance to other utilities (telecommunication, fiber optics, etc.) or high voltage underground transmission cables shall be determined on a case by case basis by CLP Engineering.
** Note: Reduced clearances to these lines must be approved by CLP Engineering.*

CLP Utilities (Underground)	Potable Water	Non-Potable Water	Waste-water	Storm Sewer	Gas Main	Gas Mains 150 psig or higher	Electric Primary Up to 34.5kV	Electric Secondary (0-480V)
Electric Primary Up to 34.5kV	10*	10*	10*	10*	6	10*	X	3
Electric Secondary (0-480V)	3	3	3	3	3	10*	3	X

TABLE 4.4: TYPICAL CROSSINGS OF UNDERGROUND UTILITIES

(All dimensions are in feet) Clearance to other utilities (telecommunication, fiber optics, etc.) or high voltage underground transmission cables shall be determined on a case by case basis by CLP Engineering.
** Note: Reduced clearances to these lines must be approved by CLP Engineering.*
*** Note: 1' separation from electric primary to plastic pipe gas main and 5' separation from electric primary to metal gas main.*

CLP Utilities (Underground)	Potable Water	Non-Potable Water	Waste-water	Storm Sewer	Gas Main	Gas Mains 150 psig or higher	Electric Primary Up to 34.5kV	Electric Secondary (0-480V)
Electric Primary Up to 34.5kV	1	1	1	1	1/5**	5*	X	0
Electric Secondary (0-480V)	1	1	1	1	1	5*	0	X

APPENDIX A SERVICE CONNECTION FORM

Application Date: JO Number: (CLP Assigns):

1. This form is used to request CLP service, connection approval or a "Connection Charge Quote." For routine projects: After date of request for "Connection Charge Quote" or request for proposal from DLA Energy, **please allow 21 days** for CLP to provide a formal proposal.

2. PROJECT INFORMATION:

Date Permanent Service Required: _____ Date Temp Service Required: _____
Are you requesting a Connection Fee Quote?
Date Connection Quote Fee Required:

Project Name:
Project Address: _____ Project Building Number: _____

Description of Project (scope)**:**

_____

3. CONTACT INFORMATION

Person CLP will contact to set up site meeting and send communications regarding changes affecting the status of the job:

Name:
Company:

Phone: Fax:
Email: Cell Phone:

4. OWNER / TENANT INFORMATION:

Name:
Legal Name of Company:
Address:
Phone: Email:

5. LOAD INFORMATION:

Service Type: ☐ Overhead ☐ Underground

Transformer: Size (kVA): _____ Secondary Nominal Voltage (V): _____

Phase: ☐ 1 Phase ☐ 3 Phase

Secondary Connection Type: _____ Number of wires for secondary connection: _____

Connected Load:

Lighting: _____kW Other: _____kW Total: _____kW

Motors:

Largest motor size: _____ HP Code Letter (if known): _____ Amps: _____ Frequency of Start: _____

Is variable frequency drive used? Yes ☐ No ☐ Inrush Current (A): _____

Motor Application: _____

Will more than one motor start at a time? Yes ☐ No ☐

Demand:

Estimated peak demand: _____kW Future Peak Demand: _____kW

6. FUNDING PROVIDER:

Person responsible for Construction / Relocation / Removal Charges:
Legal Name of Company:
Address:

Phone: Fax:
Email: Cell Phone:
Person Responsible for Funding:
Title:

7. ADDITIONAL INFORMATION:

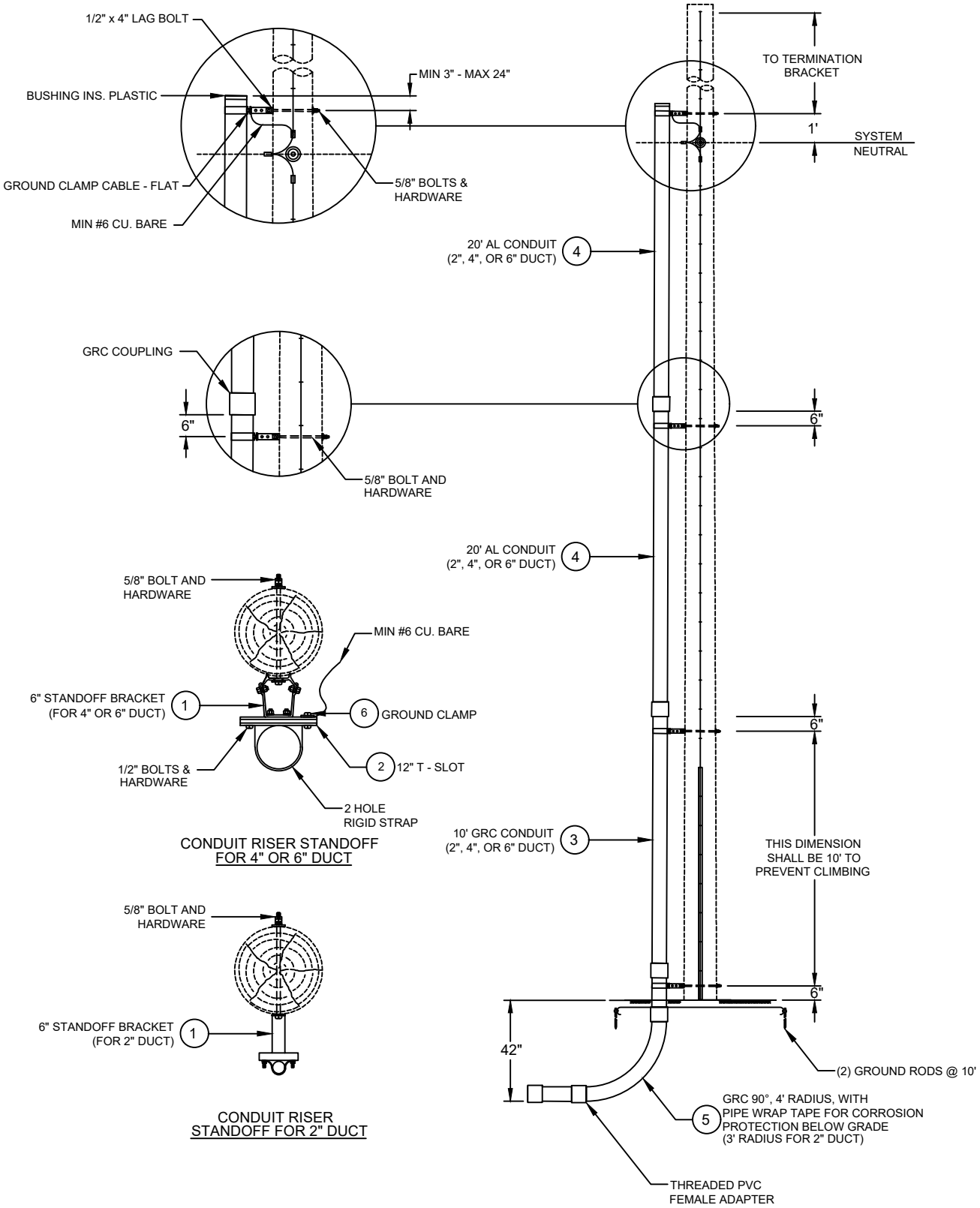
Please Email Completed Service Application along with applicable electronic versions of drawings, specifications, and other documents to:* rhh@clpinc.com, tjc@clpinc.com and/or rmk@clpinc.com. *Address: 7814 North Drive, Hill Air Force Base, UT 84056. Phone: (801) 660-2255.

APPENDIX B SERVICE CONNECTION UNDERGROUND CONSTRUCTION STANDARDS

The following section of the underground service connection requirements will apply to all CLP underground electrical distribution systems. All construction will be required to meet CLP and Industry Standards.

Table of Contents

SC5.1	Underground Conduit Standoff Riser
SC5.2	Underground Cable Identification Guide
SC5.3	Underground Primary Cables
SC5.4	Underground PD Fused 15kV Vacuum and Oil
SC5.5	Trenching, Backfill and Compaction, Concrete Aggregate Base
SC5.6	Concrete Encased Duct Banks
SC5.7	Duct Requirements for Primary Cable
SC5.8	Interrupter Switch (IS) 15kV 1-Phase, 200A
SC5.9	Vault Installation Notes, Hardware Guide
SC5.10	Padmount 12.47kV 3-Phase Transformer Installation
SC5.11	Transformer Secondary Spade Connection
SC5.12	Bumper Post Installations
SC5.13	Oil-Filled Equipment Clearance from Buildings
SC5.14	15kV Vault & Padmount Equipment Clearance for Working Space
SC5.15	15kV Vault Pad 4-Way Switch 600A

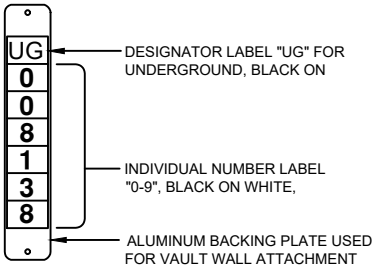


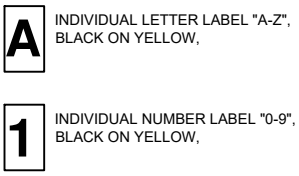
CONDUIT RISER STANDOFF
FOR 4" OR 6" DUCT

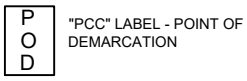
CONDUIT RISER
STANDOFF FOR 2" DUCT

CITY LIGHT & POWER

SC5.1	UNDERGROUND CONDUIT STANDOFF RISER	APPROVED AS OF 12/1/2016







LABEL

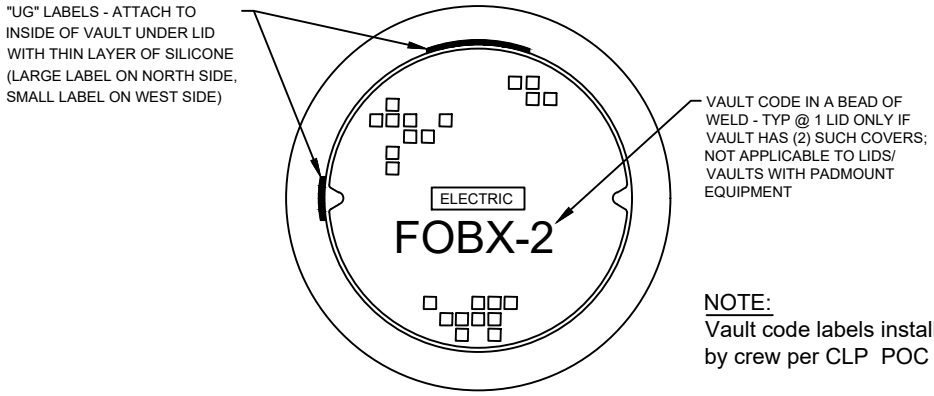
Unique location identification number used in map/facility database. (Labeling shall contact CLP POC for labeling scheme)

VAULT CODE LABELS

Black on Yellow letter and number labels (Unique location identification code, 1.5" x 2.5")

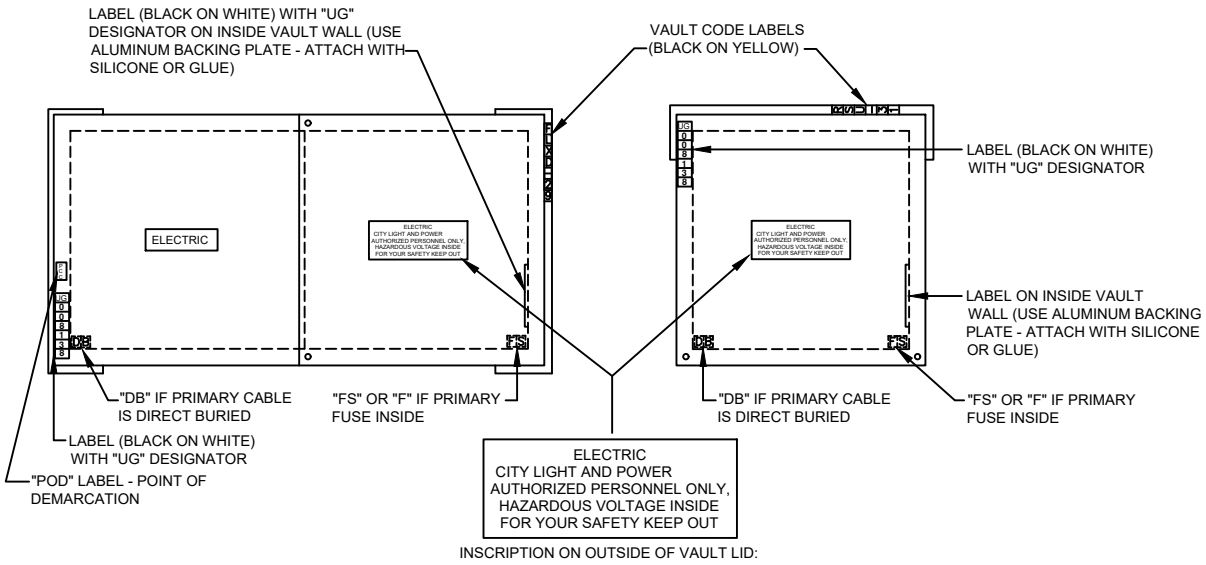
"POD" LABEL

Black on White label. (Identifies utility and customer ownership)



NOTE:
Vault code labels installed by crew per CLP POC

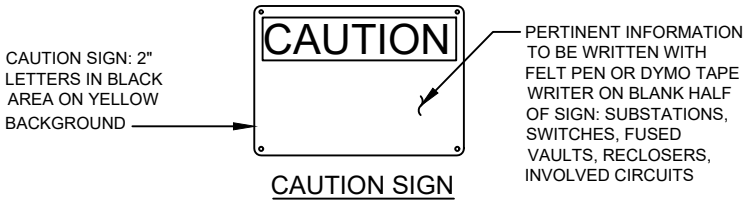
36" RING AND COVER LIDS



4'x 7'-8" VAULT LID

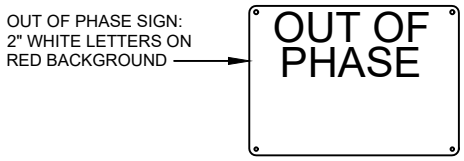
4'x 4' VAULT LID

NOTE:
Phasing order is #1 - #2 - #3 from left to right when facing loadbreak connectors from the operating side.



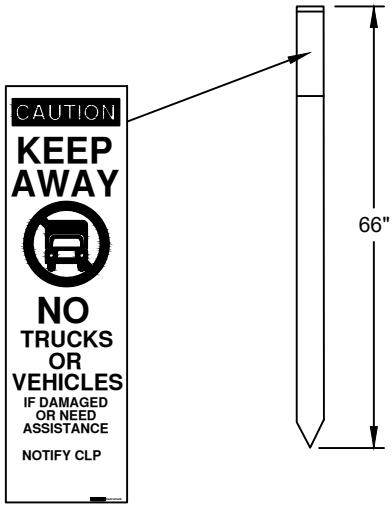
CAUTION SIGN

Use: Warning against potential hazards or to caution against unsafe practices, eg at no tie points between substations.

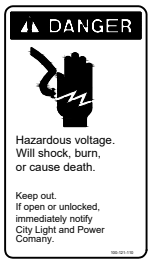


OUT-OF-PHASE SIGN

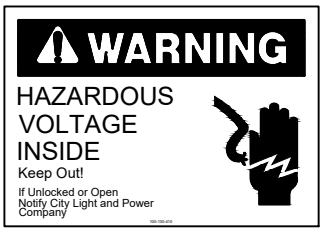
Use: When circuits are tied together by means of normally open switches. Do not close energized. Out of phase.



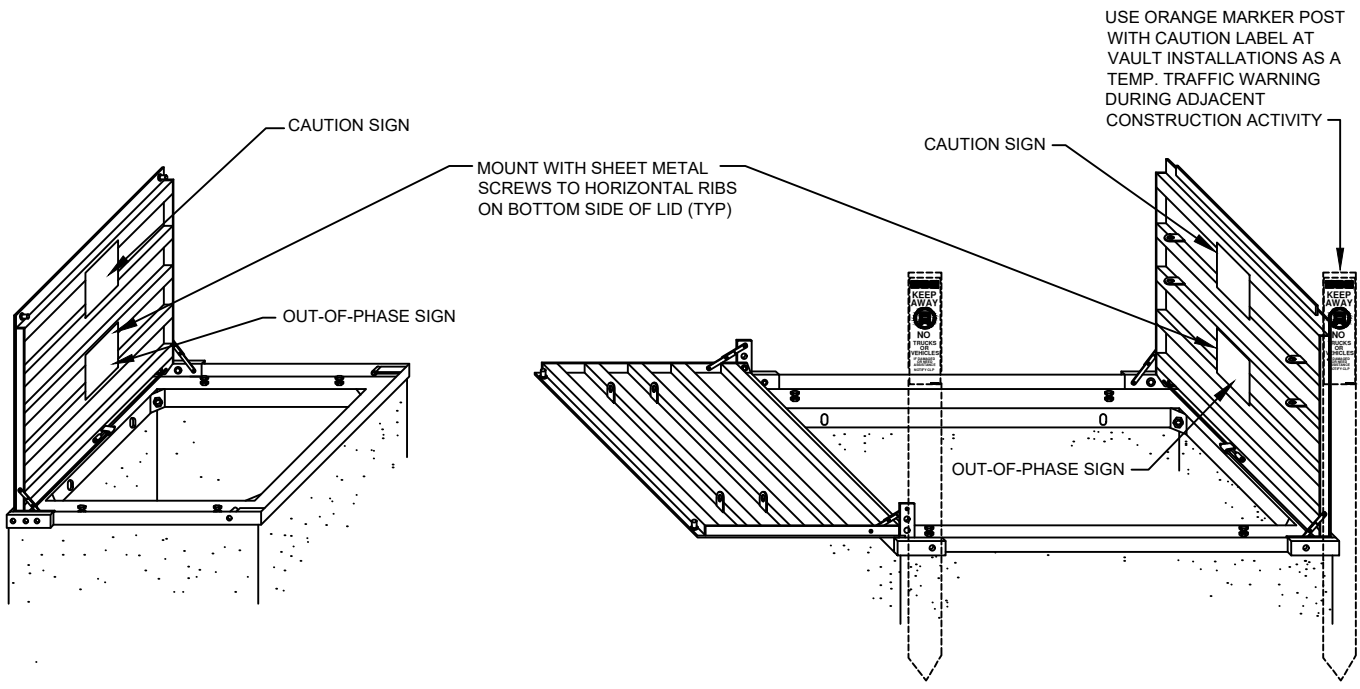
CAUTION LABEL



DANGER LABEL



WARNING SIGN/LABEL



INSIDE VIEW
4'x4' VAULT LID COVER

INSIDE VIEW
4'x7'-8" VAULT LID COVER

CAUTION AND OUT-OF-PHASE SIGN PLACEMENT

CITY LIGHT & POWER

HIGH VOLTAGE CABLE HANDLING AND STORAGE GUIDE

1. Unloading of cable should be accomplished so that equipment used does not contact either the cable surfaces or the protective wrapping. If unloading is accomplished by crane, either the cradle supporting the reel flanges or a shaft through the arbor hole should be used. If a fork is utilized, the forks must lift the reel at 90 degrees to the flange and must be long enough to make complete lifting contact with both flanges. Under no circumstances should the forks contact the cable surface or protective wrapping. For the same reason, a web-sling arrangement should not be used around the conductor as the weight could damage the cable.
2. Under no circumstances should reels be dropped from the delivering vehicle to the ground.
3. Reels should be stored on a hard surface so that the flanges do not sink into the earth, allowing the weight of the reel and cable to rest on the cable surface. In storing, never turn the reel on the flange side for this will result in cable damage. The reels should be stored upright in a rolling position.
4. Cable should be stored in an area where chemical or petroleum products will not be spilled or sprayed on the cable.
5. When a reel of cable is rolled from one point to another, care must be taken to see that there are no objects on the surface area which could contact or damage the cable surface or protective wrapping.
6. If a length of cable has been cut from a reel, the cable end should be immediately resealed to prevent the entrance of moisture. Use cable seal caps (mastic and vinyl tape (see SC5.3.5).
   Installed cable that is not immediately terminated should be sealed, especially if left overnight.
7. Cable should be stored in an area away from open flame or other sources of high heat.
8. Reels should be stored in an area where construction equipment, falling or flying objects, or other materials will not contact the cable.
9. If an inclined ramp is used for unloading, the ramp must be wide enough to contact both flanges completely, and stopping of the reels at the bottom shall be accomplished by using the reel flanges, and not the surface of the cable.

INSTALLATION TEMPERATURE GUIDE FOR PRIMARY CABLES

1. The low temperature weakness of primary cables is the semi-conducting strand and insulation shield compounds, which have a much higher brittleness temperature than the TRXLPE insulation. If a crack initiating in the shield does not propagate through the insulation as might be expected, then immediate failure may not occur and the cable could operate for some time before failure. However, to avoid any possible damage to primary cables while installing or operating cables with elbows at extremely low temperatures, the following guidelines should be used:
   A. Minimum temperature of cable during installation for primary TRXLP with thermosetting semicon shield is -25°C (-13°F).
   B. For splicing or terminating primary cables, warm cable ends up to at least 32°F.
   C. Primary cables may be operated, such as moving elbows onto a parking stand down to the same low temperature given in "A" above.
   D. If any cable damage is suspected during installation, then an additional 12-15 feet of cable should be pulled and delivered to the Standards Laboratory for analysis. The sample must be cut from the leading section of cable to determine if any damage occurred during the pull.

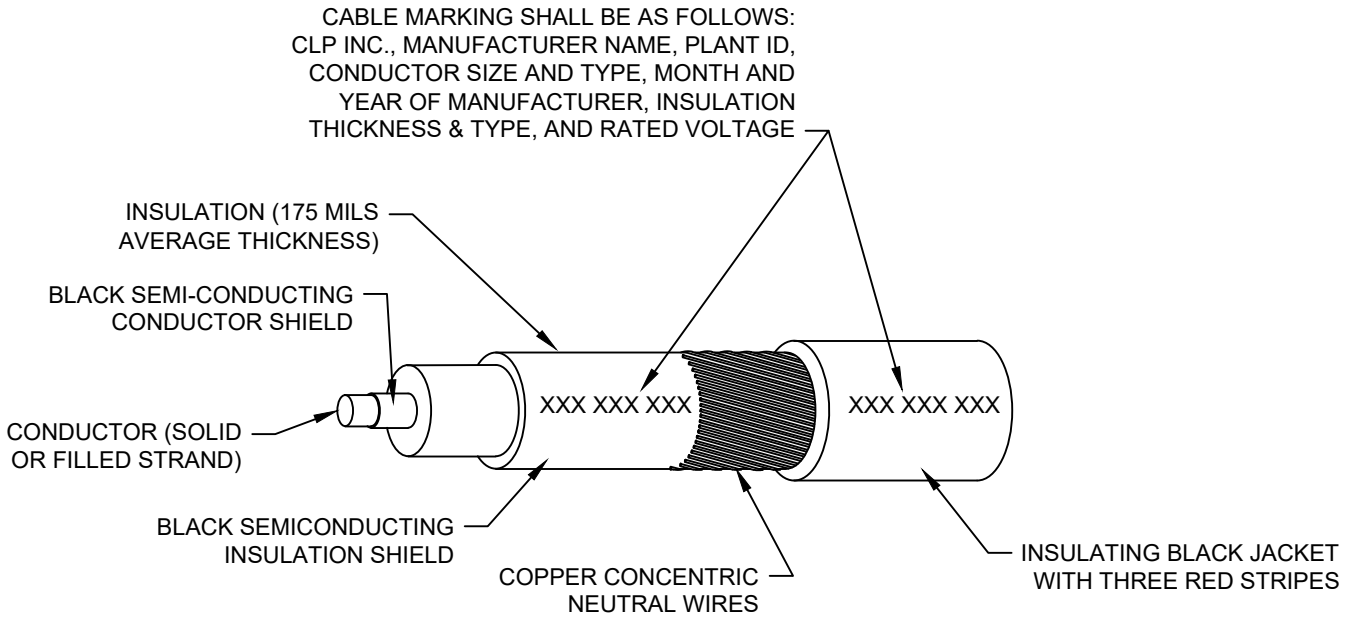
MINIMUM BENDING RADIUS

1. The minimum bending radius of primary cable shall be twelve times the overall diameter of the cable.
2. The minimum radius specified is measured to the surface of the cable on the inside of the bend.
3. These bending radii are to be considered minimum recommended dimensions and are for static bends such as manhole training bends, etc., and do not apply where pulling tensions and sidewall pressures are involved.
4. To visualize a bending radius, determine the diameter of the cable and multiply by twelve. Use this dimension as the minimum bending radius. Scribe a circle on the floor or in the dirt and form the cable around it. See cable bending radius in the tables on SC5.4.2.

ENERGIZING NEW CABLE

1. Since DC Hipot testing of cable and accessories can lead to insulation damage, this method is NOT reccommended for testing cables. A TDR (Time Domain Reflectometry) test set should be used to verify continuity and the integrity of the circuit. It is recommended, if possible, to energize new cable for one day at rated line voltage, prior to loading.

CITY LIGHT & POWER



15 KV UD CABLES

Insulated (133% level, 220 mil thick TRXLPE) single conductor cables, compressed stranding or solid, with copper concentric neutral wires. Specify total quantity in feet.

PHASE CONDUCTOR SIZE, TYPE	NEUTRAL CONDUCTOR NO. & SIZE WIRES	AMPACITY[1] DB/DUCT	DUCT SIZE	CONDUCTOR AREA IN^2/ (MM^2)
#2 AL	6 #14	175/126 (3PH)	3" OR 4"	0.0616 / (39.6)
#1/0 AL	6 #14	225/163 (3PH)	4"	0.1006 / (65.0)
#4/0 AL	11 #14	320/241 (3PH)	4"	0.2018 / (130.6)
250 KCMIL AL	13 #14	345/265 (3PH)	6"	0.2392 / (153.9)
500 KCMIL AL	25 #14	451/385 (3PH)	6"	0.4788 / (307.8)
750 KCMIL AL	24 #12	507/468 (3PH)	6"	0.7204 / (463.5)
1000 KCMIL AL	31 #12	1098/1058 (3PH)[2]	6"	0.9602 / (619.8)

DIMENSIONS/ WEIGHTS OF 15KV CABLES

ITEM DESCRIPTION	CONDUCTOR OD (IN)	INSULATION OD NOMINAL (IN)	OVERALL CABLE OD (IN) / WGT (LBS/FT)	MINIMUM BENDING RADIUS
#2 AL	0.280	0.77	1.08 / 0.486	13"
#1/0 AL	0.358	0.85	1.15 / 0.563	14"
#4/0 AL	0.507	1.0	1.30 / 0.803	16"
250 KCMIL AL	0.552	1.06	1.38 / 0.917	17"
500 KCMIL AL	0.781	1.29	1.66 / 1.534	20"
750 KCMIL AL	0.958	1.48	1.90 / 2.043	23"
1000 KCMIL AL	1.106	1.62	2.02 / 2.626	25"

15 KV UD CABLES

Insulated (133% level, 220 mil thick TRXLPE) single conductor cables, compressed stranding or solid, with copper concentric neutral wires. Specify total quantity in feet.

PHASE CONDUCTOR SIZE, TYPE	NEUTRAL CONDUCTOR NO. & SIZE WIRES	AMPACITY[1] DB/DUCT	DUCT SIZE	CONDUCTOR AREA IN^2 / (MM^2)
#2 CU	6 #14	224/162 (3PH)	3" OR 4"	0.0616 / (39.6)
#1/0 CU	9 #14	284/210 (3PH)	4"	0.1006 / (65.0)
#4/0 CU	18 #14	385/307 (3PH)	4"	0.2018 / (130.6)
250 KCMIL CU	21 #14	410/336 (3PH)	6"	0.2392 / (153.9)
500 KCMIL CU	26 #12	501/471 (3PH)	6"	0.4788 / (307.8)
750 KCMIL CU	25 #10	559/548 (3PH)	6"	0.7204 / (463.5)
1000 KCMIL CU	32 #10	1338/1192 (3PH)[2]	6"	0.9602 / (619.8)

DIMENSIONS/ WEIGHTS OF 15KV CABLES

ITEM DESCRIPTION	CONDUCTOR OD (IN)	INSULATION OD NOMINAL (IN)	OVERALL CABLE OD (IN) / WGT (LBS/FT)	MINIMUM BENDING RADIUS
#2 CU	0.280	0.77	1.08 / 0.638	13"
#1/0 CU	0.358	0.85	1.15 / 0.837	14"
#4/0 CU	0.507	1.0	1.30 / 1.358	16"
250 KCMIL CU	0.552	1.06	1.38 / 1.572	17"
500 KCMIL CU	0.781	1.29	1.66 / 2.902	20"
750 KCMIL CU	0.958	1.48	1.90 / 4.102	23"
1000 KCMIL CU	1.106	1.62	2.02 / 5.281	25"

35 KV UD CABLES[3]

Insulated (100% level, 345 mil thick TRXLPE) single conductor cables, compressed stranding or solid, with copper concentric neutral wires. Specify total quantity in feet.

PHASE CONDUCTOR SIZE, TYPE	NEUTRAL CONDUCTOR NO. & SIZE WIRES	AMPACITY[1] DB/DUCT	DUCT SIZE	CONDUCTOR AREA IN^2 / (MM^2)
#1/0 AL	6 #14	219/168 (3PH)	4"	0.1006 / (65.0)
#2/0 AL	7 #14	248/191 (3PH)	4"	0.1262 / (81.7)
#4/0 AL	11 #14	314/247 (3PH)	6"	0.2018 / (130.6)
250 KCMIL AL	13 #14	339/271 (3PH)	6"	0.2392 / (153.9)
500 KCMIL AL	25 #14	452/392 (3PH)	6"	0.4788 / (307.8)
750 KCMIL AL	24 #12	517/476 (3PH)	6"	0.7204 / (463.5)
1000 KCMIL AL	31 #12	1120/1072 (3PH)[2]	6"	0.9602 / (619.8)

DIMENSIONS/ WEIGHTS OF 35KV CABLES

ITEM DESCRIPTION	CONDUCTOR OD (IN)	INSULATION OD NOMINAL (IN)	OVERALL CABLE OD (IN) / WGT (LBS/FT)	MINIMUM BENDING RADIUS
#1/0 AL	0.358	1.10	1.40 / 0.792	17"
#2/0 AL	0.401	1.15	1.47 / 0.861	18"
#4/0 AL	0.507	1.26	1.58 / 1.058	19"
250 KCMIL AL	0.552	1.31	1.70 / 1.224	21"
500 KCMIL AL	0.781	1.54	1.94 / 1.875	24"
750 KCMIL AL	0.958	1.73	2.18 / 2.419	27"
1000 KCMIL AL	1.106	1.88	2.37 / 2.989	29"

CITY LIGHT & POWER

35 KV UD CABLES [3]

Insulated (100% level, 345 mil thick TRXLPE) single conductor cables, compressed stranding or solid, with copper concentric neutral wires. Specify total quantity in feet.

PHASE CONDUCTOR SIZE, TYPE	NEUTRAL CONDUCTOR NO. & SIZE WIRES	AMPACITY[1] DB/DUCT	DUCT SIZE	CONDUCTOR AREA IN^2 / (MM^2)
#2 CU	9 #14	224/162 (3PH)	4"	0.0616 / (39.6)
#1/0 CU	11 #14	284/210 (3PH)	4"	0.1006 / (65.0)
#4/0 CU	18 #14	385/307 (3PH)	6"	0.2018 / (130.6)
250 KCMIL CU	21 #14	410/336 (3PH)	6"	0.2392 / (153.9)
500 KCMIL CU	26 #12	501/471 (3PH)	6"	0.4788 / (307.8)
750 KCMIL CU	25 #10	559/548 (3PH)	6"	0.7204 / (463.5)
1000 KCMIL CU	32 #10	1338/1192 (3PH)[2]	6"	0.9602 / (619.8)

DIMENSIONS/ WEIGHTS OF 35KV CABLES

ITEM DESCRIPTION	CONDUCTOR OD (IN)	INSULATION OD NOMINAL (IN)	OVERALL CABLE OD (IN) / WGT (LBS/FT)	MINIMUM BENDING RADIUS
#2 CU	0.280	1.10	1.40 / 1.071	17"
#1/0 CU	0.358	1.15	1.47 / 1.212	18"
#4/0 CU	0.507	1.26	1.58 / 1.618	19"
250 KCMIL CU	0.552	1.31	1.70 / 1.885	21"
500 KCMIL CU	0.781	1.54	1.94 / 3.258	24"
750 KCMIL CU	0.958	1.73	2.18 / 4.498	27"
1000 KCMIL CU	1.106	1.88	2.37 / 5.579	29"

1. Ampacity is based on 1 circuit per trench/duct bank, 90°C conductor, 25°C ambient, soil rho 90, maximum earth interface approximately 60°C, 75% load factor, triplexed spacing (3PH, 3 phase; 1PH, single phase). See ICEA publication P-53-426 & S-66.524.
2. For 2-per-phase conductor installations of 15kV 1000 kcmil CU cable, the ampacity in duct (same conditions as mentioned above in note 1 except 100% load factor & 75°C earth interface is 1337A.
3. For specify 35kV cables shall consult with CLP engineer for further assist on 35kV, 133% insulation, 420 mils if required for the application.

TEMPORARY CABLE END CAPS FOR WATER SEALING PRIMARY CABLES

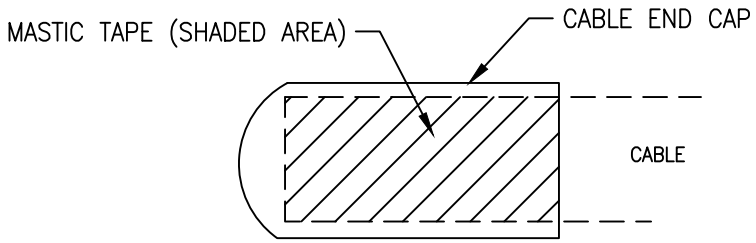
Aluminum strands can be seriously affected by water. Oxidation takes place, pitting and eroding the aluminum and in some cases, completely oxidizing the strands leaving only a residue. Moisture in cable has been found to be one of the principal causes of "treeing" in the insulation, leading directly to cable failure. Moisture can also migrate to the termination device causing intermittant feeder tripping prior to failure.

Once a small amount of moisture has entered the cable, the damage has begun. Therefore, it is imperative that cable ends never be left exposed to the elements when cable terminations or splices are not immediately going to be made. Every effort must be made to seal exposed cable ends at once to prevent moisture entry.

The cold shrink end caps shown below are for temporarily sealing the ends of aluminum cable during installation and storage to prevent the entry of moisture. In all cases, the cable end must be clean and dry before the cap is installed. Cables shall not be left exposed overnight during installation work.

All cable manufacturers are required by industry standards to seal the ends of all primary underground cable leaving their factory. Cable shipments must be inspected upon arrival for cable damage or loss of the seal caps. Replacement caps shall be installed where missing, to prevent further entry of moisture. Notify CLP Engineering to followup with the supplier.

When installing primary cable end caps that are not prefilled with mastic, wrap the cable area to be sealed with several wraps of mastic tape. Finish by installing the cable end cap per manufacturer's instructions.



PRIMARY CABLE END CAP

COLD SHRINK CAP WITHOUT MASTIC FILL

CAP SIZE*	CABLE SIZE
2”	#1 SOLID JKTD #2 URD 15KV
3”	4/0 - 15/35KV
4”	1000 KCMIL, 15KV

*NOTE:
Recommend end cap size based on actual cable outside diameter (OD) without mastic wrap. A larger end cap size may be required with mastic wrap.

COLD SHRINK CAP PREFILLED WITH MASTIC

CAP SIZE	CABLE SIZE	3M PART NUMBER
3”	#2 URD - 500 KCMIL, 15/35KV	QE-3
4”	1000 KCMIL, 15/35KV	QE-4

CITY LIGHT & POWER

SUGGESTED MINIMUM FUSE CURRENT RATING FOR SELF-COOLED 12kV- 14.4kV DISTRIBUTION TRANSFORMER								
SYSTEM NOM. KV	12.0		13.2		13.8		14.4	
FUSE MAX. KV	15.5		15.5		15.5		15.5	
TRANSFORMER KVA RATING SELF-COOLED	FULL LOAD CURRENT (Amps)	FUSE E-AMPERE RATING	FULL LOAD CURRENT (Amps)	FUSE E-AMPERE RATING	FULL LOAD CURRENT (Amps)	FUSE E-AMPERE RATING	FULL LOAD CURRENT (Amps)	FUSE E-AMPERE RATING
THREE PHASE TRANSFORMERS								
15	0.72	3E	0.66	3E	0.62	3E	0.60	3E
30	1.44	3E	1.32	3E	1.25	3E	1.20	3E
45	2.16	3E	1.98	3E	1.88	3E	1.80	3E
75	3.60	5E	3.30	5E	3.10	5E	3.0	5E
112.5	5.40	10E	4.95	7E	4.70	7E	4.51	7E
150	7.20	10E	6.56	10E	6.20	10E	6.01	10E
225	10.80	15E	9.90	15E	9.40	15E	9.02	15E
300	14.40	20E	13.10	20E	12.50	20E	12.0	20E
500	24.10	40E	21.90	30E	21.0	30E	20.10	30E
750	36.10	50E	32.80	50E	31.00	50E	30.10	50E
1000	48.10	80E	43.70	65E	42.00	65E	40.10	65E
1500	72.00	100E	65.60	100E	62.00	100E	60.10	65E
2000	96.20	150E	87.50	125E	84.00	125E	80.20	125E
2500	120.00	200E	109.0	150E	104.00	150E	100.00	150E
3750	180.00	250E	165.00	250E	156.00	250E	150.00	250E
5000	241.00	400E	218.00	300E	210.00	300E	200.00	300E
SINGLE PHASE TRANSFORMERS								
10	0.832	3E	0.76	3E	0.724	3E	0.69	3E
15	1.25	3E	1.14	3E	1.085	3E	1.64	3E
25	2.08	3E	1.90	3E	1.81	3E	1.74	3E
37.5	3.12	5E	2.84	5E	2.71	5E	2.6	5E
50	4.16	7E	3.80	7E	3.62	5E	3.47	5E
75	6.25	10E	5.70	10E	5.43	10E	5.21	10E
100	8.32	15E	7.60	15E	7.24	10E	6.94	10E
167	13.90	20E	12.70	20E	12.10	20E	11.6	20E
250	20.80	30E	19.00	30E	18.10	25E	17.40	25E
333	27.70	40E	25.20	40E	24.10	40E	23.10	40E
500	41.60	65E	38.0	65E	36.20	50E	34.70	50E
667	55.40	80E	50.50	80E	48.20	80E	46.30	65E
833	69.40	100E	63.50	100E	60.40	100E	57.90	80E
1250	104.00	150E	95.00	150E	90.60	125E	86.80	125E

NOTES:

1. Eaton power fuses are used for protecting transformers, capacitor banks, and cables in outdoor distribution through 34.5kV.
2. Two(2) 250E, 300E, and 400E Ampere fuse refills used in parallel with 10% derating factor.

TRENCHING GUIDE

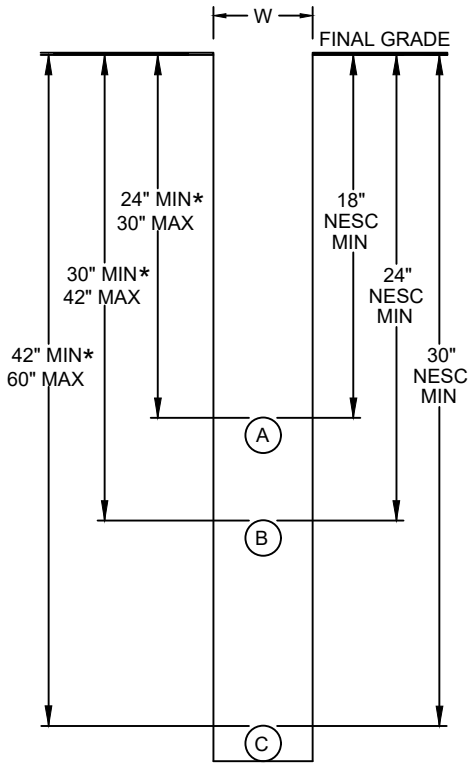


FIGURE- A
TYPICAL TRENCH DEPTHS

NESC MINIMUM COVER ABOVE TOP OF CABLES (OR DIRECT BURIED DUCT)

PER NESC RULE 353D2 (WITHOUT SUPPLEMENTAL PROTECTION- SEE NOTE 2, REQUIRES WRITTEN AUTHORIZATION FROM A CITY LIGHT AND POWER REPRESENTATIVE).

NESC MINIMUM COVER IS 24" (CITY LIGHT AND POWER ADOPTED A 30" MINIMUM COVER FOR PROPER CLEARANCE OF GAS LINES AND OTHER UNDERGROUND UTILITIES). → 30" TYP

NOTE:
SEE NOTES 6 & 7 FOR DEPTH INSPECTION REQUIREMENTS

* CITY LIGHT AND POWER REQUIRED STANDARD MINIMUM CONDUIT/ CABLE COVER

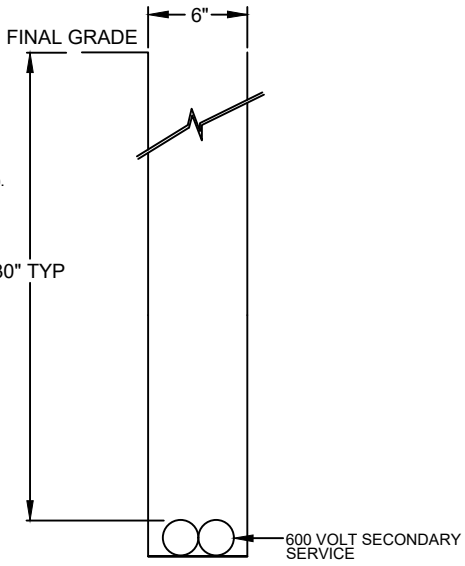


FIGURE- B
TYPICAL TRENCH CROSSING DEPTHS

CABLE/ CIRCUIT TYPE	TYPICAL TRENCH WIDTH		MAXIMUM VOLTAGE
A	STREETLIGHT FEEDS	6"	MAX. 150 VOLTS PHASE TO GROUND
B	SECONDARY	6"	0-600 VOLTS PHASE-TO-PHASE
C	PRIMARY	24"	601-50,000 VOLTS PHASE-TO-PHASE

TRANSITION COUPLINGS PROVIDED BY CITY LIGHT AND POWER	
SIZE AND TYPE	
2" E-LOK	✓
4" E-LOK	✓
6" E-LOK	✓
4" FLEX, 2-CLAMP	✓
6" FLEX, 2-CLAMP	✓

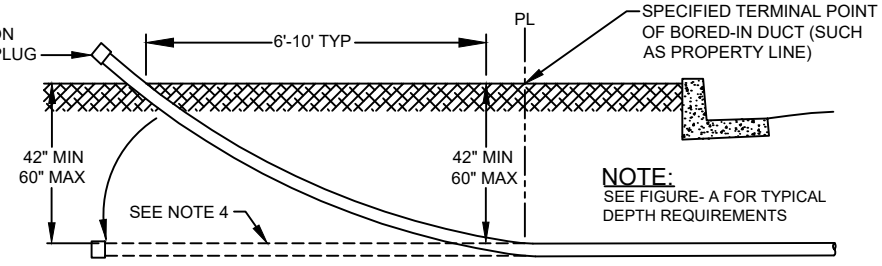


FIGURE- C
BORED-IN STUB CONFIGURATION

NOTES:

1. Trench width to be a minimum of 3" on each side of conduit or conductor, to provide for proper compaction (see table above).
2. Duct shall have a 3" minimum concrete envelope when CLP minimum cover depths are not achieved. Ducts shall also be installed with plastic base spacers to maintain a consistent 3" of concrete below duct. See SC5.6 for concrete encase duct banks.
3. All underground for clearances required by NESC from UG electric conduit/cable to other UG facilities (communication, water, sewer, foundations, sub-structures, etc).
4. City Light and Power requires an E-LOK type transition coupling at plugged end of bore, to be relocated to nearest 42" depth of stub (typically within 6'-10') and used for attachment of contractor supplied pipe. Contractor has the option of picking up bored pipe at 42" depth or digging parallel and lowering end of stub if direction of contractor's ditch allows.
5. City Light and Power acknowledges difficulties in blowing and pulling wire in ducts of dissimilar inside diameters, and accepts this responsibility if contractor supplied and installed properly.
6. If required depth of trench or bored-in conduit cannot be met by CLP contractor, new proposed depth must be approved in advance by CLP representative. CLP representative must be notified a minimum of three days in advance of bore start time. CLP representative may require utility or other locate documentation to verify existing infrastructure depths. Potholing may be required at any time, at the discretion of the CLP representative, to prove any bore depth. Conduit will be required for any installation that exceeds CLP minimum or maximum depth as shown in Figure A.
7. CLP contractor to submit bore log to CLP representative within 7 days of completion of bore installation.

CITY LIGHT & POWER

TRENCH BACKFILL AND COMPACTION GUIDE:

1. Before any backfilling operations are started, make an inspection of all trenches.

2. If soil materials in the bottom of a trench might cause unequal settlement, the unsatisfactory materials shall be removed and backfilled with selected materials.

3. Check for cable placement, conduit integrity, concrete encasement of conduit when required, adequate bedding/cover over direct buried cables, proper minimum depth, pole and pad risers, cable entrance to and from vaults and pads, secondary pull boxes and service stubs marked with electronic markers to determine that the work has been done in accordance with construction standards and job print specifications.

4. NESC Rule 352A requires the following:
   a. The bottom of the trench receiving direct-buried cable should be relatively smooth, undisturbed earth; well tamped earth; or sand. When excavation is in rock or rocky soils, the cable should be laid on a protective layer of well-tamped backfill. backfill within 100mm (4 inches) of the cable should be free of materials that may damage the cable. Backfill should be adequately compacted. Machine compaction should not be used within 150mm (6 inches) of the cable.
   b. For cable installed in a duct, the bottom of the trench should be in undisturbed, tamped, or relatively smooth earth. Where the excavation is in rock, the duct should be laid on a protective layer of clean tamped backfill. All backfill should be free of materials that may damage the duct.

5. The first twelve inches of backfill shall be free from stones, rock, or other material that might damage the cable or conduit. Selected backfill shall contain no soil material larger than 1/2" in diameter.

6. Final backfill shall be done in equal increments the length and girth of the trench line.

7. When suitable, as determined by soils test, use native material compacted in accordance with the following:
   a. For cohesive soils, compact to 95% maximum Standard Proctor dry density (ASTM D698) at ±2% of optimum moisture content.
   b. For cohesiveless soils, compact to 95% maximum Modified Proctor dry density (ASTM D1557) at +/-2% of optimum moisture content (or 100% maximum Standard Proctor dry density (ASTM D698) at ±2% of optimum moisture content). Prior to and during compaction, materials shall have a moisture content as required to obtain the specified density. Thickness of horizontal layers after compacting shall not be more than 9 inches.
   c. Thickness of horizontal layers after compacting shall not be more than 6 inches. For highly expansive soils (swell potential is greater than 2.00% under 200 psf surcharge pressure), contact City Light and Power.
   d. If native soils are not suitable for trench backfill and compaction (heavy clay or expansive soil, rock-filled, etc.), use flowable fill, T&D Underground mix #3, installed as specified on SC5.5.5 or Class 5 or 6 base course or similar graded material compacted to the test values specified above (see gradation specifications on SC5.5.5).

NOTE: CLP Inspectors routinely obtain compaction results from test labs using the Modified Proctor method and as a practical approach based on historical values or maximum density for native soils in the vicinity (not site specific) when native backfill is employed. When deemed necessary by the test lab and Utility Inspector, the site specific maximum density may need to be verified by test. Any independent contractor tests should be done using the same (Modified Proctor) test method for compaction of results or else **the limits for the Standard Proctor method shall be referenced. Backfill & compaction of all trenches shall meet the requirements of the City Light and Power SC5.5 and all other applicable Local, State, and Federal requirements.**

8. The density tests shall be performed at various depths in the trench to ensure that the required compaction is obtained throughout. For trenches less than 30" in depth, compaction tests shall be taken at the surface and within 18" above the top of conduit or cable. For trenches greater than 30" in depth, density tests shall be taken within 18" of the top of the conduit or cable and at 24" vertical intervals to the top of the trench with the final test at the surface.

9. The frequency of density tests shall be a minimum of 250 linear feet of mainline trench and at each service installed. The number of density tests may be increased if directed by the Utility Inspector. If flowable fill is installed as specified on page 4, compaction and density tests are not required.

10. All trench lines shall be restored to the original grade. Any excess soil shall be piled on top of the trench and shall be well compacted. The top surface of the trench backfill shall be relatively smooth. The premises should be left in clean condition and all rock and debris shall be removed from the site. Pavement or walk cuts shall be repaved with material identical to the original surfaces in accordance with Local Codes and Standards.

CITY LIGHT & POWER

FOUNDATION COMPACTION SPECIFICATION FOR PADMOUNTED EQUIPMENT

1. City Light and Power recommends experienced personnel who understand the importance of moisture for compacting soils and the characteristics of expansive soils.

2. Before any backfilling or compaction operations are started, inspect all conduit spacings and riser heights. Make sure they meet the construction standard specified for the equipment to be installed.

3. All pads pre-cast or poured on site shall project a minimum of 4" above grade.

4. Excavate a minimum of twelve inches beyond perimeter of pad and a minimum of 36" deep.

5. The first twelve inches of backfill shall be free from stones, rock, or other material that might damage the cable or conduit. Selected backfill shall contain no soil material larger than 1/2" in diameter.

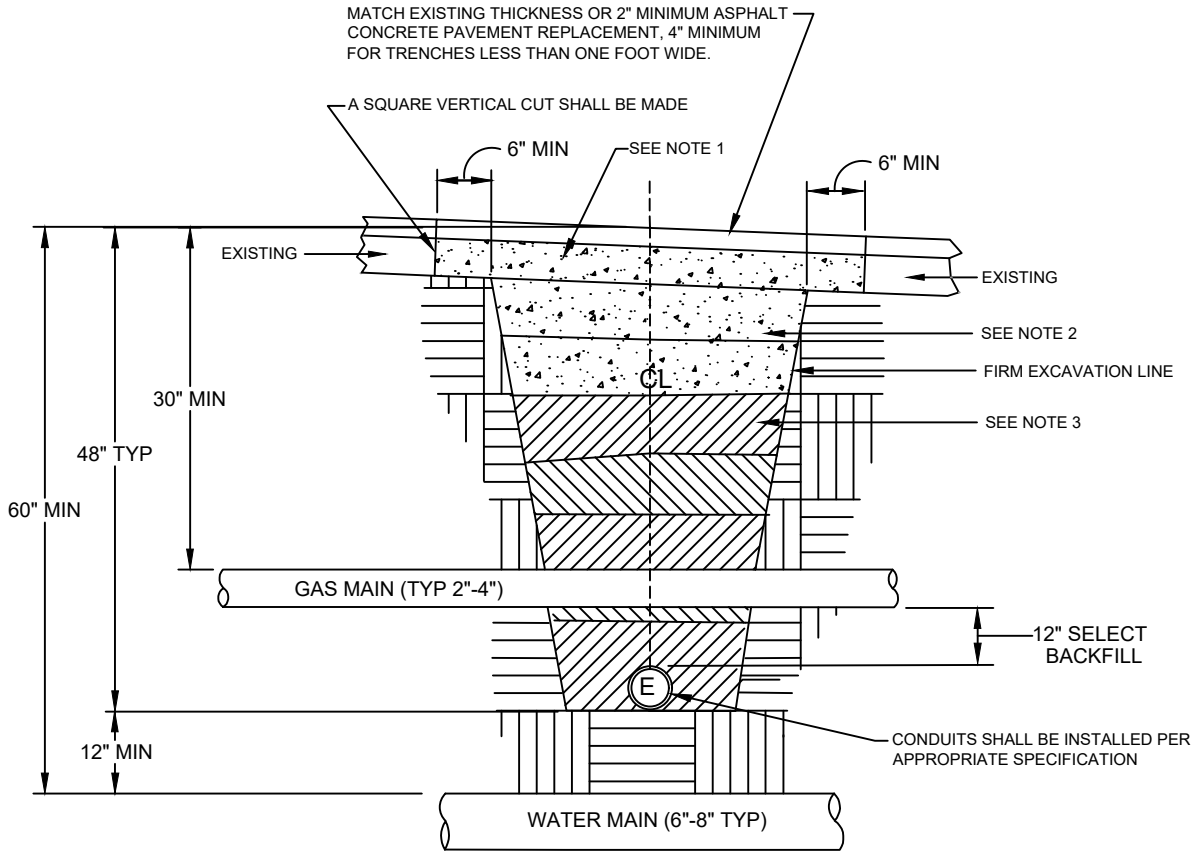
6. When suitable, as determined by soils test, use native material compacted in accordance with the following:
   a. For cohesive soils, compact to 87% maximum Modified Proctor dry density at ± 2% of optimum moisture content (or 92% maximum Standard Proctor dry density at ±2% of optimum moisture content).
   b. For cohesionless soils, compact to 85% maximum Modified Proctor dry density at -5% to +3% of optimum moisture content (or 90% maximum Standard Proctor dry density at -5% to +3% of optimum moisture content). Prior to and during compaction, materials shall have a moisture content as required to obtain the specified density. Thickness of horizontal layers after compacting shall not be more than 9".
   c. For expansive soils, remove and replace with DOT Class 5 or 6 soil and compact per 6b above

7. After successful completion of the above steps, call the City Light and Power representative who will arrange for compaction tests. This shall be done and approved before a concrete pad will be poured or a precast pad installed.

8. All equipment pads supporting City Light and Power equipment shall have compaction tests and records kept by the City Light and Power representative..

CITY LIGHT & POWER

ELECTRIC STREET CROSSINGS



PAVEMENT REPLACEMENT AND BACKFILL DETAIL

STREET CROSSING NOTES:

1. a. For streets with existing concrete subsurface:
   Use Portland cement, 3500 psi compressive strength, 6" minimum thickness (T&D Underground Mix #2).
   b. For new or recently overlayed streets (less than 3 years old):
   Use Portland cement, 3000 psi compressive strength, 6" minimum thickness (T&D Underground Mix #1).
   c. For typical streets:
   Replace with new base course to match existing or 6" depth, whichever is greater.

2. a. For streets with existing concrete subsurface:
   Use select gravel compacted to 95% of maximum Standard Proctor, 12" minimum thickness.
   b. For new or recently overlayed streets (less than 3 years old):
   New base course compacted to 95% of maximum Standard Proctor, 6" minimum thickness.

3. When suitable, use native material compacted as specified on page 2. If native soils are not suitable, install flowable fill as specified on page 5.

4. Flowable fill is required for street crossing trenches one foot or less in width.

5. Utilize the boring crew/contractor when appropriate for recently repaved streets, etc.

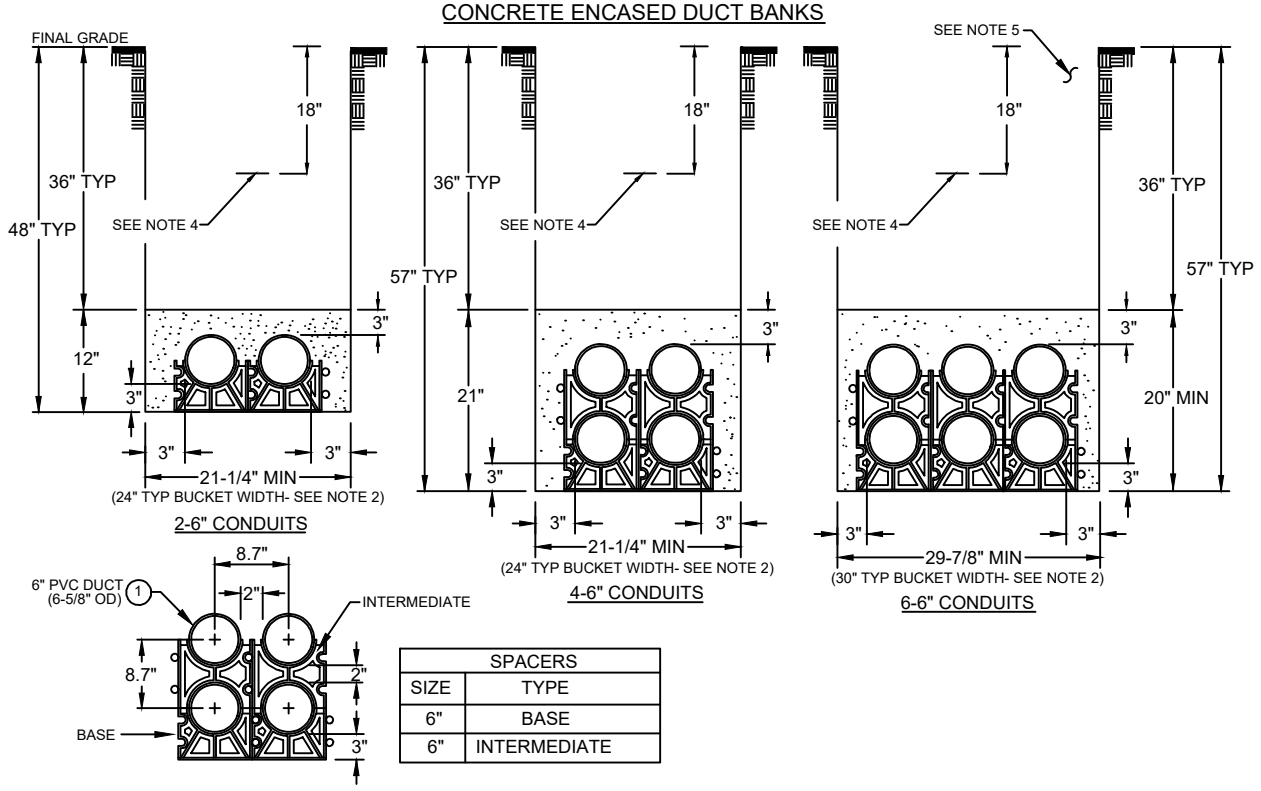
FLOWABLE FILL INSTALLATION GUIDE:

Flowable fill for utility trench restoration is to be used only as an alternative when native soil is not suitable for backfill. It will set up and provide compaction for quick trench closure. It shall be installed as follows:

1. As the cement truck begins pouring fill mix into the trench, the crew shall start vibrating the mix immediately.
2. To achieve proper hydration of the flowable fill mix, vibrators shall be used in all cases. The use of vibrators is extremely important as it removes excess water from the mix. If vibrators are not used, the flowable fill will not hydrate properly. For proper installation, the use of one vibrator minimum is required for each concrete truck pouring concrete into a trench.
3. All concrete encased ducts using "T&D Underground Mix #1" shall be allowed sufficient time to set up before the flowable fill mix is installed. This is to avoid any intermixing of the two different types of concrete. See chart for estimating flowable fill quantity when used to cover concrete encased duct banks.
4. The normal set-up time for the flowable fill mix to withstand traffic is approximately one hour after installation. Depending upon soil conditions, weather, and temperature, this time may vary. The mix will completely set up in 28 days at approximately 90-120 PSI, when properly hydrated. The set-up time required to resume normal traffic shall be determined by the City Light and Power/Representative on the job site.

CITY LIGHT & POWER

CONCRETE ENCASED DUCT BANKS



SPACERS	
SIZE	TYPE
6"	BASE
6"	INTERMEDIATE

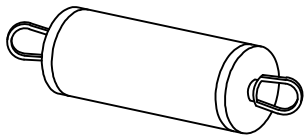
NOTES:

1. Install spacers every 7'. Base spacer and/or intermediate spacers and conduits shall be tied together using line pull polyolefin. Survey stakes shall be used at every base spacer as a tie down to prevent ducts from floating.
2. Duct is to have a minimum of 3" concrete envelope above and below, and 3" on each side. Dimensions of trench width shall be maintained as shown to keep concrete envelope volume within specification. Any trenches exceeding this limit shall be formed on one side (at contractor's expense) to minimize cost of encasement and excess trench width shall be backfilled at contractor's expense, including all material, labor and equipment costs. Bottom of trench shall be uniform, compact and free of debris.
3. Concrete used for duct encasement shall be used Portland cement, 3000psi compressive strength. Concrete shall be properly vibrated when installed to assure complete flow under, around, and between all ducts and to eliminate any air pockets.
4. All underground electrical ductbank shall provide warning tape (3" wide by 5 mil. thick) above ductbanks along the entire route within the the backfill. The warning tape shall be located approximately 18 inches below the final grade.
5. After concrete has taken firm set, the first 12 inches of backfill shall be free from stones, rock, or other material that might damage the ductbanks, cables, or conduits. Selected backfill shall contain no soil material larger than 1/2 " in diameter. For final backfill and compaction using native soils, compact to 92% maximum Standard Proctor dry density at +/-2% of optimum moisture content. Backfill of trenches in existing paved streets shall be native soil whenever economical (mechanically compacted to 95% of maximum Standard Protor with new base course to match existing or 6" depth, whichever is greater).
6. NESC Rule 352D requires a minimum of 30" cover above primary cables (601 volts to 50kV); see NESC rules for shallower burial depth requirements.
7. Encasement should be used for 1) 600 amp mainlines, 15kV and 35kV; 2) multiple-duct banks (vertically stacked); 3) installations that require flowable fill or 4) in cases where minimum cover is not met (see Note 5).

CITY LIGHT & POWER

1. The intent of this specification is to establish the guidelines on materials acceptable for underground primary installations as governed by the City Light and Power. The size of duct for primary cable run (2", 4" or 6") shall be specified by City Light and Power on the design details drawings.
2. All approved direct buried plastic ducts used for commercial/industrial installations for primary cable runs shall have a minimum cover of 36" of compacted backfill over the top of the ducts and a minimum of 3" from side of ducts to trench walls. Street crossings shall comply with City Light and Power section SC5.5. Vertical measurement shall meet or exceed the requirements both at the time of installation and subsequent thereto. A minimum of 3" of concrete encasement shall be used when adequate depth cannot be achieved. Authorization from the CLP Inspector is required before any installation with less than minimum specified cover is installed.
3. All plastic utility duct for underground installations shall conform to either National Electrical Manufacturers Association (NEMA) Standards for Electric Duct or American Society for Testing & Materials (ASTM) specifications and be installed per NEMA/ASTM guidelines. The following types of conduits are acceptable for Electric Raceways when installed as noted:
   - 3.1 EPC-40-PVC Electrical plastic conduit, schedule 40 of iron pipe dimensions, in conformance with NEMA publication number TC-2, current edition and rated for 90°C cables. These are suitable for direct burial without concrete encasement.
   - 3.2 PVC Plastic utilities duct for underground installation in conformance with NEMA publication number TC6 (or TC8: extra strength PVC duct) current edition and rated for 90°C:
     - 3.2.1 EB (Type 1) Encased burial duct is designed for use in underground concrete encased applications and shall be installed accordingly.
     - 3.2.2 DB (Type II) Direct burial duct, which has a heavier wall than EB, is designed for underground direct burial use. It may, however, be concrete encased as required.
   - 3.3 Smooth wall PVC conduit and fittings for underground installation in conformance with ASTM F512 latest edition and rated for 90°C cables: types EB-20 or EB-35 shall be concrete encased; types DB-60 or DB-120 may be direct buried or encased as required.
   - 3.4 All conduits, 90 degree bends and fittings shall be rated for 90°C cable without exception.
4. Fittings, couplings, and bends shall be of the type designed for the duct being used. For NEMA TC-2 duct, refer to NEMA TC-3, and for NEMA TC-6 (or TC-8) duct, refer to NEMA TC-9 for appropriate fittings. ASTM F512 also covers fittings; for conduits specified per ASTM F512.
5. Refer to PVC duct manufacturer recommendations for solvent cement to be used on their product. Caution shall be taken to insure that fittings and duct are compatible. For installation below 32°F, proper PVC cement shall be specified.
6. All work and materials will be inspected and approved by City Light and Power as the commercial/industrial policy indicates.
7. City Light and Power policy for underground service risers to the meter socket specifies GRC (galvanized rigid conduit) without exception for all exposed lengths above grade. All ducts of conductive material, such as GRC, which enclose electric supply lines, shall be effectively grounded in accordance with NESC rules. Grounding bushings shall be installed on all exposed GRC conduits above grade.
8. All rigid steel sweeps and 90 degree bends shall comply to ANSI standard C80.1 latest edition.
9. All galvanized conduit, 90 degree bends or long radius sweeps that are direct buried shall be coated with tar or taped with suitable material for corrosion protection. All horizontal 90 degree bends in primary conduit runs shall be 48" long-radius GRC.
10. All primary riser conduits shall be installed with bushings or bell ends to avoid cable abrasion against sharp conduit edges. Conduit risers into padmount equipment shall project 2" above grade or as shown in the specified in the details design drawings.
11. After trench is backfilled and compacted, primary cable ducts shall be clean internally and proven to be free of obstructions by passing a mandrel of the following minimum outside diameter and length:

4" duct = 3.56" OD, 6" long mandrel
6" duct = 5.69" OD, 11-1/2" long mandrel



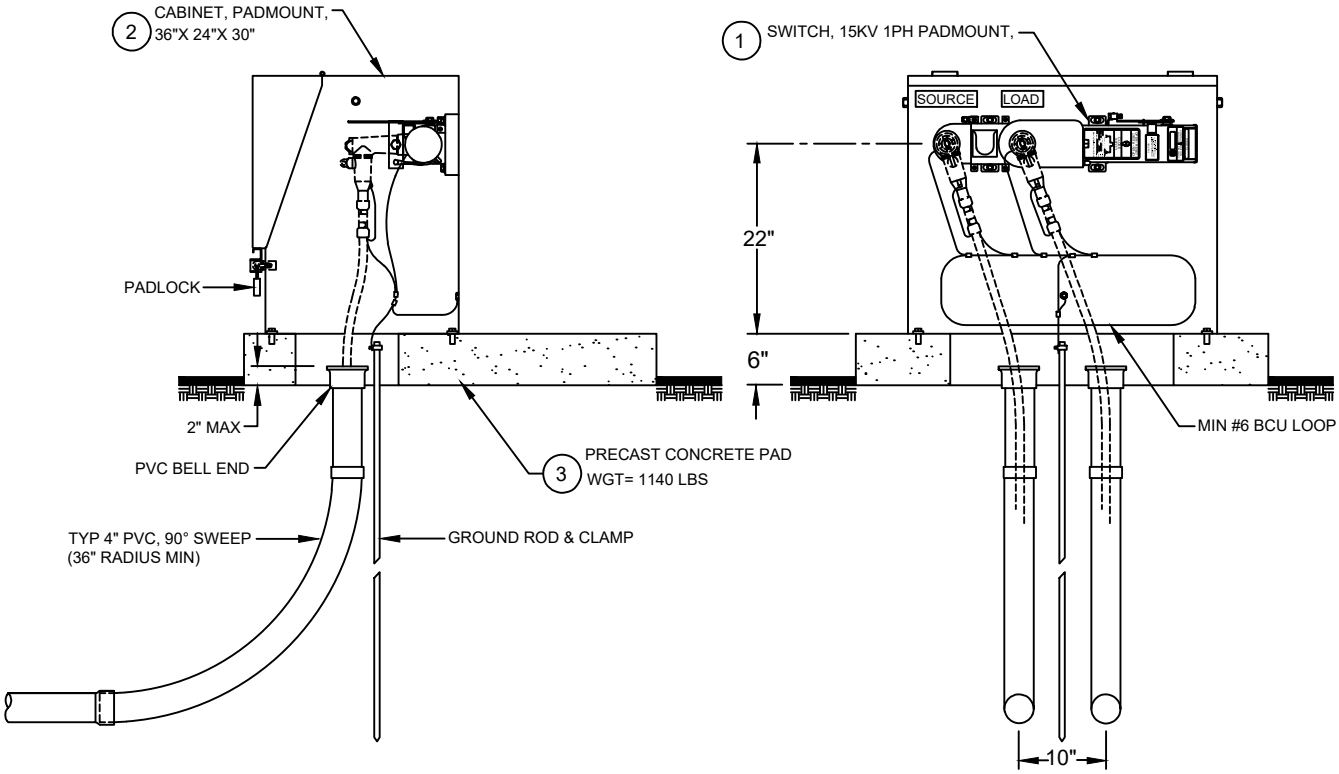
12. CT metering conduits, when required, shall be 1-1/4" size from the transformer pad or CT cabinet to the meter socket, either GRC or schedule 40 PVC, with all exposed above ground lengths to be GRC terminated with grounding bushings bonded to local ground electrodes.

CITY LIGHT & POWER

INTERRUPTER SWITCH, 15KV, 1-PHASE, 200A

(TYPICALLY USED/SET FOR 100A FEEDER PROTECTION)

(PADMOUNT OPTION)



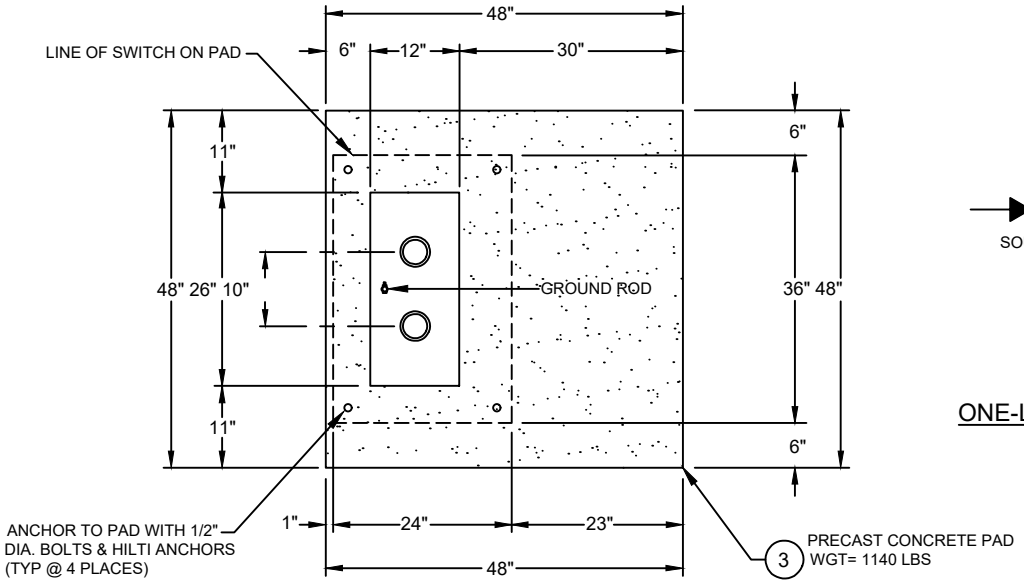
RIGHT SIDE VIEW

FRONT VIEW

(CABINET DOOR REMOVED FOR CLARITY)

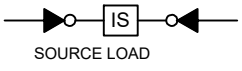
NOTES:

1. Bond primary cable concentric neutrals, bushing insert ground tab & elbow ground to the ground loop.
2. Cabinet to be bolted to pad at 4 locations (see drawing).
3. Switch & cabinet weight= 120 lbs.
4. NESC Rule 384C: Bond all above ground metallic supply and communication enclosures that are separated by 6 feet or less. Use minimum #6 bare copper wire direct buried a minimum 18" below grade, to a suitable bolted or screw connection that can be temporarily opened when locating cables. Treat open ground connections as energized!
5. Remove lifting lugs/ bolts after switch installation.



PLAN VIEW

SWITCH ON PAD



DETAILED

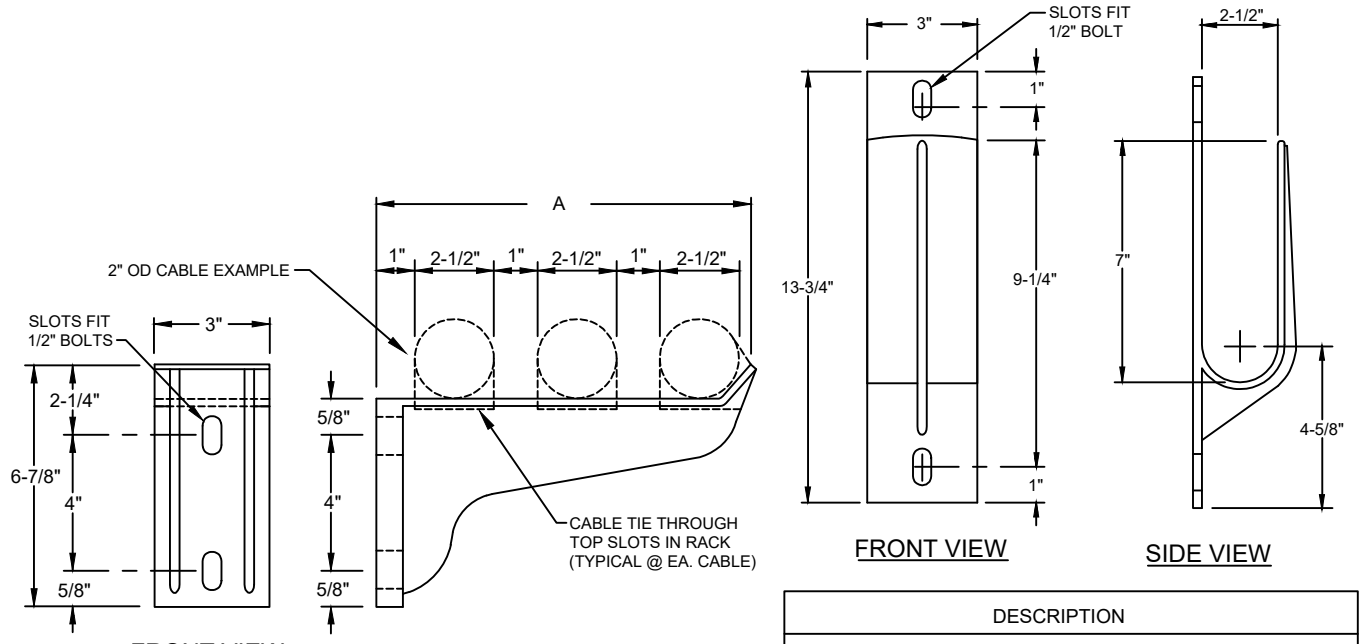
SIMPLIFIED

ONE-LINE DIAGRAMS

CITY LIGHT & POWER

INSTALLATION NOTES FOR 6' X 12' (OR LARGER) VAULTS

1. It will be the manufacturer or vendor's responsibility for delivery and setting of the vault in a previously prepared excavation. City Light and Power crews will aid in the installation. Coordination of the delivery of the vault shall be worked out by a representative of City Light and Power and the supplier.
2. Floor of vault to be level when installed with lid adjusted to final grade.
3. The manufacturer/vendor shall supply "Ram-Nek", 1-1/2" minimum width, with pre-formed gasket for joining vault sections (6' x 12' or larger 2-piece vaults). Lids are excluded from gasketing.
4. The seam between two 6' x 12' (or larger) vault lids shall be sealed with silicone caulking after all cable is pulled and equipment is installed by City Light and Power.
5. All conduits will be fitted with bell ends and grouted at knockouts.
6. Commercial installations will be grouted at knockouts if required unless seated into termiducts cast into newer vaults.
7. Cable locating test station in precast concrete vault lid: remove one stainless steel nut from stainless steel bolt, loop #6 copper wire around bolt. Apply silicone sealant around nut area on exterior side of test station for waterproofing. Install jam nut and tighten with proper tools. Bond #6 CU wire to system neutral with proper compression connector crimp. This will provide Central Locating with an above-ground attachment for locating underground primary cables.

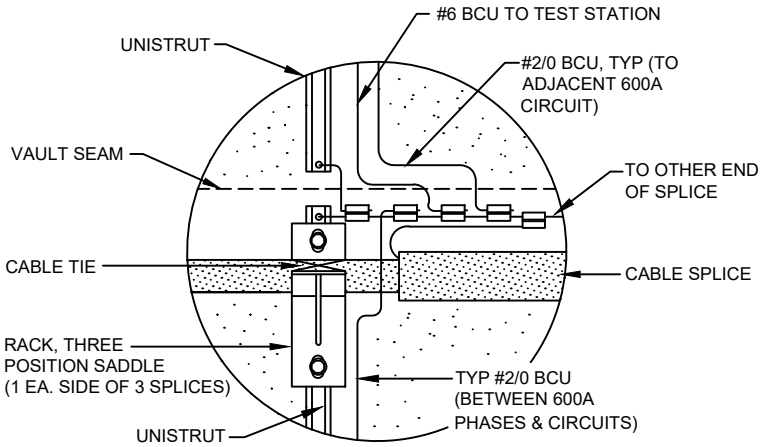


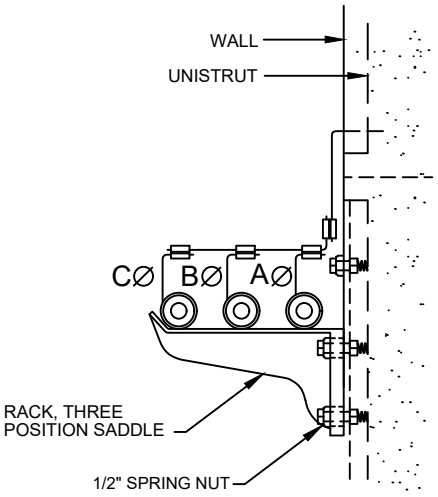
DESCRIPTION
RACK, CABLE, SINGLE SADDLE, NYLON, 2-1/2

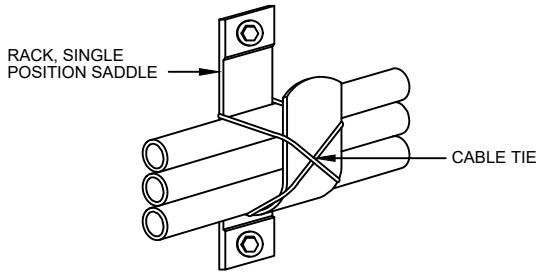
DESCRIPTION	A	VERTICAL LOADING
RACK, CABLE HORIZONTAL, 3 POSITION, NYLON, 2-1/2"	11"	300 LBS. MAX
RACK, CABLE HORIZONTAL, NYLON, 18" X 3"	18-3/4"	200 LBS. MAX

NOTE:
1. See SC 5.2 for Underground Identification Guide (Vault Labels and Signs).
2. Cable racks are typically used for supporting 15kV or 35kV cable and splices in underground vaults.

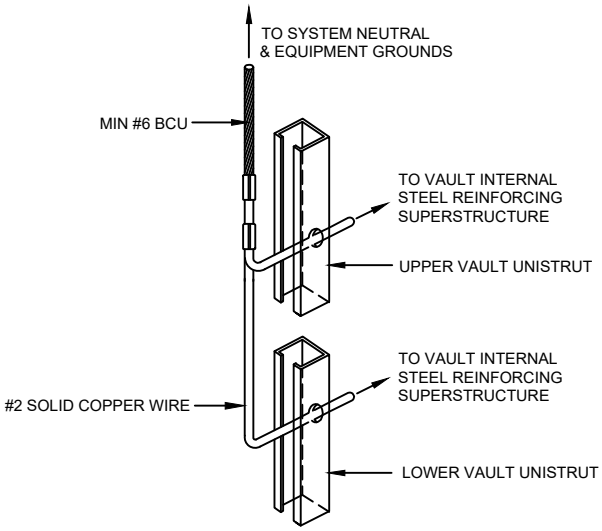
CABLE SUPPORT & GROUNDING DETAILS



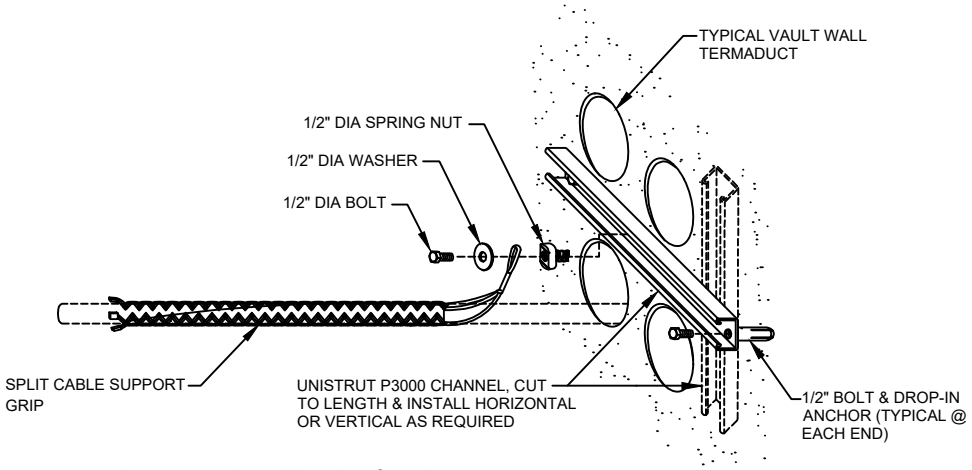




CABLE SUPPORT RACK
(Two each wall per 3-Phase 600A Circuit, Typ)



TYPICAL VAULT GROUNDING ELECTRODE
(One at Upper and Lower Vault Connection)



NOTES:
1. Install split cable grip on each cable at "uphill" side of vault.

CABLE SUPPORT AT SLOPING GRADES
(To prevent cable sliding downhill when vaults are
installed at significant grades)

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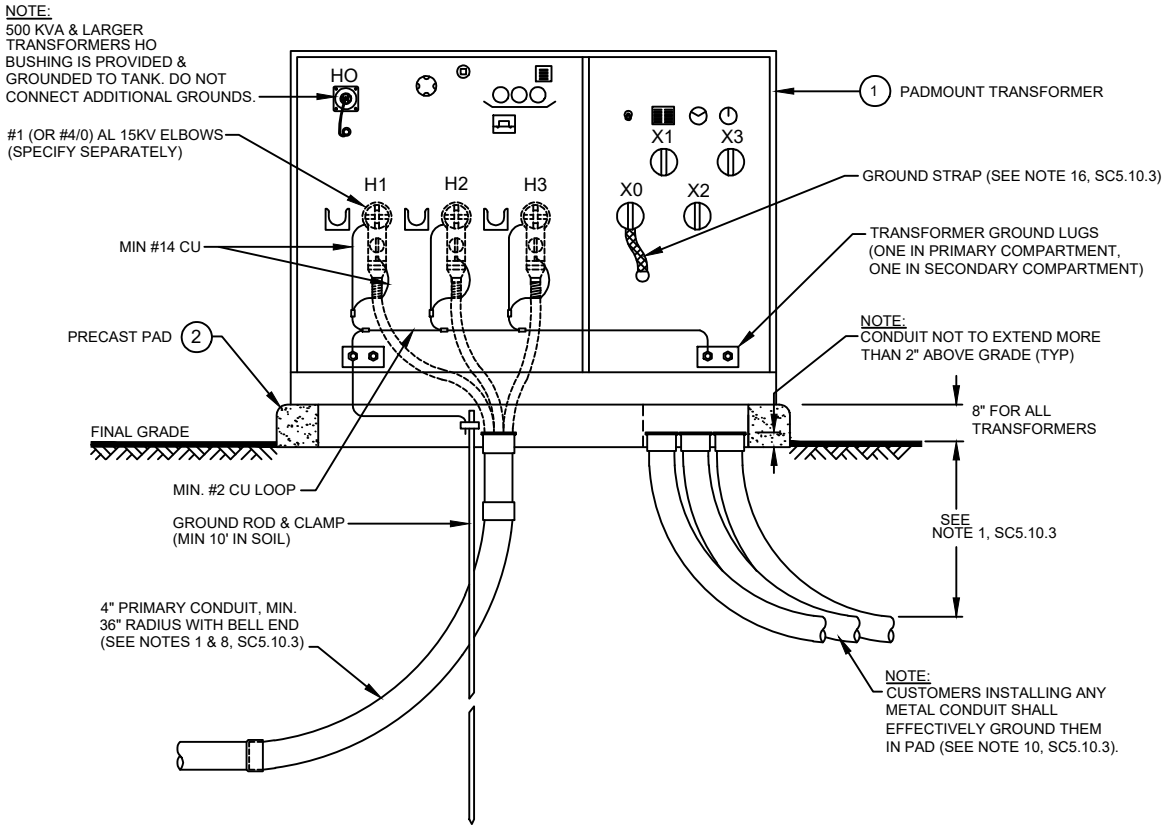
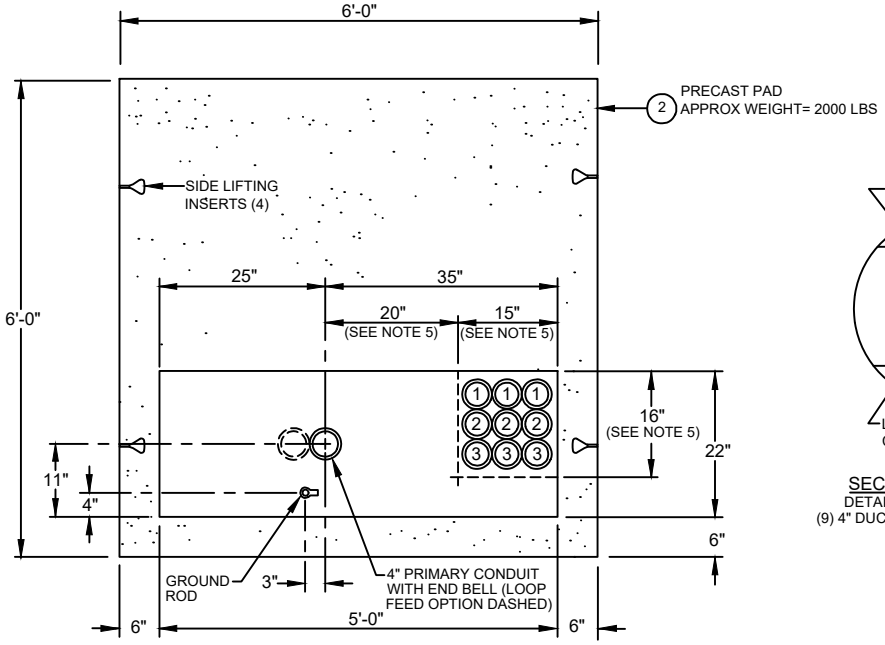
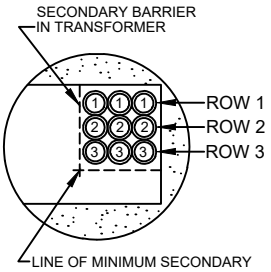
RADIAL FEED OPTION





TOP VIEW
45-150 KVA
PAD & CONDUIT DETAILS

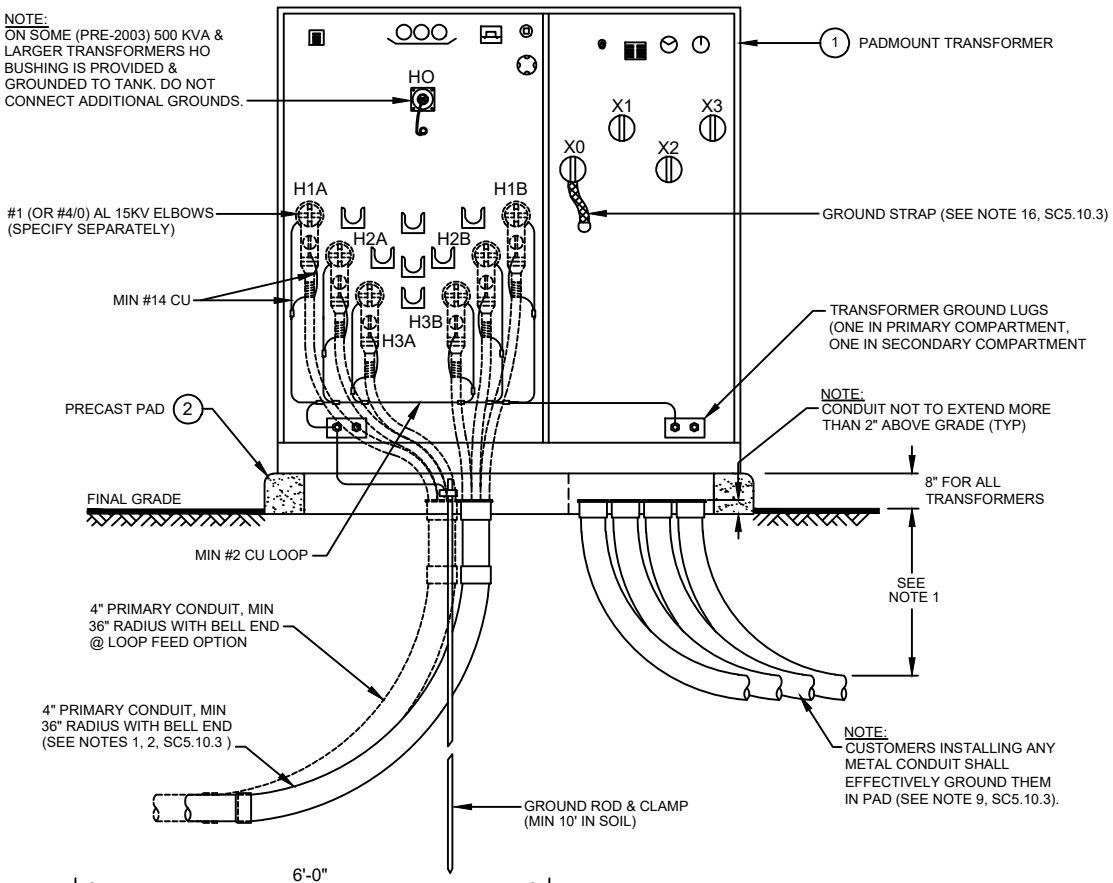


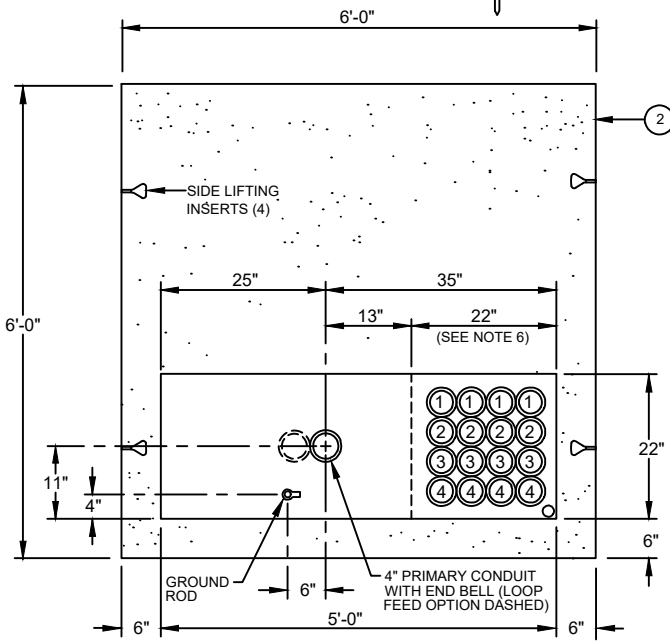
SECONDARY CONDUIT DETAIL
DETAIL SHOWN IS BASED ON MAXIMUM (9) 4" DUCTS WITH BELL ENDS (SEE NOTE 3, SC5.10.3)

CITY LIGHT & POWER

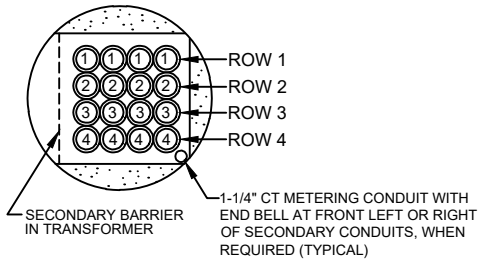
SC5.10.1	PADMOUNT 12.47KV 3-PHASE TRANSFORMER INSTALLATION	APPROVED AS OF 12/1/2016

LOOP FEED OPTION





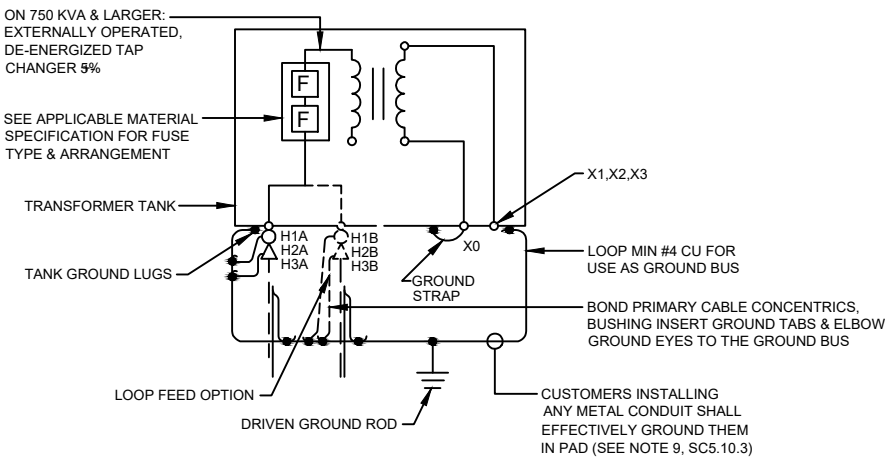
TOP VIEW
300-2500 KVA (208-480V)
PAD & CONDUIT DETAILS



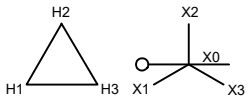
SECONDARY CONDUIT DETAIL
DETAIL SHOWN IS BASED ON MAXIMUM
(16) 4" DUCTS WITH BELL ENDS (SEE NOTE 3, SC5.10.3)

CITY LIGHT & POWER

SC5.10.2	PADMOUNT 12.47KV 3-PHASE TRANSFORMER INSTALLATION	APPROVED AS OF 12/1/2016



ONE LINE SCHEMATIC



PHASOR DIAGRAM

NOTES:

1. All conduits shall be installed per City Light and Power service connection manual. Refer to SC 5.7 for primary conduit, and SC 5.5 for primary/secondary conduit depths, trench backfilling and compaction, and pad requirements.
2. For radial feed installation of a loop-type transformer, both primary conduits shall be installed. If one is not used, it shall be stubbed and capped at least 2' out from the front edge of the pad with an 8" UG marker installed above the end.
3. Placement of multiple secondary conduits shall be by rows from back to front, example: row 1 first, then row 2, etc. Fill back row first prior to starting the next row forward, filling front row last or used for future use.
4. Do not pour concrete in the conduit window opening unless an older style transformer is issued (see note 6). Pea gravel may routinely be used as a filler if needed.
5. For 45-150 kVA transformers, frame 9 secondary conduits maximum (3 rows of 3 conduits). Each row to fit within 15" maximum width from right side of window opening, and within 16" maximum depth from back side of window opening. The distance from the secondary compartment to the center of the primary conduit shall be 22" maximum, 10" minimum. This framing arrangement works with both current and older style transformer secondary compartment dimensions.
6. For 300-2500 kVA older style transformers, frame 16 secondary conduits maximum (4 rows of 4 conduits). Each row to fit within 22" maximum width from right side of window opening, and within 22" maximum depth from back side window opening. This framing arrangement works with current style transformer secondary compartment dimensions.
7. Minimum radius of 4" primary conduit vertical bend shall be 36". Utility inspector may require 48" radius GRC bend if necessary for longer pulling length.
8. CLP Engineer to specify for pads poured-in-place when access with precast pad is not available.
9. NESC-314B: Conductive-material ducts and riser guards that enclose electric supply lines, or are exposed to contact with open supply conductors, shall be effectively grounded.
10. When terminating three phase loop feed transformers, cables using conduit on the left side shall be terminated to the HxA bushings. Cables using conduit on the right side shall be terminated to HxB bushings to prevent crossing of primary cables.
11. All secondary conductors shall be installed and terminated per City Light and Power SC 5.12.
12. Leave slack in secondary and primary cables to permit transformer removal and replacement for maintenance, train primary cables to permit parking elbows.
13. Leave sufficient slack on concentric neutrals to allow removing elbows without disconnecting neutrals.
14. Ground loop in all cases shall be installed in front of primary cables.
15. CAUTION: Ground strap on neutral bushing shall remain connected to tank in all cases (except for XO bushing in special cases, such as 2400V motor loads), tank will be energized to primary voltage if primary neutral tank grounds are disconnected and one open primary phase exists on the source side of the transformer without H0 bushings.
16. NESC Rule 384C: Bond all above ground metallic supply and communication enclosures that are separated by 6 feet or less. Use minimum #6 bare copper wire direct buried a minimum 18" below grade, to a suitable bolted or screw connection that can be temporarily opened when locating cables. Treat open ground connections as energized!

CITY LIGHT & POWER

TRANSFORMER SECONDARY SPADE CONNECTIONS

1. All compression or mechanical connectors shall be listed for use on AL and CU.
2. All secondary connections to padmount transformers shall be made with plated 1/2" medium carbon steel bolts, heat treated, quenched and tempered equal to ASTM A-325 or SAE grade 5.
3. Nuts shall be plated 1/2" heavy semi-finished hexagon, conforming to ANSI B-18.2.2, threads to be unified course series (UNC), class 2B.
4. Flat washers shall be plated steel, a plain standard WIDE series with min. O.D. of 1-5/8", conforming to ANSI B-27.2. SAE or narrow series washers shall NOT be used.
5. Spring-type (Belleville) disc washers shall be as follows: O.D. = 1-5/8", thickness = 0.140", normal load to flat = 3000 lbs. min., torque to flat. Bolts shall be tightened until an increase in torque is felt, in this manner no torque wrench is required and spring (Belleville) washer will be flattened.
6. Hardware shall be assembled as shown in Figures 1 & 2, with the sequence of connections starting from the back first as shown in Figure 3.
7. All hardware shall be lubricated with a suitable joint compound before tightening.
8. Back-up wrenches shall be used to tighten all hardware, bolts shall be tightened sufficiently to flatten spring washer and left in that position.
9. All multi-cable socket blocks or multi-hole connectors shall meet ANSI C119.4 Class A requirements and have NEMA spacing using 1/2" bolts as shown in Figure 3. Connectors shall have two spade holes per position and be listed as transformer type. 1/2" bolts must be used for all available connector spade holes. Junction box connectors are not allowed. No secondary transformer spade holes shall be covered by overlapping of customer's/contractor's lug connector(s). If overlapping does occur then the customer's/contractor's lugs holes will have to be drilled to a 1/2" hole by the customer/contractor to conform to the bolt specs in this section.
10. Bus bar extension (when required on retrofits) shall be in the vertical position only, using four bolt NEMA spacing. Bus bar material to be tin plated aluminum or copper.
11. Solid bus bar or bus way (when used) shall have a flexible expansion coupling between the bus and the transformer spade with the bus supports as required by the NESC to carry all weight of the bus.
12. Transformer spades and cantilever support assemblies shall NOT be drilled or altered, (defacing of spade or supports will result in refusal by CLP representative until spade/supports are replaced on a time and material cost and proper connections are made).
13. All connections shall be inspected by City Light and Power representative before energizing.

TABLE 1
STANDARD / MAXIMUM BUSHING HOLE QUANTITIES

KVA	208Y/120	480Y/277 AND HIGHER
45-300	4 STANDARD, 16 MAXIMUM	4 STANDARD, 16 MAXIMUM
500	6 STANDARD, 12 MAXIMUM	4 STANDARD, 16 MAXIMUM
750-1500	12 STANDARD, 20 MAXIMUM	6 STANDARD, 12 MAXIMUM
2000-3750	N/A	12 STANDARD, 20 MAXIMUM

CITY LIGHT & POWER

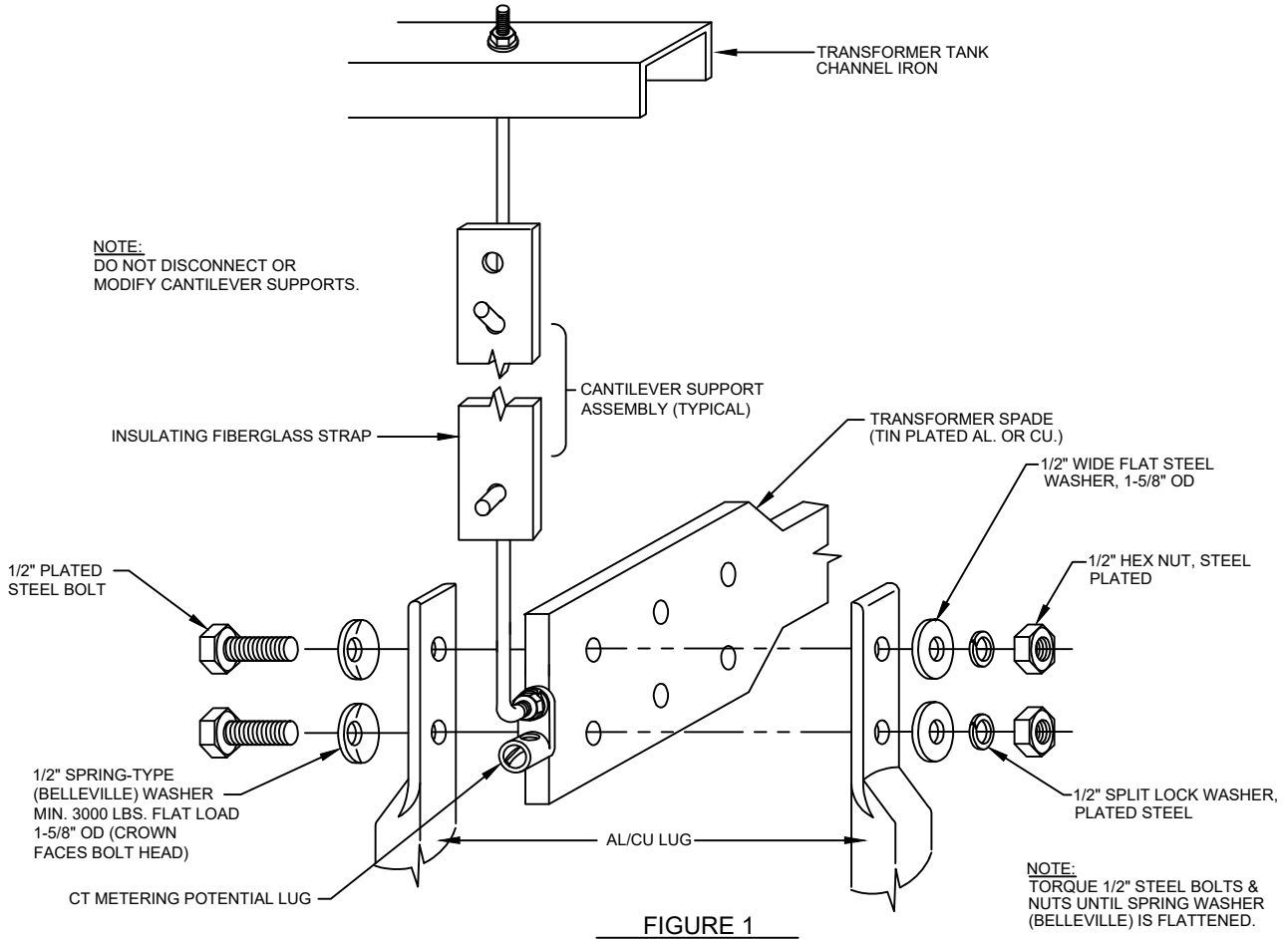


FIGURE 1
HARDWARE ASSEMBLY &
TYPICAL CANTILEVER SUPPORT

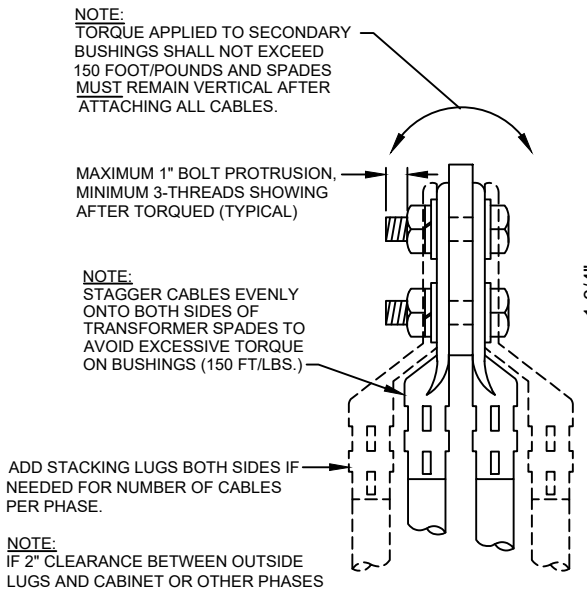


FIGURE 2
STACKING TERMINALS

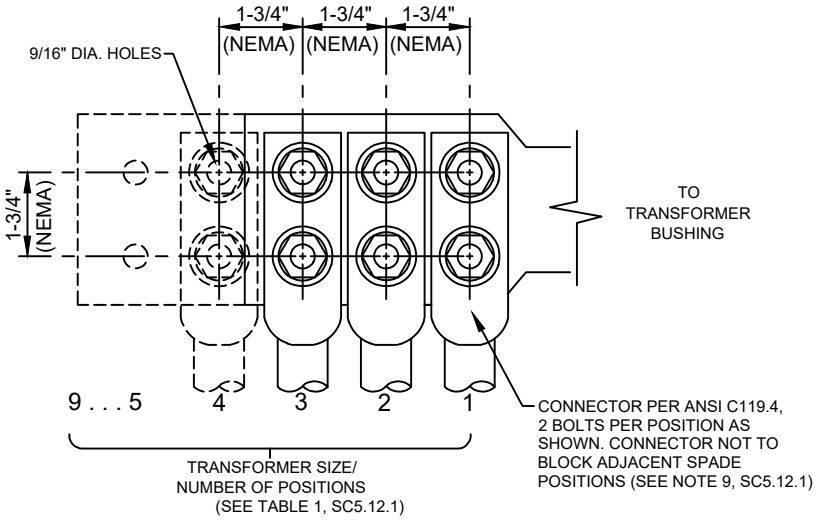
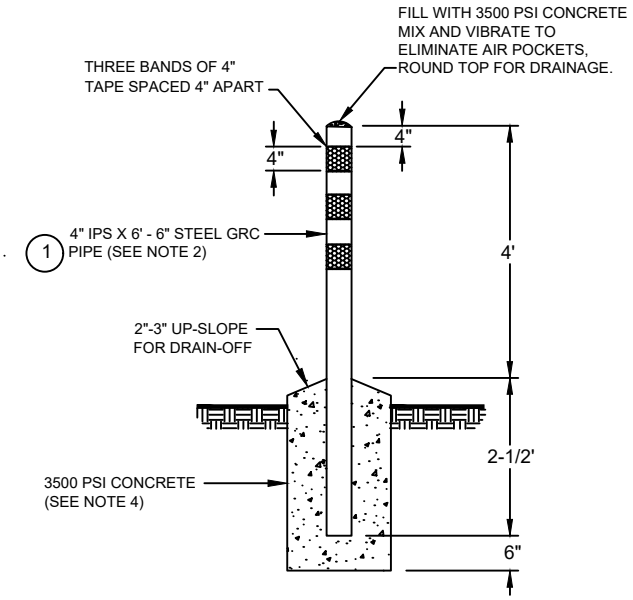


FIGURE 3
SPADE BOLT PATTERN &
SEQUENCE OF SECONDARY
CABLE CONNECTIONS

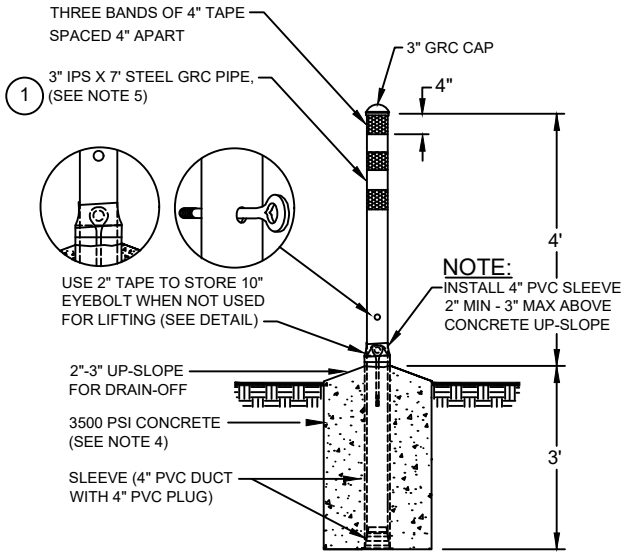
CITY LIGHT & POWER

SC5.11.2	TRANSFORMER SECONDARY SPADE CONNECTION	APPROVED AS OF 12/1/2016



CONCRETE-FILLED
PIPE BUMPER POST

THIS IS NON-PREFERRED POST AND WILL BE USED ONLY WHEN SCREW-IN BUMPER POST CANNOT BE USED.



REMOVABLE
CAPPED-PIPE BUMPER POST

THIS POST IS USED BETWEEN PERMANENT POSTS WHEN THE DISTANCE BETWEEN THE PERMANENT POSTS EXCEED 6' AND POST PLACEMENT MAY INTERFERE WITH EQUIPMENT OPERATION.

NOTES:

1. Bumper posts to be installed plumb and level across the tops from one to another when two are used.
2. Use scrap 4" GRC pipe and paint with two coats of silver paint, unless conduit piece is new.
3. Dig 20" x 36" hole- conduit to be centered in hole.
4. Concrete for anchoring posts to be 3500 psi T&D Mix #2, approximately 8.3 Cu.Ft./Pole.
5. For removable post assemble with scrap 4" PVC duct sleeve, 10"x1/2" eyebolt, 4" PVC pipe plug, 2" black tape and 4" orange reflective tape as shown.
6. Use bands of reflective tape on top of posts to warn motorists, cyclists, etc. The first band should be no lower than 4" from the top of the post.
7. Intermediate posts across at least one side (preferably the front) of the apparatus shall be of the removable type, all others can be permanent.

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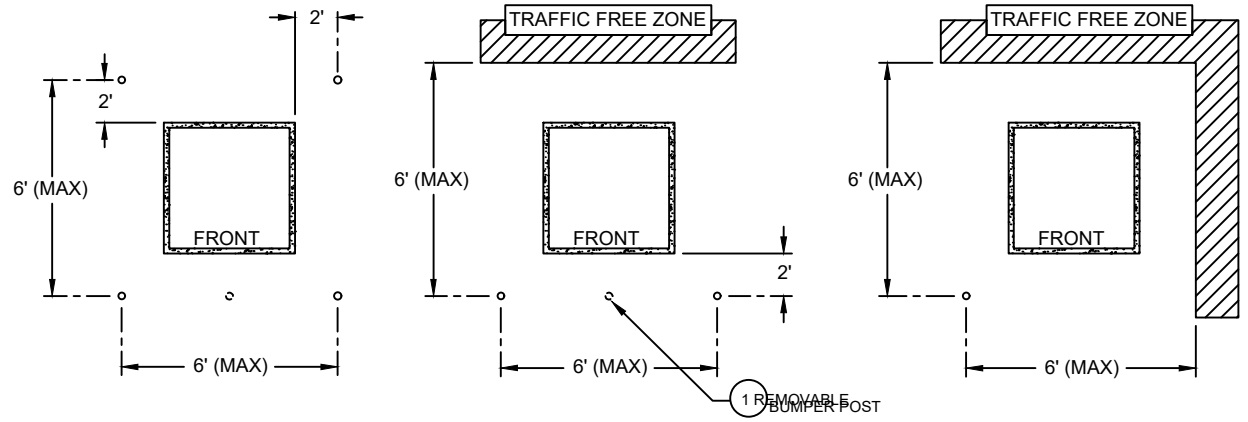
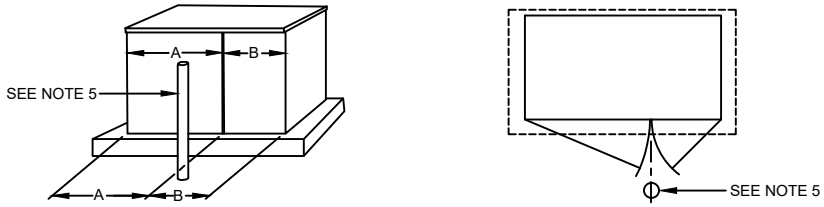


BUMPER POST PLACEMENT
AROUND PADMOUNT APPARATUS



REMOVABLE BUMPER POST PLACEMENT

NOTES:

1. Barrier posts shall be set at the corners of pad-mounted apparatus adjacent to traffic areas. The posts are to be placed a minimum of 2' to the side and 2' from the corner of the concrete pad and will allow the door(s) of the apparatus to be opened to the locking positions.
2. If the distance between two corner posts exceeds 6', an intermediate post(s) should be added between the existing posts.
3. Intermediate posts across the front of the apparatus shall be of the removable type to allow full access to the apparatus.
4. If the distance between the corner of the apparatus and the traffic free area exceeds 6', a barrier post will be installed at the corner of the apparatus adjacent to the traffic free zone.
5. Intermediate (removable) posts shall be placed in line with equipment doors so as not interfere when doors are fully opened.

CITY LIGHT & POWER

PLACEMENT FOR PADMOUNTED OIL-FILLED EQUIPMENT

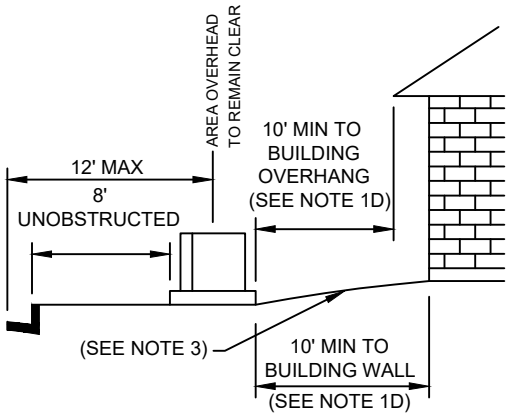


FIGURE 1

NOTES:

**1. Clearance requirements for oil filled transformers or other oil filled equipment:

* A. >12' clear area in front (door opening).
* B. 2' clear area on both sides.
* C. Equipment is to be clear of all overhead obstructions.
* D. This dimension may be reduced to 3 feet if the building wall and any overhang are made of brick, steel, tile, slate, or other non-combustible material approved by local fire protection officials, and the building wall has no windows, air intakes, vents, stairs, doors, or other wall openings within 10' of the pad measured horizontally. Contact Field Engineering for help to design a suitable fire resistant barrier in cases where this clearance cannot be obtained.

2. 12' maximum distance from a drivable surface.
3. In the event of an oil leak (possible fire hazard), a gradual slope in the land is required from the building/structure to the padmount transformer.

*Measurements from pad or equipment, whichever is closer.
**Refer to Note J insulating fluid requirements.

NON-COMBUSTIBLE WALLS

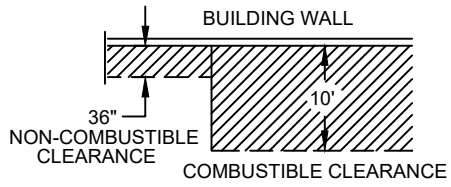


FIGURE 2

The minimum allowable clearance from a non-combustible wall to padmounted oil filled equipment is 36" when no additional consideration must be given for doors, fire escapes, air intakes, windows or combustible materials (see Figure 2).

Materials such as steel, iron, brick, tile, concrete, slate, and asbestos are considered non-combustible. Additional materials may be developed that are considered to be non-combustible, however, these materials may only be used when defined as non-combustible by the local fire protection district.

COMBUSTIBLE WALLS

The basic minimum clearance from a combustible wall to padmounted oil filled equipment is 10 feet (See Figure 2). If it is impossible to meet this clearance, the construction of a fire resistant barrier either physically attached to the wall or free-standing and separating the equipment from the wall is permissible (see Fire Resistant Barriers, pages 2 & 3).

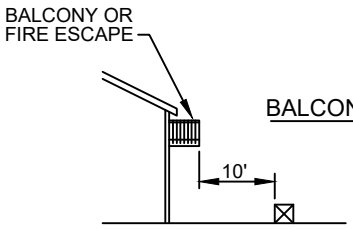


FIGURE 3

BALCONIES, FIRE ESCAPES OR OTHER OVERHANGS

For a balcony, fire escape, or overhang, the minimum clearance shall be 10 feet from the farthest projection of the overhang to the ground. No padmounted device shall be located under any overhang that will prevent the use of equipment normally used for installation or changeouts.

ADDITIONAL RESTRICTIONS FOR DOORS/FIRE EXITS, AIR INTAKES, AND WINDOWS/OTHER OPENINGS

The following restrictions are in addition to the basic clearances above. The drawings that follow are shown with a non-combustible wall. For combustible walls, the 10 foot clearance or a fire resistant barrier must be used. The equipment shall not face the building and a minimum of eight feet shall be maintained from the equipment doors to any obstruction. Side clearances must always be maintained (continued SC5.14.2).

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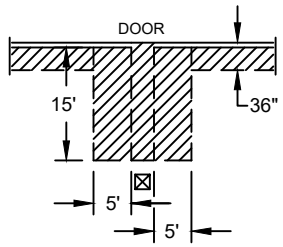
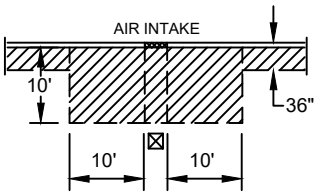
DOORS AND FIRE EXITS



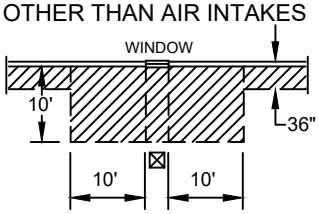
Oil filled equipment shall not be located within a zone extending 15 feet outward or 5 feet to either side of a doorway or fire exit.

AIR INTAKES



Oil filled equipment shall not be located within a zone extending 10 feet outward or 10 feet to either side of air intake vents for a building.

WINDOWS OR OPENINGS OTHER THAN AIR INTAKES



Oil filled equipment shall not be located within a zone extending 10 feet outward or 10 feet to either side of a window. Every effort should be made to maintain these clearances.

In some situations, the clearance for windows shown above may be impossible to obtain. If the preferred clearance can not be obtained, it may be reduced to a minimum of 36" from the building wall provided the following additional requirements are met:

1. All windows shall be considered combustible.
2. Oil filled equipment shall not be placed below an operating window. There shall be NO exceptions.
3. If a window is non-operating and in a non-combustible wall, then the bottom of the window must be located twice the height of the oil filled equipment above the ground.
4. Non-operating windows in a combustible wall must also be located twice the height of the oil filled equipment above the ground and a fire-resistent barrier must be utilized.

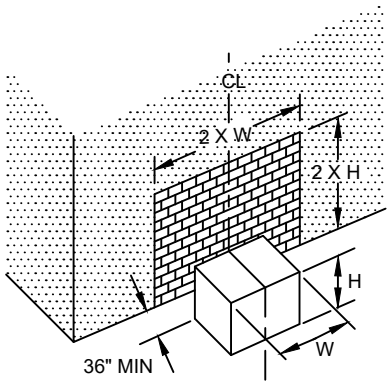
FIRE RESISTANT BARRIERS

In locations where basic clearances can not be met, a fire resistant barrier shall be installed either by the customer or at the customer's expense to reduce the required clearance to combustible walls, doors, air intakes or windows. The barrier shall be constructed of a non-combustible material certified to have a 2 hour fire rating. It shall be of sufficient strength and have stability to resist tipping and satisfy local building ordinances. If a specific ruling regarding fire ratings is necessary, contact the local fire protection district. The customer will coordinate the construction and location of the barrier, however, the customer is responsible for all maintenance. The barrier shall satisfy the following dimensional requirements. Where dimensions are:

H= Height in inches of the oil filled equipment.
W=Width in inches of the oil filled equipment.
A= Height of barrier required to completely shield the door, air intake or window of a building from an equipment fire.
B= Width of barrier required to completely shield the door, air intake or window of a building.
C= Height of barrier required to obtain a projected height of two times the height of the oil filled equipment on the building wall.
D= Width of barrier required to obtain a projected width of two times the width of the oil filled equipment on the building wall.

BARRIER ATTACHED DIRECTLY TO WALL

The height of the barrier shall be twice the height, in inches, of the oil filled equipment. The width of the barrier shall be twice the width, in inches, of the oil filled equipment.



KVA	1-PHASE	3-PHASE	H	W
75-167	X	-	3'	3'
45-500	-	X	6'	6'
750-2500	-	X	6' *	6' *

These dimensions are typical for new 15kV transformers and should be used for estimates only. Actual dimensions of equipment should be verified with Field Engineering after the transformer has been allocated.

* 8' with radiators

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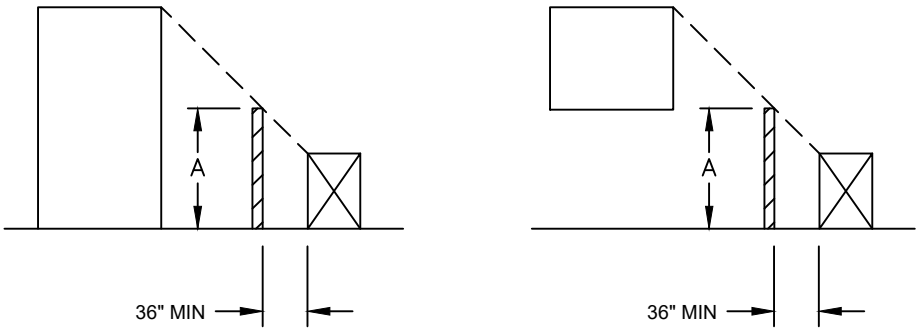
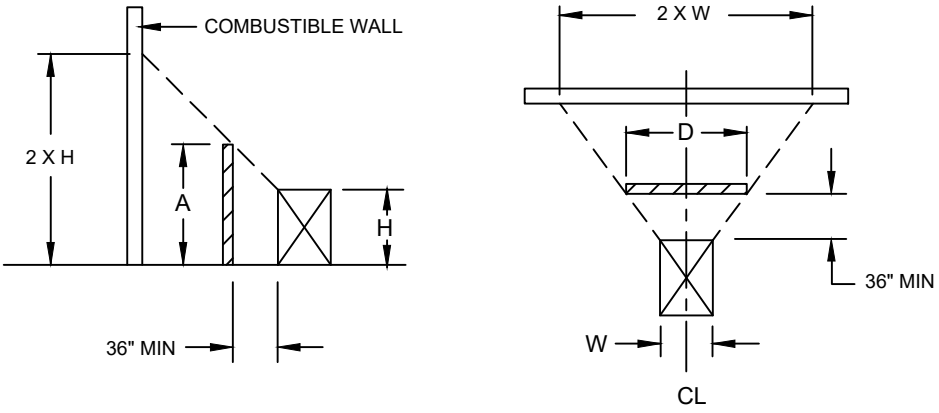
BARRIER SHIELDING OF DOORS, AIR INTAKES OR WINDOWS



FRONT VIEW

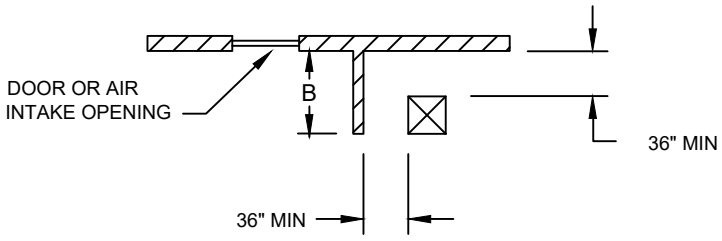
BARRIER SHIELDING OF COMBUSTIBLE BUILDING WALLS



SIDE VIEW

TOP VIEW

NON-COMBUSTIBLE WALL



TOP VIEW

CITY LIGHT & POWER

SC5.13.3	OIL-FILLED EQUIPMENT CLEARANCES FROM BUILDINGS	APPROVED AS OF 12/1/2016

NOTES:

1. For optimal performance (cooling, reliability, economics, safety) CLP prefers to install padmount transformers in the open with minimal obstruction to airflow and away from occupied buildings as detailed on previous pages. However, to accommodate a customer's desire for aesthetic screening, CLP allows enclosures to be built/maintained at customer expense around padmount installations when the following guidelines are met:

A. Such enclosures are bulit on private property outside of street right-of-ways, platted/dedicated easements, or restrictive utility easements. Enclosures are structurally sound and built to required local building codes.

B. For fences/enclosures along 2 or more sides of a padmount transformer, a minimum clear space measuring 3' horizontally from the edge of the pad will be required to the inside of enclosure walls on all sides. With Springs Utilities 1' radiator/pad overhand limit, this leaves at least 2' of clear space for worker access around all sides and allows for movement of cooling air.

C. A gated opening is permitted along the front (operating side). Gates shall provide a minimum opening at least 10' wide for full operating/removal access to 3-phase padmounts, or at least 7' wide for 1-phase padmounts. In all cases, at least 8' of clear space is required in front of each pad for adequate hotstick operating space. A minimum 2' wide exit route shall remain clear when gates are in their fully opened position. Gates shall remain free of locks that would inhibit access by utility personnel. Gates shall provide ventilation openings either by being constructed of mesh, bar, louver, or similar ventilating material, or if solid, by a 6" gap above grade to the bottom of the gate.

D. When constructed of conductive materials, walls/gates shall be bonded to the transformer LV neutral/ground with a minimum #6 bare copper buried at least 6" below grade.

E. For adequate air circulation and cooling of the transformer, the top of the enclosure shall remain open. Additionally, both end walls and the back shall have air ventilation openings provided at 6"-18" above grade equivalent in cross-sectional area to one 6" x 12" opening every 2 feet of fence/enclosure length inside and evenly spaced along the full length.

F. Customers shall maintain/clear the area immediately adjacent to these air-vents, i.e. no material storage, trash bins, vegetation, weeds/grass or other debris shall be allowed to block free air flow through the required vents.

G. Such enclosures (with vent openings near the bottom) can also serve as fire barriers when they meet all other requirements for that application.

H. Trash dumpsters/bins will not share the same enclosure with padmount transformers, i.e. they will have a wall between and separate gate/access opening.

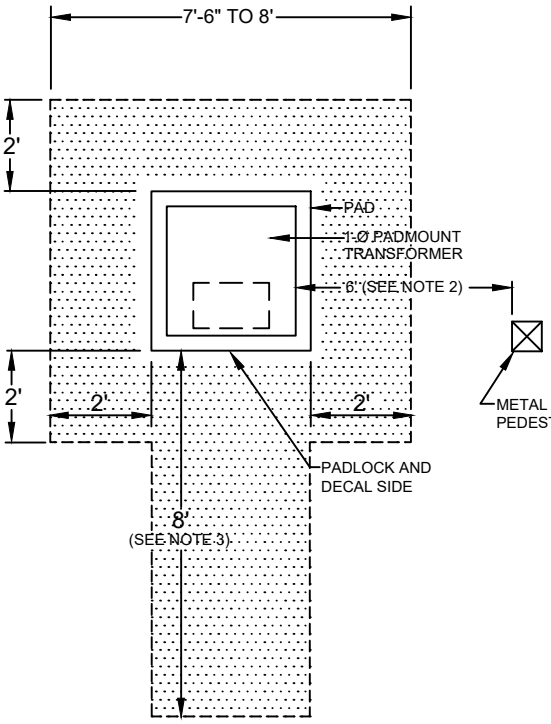
I. Maximum distance from pad and opening to paved access drive area shall be 12 feet for small kVA sizes and proportionally closer for larger transformers. This shall provide clear access by boom truck for transformer removal and replacement through the opening.

J. Transformer Rating: Recommended Minimum Distance From Buildings for Mineral-Oil Filled Transformers
(If distances do not meet below requirements, specify FR3 fluid.)

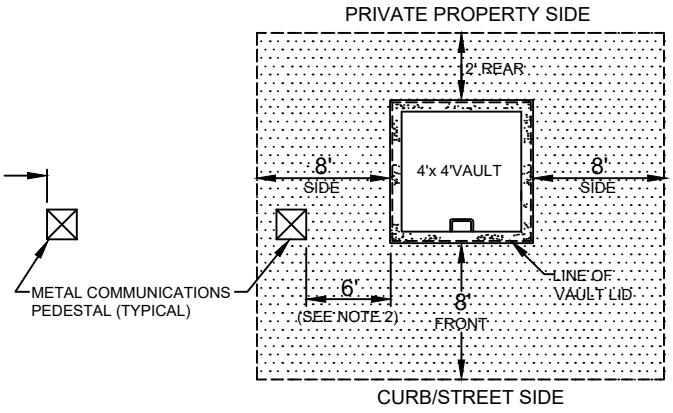
75 kVA or Less: 10-ft
76-333 kVA: 20-ft
More Than 333 KVA: 30-FT

CITY LIGHT & POWER

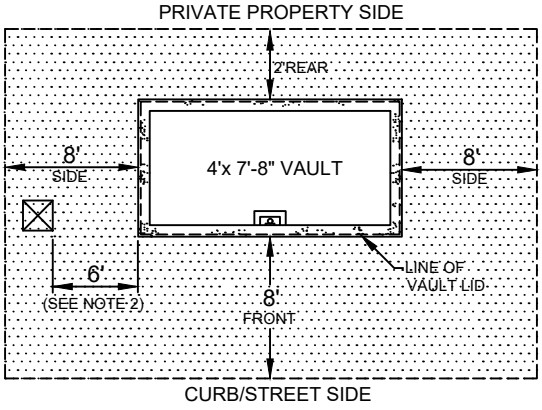
15kV 200 AMP 3-PHASE OR 1-PHASE CLEARANCES



15/35kV 1-PHASE PADMOUNT TRANSFORMER CLEARANCES



4' X 4' VAULT



4' X 7'-8" VAULT

NOTES:

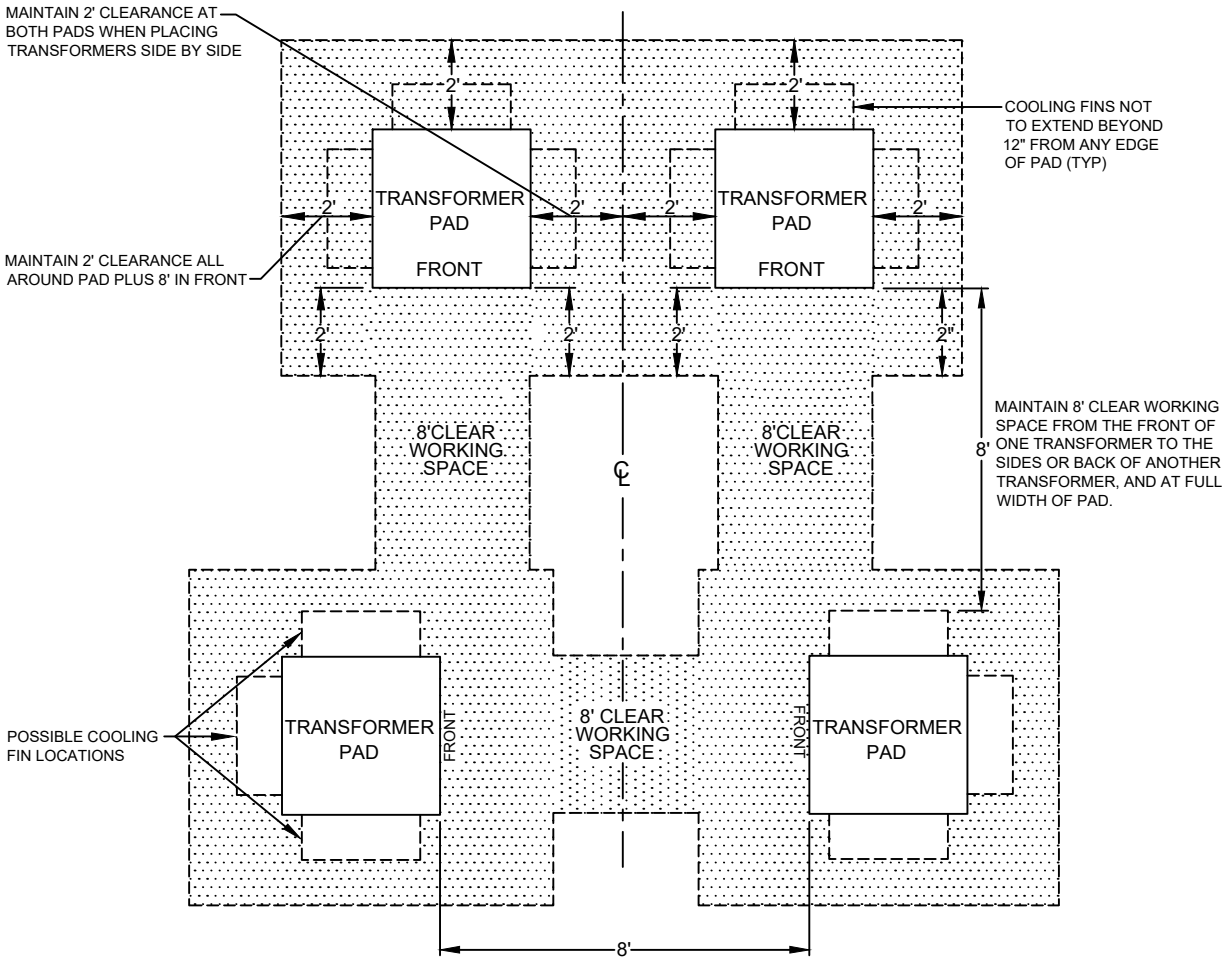
1. In the event of an equipment failure or power outage, it is necessary for utility crews to have adequate access to vaults and padmount equipment for safe operation and repair work. Access to the operating sides shall be 8 feet, access to the non-operating sides/rear shall be 2 feet or as shown. No trees, shrubs, fences, large landscape rocks, or other obstructions shall be permitted in access area. Trees should be planted far enough from equipment so that when they reach maturity, overhanging branches will not obstruct a crane from setting or removing equipment.

2. NESC Rule 384C: Bond all above ground metallic supply and communication enclosures that are separated by 6 feet or less. Use minimum #6 bare copper wire direct buried a minimum 18" below grade, to a suitable bolted or screw connection that can be temporarily opened when locating cables. Treat open ground connections as energized!

3. 2' x 8' clear working area shall be maintained around all transformers, as shown above.

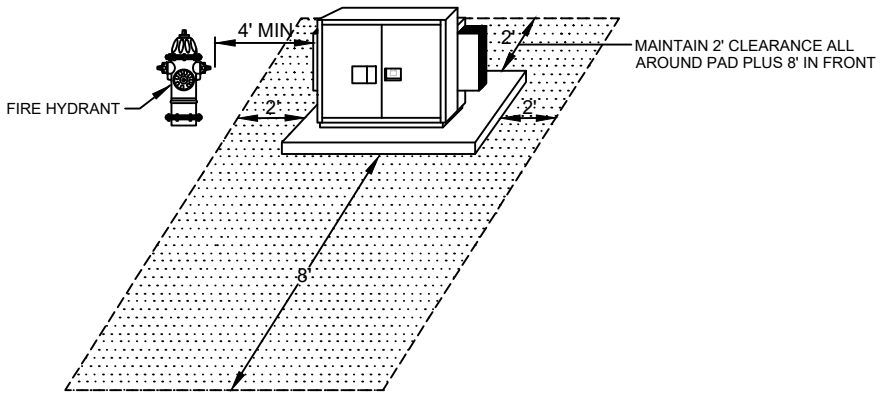
CITY LIGHT & POWER

15kV 3-PHASE PADMOUNT TRANSFORMER CLEARANCES



NOTE:

4. For additional information, see CLP SC5.14 (Oil-filled equipment from buildings.)



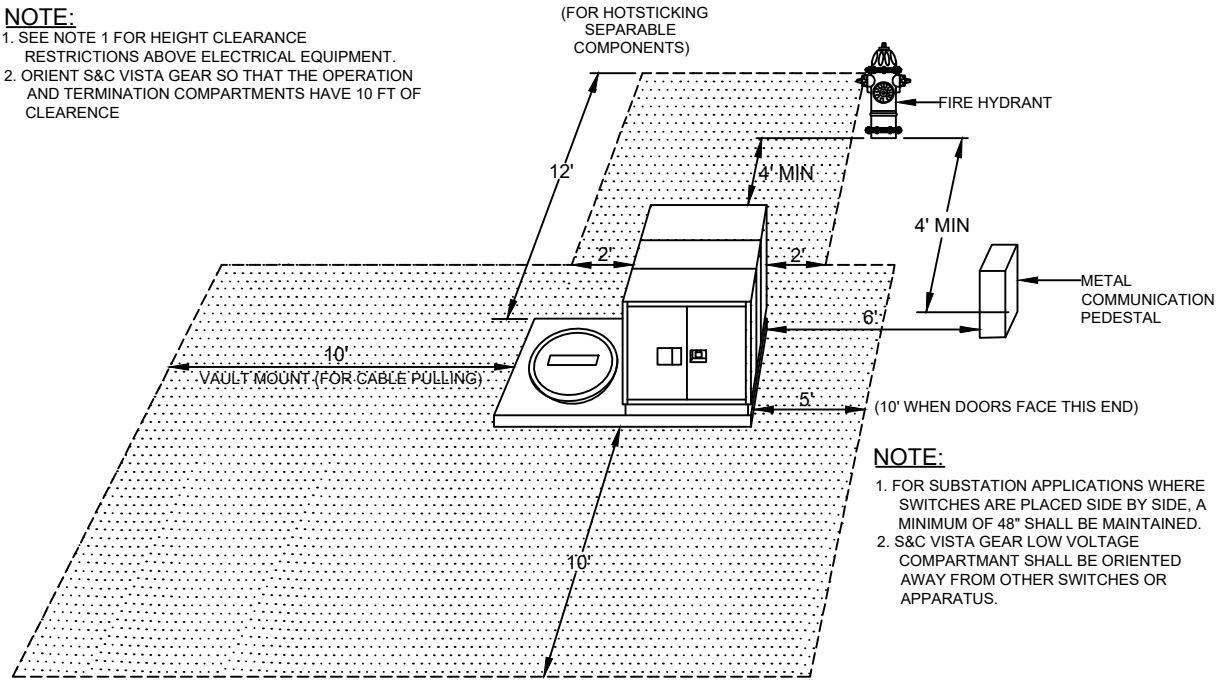
3-PHASE PADMOUNT TRANSFORMER

CITY LIGHT & POWER

SC5.14.2	15kV VAULT & PADMOUNT EQUIPMENT CLEARANCES FOR WORKING SPACE	APPROVED AS OF 12/1/2016

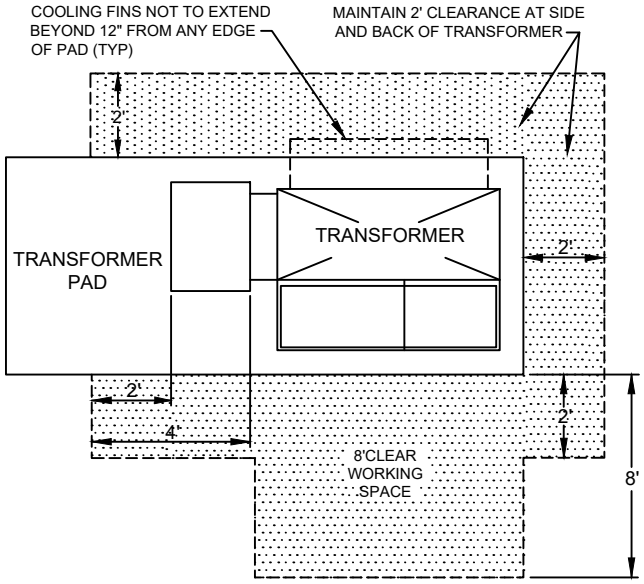
PAD AND VAULT ACCESS CLEARANCES

NOTE:
1. SEE NOTE 1 FOR HEIGHT CLEARANCE RESTRICTIONS ABOVE ELECTRICAL EQUIPMENT.
2. ORIENT S&C VISTA GEAR SO THAT THE OPERATION AND TERMINATION COMPARTMENTS HAVE 10 FT OF CLEARENCE



NOTE:
1. FOR SUBSTATION APPLICATIONS WHERE SWITCHES ARE PLACED SIDE BY SIDE, A MINIMUM OF 48" SHALL BE MAINTAINED.
2. S&C VISTA GEAR LOW VOLTAGE COMPARTMANT SHALL BE ORIENTED AWAY FROM OTHER SWITCHES OR APPARATUS.

15/35kV SWITCH CLEARANCES



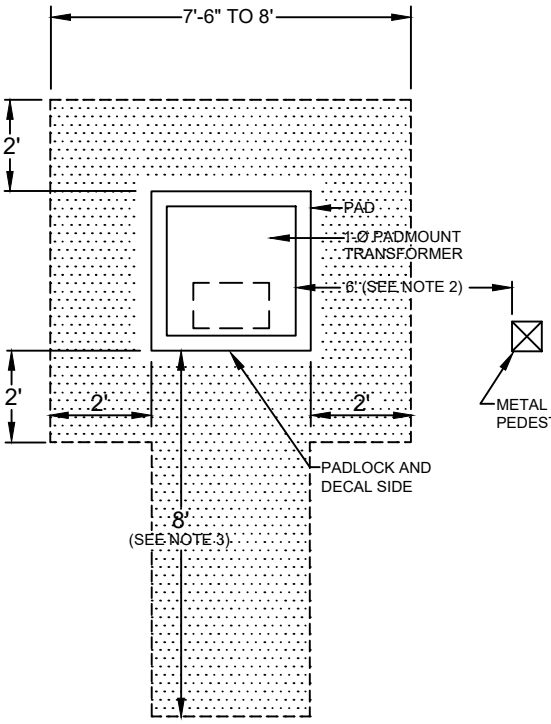
MAINTAIN 8' CLEAR WORKING SPACE FROM THE FRONT OF ONE TRANSFORMER TO THE SIDES OR BACK OF ANOTHER TRANSFORMER AND AT FULL WIDTH OF TRANSFORMER CABLE CABINET

TRANSFORMER CLEARANCES

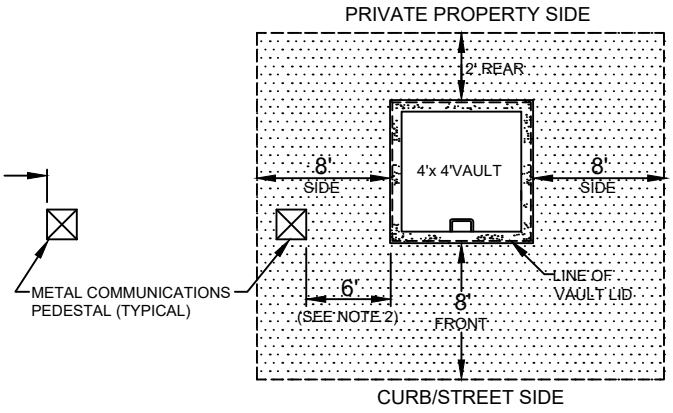
CITY LIGHT & POWER

SC5.14.3	15kV VAULT & PADMOUNT EQUIPMENT CLEARANCES FOR WORKING SPACE	APPROVED AS OF 12/1/2016

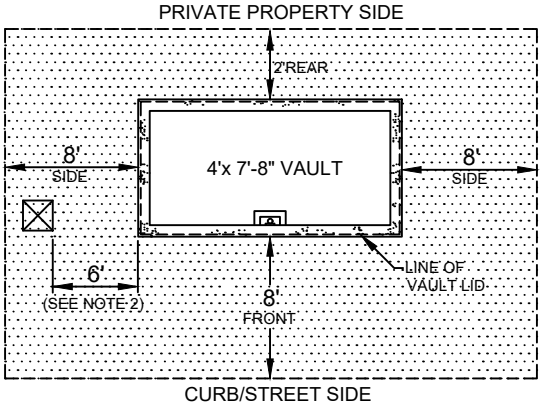
15kV 200 AMP 3-PHASE OR 1-PHASE CLEARANCES



15/35kV 1-PHASE PADMOUNT TRANSFORMER CLEARANCES



4' X 4' VAULT



4' X 7'-8" VAULT

NOTES:

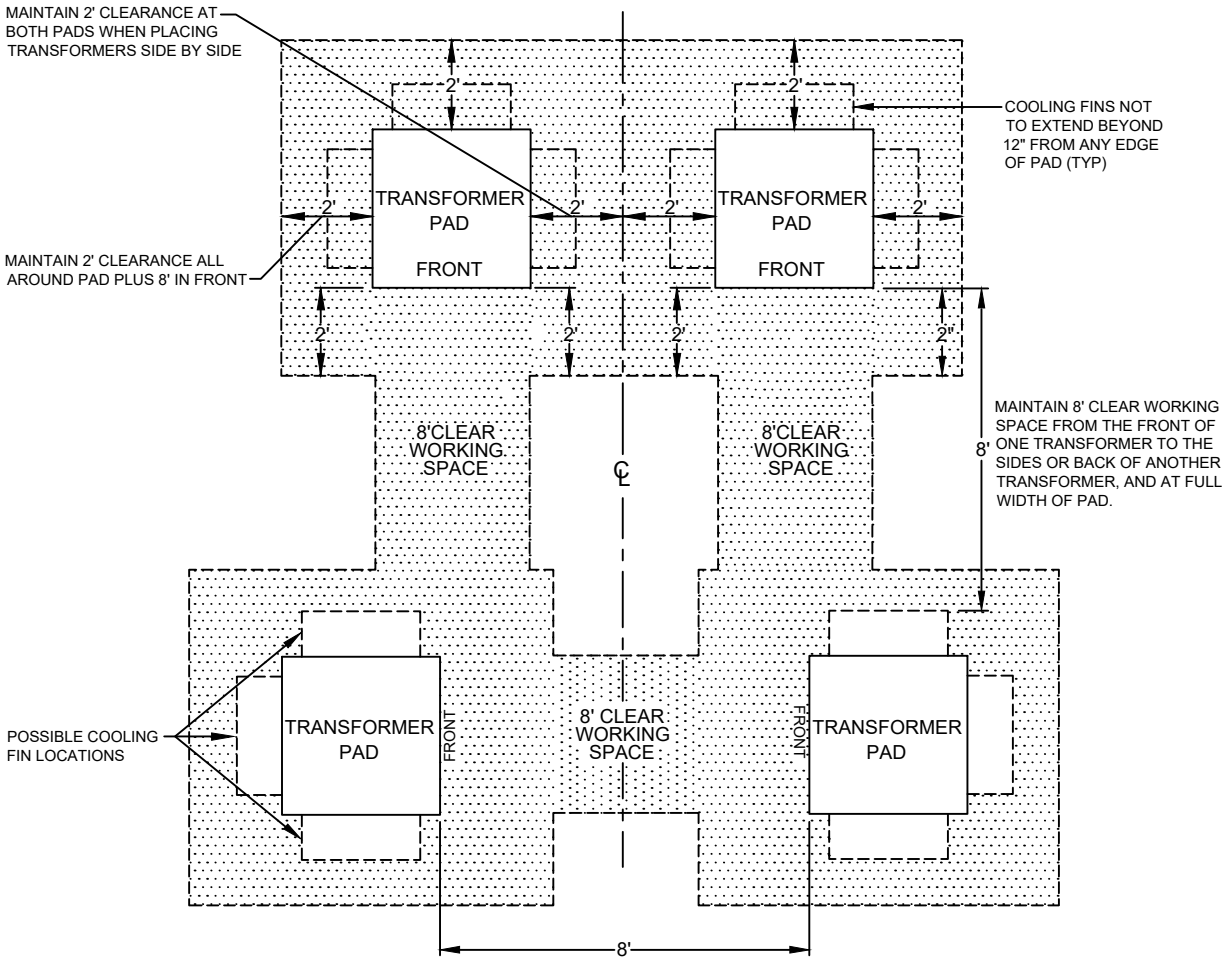
1. In the event of an equipment failure or power outage, it is necessary for utility crews to have adequate access to vaults and padmount equipment for safe operation and repair work. Access to the operating sides shall be 8 feet, access to the non-operating sides/rear shall be 2 feet or as shown. No trees, shrubs, fences, large landscape rocks, or other obstructions shall be permitted in access area. Trees should be planted far enough from equipment so that when they reach maturity, overhanging branches will not obstruct a crane from setting or removing equipment.

2. NESC Rule 384C: Bond all above ground metallic supply and communication enclosures that are separated by 6 feet or less. Use minimum #6 bare copper wire direct buried a minimum 18" below grade, to a suitable bolted or screw connection that can be temporarily opened when locating cables. Treat open ground connections as energized!

3. 2' x 8' clear working area shall be maintained around all transformers, as shown above.

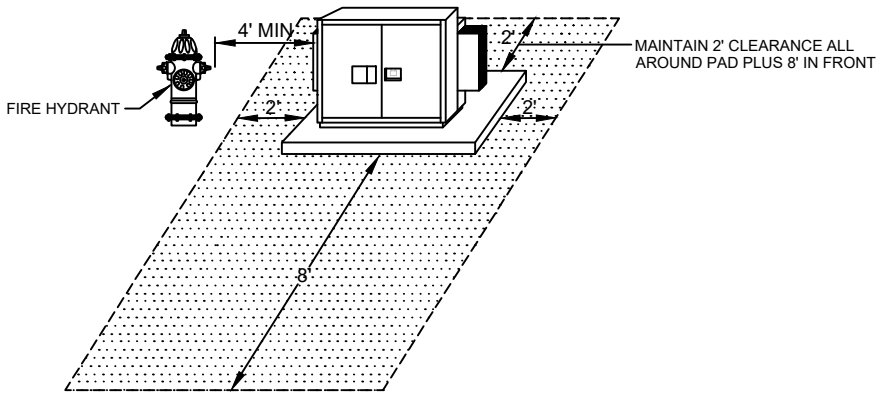
CITY LIGHT & POWER

15kV 3-PHASE PADMOUNT TRANSFORMER CLEARANCES



NOTE:

4. For additional information, see CLP SC5.14 (Oil-filled equipment from buildings.)



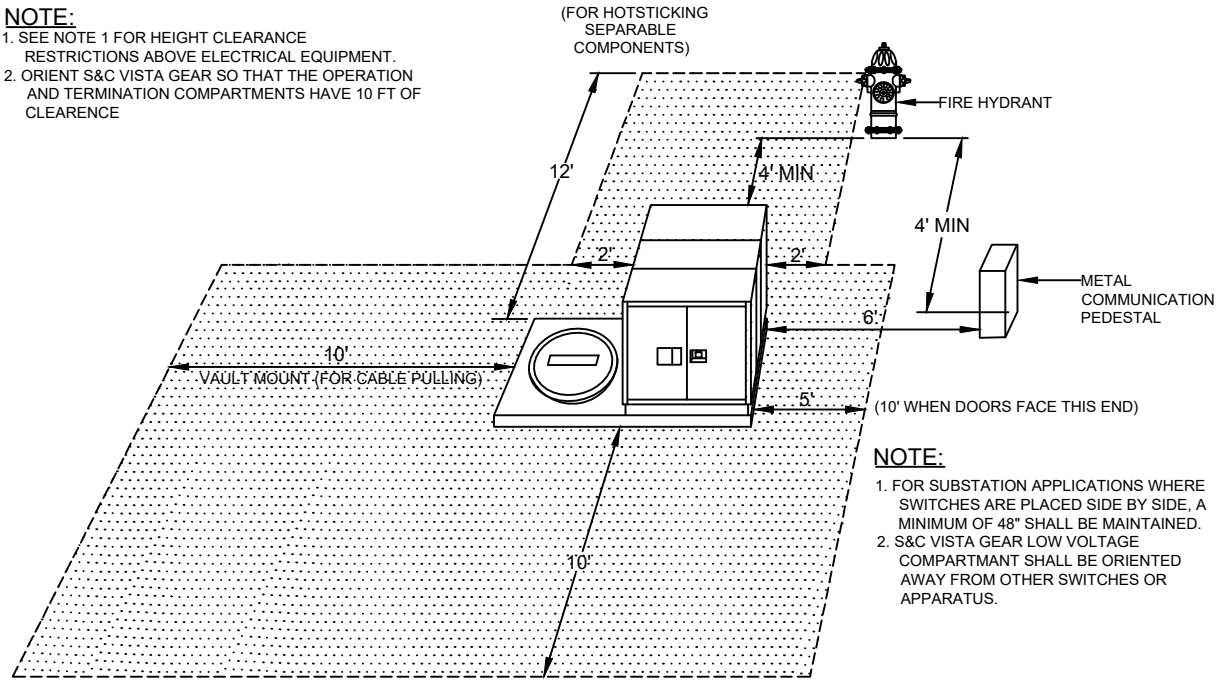
3-PHASE PADMOUNT TRANSFORMER

CITY LIGHT & POWER

SC5.14.2	15kV VAULT & PADMOUNT EQUIPMENT CLEARANCES FOR WORKING SPACE	APPROVED AS OF 12/1/2016

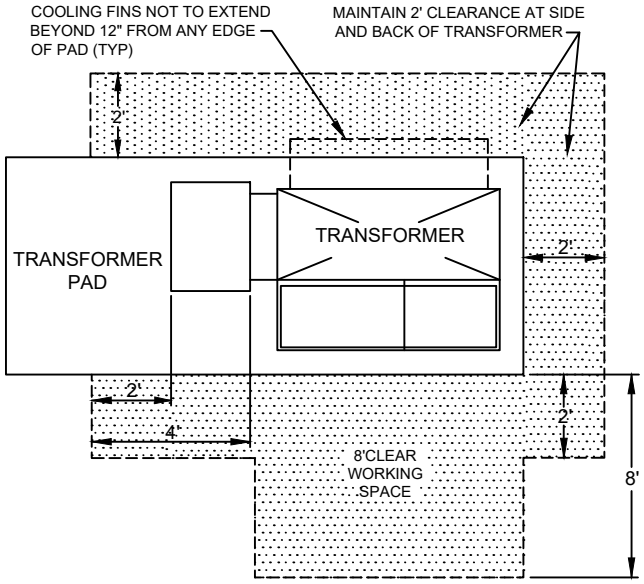
PAD AND VAULT ACCESS CLEARANCES

NOTE:
1. SEE NOTE 1 FOR HEIGHT CLEARANCE RESTRICTIONS ABOVE ELECTRICAL EQUIPMENT.
2. ORIENT S&C VISTA GEAR SO THAT THE OPERATION AND TERMINATION COMPARTMENTS HAVE 10 FT OF CLEARENCE



NOTE:
1. FOR SUBSTATION APPLICATIONS WHERE SWITCHES ARE PLACED SIDE BY SIDE, A MINIMUM OF 48" SHALL BE MAINTAINED.
2. S&C VISTA GEAR LOW VOLTAGE COMPARTMANT SHALL BE ORIENTED AWAY FROM OTHER SWITCHES OR APPARATUS.

15/35kV SWITCH CLEARANCES



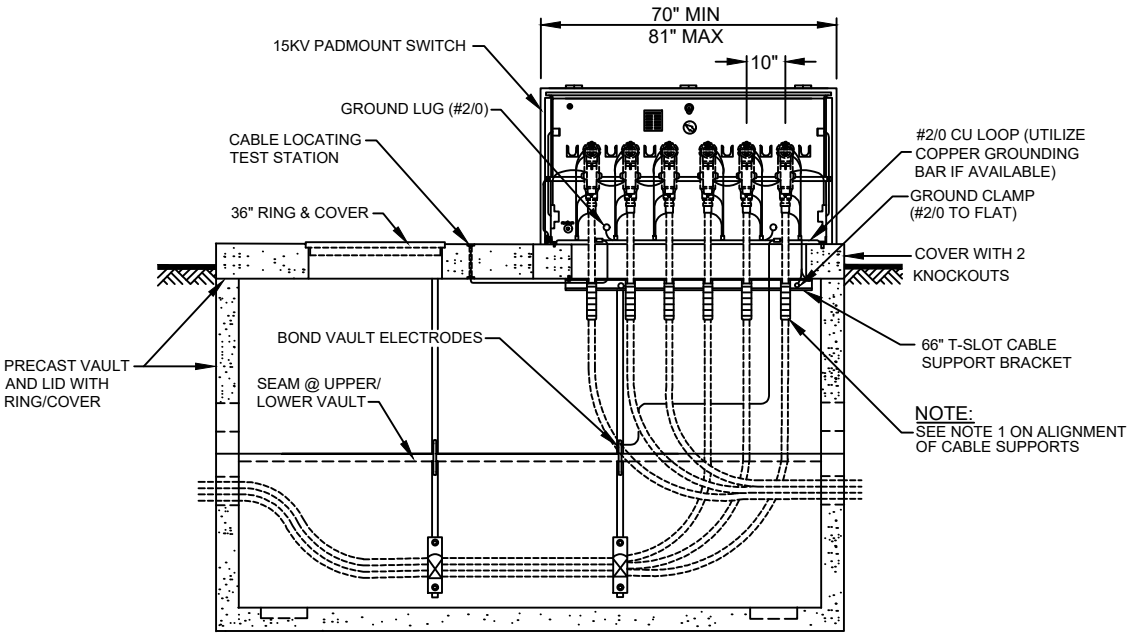
MAINTAIN 8' CLEAR WORKING SPACE FROM THE FRONT OF ONE TRANSFORMER TO THE SIDES OR BACK OF ANOTHER TRANSFORMER AND AT FULL WIDTH OF TRANSFORMER CABLE CABINET

TRANSFORMER CLEARANCES

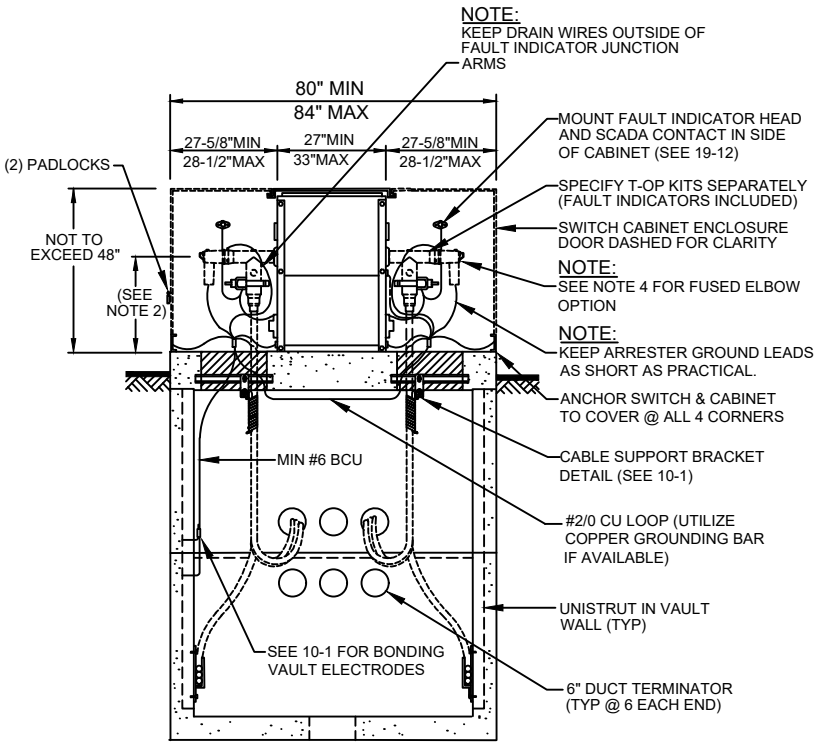
CITY LIGHT & POWER

SC5.14.3	15kV VAULT & PADMOUNT EQUIPMENT CLEARANCES FOR WORKING SPACE	APPROVED AS OF 12/1/2016

VAULT MOUNTED SWITCH



FRONT VIEW

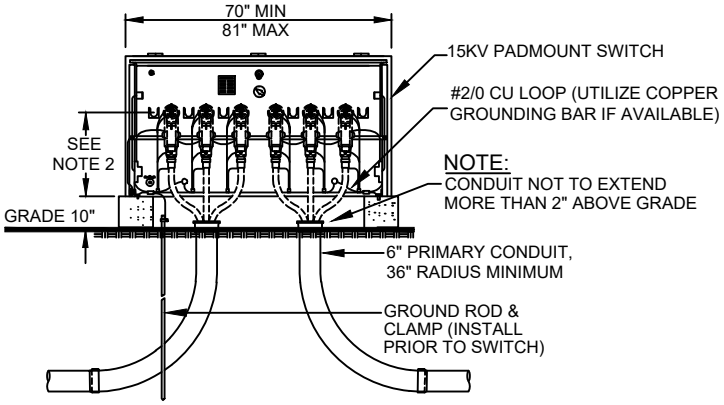


LEFT SIDE VIEW

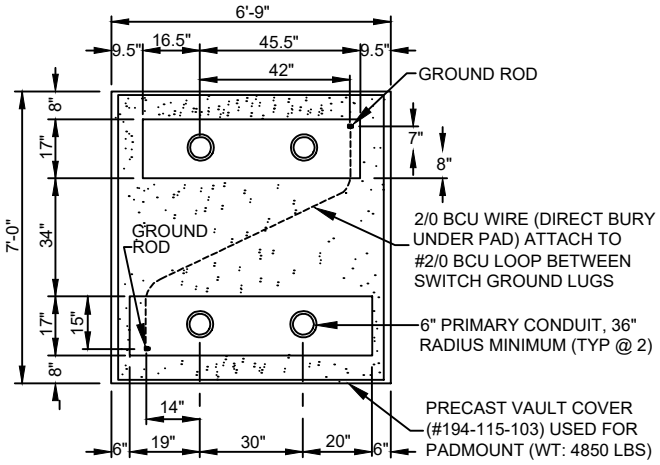
CITY LIGHT & POWER

SC5.15.1	15K VAULT & PADMOUNT 4-WAY SWITCH 600A	APPROVED AS OF 12/1/2016

PADMOUNTED SWITCH



PAD & CONDUIT FRONT VIEW



PAD & CONDUIT TOP VIEW

NOTE:
CONDUIT DIMENSIONS ARE CRITICAL FOR MAXIMUM CABLE FLEXIBILITY WHEN PARKED.

NOTES:

1. Cable supports to be aligned vertically between bushing and adjacent parking stand (toward outside) for proper standoff mounting.
2. Air switch bushing heights are 33" and 24"on Vacuum Oil Type Switches.
3. NESC Rule 384C: Bond all above ground metallic supply and communication enclosures that are separated by 6 feet or less. Use minimum #6 bare copper wire direct buried a minimum 18" below grade, to a suitable bolted or screw connection that can be temporarily opened when locating cables. Treat open ground connections as energized!

CITY LIGHT & POWER

APPENDIX C SERVICE CONNECTION OVERHEAD CONSTRUCTION STANDARDS

The following section of the overhead service connection requirements will apply to all CLP overhead electrical distribution systems. All construction will be required to meet CLP and Industry Standards.

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SC6.6	Cable Labels and Phasing Tape
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SC6.8	Typical Overhead Arresters Construction
SC6.9	Typical Pole Grounding
SC6.10	Typical Pole Grounding Notes
SC6.11	Typical Span Guying
SC6.12	Typical Sidewalk Tie and Push Brace Assemblies
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SC6.14	Typical Overhead Primary Tap Conductor Assemblies
SC6.15	Typical 1-Phase 7.2kV (12.47kV) Transformer Installation
SC6.16	3-Phase Transformer Bank Connection Diagram (Y-Y, 277/480V Service)
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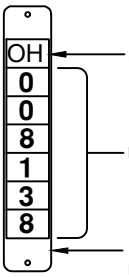
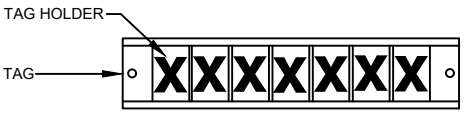
SC6.20	3-Phase Transformer Bank Connection Diagram (oY-oD, 120/240V Service)
SC6.21	Typical 3-Phase 4.16kV and 12.47kV Transformer Bank Construction



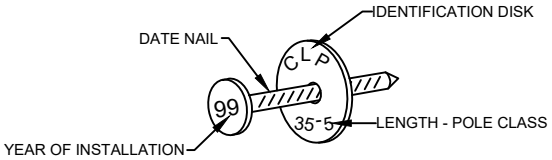
POLE IDENTIFICATION LABEL

UNIQUE LOCATION IDENTIFICATION NUMBER
USED IN MAP/FACILITY DATABASE.
(CONTACT LOCAL CLP POC FOR LABEL SCHEME)



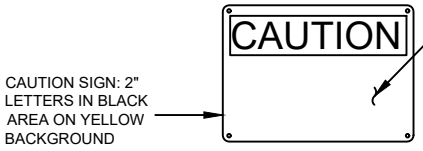
OH SWITCH NUMBER TAG

INSTALLED ON POLES WITH OVERHEAD GANG OPERATED SWITCHES AND LINE/LATERAL FUSED OR CUTOUTS (NOT TRANSFORMER, RISER, RECLOSER BYPASS OR SIMILAR EQUIPMENT) AND USED TO CONTROL SWITCH OPERATIONS.
LABEL DETEMINED BY ENGINEERING FIMS.



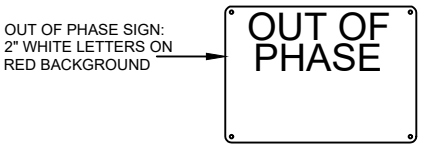
DATE NAIL

DATE NAIL TO BE INSTALLED BY CREW WHEN POLE IS SET.



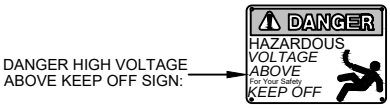
CAUTION SIGN

USE: WARNING AGAINST POTENTIAL HAZARDS OR TO CAUTION AGAINST UNSAFE PRACTICES, EG AT NO TIE POINTS BETWEEN SUBSTATIONS.



OUT-OF-PHASE SIGN

USE: WHEN CIRCUITS ARE TIED TOGETHER BY MEANS OF NORMALLY OPEN SWITCHES. DO NOT CLOSE ENERGIZED. OUT OF PHASE.



DANGER SIGN

USE: TO WARN THE PUBLIC THAT HIGH VOLTAGE IS PRESENT ON OVERHEAD POLES.

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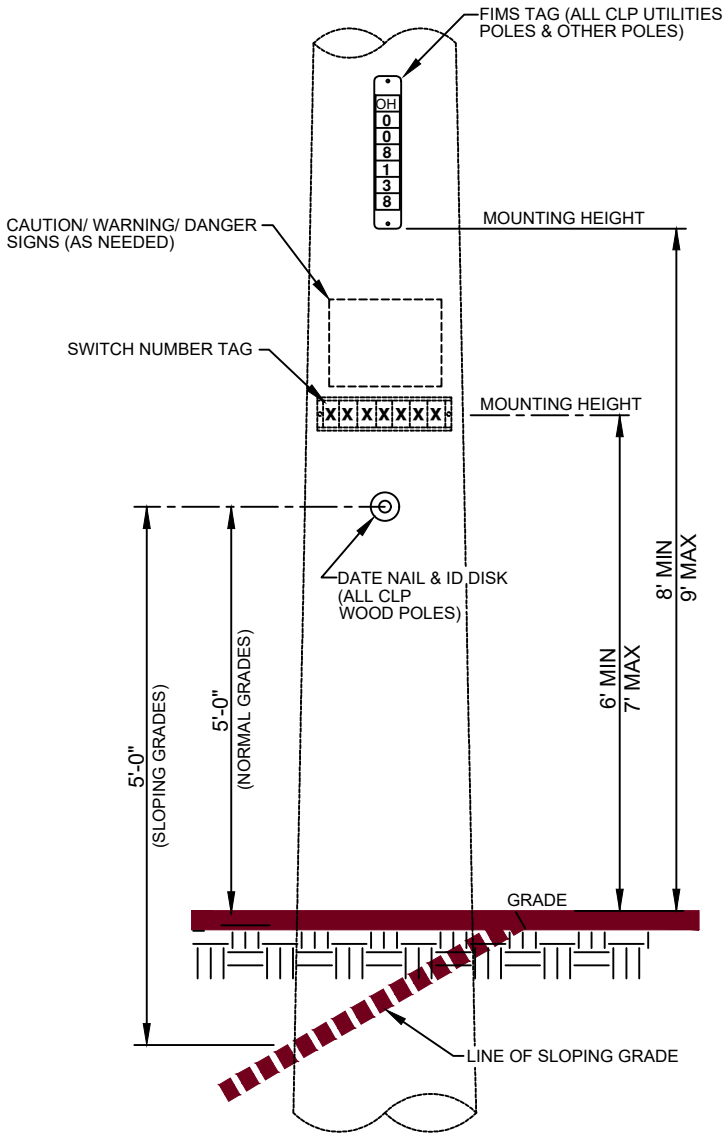
SC6.1	TYPICAL POLE LABELS	APPROVED AS OF 12/1/2016



WOOD POLE LABELING

NOTES:

1. Use aluminum or galvanized nails to attach tags to pole. Pole tag should be placed at the listed height and on the same side of the pole as the pole brand.
2. Install tags on street side of pole or side easily visible when pole is not located on a street or road.
3. In open areas install label on side paralleling conductors; use shady side as much as possible.
4. Install tags, Danger, Caution & similar signs where needed or missing.
5. Install tags under pipe and above switch handle on poles that have switches.
6. Install Switch Number in a horizontal alignment only.

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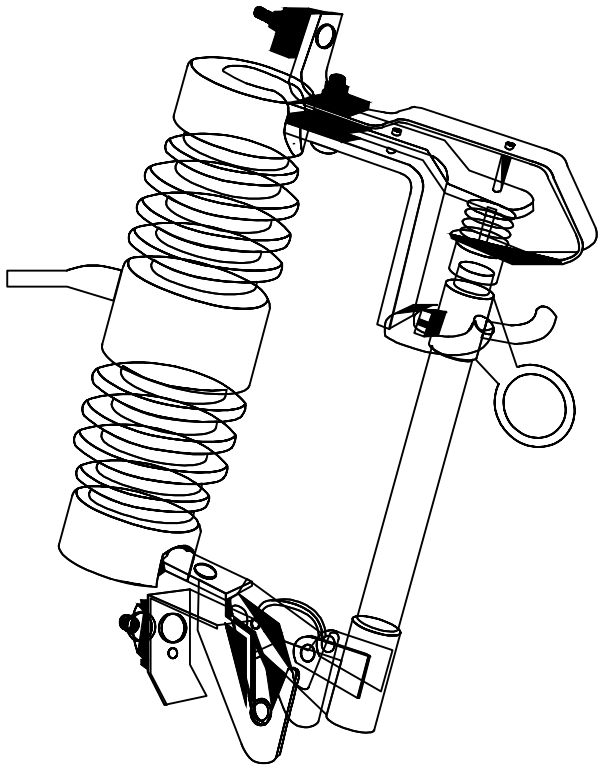


60-Hz Ratings					Leakage Distance to Ground, Minimum	
kV			Amperes, RMS			
Nom.	Max	BIL	Max	Interrupting (Sym.) 60 Hz	Inches	mm
14.4	17.0	125	200E	14 000	11	279
14.4	17.0	150	200E	14 000	17	432
25	27	150	200E	12 500	17	432
34.5	38	200	200E	10 000	25½	648

Typical fuse ratings based off of S&C SMD-20D Power Fuses.

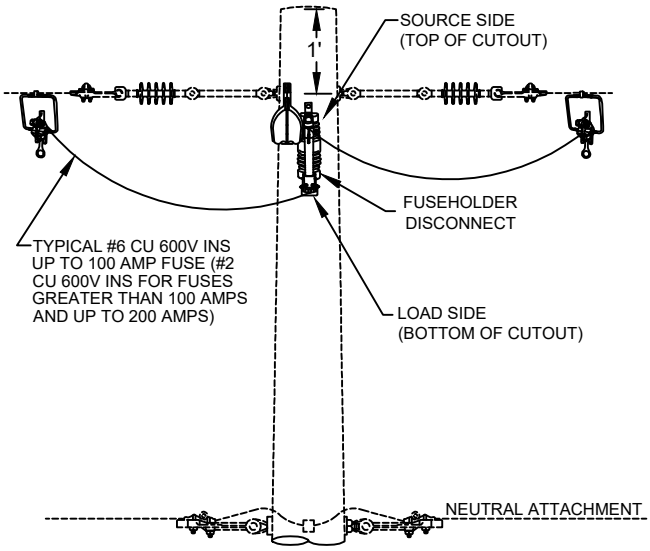
NOTES:

1. CLP requires fused-disconnects compatible with Chance Fuse Links for all branch line fusing and transformers requiring pole mounted external protection.
2. Fuses will be sized according to the branch load and/or protected transformer. Refer to Service Connection Drawing 6.4 for typical fuse sizing.

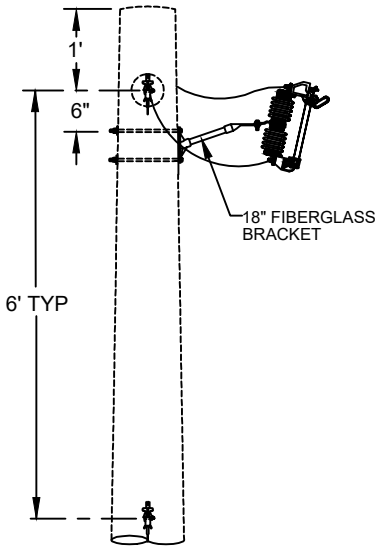
Current Limiting Fuses

Suggested Minimum Current Limiting Fuse Current Ratings for Self-Cooled 2.4–15.5 kV Transformer Applications—E-Rated Fuses

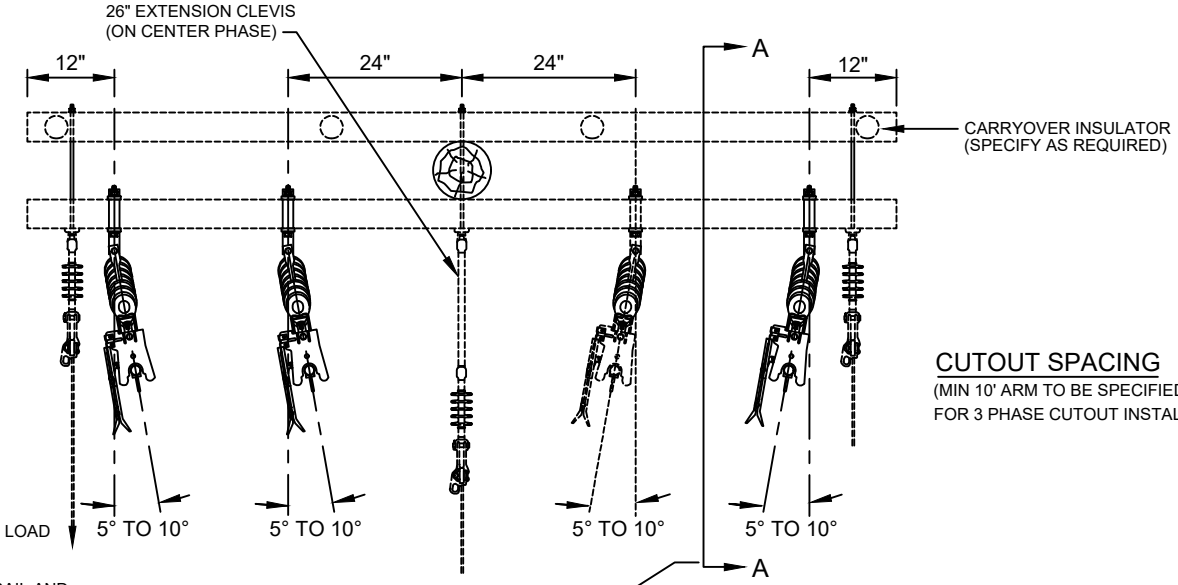
System Nominal kV	2.4		4.16		4.8		7.2		12.47		13.2		13.8		14.4	
Fuse Maximum kV	2.75		5.5		5.5		8.3		15.5		15.5		15.5		15.5	
Transformer kVA Rating Self-Cooled	Full Load Current Amps	Fuse Rating Amps E	Full Load Current Amps	Fuse Rating Amps E	Full Load Current Amps	Fuse Rating Amps E	Full Load Current Amps	Fuse Rating Amps E	Full Load Current Amps	Fuse Rating Amps E	Full Load Current Amps	Fuse Rating Amps E	Full Load Current Amps	Fuse Rating Amps E	Full Load Current Amps	Fuse Rating Amps E
Three-Phase Transformer																
9	2.2	5E	1.3	3E	1.1	3E	0.7	3E	0.4	1E	0.4	1E	0.4	1E	0.4	1E
15	3.6	10E	2.1	3E	1.8	3E	1.2	3E	0.7	1.5E	0.7	1E	0.6	1E	0.6	1E
30	7.2	15E	4.2	10E	3.6	10E	2.4	5E	1.4	3E	1.3	3E	1.3	3E	1.2	3E
45	10.8	20E	6.2	10E	5.4	10E	3.6	10E	2.2	5E	2.0	3E	1.9	3E	1.8	3E
75	18.0	30E	10.4	15E	9.0	15E	6.0	10E	3.6	10E	3.3	5E	3.1	5E	3.0	5E
112.5	27.1	50E	15.6	25E	13.5	20E	9.0	15E	5.4	10E	4.9	10E	4.7	10E	4.5	10E
150	36.1	65E	20.8	30E	18.0	30E	12.0	20E	7.2	15E	6.6	10E	6.3	10E	6.0	10E
225	54.1	80E	31.2	50E	27.1	50E	18.0	30E	10.8	20E	9.8	15E	9.4	15E	9.0	15E
300	72.2	125E	41.6	80E	36.1	65E	24.1	40E	14.4	25E	13.1	20E	12.6	20E	12.0	20E
500	120.3	200E	69.4	125E	60.1	100E	40.1	65E	24.1	50E	21.9	40E	20.9	40E	20.0	40E
750	180.4	300E	104.1	150E	90.2	150E	60.1	100E	36.1	65E	32.8	65E	31.4	65E	30.1	65E
1000	240.6	350E	138.8	200E	120.3	175E	80.2	125E	48.1	80E	43.7	80E	41.8	80E	40.1	80E
1500	360.8	600E	208.2	300E	180.4	300E	120.3	175E	72.2	125E	65.6	100E	62.8	100E	60.1	100E
2000	481.1	750E	277.6	400E	240.6	350E	160.4	250E	96.2	150E	87.5	150E	83.7	150E	80.2	125E
2500	601.4	1100E	347.0	600E	300.7	450E	200.5	300E	120.3	200E	109.3	175E	104.6	175E	100.2	175E
Single-Phase Transformer																
5	2.08	3E	1.20	3E	1.04	1.5E	0.69	3E	0.42	1E	0.38	1E	0.36	1E	0.35	1E
10	4.17	10E	2.40	5E	2.08	3E	1.39	3E	0.83	1.5E	0.76	1.5E	0.72	1.5E	0.69	1.5E
15	6.25	10E	3.61	10E	3.13	5E	2.08	3E	1.25	3E	1.14	3E	1.09	3E	1.04	3E
25	10.42	15E	6.01	10E	5.21	10E	3.47	5Ev	2.08	5E	1.89	3E	1.81	3E	1.74	3E
37.5	15.63	25E	9.01	15E	7.81	15E	5.21	10E	3.13	5E	2.84	5E	2.72	5E	2.60	5E
50	20.83	40E	12.02	20E	10.42	15E	6.94	10E	4.17	10E	3.79	10E	3.62	10E	3.47	10E
75	31.25	50E	18.03	30E	15.63	25E	10.42	15E	6.25	10E	5.68	10E	5.43	10E	5.21	10E
100	41.67	65E	24.04	50E	20.83	30E	13.89	20E	8.33	15E	7.58	15E	7.25	15E	6.94	15E
167	69.58	100E	40.14	80E	34.79	65E	23.19	40E	13.92	25E	12.65	20E	12.10	20E	11.60	20E
250	104.17	150E	60.10	125E	52.08	100E	34.72	65E	20.83	40E	18.94	30E	18.12	30E	17.36	30E
333	138.75	200E	80.05	150E	69.38	125E	46.25	80E	27.75	50E	25.23	50E	24.13	40E	23.13	40E
500	208.33	300E	120.19	175E	104.17	150E	69.44	125E	41.67	80E	37.88	65E	36.23	65E	34.72	65E
667	277.92	400E	160.34	250E	138.96	200E	92.64	150E	55.58	100E	50.53	80E	48.33	80E	46.32	80E
883	367.92	600E	212.26	300E	183.96	300E	122.64	175E	73.58	125E	66.89	125E	63.99	100E	61.32	100E
1250	520.83	750E	300.48	450E	260.42	400E	173.61	250E	104.17	175E	94.70	150E	90.58	150E	86.81	150E



CUTOUT ON SINGLE- PHASE VERTICAL 15kV

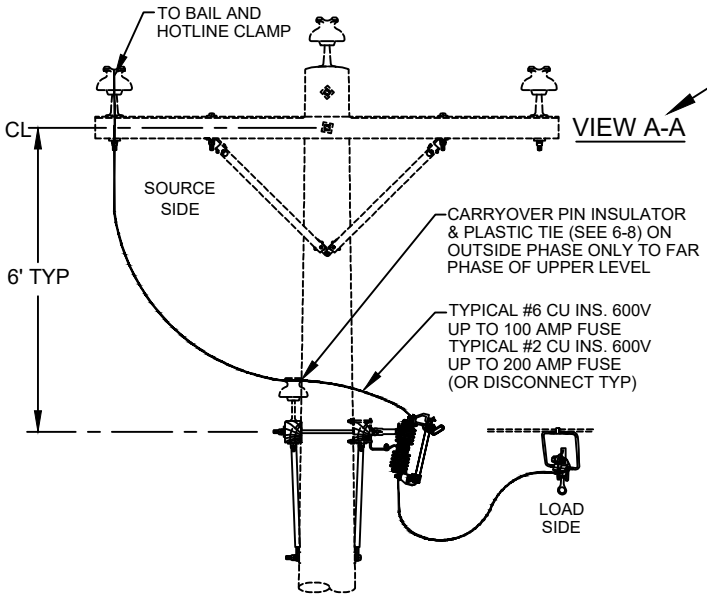


SIDE VIEW - 18" BRACKET WITH CUTOUT 15kV



CUTOUT SPACING
(MIN 10' ARM TO BE SPECIFIED
FOR 3 PHASE CUTOUT INSTALLATION)

NOTE:
CUTOUTS TO
FACE LOAD SIDE



VIEW A-A

NOTES:
1. Above spacing for cutouts can be applied in-line or on buckarm construction.
2. Mount on lower buckarm unless otherwise noted on job print.
3. Adhere to local wildlife protection guidelines.

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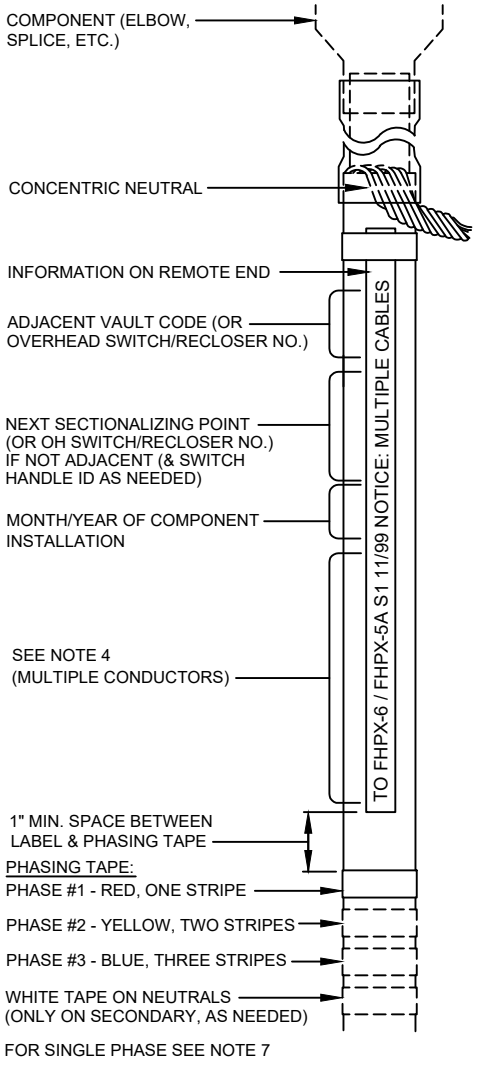
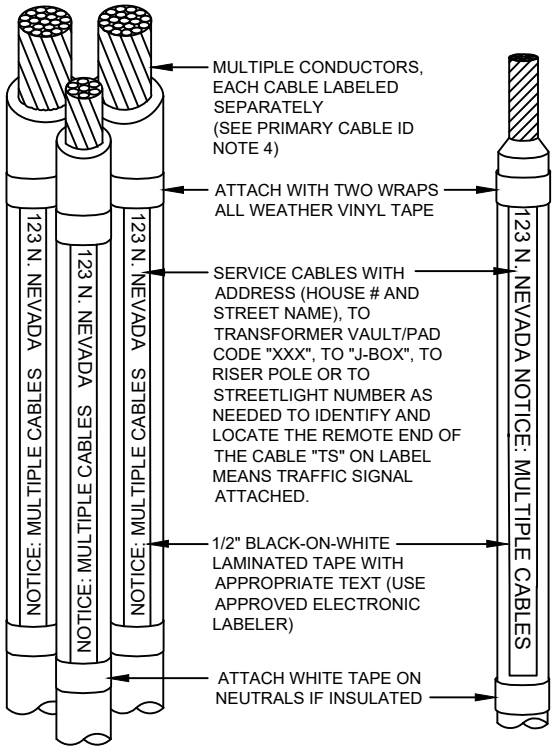
SC6.5	POLE MOUNTED CUTOUT TYPICAL CONSTRUCTION	APPROVED AS OF 12/1/2016



PRIMARY CABLE IDENTIFICATION



TRIPLEX 600 VOLT UD CABLE

SINGLE WIRE

NOTE:

THIS TYPE OF LABELING IS FOUND IN J-BOXES, SL HANDHOLES, PADMOUNT TRANSFORMERS AND SUBSURFACE VAULTS; NOT IN METER SOCKETS

SECONDARY CABLE IDENTIFICATION

PRIMARY CABLE IDENTIFICATION NOTES:

1. Sectionalizing points are defined to include: 600 amp gang-operated switches, transformer oil switches (not network transformers- drop load with protector), 15kV or 35kV loadbreak 200 amp elbows, reclosers, fault interrupters, and line disconnect blades (anywhere a clearance tag can be placed).
2. The second vault number is not needed on the label if the cable terminates at a sectionalizing device (elbows or a switch) in the adjacent vault, pad, transformer or pole.
3. For multiple conductors per phase, additional labels shall be added marking each cable with "NOTICE: MULTIPLE CABLES". Labels shall be placed at each end and in each vault. For multiple conductors to a single service (as in parallel feeds), labels must be added marking "SET 1 OF 2", "CABLE 1 OF 2", etc.
4. A feeder from a substation to the first sectionalizing point will have the substation/breaker number instead of the vault code.
5. For direct buried cable, labels are to be applied to splices regardless of being buried.
6. For single phase primary, apply phasing tape at tap and loop tie points only.

SECONDARY CABLE IDENTIFICATION NOTES:

1. Identify all cables in handholes, padmount transformers and subsurface vaults indicating remote end location.
2. Service cables shall be labeled with address (house number and street name), to transformer or vault/pad code "XXX", to "J-Box", to riser pole, or to streetlight number as needed to identify and locate the remote end of the cable.
3. Attach labels to cable where they will be visible.

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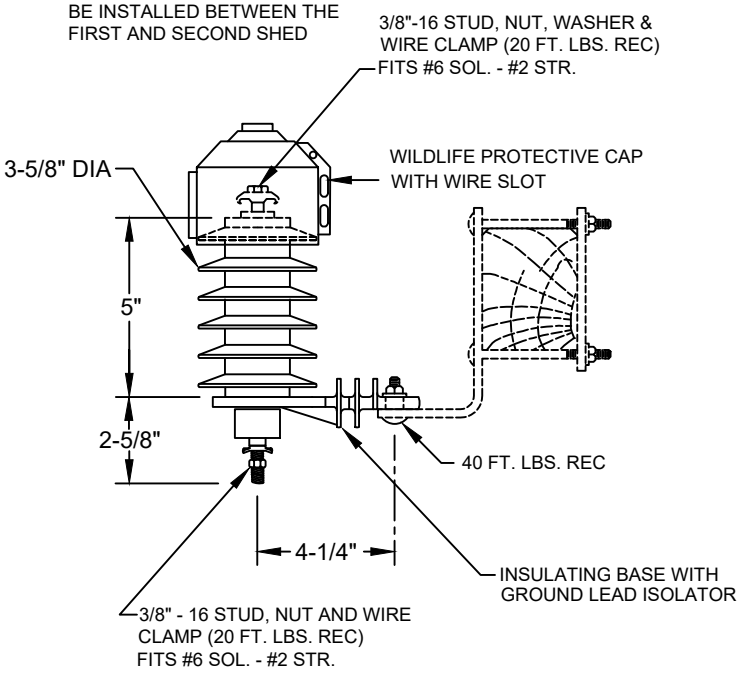
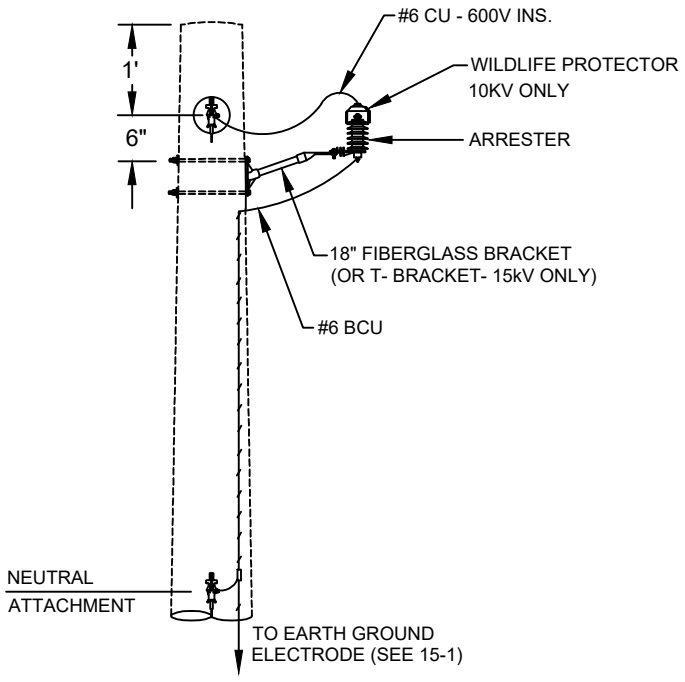
NOTE:
WILDLIFE PROTECTOR TO BE INSTALLED BETWEEN THE FIRST AND SECOND SHED



15KV SURGE ARRESTER
HEAVY DUTY DISTRIBUTION CLASS



ARRESTER ON 1 PHASE VERTICAL DEADEND

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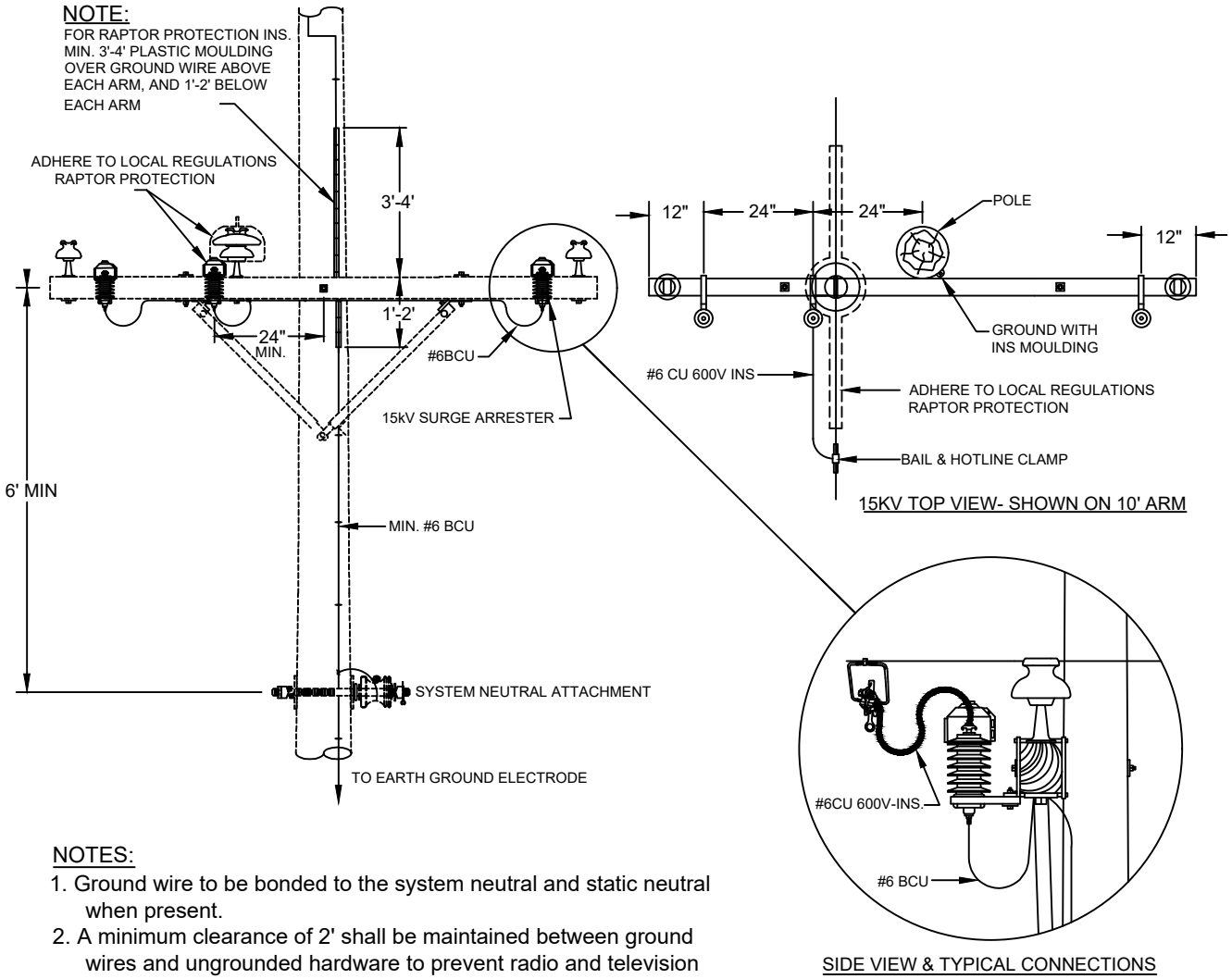
SC6.7	TYPICAL OVERHEAD ARRESTERS	APPROVED AS OF 12/1/2016

OVERHEAD ARRESTER SPACING ON ARMS



NOTES:

1. Ground wire to be bonded to the system neutral and static neutral when present.
2. A minimum clearance of 2' shall be maintained between ground wires and ungrounded hardware to prevent radio and television interference.

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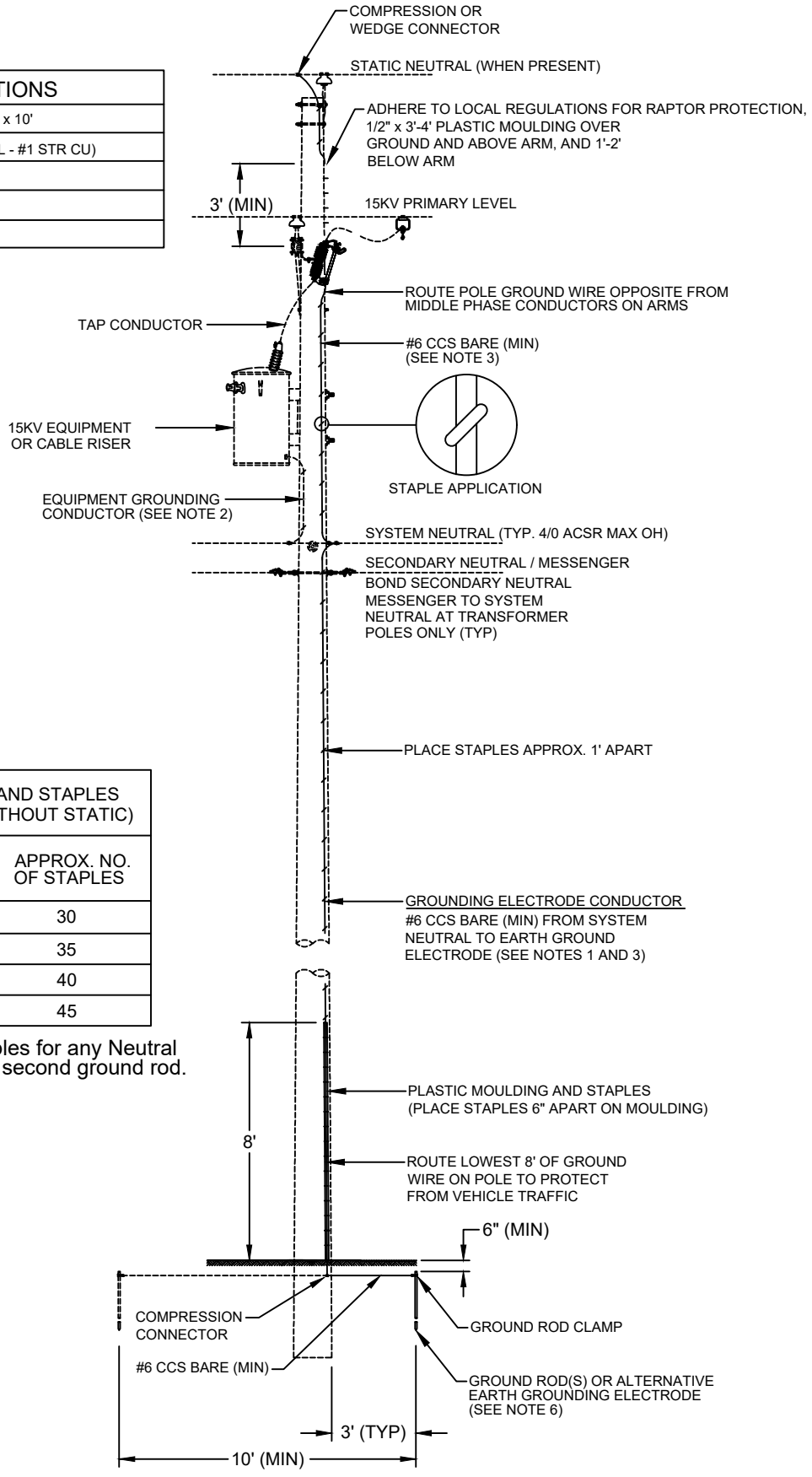
SC6.8	TYPICAL OVERHEAD ARRESTERS CONSTRUCTION	APPROVED AS OF 12/1/2016

MATERIALS DESCRIPTIONS
GROUND ROD, COPPER CLAD STEEL, 5/8" x 10'
GROUND ROD CLAMP (5/8" ROD TO #6 SOL - #1 STR CU)
STAPLES, GROUND WIRE, 2" x 1/4"
STAPLES, MOULDING, 5/8" x 2"
GUARD, PLASTIC MOULDING, 8-FEET



APPROXIMATE LENGTH OF WIRE AND STAPLES REQUIRED FOR 15KV CIRCUITS (WITHOUT STATIC)		
POLE SIZE	GROUND WIRE TO NEUTRAL	APPROX. NO. OF STAPLES
35'	30'	30
40'	35'	35
45'	40'	40
50'	45'	45

Add 25 ft. of ground wire and 25 staples for any Neutral to static; add 10 ft. of ground wire for second ground rod.

CITY LIGHT & POWER

SC6.9	TYPICAL POLE GROUNDING	APPROVED AS OF 12/1/2016

NOTES:

1. Size of Grounding Electrode Conductor: A bare #6 copper clad steel (CCS) conductor is the minimum size grounding conductor to be used from the earth grounding electrode to City Light and Power OH system neutral conductor (up to a maximum of 4/0 ACSR or 312 kcmil AAAC neutral size, based on NESC 93C2 requirements for multi-grounded system grounding conductors, having at least 20% of the ampacity rating of the conductors to which they are connected). A bare #6 CU is also the minimum size to be installed from the earth grounding electrode to an underground primary circuit neutral (1000kcmil AL cables and smaller). See note 3 for ground conductor sizes with static neutrals.
2. Size of Equipment Grounding Conductor: The following table provides the normal size OH primary tap conductor or UG cable sizes used to connect various types of equipment and the appropriate size of conductor to be used to connect tank/ground terminals to the system neutral conductor.

CAUTION: These ground conductor sizes are adequate for the fault current experienced during equipment failure, but may burn open in the event a fallen primary conductor lands on a tank (resulting in an energized tank), or due to lightning backflash from a phase conductor to the pole grounding conductor on static shielded lines. Safe approach distances and energized work practices shall be followed during work whenever grounding conductors may have melted open.

TYPE OF OH/UG/PD EQUIPMENT	PHASE OH (TAP) CONDUCTOR OR UG PRIMARY CABLE SIZE	MINIMUM RECOMMENDED EQUIPMENT GROUNDING CONDUCTOR SIZE (TO SYSTEM NEUTRAL)
OH ARRESTER	#6 CU (600V INS)	#6 CCS
OH TRANSFORMER	#6 CU (600V INS)	#6 CCS
OH CAPACITOR BANK	#6 CU (600V INS)	#6 CCS
RISER CABLES (#1 AL. 15KV 1 & 3 PH)	#6 CU (600V INS)	#6 CCS
PD / UG 1-PH TRANSFORMER / 4-WAY	#1 AL (15KV CABLE)	#4 CU (BARE) OR LOOP #6 CU
PD / UG 3-PH TRANSFORMER / 4-WAYS	#1 OR #4/0 AL (15/35KV)	#2 CU (BARE) OR LOOP #4 CU
OH / PD RECLOSER (225-AMP)	#2 CU (600V INS)	#2 CU (BARE) OR LOOP #4 CU (IF PAD)
OH PRIMARY METER (200-AMP)	#2 CU (600V INS)	#2 CU (BARE)
RISER CABLES (#4/0 & #1/0 AL.)	#2 CU (600V INS)	#2 CU (BARE)
RISER CABLES (1000KCMIL AL.)	#477 AL. (600V INS)	#2/0 CU (BARE)
PD PRIMARY METER (600-AMP)	1000KCMIL AL CABLES	#2/0 CU (BARE) OR LOOP #2 CU
SWITCH 600-AMP WITH METAL BASE/TANK (PREFER INSULATED BASE AND INSULATED SECTION IN OH OPERATING MECHANISM)	#477 (600V INS) OR 1000KCMIL CABLES	#2/0 CU (BARE) OR LOOP #2 CU (TO PROVIDE 2 RETURN PATHS)

The above sizing continues system neutrals at cable riser poles as well as limits temperature rise to the 250C limit of compression and mechanical connectors for CLP. "Loop" ground connections are defined as those where one wire is connected to two attachment points on the piece of equipment being grounded.

3. Size of Pole Ground Conductor from Static to Neutral: Pole ground conductor between static and lower neutral level should be at least #6 CCS unless otherwise stated by the table above for the equipment installed. This #6 CCS ground wire is adequate where available fault current is 10kA or less and the fault current return following lightning backflash includes two metallic paths (static neutral and neutral at secondary level). Where available fault current is higher than 10kA or on lines where only a static neutral is present, minimum #2 CU is recommended for the pole grounding conductor.

System & Equipment Grounds by Primary Voltage:

A. Install two ground rods or two alternate electrodes on all 4.16kV delta-system equipment grounds.
B. Install at least one ground rod or alternate electrode on all 12.47kV multi-grounded 4-wire system and equipment grounds.
C. Install at least 2 ground rods at any site where the system neutral is not available. Install two ground rods/electrodes at all primary cable riser poles and all OH switch poles with arresters.
D. Besides grounds at every equipment site, NESC requires at least 4 grounds in each mile of line for multi-grounded 4-wire systems, not counting those at service entrances.

5. Overhead Pole Ground:

A. Route the lowest 8' of pole ground conductor above grade on one side to avoid vehicle damage and cover that length with guard/moulding on all 4.16kV delta systems/equipment grounds (guard is optional per NESC ON multi-grounded 4-wire systems). Locate the pole ground beyond 8' on the same side as the neutral conductor and in the quadrant opposite from the pole climbing space.
B. Keep a minimum 2" clearance between ground conductors and unbonded hardware to avoid Radio Frequency Inteference / Television Interference (RFI/TVI).
C. Ground rods shall be driven and not placed in the pole hole.
D. Route pole grounds between static and lower neutral on cthe side of the pole opposite from center phases.
E. Pole line hardware shall remain unbonded for lightning performance (except on circuits underbuilt on transmission poles where hardware shall be bonded to avoid pole fires).

6. Alternate Earth Grounding Electrode: An alternate electrode to a driven ground rod is a buried counterpoise wire; at least 100-feet in length and a minimum #6 bare CCS buried 18" to 30" deep in either a straight line or in a star pattern radiating from the pole or vault. This is typically used in rocky areas where driving a ground rod is impossible. Pole butt plates do not count as an equivalent electrode. Internal vault rebar electrodes count as an equivalent of one electrode.

7. Grounding Resistance Requirements: Resistance testing shall be performed on the grounding system. A minimum requirement for single and multi-grounded systems at any point in the grounding system throughout a overhead grounding system with apparatus is 5 ohms. All others is 25 ohms.

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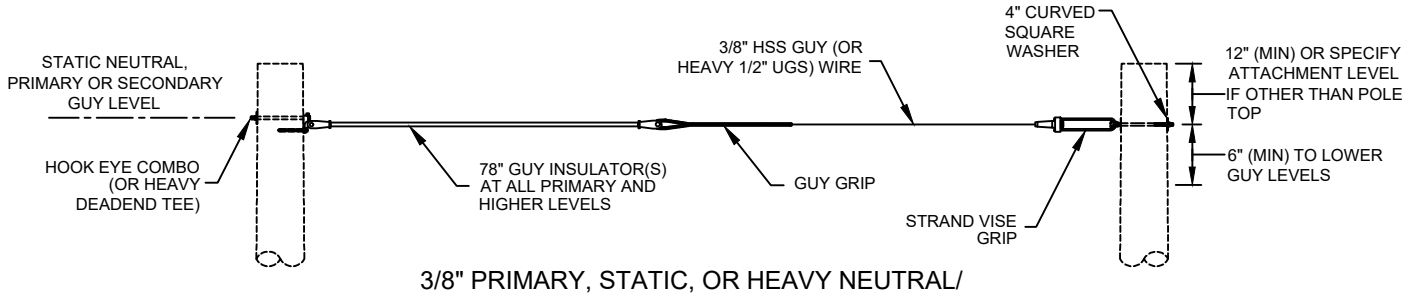
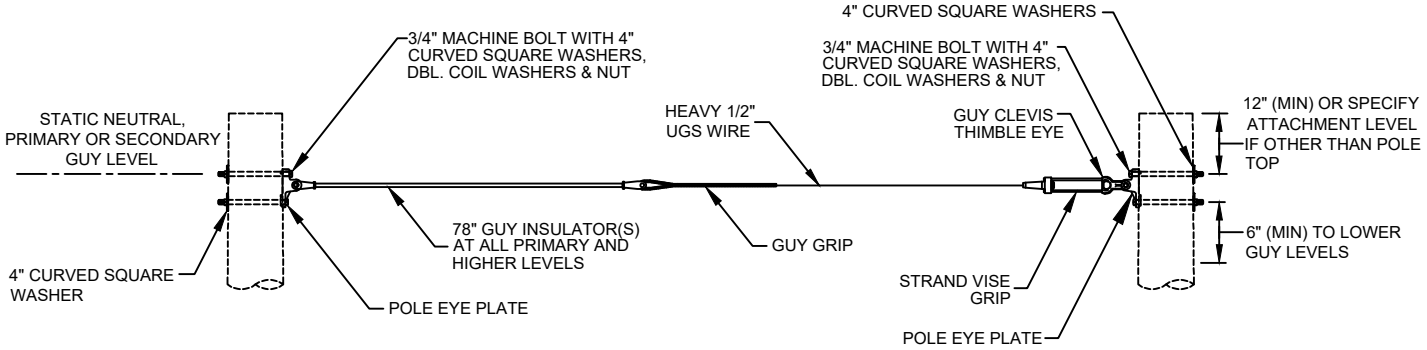
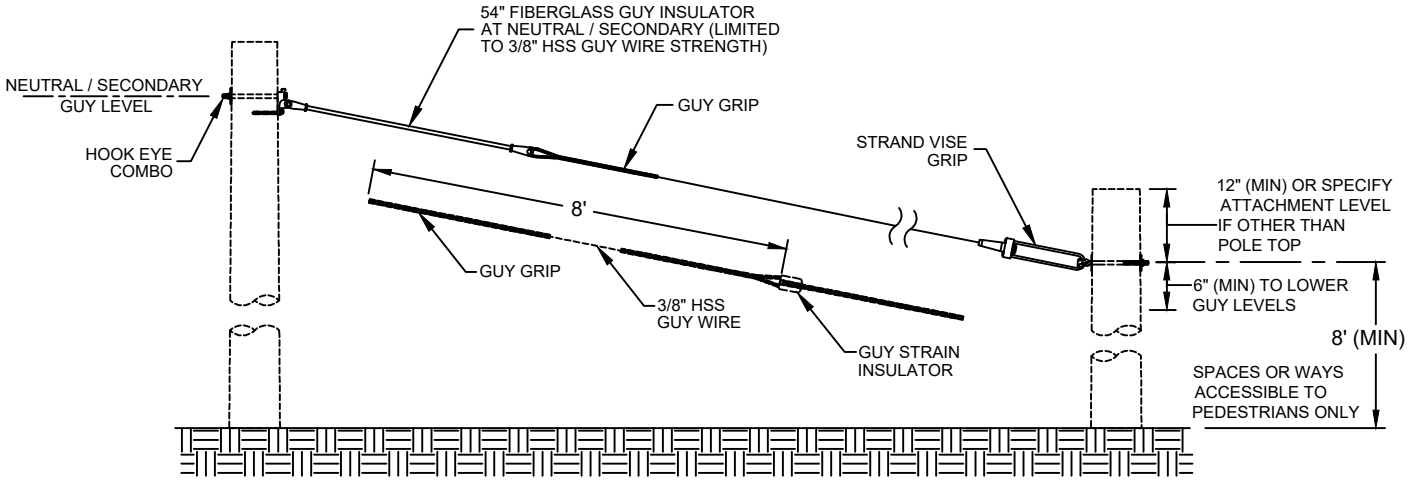


3/8" PRIMARY, STATIC, OR HEAVY NEUTRAL/
SECONDARY SPAN GUYS - LEVEL OR ANGLED



1/2" PRIMARY, STATIC, OR HEAVY NEUTRAL/
SECONDARY SPAN GUYS - LEVEL OR ANGLED



3/8" NEUTRAL AND
SECONDARY SPAN GUYS

NOTES:

1. Specify guy wire lengths separately.
2. Insulate each primary (and higher) level guy with enough 78" fiberglass guy strain insulators in series to maintain insulation on guy conductor at 8' above grade in the event of a broken guy and to avoid transfer of voltage to other equipment/facilities on pole. For additional primary equipment/risers or circuits, add 78" fiberglass guy insulators as necessary to maintain this NESC requirement (min. 1' length of fiberglass insulation length from lowest 15kV conductors on pole to broken guy wire).

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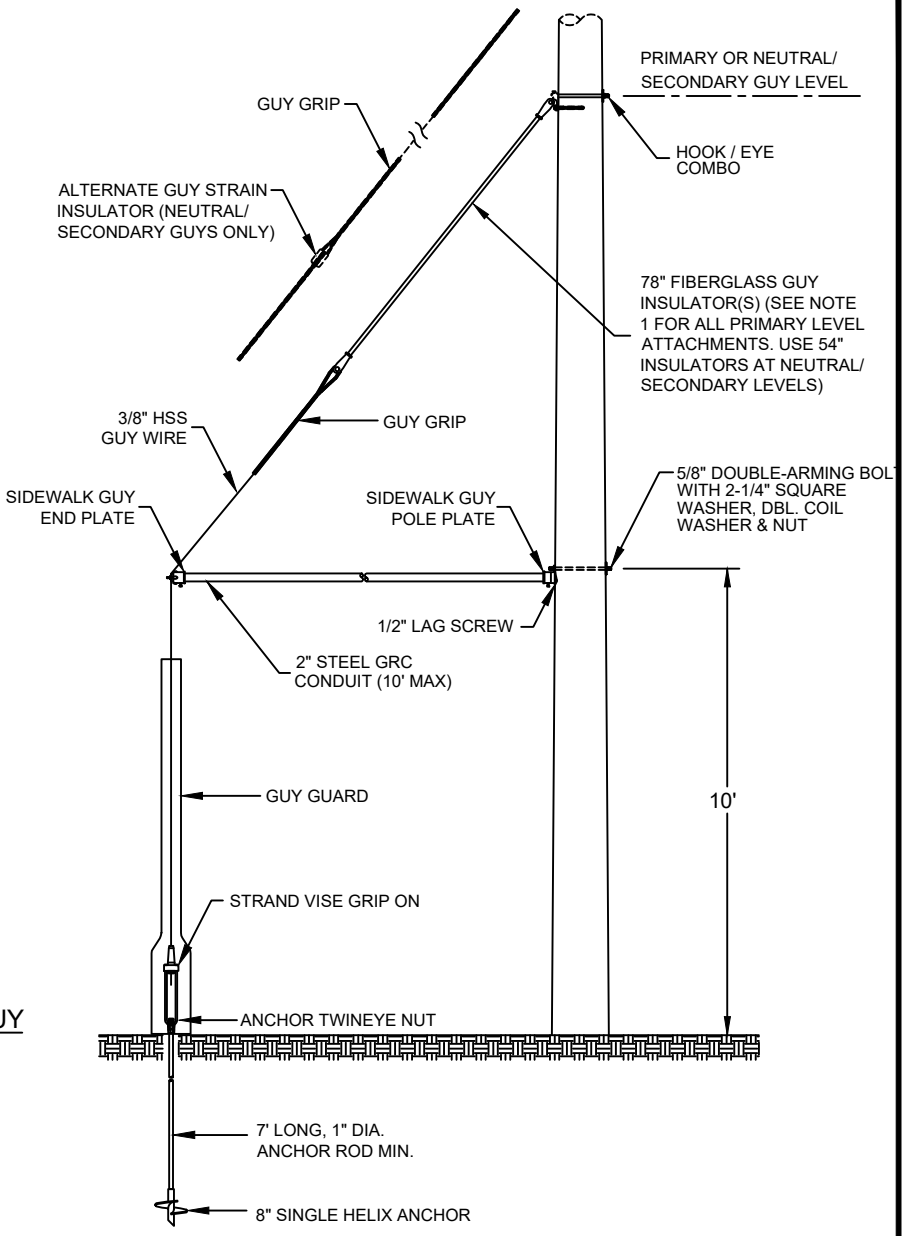
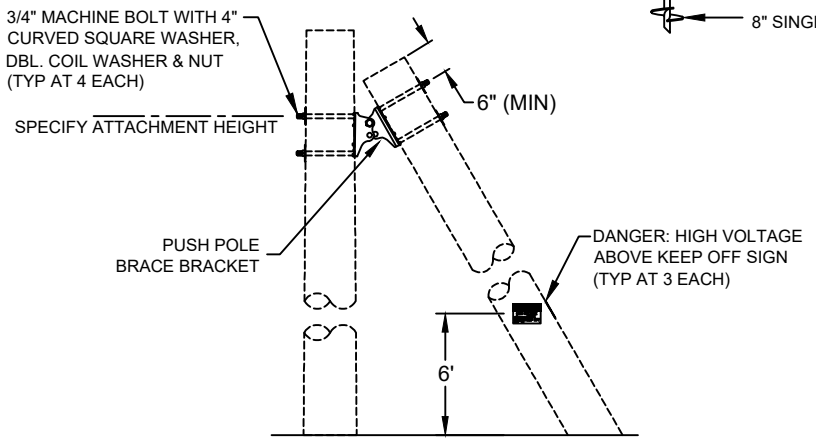
SC6.11	TYPICAL SPAN GUYING	APPROVED AS OF 12/1/2016

NOTES:

1. Insulate each primary (and higher) level guy with enough 78" fiberglass guy strain insulators in series to maintain insulation on guy conductor at 8' above grade in the event of a broken guy and to avoid transfer of voltage to other equipment/facilities on pole. For additional primary equipment/risers or circuits, add 78" fiberglass guy insulators as necessary to maintain this NESC requirement (min. 1' length of fiberglass insulation length from lowest 15 conductors on pole to broken guy wire).
2. Do not attach primary voltage to guy stub pole.
3. Length of 2" pipe to be determined by field conditions. Maximum length of pipe is 10', cut to fit in the field.
4. Length of guy wire is based on primary at 35' and neutral/ conductor at 29' above grade with 10' pipe (minus 1 - 78" guy insulator for primary).



3/8" PRIMARY AND SECONDARY SIDEWALK GUY



PUSH BRACE

NOTES:

1. Length and class of push pole to be specified by CLP Engineering.
2. Attach danger signs with rust resistant nails to 3 sides of the pole.
3. Minimum breaking strength of pole brace bracket is 8000lbs.

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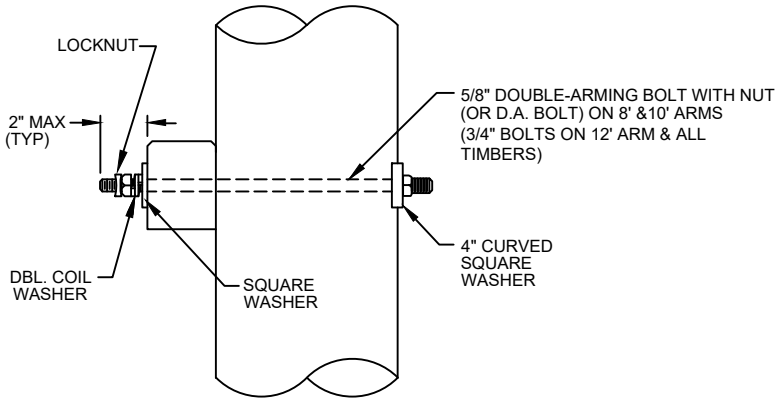
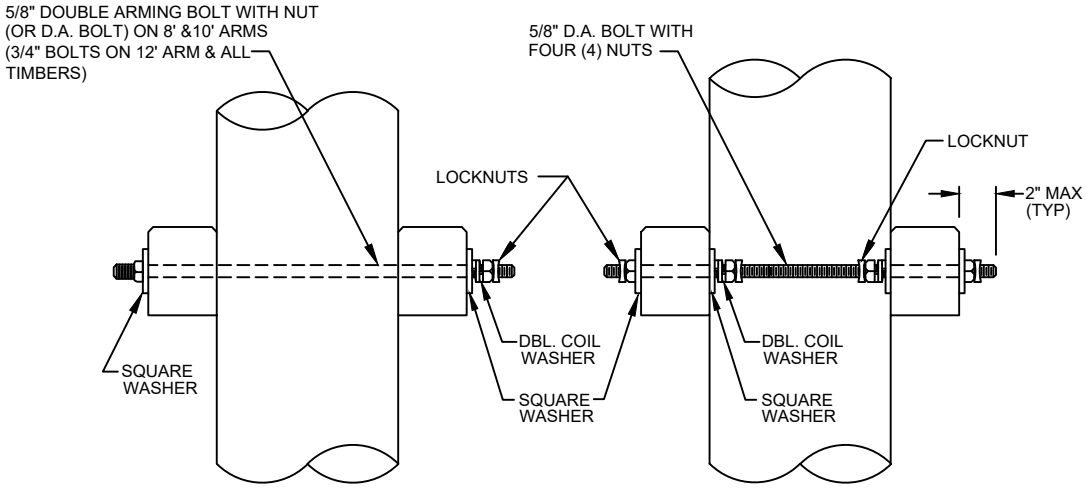
SC6.12	TYPICAL SIDEWALK TIE AND PUSH BRACE ASSEMBLIES	APPROVED AS OF 12/1/2016



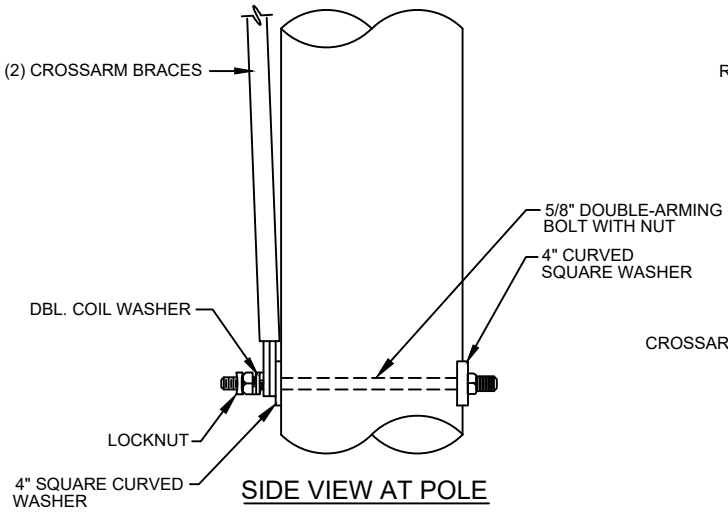
CROSSARM MOUNTING - SINGLE CROSSARM



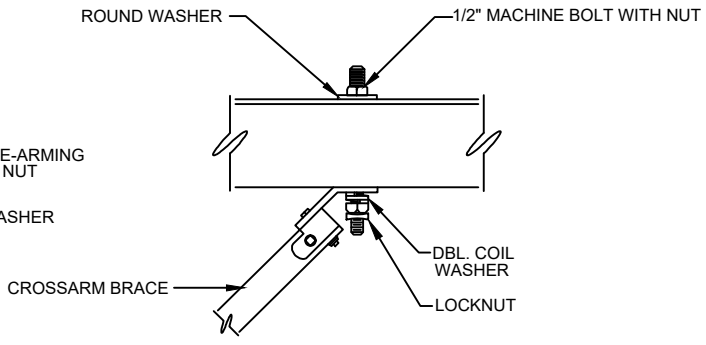
POLE THRU-BOLT

DOUBLE ARMING BOLTS
(OUTER CROSSARM - BOTH SIDES)

CROSSARM MOUNTING - DOUBLE ARMS
(all pole thru-bolts to be 5/8" unless stated otherwise)



SIDE VIEW AT POLE



ATTACHMENT AT CROSSARM

CROSSARM BRACES

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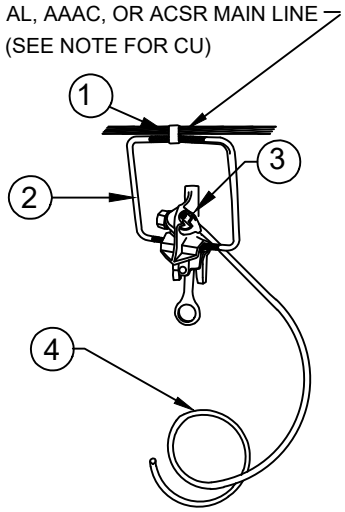
SC6.13	TYPICAL CROSSARM MOUNTING AND BRACING	APPROVED AS OF 12/1/2016

FIGURE 1: 100 AND 200 AMP CONNECTIONS



(1) CU-AL Compression Tap Connector

MAIN LINE RANGE		TAP CONDUCTOR RANGE		DIE INDEX
ALUM - COPPER	ACSR	ALUM - COPPER	ACSR	
#4 Sol. - #4 Str.	4	#6 Sol.- #2 Str.	#6 - #1 Str.	D
#2 Str. - #1 Str.	2			
1/0 Str. - 4/0 Str.	1/0 - 4/0	#6 Sol. - 2/0 Str.	#6 - 1/0	H

(2) Bail #2 HD CU

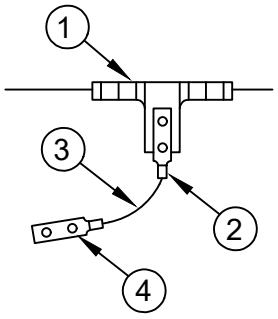
(3) Hotline Clamp for CU or AL Conductors:

CLAMP SIZE	RECOMMENDED TORQUE (Ft Lbs) Eyescrew Terminal		MAIN LINE RANGE	TAP CONDUCTOR RANGE
#8 - 2/0 AWG	15	15	#8 Sol. - 2/0 Str. CU 0.128" to 0.414"	#8 Sol. - 2/0 Str. CU 0.128" to 0.438"
#6 - 400 AWG	17	21	#6 Sol. - 400 Str. CU 0.162" to 0.745"	#6 Sol. - 4/0 CU 0.162" to 0.547"

NOTE: HOTLINE CLAMPS CAN BE APPLIED DIRECTLY ONTO COPPER MAIN LINE CONDUCTORS (W/O BAIL).

(4) Tap Conductor: 100A Tap: #6 CU 600V INS
200A Tap: #2 CU 600V INS

FIGURE 2: 600 AMP CONNECTIONS



(1) Al Compression T-Tap Connector.

(2) 2-Bolt Pad

(3) Tap Conductor: 477 kcmil AL 600V Insulator

(4) 2-Hole Pad with steel bolts, belleville (spring) washer, etc.

- All compression or mechanical connectors shall be listed for use on AL or CU.
- All connections shall be made with 1/2" medium carbon steel bolts and tempered to equal to ASTM A-325 or SAE Grade 5.
- All hardware shall be lubricated with suitable joint compound before tightening.
- All connections shall be inspected by a qualified inspector before energizing.

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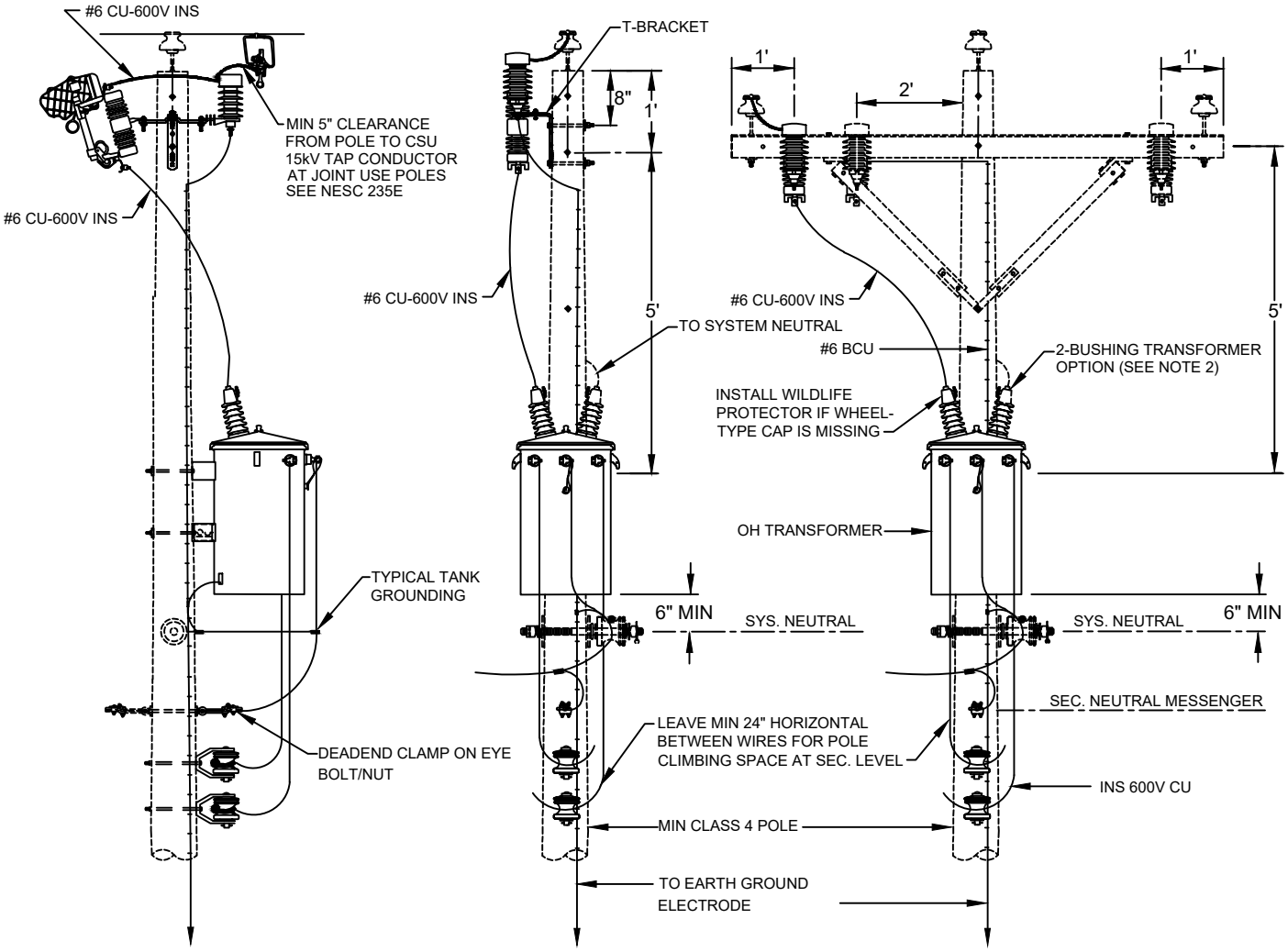

CUTOUT/ ARRESTER MOUNT - SIDE VIEW

7.2 KV VERTICAL - FRONT VIEW

7.2 KV CROSSARM - FRONT VIEW

NOTES:

1. This standard may be used on either tangent or deadend structures, existing or new.
2. Two bushing transformers may be used with H2 connected to system neutral, with minimum #6 BCU.
3. Keep arrester lead lengths as short as possible on both line and ground leads (across transformer).

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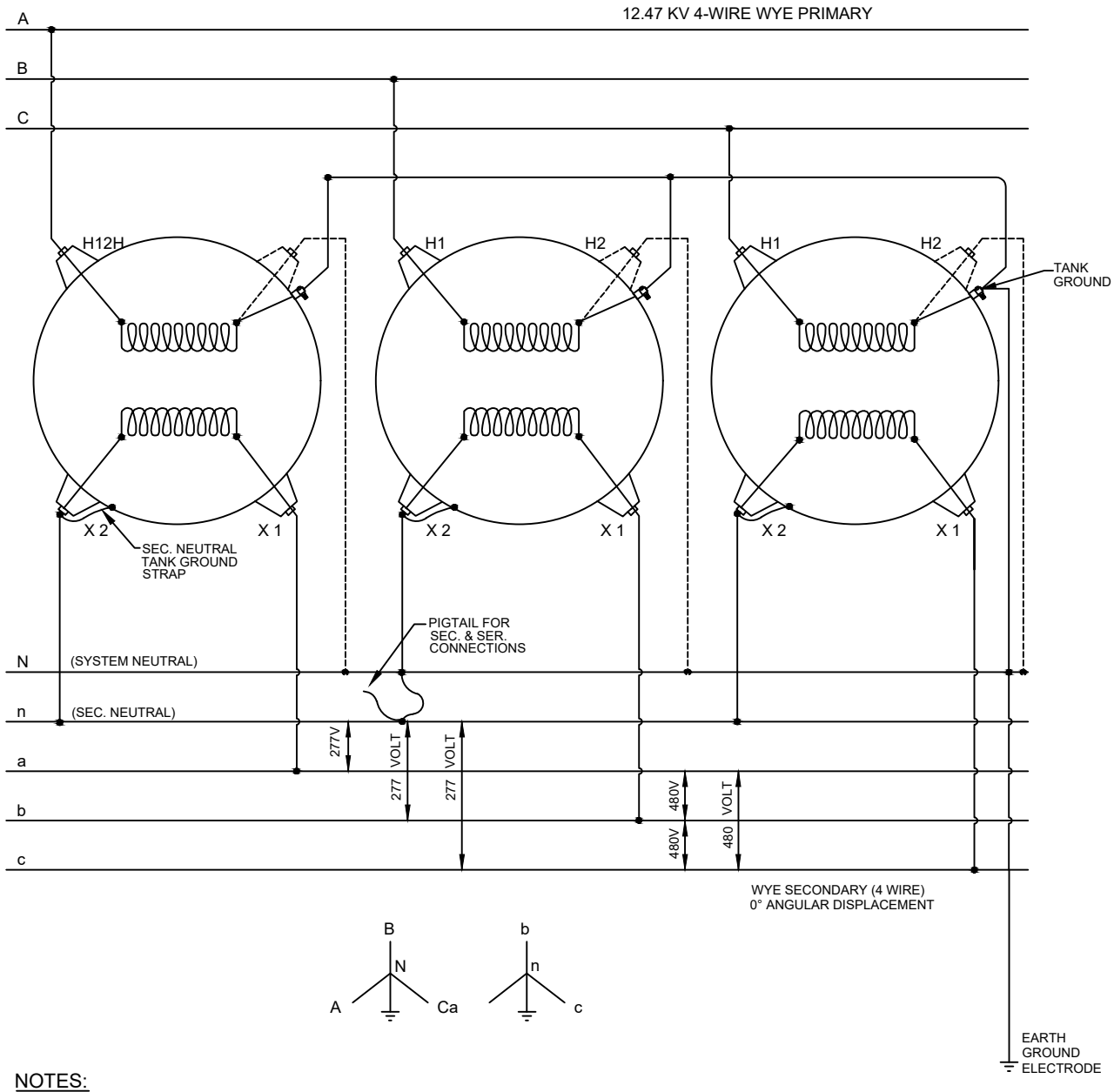
SC6.15	TYPICAL OVERHEAD 1-PHASE 7.2KV (12.47kV) TRANSFORMER INSTALLATION	APPROVED AS OF 12/1/2016

OVERHEAD THREE-PHASE 277/480 VOLT SERVICE
WYE CONNECTED PRIMARY - WYE CONNECTED SECONDARY



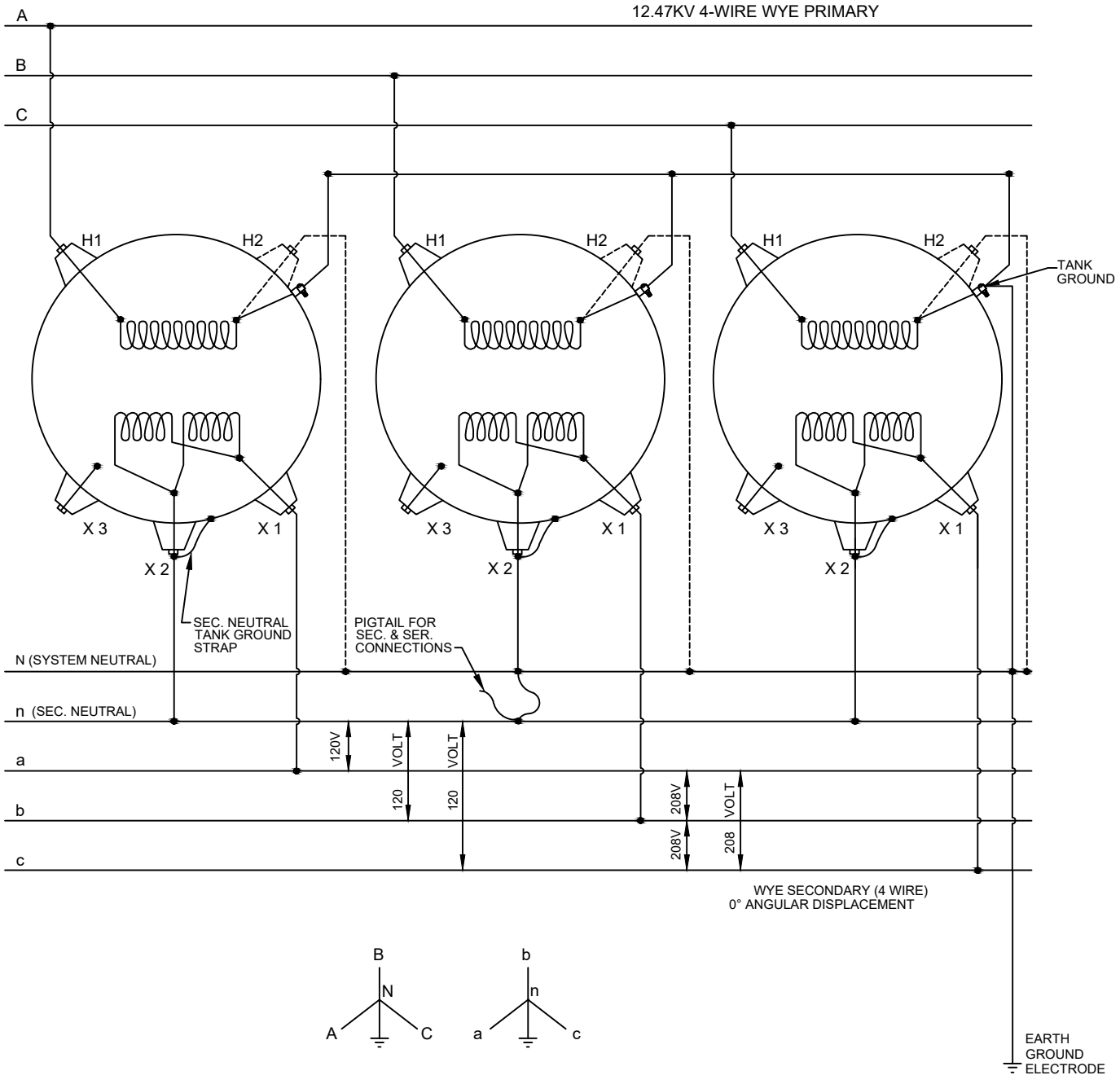
NOTES:

1. A floating neutral connection is not to be used on this connection.
2. The primary system neutral shall be bonded to the secondary neutral, otherwise, excessive voltages may develop on the secondary side.
3. Secondary terminals may not be arranged as shown- X1 & X2 will swap positions for transformers that have primary coils at 12kV & higher.

CITY LIGHT & POWER

SC6.16	3-PHASE TRANSFORMER BANK CONNECTION DIAGRAM (Y-Y, 277/480V SERVICE)	APPROVED AS OF 12/1/2016

OVERHEAD THREE-PHASE 120/208 WYE VOLT SERVICE
WYE CONNECTED PRIMARY - WYE CONNECTED SECONDARY



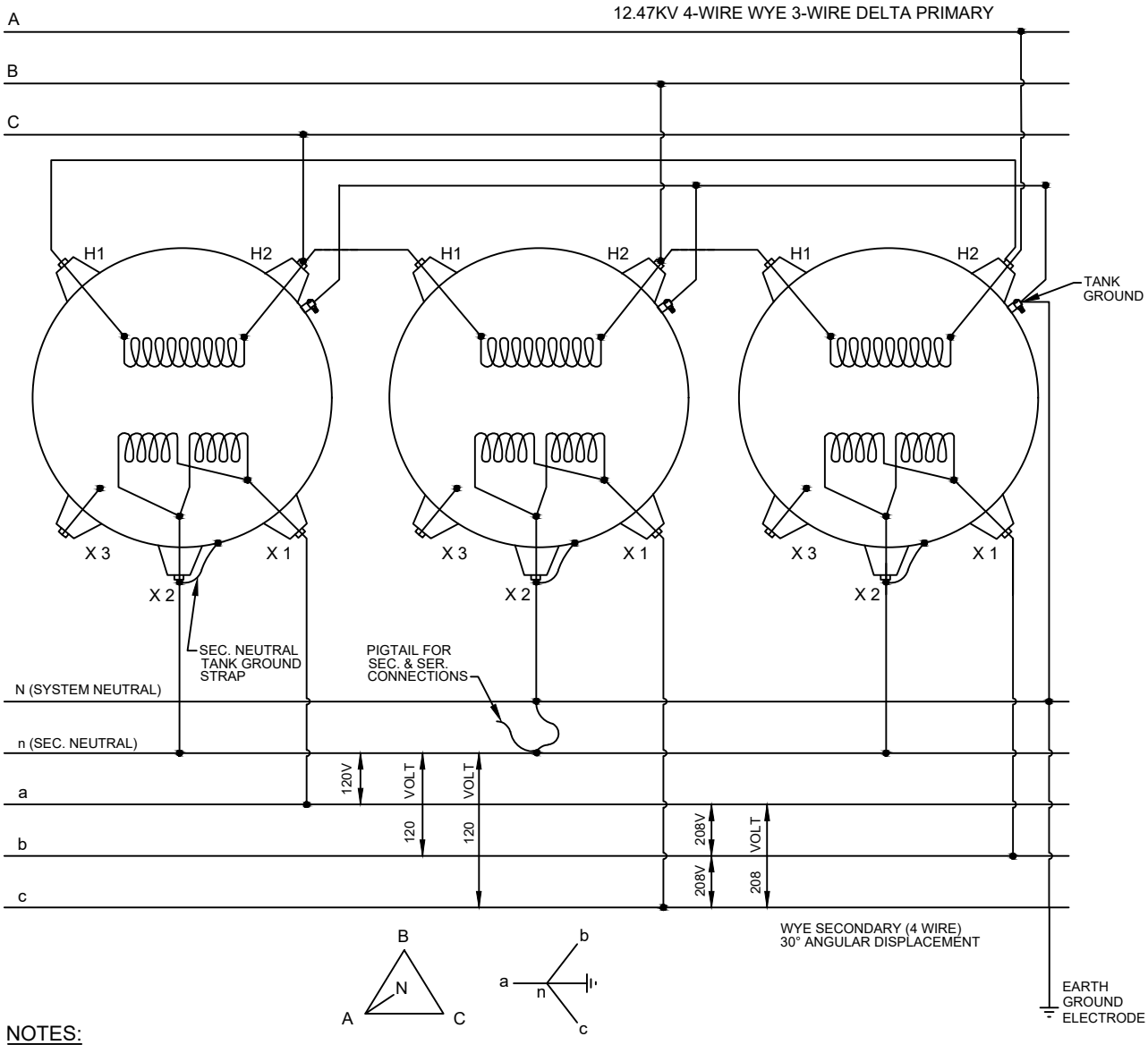
NOTES:

1. A floating neutral connection is not to be used on this connection.
2. The primary system neutral shall be bonded to the secondary neutral, otherwise excessive voltages may develop on the secondary side.
3. Secondary terminals may not be arranged as shown- X1 & X3 will swap positions for transformers that have primary coils at 12kV & higher.

CITY LIGHT & POWER

SC6.17	3-PHASE TRANSFORMER BANK CONNECTION DIAGRAM (Y-Y, 120/208V SERVICE)	APPROVED AS OF 12/1/2016

OVERHEAD THREE-PHASE 120/208 WYE VOLT SERVICE
DELTA CONNECTED PRIMARY - WYE CONNECTED SECONDARY



NOTES:

1. Connect 12.47kV Transformer in DELTA on high voltage side on 12.47kV system.
2. All transformers in a bank shall be the same type and same kVA size.
3. Secondary terminals may not be arranged as shown- X1 & X3 will swap positions for transformers that have primary coils at 12kV & higher.

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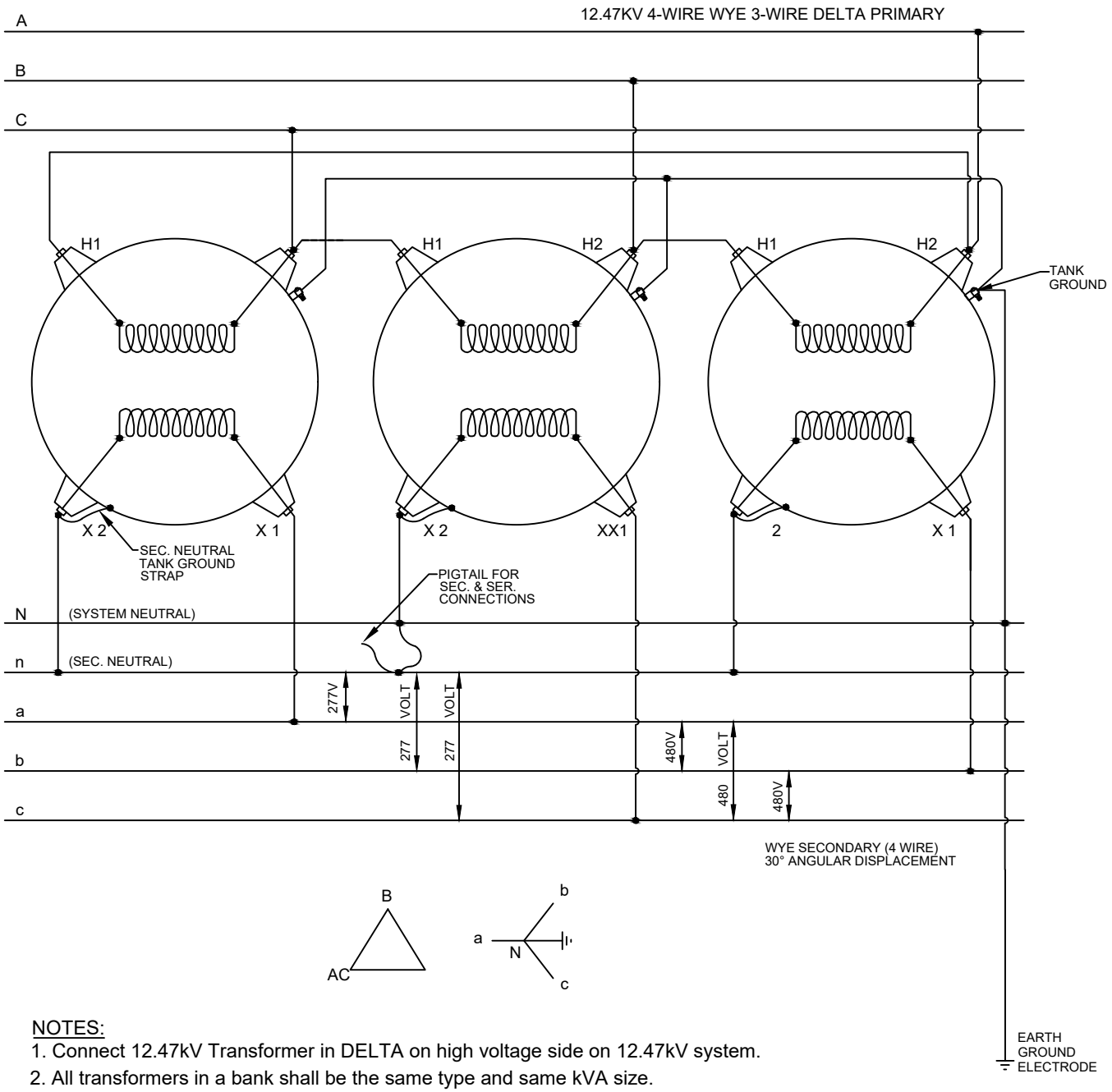
SC6.18	3-PHASE TRANSFORMER BANK CONNECTION DIAGRAM (D-Y, 120/208V SERVICE)	APPROVED AS OF 12/1/2016

OVERHEAD THREE-PHASE 277/480 VOLT SERVICE
DELTA CONNECTED PRIMARY - WYE CONNECTED SECONDARY



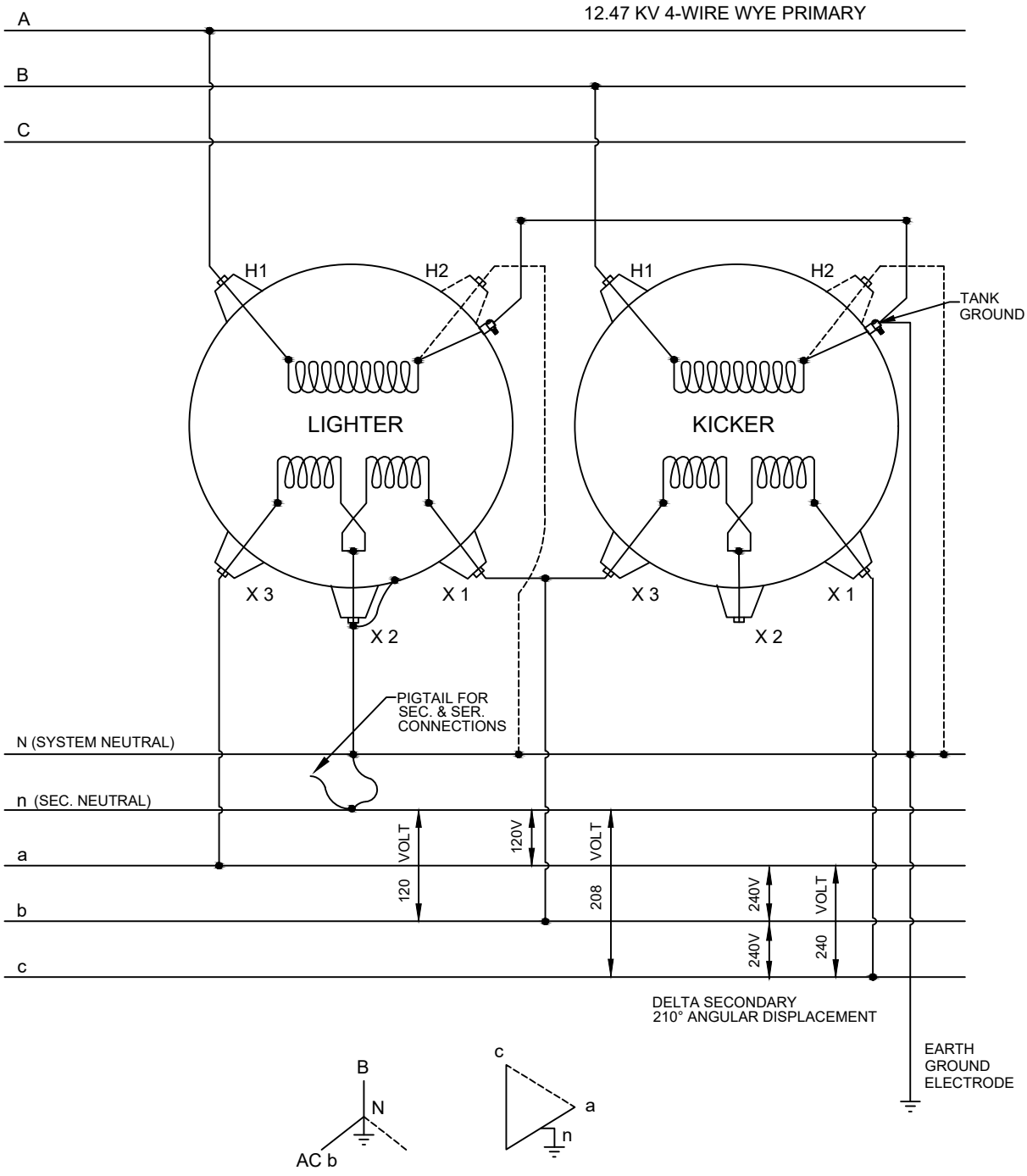
NOTES:

1. Connect 12.47kV Transformer in DELTA on high voltage side on 12.47kV system.
2. All transformers in a bank shall be the same type and same kVA size.
3. Secondary terminals may not be arranged as shown- X1 & X3 will swap positions for transformers that have primary coils at 12kV & higher.

CITY LIGHT & POWER

SC6.19	3-PHASE TRANSFORMER BANK CONNECTION DIAGRAM (D-Y, 277/480V SERVICE)	APPROVED AS OF 12/1/2016

OVERHEAD THREE PHASE OPEN WYE- OPEN DELTA
120/240 VOLT SERVICE



NOTES:

1. When using a transformer with a ground strap, the ground strap from the neutral bushing on the kicker transformer is to be removed. The ground lug is to be grounded with a separate ground wire to the system neutral.
2. Secondary terminals may not be arranged as shown- X1 & X3 will swap positions for transformers that have primary coils at 12kV & higher.

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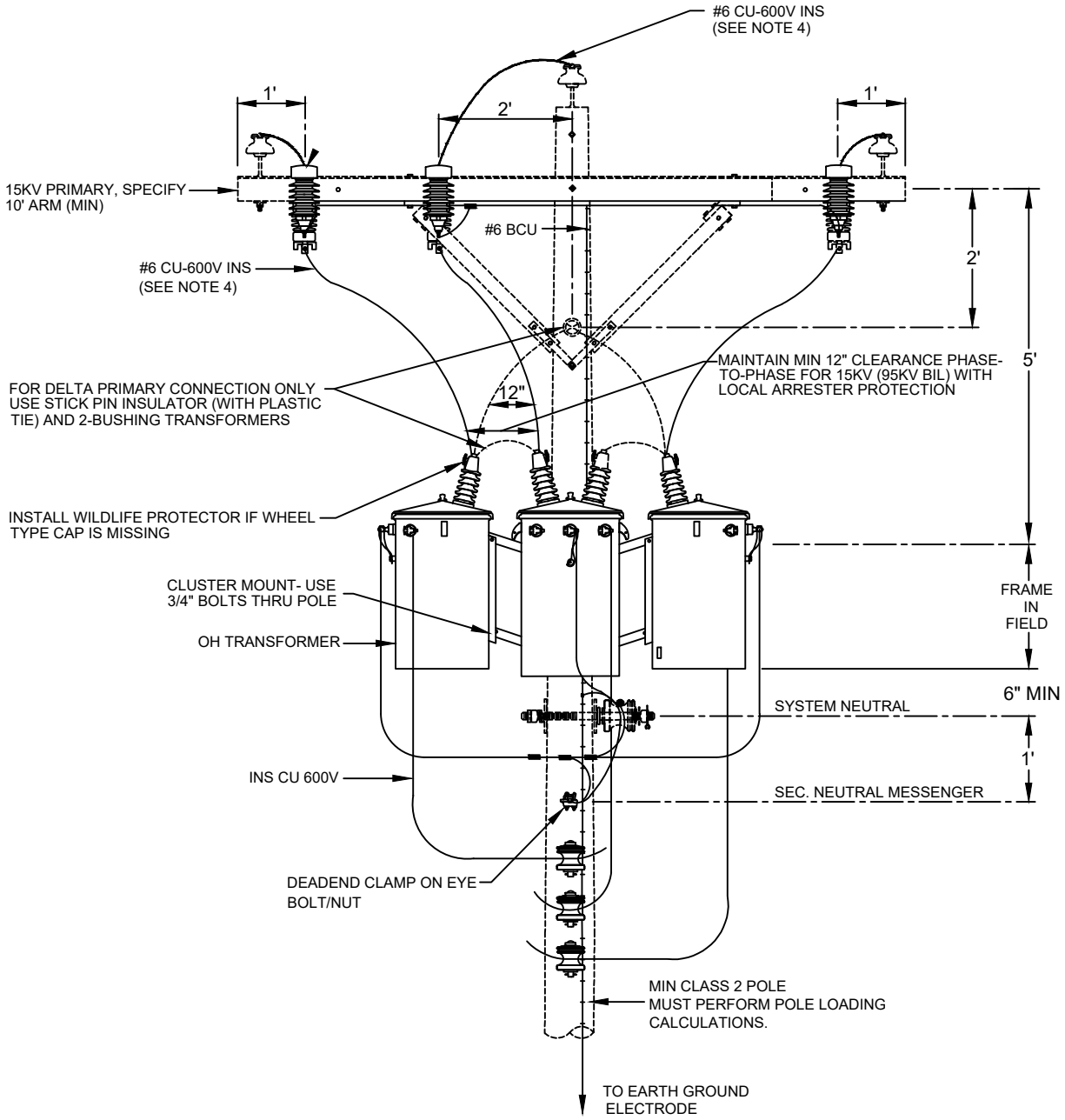
SC6.20	3-PHASE TRANSFORMER BANK CONNECTION DIAGRAM (oY-oD, 120/240V SERVICE)	APPROVED AS OF 12/1/2016



4.16KV AND 12.47KV THREE-PHASE BANKS

NOTES:

1. Shown is grounded wye-grounded wye connection for use on wye primary with either 1 or 2 bushing transformers.
2. For delta connection on primary, use 2 bushing transformers and add a stick pin insulator.
3. All energized wire from the primary side of the transformer to the 15KV primary wire connection shall be #6 insulated 600V copper.
4. New installations should be wired for secondary clockwise a-b-c phase rotation at the pole, left-to-right, top-to-bottom.
5. Adhere to local wildlife protection guidelines.
6. Engineering must perform pole loading calculations to determine proper size of pole and guying.
7. Resistance testing shall be performed on the grounding system. A minimum requirement for single and multi-grounded systems at any point in the grounding system throughout a overhead grounding system with apparatus is 5 ohms. All others is 25 ohms.

CITY LIGHT & POWER

SC6.21	TYPICAL 3-PHASE 4.16kV AND 12.47KV TRANSFORMER BANK CONSTRUCTION	APPROVED AS OF 12/1/2016

APPENDIX D SERVICE CONNECTION TYPICAL EQUIPMENT SPECIFICATIONS

Table of Contents

SPEC E-SP-002	Medium Voltage Power Cable Specifications
SPEC E-SP-006	* Padmounted Distribution Transformer Specifications
SPEC E-SP-007	Polemounted Distribution Transformer Specifications
SPEC E-SP-008	** Padmounted Underground Distribution Switch Specifications
SPEC E-SP-009	** Automatic Recloser Specifications
SPEC E-SP-010	** Polemounted Gang-Operated Load-Break Switch Specifications
SPEC E-SP-012	** Polemounted Fused Cutout Specifications

* Note: Spec datasheet available – Request from base Installation Manager

** Note: Specification awaiting approval.

GUIDEFORM SPECIFICATION FOR MEDIUM VOLTAGE POWER CABLES

SPEC NO.: E-GSP-002

CITY LIGHT & POWER, INC.

Proprietary

REVISION HISTORY

Revision	Date	Description	Author	Approval
A	04/14/2016	Original Issue	JVH	Initials

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5 References And Standards 8

SPECIFICATION

1 DESCRIPTION

Medium voltage (MV) electric utility power cable shall be 5kV, 15kV, and 35kV, single conductor cable (1/C), one-third (1/3) concentric neutral, MV-90, Aluminum/Copper, tree-retardant crosslinked polyethylene (TR-XLPE) type, 133% insulation.

Medium voltage (MV) electric utility power cable shall be 5kV, 15kV, and 35kV, single conductor cable (1/C), tape shielded, MV-105, Aluminum/Copper, ethylene polyethylene rubber(EPR) type, 133% insulation.

1.1 CONDUCTOR SIZES AND TYPES

5kV, TRXLPE, 133%, one-third (1/3) concentric neutral, AL

Conductor Size (AWG/MCM)	Nominal Overall Diameter (in.)	Nominal Cable Weight (lbs./ft)	Ampacity (Amps)		Minimum Bending Radius (in.)
			90°C in Duct	90°C Direct Buried	
2	0.82	0.330	123	179	7
1/0	0.90	0.398	160	229	8
2/0	0.94	0.453	182	258	8
4/0	1.05	0.617	237	323	9
250	1.10	0.707	261	348	10
500	1.39	1.247	381	449	12
750	1.58	1.737	464	505	13
1000	1.83	2.315	522	541	15

Note: Cable data referenced in this table is Prysmian Cable. If use any other manufacturer cable, the cable data may be differed.

15kV, TRXLPE, 133%, one-third (1/3) concentric neutral, AL

Conductor Size (AWG/MCM)	Nominal Overall Diameter (in.)	Nominal Weight (lbs./ft)	Ampacity (Amps)		Minimum Bending Radius (in.)
			90°C in Duct	90°C Direct Buried	
1/0	1.16	0.568	163	225	9
2/0	1.20	0.630	186	255	10
4/0	1.29	0.799	241	320	11
250	1.38	0.932	265	345	12
500	1.71	1.563	385	451	14
750	1.90	2.091	468	507	16

1000	2.12	2.687	529	549	17

Note: Cable data referenced in this table is Prysmian Cable. If use any other manufacturer cable, the cable data may be differed.

35kV, TRXLPE, 133%, one-third (1/3) concentric neutral, AL

Conductor Size (AWG/MCM)	Nominal Overall Diameter (in.)	Nominal Weight (lbs./ft)	Ampacity (Amps)		Minimum Bending Radius (in.)
			90°C in Duct	90°C Direct Buried	
1/0	1.58	0.945	168	219	13
2/0	1.63	1.019	191	248	14
4/0	1.80	1.297	247	314	15
250	1.85	1.412	271	339	15
500	2.15	2.107	392	452	18
750	2.33	2.687	476	517	19
1000	2.53	3.290	536	560	21

Note: Cable data referenced in this table is Prysmian Cable. If use any other manufacturer cable, the cable data may be differed.

5kV, TRXLPE, 133%, one-third (1/3) concentric neutral, CU

Conductor Size (AWG/MCM)	Nominal Overall Diameter (in.)	Nominal Weight (lbs./ft)	Ampacity (Amps)		Minimum Bending Radius (in.)
			90°C in Duct	90°C Direct Buried	
2	0.87	0.496	158	228	7
1/0	0.95	0.685	205	287	8
2/0	0.99	0.811	233	320	8
4/0	1.10	1.179	301	385	9
250	1.15	1.366	330	409	10
500	1.48	2.612	464	494	12
750	1.75	3.829	540	552	15
1000	1.93	4.987	586	607	16

Note: Cable data referenced in this table is Prysmian Cable. If use any other manufacturer cable, the cable data may be differed.

15kV, TRXLPE, 133%, one-third (1/3) concentric neutral, CU

Conductor Size (AWG/MCM)	Nominal Overall Diameter (in.)	Nominal Weight (lbs./ft)	Ampacity (Amps)		Minimum Bending Radius (in.)
			90°C in Duct	90°C Direct Buried	
2	1.08	0.627	162	224	9
1/0	1.16	0.826	210	284	10
2/0	1.20	0.958	238	317	10
4/0	1.31	1.340	307	385	11
250	1.38	1.555	336	410	12
500	1.75	2.890	471	501	14
750	1.96	4.078	548	559	16
1000	2.17	5.308	596	669	18

Note: Cable data referenced in this table is Prysmian Cable. If use any other manufacturer cable, the cable data may be differed.

35kV, TRXLPE, 133%, one-third (1/3) concentric neutral, CU

Conductor Size (AWG/MCM)	Nominal Overall Diameter (in.)	Nominal Weight (lbs./ft)	Ampacity (Amps)		Minimum Bending Radius (in.)
			90°C in Duct	90°C Direct Buried	
1/0	1.58	1.202	216	278	13
2/0	1.63	1.346	245	311	14
4/0	1.80	1.824	314	383	15
250	1.85	2.036	344	409	15
500	2.19	3.446	480	510	18
750	2.40	4.694	561	573	20
1000	2.58	5.925	609	626	21

Note: Cable data referenced in this table is Prysmian Cable. If use any other manufacturer cable, the cable data may be differed.

5kV, EPR, 133%, tape shielded, AL

Conductor Size (AWG/MCM)	Nominal Overall Diameter (in.)	Nominal Cable Weight (lbs./ft)	Ampacity (Amps)		Minimum Bending Radius (in.)
			105°C in Duct	105°C Direct Buried	
2	0.73	0.308	125	165	9
1/0	0.80	0.376	160	225	10
2/0	0.85	0.422	185	260	11
4/0	0.98	0.572	245	350	13
250	1.03	0.638	270	385	13
500	1.25	0.985	400	605	16
750	1.43	1.315	505	790	18
1000	1.58	1.638	590	950	20

Note: Cable data referenced in this table is Prysmian Cable. If use any other manufacturer cable, the cable data may be differed.

15kV, EPR, 133%, tape shielded, AL

Conductor Size (AWG/MCM)	Nominal Overall Diameter (in.)	Nominal Weight (lbs./ft)	Ampacity (Amps)		Minimum Bending Radius (in.)
			105°C in Duct	105°C Direct Buried	
2	0.96	0.484	130	170	12
1/0	1.03	0.566	165	225	13
2/0	1.08	0.620	190	260	13
4/0	1.18	0.761	245	350	15
250	1.23	0.834	270	385	15
500	1.45	1.216	400	600	18
750	1.63	1.574	490	780	20
1000	1.84	2.028	565	940	23

Note: Cable data referenced in this table is Prysmian Cable. If use any other manufacturer cable, the cable data may be differed.

35kV, EPR, 133%, tape shielded, AL

Conductor Size (AWG/MCM)	Nominal Overall Diameter (in.)	Nominal Weight (lbs./ft)	Ampacity (Amps)		Minimum Bending Radius (in.)
			105°C in Duct	105°C Direct Buried	
1/0	1.43	0.987	165	225	18
2/0	1.47	1.054	190	260	18

4/0	1.57	1.226	245	345	19
250	1.62	1.315	270	380	20
500	1.90	1.875	400	590	23
750	2.09	2.300	490	765	26
1000	2.24	2.704	565	920	27

Note: Cable data referenced in this table is Prysmian Cable. If use any other manufacturer cable, the cable data may be differed.

5kV, EPR, 133%, tape shielded, CU

Conductor Size (AWG/MCM)	Nominal Overall Diameter (in.)	Nominal Weight (lbs./ft)	Ampacity (Amps)		Minimum Bending Radius (in.)
			105°C in Duct	105°C Direct Buried	
2	0.73	0.424	155	215	9
1/0	0.81	0.577	210	290	10
2/0	0.84	0.675	235	330	11
4/0	0.97	0.982	310	445	12
250	1.02	1.126	345	495	13
500	1.24	1.988	505	775	15
750	1.43	2.863	630	1000	18
1000	1.59	3.681	720	1200	20

Note: Cable data referenced in this table is Prysmian Cable. If use any other manufacturer cable, the cable data may be differed.

15kV, EPR, 133%, tape shielded, CU

Conductor Size (AWG/MCM)	Nominal Overall Diameter (in.)	Nominal Weight (lbs./ft)	Ampacity (Amps)		Minimum Bending Radius (in.)
			105°C in Duct	105°C Direct Buried	
2	0.96	0.590	165	215	12
1/0	1.04	0.762	215	290	13
2/0	1.07	0.863	245	335	13
4/0	1.17	1.161	315	445	15
250	1.22	1.314	345	495	15
500	1.44	2.204	500	765	18
750	1.63	3.110	610	990	20
1000	1.84	4.056	690	1185	23

Note: Cable data referenced in this table is Prysmian Cable. If use any other manufacturer cable, the cable data may be differed.

35kV, EPR, 133%, tape shielded, CU

Conductor Size (AWG/MCM)	Nominal Overall Diameter (in.)	Nominal Weight (lbs./ft)	Ampacity (Amps)		Minimum Bending Radius (in.)
			105°C in Duct	105°C Direct Buried	
1/0	1.43	1.214	215	290	18
2/0	1.47	1.279	245	330	19
4/0	1.57	1.669	315	445	19
250	1.62	1.837	345	490	20
500	1.78	2.342	500	755	23
750	2.09	3.906	610	970	26
1000	2.24	4.808	690	1160	27

Note: Cable data referenced in this table is Prysmian Cable. If use any other manufacturer cable, the cable data may be differed.

1.2 CABLE RATING

MV TRXLPE power cable shall be temperature rated for ninety degrees Celsius (90°C) continuous, one hundred thirty degrees Celsius (130°C) emergency and two hundred fifty degrees Celsius (250°C) short circuit operation.

MV EPR power cable shall be temperature rated for one hundred and five degrees Celsius (105°C) continuous, one hundred forty degrees Celsius (140°C) emergency and two hundred fifty degrees Celsius (250°C) short circuit operation.

2 INSTALLATION

MV power cable typical are used at Travis base is 5kV/15kV, EPR, 133% insulation, MV-105, tape shielded, and AL/CU conductors. (See section 1.1 tables above for cable rated and sized details)

MV power cable typical are used at Hill base is 5kV/15kV, EPR, 133% insulation, MV-105, tape shielded, and AL/CU conductors. (See section 1.1 tables above for cable rated and sized details)

MV power cable typical are used at MARB base is 15kV, EPR, 133% insulation, MV-105, tape shielded, and AL/CU conductors. (See section 1.1 tables above for cable rated and sized details)

MV power cable typical are used at APG base is 5kV, 15kV, and 35kV, TRXLPE, 133% insulation, MV-90, 1/3 concentric neutral, and AL/CU conductors. (See section 1.1 tables above for cable rated and sized details)

MV power cable shall be rated for outdoor installation, underground duct in conduit and aerial. Cable shall be suited for utility primary, wet or dry locations, with messenger, direct buried or underground duct, isolated in air or conduit in air.

3 DESIGN PARAMETERS

3.1 CONDUCTOR

- Solid or Class B compressed concentric strand aluminum (Al) alloy 1350 or soft drawn annealed copper per ASTM.
- Stranded conductors are water-blocked with strand-seal conductor filling compound.

3.2 CONDUCTOR SHIELD

Conductor shield shall be extruded thermosetting semiconducting shield which is free stripping from the conductor and bonded to the insulation.

3.3 INSULATION

Insulation shall be TR-XLPE as defined in ANSI/ICEA S-94-649, exhibiting an optimum balance of mechanical and electrical properties, assuring resistance to treeing.

Insulation shall be natural high dielectric strength EPR-based insulation, combined with other materials and agents that enhance the electrical and mechanical characteristics assuring extended cable life

3.3.1 INSULATION SHIELD

Insulation shield shall be extruded thermosetting, semiconducting with controlled adhesion to the insulation providing the required balance between electrical integrity and ease of stripping.

3.3.2 METALLIC SHIELD

Metallic shield shall be solid bare copper wire helically applied and uniformly spaced. Water-blocking agents shall be applied over the insulation shield and around the neutral wires to resist longitudinal water penetration.

Metallic shield shall be helically applied non-magnetic copper tape(s) over the insulation shield with a nominal overlap of 25 %.

3.4 JACKET

Conductor jacket shall be black insulating, sunlight-resistant, linear low-density polyethylene encapsulating the neutral wires with three intruded red stripes and NESC lightning bolt symbol.

Conductor jacket shall be black, sunlight resistant, low coefficient of fiction, polyvinyl chloride (PVC) jacket tightly applied over the copper tape.

4 APLLICATION

MV power cables are recommended for distribution circuits and for feeders or branch circuits in utility, industrial and commercial installation.

5 REFERENCES AND STANDARDS

All workmanship, equipment and materials shall conform to the latest editions of the following codes and standards in addition to CLP construction standards and as indicated in the technical specifications and drawings. If there are conflicts between the technical specifications, standards and construction drawings, the most stringent requirement shall apply.

- ANSI/ICEA S-94-649 Standard for Concentric Neutral Cables Rated 5 Through 46kV
- UL 1072 Medium Voltage Solid-Dielectric Cable
- ICEA S-97-682 Utility Shielded Power Cable Rated 5-46kV
- ANSI/ICEA S-93-639 5-46kV Shielded Power Cable for use in the Transmission and Distribution of Electric Energy
- NFPA, NEC National Electrical Code
- IEEE 383 Flame Test
- IEEE 1202 Flame Test

END OF SPECIFATION

GUIDEFORM SPECIFICATION FOR PAD-MOUNTED DISTRIBUTION TRANSFORMERS

SPEC NO.: E-GSP-006

CITY LIGHT & POWER, INC.
October 10, 2016

CITY LIGHT & POWER®

Proprietary

REVISION HISTORY

Revision	Date	Description	Author
0	05/09/2016	Original Issue	JVH
A	12/1/2016	Transformer Switching	DXE

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SPECIFICATION

1 DESCRIPTION

This specification including Equipment Data Sheet, covers the technical requirements for furnishing, delivering, testing, and commissioning of the Oil-Filled Pad-mounted Transformers.

The Equipment Data Sheet covers the rating, performance, special features, general design, constructions, testing and shipping requirements for Oil-Filled Transformer(s).

All components and material shall be of the latest field proven design and in current production. Obsolete components or those scheduled for discontinuation shall not be used.

2 DESIGN PARAMETERS

The transformer shall be designed in accordance with this specification.

Ratings:

1. The primary voltage and the basic impulse level (BIL) shall be rated to the "Power Transformer" or higher BIL level. The higher rated insulation is intended to add additional protection against voltage transients and switching surges.
2. The secondary voltage and the basic impulse level (BIL) shall be in accordance with the secondary voltages listed in the Equipment Data Sheet (Attachment 1).

Standards CLP Transformer Primary and Secondary Voltages Rating:

Primary Voltage	BIL (kV)	Secondary Voltage	BIL (kV)
2400 Delta	60	208Y/120	All 45 kV
4160 Delta	60	480Y/277	
12470 Delta	95	240 Delta	
		480 Delta	
		240 Delta with 120 Mid-Tap	
		480 Delta with 240 Mid-Tap	

3. Transformer shall be looped configured using three (3) 2-Position ON/OFF switches for switching and sectionalizing.
   a. Source A 15kV isolation.
   b. Source B 15kV isolation.
   c. Transformer load 15kV isolation.
4. Transformer shall meet design requirements for base elevation operating requirements.
5. Transformer shall be new and meets DOE 2016 Standards.
6. Transformer shall include properly sized primary arresters.
7. The transformer shall be furnished with full capacity high-voltage taps. The tap changer shall be clearly labeled to reflect that the transformer must be de-energized before operating the tap changer as required in Section 4.3 of IEEE Std C57.12.34™-2009 standard. The unit shall have one of the following tap configuration:
   a. 5-position tap: 1 normal tap, 2 raise taps (2.5% each), 2 lower taps (2.5% each)
8. Recommended distances of transformers from buildings shall following the following standard.
   a. 75kVA or less: 10-ft (or specify FR3 insulating fluid)
   b. 76 - 333kVA: 20-ft (or specify FR3 insulating fluid)
   c. Greater than 333kVA: 30-ft ((or specify FR3 insulating fluid)
9. The transformer, filled with Envirotemp FR3 shall have a 55°C or 65°C average winding temperature rise rating. The winding temperature rise shall not exceed 55°C or 65°C at base KVA rating.
10. The transformer, filled with mineral oil shall have a 55°C or 65°C average winding temperature rise rating. The winding temperature rise shall not exceed 55°C or 65°C at base KVA rating.
11. The transformer, filled with liquid-immersed shall meet or exceed the Energy Conservation Program for Distribution Transformers Energy and determined by DOE 2016 10 CFR part 431.
12. The percent impedance voltage shall be rated on the voltage connection. The tolerance on the impedance shall be +/- 7.5% of nominal value for impedance values greater than 2.5% and the tolerance on the impedance shall be +/- 10% for impedance value less than or equal to 2.5% and meet the tolerances for impedance as specified in section 9.2 of IEEE C57.12.00 2006.

Percent Impedance Voltage:

KVA Rating (Low voltage < 600 V)	Impedance
75	1.10 - 5.75
112.5-300	1.40 - 5.75
500	1.70 - 5.75
750-3750	5.75 nominal

KVA Rating	Low voltage > 600 V (all nominal values)		
	≤150 kV BIL	200 kV BIL	250 kV BIL
1000 - 5000	5.75	7.00	7.50
7500 - 10000	6.50	7.00	7.50

3 CONSTRUCTION

1. The core and coil shall be vacuum processed to ensure maximum penetration of insulating fluid into the coil insulation system. While under vacuum, the windings will be energized to heat the coils and drive out moisture, and the transformer will be filled with preheated filtered degassed insulating fluid. The core shall be manufactured from burr-free, grain-oriented silicon steel and shall be precisely stacked to eliminate gaps in the corner joints. The coil shall be insulated with B-stage, epoxy coated, diamond pattern, insulating paper, which shall be thermally cured under pressure to ensure proper bonding of conductor and paper. Coils shall be either aluminum or copper.
2. The dielectric coolant shall be listed less-flammable fluid meeting the requirements of National Electrical Code Section 450-23 and the requirements of the National Electrical Safety Code (IEEE C2-2012 standard), Section 15. Refer to Section 2.8 for specifying mineral oil or FR3 insulating fluid when installation is by combustible structures.
3. Tank and Cabinet Enclosure
    a. The high-voltage and low-voltage compartments, separated by a metal barrier, shall be located side-by-side on one side of the transformer tank. When viewed from the front, the low-voltage compartment shall be on the right. Each compartment shall have a door that is constructed so as to provide access to the high-voltage compartment only after the door to the low-voltage compartment has been opened. There shall be one or more additional fastening devices that must be removed before the high-voltage door can be opened. Where the low-voltage compartment door is of a flat panel design, the compartment door shall have three-point latching with a handle provided for a locking device. Hinge pins and associated barrels shall be constructed of corrosion-resistant material, passivated ANSI Type 304 or the equivalent.
    b. A recessed, captive, penta-head bolt that meets the dimensions per IEEE C57.12.28-2005 standard shall secure all access doors.
    c. The compartment depth shall be in accordance with IEEE C57.12.34-2015 standard, unless additional depth is specified.
    d. The tank base must be designed to allow skidding or rolling in any direction. Lifting provisions shall consist of four lifting lugs welded to the tank.
    e. The tank shall be constructed to withstand 7 psi without permanent deformation, and 15 psi without rupture. The tank shall include a 15 psig pressure relief valve with a flow rate of minimum 35 SCFM.
    f. The exterior of the unit shall be painted Greystone Federal Paint # 23617 (Federal Std 595B) in color. IEEE C57.12.31 coating system requirements.
    g. The tank shall be complete with an anodized aluminum laser engraved nameplate. This nameplate shall meet Nameplate B per IEEE C57.12.00™-2010 standard.
4. High Voltage Bushings and Terminals
    a. **15 KV DEADFRONT, CURRENTS BELOW 200 AMPS:** The high voltage bushings shall be 15/25 kV 200A bushing wells with bushing well inserts installed. The bushings shall be externally removable and be supplied with a removable stud (Eaton's Cooper Power Systems catalog sections 800-32, 500-12, and 500-26 or Approved by CLP).
    b. **15 KV DEADFRONT, CURRENTS ABOVE 200 AMPS:** The high voltage bushing shall be a 600A dead-break primary one-piece bushing externally removable, 3Ø rated,

integral design. An optional 900 A bushing is available upon request (Eaton's Cooper Power Systems catalog sections 800-45 and 800-47 or approved by CLP).

5. Bushing Configuration
   a. **15 KV LOOP FEED DEADFRONT:** The transformer shall be provided with six (6) high voltage bushings in accordance Figure 11 dimensions of IEEE C57.12.34-2009 standard for loop feed configurations.
6. Low Voltage Bushings and Terminals
   a. Voltages less than 600 Volts: The transformer shall be provided with tin-plated spade-type bushings for vertical takeoff. The spacing of the connection holes shall be 1.75 inches on center, per IEEE C57.12.34-2009 standard Figure 8a.

b. Transformers 300 kVA and below, and 500 kVA with 480Y/277 secondary will have two-piece low voltage bushings with studs and screw on spades. Transformers 500 kVA with 208Y/120 secondary and all transformers above 500 kVA will have one-piece bushings.

CLP Standard Bushing Hole Quantities

KVA Rating	208Y/120V	480Y/277 V and Higher
45-300	6 standard, 8 maximum	6 standard, 8 maximum
500	8 standard, 10 maximum	6 standard, 8 maximum
750-1000	10 standard, 14 maximum	10 standard, 12 maximum
2000-3750	N/A	12 standard, 14 maximum

7. Required accessories:
   a. Liquid level gauge
   b. Liquid temperature gauge
   c. Pressure relief device
   d. 1" drain valve with sampler in LV compartment
   e. 1" fill valve
   f. Schrader valve
   g. Two-hole ground pads
   h. Ground connectors/Lug #8 solid – 2/0
   i. Nitrogen blanket
   j. Data with proposal
      i. Core Losses
      ii. Winding Losses
      iii. %Z impedance
      iv. Dimensional Drawings (Before going to manufacturing. Approval not required.)

4 REFERENCES AND STANDARDS

All workmanship, equipment and materials shall conform to the latest editions of the following codes and standards in addition to CLP General Electrical Requirements and as indicated in the technical specifications and drawings. If there are conflicts between the technical specifications, standards and construction drawings, the most stringent requirement shall apply. Deviations from applicable Codes, Standards and Regulations shall only be implemented with the written approval of the CLP.

American National Standards Institute (ANSI)

ANSI C57.12.00	General Requirements for Liquid Immersed Distribution, Power and Regulating Transformers
ANSI C57.12.28	Pad-Mounted Equipment - Enclosure Integrity
ANSI C57.12.34	Standard Requirements for Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers (2500 kVA and Smaller) - High Voltage: 34500GrdY/19920 Volts and Below; Low-

	Voltage: 480 Volt 2500 kVA and Smaller *(issued in March 2005 - combines C57.12.22 and C57.12.26 standards).*
ANSI C57.12.90	Test Code for Liquid Immersed Distribution, Power, and Regulating Transformers and Guide for Short-Circuit Testing of Distribution and Power Transformers
ANSI C57.91	Guide for Loading Mineral Oil Immersed Transformers
ANSI C57.154	Standard for the Design, Testing, and Application of Liquid-Immersed Distribution, Power, and Regulating Transformers Using High-Temperature Insulation Systems and Operating at Elevated Temperatures

National Equipment Manufacturer Association (NEMA)

NEMA TR1	Transformers, Regulators and Reactors
NEMA 260	Safety Labels for Pad-Mounted Switchgear and Transformers Sited in Public Areas.

Department of Energy (DOE)

10 CFR Part 431	Energy Conservation Program for Commercial Equipment: Distribution Transformers Energy Conservation Standards; Final Rule.

Underwriter's Laboratory (UL)

UL 508	Industrial Control Equipment

END OF SPECIFATION

GUIDEFORM SPECIFICATIONS FOR POLEMOUNTED TRANSFORMERS

SPECIFICATION NUMBER: E-GSP-007

CITY LIGHT & POWER, INC.
May 9, 2016

Proprietary

REVISION HISTORY

Revision	Date	Description	Author	Approval
A	5/9/2016	Original Issue	DXE	

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SPECIFICATION

1 DESCRIPTION

This specification covers the electrical and mechanical characteristics of 5-167kVA Single-Phase Overhead Type Distribution Transformers.

The included data covers the technical requirements for furnishing, delivering, testing, and commissioning 5-167kVA Single-Phase Overhead Type Distribution Transformers.

2 DESIGN PARAMETERS

2.1 OVERHEAD TRANSFORMER

Single-Phase Overhead transformers shall be specified according to the following requirements.

1. The ratings shall be one of the following kVA ratings:

   5, 10, 15, 25, 37.5, 50, 75, 100, 167

2. The primary voltage shall be in accordance with Table 1 and Table 2. BIL shall be in accordance with IEEE C57.12.10.

Table 1
Ratings for Single-Phase Transformers
(Single Ratio)

Transformer High-voltage	Minimum kVA Rating For Low-voltage Rating of:	
Rating (V)	120/240 [1] (V)	277 or 240/480 [1] (V)
2400/4160Y	5	5
4800/8320Y	5	5
7200/12470Y	5	5
12470GrdY/7200	5	5
7620/13200Y	5	5
13200GrdY/7620	5	5
12000	5	5
13200/22860Y [2]	5	5
13200	5	5
13800GrdY/7970	5	5
13800/23900Y [2]	5	5
13800	5	5
14400/24940Y [2]	5	5
24490GrdY/14400 [2]	5	5
16340	5	5
34500GrdY/19920 [3,4]	5	5

1. Low-voltage rating of 120/240 volts or 240/480 volts is suitable for series, multiple, or three-wire service.
2. Suitable for wye-connection on systems where ground conditions permit the use of 18-kV arresters.
3. Suitable for wye-connection on systems where ground conditions permit the use of 27-kV arresters.
4. 125 kV BIL may be used based on user/vendor agreement.

3. The secondary voltage shall be one of the following and the BIL of the secondary voltage shall be 30kVA.

   120/240 (5-100kVA - 3 Bushings, 167kVA - 4 Bushings)
   240/480 (5-100kVA - 3 Bushings, 167kVA - 4 Bushings)
   120 (2 Bushings)
   277 (2 Bushings)

4. Frequency shall be 60-Hz unless otherwise annotated in the Equipment Specifications Datasheet by CLP.

5. Operating elevation shall be specified by CLP according to installation elevation and manufacturer shall design transformers to at full nameplate rating at specified elevation.

6. Efficiency standards shall be DOE – 10 CFR Part 431 Compliant.

7. Insulation shall be Mineral Oil unless otherwise specified by CLP.

8. Cooling Class shall be ONAN unless otherwise specified by CLP.

9. Loading shall be conducted as per IEEE Standard C57.91.

10. Sound Levels shall be in accordance with NEMA TR1 Table 0-2 and IEEE Standard C57.12.90.
11. Overcurrent Protection shall be one of the following.
    a. No overcurrent protection.
    b. Internally mounted cartridge fuse protection.
    c. Secondary overcurrent and transformer overload protection by breaker. Ability for single hotstick operation to energize and de-energize the secondary service. Can be used in conjunction with primary side expulsion fuse.
    d. Primary overcurrent and transformer overload protection by breaker. Ability for single hotstick operation to energize and de-energize the secondary service. Can be used in conjunction with primary side current limiting fuse.

2.2 POLE

Poles shall be rated properly to handle all apparatuses attached to the pole. Proper pole-loading calculations shall be performed by CLP Engineering for optimal pole class specifications, guying, and line span.

2.3 TERMINATIONS

The concrete shall obtain minimum compression strength of five-thousand (5000) psi at twenty-eight (28) days of age and contain six percent (6%) entrained air by volume plus or minus one percent (1%). The concrete batching, mixing and placing shall conform to ACI A301 Specification for Structural Concrete and ASTM C94/C94M Specification for Ready-Mix Concrete and ACI 304 Guide for Measuring, Mixing, Transporting and Placing Concrete.

2.4 LOW-VOLTAGE TERMINATIONS

Terminals for se

3 REFERENCES AND STANDARDS

All workmanship, equipment and materials shall conform to the latest editions of the following codes and standards in addition to CLP construction standards and as indicated in the technical specifications and drawings. If there are conflicts between the technical specifications, standards and construction drawings, the most stringent requirement shall apply. Deviations from applicable Codes, Standards and Regulations shall only be implemented with the written approval of the CLP.

IEEE Std C57.12.00 (2010)	IEEE Standard for Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers
IEEE Std C57.12.20 (2011)	IEEE Standard for Overhead-Type Distribution Transformers 500kVA and Smaller: High Voltage, 34500V and Below; Low Voltage, 7970/13800Y V and below
IEEE Std C57.12.31 (2010)	IEEE Standard for Pole Mounted Equipment – Enclosure Integrity
IEEE Std C57.12.35 (2013)	IEEE Standard for Bar Coding for Distribution Transformers and Step-Voltage Regulators
IEEE Std C57.12.70 (2011)	IEEE Standard for Standard Terminal Markings and Connections for Distribution and Power Transformers
IEEE Std C57.12.90 (2015)	IEEE Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers
IEEE Std C57.91 (2011)	IEEE Guide for Loading Mineral-Oil-Immersed Transformers and Step-Voltage Regulators
IEEE Std C57.98 (2011)	IEEE Guide for Transformer Impulse Tests
IEEE Std C57.109 (1993)	IEEE Guide for Liquid-Immersed Transformers Through-Fault-Current Duration

IEEE Std C57.154 (2012)	IEEE Standard for the Design, Testing, and application of Liquid-Immersed Distribution, Power, and Regulating Transformers Using High-Temperature Insulation Systems and Operating at Elevated Temperatures
IEEE Std C62.11 (2012)	IEEE Standard for Metal-Oxide Surge Arresters for AC Power Circuits (>1 kV)
IEEE Std C62.22 (2009)	IEEE Guide for the Application of Metal-Oxide Surge Arresters for Alternating-Current Systems
NEMA TR 1 (2013)	Transformers, Regulators and Reactors, Table 0-2 Audible Sound Levels
10 CFR Part 431 (2016)	DOE – Energy Conservation Program for Commercial Equipment: Distribution Transformers Energy Conservation Standards; Final Rule

END OF SPECIFATION

APPENDIX E ABBREVIATIONS

When practicable, the following standard abbreviations and symbols shall be used on all electric distribution line construction and one-line drawings. Whenever these abbreviations or symbols do not clearly define the work to be done, additional notes of explanation will be necessary for accurate understanding of the work order.

A, AMPS	Amperes
AAAC	All Aluminum Alloy Conductor
ACSR	Aluminum Conductor Steel Reinforced
AL	Aluminum
ALLEY	Alley Arm (sidearm)
AR	Crossarm
ARR	Arrester (Surge, Lightning)
ASB	Anti-Splitting Bolt
ATO	Automatic Throw-Over
BAR	Buckarm
BCU	Bare Copper
BP	Box Pad
BR	Brace
BRKT	Bracket
BRL	Barrel Configuration
C	Capacitor
CA	Concrete Anchor
CATV	Cable TV
CCS	Copper Clad Steel
CLF	Current Limiting Fuse
CNR	Corner (or Shoulder) Type Pins
CP	Concrete Pad
CSP	Completely Self-Protected Transformer
CT	Current Transformer
CU	Copper
CW	Copper weld
DA	Double Arming
DBL	Double (Pins/ INS &/ or Arms)
DB	Direct Bury
DDE	Double Deadend
DE	Deadend
DHA	Double Helix Anchor
DUP	Duplex
E	Electronic Recloser
ENC	Encased in Concrete
EX, EXIST	Existing
EXT	Extension
F	Fuse
FCI	Faulted Circuit Indicator

FE	Fused
FG	Fiberglass
FIMS	Facilities Information Management
FO	Fiber Optic
FS	Fused Switch
G	Gas Line
GO	Gang Operated
GRD	Ground
H, HVY	Heavy, High Strength
HPS	High Pressure Sodium
IN	Install
INS, INSUL	Insulator, Insulated, Insulate
IS	Interrupter Switch (Fault)
J, JBOX	Junction Box
KCMIL	Thousands Circular Mils
KV	Kilovolts
KVA	Kilovolt-Amperes
KW	Kilowatts
LA	Line Angle
LBS	Pounds
LBU	Load Break Unit
LF	Loop Feed
M	Meter, Meter Location
MH	Mounting Height
MO	Motor Operated
MV	Mercury Vapor, Medium Voltage
MVI	Molded Vacuum Interrupter
#	Number
N, NEUT	Neutral
NC	Normally Closed
NO	Normally Open
NR	Non Reclose
NT	Network Transformer
OD	Open Delta Connection
OH	Overhead
P, PRI	Primary
PB	Push Brace
PD	Padmount
PE	Photoelectric

PED	Pedestal
PH or Ø	Phase
PT	Potential Transformer
QUAD	Quadraplex
R	Recloser
RA	Rock Anchor
RBS	Rated Breaking Strength
REG	Regulator
RF	Radial Feed
RM	Remove, Removable
ROW	Right-of-Way
RP	Replace
RS	Ruling Span (for Sag/Tension)
SCADA	Supervisory Control & Data Acquisition System
S, SEC	Secondary
SECT	Sectionalizer
SER	Service
SG, SGH	Span Guy, Span Guy Heavy
SGL	Single (Pins, Arms, INS)
SHA	Single Helix Anchor
SL	Street Light
SOL	Solid
SS	Sanitary Sewer, Storm Sewer
ST	Static (Shield Wire/ Neutral Level)

STR	Strand, Stranded
SW	Switch
SWG	Sidewalk Guy
T-OP	Tee-Op 600 Amp Separable Connectors
TEL	Telephone
TEMP	Temporary
TERM	Terminate, Cable Terminator
TPA	Tipping Plate Anchor
TRANS	Transmission
TRI	Triplex
TS	Traffic Signal
TSFR	Transformer
TYP	Typical
U, UBLT	Underbuilt
UG	Underground
V	Volts
VERT	Vertical Construction
VLT	Vault
VT	Voltage Transformer
W	Watts, Waterline
WO	Without
WP	Wood Pole
X	Crossing, Cross
XA	Expanding Anchor

004 TECHNICAL SPECIFICATIONS

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SECTION 01 00 00

GENERAL REQUIREMENTS

04/15

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GENERAL REQUIREMENTS
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PART 1 GENERAL

1.1 REFERENCES

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

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3-4 2014; AMD 4-6 2014; AMD 1-2 2016; Errata 1-2 2016; 2017) National Electrical Code

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual
ER 415-1-15	(1989) Construction Time Extensions for Weather

U.S. ARMY CORPS OF ENGINEERS, SACRAMENTO DISTRICT (CESPK)

CESPK FORM 450	(1992) Contractor Equipment Data Sheet

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

29 CFR 1904	Recording and Reporting Occupational Injuries and Illnesses
29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1926	Safety and Health Regulations for Construction

1.2 VETERANS EMPLOYMENT EMPHASIS FOR U.S. ARMY CORPS OF ENGINEERS CONTRACTS

In addition to complying with the requirements outlined in FAR Part 22.13, FAR Provision 52.222-38, FAR Clause 52.222-35, FAR Clause 52.222-37, DFARS 222.13 and Department of Labor regulations, U.S. Army Corps of Engineers (USACE) contractors and subcontractors at all tiers are encouraged to promote the training and employment of U.S. veterans while performing under a USACE contract. While no set-aside, evaluation preference, or incentive applies to the solicitation or performance under the resultant contract, USACE contractors are encouraged to seek out highly qualified veterans to perform services under this contract. The following resources are available to assist USACE contractors in their outreach efforts:

Federal Veteran employment information at
http://www.fedshirevets.gov/index.aspx

Department of Labor Veterans Employment Assistance
http://www.dol.gov/vets/

Department of Veterans Affairs-VOW to Hire Heros Act
http://benefits.va.gov/vow/

Army Wounded Warrior Program -
http://wtc.army.mil/modules/employers/index.html

U.S. Chamber of Commerce Foundation-Hiring Our Heros
http://www.hiringourheroes.org/

Guide to Hiring Veterans - Reference Material
http://www.whitehouse.gov/sites/default/files/docs/white_house_business_council_-_guide_to_hiring_veterans_0.pdf

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Provisions of Positive Protection System; G

SD-11 Closeout Submittals

Worker's Compensation Claims

Submit written summary of worker's compensation claims filed by workers on the project at the 50 percent and 100 percent points of project completion.

1.4 SCRAP MATERIAL

Materials specified to be removed and become the property of the Contractor are designated as scrap, and the Contractor, by signing this contract, hereby acknowledges that he has made due allowance for value, if any, of such scrap in the contract price.

1.5 WRITTEN GUARANTEES AND GUARANTOR'S LOCAL REPRESENTATIVE

Prior to completion of the contract, obtain and furnish to the Contracting Officer's representative written guarantees for all the equipment and/or appliances furnished under the contract. Furnish with each guarantee: The name, address, and telephone number of the guarantor's representative nearest to the location where the equipment and/or appliances are installed, who, upon request of the Using Service's representative, will honor the guarantee during the guaranty period and will provide the services prescribed by the terms of the guarantee.

1.6 PRICING OF CONTRACTOR-FURNISHED PROPERTY

At the request of the Contracting Officer, promptly furnish and must cause any subcontractors to furnish, in like manner, unit prices and descriptive

data required by the Government for property record purposes of fixtures and equipment furnished and installed by the Contractor.

1.7 TEMPORARY ELECTRIC WIRING

1.7.1 Temporary Power and Lighting

Provide construction power facilities in accordance with the safety requirements of the NFPA 70 and EM 385-1-1. Enforce all the safety requirements of electrical extensions for the work of all subcontractors. All work must be accomplished by skilled electrical tradesmen in a workmanlike manner, as approved by the Contracting Officer.

1.7.2 Construction Equipment

In addition to the requirements of EM 385-1-1, all temporary wiring conductors installed for operation of construction tools and equipment must be either Type TW or THW contained in metal raceways, or may be multiconductor cord. Temporary wiring must be secured above the ground or floor in a workmanlike manner and must not present an obstacle to persons or equipment. Open wiring may only be used outside of buildings, and then only in strict accordance with the provisions of the National Electrical Code.

1.7.3 Circuit Protection

In addition to the present requirements in EM 385-1-1 and NFPA 70, all 15 and 20-ampere receptacle outlets used for obtaining power during construction must have ground fault circuit interrupters (GFCI) for personnel protection. Block and brick saws must also be equipped with GFCI. The Contracting Officer may allow an exception to this requirement for circuits for concrete vibrators or circuits operating at other than 60 Hertz normal (in both cases an assured grounding program as described in the NFPA 70, except utilizing the daily inspection frequency of the grounding means of such equipment, may be permitted). The assured grounding program will not be permitted as a substitute for usage of GFCI'S except as described above. All generator-powered 15- and 20-ampere, 60 Hertz receptacle outlets must have GFCI'S, and must be properly grounded. Provide a testing means which will impose a measured fault of 5 milliamperes, plus or minus 1 milliamperes, and result in tripping the GFCI unit.

1.8 UTILITIES

Immediately notify the Contracting Officer in writing if utilities not shown on the plans and not visible as to the date of this contract are encountered within the construction limits of the entire project, and such utilities will interfere with construction operations, to enable a determination by the Contracting Officer as to the necessity for removal or relocation. If such utilities are removed or relocated as directed by the Contracting Officer, an equitable adjustment in the contract price must be made pursuant to the Contract Clause CHANGES to cover the cost of any additional pertinent work or delay.

1.9 GENERAL SAFETY REQUIREMENTS

1.9.1 General

For information regarding specific Safety Requirements see Section 01 35 26

GOVERNMENTAL SAFETY REQUIREMENTS. Refer to EM 385-1-1, (see Contract Clauses, Section 00 73 00, ACCIDENT PREVENTION) and the Occupational Safety and Health Act (OSHA) Standards for Construction 29 CFR 1926; General Industry Standards 29 CFR 1910; and the National Fire Protection Association Codes are applicable to this contract. In case of conflict the most stringent requirement of the standards is applicable.

1.9.2 The Prime Contractor's Superintendent

The Prime Contractor's superintendent must take an active role in enforcing the safety requirements by participation in safety conferences, hazard analysis (see below), tool box meetings, walk-through inspections, correction of violations, etc., and including that of the subcontractor's work.

1.9.3 Activity Hazard Analysis

Based on the construction schedule, submit a activity hazard analysis of each major phase of work prior to entering that phase of activity. The analysis must include major or high risk hazards, as well as commonly recurring deficiencies that might possibly be encountered for that operation, and must identify proposed methods and techniques of accomplishing each phase in a safe manner. The Prime Contractor's superintendent must take active participation in the Activity Hazard Analysis, including the subcontractors' work. Prior to start of actual work a meeting must be held with Prime Contractor, Government, and affected subcontractor to review the Activity Hazard Analysis. In addition, job site meetings must be held to indoctrinate foreman and workers on details of this analysis.

1.9.4 Violations

If recurring violations and/or gross violation indicate that the safety performance is unsatisfactory, corrective action must be taken as directed, and at the discretion of the Contracting Officer the retention or some part thereof will be withheld from the progress payment until corrective action has been completed.

1.9.5 Elevated Work Areas

Workers in elevated work areas in excess of 6 feet above an adjoining surface require special safety attention. In addition to the provisions of EM 385-1-1, the following safety measures are required to be submitted to the Contracting Officer's Representative. Prior to commencement of work in elevated work areas, submit drawings depicting all provisions of positive protection system including, but not limited to, all details of guard rails.

1.9.5.1 Protection

Positive protection for workmen engaged in the installation of structural steel and steel joists must be provided by safety nets, tie-off's, hydraulic man lifts, scaffolds, or other required means. Decking crews must be tied-off or work over nets or platforms not over 6 feet below the work area. Walking on beams and/or girders and the climbing of columns is prohibited without positive protection.

1.9.5.2 Guard Rails

Perimeter guard rails must be installed at floor, roof, or wall openings

more than 6 feet above an adjoining surface and on roof perimeters. Rails must be designed to protect all phases of elevated work including, but not limited to, roofing operations and installation of gutters and flashing. Rails around roofs may not be removed until all work on the roof is complete and all traffic on or across the roof ceases. Rails must be designed by a licensed engineer to provide adequate stability under any anticipated impact loading. As a minimum, the rails must consist of a top rail at a height of 42 inches, a mid rail and a toe board. Use of tie-offs, hydraulic man lifts, scaffolds, or other means of roof edge protection methods may be utilized on small structures such as family housing, prefabricated metal buildings, etc.

1.9.6 Fire Prevention

Twenty-four hours notice must be given to the Contracting Officer for coordination with the Facility Fire Department prior to conducting any fire hazardous operation. Cutting or welding will be permitted only in areas that are or have been made fire safe. Where possible, all combustibles must be located at least 35 feet horizontally from the work site. Where such location is impracticable, combustibles must be protected with fire blankets and/or protective welding screens to prevent slag from running out of the work area. Edges of covers at the floor must be tight to prevent sparks from going under them. This precaution is also important at overlaps where several covers are used to protect a large pile. Do not allow any welding/cutting or open flame operations in facilities that are protected by a wet pipe fire sprinkler or an automatic detection system, if the system is out of service. First priority of work will be to return the suppression/detection system to operational condition. Return the fire detection and/or suppression system back to an operational status (if possible) during periods that the facility is unoccupied, and at the end of the work day. Post a fire guard for a 24 hour period (or certify to the Fire Department that the facility is safe) after welding, cutting, and open flame operations in a facility when: (a) fire detection and suppression system can not be returned to service; (b) fire detection or suppression systems do not exist. Other fire prevention precautions must be in accordance with the latest National Fire Codes.

1.9.6.1 Inspections

All construction sites are subject to fire and safety inspections without notice. Any violation of fire and safety standards may result in a work stoppage at the expense of the Contractor.

1.9.7 Recordkeeping/Reporting Requirements

On all contract operations, record and report all accident exposure and experience incident work. (This includes exposure and experience of the prime contractor and sub-contractor(s)). As a minimum these records must include exposure work-hours and a log of occupational injuries and illnesses. (OSHA Form 300 or state equivalent as prescribed by 29 CFR 1904) Refer to EM 385-1-1, 01.D.04.

1.9.8 Accident Reporting

In addition to the requirements for reporting accidents in accordance with EM 385-1-1, Section 1, submit at the 50 percent point and 100 percent of project completion, a written summary of worker's compensation claims filed by workers on the project. The report will include all subcontractors. The main report covering the Prime Contractor claims will be certified as

"correct and true" by the Contractor's compensation insurance carrier. The same certification will be required for subcontractor reports.

1.10 PLANNED UTILITY OUTAGES AND STREET CLOSURES

All utility outages and street closures must be of as short a duration as possible and must be scheduled as far in advance as possible with the Contracting Officer, in no case less than 21 days before the outage or closure. Obtain from the Contracting Officer in writing a statement or schedule giving the permissible times of outages or closures for particular installations and the maximum time allowed for each. Strictly observe such schedules and the contractor will be held responsible for any violations.

1.11 EXCAVATION PERMITS

All excavation permits will be issued to the Contractor from the Base Civil Engineer (BCE) through the Contracting Officer. The appropriate form, for this request, may be obtained from the Contracting Officer. Processing time required by the BCE is 21 calendar days. Questions concerning the excavation permit should be directed to the Contracting Officer.

The Contractor shall protect from damage all existing improvements and utilities at or near the work site, and on adjacent property of a third party, the locations of which are made known to or should be known by the Contractor.

The Contractor shall repair any damage to those facilities, including those that are the property of a third party, resulting from failure to obtain necessary permits and utility marking or failure to exercise reasonable care in performing the work. This includes irrigation lines and sprinkler components. If the Contractor fails or refuses to repair the damage promptly, the Contracting Officer may have the necessary work performed and charge the cost to the Contractor.

The Contractor shall verify the elevations of existing piping, utilities, and any type of underground obstruction not indicated or specified to be removed but indicated in locations to be crossed by piping, ducts, and other work to be installed. Verify elevations before installing new work closer than nearest manhole or other structure at which an adjustment in grade can be made.

Hand digging may be required to locate utilities shown on the contract drawings, Excavation Permit, or 3 feet on either side of locations identified by Base Maintenance Shops. For facilities that store munitions hand digging is required within 10 feet of the bldg to locate the existing grounding cable.

All excavation work within 15ft of a Questar high pressure natural gas distribution line will require Questar Gas technicians to be on-site during the excavation. Contractor shall coordinate this through Blue Stakes.

1.12 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER

a. This provision specifies the procedure for the determination of time extensions for unusually severe weather. In order for the Contracting Officer to award a time extension under this clause, the following conditions must be satisfied:

    1. The weather experienced at the project site during the contract

period must be found to be unusually severe, that is, more severe than the adverse weather anticipated for the project location during any given month.

2. The unusually severe weather must actually cause a delay to the completion of the project. The delay must be beyond the control and without the fault or negligence of the Contractor.

b. The following schedule of monthly anticipated adverse weather delays is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the project location and will constitute the base line for monthly weather time evaluations. The Contractor's progress schedule must reflect these anticipated adverse weather delays in all weather dependent activities.

MONTHLY ANTICIPATED ADVERSE WEATHER DELAY
WORK DAYS BASED ON (5) DAY WORK WEEK

STATE

UTAH

HILL AFB-FT

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
22)	(17)	(13)	(08)	(05)	(03)	(01)	(02)	(03)	(05)	(12)	(22)

c. Upon execution of the Notice to Proceed (NTP) and continuing throughout the contract, the Contractor will record on the daily CQC report, the occurrence of adverse weather and resultant impact to normally scheduled work. Actual adverse weather delay days must prevent work on critical activities for 50 percent or more of the Contractor's scheduled work day. Refer to ER 415-1-15.

1.13 EQUIPMENT DATA FORM

In conjunction with paragraph, UAI 31.105-101 EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE, in Section 00 73 00, submit CESPK FORM 450 for all necessary equipment to perform work requiring adjustment of contract price and must submit these forms with the modification proposals. A sample form is attached at the end of this section.

1.14 SPECIAL CONSTRUCTION PROCEDURES

1.14.1 Cooperation with Others

During the life of this contract, other Contractors will be performing operations in the general area where work under this contract is being performed. The Contractor shall cooperate with others in all respects wherever necessary for the better prosecution of the work. As far as practicable, all persons working in the vicinity shall have equal rights to the use of all transportation facilities and grounds within the limitations specified in the CONTRACT CLAUSES, Section 00 70 00. The obligation of the Contractor under this contract shall include jointly planning and scheduling the work, on a cooperative basis, with other Contractors in order to minimize delays and interferences. The Contractor shall so arrange his operations as to not interfere with other work in progress. In case of dispute or disagreement regarding use of transportation and storage facilities and

rights of access, the decision of the Contracting Officer shall govern.

1.14.2 Dust

Dust shall be controlled as the work proceeds, and not allowed to become a hazard or a nuisance.

1.14.3 Portable Facilities

Toilet facilities are not available on site for contractors use. The contractor shall provide portable toilets for his personnel.

1.14.4 Borrow Material

Borrow material is not available on base. Locally obtained borrow materials shall conform to project specifications and any available.

1.14.5 Storm Water Permitting:

a. Contractors shall obtain a Utah Pollutant Discharge Elimination System (UPDES) storm water permit if the project disturbs one or more acres of soil surface area. To obtain the permit the contractor must submit a Notice of Intent (NOI), Pollution Prevention Plan and the required fee to the State of Utah, Department of Environmental, Quality Division of Water Quality. Contractor shall submit and receive approval of the UPDES permit before starting construction.

b. Contractors with projects disturbing one or more acres of soil surface area will submit a sediment and erosion control plan to the project manager for subsequent review and approval by the Environmental Compliance Office (OO-ALC/EMC). The contractor shall receive approval of the plan and implement approved best management practices before starting construction.

c. Contractors with projects more than one acre of soil surface area will submit a plan for permanent stabilization of disturbed area to the project manager for subsequent review and approval by the Environmental Compliance Office (OO-ALC/EMC). The contractor shall receive approval of the plan and implement approved best management practices before contract closeout. Examples of best management practices are available at the following web sites:

http://cfpub.epa.gov/npdes/stormwater/menuofbmps/con_site.cfm
http://cfpub.epa.gov/npdes/stormwater/menuofbmps/post.cfm

1.14.6 Government Caused Delays

Contractor shall allow in their planned work schedule for potential Government caused delays as follows; Allow for 5 calendar days where the contractor's construction activity is prohibited by Air Force Exercises or similar military events. Allow for 21 calendar days where excavation, utility outages, road closures, or other subsurface requested activities may be prevented. (Other construction activities will be permitted to continue.) Government will provide 24 hour notification each time the government caused delays mentioned above are invoked. No additional time will be granted for delays falling within those limits.

Normal duty hours for work shall be 0730 to 1600 hours exclusive of Saturdays, Sundays, and holidays unless other times are approved by the Contracting Officer, or otherwise stated in the contract. Coordinate the work schedule with the Contracting Officer.

1.14.7 Occupancy

Building will not be occupied during the construction performance of work under this Contract unless expressly stated otherwise in writing from the Contracting Officer.

1.14.8 Property Damage

In addition to FAR 52.236-9 the Contractor shall conduct all operations in such a manner as to prevent injury or damage to government property and any portions of the existing work which are to remain. This requirement is not limited to just the project site but includes landscaping, curbs, pavements, and utilities adjacent to the site as well as along routes to and from the site. Where any ambiguity exists the contractor shall request clarification from the Contracting Officer before beginning work.

Contractor shall make repairs to or replace portions of existing work that is damaged or altered during construction operations to match existing or adjoining work, as approved by the Contracting Officer. At the completion of operations, existing work shall be in a condition equal to or better than that which existed before new work started.

In the event the contractor fails or refuses to make satisfactory repairs or replacements to property damaged by the contractor under this contract the government will have the repairs made and charge the cost to the contractor.

1.15 SECURITY PROCEDURE

1.15.1 Security

Obtain entrance passes for construction vehicles, coordinate with Contracting Officer and Base Pass & Control Office.

A list must be generated by the Prime contractor of all employees that will be working at the site. Submit the list to Security Forces at least 14 days before construction begins for background checks. Individuals on the list, who have been cleared by Security Forces, may be granted entry through the gate if escorted by a fully authorized sponsor. No personnel may be permitted to work on the site unless they are actually constructing the site (i.e. no administrative secretaries will be allowed). Employees without badges found unescorted outside of the construction site boundaries, but within the security gated area will be subjected for removal from the project site.

1.15.1.1 Contractor Base Credentials:

(1) To obtain base identification passes for contractor personnel the Prime Contractor shall submit a written request on company letterhead stationary, if available, to the Contracting Officer specifying the following:

a. Contract number.

b. Location of the work.

c. Date entry to the base required and contemplated termination date of entry.

d. Names of contractor and subcontractor employee requiring access to the base.

e. The name of the individual who will submit the Request of Identification Credentials for each employee for who identification credentials are needed.

(2) The Contracting Officer will:

a. Endorse the request.

b. Attach a copy of the contract cover page and any other pages that provide performance information, such as the need for and duration of access to the work site.

c. Forward this request to the Security Forces, Pass and Registration Office of the installation where the work is to be performed.

d. Provide blank Application For AFMC Identification Card, AFMC Form 496 and Unescorted Entry Authorization Certificate, AF Form 2586 to the Prime Contractor.

(3) The Prime Contractor shall be required to complete and submit AFMC Form 496, for each of the firm's employees and for each subcontractor employee who must have access to the installation. For contracts, 90 days or less contractor employees will be issued an AF Form 75 unless the work is in a controlled or restricted area. For contracts in a controlled or restricted area or greater than 90 days an AFMC Form 387 will be issued.

(4) The contractor is required to provide a list of all employees and sub-contractor employees that will access the Free Zone on a continual basis. This list will be used for back ground checks for acceptability in the controlled area. The list will need to have each employees first and last names, middle initial, birthdate, a state identification number (driver's license number) and location of birth. No foreign Nationals will be allowed In MAMS 1. This list will be investigated one time as it takes considerable resources to complete investigations for the amount of individuals that will be required for the project. Government recommends that all personnel for this project be submitted at least 4 weeks prior to scheduled construction activities. The Prime Contractor shall ensure that all contractor personnel including subcontractors attend the Explosive Safety Briefing if applicable. An Explosive Safety Awareness Statement signed by those requesting access is required. The Weapon Safety Monitor will provide the Contracting Officer copies of the awareness statements. The Prime Contractor shall also request AF Form 75, Visitor/Vehicle Pass or DD Form 2220, DoD Registered Vehicle, for vehicle decals. To obtain the vehicle decal from the Security Forces, Pass and Registration Office, the Contractor shall produce:

a. A valid driver's license.

b. Proof of financial responsibility of insurance, which meets the

minimum requirements of the contract clause, entitled "Required Insurance."

c. Current vehicle registration.

d. Proof of Davis County emissions certification if the vehicle is not registered in a county within the State of Utah, which requires emissions testing.

(5) Follow the guidance in AFI 31-101, The Installation Security Program, when work under this contract requires entry to controlled areas. Refer to the Free Zone Requirements in Section 01 10 10 SPECIFIC TECHNICAL ENGINEERING AND DESIGN CRITERIA.

(6) When contract performance requires unescorted entry (no access to classified information) to a "Restricted Area" on a military installation, contractor personnel requiring unescorted entry must meet the investigative requirements of AFI 31-501, USAF Personnel Security Program. Contractor employees not meeting these requirements will be provided escort as determined by the Contracting Officer in coordination with the Chief, Security Forces Division of the military installation involved.

(7) Any non-US citizen not in possession of a "Green Card" will not be allowed access on base without the Contracting Officer first clearing the employee through the Foreign Disclosure Office OO-ALC/LGMS, Bldg 1209, 777-6857 or 777-6858.

(8) Contractor employees, at all times while on a military installation, shall wear visible contractor-provided identification either as a part of, or attached to, their outer clothing. The identification shall clearly identify the individual as being a contractor employee.

(9) During performance of the contract, the Contractor shall be responsible for obtaining required identification for newly assigned personnel, and for prompt return of credentials and vehicle registration decals to the Security Forces, Pass and Registration Office, for any employee who no longer requires access to the work site.

(10) At the termination or completion of the contract, or upon the expiration of credentials (if any such expirations are specified), the Contractor must be sure that all base identification credentials and vehicle registration decals for all contractor and subcontractor employees are returned to the Contracting Officer.

(11) Prior to submitting an invoice for final payment, the Prime Contractor shall obtain a clearance certification from the contracting officer which states that all base identification credentials and vehicle decals have been returned or "accounted for." This certification shall be attached to the final invoice at the time of submittal for payment. Failure to comply with these requirements will result in withholding final payment.

(12) If it becomes necessary for the Contractor to enter any unmanned base entry gate, they must first contact 75 SFS/SFO at 777-5531. If the Contractor assumes custody or control of a particular gate they will insure:

a. Only cleared contractor personnel for that respective project

gain access to the base through that gate.

b. Lock and Key Control will be established in such a manner as to clearly define an audit trail of who have keys to the gates and the times the gates are opened and closed, 24 hours a day.

1.15.2 Explosive Safety

(1) Contractor will be required to attend an initial explosive safety briefing. The class is conducted every Monday @ 2:30 P.M. in Bldg 383, Room 227. No sign up is needed.

(2) Smoking by any personnel is not permitted within the explosive area or free zone.

(3) Any open flame or welding requires a permit from wing safety and fire dept.

(4) All personnel must follow posted speed limits, and are not to stray outside of the established free zone.

(5) No cameras or picture taking is permitted.

(6) Contractor and his personnel, must maintain a clean/combustion free worksite.

1.15.3 Protection

Protection to Contractor personnel or their equipment cannot be provided by the Government at the worksites nor at the travel routes to/from the worksites.

1.15.4 Critical Delivery Process

The end using agency will provide escorts for concrete trucks and pumps. The contractor will provide a request to the Contracting Officer and Air Force no sooner than 3 business days prior to special delivery and will provide the times and amounts of trucks so that proper escorting can be planned and provided for these critical deliveries

1.16 CONTRACTOR SAFETY PERSONNEL REQUIREMENTS

See Section 01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS for all safety requirements.

1.17 MONTHLY SAFETY INSPECTION

A monthly on-site inspection will be made by the insurance carriers of the prime and subcontractors. The Contractor's safety program will be reviewed and a meeting will be held with the Contracting Officer's Representative to discuss the job-site safety. A written report will be made by the Contractor stating the results of the inspection and the action taken.

PART 2 PRODUCTS

2.1 GOVERNMENT FURNISHED MATERIALS

The Government will provide an optical disk at the preconstruction conference that contains the following:

a. One set of "as-designed" electronic CADD drawing files in the specified software and format, revised to reflect all amendments, of the Government's conceptual site and facility design.

b. A submittal register data file in comma separated value (CSV) format for import into the Resident Management System (RMS).

c. Informational copies of the contract specifications and drawings, the original solicitation drawings and specifications, plus all amendments in Portable Data Format (PDF).

PART 3 EXECUTION

3.1 AFTER AWARD DOCUMENTS

After AWARD the Government will provide, without charge one copy of the CAD drawings of the Government's conceptual site and facility design.

Provide hard copy sets as follows. Code Number, Agency and Mailing Address are identified in in Section 01 33 16 DESIGN AFTER AWARD paragraph 16.2 Offices for Distribution:

1/MAJ: (1) 11x17

2/DIST: (1) 11x17

3/RES: (3) ANSI D, (3) Specs

4/CONS: None

5/BCE: (2) ANSI D, (2) 11x17, (2) Specs

Provide the Resident Engineer a copy ("hard" and "PDF") of the signed Bond and Notice to Proceed within 5 working days after receipt from the Contracting Officer.

-- End of Section --

CONTRACTOR EQUIPMENT DATA SHEET

(Data to be furnished by Contractor for all equipment to be used on modifications as required under the Special Provisions of the Contract.)

DATE

CONTRACTOR

CONTRACT NUMBER

1. EQUIPMENT DESCRIPTION
_____

2. MODEL AND SERIES
_____

3. YEAR PURCHASED
_____

4. PURCHASE PRICE AT YEAR PURCHASED
_____

5. LIST PRICE, YEAR OF MANUFACTURE
_____

6. YEAR MANUFACTURED
_____

7. EQUIPMENT HORSEPOWER
_____

8. CARRIER HORSEPOWER
_____

9. FUEL TYPE
_____

10. SHIPPING WEIGHT
_____

11. TIRE SIZE: FRONT - _____ DRIVE - _____ TRAILING - _____

REMARKS:

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 01 10 10

SPECIFIC TECHNICAL ENGINEERING AND DESIGN CRITERIA

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1. SCOPE

1.1 Design and construct five (5) earth covered reinforced concrete modular Munitions Storage Magazines (MSMs) capable of storing 150,000 pounds of class 1.1 munitions each. Construct the new MSMs or "igloos" in the Munitions and Missile Storage (MAMS) 1 area at Hill Air Force Base (HAFB). Design the facilities as a permanent construction in accordance with UFC 1-200-01. The work entails the site adaption of Department of Defense Explosives Safety Board (DDESB) approved drawing set "MSM Box-Type" standard 421-80-08 as provided in Attachment 07 and the demolition of two existing igloos Buildings 1460 and 1461 (3451 sf total). Included are access roads, reinforced concrete approach aprons, catenary lightning protection, utilities, site improvements, communication support, and all other necessary support. The vicinity and base map for the project is shown on 005 Drawings sheet G-101*, Location Map*.

1.2 The Contractor is responsible for the professional quality, technical accuracy and coordination of all designs, drawings, specifications and other documents or publications upon which construction is based. The design of architectural, structural, mechanical, electrical, civil, landscape and other engineering features of the work shall be accomplished, reviewed, approved and sealed by engineers and architects who are licensed professionals with a minimum of six years' experience to practice in their respective professional field in a state or possession of the United States. See 01 33 16 for more information.

1.3 The design and construction of this project shall conform to the Hill AFB Design Guide and the requirements contained in this solicitation. Features differing from the Hill AFB Design Guide and the requirements in this RFP may be allowed if said changes otherwise provide the same level of function, quality and performance established in Solicitation. The Government will be the sole authority in determining if changes are acceptable.

1.4 The Contractor is responsible and liable for the complete design and shall not assume that the provided design criteria and drawings in this solicitation will alleviate him from performing any additional design as required to produce a complete set of construction documents. The following provisions shall be maintained in the Contractor's design:

1.4.1 **Provision 1: Gross Square Feet**: The Contractor's design shall provide at least the same square foot area overall as shown in the Government's conceptual design.

1.4.2 **Provision 2: Equivalent Functional Arrangement:** The Contractor's design shall provide equivalent functional arrangement of spaces as shown in the Government's conceptual design.

1.4.2.2 The Government's conceptual facility and site design provided in the RFP documents illustrates intent and functional relationships and does not indicate all necessary construction requirements or components. The written RFP describes associated technical, performance and systems requirements. The Contractor is responsible for the complete Project design, shall retain all responsibilities, and be recognized as the Designer of Record.

1.4.3 **Provision 3: Overall Site Limits**: The Contractor's design shall be limited to the general extents of the Project site shown in the Government's conceptual design.

1.4.4 **Provision 4**: **Sustainable Design:** See paragraph 5.

2 SUMMARY DESCRIPTIONS

2.1 This project will construct 5 single story MSM's totaling approximately 10,400 square feet. The project shall be designed within the criteria prescribed in *UFC 1-200-01*, *UFC 3-600-01*, and operations and maintenance manuals. See paragraph 4.14 for a list of applicable codes and criteria.

2.2 **PROPOSED SITING SUMMARY.** The new Storage Magazines will be sited within the MAMS 1 area, North-East of the intersection of Georgia Street and Redwood Street. See 005 Drawings sheet *G-101, Site Location Map* for more information. Preliminary geotechnical information has been included in this RFP (see paragraph 8 for more information).

2.3 **BUILDING CONSTRUCTION SUMMARY:** Minimum requirements to site-adapt design and construct the igloos includes but is not limited to stripping vegetation, demolition of existing concrete pads and igloos, providing access driveways, providing reinforced concrete aprons, providing utilities, providing lightening protection, providing site improvements, providing communications support, and providing any other necessary support utilizing conventional design and construction methods to accommodate the mission of the facility.

3 DESCRIPTION OF CONDITIONS AND OPERATIONS

3.1 **BASE DESCRIPTION:** Hill Air Force Base (HAFB) is an Air Force Materiel Command base located in northern Utah. HAFB is the Air Force's third largest base by population and size, and is home to many operational and support missions, with the host organization being the 75th Air Base Wing.

3.2 **BACKGROUND:** The project is intended to increase storage capacity of Storage Magazines at HAFB. There are insufficient igloos at HAFB to support current and future missions.

4 DESIGN SUBMITTAL REQUIREMENTS

4.1 The design requirements within this Section 01 10 10 represent the minimum quality and quantity acceptable for the proposals and project submittals. The standards, documents, and criteria referenced within this RFP, although not all attached within this RFP document, are modified to the extent indicated within this section. Each Offeror shall be responsible for obtaining any documents not attached as part of this RFP but referenced as criteria for the project. Requirements of this section may delete, revise, add to, or substitute for criteria contained in the referenced documents and this section shall be deemed the controlling authority of any changes to the other referenced documents and criteria.

4.2 **DESIGN STANDARDS.** Equipment, hardware, and materials shall be standard manufactured domestic items unless otherwise specified. Replacement parts shall be standard and readily available through commercial means. Discontinued products will not be accepted unless approved by the Contracting Officer.

4.3 **CODES.** The design, materials, equipment, and installation shall be in accordance with the requirements of the listed codes and design manuals, with the requirements of this section, and with the listed specifications. The building will be of a noncombustible construction classification. Wood structural elements will not be acceptable.

4.4 **IMPERIAL DESIGN.** This project shall be designed in Imperial/English inch-pound (I-P) units per the preference of the Using Agency and Major Command.

4.5 **DRAWINGS.** Attached drawings provide information on the project site and functional arrangement and relationships of internal components. Changes and adjustments to the site and building plan arrangement are allowed subject to provisions established in Paragraph 1.4.

4.6 **FIELD INFORMATION.** The utility and as-built information provided in the drawings is the best information available. It is provided to assist the offerors in preparing their proposal and then during the design of this project. The Contractor is responsible for field verifying all information given. The Contractor is also responsible for obtaining all information necessary to properly design and install all work. Gathering information during design shall be coordinated through the Contracting Officer. Any survey required to provide utility locations, manhole inverts, verification of existing features, etc. shall be the responsibility of the Contractor and shall tie into the project datum.

4.7 **DESIGN DETAILS AND STANDARDS.** The Contractor shall create design details as required, but shall conform to the requirements of the RFP, and are subject to approval by the Government.

4.8 **ASBESTOS AND LEAD BASED PAINT (LBP) SURVEY.** Results of an asbestos survey are attached to Attachment 09.

4.9 **SPECIFICATIONS.** The Contractor shall follow all Unified Facilities Guide Specifications (UFGS) already included in this RFP, and the Contractor shall also

provide all other applicable, edited UFGS sections as required for the design and construction of this project. The Unified Facilities Guide Specifications can be retrieved at http://www.wbdg.org/ccb/. Items to be deleted from the specifications shall use the “strikethrough” formatting process to delete any portion of the specifications. Additions to the specifications shall be shown in a color font. Unless noted otherwise, material specifications, equipment efficiencies, equipment listing (i.e., UL, ANSI, NEMA, etc,), testing requirements, execution, etc., shall not be changed unless dictated by more stringent requirements in this RFP, including technical criteria such as codes and government and industry publications that are referenced in this RFP.

4.9.1 **UFGS Selection.** UFGS that have been unified for use by all participating agencies have a level 3 or level 4 MasterFormat™ number. UFGS that are agency-specific have a fifth level number indicating it as an agency specific specification. A specification that has a fifth level number "10" indicates USACE, a "20" indicates NAVFAC, a "30" indicates AFCESA and a "40" indicates NASA. Preparing agencies are indicated in the UFGS header of each specification. The DB Contractor must adhere to the following order of precedence in selecting UFGS sections: first, a UFGS specific to the project’s installation; second, a USACE specification; third, a unified UFGS if one is available; and lastly, a UFGS specific to another DoD agency.

4.9.2 The Contractor shall not edit the UFGS sections to the point that they no longer contain any original information. Edits to the UFGS sections is permitted only in such instances that the language becomes specific to this project.

4.10 **SUSTAINABLE DESIGN.** See paragraph 5 for more information and additional requirements.

4.11 **ANTI-TERRORISM/FORCE PROTECTION (AT/FP).** As an unoccupied building, compliance with the AT/FP standoff distances per *UFC 4-010-01, DOD Minimum Antiterrorism Standards for Buildings* is not required.

4.12 **BARRIER FREE DESIGN.** Architectural Barriers Act (ABA) compliance is not required.

4.13 **ENVIRONMENTAL PROTECTION.** All work and Contractor operations shall comply with the requirements imposed by all applicable federal, state, county, local and base regulations and permits concerning environmental protection. Project schedule shall reflect time required to acquire permits and provide copies to the Contracting Officer prior to commencing work. Contractor shall coordinate with the Base Environmental Engineer for all applicable permits.

4.14 **CONSOLIDATED LIST OF CODES AND STANDARDS.** Each design discipline cites references to various codes and standards that govern the design of the project. A listing of the majority of codes and standards required for compliance with the requirements of this RFP follows. Note: Unless otherwise noted, use the latest edition for all reference standards or criteria listed in this section as of the contract award date.

4.14.1 UFC 1-200-01, DoD Building Code (General Building Requirements)

4.14.2 UFC 1-200-02, High Performance and Sustainable Building Requirements.

4.14.3 UFC 3-101-01, Architecture, with Change 3

4.14.4 UFC 3-110-03, Roofing, with Change 2

4.14.5 UFC 3-120-01, Design: Sign Standard, with Change 2

4.14.6 UFC 3-190-06, Protective Coatings and Paints

4.14.7 UFC 3-201-01, Civil Engineering

4.14.8 UFC 3-210-10, Low Impact Development, with Change 1

4.14.9 UFC 3-220-01, Geotechnical Engineering

4.14.10 UFC 3-220-04FA, Backfill for Subsurface Structures

4.14.11 UFC 3-220-05, Dewatering and Groundwater Control

4.14.12 UFC 3-220-10N, Soil Mechanics

4.14.13 UFC 3-250-01, Pavement Design for Roads and Parking Areas

4.14.14 UFC 3-250-04, Standard Practice for Concrete Pavements, with Change 2

4.14.15 UFC 3-250-07, Standard Practice for Pavement Recycling

4.14.16 UFC 3-250-11, Soil Stabilization for Pavements

4.14.17 UFC 3-301-01 Structural Engineering, with Change 3

4.14.18 UFC 3-310-04, Seismic Design for Buildings, with Change 1

4.14.19 UFC 3-340-02, Structures to Resist the Effects of Accidental Explosions, with Change 2

4.14.20 UFC 3-400-02, Design: Engineering Weather Data

4.14.21 UFC 3-401-01, Mechanical Engineering, with Change 1

4.14.22 UFC 3-410-01, Heating, Ventilating and Air Conditioning Systems, with Change 2

4.14.23 UFC 3-410-02, Lonworks® Direct Digital Control for HVAC and Other Local Building Systems, with Change 1

4.14.24 UFC 3-410-04N, Industrial Ventilation

4.14.25 UFC 3-420-02FA, Compressed Air, with Change 1

4.14.26 UFC 3-430-09, Exterior Mechanical Utility Distribution, with Change1

4.14.27 UFC 3-450-01, Noise and Vibration Control

4.14.28 UFC 3-501-01, Electrical Engineering

4.14.29 UFC 3-520-01, Interior Electrical Systems

4.14.30 UFC 3-530-01, Interior and Exterior Lighting Systems and Controls

4.14.31 UFC 3-550-01, Exterior Electrical Power Distribution

4.14.32 UFC 3-560-01, Electrical Safety, O&M

4.14.33 UFC 3-570-01, Cathodic Protection

4.14.34 UFC 3-570-06 O&M: Cathodic Protection Systems

4.14.35 UFC 3-575-01, Lightning and Static Electricity Protection Systems

4.14.36 UFC 3-580-01, Telecommunications Interior Infrastructure Planning and Design

4.14.37 UFC 3-600-01, Fire Protection Engineering for Facilities, with Change 1

4.14.38 UFC 4-010-01, DOD Minimum Antiterrorism Standards for Buildings, with Change 1

4.14.39 UFC 4-020-01 Security Engineering Facilities Planning Manual

4.14.40 UFC 4-021-02, Electronic Security Systems

4.14.41 UFC 4-420-01 Ammunition and Explosive Storage Magazines

4.14.42 AFMAN 91-201, Explosives Safety Standards (Air Force)

4.14.43 Air Force Munitions Facilities Guide

4.14.44 DoD 6055.09-M, *DOD Ammunition and Explosives Safety Standards*

4.14.45 DoD 4145.26-M, *DoD Contractors' Safety Manual for Ammunition and Explosives*

4.14.46 DoD 5100.76-M, *Physical Security of Sensitive Conventional Arms, Ammunition, and Explosives*

4.14.47 DDESB-PD Memorandum, "*Minimum Requirements to Validate Explosives Safety Protective Construction,*" dated 21 October 2008,

4.14.48 Technical Paper No. 15, *Approved Protective Construction (DDESB)*

4.14.49 Unified Facilities Guide Specifications (UFGS)

4.14.50 International Building Code 2015 (IBC), except as modified in UFC 1-200-01 & UFC 3-301-01

4.14.51 International Plumbing Code (IPC)

4.14.52 International Mechanical Code (IMC)

4.14.53 NFPA 13, Installation of Sprinkler Systems

4.14.54 NFPA 17A, Standard for Wet Chemical Extinguishing Systems

4.14.55 NFPA 20, Installation of Stationary Pumps for Fire Protection

4.14.56 NFPA 24, Installation of Private Fire Service Mains

4.14.57 NFPA 30, Flammable and Combustible Liquids Code

4.14.58 NFPA 54, National Fuel Gas Code

4.14.59 NFPA 70, National Electrical Code

4.14.60 NFPA 70E, Standard for Electrical Safety in the Workplace

4.14.61 NFPA 72, National Fire Alarm Code

4.14.62 NFPA 72H, Guide for Testing Procedures for Local Auxiliary Remote Station and Proprietary Protective Signaling Systems

4.14.63 NFPA 80, Fire Doors and Fire Windows

4.14.64 NFPA 90A, Installation of Air Conditioning And Ventilating Systems

4.14.65 NFPA 90B, Installation of Warm Air Heating and Air-Conditioning Systems

4.14.66 NFPA 96, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations

4.14.67 NFPA 101, Life Safety Code 2015

4.14.68 NFPA 110, Emergency and Standby Power Systems

4.14.69 NFPA 111, Stored Electrical Energy Emergency Standby Power Systems

4.14.70 NFPA 780, Lightning Protection Systems

4.14.71 Federal Specification (FS) HH-I-558, Insulation, Blankets, Thermal (Mineral Fiber, Industrial Type)

4.14.72 Manual on Uniform Traffic Control Devices (MUTCD), US Department of Transportation, Federal Highway Administration

4.14.73 National Earthquake Hazard Reduction Program (NEHRP), US Geological Survey (USGS)

4.14.74 ACI 318-14, Building Code Requirements for Structural Concrete

4.14.75 ACI 530-13/ASCE 5-13/TMS 402-13, Building Code Requirements for Masonry Structures

4.14.76 AISI Cold Formed Steel Design, 2012

4.14.77 ASCE 7-10, Minimum Design Loads for Buildings and Other Structures

4.14.78 ANSI/BHMA A156.1, Butts and Hinges

4.14.79 ANSI/BHMA A156.2, Bored and Preassembled Locks and Latches

4.14.80 ANSI/BHMA A156.3, Exit Devices

4.14.81 ANSI/BHMA A156.4, Door Controls - Closers

4.14.82 ANSI/BHMA A156.5, Cylinders and Input Devices for Locks

4.14.83 ANSI/BHMA A156.6, Architectural Door Trim

4.14.84 ANSI/BHMA A156.13, Mortise Locks & Latches

4.14.85 ANSI/BHMA A156.18, Materials and Finishes

4.14.86 ANSI/BHMA A156.36, Auxiliary Locks

4.14.87 ANSI A440, Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors

4.14.88 ANSI A250.8, Standard Steel Doors and Frames

4.14.89 ANSI C2, National Electrical Safety Code

4.14.90 ANSI C57.12.00 General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers

4.14.91 ANSI C57.12.26 Requirements for Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers for use with Separable Insulated High-Voltage Connectors, High-Voltage, 34500GrdY/19920 Volts and Below; 2500 kVA and Smaller

4.14.92 ANSI C57.12.27 Conformance Requirements for Liquid-Filled Distribution Transformers Used in Pad-Mounted Installations, Including Unit Substations

4.14.93 ANSI C57.12.28 Switchgear and Transformers - Pad-Mounted Equipment - Enclosure Integrity

4.14.94 ANSI C62.41 Surge Voltage in Low Voltage AC Power Circuits

4.14.95 ANSI C84.1, Electric Power Systems and Equipment - Voltage Ratings

4.14.96 ANSI C502, Dry-Barrel Fire Hydrants

4.14.97 ANSI C900, Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 inches through 12 inches, for Water Transmission and Distribution

4.14.98 ANSI C901, Standard for Polyethylene (PE) Pressure Pipe and Tubing, ½ inch through 3 inches, for Water Service.

4.14.99 ANSI Z358.1, Emergency Eye Wash: Fountain

4.14.100 ANSI/IEEE Std. 142, Recommended Practice for Grounding of Industrial and Commercial Power Systems – IEEE Green Book

4.14.101 ANSI/IEEE Std. 241, Recommended Practice for Electric Power Systems in Commercial Buildings – IEEE Gray Book

4.14.102 ANSI/IEEE Std. 242, Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems – IEEE Buff Book

4.14.103 ANSI/IEEE Std. 399, Recommended Practice for Industrial and Commercial Power Systems Analysis – IEEE Brown Book

4.14.104 ANSI/IEEE Std. 446, Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications – IEEE Orange Book

4.14.105 ANSI/IEEE Std. 493, Recommended Practice for the Design of Reliable Industrial and Commercial Power Systems – IEEE Gold Book

4.14.106 ANSI/IEEE Std. 519, Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems-Second Printing

4.14.107 ANSI/IEEE Std. 1100, Recommended Practice for Powering and Grounding Electronic Equipment – IEEE Emerald Book

4.14.108 ANSI/IEEE Std. 1584, IEEE Guide for Performing Arc Flash Hazard Calculations

4.14.109 ANSI/TIA/EIA-TSB-67, Transmission Performance Specifications for Field Testing of Unshielded Twisted Pair (UTP) Cabling System

4.14.110 ANSI/TIA/EIA-568-B, Commercial Building Telecommunications Cabling Standard

4.14.111 ANSI/TIA/EIA-568-C, Commercial Building Telecommunications Cabling Standards

4.14.112 ANSI/TIA/EIA-569-A, Commercial Building Standard For Telecommunications Pathways and Spaces

4.14.113 ANSI/TIA/EIA-606-A, The Administration Standard For the Telecommunications Infrastructure of Commercial Buildings

4.14.114 ANSI/TIA/EIA-607, Commercial Building Grounding and Bonding Requirements for Telecommunications

4.14.115 ANSI/TIA/EIA 758, Customer Owned Outside Plant Telecommunications Cabling Standard

4.14.116 ASTM A36, Carbon Structural Steel

4.14.117 ASTM A53, Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

4.14.118 ASTM 105, Carbon Steel Forgings for Piping Applications

4.14.119 ASTM A216, Steel Castings, Carbon, Suitable for Fusion Welding, for High-Temperature Service

4.14.120 ASTM A106, Seamless Carbon Steel for High-Temperature Service

4.14.121 ASTM 153, Zinc Coating (Hot-Dip) on Iron and Steel Hardware

4.14.122 ASTM A193, Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service and Other Special Purpose Applications

4.14.123 ASTM A194, Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature Service, or Both

4.14.124 ASTM A446, Standard Specifications and Operating Instructions for Glass Capillary Kinematic Viscometers

4.14.125 ASTM A463, Steel Sheet, Aluminum-Coated, by the Hot-Dip Process

4.14.126 ASTM A500, Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

4.14.127 ASTM A572, High-Strength Low-Alloy Columbium-Vanadium Structural Steel

4.14.128 ASTM A615, Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

4.14.129 ASTM A653, Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

4.14.130 ASTM A706, Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement

4.14.131 ASTM A792, Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process

4.14.132 ASTM A1011, Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength

4.14.133 ASTM B209, Aluminum and Aluminum-Alloy Sheet and Plate

4.14.134 ASTM B221, Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

4.14.135 ASTM C33, Concrete Aggregates

4.14.136 ASTM C90, Loadbearing Concrete Masonry Units

4.14.137 ASTM C94, Ready-Mixed Concrete

4.14.138 ASTM C373, Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products

4.14.139 ASTM C518, Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus

4.14.140 ASTM C534, Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form

4.14.141 ASTM C578, Rigid, Cellular Polystyrene Thermal Insulation

4.14.142 ASTM C612, Mineral Fiber Block and Board Thermal Insulation

4.14.143 ASTM C636, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels

4.14.144 ASTM C645, Nonstructural Steel Framing Members

4.14.145 ASTM C665, Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing

4.14.146 ASTM C734, Low-Temperature Flexibility of Latex Sealants After Artificial Weathering

4.14.147 ASTM C834, Latex Sealants

4.14.148 ASTM C919, Standard Practice for Use of Sealants in Acoustical Applications

4.14.149 ASTM C954, Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness

4.14.150 ASTM C955, Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases

4.14.151 ASTM C1002, Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs

4.14.152 ASTM C1028, Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method

4.14.153 ASTM C1060, Standard Practice for Thermographic Inspection of Insulation Installations in Envelope Cavities of Frame Buildings

4.14.154 ASTM C1289, Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board

4.14.155 ASTM D217, Standard Test Methods for Cone Penetration of Lubricating Grease

4.14.156 ASTM D522, Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings

4.14.157 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort

4.14.158 ASTM D714, Standard Test Method for Evaluating Degree of Blistering of Paints

4.14.159 ASTM D968, Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive

4.14.160 ASTM D1003, Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics

4.14.161 ASTM D1056, Flexible Cellular Materials - Sponge or Expanded Rubber

4.14.162 ASTM D1308, Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes

4.14.163 ASTM D1556, Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method

4.14.164 ASTM D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort

4.14.165 ASTM D1586, Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils

4.14.166 ASTM E1592, Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference

4.14.167 ASTM D1654, Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments

4.14.168 ASTM D1785, Poly(Vinyl Chloride) (PVC) Plastic Pipe

4.14.169 ASTM D2216, Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

4.14.170 ASTM D2244, Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates

4.14.171 ASTM D2247, Standard Practice for Testing Water Resistance of Coatings in 100 % Relative Humidity

4.14.172 ASTM D2487, Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)

4.14.173 ASTM D2488, Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)

4.14.174 ASTM D3359, Standard Test Methods for Measuring Adhesion by Tape Test

4.14.175 ASTM D3441, Standard Test Method for Mechanical Cone Penetration Tests of Soil

4.14.176 ASTM D4060, Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser

4.14.177 ASTM D4214, Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films

4.14.178 ASTM D4226, Standard Test Methods for Impact Resistance of Rigid Poly(Vinyl Chloride) (PVC) Building Products.

4.14.179 ASTM D4397, Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications

4.14.180 ASTM D4434, Poly(Vinyl Chloride) Sheet Roofing

4.14.181 ASTM D4643, Standard Test Method for Determination of Water (Moisture) Content of Soil by Microwave Oven Heating

4.14.182 ASTM D4959, Standard Test Method for Determination of Water (Moisture) Content of Soil by Direct Heating

4.14.183 ASTM D6938, Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

4.14.184 ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials

4.14.185 ASTM E90, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

4.14.186 ASTM E96, Standard Test Methods for Water Vapor Transmission of Materials

4.14.187 ASTM E119, Standard Test Methods for Fire Tests of Building Construction and Materials

4.14.188 ASTM E136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C

4.14.189 ASTM E514, Standard Test Method for Water Penetration and Leakage Through Masonry

4.14.190 ASTM E648, Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source

4.14.191 ASTM E779, Standard Test Method for Determining Air Leakage Rate by Fan Pressurization

4.14.192 ASTM E814, Standard Test Method for Fire Tests of Penetration Firestop Systems

4.14.193 ASTM E1186, Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems

4.14.194 ASTM E1745, Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs

4.14.195 ASTM E1827, Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door

4.14.196 ASTM E2178, Standard Test Method for Air Permeance of Building Materials

4.14.197 ASHRAE Handbook, Fundamentals

4.14.198 ASHRAE Handbook, HVAC Systems and Equipment

4.14.199 ASHRAE Handbook, HVAC Applications.

4.14.200 ASHRAE Standard 62.1, Ventilation for Acceptable Indoor Air Quality

4.14.201 ASHRAE Standard 70, Method of Testing the Performance of Air Outlets and Air Inlets

4.14.202 ASHRAE Standard 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings, 2010

4.14.203 ASHRAE Standard 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings (IESNA cosponsored), I-P Edition (ANSI approved)

4.14.204 ASHRAE 189.1, Design of High-Performance Green Buildings Except Low-Rise Residential Buildings

4.14.205 Plumbing and Drainage Institute (PDI) WH 201, Water Hammer Arresters Standard

4.14.206 Plastic Pipe Institute Technical Report PPI-TR21, Thermal Expansion and Contraction of Plastic Pipe

4.14.207 SMACNA Architectural Sheet Metal Manual

4.14.208 SMACNA, HVAC Systems – Duct Design Manual

4.14.209 ISO 6781, Thermal Insulation - Qualitative Detection of Thermal Irregularities in Building Envelopes - Infrared Method First Edition

4.14.210 UL Fire Resistance Directory, Vol. 1 and 2

4.14.211 UL 50, Enclosures for Electrical Equipment

4.14.212 UL 263, Fire Tests of Building Construction and Materials

4.14.213 UL 268, Smoke Detectors for Fire Protective Signaling Systems

4.14.214 UL 300, Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking Equipment

4.14.215 UL 464, Audible Signal Appliances

4.14.216 UL 497, Protectors for Paired Conductor Communication Circuits

4.14.217 UL 580, Tests for Uplift Resistance of Roof Assemblies

4.14.218 UL 723, Test for Surface Burning Characteristics of Building Materials

4.14.219 UL 762, Outline of Investigation for Power Roof Ventilators for Restaurant Exhaust Appliances

4.14.220 UL 790, Standard Test Methods for Fire Tests of Roof Coverings

4.14.221 UL 910, Test for Flame-Propagation and Smoke-Density Values for Electrical and Optical-Fiber Cables Used in Spaces Transporting Environmental Air

4.14.222 UL 1479, Fire Tests of Through-Penetration Firestops

4.14.223 UL 1480, Speakers for Fire Alarm, Emergency, and Commercial and Professional Use

4.14.224 Aluminum Association Designation System

4.14.225 Rural Utility Service, Bulletin 1753F-201 (PC-4), Standard for Acceptance Tests and Measurements of Telecommunications Plant

4.14.226 IESNA HB-10 (2011), IES Lighting Handbook

4.14.227 IESNA LM-79-08, Electrical and Photometric Measurements of Solid-State Lighting Products

4.14.228 IESNA LM-80-08, Measuring Lumen Maintenance of LED Light Sources

4.14.229 City Light & Power (CL&P) Electric Service Connection Standards Manual

4.14.230 EPACT 2005

4.14.231 DODI 4170.11

4.14.232 DOD Utilities Meter Policy

4.14.233 All attachments to this RFP

5 SUSTAINABLE DESIGN

5.1 GENERAL:

5.1.1 The Contractor is required to comply with all state and federal laws regarding sustainable design. See UFC 1-200-02 and specification 01 33 29 SUSTAINABILITY REPORTING for more information and additional requirements not listed here.

5.1.2 A preliminary Air Force MILCON Sustainability Requirements Scoresheet has been provided as part of this contract. The Contractor is responsible for keeping this and other compliance reporting documents updated throughout the course of design and construction. Updated documents are required to be submitted at 65% design, 95% design, design completion, and construction completion. See Section 01 33 16 for more information about submittal requirements.

5.2 **REFERENCES.** See paragraph 4.14.

5.3 **PROJECT REGISTRATION.**

5.3.1 The Contractor is responsible for registering the project with the Green Business Certification Inc.'s (GBCI) Guiding Principles Assessment for Department of Defense. The Contractor is responsible for all additional project costs, including registration, reviews, and any cost arising from denied credits or re-submittals. Contact GuidingPrinciplesAssessment@gbci.org for more information.

5.3.2 The Contractor is responsible for registering the project with the Energy Star program after award of the Contract and prior to starting construction activities.

5.4 **EPA "DESIGNED TO EARN THE ENERGY STAR."** The Contractor shall select appropriate appliances, fixtures, and equipment so that the project meets the requirements of the Environmental Protection Agency's (EPA) "Designed to Earn the Energy Star" program for Commercial New Construction.

5.4.1 The Contractor shall use the "Target Finder" program to analyze the energy use. The design shall achieve a rating of 75 or higher. Analysis shall be conducted per the EPA guidelines and documented as part of the Contractor's Design Analysis. Results of the "Target Finder" analysis shall be submitted to the EPA for review. Once accepted, they will provide the Architect of Record an electronic file with the "Designed to Earn the Energy Star" graphic. The Contractor shall place this graphic in the title block on all construction drawings and on the cover of all Contract Documents. More information about the "Designed to Earn the Energy Star" program and requirements can be found at the EPA Energy Star website: http://www.energystar.gov/buildings/facility-owners-and-managers/new-construction.

5.5 **FEDERAL HIGH PERFORMANCE AND SUSTAINABLE BUILDINGS.** As required by federal law, the Contractor shall design a building that meets the Federal Requirements for High Performance Sustainable Buildings (HPSB). See UFC 1-200-02 and the Air Force Sustainable Design and Development Implementing Guidance memorandum for more information. See also the Whole

Building Design Guide's FHPSB website for new construction: http://www.wbdg.org/references/fhpsb_new.php

5.5.1 Required Sustainable Features. The following features are required to be incorporated in to this project. See UFC 1-200-02 for additional information.

5.5.1.1 Integrated Design. A collaborative and integrated planning and design team has been involved in the development of this RFP. The Contractor shall conduct their pre-design charrette in accordance with *ASHRAE 189.1-2014*, section F1.1.1, ensuring compliance with *UFC 1-200-02*, section 2-2.1.1 through 2-2.1.4.

5.5.1.2 Commissioning. Comply with ASHRAE 189.1, paragraph 10.3.1.2, and the requirements of Section 01 91 00.00 10 TOTAL BUILDING COMMISSIONING. The Contractor shall employ an experienced commissioning agent (CxC/CxA) to coordinate the design, construction, and testing of all commissioned systems. An independent commissioning authority (CxG) chosen by the Government shall review the Owner's Project Requirements, Basis of Design, design drawings, and commissioning plans and reports to ensure their completeness and accuracy. See ASHRAE 189.1 and Section 01 91 00.00 10 TOTAL BUILDING COMMISSIONING for list of systems required to be commissioned. Revise this list as is applicable to the building, and update 01 91 00.00 10 to correspond. Compliance with ASHRAE 55, section 6.2, is not required as identified in ASHRAE 189.1.

5.5.1.3 Energy Efficiency –Commercial Buildings. Energy use shall be reduced at least 30% below the baseline of ASHRAE 90.1-2013. If this is not lifecycle cost effective, achieve the maximum efficiency that is lifecycle cost effective. Results of a Life Cycle Cost Analysis (LCCA) are required to be included in the Energy Compliance Analysis. Required energy performance for Federal facilities is determined by the calculation established by the Department of Energy (DOE) in CFR Title 10 Part 433. The formula for calculating the Performance Rating in *ASHRAE 90.1*, paragraph G1.2, shall be changed to:

$$\%\ improvement = \frac{[(\text{Baseline building consumption}) - (\text{receptacle and process loads})] - [(\text{Proposed building consumption}) - (\text{receptacle and process loads})]}{(\text{Baseline building consumption}) - (\text{receptacle and process loads})}$$

5.5.1.4 Energy Efficient Products. For those product categories covered by Energy Star or FEMP, select products that are Energy Star qualified or FEMP designated, based on life cycle cost. See UFC 1-200-02 for additional resources.

5.5.1.5 Standby Powered Devices. Provide products that use no more than 1 watt in standby mode.

5.5.1.6 On-site Renewable Energy. Determine if a building-level renewable energy system is life cycle cost effective (LCCE) based on the requirements of *ASHRAE 189.1*, paragraph 7.4.1.1, and *UFC 3-440-01*. If a Life Cycle Cost Analysis (LCCA) determines a building-level solution is not LCCE, utilize an installation-level solution. Results of a Life Cycle Cost Analysis (LCCA) are required to be included in the Energy Compliance Analysis.

5.5.1.7 Energy Compliance Analysis. An Energy Compliance Analysis must be completed to verify compliance with *UFC 1-200-02*. See *UFC 1-200-02* for detailed requirements

5.5.1.8 Metering. Provide advanced utility meters for all utilities serving the building. Meters must be connected to the base wide energy and utility monitoring and control system. See paragraph 6 Civil Design for more information.

5.5.1.9 Stormwater Management. Comply with *UFC 3-210-10*. See also paragraph 6 Civil Design, specification 01 57 23 STORM WATER POLLUTION PREVENTION MEASURES, and specification 01 57 20 ENVIRONMENTAL PROTECTION for additional stormwater management requirements.

5.5.1.9.1 Per Air Force Instruction (AFI) 32-1067, Water and Fuel Systems, the proponent/contractor shall prepare a Storm Water Pollution Prevention Plan (SWPPP) to include site-specific control measures and best management practices that would be implemented during construction activities. This plan shall be submitted to 412 CEG/CEVC for approval.

5.5.1.10 Moisture Control. See *UFC 1-200-02* for more detailed information on moisture control strategy requirements.

5.5.1.11 Reduce Volatile Organic Compounds. All construction materials, interior finishes, and other products must be low- or zero-emitting. This includes composite wood products, adhesives, sealants, interior paints and finishes, all flooring systems, structural wood panels, agrifiber products, ceiling and wall systems, and furnishings. Comply with *ASHRAE 189.1*, paragraph 8.4.2, excluding the first sentence.

5.5.1.12 Protect Indoor Air Quality During Construction. Contractor shall comply with *ASHRAE 189.1*, paragraph 10.3.1.4 to develop an indoor air quality construction management plan. Relative humidity shall be no greater than 60%.

5.5.1.12.1 Contractor shall operate in accordance with all Federal and State air emission and performance laws and standards as specified in Section 01 57 20 ENVIRONMENTAL PROTECTION, paragraph 3.4 AIR RESOURCES.

5.5.1.13 Environmental Tobacco Smoke Control. Smoking is prohibited within 50 feet of all building entrances and ventilation intakes.

5.5.1.14 Environmentally Preferable Products. Provide products with a low impact on human health and the environment, such as products with recycled content or biologically-based products. Contractor and specifiers shall consult GSA's Green Products Compilation, EPA's Comprehensive Procurement Guidelines, and the Federal Green Construction Guide for Specifiers. Any products chosen must also meet the technical criteria contained within this Request for Proposal.

5.5.1.14.1 *Ozone Depleting Substances*. Comply with *ASHRAE 189.1*, paragraph 9.3.3. CFC-based refrigerants shall not be used in HVAC systems. Fire suppression systems shall not contain CFCs, HCFCs, or Halons.

5.5.1.14.2 *Other Hazardous Materials.* Products or materials containing asbestos, lead, or polychlorinated biphenyls are not permitted.

5.5.1.15 Storage and Collection of Recyclables. Provide a designated area for the storage and collection of nonhazardous recyclables, per *ASHRAE 189.1*, paragraph 9.3.4.1.

5.5.1.16 Waste Diversion. A minimum of 60% of non-hazardous construction and demolition waste must be diverted from landfills. See specification 01 74 19 CONSTURCTION AND DEMOLITION WASTE MANAGEMENT for more information and requirements.

5.5.1.16.1 Waste and Materials Management shall be conducted in accordance with specification 01 57 20 ENVIRONMENTAL PROTECTION, paragraphs 3.6 CHEMICAL MATERIALS MANAGEMENT AND WASTE DISPOSAL, 3.7 RECYCLING AND WASTE MINIMIZATION, and 3.8 NON-HAZARDOUS SOLID WASTE DIVERSION REPORT.

5.5.1.17 Address Climate Change Risk. Discuss with Base personnel if there are any provisions needed to account for Government-provided projects of climate change effects on the site. Documentation of this discussion shall be included in paragraph 5.5.1.1 above.

5.6 **USGBC GUIDING PRINCIPLES ASSESSMENT.** The Contractor shall take appropriate actions and incorporate design and construction features such that the project shall accomplish all requirements of UFC 1-200-02 and receive a Compliant rating under the USGBC Guiding Principles Assessment.

5.7 **SUSTAINABILITY REPORTING.**

5.7.1 Contractor shall prepare a Sustainability Action Plan and a Sustainability Notebook as required by specification 01 33 29 SUSTAINABILTIY REPORTING. Contractor shall also prepare and regularly update the Air Force MILCON Sustainability Requirements Scoresheet, as required by specification 01 33 29.

5.8 **CERTIFICATES AND PLAQUES:** See specification 01 33 29 SUSTAINABILTIY REPORTING for additional information.

6 CIVIL DESIGN

6.1 **GENERAL**. The project consists of the design and construction of five (5) site-adapted earth covered reinforced concrete modular Munitions Storage Magazines (MSMs) based upon the "MSM Box-Type" standard plans 421-80-08. The project location, demolition plan, site plan, and utility plan are shown respectively on 005 Drawings sheets G-101, Site Location Map; C-131, Demo Plan; and C-141, Site Plan. Construction activities include but are not limited to: stripping vegetation; demolition of 2 existing igloos and associated steam piping, concrete pads, and AC driveways; providing access driveways, reinforced concrete loading aprons, utilities, catenary lightening protection, site improvements, communications /intrusion detection, and lighting utilizing conventional design and construction methods to accommodate the mission of the facility. Utility services to the new igloos shall include: electrical and telecommunications.

6.2 Electrical and Communication utilities are required as part of this project. See paragraph 14 Electrical Design and paragraph 17 Telecommunications Design for details.

6.3 **SITE.** The MSMs will be constructed in the MAMS 1 area between Birch Lane and Hawthorne Avenue and north of Georgia Street. The southernmost of the five MSMs will be sited to the north of the concrete access apron of building 1405. The magazine doors will face west towards Birch Lane and will be accessed by asphaltic concrete driveways. The west wall of the magazines will be offset approximately 220 feet from Birch Lane and align with the headwall of building 1405. Existing MSMs 1460 and 1461 will be demolished for this project. The topography in the project area is relatively flat with little vegetation.

6.4 **TECHNICAL CRITERIA AND STANDARDS.** See paragraph 4.14.

6.5 **PROJECT SITE FIELD SURVEY.** No initial site survey has been performed. The Contractor shall be responsible for performing any survey to be used for construction and as required to complete the design. The survey drawings can be produced in either AutoCAD or Microstation but files must be submitted in DWG or DXF format only using Universal Transverse Mercator coordinates (UTM), Zone 12 North. The horizontal datum shall be the North American Datum 1983 (NAD83) and the vertical datum shall be the North American Datum of 1988 (NAVD 88). Aerial photos shown on drawings are dated and should not be relied upon for accurate site details. Existing survey monuments shall be protected during construction from movement or damage. Damaged monuments shall be replaced by a Licensed Professional Land Surveyor to the original order of survey accuracy, at no cost to the Government.

6.6 **SITE DEMOLITION.** Buildings 1460 and 1461 are existing MSMs that will be decommissioned and abandoned by the Government prior to contract award. Demolish the two MSMs (3451 sq. ft.) including their foundations, associated AC access driveways, PCC aprons, and steam piping and supports. See 005 Drawings sheet *C-131, Demolition Plan* for details.

6.6.1 **Waste Disposal.** Project demolition and construction waste shall be disposed of off-post at a location approved by the Contracting Officer. There are no landfills

located at HAFB. Government policy is to apply sound environmental principles in the design, construction, and use of facilities. As part of the implementation of that policy the Contractor shall practice efficient waste management when sizing, cutting, and installing products and materials and use all reasonable means to divert construction and demolition waste from landfills and incinerators and to facilitate their recycling and reuse.

6.6.2 **Haul Route.** See 005 Drawings sheet *G-101* for haul route path. The project site is within the MAMS area of HAFB and within a secondary fenced and guarded perimeter. The Roy Gate will be the entry and exit point for haul vehicles. The gate operation hours are 24 hours a day, 7 days a week. Contact HAFB for further details. Installation roadways sustaining damage from construction activities shall be repaired at the Contractor's expense after project completion. The Contractor shall coordinate with the Base's Department of Emergency Services.

6.6.3 **Free Zone Requirements.** The Contractor, in coordination with HAFB, is required to develop a Free Zone within which he is to work. A Free Zone Boundary Map which indicates Contractor's access and required signage to access the site within the MAMS I Area will be developed and Contractor's activities shall be limited to the Free Zone as indicated. Free Zone Map and boundaries must be approved by HAFB and the Contracting Officer. Follow the guidance in AFI 31-101, The Installation Security Program, when work under this contract required entry to controlled areas. The Contractor will request completion of an AF Form 2586, from the project manager for one prime contractor employee. That employee will act as escort for all other prime and subcontractor employees. Contractor employees with controlled area badges are required to escort contractor employees without badges, at all times, in and out of controlled areas. If it becomes necessary to establish a Free Zone for the Contractor, it must be approved in writing by the installation commander. The Free Zone must have clearly defined boundaries. It is recommended the Free Zone begin at some point in the boundary of the controlled area, which enables entry by the Contractor and other authorized personnel. The Free Zone must be closed during non-duty hours. The boundaries of the designated responsible activity. The Contractor shall not permanently alter any surface in the controlled area when establishing a Free Zone such as drilling holes in pavement for temporary fencing or drilling holes in walls and floors for other barriers. A Free Zone access list shall be developed to, at a minimum, include Contractor employees last name, first name, middle initial, date of birth, place of birth, company name, and driver's license number and issue state.

6.7 **EARTHWORK.**

6.7.1 **General.** During construction, minimize disturbed areas, stockpile excavated soils, and protect excavated soils from wind and water erosion. Replace or remove soils when construction is complete.

6.7.2 **Excavation.** There are no known contaminants or contaminated soils at the site. If contaminants are encountered or suspected either by detecting suspicious odors or discolored soil, the Contractor shall notify the Contracting Officer immediately.

6.7.2.1 If the Contractor discovers unidentified hazardous conditions after construction commencement, he shall notify the Contracting Officer immediately. The

Contractor shall stop construction for up to ten (10) days to allow time for Environmental Management (EM) representatives to sample and analyze suspected contamination. If the soil is determined to be contaminated, the Contractor shall set the contaminated soil aside on some contained area (asphalt, plastic lining, etc). The contained area shall first be covered with minimum 15 mil plastic before any soil is placed there. After the soil has been placed there it shall be entirely covered with minimum 15 mil plastic sufficiently anchored to remain in place during windy/stormy conditions. Storm water shall be diverted away from the stockpile, and any runoff from the stockpile area shall be contained and properly disposed.

6.7.3 **Borrow.** All borrow shall be obtained off-post at Contractor's expense from an off-site source acceptable to the Contracting Officer and meeting gradation requirements of Geotechnical Report. All excess materials shall be disposed of at an approved municipal landfill. The Contractor shall submit material certification for approval prior to placement.

6.7.4 **Geotechnical Report.** Geotechnical logs from June 2010 logs and April 2013 by A Cache Corp. is provided in Attachment 08 of this RFP to assist the Contractor in preparing their proposal. It represents the best available data for subsurface conditions to be expected in the project vicinity, and the recommendations made therein represent minimum requirements for this project for bidding purposes only until superseded by the Contracting Officer's -approved Contractor's Final Geotechnical Report. The Contractor is required to obtain the services of a Geotechnical Engineer. All explorations and geotechnical evaluations and recommendations are the responsibility of the Contractor. See paragraph 8 "Geotechnical Design Requirements" for additional information and requirements regarding the Contractor's Geotechnical Report.

6.8 **SITE DEVELOPMENT**

6.8.1 **Building Siting.** Building location and orientation of the new facility is shown on the 005 Drawings Civil sheets. Igloos shall have 100 foot clear space between the outside concrete walls as shown on conceptual plans per DDESB requirements. The final site design shall be determined by the Contractor meeting the minimum provisions of all applicable references indicated in the RFP documents and with the final approval of the Contracting Officer and DDESB. The Contractor shall confine proposed development to the project area as shown on 005 Drawings sheet *C-141, Site Plan*.

6.8.2 **Staging Area.** The Contractor staging area and trailer shall be located within the project limits and a proposed 1 acre location is shown on 005 Drawings sheet *C-141, Site Plan.*

6.9 **GRADING.** The Contractor shall design the grading of the site and elevations of new pavement. The Contractor shall design grading and drainage of the site to meet Low Impact Development criteria as specified in UFC 3-201-10 so all runoff drains away from the igloos, loading aprons, and access drives, and is directed into bioswales, shallow detention areas, or other LID features.

6.9.1 **Site Drainage Concept.** Drainage shall generally be surface drainage away from building with paved areas sloping a minimum of 1%; earth areas a minimum of 1% to 2%; and earth areas for the first 10-feet around the building 5%. Contractor shall submit a drainage plan with the design submittal.

6.9.2 **Building Site.** Grading around and immediately adjacent to the building shall be directed away from the building.

6.10 **SITE IMPROVEMENTS.**

6.10.1 **Standard Details.** Site details shall be constructed per the Department of Public Works (DPW) standard details and HAFB Facilities Design Standards.

6.10.2 **Concrete Exterior Slab and Concrete Paving.** Provide concrete driveways for truck (40 foot trailer/10-ton tractor combination) and fire equipment access from Birch Lane and a shared reinforced concrete forklift loading apron that traverses along the headwall and door of each MSM. Size the width of the loading apron and adjacent concrete access driveway to permit the loading and simultaneous passing of a truck. The MSMs will be unoccupied, therefore, there is no requirement for a parking lot or sidewalks. The Contractor shall design and construct concrete slabs, footings, and pavements based on the recommendations of their geotechnical engineering analysis.

6.11 **STORM RUNOFF AND DRAINAGE.**

6.11.1 **Storm Runoff.** Storm drainage will be managed on-site. The roof of each MSM will be earth and vegetation covered. Additional runoff will be managed by sheetflow, swales, and possibly culverts. The Contractor shall design grading of the site so all runoff drains away from the igloos, loading aprons, and access drives and provide on-site detention features to allow infiltration/evaporation per Low Impact Development criteria as specified in UFC 3-201-10. Integrate the MSM's foundation drains into the overall on-site storm drainage plan.

6.12 **UTILITIES.**

6.12.1 **Utility Connections.** Utility upgrades and connections shall be provided by the Contractor for the new facility as required. Service connection locations for steam (service to Bldg 1462), electrical and telecommunications shall be shown on the Contractor's Utility Plan. These connection locations must be verified using the criteria referenced in this specification and may require adjustment during final design.

6.12.2 **Existing Utilities.** Existing utilities are described based upon surface observations and information provided by HAFB. The Contractor is responsible for verifying the existence, location, size, depth and condition of existing utilities for the final design. Utilities found within the footprint of the building shall be located and marked. No utility, unless noted otherwise on the conceptual plans, shall be removed and relocated prior to receiving approval from the Contracting Officer. Existing utilities requiring relocation shall be relocated at least 5 feet outside of the building/structure footprint.

6.12.3 **Steam Lines**. The steam lines servicing MSM Buildings 1460 and 1461 will be removed and relocated as shown on the drawings to maintain steam service to MSM Building 1462. Provide new steam piping system, including steam supply and condensate return in compliance with UFC 3-430-09, Exterior Mechanical Utility Distribution. Contractor shall field verify existing steam system and identify existing sytem temperature, pressure, and pipe size. Design and install the new steam piping system in accordance with UFGS 33 63 23, Above Ground Steam Pipe; UFGS 23 22 13.35 40, Steam Traps; and UFGS 23 22 25.00 40 Steam Valve. Provide pipe insulation, support pole, manhole drainer as specified in UFGS 33 63 23.

6.12.3.1 See paragraph **14 Electrical Design** for details.

6.12.3.2 See paragraph **17 Telecommunications Design** for details.

6.12.4 **ANTI-TERRORISM/FORCE PROTECTION.** The MSMs are unoccupied facilities located inside the existing MAMS I fence line, therefore, AT/FP standoff distances per UFC 4-010-01 do not apply.

7 LANDSCAPE ARCHITECTURE

7.1 **GENERAL:** Use Hill native seed mix (Attachment 14) for erosion control vegetation on the MSM's earthen cover and on other ground surfaces disturbed during construction. No landscape architecture required.

8 GEOTECHNICAL DESIGN

8.1 **GENERAL**. The Contractor's Geotechnical support for design documentation shall be written in units consistent with the RFP requirements for the overall project design. The requirements and information contained in paragraphs 8.1 through 8.6 herein represent minimum requirements to be used for preparing design and construction documents. The more stringent/conservative of these geotechnical design requirements, the Hill AFB Facility Design Standard, the Contractor's Final Geotechnical Report recommendations, the applicable UFGS Section requirements and notes, or applicable UFC documents, as approved by the Contracting Officer, shall govern when preparing the final construction drawings and specifications. Where an item is not covered in these documents, applicable industry standards should be used as approved by the Contracting Officer. See paragraph 8.7 Preliminary Data and data contained in Attachment 08 for additional Geotechnical information to be used, except as otherwise stipulated in this Section 01 10 10, for preparing bids.

8.1.1 Design and construction shall be supported with appropriate geotechnical engineering. The Contractor is fully responsible for the design and construction of acceptable foundations. The Contractor shall secure the services of a competent and reputable Geotechnical Engineering consulting firm to provide the geotechnical basis of design for foundations, pavements, retaining walls, utility earthwork, grading, and any other geotechnical related items. The design parameters and material requirements shall be used for producing drawings for construction and for editing applicable Unified Facility Guide Specifications (UFGS) for earthwork, foundations, paving, and concrete features. All Geotechnical-related laboratory testing performed to support both design and construction shall be by an approved certified laboratory in accordance with Sacramento District-provided UFGS *Section 01 45 00 (or similar number) entitled "Quality Control"*. *ASTM D1557* (Modified Proctor) shall be specified for all design and construction compaction testing; *ASTM D698* (Standard Proctor) will not be allowed for determining the laboratory moisture-density relationships. Pavement section materials shall be as specified in the applicable UFGS Sections. All fill supporting foundations shall consist of Select Granular Fill (UFGS 31 00 00) or approved equal, compacted in maximum 8-inch lifts to a minimum of 95 percent of ASTM D 1557 maximum laboratory density. Native soils at Hill AFB are generally found to be mildly corrosive, and therefore cathodic protection or similar approved protection of buried metal utilities and appurtenances is required; see UFC 3-570-06 for applicable requirements. Pavement designs shall be in accordance with UFC 3-250-01FA, excepth the draft UFC 3-250-01 and PCASE program may be used at the Contractor election. Pavement section materials listed in the Hill AFB Facility Design Standard shall be followed, and/or material silsted in the latest edition of the State of Utah Standard Specifications for Road and Bridge Construction, may be specified for non-airfield pavements when appropriate for the project features/design; note that the ½" max size aggregate mix is normally preferred by Hill AFB for asphalt concrete paving of POV areas. Minimum pavement section for POV and other light traffic areas shall be 2 inches of asphalt concrete over 6 inches of aggregate base course @ 100 percent compaction over a minimum of 6 inches of compacted subgrade @ 95 percent compaction, or heavier/thicker as determined by the Contractor's Geotechnical Engineer's approved calculations. Minimum pavement section of 8 inches of Portland Cement

Concrete over 18 inches of aggregate base course @ 100 percernt compaction over a minimum of 6 inches of compacted subgrade @ 95 percent compaction or heavier/thicker as determined by the Contractor's Geotechnical Engineer's approved calculations for approaches to structures where heavier vehicles will expected. The more strigent/conservative of the foregoing geotechnical design requirements and recommendations, or applicable UFGS Section requirements and notes, shall govern when preparing the final construction drawings and specifications.

8.1.2 The Contractor shall include drawings for construction showing the actual locations of any Contractor-performed as well as all site-specific RFP-provided exploration locations, including cone penetration (CPT) and/or trench data if applicable. The drawings shall also include appropriate foundation preparation and over-excavation details. The Contractor shall also provide with their Final Geotechnical Report and with the final specifications for construction, complete and certified logs of their explorations (generated with approved software, e.g. gINT) depicting the subsurface conditions encountered at the project site

8.1.3 The Contractor shall be responsible to provide borrow material at the Contractor's expense from an off-base borrow site. The Contractor shall find the most cost effective borrow site as approved by the Contracting Officer.

8.1.4 See civil design drawings and specifications for earthwork preparation of foundations including the removal of organic materials, compacting the soils beneath the structures, backfill requirements for over excavation and removal of unsuitable materials. The following paragraphs shall replace UFGS paragraph "3.18 TESTING" and related subparagraph "3.18.3 Check Tests on In-Place Densities" in the Contractor's final edited specification *Section 31 00 00 Earthwork*.

3.18 TESTING

Perform testing by a Corps validated commercial testing laboratory meeting the requirements of SECTION 01 45 00 (or similar number) QUALITY CONTROL and approved by the Contracting Officer. Determine field in-place density in accordance with the sand cone method ASTM D1556, except the nuclear gauge method ASTM D6938 may be used, as further qualified hereinafter, to determine in-place density of materials verified to be free of mica or other materials known to give inconsistent nuclear gauge results. When ASTM D6938 is used, check the calibration curves as described in ASTM D6938 and adjust using only the sand cone method as described in ASTM D1556; check the calibration of the density gauge prior to the first use of each different type of material encountered and at intervals as directed by the Contracting Officer. Both ASTM D1556 and ASTM D6938 result in a wet unit weight of soil and when using either of these methods, use only method ASTM D2216 to determine the moisture content for calculating in-place dry density of the soil. For a rough estimate of in-place density to control field activities only, the Contractor may perform moisture content testing by method ASTM D4643 or ASTM D4959 in conjunction with density testing by method ASTM D6938. Density results determined by sand cone method ASTM D1556 shall

govern, and shall be used to calibrate (adjust) the results determined for similar materials by nuclear gauge method ASTM D6938. If differing results are consistently determined, use of the nuclear gauge shall be discontinued and only method ASTM D1556 shall be used. When test results indicate, as determined by the Contracting Officer, that compaction is not as specified, remove the material, replace and recompact to meet specification requirements. Perform tests on recompacted areas to determine conformance with specification requirements. For all tests required by these specifications, appoint a registered professional civil engineer to certify inspections and test results. These certifications shall state that the tests and observations were performed by or under the direct supervision of the engineer and that the results are representative of the materials or conditions being certified by the tests. The following number of tests, if performed at the appropriate time, will be the minimum acceptable for each type operation.

3.18.3 Check Tests on In-Place Densities

If nuclear gauge method ASTM D 6938 is used, check in-place densities by the sand cone method ASTM D 1556 at a minimum frequency of one sand cone test per lift for every six or fraction thereof tests by the nuclear gauge method. Use these sand cone "check test" results to calibrate (adjust) the nuclear gauge results for representative materials as described in paragraph "TESTING" above.

8.1.5 The following paragraphs shall replace UFGS subparagraph “1.6.2.4 Field Density Tests” and paragraph “3.7 MAINTENANCE” in the Contractor’s final edited specification *Section 32 11 23 Aggregate Base Course*:

1.6.2.4 Field Density Tests

Determine the in-place density in accordance with ASTM D 1556, except that method ASTM D 6938 may be used, as further qualified hereinafter, to determine in-place density of materials verified to be free of mica or other materials known to give inconsistent results with the nuclear gauge. When ASTM D 6938 is used, check the calibration curves as described in ASTM D 6938 and adjust using only the sand cone method as described in paragraph Calibration of the ASTM publication. Check the calibration of the density gauge prior to the first use of each different type of material encountered and at intervals as directed by the Contracting Officer, and submit curves and results within 24 hours of running the test. Both ASTM D 1556 and ASTM D 6938 result in a wet unit weight of soil and when using either of these methods, use only method ASTM D 2216 to determine the moisture content for calculating in-place dry density of the soil. For a rough estimate of in-place density to control field activities only, the Contractor may perform moisture content testing by method ASTM D 4643 or ASTM D 4959 in conjunction with density testing by method ASTM D 6938. If the nuclear gauge method ASTM D 6938 is used for compliance testing, those test values shall be checked against tests performed in accordance with the sand cone method ASTM D 1556 at a minimum frequency of one sand cone test per lift for every six or fraction thereof tests by the nuclear gauge method. Density test results determined by ASTM D 1556 shall govern over those determined by ASTM D 6938. If differing results are consistently obtained, use of the nuclear gauge shall be discontinued and only sand cone method ASTM D 1556 shall be used.

3.7 MAINTENANCE

The base course shall be maintained in a satisfactory condition including preservation of moisture and density until the full pavement section is completed and accepted. Maintenance shall include immediate repairs to any defects and shall be repeated as often as necessary to keep the area intact. Any base course that is not paved over within 7 days of completion or that has received measurable rainfall prior to paving, shall be retested to verify that it still complies with the requirements of this specification. Any area of base course that is damaged or out of compliance shall be reworked or replaced as necessary to comply with this specification. The Contractor may elect to help preserve the base course by applying a prime coat meeting local air quality standards, but such application will not relieve the Contractor from compliance with the maintenance, verification, and re-work requirements specified herein.

8.2 **GEOTECHNICAL ENGINEERING FIRM:** The Geotechnical Engineering firm shall be familiar with seismic, geologic and geotechnical conditions, hazards and issues in the Ogden-Salt Lake City Area, where the project is located. The Geotechnical Engineering Firm shall have at least five (5) years experience in the region. All geotechnical engineering work products shall be reviewed, approved, and stamped by a Senior Civil or Geotechnical Engineer. Approving engineers shall be registered in the State of Utah. Lastly, the firm shall provide engineering support during project grading, foundation, and pavement construction.

8.3 **GEOTECHNICAL WORK.** The Geotechnical Engineering Firm shall prepare and submit a Final Geotechnical Report (FGR) through the Contractor to the Government. The Contractor's FGR and the Contractor's design shall be based upon site-specific expolorations and field and laboratory testing performed by the Contractor, the relevant RFP-provide expolorations/soil data, and these RFP requirements. Final design parameters for preparing construction drawings and specifications shall be based upon the most stringent/conservative criteria as specified by paragraphs 8.1 through 8.4 herein. The Contractor along with their Geotechnical Engineer shall carefully study these RFP requirements and the provided data, and shall be fully responsible to determine the need for and scope of any necessary additional explorations and/or testing. All field and laboratory work shall be conducted in accordance with appropriate ASTM Standards. Design parameters shall be in English units and shall be based on applicable Unified Facilities Criteria (UFC) manuals, engineering publications, applicable UFGS section and notes, and Hill AFB Facility Design Standards. Manuals and publications for design parameters and calculations shall be specifically referenced in the Final Geotechnical Report. The Final Geotechnical Report and computations shall be submitted for Government approval and shall include but not be limited to the items listed in the following paragraphs:

8.3.1 Inspection of nearby building structures, pavements, and walls noting their foundation design and any distress from excessive expansion or settlement.

8.3.2 Description of site-specific soil conditions including soil types, densities–consistencies, groundwater conditions, capillarity, shrink-swell potential, and frost-group/frost-heave potential.

8.3.3 Site-specific soil parameters: including design native and borrow material unit weight(s); shear strength(s); φ angle(s); and the site seismic soil profile and lateral loading, and evaluation of soil liquefaction potential including applicable design recommendations.

8.3.4 Lateral design coefficients including K_a, K_P, K_h, and K_o.

8.3.5 Pavement subgrade design parameters: Including K_s for rigid pavements and the CBR (California Bearing Ratio) for flexible pavements; and pavement sections including materials, compaction requirements, and subgrade preparation requirements, as applicable.

8.3.6 Foundation design parameters including bearing capacity(s); minimum footing dimensions (minimum column footing dimension = 24 inches, minimum continuous wall footing width = 18 inches); minimum embedment depth for frost prevention (minimum bearing depth = 36 inches); consideration of separation from and/or attachment to existing adjacent structures; considerations for demolition or abandonment of existing foundation; estimates of total and differential settlement, liquefaction potential, and vibration settlement relative to the adjacent existing buildings.

8.3.7 Footing, concrete pad, thrust anchor, and slab-on-grade requirements including thickness(s); concrete strength(s); subgrade preparation including over-excavation and replacement requirements; backfill and compaction requirements (maximum 8-inch loose lift thickness); protection and/or monitoring of existing adjacent foundations; and new apparatus bay and other structural slabs and "floating" (isolated) non-apparatus slab-on-grade (minimum 6-inch thick 4,000 psi PCC) materials, including vapor barrier (2 inches slightly moist *ASTM C33* fine aggregate on minimum 15-mil *ASTM E1745* Class A poly sheeting) for slabs to receive floor coverings or coatings/sealers or other moisture-sensitive finishes, and capillary water barrier (minimum 6 inches *ASTM C33* Size No. 57 coarse aggregate) placed on compacted subgrade; and any special installation and inspection recommendations for thrust anchors (if applicable)".

8.3.8 Pavement subgrade design parameters including Ks for rigid pavements and the CBR (California Bearing Ratio) for flexible pavements, as applicable.

8.3.9 Pavement sections for each applicable use and traffic type, physical properties/gradation, placement, and compaction requirements for each soil/material layer; and subgrade preparation requirements. Provide copies of PCASE runs and/or hand calculations as applicable for pavement designs.

8.3.10 Utility earthwork requirements, including trench slopes/safety shoring; minimum depth of cover; backfill material parameters; minimum compaction requirements; and all necessary recommendations for any proposed jack & bore utility installation such as beneath airfield pavements.

8.3.11 Grading earthwork requirements, including drainage/subdrainage, minimum and maximum slopes, material requirements, and the minimum compaction requirements for building areas, pavement areas, and open areas.

8.3.12 Minimum recommendations (test methods and required test values) for laboratory testing of all Geotechnical-related materials during construction.

8.3.13 Soil chemistry including resistivity pH, sulfide content, chloride content, evidence of gypsiferous materials; and any applicable grounding requirements. Based on soil chemistry, make recommendations on admixtures for Portland cement concrete and other surface and subsurface construction.

8.3.14 Locations of soil and clean demolition debris disposal areas (confirm witht the Base Civil Engineer or Utah Resident Office that all materials including clean soil and demolished concrete and asphalt materials must be disposed off-Base); and local borrow areas (none are available on Hill AFB) with potential "satisfactory" fill and other soil materials required for the project.

8.3.15 Design calculations and recommendations for temporary dewatering during construction, and for maximum excavation slopes and certified shoring system design, as applicable.

8.3.16 Any miscellaneous geotechnical design items required by the Contractor for the satisfactory completion of the project.

8.4 **ACCEPTANCE:** The Final Geotechnical Report and geotechnical basis of design shall meet the standards outlined herein and in the applicable UFC, Engineer Manuals, Technical Manuals, and ASTM publications. The Contractor shall be notified of any errors and/or incomplete work (note: lack of notification does not relieve the Contractor of contract requirements), and shall require the Geotechnical Engineering firm to provide additional information or testing and explorations as required by the Government. No additional compensation shall be forthcoming for the correction of errors or incomplete work.

8.5 **CONTRACTOR-PERFORMED GEOTECHNICAL INVESTIGATIONS:** The Contractor and their Geotechnical Engineer, consistent with all applicable RFP requirements and after careful evaluation of the available soils information provided in Attachment 08, shall be solely responsible for the scope and performance of all necessary geotechnical investigations at the project site. Contractor-performed investigations shall comply with and be coordinated with all applicable RFP requirements and particular attention is directed to Section 01 10 10 paragraph 8.3 Geotechnical Work and Part 10 Structural Design.

8.5.1 **Explorations:** Borings accompanied by standard penetration (SPT) testing shall be performed in general accordance with *ASTM D1586*, with the recommended testing to be continuous to at least a depth of 10 feet and thereafter to the bottom of the hole at intervals not to exceed 5 feet. All soil materials shall be field logged in accordance with *ASTM D2488*, and final construction-document logs that are updated with applicable soil laboratory testing results shall be prepared in accordance with *ASTM D2487*. Borings accompanied by cone penetration (CPT) testing shall be performed in general accordance with *ASTM D3441*.

8.5.2 **Laboratory Testing and Field Testing:** All necessary laboratory and/or field testing shall be performed in general accordance with applicable ASTM

publications, or in accordance with widely-accepted publications and practices when not addressed by an appropriate ASTM publication.

8.6 **PRELIMINARY DATA:**

8.6.1 **Topography:** Hill Air Force Base is located approximately 40 km (25 miles) north of Salt Lake City, just south of the Weber River and the City of Ogden, and northeast of the Great Salt Lake and the City of Clearfield. The Base is located on the Ogden, Kaysville, Roy, and Clearfield, Utah, 1:24,000 USGS 7.5 minute Quadrangles. Hill Air Force Base is situated on a large plateau approximately 60 meters (200 feet) above the surrounding area. The Base has MLLW elevations that range from 1,463 meters (4,800 feet) near the east side of the eastern airfield to 1,402 meters (4,600 feet) on the western boundary of the Base. The project site is located in an area of even terrain in the central portion of Hill Air Force Base.

8.6.2 **Regional Geology:** The Base soil materials are composed of sand and gravel alluvial deposits interbedded with sedimentary lacustrine deposits of clay and silt. The alluvial deposits are thought to be from the erosion of the Wasatch Mountain Range and the lacustrine deposits are from ancient Lake Bonneville. Local areas of perched groundwater may be found on the Base, especially during the wet seasons and the spring thaw. Typically, aquifers are found at depths of 73 to 274 meters (240 to 900 feet) and the water wells at Hill Air Force Base are drilled to depths of 244 to 274 meters (800 to 900 feet) below the ground elevation.

8.6.3 From the 2015 *International Building Code* and available data, the building area is expected to be a stiff soil profile Site Class “D” with average SPT “N” values in the upper 100 feet of between 15 and 50, but may be a soft soil profile Site Class “E” with average “N” values of less than 15. Although studies of the area have stated that Hill Air Force Base has a very low potential for liquefaction, loose sand/silt deposits may be present in the vicinity of this building site and if these become saturated, liquefaction is possible during seismic events. Refer to paragraph 2-1.6 of UFC 3-301-01 “Structural Engineering” for discussion of IBC Section 1613 “Earthquake Loads”, including applicability of seismic acceleration parameters for Class “B” (rock) sites as listed in Table E-2 of the UFC, as well as the utilization of webbased USGS Seismic Design Maps.

8.6.4 **Available Soils Data: :** Boring locations, boring logs and laboratory data from the June 2010 and April 2013 Geotechnical Investigation reports by A Cache Corp. are provided as Attachment 08 to this RFP to assist the Contractor in preparing their proposal. Those reports represent the best available data for subsurface conditions to be expected in the project vicinity, and the recommendations made in the 2013 report represents the minimum requirements for this project for bidding purposes only until superseded by the Contracting Officer-approved Contractor’s Final Geotechnical Report.

9 STRUCTURAL DESIGN

9.1 **GENERAL.** This project shall construct five (5) new properly sized and configured earth covered reinforced concrete Munitions Storage Magazines (MSMs). Each MSM shall be capable of storing 150,000 pounds of Class 1.1 munitions. The contractor shall construct the MSMs in accordance with the Approved DDESB drawings, dated June 2013 (Attachment 07), which shall be site-adapted as required and are a part of these contract documents. The contractor shall hire a licensed structural and/or civil engineer registered in the State of Utah to prepare the necessary contract documents for this project. This structure is designated as Occupancy Category III per *Table 2-2 of UFC 3-301-01*. The structural work consists of design and construction of, the following items:

a. The magazine has been analyzed for the loads listed on sheet S-001 of the approved DDESB drawings, dated June 2013 (Attachment 07) and determined to be adquate under these loadings. However, the designer shall verify the structure for the site-specific loading criteria. If site-specific loads exceed these listed on sheet S-001, the designer must address all deficiencies that do not meet current building codes.

b. Foundations must be revised to reflect the requirements included in the Final Geotechnical Report.

c. Structural components, with the exception of the foundation (footings), slab-on-grade, and wing walls shall not be modified without the approval of the contracting officer, who should consult with the U.S. Army Engineering and Support Center, Huntsville (Structural Branch). Structure has been determined to be adequate for the design criteria listed on sheet S-001 (Attachment 07).

9.1.1 **GEOTECHNICAL RECOMMENDATIONS.** Refer to paragraph 8 Requirements above and Attachment 08 “2591 Hayman Igloo Geotech Report (April 2013)” and “2590 Hayman Igloo Boring Data (June 2010)” regarding required Contractor Geotechnical Report and minimum foundation recommendations.

9.2 **ENGINEER OF RECORD.** All structural calculations shall be checked, reviewed and initialed by a registered structural and/or civil engineer other than the original EoR. The EoR shall stamp final structural calculations and final structural drawings.

9.3 **APPLICABLE STANDARDS/CRITERIA.** See paragraph 4.14.

9.4 **GENERAL DESIGN CRITERIA.**

9.4.1 The design drawings shall contain structural notes which shall contain loading criteria, a list of the strengths of the engineering materials used, the design soil values, and any other data that would be pertinent to these MSMs.

9.5 **DESIGN CRITERIA.**

9.5.1 **Serviceability.** The provisions of *IBC*, *UFC 3-301-01* and *UFC 3-310-04* shall be followed.

9.5.2 **Construction Tolerances.** Allowable variations from level, or specific slopes, shall be as follows:

a. For overall length, or surface of 10 feet or less: plus or minus 1/8-inch.

b. Up to 20 feet: plus or minus 1/4-inch.

c. Up to 40 feet: plus or minus 3/8-inch.

9.5.3 **Durability - Time Reliability.**

9.5.3.1 Structural components shall be protected from condensed moisture that could impair their structural adequacy through deterioration.

9.5.3.2 Special attention shall be given to protection for corrosion or oxidation of metals, spalling of concrete, leaching of mortar, and deterioration of adhesives. Prevention of these hazards shall be especially important.

9.5.3.3 The materials used in structural elements, components, and assemblies shall be resistant to or protected from damage by exposure to normal climatic conditions.

9.6 **DESIGN LOADS.**

9.6.1 **General.** Design loads shall be included in the structural notes on the contract drawings.

9.6.2 **Dead Loads.** The structural system shall be designed and constructed to safely support all dead loads, permanent or temporary.

9.6.3 **Live Loads.**

a. Roof Live Load = 100 pounds per square foot per the Approved DDESB drawings, dated June 2013, sheet S-001 (Attachment 07).

b. Floor Live Load = 100 pounds per square foot per the Approved DDESB drawings, dated June 2013, sheet S-001 (Attachment 07).

c. **Snow loads.** Ground snow load = 60 pounds per square foot per the Approved DDESB drawings, dated June 2013, sheet S-001 (Attachment 07).

d. **Wind Loads.** Basic wind speed = 130 MPH per the Approved DDESB drawings, dated June 2013, sheet S-001 (Attachment 07).

e. **Seismic Loads.** The seismic data shall be per the contractor's Final Geotechnical Report.

9.6.4 **AT/FP Loads. See *UFC 4-010-01.*** Use *Low Level o*f Protection.

9.7 **CONCRETE DESIGN.**

9.7.1 **General.** All foundation (walls and footings) shall be constructed of reinforced cast-in-place concrete. All project concrete shall have a minimum compressive strength of 4,500 pounds per square inch at 28 days and a maximum water/cement ratio of 0.45.

9.7.2 **Testing.** Testing of concrete work shall be done at the contractor's expense by an approved independent testing laboratory.

9.7.3 **Forms.** Materials for forms shall be plywood, metal, metal-framed, reinforced fiberglass, or plywood-faced, to provide continuous, straight**,** smooth**,** exposed surfaces.

9.7.4 **Reinforcing Materials.** Reinforcing bars shall meet the minimum requirements of *ASTM A615* and/or *ASTM A706*, minimum Grade 60, deformed.

9.7.5 **Concrete Mixing Operation.** *ASTM C94*.

9.8 **FOUNDATION DESIGN:** The contractor's EoR shall design the foundation in accordance with the provisions set forth in the Final Geotechnical Report.

9.8.1 **General.** Foundation notes shall be included in the structural drawings.

9.8.2 **Minimum Footing Depth.** The minimum footing depth from bottom of footing to outside finish grade for frost penetration and/or earth cover shall be 36 inches.

9.8.3 **Type of Foundation.** The foundation system shall be designed by the contractor's EoR.

9.8.4 **Design Loads.** The allowable soil bearing pressure and pertinent soil properties shall be given in the Final Geotechnical Report.

9.8.5 **Continuous Footings.** The foundation continuous footings shall be reinforced concrete with a minimum thickness of 12 inches.

9.8.6 **Slabs-On-Grade.** The slab-on-grade information indicated on the Approved DDESB drawings, dated June 2013 is preliminary. The contractor's EoR is responsible for the final design of the slab-on-grade based on the recommendations in the Final Geotechnical Report.

9.8.7 **Foundation Stem Walls.** The foundation stem walls shall be a minimum 8 inches thick reinforced concrete.

9.8.8 **Equipment Pads.** Pads for interior and exterior mechanical and electrical equipment shall be shown on the contract drawings.

9.9 **STEEL.**

9.9.1 After erection, the field bolt heads and nuts, field welds, and any abrasions in the shop coat shall be cleaned and primed with paint of the same quality as that used for the shop coat.

9.9.2 Connection for structural steel will be welded, or bolted with high strength bolts. All connections shall be detailed on the final plans.

10 ARCHITECTURAL DESIGN

10.1 SCOPE.

10.1.1 **General.** Construction for the Igloos shall be laid out, designed, and constructed as shown in the Modular Storage Magazine standard drawings and specifications. The building shall be constructed of noncombustible construction according to the International Building Code (IBC) 2015.

10.1.1.1 The storage Igloo architectural theme shall be as shown in Attachment 07, Modular Storage Magazine standard drawings.

10.1.1.2 See Civil drawings for project location.

10.1.1.3 Locate all above grade utility connections, vents and other projections through exterior walls away from high visibility areas such as front facades or pedestrian areas.

10.1.1.4 No windows are permitted throughout the facility.

10.1.2 **Handicapped Requirements.** None required.

10.1.3 **Gross Floor Area.** Each MSM / igloo is 25’-0” x 80’-0” (2,000 SF). See Attachment 07, Modular Storage Magazine standard drawings.

10.1.4 **Net Floor Area.** The net floor area shall be as shown in the Modular Storage Magazine standard drawings for floor plan and dimensions.

10.1.5 **Special Requirements.** See Structural drawings for special requirements.

10.1.6 **Fire Safety.** See paragraph 11.

10.1.7 **Miscellaneous Metal.**

10.1.7.1 Pipe Bollards: Pipe bollards shall be 4” dia., .25” thick heavy duty steel pipe conforming to ASTM A53. Hollow core of the pipe shall be filled with concrete having a compressive strength of 21 MPa. Bollards color shall match Fed. Spec 595B Dakota Brown 30099 with two 4-inch reflector tape and be approved by the Contracting Officer. Bollards shall be placed with the centerline offset 2” outward from the edge of the door opening, so as not to reduce the effective width of the door, and shall protect mechanical and electrical equipment susceptible to damage.

10.1.7.2 Sheet Metalwork: Flashings shall be installed in conformance with the SMACNA Architectural Sheet Metal Manual.

10.1.8 **Caulking and Sealants.**

10.1.8.1 Caulking and sealants shall be selected according to materials they are being applied to for compatibility. These sealants and caulks shall be either a two-component, rubber base, chemical-curing compound based on polysulfide and/or

polyurethane; or a single-component, rubber base, chemical-curing compound such as polysulfides, polyurethanes, and silicones.

10.1.8.2 Caulking shall occur around all door frames and at all material changes. The minimum joint width shall be 1/4 inch, and joint widths in excess of 1/4 inch shall have a back stop material provided in the joint, and the depth of all joints shall be equal to the width. Color of caulking and sealants shall match adjacent materials.

10.1.9 **Steel Igloo Doors.**

10.1.9.1 System Description: Doors shall be designed as indicated in the Modular Storage Magazine standard drawings. Structural steel doors shall be flush mounted in frames or surface mounted as indicated. Doors shall be the manually operated, side hinged, swinging type. Each door assembly shall include the door, frame, anchors, hardware, and accessories and shall be provided by a single manufacturer. Door hardware shall be provided per MSM standard drawings. Frames and anchors shall be capable of transferring blast and rebound reactions to the adjacent supporting structure.

10.1.9.1.1 Quality Assurance: Welders, welding operators, and weld inspectors shall be qualified in accordance with AWS D1.1/D1.1M except that welders performing arc welding of steel sheet and strip shall be qualified in accordance with AWS D1.3/D1.3M and welders and weld operators performing welding of reinforcing bars shall be qualified in accordance with AWS D1.4/D1.4M.

10.1.9.1.2 Warranty: Furnish manufacturer's written warranty covering the igloo / blast door assembly for 2 years after acceptance by the Government. Warranty shall provide for repair and replacement of the igloo / blast door assembly and individual hardware and accessory items in the event of malfunction due to defects in design, materials, and workmanship except that the warranty need not cover finishes provided by others.

10.1.9.1.3 Materials: Only structural quality steel materials, for which tension properties meeting MSM standard design requirements have been obtained, shall be used to resist blast except that commercial quality steel sheet and strip shall be permitted for prototype tested hollow metal doors. Select steel used in the door, door frame, and door frame anchors, and non stainless steel fasteners that resist blast, from the materials specified.

10.1.9.1.3.1 Straight Steel Bar Door Pull: Straight steel bar door pulls shall be manufactured of round steel bar. The type furnished shall be Type III: 5/8 inch diameter, 8 inch grip and 4 inch projection with 15/16 inch inside bend radiuses. Grip and projection dimensions are measured from the bar centerline. The pull shall be attached to the door by fillet welding all around.

10.1.9.1.3.2 Subframe: At the Contractor's option, a subframe can be provided and built into the structure prior to installation of the frame. The subframe and subframe anchors shall be capable of transferring blast and rebound reactions to the adjacent structure, and the frame shall be capable of transferring these reactions to the subframe. The subframe shall be fabricated in the same manner specified for the frame.

10.1.9.1.3.3 Nameplate: Each door assembly shall have a permanently affixed nameplate that displays the manufacturer's name, place and year of manufacture, and the applicable peak overpressure, impulse, and rebound rating.

10.1.9.1.3.4 Self-Rescue Kit: Self-rescue kits shall contain illustrated instructions, nonadjustable wrenches, screwdrivers, jacks, and all other tools required to open the igloo / blast door from the seating face to a width of at least 12 inches. The jack capacity shall not be less than 75,000 lbf. Tools shall be securely mounted in a steel frame using wing nuts or other approved fasteners. The self-rescue kit frame shall be fabricated in the same manner specified for the door frame and shall be securely anchored to the wall at the location indicated or as directed.

10.1.9.1.3.5 Shop Finishing: Shop priming of steel surfaces shall conform to specifications, except that surfaces that will be embedded in concrete need not be primed and hollow metal doors shall be either dipped in primer after welding is completed, or exposed surfaces shall be primed and interior surfaces coated with an approved rust inhibitor.

10.1.9.1.3.6 Hardware: Full surface hinges shall be Type 2. Multiple latching points and a single lever handle operated from opposite the seating face with manual latch engagement and either sliding or lever latch bolts shall be provided. Hinges shall be reinforced to discourage door shifting, as indicated in Modular Storage Magazine standard drawings. The latching mechanism shall be safety plated. A Type I straight steel bar door pull door stop, and gasket seals shall be provided.

10.1.9.1.3.7 Internal Locking Device: An internal locking device shall be provided to secure the door, and it shall conform to UFC 4-420-10.

10.1.9.1.3.8 Operating Forces: Maximum operating forces shall be 100 lbf to set the door in motion and 50 lbf to swing the door. Maximum force to engage and release latches shall be 30 lbf. Operating forces shall conform to NFPA 101.

10.1.9.1.4 Keying: Contractor shall purchase and install locking mechanism; however, Hill AFB owns and will install lock core. Mechanical room doors shall not be part of the base master key system. Provide temporary lock cores for protection of the work during construction; cores shall be removed before project turnover. Coordate with Contracting Officer.

10.1.10 **Painting.**

10.1.10.1 Interior exposed surfaces, except factory prefinished material, shall be painted a minimum of one prime coat and two finish coats. The prime coat for any painted concrete shall be as recommended by the painting manufacturer. All spaces shall have satin or eggshell or semi-gloss finish on walls, semi-gloss finish on trim and eggshell or semi-gloss finish on ceilings. Do not use flat finish.

10.1.10.2 All exterior surfaces to be painted, including all utility appendages shall receive a minimum of one prime coat and two finish coats of paint.

10.1.10.3 Application of paint: Paint shall be applied by brush or roller. Spray painting method shall be used only under approved conditions. Spraying shall be done only when

there is no wind, or under very low wind velocity. When wind velocity increases, all spraying operation shall be stopped as directed by the Contracting Officer. Before start of spraying, all surfaces that do not require painting shall be completely masked and protected. Adequate drop cloths shall be provided over floors, adjacent sidewalks, and over all cars parked nearby that may be stained or damaged from the spray work. The Contractor shall be liable for all damage resulting from the spray painting operation. All such damages shall be satisfactorily repaired and resolved at no additional cost to the Government. Adequate ventilation shall be provided during paint application. Respirators shall be worn by all persons engaged in spray painting. Adjacent areas shall be protected by approved precautionary measures.

10.1.10.4 Paints shall comply with State Regulations and the following Masters Painters Institute Specifications. No lead paints are acceptable.

MPI 1	Aluminum Paint
MPI 8	Exterior Alkyd, Flat
MPI 9	Exterior Alkyd, Enamel
MPI 10	Exterior Latex, Flat
MPI 11	Exterior Latex, Semi-gloss
MPI 18	Organic Zinc Rich Coating
MPI 23	Surface Tolerant Metal Primer
MPI 31	Polyurethane, Moisture Cured, Clear Gloss
MPI 50	Interior Latex Primer Sealer
MPI 77	Epoxy Cold Cured, Gloss
MPI 94	Exterior Alkyd, Semi-Gloss, MPI Gloss Level 5
MPI 97	Latex Traffic Marking Paint
MPI 99	Interior/Exterior Clear Concrete Floor Sealer (water based)
MPI 119	Exterior Latex, Gloss
MPI 131	Interior Latex Ceiling Paint
SSPC Paint 5	Paint, For Interior Galvanized Surfaces.
SSPC Paint 21	Paint, Alkyd, For Factory Primed Mechanical and Electrical Equipment

10.1.10.5 Colors shall be as approved from schemes submitted with proposal. Each proposal shall include one basic exterior and interior color coordinated schemes and color samples.

10.1.11 **Exterior Signs.**

10.1.11.1 HAFB will provide signage at no cost; signage shall be Government Furnished / Contractor Installed (GF / CI). Coordinate with Contracting Offer's Representative.

11 LIFE SAFETY

11.1 **GENERAL.** This facility shall be designed to meet or exceed the minimum construction and life safety standards as required by the referenced national and internal federal codes and criteria. The Contractor shall provide a design analysis as required by *UFC 3-600-01 Design: Fire Protection Engineering for Facilities*, with a complete life safety analysis citing the appropriate code references. References shall include NFPA 101 and IBC. The Contractor is responsible for ensuring design complies with all applicable life safety codes and requirements.

11.2 **REFERENCES.**

11.2.1 UFC 1-200-01, Unified Facilities Criteria, Design: General Building Requirements, 16 August 2010, including Change 3, 1 August 2015

11.2.2 UFC 3-600-01, Unified Facilities Criteria, Design: Fire Protection Engineering for Facilities, 26 September 2006, Change 3, 1 March 2013.

11.2.3 International Building Code (IBC), 2015.

11.2.4 NFPA 101, Life Safety Code, 2015.

11.2.5 NFPA 80, Standard for Fire Doors and Fire Windows, 2013.

11.2.6 NFPA 13, Installation of Sprinkler Systems, 2013.

11.3 **BUILDING CONSTRUCTION AND HAZARDS.**

11.3.1 Construction: New DoD facilities must comply with UFC 1-200-01

UFC 1-200-01, 1-1

New construction must comply with UFC 3-600-01

UFC 3-600-01, 1-2.1.1

11.3.2 Basic Criteria Use IBC 2015 for types of building construction, allowable floor area, building height limits, occupancy separation and building separation distance, except as modified by UFC 1-200-01. And UFC 3-600-01.

UFC 1-200-01, 1-2

UFC 3-600-01, 3-1

11.3.3 Basic Criteria Use NFPA 101 (most recent release) for means of egress, safety to life, interior finish ratings and fire resistance ratings of non-bearing partitions. For conflicts between IBC and NFPA 101, conform to NFPA 101.

UFC 3-600-01, 10-1

11.3.4 Occupancy: High Hazard (H-1) IBC, 307

Storage NFPA 101, 6.1.13.1

11.3.5 Per UFC 3-600-01, paragraph 4-30.2.1: A/E storage Facilities are permitted to be either Earth Covered Magazines (ECM) or Above Ground Magazines (AGM) as defined by DoD 6055.09-M. An A/E storage Facility is used for A/E storage only. The storage Facility must not be used for handling, processing, testing, servicing, and inspection of ammunition, explosives, propellants, and oxidizers or joint use of storage and the handling, processing, testing, servicing, and inspection of ammunition, explosives, propellants, and oxidizers.

11.3.6 Per UFC 3-600-01, paragraph 4-30.2.3: Automatic sprinklers and hydrant protection are not required for A/E storage Facilities.

11.3.7 Per UFC 3-600-01, paragraph 4-30.2.4: Compliance with IBC or NFPA 101 is not required for A/E storage Facilities.

11.4 **EXIT REQUIREMENTS.**

11.4.1 Minimum Width of Doors.

32 inches NFPA 101, 7.2.1.2.4
Pair of doors: at least one must be 32 inches in width.

11.4.2 Distance to Exits:

High Hazard: 75 feet (without sprinklers)
NFPA 101, Table 42.2.6

11.4.3 Dead End Corridors:

High Hazard Occupancy: Not permitted (without sprinklers)
NFPA 101, Table 42.2.5

11.4.4 Common Path of Travel:

High Hazard Occupancy: Not permitted (without sprinklers)
NFPA 101, Table 42.2.5

11.4.5 Interior Wall & Ceiling Finishes: UFC 3-600-01, 8-1

High Hazard Occupancy: NFPA 101, 42.3.3.2
All areas: Class A, B, or C

11.4.6 Interior Floor Finishes UFC 3-600-01, 8-1

High Hazard Occupancy: NFPA 101, 42.3.3.3
Exit enclosures: Class I or Class II
Other areas: Compliance not required

11.4.7 Roof Coverings and Roof Deck Assemblies

Roof covering: Minimum Class C

UFC 3-600-01, 15-1

Roof deck: For non-sprinklered Facilities, roof deck assemblies must be FM Class I approved, or UL-listed as fire classified or equal listing or classification by a Nationally Recognized Testing Laboratory.

UFC 3-600-01, 15.2.1.1

11.5 **FIRE EXTINGUISHING SYSTEM.**

11.5.1 Not required; see above and paragraph 13.

11.6 **PORTABLE FIRE EXTINGUISHERS.**

11.6.1 Extinguishers shall be Government Furnished / Government Installed (GF / GI).

11.7 **FIRE ALARM SYSTEM.** Not required; see paragraph 15.

12 MECHANICAL DESIGN

12.1 **GENERAL**. Provide a completely functioning, serviceable and tested building that meets or exceeds the criteria of this Request for Proposal (RFP). The most stringent criteria shall be utilized where multiple sources provide differing values or approaches.

12.1.1 **Criteria Sources and References.** See paragraph 4.14.

12.1.2 **Design Submittal.** Complete mechanical systems design shall be submitted in accordance with requirements indicated in RFP Section 01 33 16 DESIGN AFTER AWARD and the succeeding paragraphs.

12.1.2.1 Design Analysis**:** Provide a design analysis/narrative for the criteria usage, outdoor and indoor design conditions, and HVAC and plumbing systems selection when required.

12.1.2.2 Calculations: Provide calculations leading to size of distribution systems and selection of equipment.

12.1.2.3 Specifications: Provide all applicable, edited Unified Facilities Guide Specifications (UFGS) for all mechanical components, equipment, and control systems included in the design.

12.1.2.4 Equipment Catalogue Sheets**:** Provide catalogue cuts of all major components.

12.1.3 **General Design Requirements.** Refer to UFC 4-420-01 - Ammunition and Explosive Storage Magazine, AFMAN91-201 – Air Force Explosive Safety Standard, and Air Force Munitions Facilities Guide for general design requirements and considerations.

12.1.3.1 Seismic Protection**:** All equipment shall be seismically braced per UFC 3-310-04 – Seismic Design of Buildings. Refer to section 8.3.6 Seismic Loads for additional seismic requirements.

12.1.3.2 Service and Maintenance: Equipment selection and layout shall comply with the code and manufacturer's recommended clearances requirements and shall be annotated on the drawings. The major system component shall be configured and arranged in order to allow ease and efficiency in performing routine and scheduled maintenance as well as facilitate sub-component repair and replacement.

12.1.3.3 Expansion Joints / Anchors / Guides: Expansion of all piping shall be computed by the method outlined in the *ASHRAE Handbook, Equipment*. Expansion of plastic piping shall be determined from the *Plastic Pipe Institute Technical Report PPI-TR21, Thermal Expansion and Contraction of Plastic Pipe*. If expansion joints are required, drawings and calculations shall be provided**.**

12.1.3.4 Insulation: Insulation for mechanical systems shall be provided to prevent personnel injury, to prevent condensation, and for energy conservation in accordance with IECC. Insulation shall comply with ASHRAE 90.1 at a minimum

12.1.3.5 Cathodic Protection: See electrical narrative regarding cathodic protection requirements. Provide dielectric unions or flanges at all dissimilar metals.

12.1.3.6 Elevation: Design and selection of all equipment shall take into account for the effects of elevation and shall be included in calculations

12.1.3.7 Training: Provide training as needed for the base maintenance personnel/building occupants. A training plan shall be submitted.

12.1.3.8 Access Panels: Access panels/doors shall be provided as required for equipment and appurtenances.

12.2 **HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)**

12.2.1 **Facility Operational Hours:** Facility operation hour is 24/7, 365 days.

12.2.2 **Fuel Sources**: The use of electric resistance heating is not permitted. Steam heat should not be used for heat generating system as per HAFB Base Facility Design Standard.

12.2.3 **Site Criteria:**

12.2.3.1 Location:

Project Location:	Hill AFB, Utah
Latitude:	41.12N
Longitude:	111.97W
Elevation:	4789 feet
Cooling Degree Days (Base 50):	2541
Heating Degree Days (Base 65):	6854
ASHRAE Standard 90.1 Climate Zone:	5B

12.2.3.2 Outside Design Temperature**:** The following design temperatures are provided for reference:

Outside Summer (1.0%):	91^{o} F DB, 60^{o} F WB
Outside Winter (99.0%):	12^{o} F DB

12.2.3.3 Indoor Design Criteria**:** Indoor condition shall be designed in accordance with UFC 4-420-01, Ammunition and Explosive Storage Magazine. Space climate control with heating or cooling is not required.

12.2.4 **Ventilation System:** Provide magazines with appropriate means of air circulation in accordance to UFC 4-420-01, Ammunition and Explosive Storage Magazine, AFMAN91-201, Air Force Explosive Safety Standards.

12.2.4.1 Passive Ventilator: Magazine vents shall conform to AFMAN91-201. Refer to drawings in Attachment 07, Modular Storage Magazine for vent size, location, and pipe arrangement requirement.

12.3 **PLUMBING**

12.3.1 **General:** Plumbing system shall be designed and installed in accordance with ICC IPC and the requirements of UFC 3-420-01. Inspection and testing of the plumbing system shall be performed as prescribed in ICC IPC. Piping outside of the five-foot line of the building is to be specified under the civil portion of the design criteria.

12.3.2 **Domestic Water:** Domestic water service is not required

12.3.3 **Domestic Waste:** Coordinate location of perimeter trench drain with structural discipline for floor sloping requirements. Provision shall be made to collect trench drains and route them to the perforated footing drain pipe next to building footing. Refer to drawings in Attachment 07, Modular Storage Magazine for detail requirement.

12.3.4 Trench Drains: Trench shall be slopped for proper drainage. The trench grates shall be slotted and constructed of either cast or ductile iron. Grates shall be bolted in position and readily removable for access to the trench. Provide cast iron domed strainers. Waste from the domed strainers will tie into a 6” perforated footing drain pipe next to the building footing. Refer to drawings in Attachment 07, Modular Storage Magazine for detail requirement. Trench grate load class shall be designed to handle the axial load of all vehicles.

13 FIRE PROTECTION

13.1 **GENERAL.** Fire protection system shall be designed and installed in accordance with the requirements of *UFC 3-600-01*. Automatic fire suppression sprinkler system is not required as per UFC 3-600-01, section 4-30.2.

14 ELECTRICAL DESIGN

14.1 **GENERAL.** Electrical work in this project includes the construction of new electrical power, lighting, communication, intrusion detection, and lightning protection system inside and outside the new modular storage magazines (MSM) to comply with applicable UFCs, standards and codes. Minimum electrical design includes underground primary feeders, transformers, underground secondary feeders, distribution panels, lighting, receptacles, underground communications, phone lines, intrusion detection system, and all associated conduit, wiring, and connections for these systems.

14.1.1 **References.** See paragraph 4.14.

14.1.1.1 Note: per the latest *Hill Air Force Base Facility Design Standard*, dated 19 Jan 2017, paragraph 14.1.1, City Light & Power (CL&P) specifications take precedence over UFC and other government requirements, when concerning the electrical power distribution system. Where the *CL&P Electrical Service Connection Standards Manual* is silent, contractor shall still meet *UFC 3-550-01* requirements. See paragraphs 14.3.3 through 14.3.4 for information on the primary electrical distribution system.

14.1.2 **Demolition.** Demolish all electrical components of buildings 1461 and 1460. Additionally, no construction work shall damage or hinder any existing systems to remain in place at Hill AFB.

14.1.3 **Outage Coordination.** Electrical work including any outage requirements for connections to existing electrical system shall be coordinated through the Contracting Officer. Contractor shall submit a formal outage request a minimum of 21 days in advance of any power utility outages required.

14.1.4 **Digging Permits.** Digging permits shall be obtained from the Contracting Officer.

14.1.5 **UL Label.** All electrical material and equipment shall be Underwriters Laboratories, Inc. (UL) listed, UL labeled (if not available), or be labeled by a similar organization acceptable to the Government. The label or listing will be accepted as evidence that the materials or equipment conform to the applicable standards of that agency.

14.1.6 **PCB Standards.** Electrical equipment supplied shall be supplied without Polychlorinated Biphenyl's (PCB).

14.1.7 **New Equipment.** All electrical equipment/materials provided by Contractor shall be new.

14.1.7.1 Capacity. All feeders, main service switchboard(s), transformers, distribution panel boards, and panel boards shall have 20% spare capacity. Use the demand and diversity factors as recommended in *NFPA 70.*

14.1.7.2 Short Circuit. All equipment protective devices shall be properly coordinated to provide selective tripping. Series rated protective equipment and/or devices will not be allowed.

14.1.7.3 Arc Flash. All electrical systems shall comply with *NFPA 70E.*

14.1.8 **Warning Signs and Safety Labels.** Provide and install all warning signs and safety labels required for the installation, operation, and maintenance of the building's electrical systems including the following:

a. General use safety labels.

b. Arc flash warning labels shall comply with DA PAM 385-26, The Army Electrical Safety Program, and NFPA 70E.

c. Short circuit rating and load information labels on panels.

14.1.8.1 Safety labels and warning signs shall be readable from each accessible side. Space the signs in accordance with *NFPA 70E*.

14.1.9 **Nameplates and Identification Tags.** Provide and install all nameplates and identification tags required for the installation, operation, and maintenance of the building's electrical systems including the following:

a. Panel Nameplates: Include panel numbers, motor control centers, disconnects, motors, electrical devices, and controls. All electrical equipment, devices, and controls shall be clearly identified and tagged.

b. Laminated plastic nameplates for each switchboard, panelboard, equipment enclosure, motor controller, relay, and switch identifying its function, number and, when applicable, source of power and location of source of power. Provide melamine plastic nameplates, 0.125 inch (3 mm) thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be 1-inch by 2-1/2 inches (25 mm by 65 mm). Lettering shall be a minimum of 0.25 inch (6.35 mm) high normal block style.

c. Cable and Wire Numbers: Provide cable numbers on all cables (both ends) and wire numbers on all wires at their termination points.

d. Motor Numbers: Tag motors with motor numbers on permanently attached tags. Motor number shall be as shown on power one line and control schematics.

e. Control Stations: Tag all control stations with the control station number, description of motor, and motor number with a laminated plastic nameplate.

f. Controls: Tag and identify all controls and control wiring (such as HVAC controls). Tag and identification shall agree with the control schematics provided.

14.2 **DESIGN REQUIREMENTS.**

14.2.1 **Studies and Calculations.** Provide design studies and calculations for all facility spaces and loads as applicable in accordance with this Request For Proposal. All

electrical drawings and calculations shall bear the stamp and signature of the registered professional electrical engineer who is the designer of record. Design studies and calculations to be provided by Contractor shall include the following:

14.2.1.1 Load calculations and electrical load summary: Include connected loads, demand loads, and diversity factors for each panelboard, switchboard, etc. in the electrical distribution system. Include 20% spare capacity when sizing feeders, main service switchboard(s), transformers, distribution panel boards, and panel boards. Use the following demand and diversity factors as recommended in *NFPA 70*.

14.2.1.2 Short circuit calculations: Include a circuit breaker protective device coordination study. All equipment protective devices shall be properly coordinated to provide selective tripping. Series rated protective equipment and/or devices will not be allowed. Surge protection shall be incorporated in the coordination analysis. The studies shall be performed by a registered professional engineer with demonstrated experience in power system coordination in the last three years.

14.2.1.3 Voltage drop calculations: Calculations shall demonstrate the worst-case voltage drop for the main electrical service, distribution panels, branch circuit panels, and any other devices/equipment indicated on the one-line diagram. The maximum voltage drop shall be no greater than 5%, including 2% voltage drop for feeders, and 3% voltage drop for branch circuits.

14.2.1.4 Arc flash analysis: Include all electrical systems per requirements set forth in the current version of *NFPA 70E*. The calculations shall be performed according to the *IEEE Standard 1584*. The flash protection boundary and the incident energy shall be calculated at significant locations in the electrical distribution system (switchboards, panelboards, etc.) where work could be performed on energized parts. Panels should be labeled as per UFC 3-560-01 Figure 1-3.

14.2.1.5 Lighting calculations for all exterior and interior spaces shall utilize computational software to provide “point-by-point” values for each room and/or area. Exterior lighting calculations shall include iso-footcandle curves for all parking lot and sidewalk areas.

14.2.2 **Drawings and Documents.** Provide all drawings and documentation required to install, operate, and maintain the building’s electrical systems. Include the following:

a. Drawing Index: Provide and keep current throughout the life of the project a drawing list with current revision number for each drawing.

b. Building Services Power and Lighting Plan Drawings: Provide plan drawings showing all lighting and convenience outlets. The building services power and lighting plans shall show circuits and luminaire and device type for all indicated lighting and devices. Lighting Plan Drawings shall show lighting controls, such as switches, occupancy sensors, vacancy sensors, photosensors and all other lighting controls.

c. Building Telecommunications Drawings: Provide telecommunications plans showing all communications equipment, such as wall data/voice outlets.

d. Security Systems Drawings: Provide security systems plans showing cameras, balanced magnetic switches (if applicable), security alarm sensors, and all other security systems equipment.

e. Power One-Line Drawings: Provide a power one-line showing the distribution of power as a single line representation including feeder cables, switchgear with protective devices and rating, power systems, and panelboards.

f. Grounding Drawings: Provide grounding drawings detailing all ground rod placements, ties to building steel, major electrical equipment, and exterior process equipment and storage tanks. Include installation details of components, connections, and test grounding stations.

g. Lightning Protection Drawings: Provide lighting protection plan, elevation, and detail drawings showing placement of air terminals, poles, catenarys and counterpoises, and any other accompanying details. Provide rolling sphere analysis diagrams.

h. Power and Lighting Panel Schedules: Provide power and lighting panel schedules for lighting and instrument power panels. Panel schedules shall show in tabular and schematic format the electrical connections in the distribution boards.

i. Installation Details and Schematics: Provide details and schematics as required to clearly identify installation conditions and/or special building systems.

j. Communication Riser diagrams and Installation details: Provide riser diagrams and details of new installed systems

14.3 EXTERIOR ELECTRICAL.

14.3.1 General Requirements.

14.3.1.1 Labeling. All materials, equipment, fixtures and appurtenances shall be Underwriters Laboratories, Inc. (UL) labeled, or if not available with the UL label, be labeled by a similar organization acceptable to the Government.

14.3.1.2 Routing and Location. The routing of the new underground feeders both primary and secondary shall be approved by and coordinated with the Contracting Officer. Except for crossings, electrical and communications utilities shall not be located under streets or sidewalks.

14.3.1.3 Available Fault Current. Contractor shall use available fault current contribution of the transformer and utility grid based upon actual impedance and characteristics for the basis of the final system design.

14.3.1.4 Fault and Overcurrent Protection. Overcurrent and fault protection devices shall be coordinated with line-side and load-side fuses or circuit breakers to isolate any electrical fault or overload from the rest of the system. Some breaker sizes may not coordinate under some fault conditions. However, good engineering practices

shall be used and devices shall coordinate for all overload conditions. All new work shall use circuit breakers only (no fuses).

14.3.1.5 Cable Ducts. Provide 4" secondary multiple conduits per *UFC 3-520-01*. Provide manholes, handholes and pullboxes as required per the UFC, Hill AFB Facility Design Standards and good engineering practice.

14.3.1.6 Burial Depths. For power, the ducts shall be buried with the top of the concrete a minimum of 36 inches below grade, per Hill Air Force Base Facility Design Standard, and 24" minimum depth under roads and pavement as directed per *UFC 3-550-01*. Provide 3" of concrete cover around type EB PVC ducts.

14.3.1.7 Warning Tape. Warning tapes shall be installed directly above the pipe or duct bank. Bury tape 12 inches below finished grade; under pavements and slabs, bury tape 6 inches below top of subgrade All warning tape shall be polyethylene plastic tape with tracer wire, a minimum width of 6 inches, and imprinted with the words "WARNING – POWER CABLE BELOW" for power lines or "WARNING - TELECOMMUNICATION CABLE BELOW" for telecommunication lines at not more than 48 inch intervals to permit easy location of the duct line. Warning tape color shall be as follows: RED for power and ORANGE for telecommunications. Provide and inform Hill AFB personnel of the warning tape color convention.

14.3.1.8 Equipment Grounding. All equipment shall be grounded in accordance with UFC and *NEC* requirements.

14.3.1.9 Conductor Type. All conductors shall be copper.

14.3.2 **Exterior Demolition and Rerouting.** Demolish all electrical components of buildings 1461 and 1460. This includes, but is not limited to, all interior and exterior: feeders, branch circuits, fixtures, receptacles, conduits and raceways, distribution equipment, ground conductors, lightning protection systems, and transformers. Demolish everything up to and including the transformers, except that transformers that feed other buildings to remain shall not be demolished. Loop feed type transformers to be demolished shall have their primary conductors connected so that the loop is not broken. For any high voltage equipment, coordinate with base electrical utility owner, City Light and Power (See "Primary Power" below). Coordinate with user to determine what equipment will be turned over to them.

14.3.2.1 Rerout the existing communications line that feeds existing Building 1462. This includes demolishing the underground cable and conduit, and installing new cable and conduit. See more details on 005 Drawings sheet E-101 and telecommunication requirements in Part 17 of section 01 10 10. Reroute any other underground power and communication lines that interfere with the new MSM building footprints. For any high voltage power lines, coordinate with base electrical utility owner, City Light and Power (See "Primary Power" below). Coordinate with user for any interruptions to communications or power services for this work.

14.3.3 **Primary Power.** The privatized exterior electrical contractor, City Light and Power (CLP or CL&P), is the only authorized company to provide connection to the exterior electrical distribution system. CLP, in accordance with the Air Force Utility

Privatization (UP) contract will be compensated by means of the industry standard referred to as a “connection fee.”

14.3.3.1 CLP will perform the installation of the exterior high voltage electrical components providing the proper connection to the system. In order to accommodate for all load requirements and design challenges, CLP is required to participate in the design meetings of each project involving exterior electrical installation and be the only source for the connection to the system.

14.3.3.2 The Connection fee will consist of the connection to the main power distribution system via the CLP installed transformer, pad, pole, wire and any other associated components required to connect to the electrical high voltage system. Contractor will perform the connections to the secondary side of the transformers which will provide power to the new facilities. See 005 Drawings sheet E-101 for proposed site electrical plan, describing what work City Light and Power will perform, and what work the contractor will perform.

14.3.3.3 Points of Contact. Primary Point of Contact with City Light & Power for this project is the CLP corporate electrical engineer, Mr. Ajay Sitaula at 720-305-0410. Additionally, Mr. Todd Cook is available to discuss locally at 801-660-2255. Mr. Richard Houghton is the Installation Manager for CLP-Hill.

14.3.4 **Transformers.** City Light & Power shall provide 2 new single phase, pad mounted transformers, connected loop-feed type, with copper windings. One transformer will provide secondary power to 3 of the Modular Storage Magazines, and one transformer will provide secondary power to 2 of the Modular Storage Magazines. See 005 Drawings sheet E-101 for proposed locations of new transformers. The secondary power shall be 120/240V single phase, 3-wire. Each transformer is estimated to be 25 kVA. Actual size shall be calculated by Contractor to accommodate all possible electrical loads. Contractor shall coordinate with City Light & Power in determining precise locations and power requirements for the transformers.

14.3.5 **Standby Power.** There is no standby power system to be installed for this project.

14.3.6 **Automatic Transfer Switch (ATS).** Not Applicable to this project.

14.3.7 **Spare Conduits.** Provide a 4” spare conduit for each secondary power conduit, with 1/4-inch nylon pull rope.

14.3.8 **Facility Service Entrance.** The modular storage magazines shall be fed via secondary service conductors from the new transformers, in duct(s) to the service entrance equipment located inside the magazines. The service entrance conductors shall be only copper, and not larger than 500 Kcmil. If the ampacity of the total load exceeds the ampacity of a single wire, then parallel runs of conductors shall be used.

14.3.9 **Lightning Protection.** Design and provide a masted metal pole Lightning Protection system in accordance with the latest *NFPA 780* and *UFC 3-575-01*, and the Hill AFB Facility Design Guide. The system shall protect all of the new modular storage magazines. Do NOT provide the air terminal lighting protection system detailed in the standard design "Modular Storage Magazine Box-type, STD 421-80-08" drawings. The masted metal pole lighting protection system, and the grounding and bonding system shall still meet the requirements specified in the standard design drawings, unless otherwise specified herein. A single ground ring conductor shall encircle the whole site LPS rather than each individual structure. Do not provide air terminals on top of the MSMs. Do not provide bonding conductors on top of the MSMs unless they are bonding metallic objects on top of the MSM, such as the ventilator, to the grounding system.

14.3.9.1 Qualifications The system shall be installed by a certified lightning protection installer who is listed with the National Recognized Testing Laboratory (NRTL) and is actively engaged in the installation of UL Master Labeled lightning protection systems or who is certified by the Lightning Protection Institute (LPI) as a master Installer/designer and be so listed by the Lightning Protection Institute and by Underwriters Laboratories, Inc. For the complete scope of the installation of a lightning protection system the installer shall provide a UL certification stating compliance with AFI 32-1065 *Grounding Systems*, and a UL Master Label. A complete drawing showing connections and initial test results shall be forwarded to the 75th CES Exterior Electrical section. All lightning protection system installations and modifications shall be of copper materials. The exception will be the use of connections with dissimilar metals, and then aluminum may be used. All lightning protection systems will have surge protection at all points where electrical or electronic system conductors enter or exit a facility.

14.3.9.2 Analysis. Contractor shall submit rolling sphere analysis and side-flash calculations to contracting officer for approval.

14.3.10 **Grounding and Bonding.** Provide grounding and bonding bar near the electrical service entrance in each modular storage magazine, with all grounding leads (including communication, grounding electrode, etc.) brought on this bar. This bar will act as a main grounding inspection and testing point for all ground leads. The grounding system shall adhere to the requirements of *IEEE Standard 142* and the overall grounding system shall not exceed a maximum acceptable resistance of 25 ohms between the grounding electrode system and ground.

14.3.11 **Exterior Lighting.** Provide two separate exterior lighting systems at all magazine entrances in accordance with the requirements in *UFC 3-530-01,* and *UFC 4-420-01* paragraph 3-8.3. Luminaires shall be white colored LED. The photocell controlled security lighting shall have a hand-off-auto switch. Pole mounted lighting for the driveways leading to the new Modular Storage Magazines is not required for this project.

14.3.11.1 **Exterior Lighting Levels.** Follow *UFC 4-420-01, UFC 3-530-01* and *IES Lighting Handbook* recommendations for lighting levels of exterior lighting. Where conflicting lighting intensity levels are given between documents, follow the light level specified in the *UFC 4-420-01 first, UFC 3-530-01* second, and then the *IES*

Lighting Handbook third. LED light fixtures shall meet *IESNA LM-79-08* and *IESNA LM-80-08*.

14.3.11.2 **Exterior Lighting Fixtures.** Cutoff fixtures, louvers and/or hoods shall be used to minimize light trespass

14.3.11.3 **Exterior Lighting Coordination.** Coordinate exterior fixtures and lighting with requirements of *UFC 4-420-01* and *UFC 3-530-01*. All exterior fixtures shall be submitted to the Contracting Officer for review and approval.

14.3.11.4 **Controls and Wiring.** Each lighting circuit shall carry its own neutral. Shared neutrals between lighting circuits are not allowed. Provide photoelectric controls for exterior lighting.

14.3.12 **Exterior Receptacles.** Provide exterior duplex receptacles (1 for each magazine), located near the entrance to each magazine. Receptacles shall be GFCI type with “in-use”, weatherproof cover.

14.3.13 **Road Crossings.** Contractor shall provide proper coordination and obtain all necessary permits, approvals, etc., before installing any road crossings. Crossings shall be bored and steel sleeved, or saw-cut, depending on the installation. Saw-cut vs. bore shall be approved by and coordinated with the Contracting Officer. Any saw-cut to an existing roadway and/or pavement shall be restored to original condition by the Contractor.

14.3.14 **Utility Crossings.** Clearances from existing and new utilities (water, gas, sewer, etc.) shall be as specified in *ANSI C2* and the UFCs.

14.3.15 **Underground Splices.** Underground connections or splices shall not be permitted in primary or secondary conductors.

14.3.16 **Cathodic Protection.** Per Hill AFB Facility Design Standard, paragraph 12.1 Cathodic Protection, new construction shall comply with *UFC 3-570-02A*, *UFC 3-570-02N*, and *UFC 3-570-06*. At a minimum, provide any ferrous material that comes into contact with the earth with cathodic protection.

14.3.16.1 Cathodic Protection Qualifications: Obtain the services of a "corrosion expert" to supervise, inspect, and test the installation and performance of the cathodic protection system. Corrosion Expert must be accredited or certified by the National Association of Corrosion Engineers (NACE) as a NACE Accredited Corrosion Specialist or a NACE certified Cathodic Protection (CP) Specialist or be a registered professional engineer who has certification or licensing that includes education and experience in corrosion control of buried or submerged metallic piping and tank systems, if such certification or licensing includes 5 years experience in corrosion control on underground metallic surfaces of the type under this contract. Submit evidence of qualifications of the "corrosion expert". The "corrosion expert" shall make at least 3 visits to the project site.

14. 4 **INTERIOR ELECTRICAL.**

14.4.1 **General.** Design, furnish, install, and test a complete new interior electrical system. Provide power and controls for all new equipment and coordinate installation with the User. Restore power to any accidentally disconnected equipment. Some equipment will be provided by the Government. For Government provided equipment, Contractor shall be responsible for matching power, voltage, and receptacle type required for proper operation. Coordinate all Government-furnished, Contractor-installed equipment prior to any rough-ins.

14.4.1.1 **Hazard Classification.** Reference UFC 4-420-01 paragraph 2-5: Since these ordinance storage magazines only store “DoD-titled ammunition and explosives” (AE) in its original packaging, the interior spaces of the Modular Storage Magazines are NOT considered as hazardous (classified) locations as defined in NFPA 70 articles 500 through 506. The hazardous classifications defined in NFPA 70 article 500 refer to explosive and flammable atmospheres, where combustible dust, fibers, gas, or vapors may be present. Since these areas are not considered hazardous locations, explosionproof enclosures for equipment is not required.

14.4.2 **Protective Coordination.** Overcurrent and fault protection devices shall be coordinated with line-side and load-side fuses or circuit breakers to isolate any electrical fault or overload from the rest of the system. Some breaker sizes may not coordinate under some fault conditions. Good engineering practices shall be used and devices shall coordinate for all overload conditions. No series rated protective equipment shall be used.

14.4.3 **Electric Power Metering.** Provide an AMR compatible watt-hour electrical meter on each new MSM. Contractor shall be responsible for connecting the meters to the EMCS, located in Building 593. All communication connections will be made by the Contractor to include all wiring, conduit, radios, and/or antennae required to support transmission of data to the EMCS server interface. Meters shall meet the requirements of *UFC 1-200-02*, paragraph 2-3.4, the *Hill AFB Facility Design Standard*, section 6.5, *UFGS 26 27 13.10 30, Electric Meters*, the *EPACT 2005* requirements for advanced metering, *DODI 4170.11*, and the *DOD Utilities Meter Policy*.

14.4.4 **Service Entrance.**

14.4.4.1 **Service and Distribution Equipment.** Facility service entrance equipment shall be service rated, sized per load calculations per the UFCs and *NEC*.

14.4.4.1.1 Interior building distribution voltage shall be 120/240 volt, single phase, 3-wire. Voltage drop shall be limited to 5 percent per the *NEC* (combined voltage drop on both feeders and branch circuits to the furthest outlet of power, heating, and lighting loads shall be 5% or less). All circuit breakers shall be 100% rated. All electrical equipment buses shall be copper. Provide 20% spare capacity in the panelboards. To reduce voltage drop, cable length between panel and load shall be kept to a minimum. Provide a voltage drop calculation for each branch circuit over 100ft.

14.4.5 **Panelboard Feeders.** Size of panelboard feeders, panelboards, and main circuit breakers (in the panelboard) shall be calculated per *NEC* and UFCs to ensure proper device coordination. Provide for a minimum of 20% spare capacity.

14.4.6 **Panelboards.** Provide a NEMA 3S rated distribution panel on the exterior headwall of each igloo, located near the entrance. Coordinate precise location with the user. Per *UFC 4-420-01*, paragraph 3-8.2, electrical control equipment shall be located 48 inches above the floor. Distribution and branch circuit panels shall be fully rated for the available fault current, and furnished with a main circuit breaker. Provide panels with full-sized, bolt-on, branch breakers, copper main busses, insulated copper neutral bus and bonded equipment grounding bus. Provide a minimum of 10% spare circuit breakers and 10% space for future use in each panel. The Contractor shall provide and install printed panel labels with descriptive names for all installed circuits and electronic copies of the labels for future modification.

14.4.7 **Grounding Systems.** Provide new grounding system for the new electrical service per the UFCs and *NEC*. Provide separate grounding systems for both the electrical and telecommunication systems per the UFC (both electrical and telecommunications) and *NEC* Article 250. However both grounding systems shall be brought to a common Master Ground Bar located near the service entrance. This master ground shall be a wall mounted copper bar. Master ground bar is optimum way of meeting the intents of Article 250 of *NEC*, both for verification and measurement purposes.

14.4.8 **Conduits and Conductors.** Wiring shall consist of 600-volt insulated single conductors type THWN, THHN, or THW conforming to UL 83, installed in raceways consisting of galvanized steel rigid metal conduit (RMC), per UFC 4-420-01, paragraph 3-8.2. Insulation type shall be suitable for the application according to the *NEC*. Use of Metal Clad (MC), Armored Cable (AC), Non-Metallic Sheathed Cables (NMC), and Electrical Non-Metallic Tubing (ENT) are prohibited. All conductors shall be copper. The minimum branch-circuit conductor size shall be No. 12 American Wire Gauge (AWG). Number of current-carrying conductors per conduit shall be 6 maximum. Provide each single 20 amp branch circuit for either lighting or convenience receptacles with a dedicated neutral conductor. Shared neutrals are not allowed on this project. Class 1 remote control and signal circuit conductors shall be not less than No. 14 AWG. Class 2 remote control and signal circuit conductors shall be not less than No. 16 AWG. Class 3 low-energy, circuit conductors shall be not less than No. 22 AWG.

14.4.8.1 Routing of raceways and cables shall be parallel or perpendicular to walls and ceilings. Conduit couplings and fittings shall be threaded type. Fire-stop any cable or raceway penetrations through rated wall assemblies to maintain fire resistance ratings. Provide labels identifying the manufacturer of the fire-stopping system and date of installation next to each location. Raceways shall be concealed within finished walls, suspended ceilings, and floors. Raceways crossing structural expansion joints or seismic joints or wall foundations shall be provided with suitable expansion fittings on both sides or other suitable means to compensate for the building expansion and contraction. The minimum conduit size for power to equipment shall be ¾" (20 mm). The minimum conduit size for telecommunications cabling systems shall be 1-inch (27 mm). Conduit can be ½", as a minimum size, for lighting and receptacle circuits such as 2#12 with 1#12 ground conductors feeding a receptacle or a light.

14.4.8.2 **Wiring Temperature Rating.** Where wiring is connected to devices rated at 100 amperes or less, utilize the ampacity limit listed for 60 degrees C wire in allowable

ampacity table 310-15(B)(16) in the *NEC* whether or not the wire is rated at a higher temperature. Where wiring is connected to devices rated over 100 amperes, utilize the ampacity limit listed for 75 degrees C wire in allowable ampacity table 310-15(b)(16) in the *NEC* whether or not the wire is rated at a higher temperature.

14.4.9 **Conduit Stub-Ups.** Where conduits are to be stubbed up through concrete floors, a short sweep shall be installed below grade to transition from the horizontal run of conduit to a vertical run. A conduit coupling fitting, threaded on the inside shall be installed, to allow terminating the conduit flush with the finished floor. Wiring shall be extended in rigid threaded conduit (RGS) only, to equipment. Empty or spare conduit stub-ups shall be plugged flush with the finished floor with a threaded, recessed plug.

14.4.9.1 **Below Slab-On-Grade or in the Ground.** Electrical wiring below slab-on-grade or in the ground shall be protected by a conduit system. Conduit passing vertically through slabs-on-grade shall be PVC-RGS (factory coated). Conduits installed below slab-on-grade or in the earth shall be PVC-RGS (factory coated). At changes in direction provide PVC-RGS (factory coated) elbows.

14.4.9.2 **Installing Conduit in Slabs Including Slabs on Grade.** Horizontal installation of conduits in slabs is not allowed.

14.4.9.3 **Conduit Supports.** Except where otherwise permitted by *NFPA 70*, conduits shall be securely and rigidly fastened in place at intervals of not more than 10 feet and within 3 feet of boxes, cabinets, and fittings, with approved pipe straps, wall brackets, conduit clamps, conduit hangars, threaded C-clamps, beam clamps or ceiling trapeze. Loads and supports shall be coordinated with supporting structure to prevent damage or deformation to the structure. Loads shall not be applied to joist bridging. Attachment shall be by wood screw-type nails to wood; by toggle bolts on hollow masonry units; by expansion bolts on concrete or brick; by machine screws, welded threaded studs, heat-treated or spring-steel-tension clamps on steel work. Nail-type nylon anchors or threaded studs driven in by a powder charge and provided with lock washers and nuts may be used in lieu of expansion bolts or machine screws. Raceways or pipe straps shall not be welded to steel structures. Cutting the main reinforcing bars in reinforced concrete beams or joists shall be avoided when drilling holes for support anchors. Holes drilled for support anchors, but not used, shall be filled. In partitions of light steel construction, sheet-metal screws may be used. Raceways shall not be supported using wire or nylon ties. Raceways shall be independently supported from the structure. Upper raceways shall not be used as a means of support for lower raceways. Supporting means will not be shared between electrical raceways and ceiling grids. Except where permitted by *NFPA 70*, wiring shall not be supported by ceiling support systems. Conduits shall be fastened to sheet-metal boxes and cabinets with two locknuts where required by *NFPA 70*, where insulating bushings are used, and where bushings cannot be brought into firm contact with the box; otherwise, a single locknut and bushing may be used. Thread-less fittings for electrical metallic tubing shall be of a type approved for the conditions encountered. Additional support for horizontal runs is not required when EMT rests on steel stud cutouts.

14.4.10 **Branch Circuits, Receptacles and Outlets.** All general receptacle and lighting circuits shall be 20-ampere circuits, minimum, fed by 20-ampere circuit breakers,

minimum. Provide dedicated branch circuits required by this RFP, the UFCs and the *NEC*.

14.4.10.1 **Separate Circuits.** Lighting and receptacles shall be on separate branch circuits.

14.4.10.2 **Receptacles.** Provide two receptacles for each MSM: one for the interior near the door, and one for the exterior near the door. All receptacles shall be GFCI protected. Receptacles shall be provided in accordance with UFCs. All receptacles shall have a label on device plate with circuit and panel designations. Per *UFC 4-420-01*, paragraph 3-8.2, receptacles shall be located 48 inches above finished floor.

14.4.11 **Surge Protection.** The facility power supply system shall include a complete surge protection system. The system shall consist of surge protection devices installed in Distribution panels as per *UFC 3-520-01*. See also requirements for building entrance terminals under “Telecommunications Design.”

14.4.12 **Grounding.** Provide a separate, green, insulated ground conductor for all branch circuits or feeders. Connect ground wire to ground bus in panel, outlet box, and grounding terminal on outlet.

14.4.13 **Interior Lighting.** Provide lighting in the interior of the MSMs. The lighting design shall meet the requirements of *UFC 3-530-01*, *UFC 4-420-01*, and these specifications. The fixture types and specifics spelled out in this RFP are to be interpreted as taking precedence over fixtures called out in *UFC 4-420-01*. The color temperature of lamps shall be 3500K and have a CRI of 86 or better.

14.4.13.1 **Light Fixture Quality.** All light fixtures and their components shall be "specification-grade” or better, painted after fabrication.

14.4.13.2 **Lighting Illumination Levels.** Lighting for the interior of the Modular Storage Magazines shall be designed to follow specifications of UFC 4-420-01, ANSI/ASHRAE/IESNA Standard 90.1 2013, UFC 3-530-01 and the *IES Lighting Handbook*. Use good engineering practice. The average horizontal illumination level shall not be less than 30 footcandles. Where conflicting lighting intensity levels are given between documents, follow the light level specified in the UFC 4-420-01 first, ANSHRAE 90.1 second, *UFC 3-530-01* third, and then the light level specified in the *IES Lighting Handbook* fourth. Provide detailed lighting calculations with average foot-candle levels. LED light fixtures shall meet *IESNA LM-79-08* and *IESNA LM-80-08*.

14.4.13.3 **Fixture Installation.** Center-mount the luminaires between ceiling panel ribs, in the cavities, to minimize penetratrion below the ceiling panel ribs. Do not recess the luminaires so far as to impede access to the luminaires for maintenance, or obstruct the horizontal distribution of light. Attempt to install the luminaires flush with the rib cavity. Coordinate with contracting officer before installing luminaires. Provide the initial installation of lamps throughout, so that at the date of formal acceptance of the work, all fixtures and lamps are functional.

14.4.13.4 **Fixture Selection Considerations.** The fixtures selected shall be LED luminaires, and rated for damp locations. They shall meet requirements as stated in this RFP and the UFCs. Lighting fixtures shall not be provided with receptacles.

14.4.13.5 **Exit and Emergency Lighting.** Exit and emergency lighting is not required for this project

14.4.13.6 **Lighting Circuiting Requirements.** Lighting circuits shall not be loaded above 12 amps. This is to allow for future modifications/additions while staying under 16 amp maximum branch circuit continuous lighting loading. Each circuit shall have its own neutral. No shared neutrals shall be used.

14.4.13.7 **Light Fixture Sources.** Provide labeling on each fixture with lamp type, wattage, manufacturers name, mailing address and phone number for obtaining of replacement parts.

14.4.13.8 **Lighting Control.** Control switches or manual overrides for MSM lighting shall be located at room entrances for all MSMs. Each MSM shall be individually switched. Per *UFC 4-420-01*, paragraph 3-8.2, electrical control equipment shall be located 48 inches above finished floor.

14.4.13.8.1 **Occupancy Sensors.** Provide manual on, vacancy off occupancy sensor lighting controls in each MSM, per UFC 4-420-01 paragraph 3-8.4.

14.4.14 **Seismic Considerations.** Provide seismic bracing or restraints for electrical equipment (transformers, lighting fixtures, etc.) in accordance with the requirements of this RFP and *TI 809-04*, and per specification Section 26 05 48.00 10, Seismic Protection for Electrical Equipment. Seismic drawings and calculations shall be stamped and signed by a Registered Professional Structural Engineer.

14.4.15 **Device Body and Coverplate Colors and Labeling.** Device bodies and coverplates for wall switches and power and communications outlets shall be steel. All devices in the same room shall be the same color, unless otherwise noted or required. Label all junction boxes showing all the panel and circuit numbers for conductors contained in junction box. Use a printed label.

14.4.16 **Bonding.** All metallic conductive parts including steel structures, utility ducts and electrical conduits shall be bonded at separation joints throughout the length of the system to assure grounding continuity and safety of personnel from accidental contact. All external metallic penetrations such as electrical conduits, ducting and steam lines shall be bonded to the building grounding system.

14.4.17 **Fire Alarm.** Not required.

15 FIRE ALARM AND MASS NOTIFICATION SYSTEMS

15.1 **GENERAL.** Per *UFC 4-420-01*, paragraphs 3-6.4 and 3-6.5, Fire alarm systems and mass notification systems are not required for AE storage facilities.

16 BUILDING SECURITY SYSTEM

16.1 **GENERAL.** Coordinate all security system design and installation with the Hill AFB alarm shop. See “Consultation” below.

16.2 **CLOSED CIRCUIT TELEVISION SYSTEM (CCTV).** There is no closed circuit television system (CCTV) in this project.

16.3 **INTRUSION DETECTION SYSTEM (IDS).** Provide an Intrusion Detection System (IDS) in accordance with the sufficient levels of protection specified in AFI 31-101 and AFI 31-601. Design the system in accordance with the Hill AFB Facility Design Standard, and coordinate with Hill AFB alarm shop. Final CAD drawings must be approved by both the Hill AFB Alarm Shop and Security Forces. The IDS must be compatible with the existing Hill AFB alarm system, which is a Honeywell/Vindicator V5 w/TDEA. Coordinate with Hill AFB Alarm Shop for sole source selection. Contractor shall install all conduit, wiring, and devices for the Intrusion Detection System. The Hill AFB Alarm shop will make final connections to the system, and program the system. Install the IDS panels on the interior walls of each modular storage magazine, located near the entrance.

16.3.1 **CERTIFICATION.** The Intrusion Detection System must be installed by a Honeywell/Vindicator Certified installer. Contractor must provide Hill AFB alarm shop with Honeywell/Vindicator Certification for approval.

16.3.2 **COMPONENTS.** Coordinate with Hill AFB Alarm Shop for specific components for the intrusion detection system. Some of the components may include, but are not limited to, magnetic door contacts, 360 degree PIR motion sensor, keypad, Ethernet extenders, and IDS control system. See also Attachment 15, listing the sole source components (including part numbers) required for each intrusion detection system. IDS panel shall be lockable and large enough to contain all required items, or 24” by 36”, whichever is larger.

16.3.3 **CONSULTATION.** Contractor shall consult the following offices for the requirements of the IDS: 75th CES electric/Electronic Shop; 75th ABW/IP; and 75 SFS/S4E. POC is Dan Jensen (801-940-2981). All IDS system requirements must have a letter of authorization on file.

16.4 **ELECTRONIC ACCESS CONTROL SYSTEM (ACS)**. There is no requirement for an Access Control System.

17. TELECOMMUNICATIONS DESIGN

17.1 **REFERENCES.** See Section 4.14.

17.2 **COMMUNICATIONS SYSTEMS ENGINEERING.** Communications Systems Engineering and Design shall be performed by a BICSI Registered Communications Distribution Designer (RCDD). The shop drawings shall be Stamped and Signed by the RCDD certifying compliance with the applicable EIA/TIA standards as required.

17.2.1 The RCDD shall design the Building Telecommunication Cabling System (BTCS) for this facility. The designed system shall be a Certified Structured Cabling System with a minimum of 15 years of product, application, and performance assurance warranty.

17.2.2 The telecommunications work includes installation of an external phone line for all 5 of the new MSMs to share, individual telecommunication lines for the IDS at each MSM, and connection of all required meters to the EMCS located in Building 593. No work shall disconnect or hinder any existing communication lines to remain in the area.

17.3 **TELEPHONE AND DATA SYSTEM.** Provide *EIA/TIA-568B* Category 6 type (8p8c) telephone and data modular jack assemblies outside each MSM door for connection to a phone/vindicator. The jack assembly shall be rated for outdoor use. All exterior phone/vindicator jacks shall share the same communication line. Connect individual 4-pair lines to each intrusion detection system located inside each MSM, next to the communications panel. The system shall be installed in accordance with EIA/TIA criteria as a complete system, including raceway, conduit cable, and connection and termination devices.

17.4 **TELECOMMUNICATIONS SERVICE.** Provide new telecommunication service for the MSMs. See 005 Drawings sheet E-101 for proposed layout.

17.4.1 **Point of Connection.** New 50 pair copper communication line shall be spliced to existing communication line (Cable 20, 301-350) at existing manhole MH17013-01. Run two each 4” PVC conduits with 4 each vacant fiber innerduct from MH17013 north along Hawthorne Ave to new 4’x4’ handhole located near the north-most new MSM. Provide 3 new buried distribution line pedestals located between the new MSMs, such that each new MSM is adjacent to one pedestal. Run a 4” PVC conduit with 3 each vacant fiber innerduct from the new pedestals to the new handhole or existing manhole as appropriate. Provide a ground rod at each pedestal, and bond the pedestal, terminals, and cable shields to it. At each pedestal, install a 25 pair protected terminal, and splice the cables using 3M-710 splice connectors. Connect each MSM communications service entrance to the nearest pedestal with adequate conduit and copper for phone line (4 pair shared among all 5 MSMs), and intrusion detection system (4 pair unique for each MSM).

17.4.1.1 **Service Entrance and Surge Protection.** Provide an external pedestal with a building entrance terminal at all communications entrances to the MSMs. Provide another building entrance terminal inside the MSMs, which will then connect to the punch-down block inside the communications cabinet.

17.4.1.2 **Demolition and Rerouting.** Reroute the communications service for existing Building 1462, which runs through the new MSM footprint. Demolish the underground cable and conduit for this line that lies within the project boundaries. Connect a new 4" PVC conduit with new cable from the new 4'x4' handhole to the existing building 1462 communications service entrance.

17.4.2 **Communications Conduit and Outlet Boxes.** All communications conduits shall comply with *NFPA 70* guidelines for bends and fill ratios. Outlet boxes will be 4-11/16" sq x 2-1/2" deep with a single gang reducing ring. Outdoor outlet boxes for the phone/vindicator must be rated for outdoor use.

17.4.3 **Communications Cabinets.** Provide dedicated separate cabinets for telecommunications equipment and the intrusion detection system in each MSM. Cabinets shall be large enough to fit all required communications equipment.

17.4.4 **Data Transmission Tests.** The Contractor shall notify the Contracting Officer a minimum of 21 days before the acceptance tests are to be conducted. The Category 6 data transmission system shall be tested to confirm that each Category 6 telephone & data cable & outlet will transmit data at an acceptable level for the application. Coordinate with base alarm shop for minimum testing requirements. Contractor shall provide all necessary test equipment required to properly test the telephone & data cables & outlets.

17.4.5 **Copper Cable Entrance & Building Distribution Cable Tests.** Cable tests shall be performed with all cables in place. A Cable Status Certificate form shall be used to document cable tests. Testing shall be performed in accordance with *RUS Bulletin 1753F-201 (PC-4)* Standard for Acceptance Tests and Measurements of Telecommunications Plant and *TIA/EIA-568C* for attenuation, capacitance, and near-end crosstalk. All defective pairs, except those noted by the manufacturer in accordance with the applicable cable specifications, shall be repaired or replaced by the Contractor.

17.4.6 **Contractor Submittals.** The Contractor shall provide a complete shop drawing set including, but not limited to, the system's riser diagram, equipment and device layout, and sequence of operations.

17.5 **METER CONNECTIONS.** Contractor shall be responsible for connecting all required utility meters to the EMCS located in Building 593, per the *Hill AFB Facility Design Standard*, section 6.5, Meters. All communication connections shall be made by the Contractor to include all wiring, conduit, radios, and/or antennae required to support transmission of data to the EMCS server interface.

17.6 **TESTING AND COMMISSIONING.** Test each system and subsystem in the presence of Contracting Officer and/or his designated Representative.

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SECTION 01 32 01

PROJECT SCHEDULE
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PART 1 GENERAL

1.1 REFERENCES

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

AACE INTERNATIONAL (AACE)

AACE 29R-03	(2011) Forensic Schedule Analysis
AACE 52R-06	(2006) Time Impact Analysis - As Applied in Construction

U.S. ARMY CORPS OF ENGINEERS (USACE)

ER 1-1-11	(1995) Administration -- Progress, Schedules, and Network Analysis Systems

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Preliminary Project Schedule; G

Initial Project Schedule; G

1.3 PROJECT SCHEDULER QUALIFICATIONS

Designate an authorized representative to be responsible for the preparation of the schedule and all required updating and production of reports. The authorized representative must have a minimum of 2-years experience scheduling construction projects similar in size and nature to this project with scheduling software that meets the requirements of this specification. Representative must have a comprehensive knowledge of CPM scheduling principles and application.

PART 2 PRODUCTS

2.1 SOFTWARE

The scheduling software utilized to produce and update the schedules required herein must be capable of meeting all requirements of this specification.

2.1.1 Government Default Software

The Government intends to use Primavera P6.

2.1.2 Contractor Software

Scheduling software used by the contractor must be commercially available from the software vendor for purchase with vendor software support agreements available. The software routine used to create the required sdef file must be created and supported by the software manufacturer.

2.1.2.1 Primavera

If Primavera P6 is selected for use, provide the "xer" export file in a version of P6 importable by the Government system.

2.1.2.2 Other Than Primavera

If the contractor chooses software other than Primavera P6, that is compliant with this specification, provide for the Government's use two licenses, two computers, and training for two Government employees in the use of the software. These computers will be stand-alone and not connected to Government network. Computers and licenses will be returned at project completion.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Prepare for approval a Project Schedule, as specified herein, pursuant to FAR Clause 52.236-15, SCHEDULE FOR CONSTRUCTION CONTRACTS. Show in the schedule the proposed sequence to perform the work and dates contemplated for starting and completing all schedule activities. The scheduling of the entire project is required. The scheduling of design and construction is the responsibility of the Contractor. Contractor management personnel must actively participate in its development. Designers, subcontractors and suppliers working on the project must also contribute in developing and maintaining an accurate Project Schedule. Provide a schedule that is a forward planning as well as a project monitoring tool. Use the Critical Path Method (CPM) of network calculation to generate all Project Schedules. Prepare each Project Schedule using the Precedence Diagram Method (PDM).

3.1.1 Schedule Status Reports

Provide a Schedule Status Report on at least a monthly basis. If, in the opinion of the Contracting Officer, the Contractor falls behind the approved schedule, take steps necessary to improve its progress including those that may be required by the Contracting Officer, without additional cost to the Government. In this circumstance, the Contracting Officer may require the Contractor to increase the number of shifts, overtime operations, days of work, and/or the amount of construction plant, and to submit for approval any supplementary schedule or schedules as the Contracting Officer deems necessary to demonstrate how the approved rate of progress will be regained.

3.1.2 Default Terms

Failure of the Contractor to comply with the requirements of the Contracting Officer must be grounds for a determination, by the Contracting Officer, that the Contractor is not prosecuting the work with sufficient diligence to ensure completion within the time specified in the contract. Upon making this determination, the Contracting Officer may terminate the Contractor's right to proceed with the work, or any separable part of it, in accordance with the default terms of the contract.

3.2 BASIS FOR PAYMENT AND COST LOADING

The approved Project Schedule is the basis for determining contract earnings during each update period and therefore the amount of each progress payment. The aggregate value of all activities coded to a contract CLIN must equal the value of the CLIN.

3.2.1 Activity Cost Loading

Activity cost loading must be reasonable and without front-end loading. Provide additional documentation to demonstrate reasonableness if requested by the Contracting Officer.

3.2.2 Withholdings / Payment Rejection

Failure to meet the requirements of this specification may result in the disapproval of the preliminary, initial or periodic schedule updates and subsequent rejection of payment requests until compliance is met.

In the event that the Contracting Officer directs schedule revisions and those revisions have not been included in subsequent Project Schedule revisions or updates, the Contracting Officer may withhold 10 percent of pay request amount from each payment period until such revisions to the project schedule have been made.

3.3 PROJECT SCHEDULE DETAILED REQUIREMENTS

3.3.1 Level of Detail Required

Develop the Project Schedule to the appropriate level of detail to address major milestones and to allow for satisfactory project planning and execution. Failure to develop the Project Schedule to an appropriate level of detail will result in its disapproval. The Contracting Officer will consider, but is not limited to, the following characteristics and requirements to determine appropriate level of detail:

3.3.2 Activity Durations

Reasonable activity durations are those that allow the progress of ongoing activities to be accurately determined between update periods. Less than 2 percent of all non-procurement activities shall have Original Durations (OD) greater than 20 work days or 30 calendar days.

3.3.3 Design and Permit Activities

Include design and permit activities with the necessary conferences and follow-up actions and design package submission dates. Include the design schedule in the project schedule, showing the sequence of events involved in carrying out the project design tasks within the specific contract

period. Provide at a detailed level of scheduling sufficient to identify all major design tasks, including those that control the flow of work. Also include review and correction periods associated with each item.

3.3.4 Procurement Activities

Include activities associated with the critical submittals and their approvals, procurement, fabrication, and delivery of long lead materials, equipment, fabricated assemblies, and supplies. Long lead procurement activities are those with an anticipated procurement sequence of over 90 calendar days.

3.3.5 Mandatory Tasks

Include the following activities/tasks in the initial project schedule and all updates.

a. Submission, review and acceptance of SD-01 Preconstruction Submittals (individual activity for each).

b. Submission, review and acceptance of design packages.

c. Submission of mechanical/electrical/information systems layout drawings.

d. Long procurement activities

e. Submission and approval of O & M manuals.

f. Submission and approval of as-built drawings.

g. Submission and approval of DD1354 data and installed equipment lists.

h. Submission and approval of testing and air balance (TAB).

i. Submission of TAB specialist design review report.

j. Submission and approval of fire protection specialist.

k. Submission and approval of Building Commissioning Plan, test data, and reports: Develop the schedule logic associated with testing and commissioning of mechanical systems to a level of detail consistent with the contract commissioning requirements. All tasks associated with all building testing and commissioning will be completed prior to submission of building commissioning report and subsequent contract completion.

l. Air and water balancing.

m. Building commissioning - Functional Performance Testing.

n. Controls testing plan submission.

o. Controls testing.

p. Performance Verification testing.

q. Other systems testing, if required.

r. Contractor's pre-final inspection.

s. Correction of punch list from Contractor's pre-final inspection.

t. Government's pre-final inspection.

u. Correction of punch list from Government's pre-final inspection.

v. Final inspection.

3.3.6 Government Activities

Show Government and other agency activities that could impact progress. These activities include, but are not limited to: acceptance, design reviews, environmental permit approvals by State regulators, inspections, utility tie-in, Government Furnished Equipment (GFE) and Notice to Proceed (NTP) for phasing requirements. Show Government approval of shop drawings activities with at least the minimum duration allowed by the contract. Failure to provide reasonable durations in the schedule for Government activities does not establish or change the Government's review or approval path periods and the durations established for Government's activities are subject to approval by the Contracting Officer.

Allow 30 calendar days total duration prior to current contract completion date for the following activities:

a. Submission of Contractor Quality Control (CQC) for all mechanical/electrical/information systems tests.

b. Government QA for all mechanical systems acceptance/operational tests.

c. Government QA for all electrical systems acceptance/operational tests.

d. CQC completion inspection of the entire project.

e. Contractor works off CQC punchlist.

f. Prefinal inspection performed when the facility is completed such that it can be used for it intended function, as determined by the Contracting Officer.

g. Contractor works off prefinal punchlist.

h. Final/acceptance inspection of the entire project.

i. Contractor works off final punchlist.

3.3.7 Standard Activity Coding Dictionary

Use the activity coding structure defined in the Standard Data Exchange Format (SDEF) in ER 1-1-11. This exact structure is mandatory. All Activity Codes shall be developed and assigned to activities as detailed herein. A template SDEF compatible schedule backup file is available on the QCS web site: http://rms.usace.army.mil.

The SDEF format is as follows:

Field	Activity Code	Length	Description
1	WRKP	3	Workers per day
2	RESP	4	Responsible party
3	AREA	4	Area of work
4	MODF	6	Modification Number
5	BIDI	6	Bid Item (CLIN)
6	PHAS	2	Phase of work
7	CATW	1	Category of work
8	FOW	20	Feature of work*

*Some systems require that FEATURE OF WORK values be placed in several activity code fields. The notation shown is for Primavera P6. Refer to the specific software guidelines with respect to the FEATURE OF WORK field requirements.

3.3.7.1 Workers Per Day (WRKP)

Assign Workers per Day for all field construction or direct work activities, if directed by the Contracting Officer. Workers per day shall be the average number of workers expected each day to perform a task for the duration of that activity.

3.3.7.2 Responsible Party Coding (RESP)

Assign responsibility code for all activities to the Prime Contractor, Subcontractor(s) or Government agency(ies) responsible for performing the activity.

a. Activities coded with a Government Responsibility code include, but are not limited to: Government approvals, Government design reviews, environmental permit approvals by State regulators, Government Furnished Property/Equipment (GFP) and Notice to Proceed (NTP) for phasing requirements.

b. Activities cannot have more than one Responsibility Code. Examples of acceptable activity code values are: DOR (for the designer of record); ELEC (for the electrical subcontractor); MECH (for the mechanical subcontractor); and GOVT (for USACE).

3.3.7.3 Area of Work Coding (AREA)

Assign Work Area code to activities based upon the work area in which the activity occurs. Define work areas based on resource constraints or space constraints that would preclude a resource, such as a particular trade or craft work crew from working in more than one work area at a time due to restraints on resources or space. Examples of Work Area Coding include different areas within a floor of a building, different floors within a

building, and different buildings within a complex of buildings. Activities cannot have more than one Work Area Code.

Not all activities are required to be Work Area coded. A lack of Work Area coding indicates the activity is not resource or space constrained.

3.3.7.4 Modification Number (MODF)

Assign a Modification Number Code to any activity or sequence of activities added to the schedule as a result of a Contract Modification, when approved by Contracting Officer. Key all Code values to the Government's modification numbering system. An activity can have only one Modification Number Code.

3.3.7.5 Bid Item Coding (BIDI)

Assign a Bid Item Code to all activities using the Contract Line Item Schedule (CLIN) to which the activity belongs, even when an activity is not cost loaded. An activity can have only one BIDI Code.

3.3.7.6 Phase of Work Coding (PHAS)

Assign Phase of Work Code to all activities. Examples of phase of work are design phase, procurement phase, and construction phase. Each activity can have only one Phase of Work code.

a. Code proposed fast track design and construction phases proposed to allow filtering and organizing the schedule by fast track design and construction packages.

b. If the contract specifies phasing with separately defined performance periods, identify a Phase Code to allow filtering and organizing the schedule accordingly.

3.3.7.7 Category of Work Coding (CATW)

Assign a Category of Work Code to all activities. Category of Work Codes include, but are not limited to design, design submittal, design reviews, review conferences, permits, construction submittals, procurement, fabrication, weather sensitive installation, non-weather sensitive installation, start-up, and testing activities. Each activity can have no more than one Category of Work Code.

3.3.7.8 Feature of Work Coding (FOW)

Assign a Feature of Work Code to appropriate activities based on the Definable Feature of Work to which the activity belongs based on the approved QC plan.

Definable Feature of Work is defined in Section 01 45 00 QUALITY CONTROL. An activity can have only one Feature of Work Code.

3.3.8 Contract Milestones and Constraints

Milestone activities are to be used for significant project events including, but not limited to, project phasing, project start and end activities, or interim completion dates. The use of artificial float constraints such as "zero free float" or "zero total float" are prohibited.

Mandatory constraints that ignore or effect network logic are prohibited. No constrained dates are allowed in the schedule other than those specified herein. Submit additional constraints to the Contracting Officer for approval on a case by case basis.

3.3.8.1 Project Start Date Milestone and Constraint

The first activity in the project schedule must be a start milestone titled "NTP Executed," which must have a "Start On" constraint date equal to the date that the NTP is executed by the Contracting Officer.

3.3.8.2 End Project Finish Milestone and Constraint

The last activity in the schedule shall be a finish milestone titled "End Project."

The project schedule must be constrained to the Contract Completion Date in such a way that if the schedule calculates an early finish, then the float calculation for "End Project" milestone reflects positive float on the longest path. If the project schedule calculates a late finish, then the "End Project" milestone float calculation reflects negative float on the longest path. The Government is under no obligation to accelerate Government activities to support a Contractor's early completion.

3.3.8.3 Interim Completion Dates and Constraints

Constrain contractually specified interim completion dates to show negative float when the calculated late finish date of the last activity in that phase is later than the specified interim completion date.

3.3.8.3.1 Start Phase

Use a start milestone as the first activity for a project phase. The start milestone shall be called "Start Phase X" where "X" refers to the phase of work.

3.3.8.3.2 Design phase

See Section 01 33 16 Design After Award for all design phase.

3.3.8.3.3 End Phase

Use a finish milestone as the last activity for a project phase. Call the finish milestone "End Phase X" where "X" refers to the phase of work.

3.3.9 Calendars

Schedule activities on a Calendar to which the activity logically belongs. Develop calendars to accommodate any contract defined work period such as a 7-day calendar for Government Acceptance activities, concrete cure times, etc. Develop the default Calendar to match the physical work plan with non-work periods identified including weekends and holidays. Develop seasonal Calendar(s) and assign to seasonally affected activities as applicable.

If an activity is weather sensitive it should be assigned to a calendar showing non-work days on a monthly basis, with the non-work days selected at random across the weeks of the calendar, using the anticipated days provided in the contract clause TIME EXTENSIONS FOR UNUSUALLY SEVERE

WEATHER. The assignment of the non-work days should be over a seven-day week since weather records are compiled on seven-day weeks, which will cause some of the weather related non-work days to fall on weekends.

3.3.10 Open Ended Logic

Only two open ended activities are allowed: the first activity "NTP executed" must have no predecessor logic, and the last activity -"End Project" must have no successor logic.

Predecessor open ended logic may be allowed in a time impact analyses upon the Contracting Officer's approval.

3.3.11 Default Progress Data Disallowed

Actual Start and Finish dates must not automatically update with default mechanisms included in the scheduling software. Updating of the percent complete and the remaining duration of any activity must be independent functions. Disable program features that calculate one of these parameters from the other. Activity Actual Start (AS) and Actual Finish (AF) dates assigned during the updating process must match those dates provided in the Contractor Quality Control Reports. Failure to document the AS and AF dates in the Daily Quality Control report will result in disapproval of the Contractor's schedule.

3.3.12 Out-of-Sequence Progress

Activities that have progressed before all preceding logic has been satisfied (Out-of-Sequence Progress) will be allowed only on a case-by-case basis subject to approval by the Contracting Officer. Propose logic corrections to eliminate out of sequence progress or justify not changing the sequencing for approval prior to submitting an updated project schedule. Address out of sequence progress or logic changes in the Narrative Report and in the periodic schedule update meetings.

3.3.13 Added and Deleted Activities

Do not delete activities from the project schedule or add new activities to the schedule without approval from the Contracting Officer. Activity ID and description changes are considered new activities and cannot be changed without Contracting Officer approval.

3.3.14 Original Durations

Activity Original Durations (OD) must be reasonable to perform the work item. OD changes are prohibited unless justification is provided and approved by the Contracting Officer.

3.3.15 Leads, Lags, and Start to Finish Relationships

Lags must be reasonable as determined by the Government and not used in place of realistic original durations, must not be in place to artificially absorb float, or to replace proper schedule logic.

a. Leads (negative lags) are prohibited.

b. Start to Finish (SF) relationships are prohibited.

3.3.16 Retained Logic

Schedule calculations must retain the logic between predecessors and successors ("retained logic" mode) even when the successor activity(s) starts and the predecessor activity(s) has not finished (out-of-sequence progress). Software features that in effect sever the tie between predecessor and successor activities when the successor has started and the predecessor logic is not satisfied ("progress override") are not be allowed.

3.3.17 Percent Complete

Update the percent complete for each activity started, based on the realistic assessment of earned value. Activities which are complete but for remaining minor punch list work and which do not restrain the initiation of successor activities may be declared 100 percent complete to allow for proper schedule management.

3.3.18 Remaining Duration

Update the remaining duration for each activity based on the number of estimated work days it will take to complete the activity. Remaining duration may not mathematically correlate with percentage found under paragraph entitled Percent Complete.

3.3.19 Cost Loading of Closeout Activities

Cost load the "Correction of punch list from Government pre-final inspection" activity(ies) not less than 1 percent of the present contract value. Activity(ies) may be declared 100 percent complete upon the Government's verification of completion and correction of all punch list work identified during Government pre-final inspection(s).

3.3.19.1 As-Built Drawings

If there is no separate contract line item (CLIN) for as-built drawings, cost load the "Submission and approval of as-built drawings" activity not less than $35,000 or 1 percent of the present contract value, which ever is greater, up to $200,000. Activity will be declared 100 percent complete upon the Government's approval.

3.3.19.2 O & M Manuals

Cost load the "Submission and approval of O & M manuals" activity not less than $20,000. Activity will be declared 100 percent complete upon the Government's approval of all O & M manuals.

3.3.20 Anticipated Adverse Weather

Paragraph applicable to contracts with clause entitled TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER. Reflect the number of anticipated adverse weather delays allocated to a weather sensitive activity in the activity's calendar.

3.3.21 Early Completion Schedule and the Right to Finish Early

An Early Completion Schedule is an Initial Project Schedule (IPS) that indicates all scope of the required contract work will be completed before the contractually required completion date.

a. No IPS indicating an Early Completion will be accepted without being fully resource-loaded (including crew sizes and manhours) and the Government agreeing that the schedule is reasonable and achievable.

b. The Government is under no obligation to accelerate work items it is responsible for to ensure that the early completion is met nor is it responsible to modify incremental funding (if applicable) for the project to meet the contractor's accelerated work.

3.4 CONTRACTS WITH MULTIPLE BUILDINGS/FACILITIES

Prepare a separate detailed schedule for each building/facility indicating its critical path for specified interim completion dates or critical milestone date. The master schedule must indicate the interface/lag/link between buildings/facilities to maximize/level the labor and other resources. The master schedule critical path must be indicated through the various buildings/facilities and total duration equal to the contract duration.

3.5 PROJECT SCHEDULE SUBMISSIONS

3.5.1 Preliminary Project Schedule Submission

Submit the Preliminary Project Schedule within 15 calendar days after the NTP is executed defining the planned operations detailed for the first 90 calendar days for approval. The approved Preliminary Project Schedule will be used for payment purposes not to exceed 90 calendar days after NTP. Completely cost load the Preliminary Project Schedule to balance the contract award CLINS shown on the Price Schedule. The Preliminary Project Schedule may be summary in nature for the remaining performance period. It must be early start and late finish constrained and logically tied as specified. The Preliminary Project Schedule forms the basis for the Initial Project Schedule specified herein and must include all of the required plan and program preparations, submissions and approvals identified in the contract (for example, Quality Control Plan, Safety Plan, and Environmental Protection Plan) as well as design activities, planned submissions of all early design packages, permitting activities, design review conference activities, and other non-construction activities intended to occur within the first 90 calendar days. Government acceptance of the associated design package(s) and all other specified Program and Plan approvals must occur prior to any planned construction activities. Activity code any activities that are summary in nature after the first 90 calendar days with Bid Item (CLIN) code (BIDI), Responsibility Code (RESP) and Feature of Work code (FOW).

3.5.2 Initial Project Schedule Submission

Submit the Initial Project Schedule for approval within 42 calendar days after notice to proceed is issued. The schedule must demonstrate a reasonable and realistic sequence of activities which represent all work through the entire contract performance period. Include in the design-build schedule detailed design and permitting activities, including but not limited to identification of individual design packages, design submission, reviews and conferences; permit submissions and any required Government actions; and long lead item acquisition prior to design completion. Also cover in the preliminary design-build schedule the entire construction effort with as much detail as is known at the time but, as a minimum, include all construction start and completion milestones, and detailed construction activities through the dry-in milestone,including all

activity coding and cost loading. Include the remaining construction, including cost loading, but it may be scheduled summary in nature. As the design proceeds and design packages are developed, fully detail the remaining construction activities concurrent with the monthly schedule updating process. Constrain construction activities by Government acceptance of associated designs. When the design is complete, incorporate into the then approved schedule update all remaining detailed construction activities that are planned to occur after the dry-in milestone. If applicable, include in the design-build schedule detailed design and permitting activities, including but not limited to identification of individual design packages, design submission, reviews and conferences, permit submissions and any required Government actions, and long lead item acquisition prior to design completion. Also cover in the preliminary design-build schedule the entire construction effort with as much detail as is known at the time but, as a minimum, include all construction start and completion milestones, and detailed construction activities through the dry-in milestone, including all activity coding and cost loading. Include the remaining construction, including cost loading, but it may be scheduled summary in nature. As the design proceeds and design packages are developed, fully detail the remaining construction activities. No payment will be made for work items not fully detailed in the Project Schedule.

3.5.2.1 Design Package Schedule Submission

With each design package submitted to the Government, submit a fragnet schedule extracted from the then current Preliminary, Initial or Updated schedule which covers the activities associated with that Design Package including construction, procurement and permitting activities.

3.5.3 Periodic Schedule Updates

Update the Project Schedule on a regular basis, monthly at a minimum. Provide a draft Periodic Schedule Update for review at the schedule update meetings as prescribed in the paragraph PERIODIC SCHEDULE UPDATE MEETINGS. These updates will enable the Government to assess Contractor's progress. Update the schedule to include detailed construction activities as the design progresses, but not later than the submission of the final un-reviewed design submission for each separate design package. The Contracting Officer may require submission of detailed schedule activities for any distinct construction that is started prior to submission of a final design submission if such activity is authorized.

a. Update information including Actual Start Dates (AS), Actual Finish Dates (AF), Remaining Durations (RD), and Percent Complete is subject to the approval of the Government at the meeting.

b. AS and AF dates must match the date(s) reported on the Contractor's Quality Control Report for an activity start or finish.

3.6 SUBMISSION REQUIREMENTS

Submit the following items for the Preliminary Schedule, Initial Schedule, and every Periodic Schedule Update throughout the life of the project:

3.6.1 Data CD/DVDs

Provide two sets of data CD/DVDs containing the current project schedule and all previously submitted schedules in the format of the scheduling software (e.g. .xer). Also include on the data CD/DVDs the Narrative

Report and all required Schedule Reports. Label each CD/DVD indicating the type of schedule (Preliminary, Initial, Update), full contract number, Data Date and file name. Each schedule must have a unique file name and use project specific settings.

3.6.2 Narrative Report

Provide a Narrative Report with each schedule submission. The Narrative Report is expected to communicate to the Government the thorough analysis of the schedule output and the plans to compensate for any problems, either current or potential, which are revealed through that analysis. Include the following information as minimum in the Narrative Report:

a. Identify and discuss the work scheduled to start in the next update period.

b. A description of activities along the two most critical paths where the total float is less than or equal to 20 work days.

c. A description of current and anticipated problem areas or delaying factors and their impact and an explanation of corrective actions taken or required to be taken.

d. Identify and explain why activities based on their calculated late dates should have either started or finished during the update period but did not.

e. Identify and discuss all schedule changes by activity ID and activity name including what specifically was changed and why the change was needed. This should include at a minimum new and deleted activities, logic changes, duration changes, calendar changes, lag changes, resource changes, and actual start and finish date changes.

f. Identify and discuss out-of-sequence work.

3.6.3 Schedule Reports

The format, filtering, organizing and sorting for each schedule report must be as directed by the Contracting Officer. Typically, reports shall contain Activity Numbers, Activity Description, Original Duration, Remaining Duration, Early Start Date, Early Finish Date, Late Start Date, Late Finish Date, Total Float, Actual Start Date, Actual Finish Date, and Percent Complete. Provide the reports electronically in .pdf format. Provide 2 sets of hardcopy reports. The following lists typical reports that will be requested:

3.6.3.1 Activity Report

List of all activities sorted according to activity number.

3.6.3.2 Logic Report

List of detailed predecessor and successor activities for every activity in ascending order by activity number.

3.6.3.3 Total Float Report

A list of all incomplete activities sorted in ascending order of total float. List activities which have the same amount of total float in

ascending order of Early Start Dates. Do not show completed activities on this report.

3.6.3.4 Earnings Report by CLIN

A compilation of the Total Earnings on the project from the NTP to the data date. This report must reflect the earnings of activities based on the agreements made in the schedule update meeting defined herein. Provided a complete schedule update has been furnished, this report serves as the basis of determining progress payments. Group activities by CLIN number and sort by activity number. This report must also provide a total CLIN percent earned value, CLIN percent complete, and project percent complete. The printed report must contain the following for each activity: the Activity Number, Activity Description, Original Budgeted Amount, Earnings to Date, Earnings this period, Total Quantity, Quantity to Date, and Percent Complete (based on cost).

3.6.3.5 Schedule Log

Provide a Scheduling/Leveling Report generated from the current project schedule being submitted.

3.6.4 Network Diagram

The Network Diagram is required for the Preliminary, Initial and Periodic Updates. Depict and display the order and interdependence of activities and the sequence in which the work is to be accomplished. The Contracting Officer will use, but is not limited to, the following conditions to review compliance with this paragraph:

3.6.4.1 Continuous Flow

Show a continuous flow from left to right with no arrows from right to left. Show the activity number, description, duration, and estimated earned value on the diagram.

3.6.4.2 Project Milestone Dates

Show dates on the diagram for start of project, any contract required interim completion dates, and contract completion dates.

3.6.4.3 Critical Path

Show all activities on the critical path. The critical path is defined as the longest path.

3.6.4.4 Banding

Organize activities using the WBS or as otherwise directed to assist in the understanding of the activity sequence. Typically, this flow will group activities by major elements of work, category of work, work area and/or responsibility.

3.6.4.5 Cash Flow / Schedule Variance Control (SVC) Diagram

With each schedule submission, provide a SVC diagram showing 1) Cash Flow S-Curves indicating planned project cost based on projected early and late activity finish dates, and 2) Earned Value to-date.

3.7 PERIODIC SCHEDULE UPDATE

3.7.1 Periodic Schedule Update Meetings

Conduct periodic schedule update meetings for the purpose of reviewing the proposed Periodic Schedule Update, Narrative Report, Schedule Reports, and progress payment. Conduct meetings at least monthly within five days of the proposed schedule data date. Provide a computer with the scheduling software loaded and a projector which allows all meeting participants to view the proposed schedule during the meeting. The Contractor's authorized scheduler must organize, group, sort, filter, perform schedule revisions as needed and review functions as requested by the Contractor and/or Government. The meeting is a working interactive exchange which allows the Government and Contractor the opportunity to review the updated schedule on a real time and interactive basis. The meeting will last no longer than 8 hours. Provide a draft of the proposed narrative report and schedule data file to the Government a minimum of two workdays in advance of the meeting. The Contractor's Project Manager and scheduler must attend the meeting with the authorized representative of the Contracting Officer. Superintendents, foremen and major subcontractors must attend the meeting as required to discuss the project schedule and work. Following the periodic schedule update meeting, make corrections to the draft submission. Include only those changes approved by the Government in the submission and invoice for payment.

3.7.2 Update Submission Following Progress Meeting

Submit the complete Periodic Schedule Update of the Project Schedule containing all approved progress, revisions, and adjustments, pursuant to paragraph SUBMISSION REQUIREMENTS not later than 4 work days after the periodic schedule update meeting.

3.8 WEEKLY PROGRESS MEETINGS

Conduct a weekly meeting with the Government (or as otherwise mutually agreed to) between the meetings described in paragraph entitled PERIODIC SCHEDULE UPDATE MEETINGS for the purpose of jointly reviewing the actual progress of the project as compared to the as planned progress and to review planned activities for the upcoming two weeks. Use the current approved schedule update for the purposes of this meeting and for the production and review of reports. At the weekly progress meeting, address the status of RFIs, RFPs and Submittals.

3.9 REQUESTS FOR TIME EXTENSIONS

Provide a justification of delay to the Contracting Officer in accordance with the contract provisions and clauses for approval within 10 days of a delay occurring. Also prepare a time impact analysis for each Government request for proposal (RFP) to justify time extensions.

3.9.1 Justification of Delay

Provide a description of the event(s) that caused the delay and/or impact to the work. As part of the description, identify all schedule activities impacted. Show that the event that caused the delay/impact was the responsibility of the Government. Provide a time impact analysis that demonstrates the effects of the delay or impact on the project completion date or interim completion date(s). Multiple impacts must be evaluated chronologically; each with its own justification of delay. With multiple

impacts consider any concurrency of delay. A time extension and the schedule fragnet becomes part of the project schedule and all future schedule updates upon approval by the Contracting Officer.

3.9.2 Submission Requirements

Submit a justification for each request for a change in the contract completion date of less than 2 weeks based upon the most recent schedule update at the time of the NTP or constructive direction issued for the change. Such a request must be in accordance with the requirements of other appropriate Contract Clauses and must include, as a minimum:

a. A list of affected activities, with their associated project schedule activity number. Identify activities impacted in each justification for change by a unique activity code contained in the required data file.

b. A brief explanation of the causes of the change.

c. An Time Impact Analysis of the overall impact of the changes proposed.

d. A Fragmentary Network of the affected area.

3.9.3 Time Impact Analysis (Prospective Analysis)

Prepare a time impact analysis for approval by the Contracting Officer based on industry standard AACE 52R-06. Utilize a copy of the last approved schedule prior to the first day of the impact or delay for the time impact analysis. If Contracting Officer determines the time frame between the last approved schedule and the first day of impact is too great, prepare an interim updated schedule to perform the time impact analysis. Unless approved by the Contracting Officer, no other changes will be incorporated into the schedule being used to justify the time impact.

3.9.4 Forensic Schedule Analysis (Retrospective Analysis)

Prepare an analysis for approval by the Contracting Officer based on industry standard AACE 29R-03.

3.9.5 Fragmentary Network (Fragnet)

Prepare a proposed fragnet for time impact analysis. The proposed fragnet must consist of a sequence of new activities that are proposed to be added to the project schedule to demonstrate the influence of the delay or impact to the project's contractual dates. Clearly show how the proposed fragnet is to be tied into the project schedule including all predecessors and successors to the fragnet activities. The proposed fragnet must be approved by the Contracting Officer prior to incorporation into the project schedule.

3.9.6 Time Extension

The Contracting Officer must approve the Justification of Delay including the time impact analysis before a time extension will be granted. No time extension will be granted unless the delay consumes all available Project Float and extends the projected finish date ("End Project" milestone) beyond the Contract Completion Date. The time extension will be in calendar days.

Actual delays that are found to be caused by the Contractor's own actions, which result in a calculated schedule delay will not be a cause for an extension to the performance period, completion date, or any interim milestone date.

3.9.7 Impact to Early Completion Schedule

No extended overhead will be paid for delay prior to the original Contract Completion Date for an Early Completion IPS unless the Contractor actually performed work in accordance with that Early Completion Schedule. The Contractor must show that an early completion was achievable had it not been for the impact..

3.10 FAILURE TO ACHIEVE PROGRESS

Should the progress fall behind the approved project schedule for reasons other than those that are excusable within the terms of the contract, the Contracting Officer may require provision of a written recovery plan for approval. The plan must detail how progress will be made-up to include which activities will be accelerated by adding additional crews, longer work hours, extra work days, etc.

3.10.1 Artificially Improving Progress

Artificially improving progress by means such as, but not limited to, revising the schedule logic, modifying or adding constraints, shortening activity durations, or changing calendars in the project schedule is prohibited. Indicate assumptions made and the basis for any logic, constraint, duration and calendar changes used in the creation of the recovery plan. Any additional resources, manpower, or daily and weekly work hour changes proposed in the recovery plan must be evident at the work site and documented in the daily report along with the Schedule Narrative Report.

3.10.2 Failure to Perform

Failure to perform work and maintain progress in accordance with the supplemental recovery plan may result in an interim and final unsatisfactory performance rating and/or may result in corrective action directed by the Contracting Officer pursuant to FAR 52.236-15 Schedules for Construction Contracts, FAR 52.249-10 Default (Fixed-Price Construction), and other contract provisions.

3.10.3 Recovery Schedule

Should the Contracting Officer find it necessary, submit a recovery schedule pursuant to FAR 52.236-15 Schedules for Construction Contracts.

3.11 OWNERSHIP OF FLOAT

Except for the provision given in the paragraph IMPACT TO EARLY COMPLETION SCHEDULE, float available in the schedule, at any time, shall not be considered for the exclusive use of either the Government or the Contractor including activity and/or project float. Activity float is the number of work days that an activity can be delayed without causing a delay to the "End Project" finish milestone. Project float (if applicable) is the number of work days between the projected early finish and the contract completion date milestone.

3.12 TRANSFER OF SCHEDULE DATA INTO RMS/QCS

Import the schedule data into the Quality Control System (QCS) and export the QCS data to the Government. This data is considered to be additional supporting data in a form and detail required by the Contracting Officer pursuant to FAR 52.232-5 - Payments under Fixed-Price Construction Contracts. The receipt of a proper payment request pursuant to FAR 52.232-27 - Prompt Payment for Construction Contracts is contingent upon the Government receiving both acceptable and approvable hard copies and matching electronic export from QCS of the application for progress payment.

3.13 PRIMAVERA P6 MANDATORY REQUIREMENTS

If Primavera P6 is being used, request a backup file template (.xer) from the Government, if one is available, prior to building the schedule. The following settings are mandatory and required in all schedule submissions to the Government:

a. Activity Codes must be Project Level, not Global or EPS level.

b. Calendars must be Project Level, not Global or Resource level.

c. Activity Duration Types must be set to "Fixed Duration & Units".

d. Percent Complete Types must be set to "Physical".

e. Time Period Admin Preferences must remain the default "8.0 hr/day, 40 hr/week, 172 hr/month, 2000 hr/year". Set Calendar Work Hours/Day to 8.0 Hour days.

f. Set Schedule Option for defining Critical Activities to "Longest Path".

g. Set Schedule Option for defining progressed activities to "Retained Logic".

h. Set up cost loading using a single lump sum resource. The Price/Unit must be $1/hr, Default Units/Time must be "8h/d", and settings "Auto Compute Actuals" and "Calculate costs from units" selected.

i. Activity ID's must not exceed 10 characters.

j. Activity Names must have the most defining and detailed description within the first 30 characters.

-- End of Section --

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SECTION 01 33 00

SUBMITTAL PROCEDURES
05/11

PART 1 GENERAL

1.1 SUMMARY

The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections.

Units of weights and measures used on all submittals are to be the same as those used in the contract drawings.

Each submittal is to be complete and in sufficient detail to allow ready determination of compliance with contract requirements.

Contractor's Quality Control (CQC) System Manager and the Designer of Record, if applicable, to check and approve all items prior to submittal and stamp, sign, and date indicating action taken. Proposed deviations from the contract requirements are to be clearly identified. Include within submittals items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals.

Submittals requiring Government approval are to be scheduled and made prior to the acquisition of the material or equipment covered thereby. Pick up and dispose of samples not incorporated into the work in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

A submittal register showing items of equipment and materials for when submittals are required by the specifications is provided as "Appendix A - Submittal Register".

1.2 DEFINITIONS

1.2.1 Submittal Descriptions (SD)

Submittals requirements are specified in the technical sections. Submittals are identified by Submittal Description (SD) numbers and titles as follows:

SD-01 Preconstruction Submittals

Submittals which are required prior to start of construction (work).or the start of the next major phase of the construction on a multi-phase contract, includes schedules, tabular list of data, or tabular list including location, features, or other pertinent information regarding products, materials, equipment, or components to be used in the work.

Certificates of insurance

Surety bonds

List of proposed Subcontractors

List of proposed products

Construction progress schedule

Network Analysis Schedule (NAS)

Submittal register

Schedule of prices or Earned Value Report

Health and safety plan

Work plan

Quality Control(QC) plan

Environmental protection plan

SD-02 Shop Drawings

Drawings, diagrams and schedules specifically prepared to illustrate some portion of the work.

Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the Contractor for integrating the product or system into the project.

Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be coordinated.

SD-03 Product Data

Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials, systems or equipment for some portion of the work.

Samples of warranty language when the contract requires extended product warranties.

SD-06 Test Reports

Report signed by authorized official of testing laboratory that a material, product or system identical to the material, product or system to be provided has been tested in accord with specified requirements. Unless specified in another section, testing must have been within three years of date of contract award for the project.

Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work or prototype prepared for the project before shipment to job site.

Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.

Investigation reports.

Daily logs and checklists.

Final acceptance test and operational test procedure.

SD-07 Certificates

Statements printed on the manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements. Must be dated after award of project contract and clearly name the project.

Document required of Contractor, or of a manufacturer, supplier, installer or Subcontractor through Contractor. The document purpose is to further promote the orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel qualifications.

Confined space entry permits.

Text of posted operating instructions.

SD-08 Manufacturer's Instructions

Preprinted material describing installation of a product, system or material, including special notices and (MSDS)concerning impedances, hazards and safety precautions.

SD-10 Operation and Maintenance Data

Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel, including manufacturer's help and product line documentation necessary to maintain and install equipment. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

This data is intended to be incorporated in an operations and maintenance manual or control system.

SD-11 Closeout Submittals

Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

Submittals required for Guiding Principle Validation (GPV) or Third Party Certification (TPC).

Special requirements necessary to properly close out a construction contract. For example, Record Drawings and as-built drawings. Also, submittal requirements necessary to properly close out a major phase of construction on a multi-phase contract.

1.2.2 Approving Authority

Office or designated person authorized to approve submittal.

1.2.3 Work

As used in this section, on- and off-site construction required by contract documents, including labor necessary to produce submittals, except those SD-01 Pre-Construction Submittals noted above, construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with this section.

SD-01 Preconstruction Submittals

Submittal Register; G

1.4 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.4.1 Designer of Record Approved (DA)

Designer of Record (DOR) approval is required for extensions of design, critical materials, any deviations from the solicitation, the accepted proposal, or the completed design, equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Within the terms of the Contract Clause SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION, they are considered to be "shop drawings." Contractor to provide the Government with the number of copies designated hereinafter of all DOR approved submittals. The Government may review any or all Designer of Record approved submittals for conformance to the Solicitation, Accepted Proposal and the completed design. The Government will review all submittals designated as deviating from the Solicitation or Accepted Proposal, as described below. Design submittals to be in accordance with Section 01 33 16 DESIGN AFTER AWARD. Generally, design submittals should be identified as SD-05 Design Data submittals.

1.4.2 Government Approved (G)

Government approval is required for extensions of design, critical materials, deviations, equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Government approval is required for any deviations from the Solicitation or Accepted Proposal and other items as designated by the Contracting Officer. Within the terms of the Contract Clause SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION, they are considered to be "shop drawings."

1.4.3 Government Conformance Review of Design (CR)

The Government will review all intermediate and final design submittals for conformance with the technical requirements of the solicitation. Section 01 33 16 DESIGN AFTER AWARD covers the design submittal and review process in detail. Review will be only for conformance with the applicable codes,

standards and contract requirements. Design data includes the design documents described in Section 01 33 16 DESIGN AFTER AWARD. Generally, design submittals should be identified as SD-05 Design Data submittals.

1.4.4 Designer of Record Approved/Government Conformance Review (DA/CR)

1.4.4.1 Deviations to the Accepted Design

Designer of Record approval and the Government's concurrence are required for any proposed deviation from the accepted design which still complies with the contract before the Contractor is authorized to proceed with material acquisition or installation. Within the terms of the Contract Clause SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION, they are considered to be "shop drawings." If necessary to facilitate the project schedule, the Contractor and the DOR may discuss a submittal proposing a deviation with the Contracting Officer's Representative prior to officially submitting it to the Government. However, the Government reserves the right to review the submittal before providing an opinion, if deemed necessary. In any case, the Government will not formally agree to or provide a preliminary opinion on any deviation without the DOR's approval or recommended approval. The Government reserves the right to non-concur with any deviation from the design, which may impact furniture, furnishings, equipment selections or operations decisions that were made, based on the reviewed and concurred design.

1.4.4.2 Substitutions

Unless prohibited or provided for otherwise elsewhere in the Contract, where the accepted contract proposal named products, systems, materials or equipment by manufacturer, brand name and/or by model number or other specific identification, and the Contractor desires to substitute manufacturer or model after award, submit a requested substitution for Government concurrence. Include substantiation, identifying information and the DOR's approval, as meeting the contract requirements and that it is equal in function, performance, quality and salient features to that in the accepted contract proposal. If the Contract otherwise prohibits substitutions of equal named products, systems, materials or equipment by manufacturer, brand name and/or by model number or other specific identification, the request is considered a "variation" to the contract. Variations are discussed below in paragraphs: "Designer of Record Approved/Government Approved" and "VARIATIONS."

1.4.5 Designer of Record Approved/Government Approved (DA/GA)

In addition to the above stated requirements for proposed deviations to the accepted design, both Designer of Record and Government Approval and, where applicable, a contract modification are required before the Contractor is authorized to proceed with material acquisition or installation for any proposed variation to the contract (the solicitation and/or the accepted proposal), which constitutes a change to the contract terms. Within the terms of the Contract Clause SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION, they are considered to be "shop drawings." The Government reserves the right to accept or reject any such proposed deviation at its discretion.

1.4.6 For Information Only

Submittals not requiring Government approval will be for information only. For Design-build construction all submittals not requiring Designer of Record or Government approval will be for information only. They are not

considered to be "shop drawings" within the terms of the Contract Clause referred to above.

1.5 PREPARATION

1.5.1 Transmittal Form

Use the attached sample transmittal form in Appendix B ENG Form 4025-R for submitting both Government approved and information only submittals in accordance with the instructions on the reverse side of the form. These forms are included in the QCS software that the Contractor is required to use for this contract. Properly complete this form by filling out all the heading blank spaces and identifying each item submitted. Exercise special care to ensure proper listing of the specification paragraph and sheet number of the contract drawings pertinent to the data submitted for each item.

1.5.2 Source Drawings for Shop Drawings

The entire set of Source Drawing files (DWG) will not be provided to the Contractor. Only those requested by the Contractor to prepare shop drawings may be provided. Request the specific Drawing Number only for the preparation of Shop Drawings. These drawings may only be provided after award.

1.5.2.1 Terms and Conditions

Data contained on these electronic files must not be used for any purpose other than as a convenience in the preparation of construction data for the referenced project. Any other use or reuse shall be at the sole risk of the Contractor and without liability or legal exposure to the Government. The Contractor must make no claim and waives to the fullest extent permitted by law, any claim or cause of action of any nature against the Government, its agents or sub consultants that may arise out of or in connection with the use of these electronic files. The Contractor must, to the fullest extent permitted by law, indemnify and hold the Government harmless against all damages, liabilities or costs, including reasonable attorney's fees and defense costs, arising out of or resulting from the use of these electronic files.

These electronic Source Drawing files are not construction documents. Differences may exist between the Source Drawing files and the corresponding construction documents. The Government makes no representation regarding the accuracy or completeness of the electronic Source Drawing files, nor does it make representation to the compatibility of these files with the Contractor hardware or software. In the event that a conflict arises between the signed and sealed construction documents prepared by the Government and the furnished Source Drawing files, the signed and sealed construction documents govern. The Contractor is responsible for determining if any conflict exists. Use of these Source Drawing files does not relieve the Contractor of duty to fully comply with the contract documents, including and without limitation, the need to check, confirm and coordinate the work of all contractors for the project. If the Contractor uses, duplicates or modifies these electronic Source Drawing files for use in producing construction data related to this contract, remove all previous indicia of ownership (seals, logos, signatures, initials and dates).

1.5.3 Electronic File Format

Provide submittals in electronic format, with the exception of material samples required for SD-04 Samples items. In addition to the electronic submittal, provide two hard copies of the submittals. Compile the submittal file as a single, complete document, to include the Transmittal Form described within. Name the electronic submittal file specifically according to its contents, coordinate the file naming convention with the Contracting Officer. Electronic files must be of sufficient quality that all information is legible. Electronic format shall be in PDF, unless otherwise specified or directed by the Contracting Officer. Generate PDF files from original documents with bookmarks so that the text included in the PDF file is both searchable and can be copied. If documents are scanned, Optical Character Resolution (OCR) routines are required. Index and bookmark files exceeding 30 pages to allow efficient navigation of the file. When required, the electronic file must include a valid electronic signature, or scan of a signature.

Provide electronic documents on an optical disc.

Provide hard copies of submittals the Contracting Officer. Up to three additional hard copies of any submittal may be requested at the discretion of the Contracting Officer, at no additional cost to the Government.

1.6 QUANTITY OF SUBMITTALS

1.6.1 Number of Copies of SD-02 Shop Drawings

Submit two copies of submittals of shop drawings requiring review and approval only by QC organization and two copies of shop drawings requiring review and approval by Contracting Officer.

1.6.2 Number of Copies of SD-03 Product Data and SD-08 Manufacturer's Instructions

Submit in compliance with quantity requirements specified for shop drawings.

1.6.3 Number of Samples SD-04 Samples

a. Submit two samples, or two sets of samples showing range of variation, of each required item. One approved sample or set of samples will be retained by approving authority and one will be returned to Contractor.

b. Submit one sample panel or provide one sample installation where directed. Include components listed in technical section or as directed.

c. Submit one sample installation, where directed.

d. Submit one sample of non-solid materials.

1.6.4 Number of Copies SD-05 Design Data and SD-07 Certificates

Submit in compliance with quantity requirements specified for shop drawings.

1.6.5 Number of Copies SD-06 Test Reports and SD-09 Manufacturer's Field Reports

Submit in compliance with quantity and quality requirements specified for

shop drawings other than field test results that will be submitted with QC reports.

1.6.6 Number of Copies of SD-10 Operation and Maintenance Data

Submit two copies of O&M Data to the Contracting Officer for review and approval.

1.6.7 Number of Copies of SD-01 Preconstruction Submittals and SD-11 Closeout Submittals

Unless otherwise specified, submit two sets of administrative submittals.

1.7 INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of the Contracting Officer is not required on information only submittals. The Government reserves the right to require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so prescribe. For design-build construction the Government will retain two copies of information only submittals.

1.8 VARIATIONS

Variations from contract requirements require both Designer of Record (DOR) and Government approval pursuant to contract Clause FAR 52.236-21 and will be considered where advantageous to Government.

1.8.1 Considering Variations

Discussion with Contracting Officer prior to submission, after consulting with the DOR, will help ensure functional and quality requirements are met and minimize rejections and re-submittals. When contemplating a variation which results in lower cost, consider submission of the variation as a Value Engineering Change Proposal (VECP).

Specifically point out variations from contract requirements in transmittal letters. Failure to point out deviations may result in the Government requiring rejection and removal of such work at no additional cost to the Government.

1.8.2 Proposing Variations

When proposing variation, deliver written request to the Contracting Officer, with documentation of the nature and features of the variation and why the variation is desirable and beneficial to Government, including the DOR's written analysis and approval. If lower cost is a benefit, also include an estimate of the cost savings. In addition to documentation required for variation, include the submittals required for the item. Clearly mark the proposed variation in all documentation.

Check the column "variation" of ENG Form 4025 for submittals which include proposed deviations requested by the Contractor. Set forth in writing the

reason for any deviations and annotate such deviations on the submittal. The Government reserves the right to rescind inadvertent approval of submittals containing unnoted deviations.

1.8.3 Warranting that Variations are Compatible

When delivering a variation for approval, Contractor, including its Designer(s) of Record, warrants that this contract has been reviewed to establish that the variation, if incorporated, will be compatible with other elements of work.

1.8.4 Review Schedule is Modified

In addition to normal submittal review period of 35 calendar days, a period of 10 working days will be allowed for consideration by the Government of submittals with variations.

1.9 SUBMITTAL REGISTER

Prepare and maintain submittal register, as the work progresses. Do not change data which is output in columns (c), (d), (e), and (f) as delivered by Government; retain data which is output in columns (a), (g), (h), and (i) as approved. A submittal register showing items of equipment and materials for which submittals are required by the specifications is provided as an attachment. This list may not be all inclusive and additional submittals may be required. Maintain a submittal register for the project in accordance with Section 01 45 00.10 QUALITY CONTROL SYSTEM (QCS). The Government will provide the initial submittal register in electronic format with the following fields completed, to the extent that will be required by the Government during subsequent usage.

Column (c): Lists specification section in which submittal is required.

Column (d): Lists each submittal description (SD No. and type, e.g. SD-02 Shop Drawings) required in each specification section.

Column (e): Lists one principal paragraph in specification section where a material or product is specified. This listing is only to facilitate locating submitted requirements. Do not consider entries in column (e) as limiting project requirements.

Thereafter, the Contractor is to track all submittals by maintaining a complete list, including completion of all data columns, including dates on which submittals are received and returned by the Government.

The Designer of Record develops a complete list of submittals during design and identify required submittals in the specifications, and use the list to prepare the Submittal Register. The list may not be all inclusive and additional submittals may be required by other parts of the contract. Complete the submittal register and submit it to the Contracting Officer for approval no later than 30 calendar days prior to Notice to Proceed for construction. The approved submittal register will serve as a scheduling document for submittals and will be used to control submittal actions throughout the contract period. Coordinate the submit dates and need dates with dates in the Contractor prepared progress schedule. Submit monthly or until all submittals have been satisfactorily completed, updates to the submittal register showing the Contractor action codes and actual dates with Government action codes. Revise the submittal register when the

progress schedule is revised and submit both for approval.

1.9.1 Use of Submittal Register

Submit submittal register. Submit with QC plan and project schedule. Verify that all submittals required for project are listed and add missing submittals. Coordinate and complete the following fields on the register submitted with the QC plan and the project schedule:

Column (a) Activity Number: Activity number from the project schedule.

Column (g) Contractor Submit Date: Scheduled date for approving authority to receive submittals.

Column (h) Contractor Approval Date: Date Contractor needs approval of submittal.

Column (i) Contractor Material: Date that Contractor needs material delivered to Contractor control.

1.9.2 Contractor Use of Submittal Register

Update the following fields in the Government-furnished submittal register program or equivalent fields in program utilized by Contractor with each submittal throughout contract.

Column (b) Transmittal Number: Contractor assigned list of consecutive numbers.

Column (j) Action Code (k): Date of action used to record Contractor's review when forwarding submittals to QC.

Column (l) List date of submittal transmission.

Column (q) List date approval received.

1.9.3 Approving Authority Use of Submittal Register

Update the following fields in the Government-furnished submittal register program or equivalent fields in program utilized by Contractor.

Column (b) Transmittal Number: Contractor assigned list of consecutive numbers.

Column (l) List date of submittal receipt.

Column (m) through (p) List Date related to review actions.

Column (q) List date returned to Contractor.

1.9.4 Copies Delivered to the Government

Deliver one copy of submittal register updated by Contractor to Government with each invoice request.

1.10 SCHEDULING

Schedule and submit concurrently submittals covering component items

forming a system or items that are interrelated. Include certifications to be submitted with the pertinent drawings at the same time. No delay damages or time extensions will be allowed for time lost in late submittals. An additional 35 calendar days for Government Approve and 21 calendar days for information only will be allowed and shown on the register for review and approval of submittals for food service equipment and refrigeration and HVAC control systems.

a. Coordinate scheduling, sequencing, preparing and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow for potential resubmittal of requirements.

b. Submittals called for by the contract documents will be listed on the register. If a submittal is called for but does not pertain to the contract work, the Contractor is to include the submittal in the register and annotate it "N/A" with a brief explanation. Approval by the Contracting Officer does not relieve the Contractor of supplying submittals required by the contract documents but which have been omitted from the register or marked "N/A."

c. Re-submit register and annotate monthly by the Contractor with actual submission and approval dates. When all items on the register have been fully approved, no further re-submittal is required.

d. Carefully control procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved "Submittal Register."

1.10.1 Government Reviewed Design

The Government will review design submittals for conformance with the technical requirements of the solicitation. Section 01 33 16 DESIGN AFTER AWARD covers the design submittal and review process in detail. Government review is required for deviation from the completed design. Review will be only for conformance with the contract requirements. Included are only those construction submittals for which the Designer of Record design documents do not include enough detail to ascertain contract compliance. The Government may, but is not required, to review extensions of design such as structural steel or reinforcement shop drawings.

1.11 GOVERNMENT APPROVING AUTHORITY

When approving authority is Contracting Officer, the Government will:

a. Note date on which submittal was received.

b. Review submittals for approval within scheduling period specified and only for conformance with project design concepts and compliance with contract documents.

c. Identify returned submittals with one of the actions defined in paragraph REVIEW NOTATIONS and with markings appropriate for action indicated.

Upon completion of review of submittals requiring Government approval, stamp and date submittals. One copy of the submittal will be retained by the Contracting Officer and One copy of the submittal will be returned to the Contractor. If the Government performs a conformance review of other Designer of Record approved submittals, the submittals will be so

identified and returned, as described above.

1.11.1 Review Notations

Contracting Officer review will be completed within 30 calendar days after date of submission. Submittals will be returned to the Contractor with the following notations:

a. Submittals marked "approved" or "accepted" authorize the Contractor to proceed with the work covered.

b. Submittals marked "approved as noted" "or approved, except as noted, resubmittal not required," authorize the Contractor to proceed with the work covered provided he takes no exception to the corrections.

c. Submittals marked "not approved" or "disapproved," or "revise and resubmit," indicate noncompliance with the contract requirements or design concept, or that submittal is incomplete. Resubmit with appropriate changes. No work shall proceed for this item until resubmittal is approved.

d. Submittals marked "not reviewed" will indicate submittal has been previously reviewed and approved, is not required, does not have evidence of being reviewed and approved by Contractor, or is not complete. A submittal marked "not reviewed" will be returned with an explanation of the reason it is not reviewed. Resubmit submittals returned for lack of review by Contractor or for being incomplete, with appropriate action, coordination, or change.

1.12 DISAPPROVED OR REJECTED SUBMITTALS

Contractor shall make corrections required by the Contracting Officer. If the Contractor considers any correction or notation on the returned submittals to constitute a change to the contract drawings or specifications; notice as required under the Contract clause CHANGES, is to be given to the Contracting Officer. Contractor is responsible for the dimensions and design of connection details and construction of work. Failure to point out deviations may result in the Government requiring rejection and removal of such work at the Contractor's expense.

If changes are necessary to submittals, make such revisions and submission of the submittals in accordance with the procedures above. No item of work requiring a submittal change is to be accomplished until the changed submittals are approved.

1.13 APPROVED/ACCEPTED SUBMITTALS

The Contracting Officer's approval or acceptance of submittals is not to be construed as a complete check, and indicates only that design, general method of construction, materials, detailing and other information appear to meet the Solicitation and Accepted Proposal.

Approval or acceptance will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the Contractor Quality Control (CQC) requirements of this contract is responsible for design, dimensions, all design extensions, such as the design of adequate connections and details, etc., and the satisfactory construction of all work.

After submittals have been approved or accepted by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

1.14 APPROVED SAMPLES

Approval of a sample is only for the characteristics or use named in such approval and is not be construed to change or modify any contract requirements. Before submitting samples, the Contractor to assure that the materials or equipment will be available in quantities required in the project. No change or substitution will be permitted after a sample has been approved.

Match the approved samples for materials and equipment incorporated in the work. If requested, approved samples, including those which may be damaged in testing, will be returned to the Contractor, at his expense, upon completion of the contract. Samples not approved will also be returned to the Contractor at its expense, if so requested.

Failure of any materials to pass the specified tests will be sufficient cause for refusal to consider, under this contract, any further samples of the same brand or make of that material. Government reserves the right to disapprove any material or equipment which previously has proved unsatisfactory in service.

Samples of various materials or equipment delivered on the site or in place may be taken by the Contracting Officer for testing. Samples failing to meet contract requirements will automatically void previous approvals. Contractor to replace such materials or equipment to meet contract requirements.

Approval of the Contractor's samples by the Contracting Officer does not relieve the Contractor of his responsibilities under the contract.

1.15 WITHHOLDING OF PAYMENT

No payment for materials incorporated in the work will be made if all required Designer of Record or required Government approvals have not been obtained. No payment will be made for any materials incorporated into the work for any conformance review submittals or information only submittals found to contain errors or deviations from the Solicitation or Accepted Proposal.

1.16 STAMPS

Stamps used by the Contractor on the submittal data to certify that the submittal meets contract requirements is to be similar to the following:

CONTRACTOR
(Firm Name)
_____ Approved
_____ Approved with corrections as noted on submittal data and/or attached sheets(s)
SIGNATURE: _____
TITLE: _____
DATE: _____

For design-build construction, both the Contractor Quality Control System Manager and the Designer of Record are to stamp and sign to certify that the submittal meets contract requirements.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
FY17 MUNS MUNITIONS STORAGE MAGAZINES

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01 00 00	SD-02 Shop Drawings															
			Provisions of Positive Protection	1.9.5	G													
			System															
			SD-11 Closeout Submittals															
			Worker's Compensation Claims	1.9.8														
		01 32 01	SD-01 Preconstruction Submittals															
			Preliminary Project Schedule	3.5.1	G													
			Initial Project Schedule	3.5.2	G													
		01 33 00	SD-01 Preconstruction Submittals															
			Submittal Register	1.9	G													
		01 33 29	SD-01 Preconstruction Submittals															
			Preliminary Sustainability	1.5.2.1	G	DO												
			Notebook															
			Preliminary High Performance	1.5.2.1														
			and Sustainable Building Checklist															
			SD-07 Certificates															
			Third Party Certification (TPC)	1.4.5														
			SD-11 Closeout Submittals															
			Final Sustainability Notebook	1.5.2.1	G													
			Final High Performance and	1.5.2.1	G	DO												
			Sustainable Building Checklist															
			Amended Final Sustainability	1.5.2.1	G	DO												
			Notebook															
			Third Party Certification	3.2.1	G	RO												
			Certificates															
		01 35 26	SD-01 Preconstruction Submittals															

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		01 35 26	Accident Prevention Plan (APP)	1.6	G	DO													
			SD-06 Test Reports																
			Monthly Exposure Reports	1.11.3															
			Notifications and Reports	1.11															
			Accident Investigation Reports	1.11.2	G	DO													
			LHE Inspection Reports	1.11.4															
			Health Hazard Control Plan	1.6.2.14	G														
			Regulatory Citations and Violations	1.11.6															
			Emergency Action Plan	1.6.2.15	G														
			SD-07 Certificates																
			Crane Operators/Riggers	1.5.1.4															
			Standard Lift Plan	1.6.2.2	G														
			Critical Lift Plan	1.6.2.3	G	DO													
			Activity Hazard Analysis (AHA)	1.7															
			Confined Space Entry Permit	1.8.1															
			Hot Work Permit	1.8.1															
			Certificate of Compliance	1.11.5															
			Excavation Permit	3.7															
			Proof of Current Qualification	1.5.1.4															
		01 45 00	SD-01 Preconstruction Submittals																
			Contractor Quality Control (CQC) Plan	3.2	G														
			Design Quality Control (DQC) plan	3.2.2	G														
			MTC validation	3.7.2.1	G														

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		01 50 00	SD-01 Preconstruction Submittals															
			Site Plan and Access	1.4.1	G													
			Temporary Earthwork Plan	1.4.2	G													
			Traffic Control Plan	3.1.10.1	G													
			SD-06 Test Reports															
			Backflow Preventer Tests	2.2.5	G													
			SD-07 Certificates															
			Backflow Tester	1.5.1	G													
			Backflow Preventers	1.5														
		01 57 20	SD-01 Preconstruction Submittals															
			Environmental Protection Plan	1.7	G													
		01 57 23	SD-01 Preconstruction Submittals															
			Storm Water Pollution Prevention	1.3.2														
			Plan															
			Storm Water Notice of Intent	1.3.2														
			SD-03 Product Data															
			BMP Product Data															
			Geotextiles and Mats		G	DO												
			SD-06 Test Reports															
			Storm Water Inspection Reports	1.3.2														
			for General Permit															
			Erosion and Sediment Controls	1.3														
			SD-07 Certificates															
			Mill Certificate or Affidavit	2.1.3														
			SD-11 Closeout Submittals															
			Final SWPPP		G	DO												

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		01 57 23	NOPT Application		G	DO												
		01 74 19	SD-01 Preconstruction Submittals															
			Waste Management Plan	1.5	G													
			SD-11 Closeout Submittals															
			Records	1.6														
		01 78 00	SD-03 Product Data															
			Warranty Management Plan	1.7.1														
			Warranty Tags	1.7.5														
			Spare Parts Data	1.5														
			SD-06 Test Reports															
			working as-built markup drawings	3.1.2	G													
			final as-built record drawings	3.2	G	DO												
			SD-08 Manufacturer's Instructions															
			Preventative Maintenance	3.10														
			Condition Monitoring (Predictive Testing)	3.10														
			Inspection	3.10														
			Instructions	1.7.1														
			SD-10 Operation and Maintenance Data															
			Operation and Maintenance Manuals	3.8														
			SD-11 Closeout Submittals															
			As-Built Record of Equipment and Materials	2.4.1														
			Record Drawings	1.3.5	G	DO												

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		01 78 00	Certification of EPA Designated	2.3	G													
			Items															
			Interim DD FORM 1354	3.11	G													
			Checklist for DD FORM 1354	3.11	G													
			Equipment-In-Place List	2.4.2														
			classroom and field instructions	3.8.2														
			Preventative Maintenance	3.10														
			Final Approved Shop Drawings	3.5														
			Construction Contract	3.6														
			Specifications															
		01 78 23	SD-10 Operation and Maintenance															
			Data															
			O&M Database	1.3	G													
			Training Plan	3.1.1	G													
			Training Outline	3.1.3	G													
			Training Content	3.1.2	G													
			SD-11 Closeout Submittals															
			Training Video Recording	3.1.4	G													
			Validation of Training Completion	3.1.6	G													
		02 41 00	SD-01 Preconstruction Submittals															
			Demolition Plan	1.2.1	G													
			Existing Conditions	1.10														
			SD-07 Certificates															
			Notification	1.7	G													
			SD-11 Closeout Submittals															
			Receipts	3.3.3														

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		02 82 13	SD-02 Shop Drawings															
			Detailed Drawings	1.3	G													
			SD-03 Product Data															
			Asbestos Waste Shipment Records	3.10.3.1	G													
			Encapsulants	2.1	G													
			Respiratory Protection Program	1.8.1	G DO													
			Cleanup and Disposal	3.10	G													
			Qualifications	1.5.1	G													
			Training Program	1.10														
			Licenses, Permits and Notifications	1.7.1														
			Asbestos Management Plan	3.10.3.2	G DO													
			SD-06 Test Reports															
			Exposure Assessment and Air Monitoring	3.8														
			Local Exhaust System	1.6.3														
			SD-07 Certificates															
			Local Exhaust System	1.6.3														
			Encapsulants	2.1	G													
			Medical Surveillance Requirements	1.8														
		02 83 13	SD-01 Preconstruction Submittals															
			Lead Compliance Plan	1.5.2.2	G													
			Competent Person	1.5.1.1	G													
			Training Certification	1.5.1.2	G													

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		02 83 13	Lead waste management plan	1.5.2.8	G													
			Written evidence	3.5.2.1	G													
			Medical Examinations	1.5.2.4	G													
			SD-06 Test Reports															
			Sampling results	1.5.2.3	G													
			Occupational and Environmental Assessment Data Report	1.5.2.3	G													
			SD-07 Certificates															
			Testing laboratory	1.5.1.3														
			Clearance Certification	3.5.1.1														
			SD-11 Closeout Submittals															
			hazardous waste manifest	3.5.2.1														
			turn-in documents or weight tickets	3.5.2.1														

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read instructions on the reverse side prior to initiating this form)*	DATE	TRANSMITTAL NO.

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO:	FROM:	CONTRACT NO.	CHECK ONE: ☐ THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)*	PROJECT TITLE AND LOCATION		CHECK ONE: THIS TRANSMITTAL IS FOR ☐ FIO ☐ GOV'T. APPROVAL

ITEM NO. *a.*	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* *b.*	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. *(See instruction no. 8)* *c.*	NO. OF COPIES *d.*	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE *g.*	VARIATION *(See instruction No. 6)* *h.*	FOR CE USE CODE *i.*
				SPEC. PARA. NO. *e.*	DRAWING SHEET NO. *f.*			

REMARKS	I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as other wise stated. _____ NAME AND SIGNATURE OF CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED *(List by Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

INSTRUCTIONS

1. Section I will be initiated by the Contractor in the required number of copies.

2. Each transmittal shall be numbered consecutively in the space provided for "Transmittal No.". This number, in addition to the contract number, will form a serial number for identifying each submittal. For new submittals or resubmittals mark the appropriate box; on resubmittals, insert transmittal number of last submission as well as the new submittal number.

3. The "Item No." will be the same "Item No." as indicated on ENG FORM 4288-R for each entry on this form.

4. Submittals requiring expeditious handling will be submitted on a separate form.

5. Separate transmittal form will be used for submittals under separate sections of the specifications.

6. A check shall be placed in the "Variation" column when a submittal is not in accordance with the plans and specifications--also, a written statement to that effect shall be included in the space provided for "Remarks".

7. Form is self-transmittal, letter of transmittal is not required.

8. When a sample of material or Manufacturer's Certificate of Compliance is transmitted, indicate "Sample" or "Certificate" in column c, Section I.

9. U.S. Army Corps of Engineers approving authority will assign action codes as indicated below in space provided in Section I, column i to each item submitted. In addition they will ensure enclosures are indicated and attached to the form prior to return to the contractor. The Contractor will assign action codes as indicated below in Section I, column g, to each item submitted.

THE FOLLOWING ACTION CODES ARE GIVEN TO ITEMS SUBMITTED

A	--	Approved as submitted.	E	--	Disapproved (See attached).
B	--	Approved, except as noted on drawings.	F	--	Receipt acknowledged.
C	--	Approved, except as noted on drawings. Refer to attached sheet resubmission required.	FX	--	Receipt acknowledged, does not comply as noted with contract requirements.
D	--	Will be returned by separate correspondence.	G	--	Other *(Specify)*

10. Approval of items does not relieve the contractor from complying with all the requirements of the contract plans and specifications.

(Reverse of ENG Form 4025-R)

SECTION 01 33 16

DESIGN AFTER AWARD

1 **SUBMISSION OF CONSTRUCTION DRAWINGS, SPECIFICATIONS AND DESIGN ANALYSES**: The contractor shall follow the design submission requirements as listed below. In addition, the contractor shall comply with other design submission requirements as listed and required in other areas of the RFP.

1.1 The following web addresses contain guides and criteria necessary to support completion of the project design. See Section 01 10 10 for other guides and criteria required for the design and construction of the project.

1.1.1 **General Guidance**: General guidance for A-E Firms and Basic Design Package will be provided on the Award CD.

1.1.2 **Drawing Format**: Refer to Appendix A for Drawing Format, Appendix L for the Air Force (AF) Minimum BIM Requirements and Appendix M for the AF BIM PxP Template.

1.1.3 Design Analysis and Drawings Baseline Guidance ER 1110-345-700 (serves as a baseline guide and may be adjusted if/as noted herein): http://publications.usace.army.mil/publications/eng-regs/ER_1110-345-700/toc.htm

1.1.4 **Specifications Baseline Guidance ER 1110-1-8155, Engineer and Design – Specifications**:
http://publications.usace.army.mil/publications/eng-regs/ER_1110-345-700/toc.htm

1.1.5 **Air Force Civil Engineering Sustainable Design Tool Kit:**
http://www.wbdg.org/ccb/AF/AFSUSTTOOLKIT/

1.1.6 Unified Facilities Guide Specifications (UFGS) is the required format for the design guide specifications. Download the latest UFGS Master from http://www.wbdg.org/ccb/browse_cat.php?c=3.

1.1.7 **Unified Facilities Criteria (UFC)**:
http://www.wbdg.org/ccb/browse_cat.php?o=29&c=4

1.1.8 **Air Force Engineering Technical Letters (ETLs)**: for a complete listing go to http://www.wbdg.org/ccb/browse_cat.php?o=33&c=125.

1.1.9 **Air Force Publications**: http://www.e-publishing.af.mil/

1.1.10 **Overall Design Site**: The site will offer a pathway to regularly used criteria: http://publications.usace.army.mil/publications/index.html

1.1.11 **Air Force Interior Design Guide and other products and services offered by AFCEC:** This site includes the guidance and specifications to be followed during the development and design of the Air Force structural interior design and the comprehensive interior design.
http://www.wbdg.org/ccb/browse_cat.php?c=129

2 Submittal Certifications:

2.1 The Contractor shall certify in the design submittal (by cover letter) that all items submitted in the documents comply with the contract. This shall be provided for each track's submittals through and including final design submittal. Attached to this letter shall be the signed certifications from each of the independent technical reviewers.

2.2 The content of each independent technical reviewer certification shall include the following statement on his/her company's letterhead:

2.2.1 **I (name of reviewer with title(s)) have completed the independent technical review for (stage of submittal) of (project name and location) design submittal. Notice is hereby given that all quality control activities, appropriate to the level of risk and complexity inherent in the project, as defined in the Quality Control Plan have been completed. Compliance with the contract, established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of assumptions; methods, procedures, and material used in analyses; alternatives evaluated; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing Air Force and Corps of Engineers policy. Documentation of the quality control process is attached. Significant concerns and the explanation of their resolution are as follows: (Describe the major technical concerns, possible impact, and resolution)**

2.3 The "For Construction" submittal for the project, building, and/or site system shall be accompanied with a letter from each key sub-contractor/ supplier having direct construction/materials/ equipment defined within the submittal. The purpose of the letter is to bring together and coordinate the designers and the sub-contractors slated to accomplish the work and the suppliers of the material and equipment. Each sub-contractor and supplier shall briefly state their involvement in the preparation of the submittal, their proposed activity during the design-build contract associated with the contents of the submittal, and state the design is appropriate for their related field and appropriate for their capabilities/expertise. Each letter shall be on the sub-contractor's/supplier's letter head and signed by a principal of the firm. Included with these letters shall be the certifications from each of the independent technical reviewers. In addition --- each drawing shall be stamped and signed by the responsible designer **and** the responsible licensed professional technical reviewer (two signed stamps required on each drawing).

3 Criteria and Deviations

3.1 The criteria specified in this Contract are binding contract criteria and in case of any conflict, after award, between the Contract and Contractor's submittals, the Contract will govern unless there is a written and signed agreement between the Contracting Officer and the Contractor modifying a specific requirement.

3.2 Contractor's deviations from the Contract requirements (shall be defined in a letter submitted to the Contracting Officer with justification, analysis, and detailed cost savings and shall also be presented and highlighted in a separate section in the analysis so it is clear to the reviewer) may be considered by the Government, and where appropriate, may be specifically approved by the Contracting Officer. Deviations from the contract requirements shall not be assumed or considered approved unless contractually approved by the Contracting Officer in writing. Such deviations, when not contractually approved by the Contracting Officer or when subsequently found at any time during the contract, shall be corrected by the Contractor at no additional time or cost to the Government. It is the Contractor's responsibility to clearly note features/aspects in his design or construction that are deviations to the contract requirements. The Contractor shall not assume silence on such issues by the Government to be a sign of acceptance. The Contractor is cautioned to not work verbally approved adjustments to the contract but rather to work adjustments to the contract in writing with Government personnel having appropriate authority to execute such adjustments to the contract.

4 Topographic, Geotechnical, and Existing Conditions

4.1 The Contractor shall verify and determine field conditions, by field inspection, field exploration, and other means deemed appropriate and necessary for proposal, design, and construction to yield a safe, complete, and useable facility/supporting features for their intended use. The information shall be reflected in the design documents.

4.2 The Contractor is required to conduct all topographic surveys and necessary related activity in accordance with the information contained herein and as appropriate/applicable from the Base Design Standards. The reviewed and corrected (as appropriate) topographic survey shall be the basis for design of the topographic features and controls for all projects. This survey shall include all areas necessary to design and build all features required in base pricing schedule and option pricing schedule items. All Projects with data as a deliverable, will be delivered in Universal Transverse Mercator (UTM 12 North) coordinate system, World Geodetic System 1984 (WGS84) datum and use metric coordinate units. The North American Vertical Datum of 1988 (NAVD88) will be used as a basis for all elevations. As a part of each design submittal, the contractor/designer shall include the following information that will be imported into the Hill AFB GIS platform;

4.2.1 Ground elevation and simple building envelope massing (i.e.: entry canopy, equipment, etc.).

4.2.2 Elevation of each floor and/or Mezzanine.

4.2.3 Elevation of the roof plane, parapet, and all projecting objects (stacks/mechanical equipment above the roof plane, etc.)

4.2.4 Object envelope simple massing for all ground mounted equipment (i.e. transformers, chillers, compactors, compressors, bag filters, etc.).

4.3 The Government has provided existing geotechnical information in Attachment 8 to provide basic information on conditions. Additional geotechnical information is required and is the responsibility of the Contractor. The Contractor is required to conduct all geotechnical and foundation site explorations, laboratory analysis and results, and generate a geotechnical report with log of explorations in accordance with the information contained herein for all project structures, features, and utility systems. This report shall be the basis for the design of the Geotechnical related features of the project.

4.4 The Government has provided sufficient hazardous materials information in Appendix G to understand the site conditions. The Contractor shall perform additional hazardous materials survey as required, in accordance with Federal, State of Utah and local regulations. The survey shall represent a complete picture of the current condition in the affected areas for this project. Areas to be investigated include walls, wall cavities, area above the ceiling tiles, floor, drywall joint compound, HVAC joints/insulation, surfacing materials, and surfaces/components systems to be impacted by the renovation/demolition.

5 Specification Number & Drawing File Numbers

5.1 The general dwg file number for the FY17 649 MUNS Munitions Storage Magazines: 180-25-0950.

5.2 The log of boring file number is: 180-01-0950 (to be located in the lower-right hand corner in the drawing sheet border, outside the title block).

5.3 The topographic survey file number is; 180-13-0950 (to be located in the lower-right hand corner in the drawing sheet border, outside the title block).

5.4 The above supplied file numbers are intended to for tracking purposes, when assimilated into the government electronic map filing system. Use of numbers will depend on actual need for the documents.

5.5 Provide drawing deliverables in both BIM native format and AutoCAD format 2015 or the latest version. Horizontal disciplines (Geotechnical, Civil, Landscape] should be provided in CADD or CIM (Civil Information Modeling). Vertical disciplines (Structural, Architect, Mechanical, Plumbing, Elec, etc.] should be provided in Revit. Refer to the A/E/C CADD standards. The

Government will only accept the final product for full operation. Drawings produced by scanning drawings of record or containing photographic images shall be delivered in a raster format compatible with the target platform AutoCAD electronic digital format. Drawing files shall also be delivered in Portable Document Format (PDF). Media for deliverables shall be Compact Disc (in CD-R). Compact discs shall be furnished in addition to hard copy drawings. Text height for all Design drawings shall be minimum 1/8-inch high.

6 Design Charrette Meeting

6.1 During the third full week following the NTP the Contractor shall conduct a two-day Design Charrette Meeting at Hill AFB (location & time TBD) with Air Force Stakeholders to discuss the program requirements, to further develop floor plans, elevations, site plan, building orientation, traffic flow patterns, supporting feature locations, utility service connections/routings, and Beneficial Occupancy Date. The text height for all Design Charrette drawings shall be minimum 1/8-inch high. The Contractor shall establish the agenda. The Charrette shall be scheduled to begin on a Tuesday (nor adjacent to a Monday, which is a national holiday) to allow travel on a Monday.

6.2 Representing the Contractor shall be the Contractor's Project Manager and Design/Engineer Team (appropriate disciplines).

6.3 The Contractor shall chair the conference. Minimum requirements for the conference are:

6.3.1 The Contractor shall prepare and present, via PowerPoint presentation, their interpretation of the Contract requirements. Contractor will coordinate necessary presentation equipment. A copy of the PowerPoint slides shall be printed and bound and a copy given to each attendee at the beginning of the presentation.

6.3.2 The Contractor shall conduct appropriate "splinter" meetings and receive immediate input on their initial presentation.

6.3.3 The Contractor shall use and complete the ETL 01-1 "Reliability and Maintainability **Design Checklist**" during the Charrette to ensure aspects of the design/construction, typically missed, are brought forward and discussed. At the conclusion of the Charrette, each line item of the checklist shall be annotated YES-NO-N/A. Not Applicable "N/A" shall be used for features clearly not in the scope of the project. "No" shall be accompanied with an explanation as to why the feature is not being included in the design/construction --- the Contractor is cautioned to clarify a "No" interpretation early in the proposal process. The "No" response shall be the exception and clearly not a part of the contract --- the "Yes" response shall be the rule. This completed list shall be submitted with the Charrette submittal.

6.3.4 The Contractor shall make final adjustments to their presentation based on discussions and comments, and make a final presentation to the Hill AFB Base Civil Engineer. A copy of the PowerPoint slides (with adjustments) shall be included in the charrette submittal.

6.3.5 Within two-weeks following the Charrette, the Contractor shall distribute the design Charrette submittal and Meeting Minutes, for review and comment per the distribution matrix.

7 Design Quality Control Plan

7.1 The Contractor shall submit the Design Quality Control (DQC) Plan see Section 01 45 00 --- also cross reference to portions of this Section (01 33 16) that may have applicable additional design team, minimum qualifications. The Contractor shall correct this plan and re- submit until such time as the Contracting Officer accepts it. The Contracting Officer will not entertain a design charrette until the Contracting Officer accepts this plan. This plan is extremely important and allows the Government an opportunity to review processes proposed to be used by the Contractor. Since a technical review is no longer conducted on the design deliverables --- review of this plan by the Government helps to ensure steps are taken to reduce risk of error. The Contractor's DQC Plan shall provide and maintain an effective quality control program, which will assure that all services required by this design- build contract are performed and provided in a manner that meets professional design and engineering quality standards. ***The Contractor shall allow for a 15 WORKING DAY government review period for each submittal of the DQC Plan.***

7.2 CAUTION: A SUBMITTAL NOT READY FOR A GOV'T QUALITY ASSURANCE REVIEW WILL WASTE GOV'T RESOURCES AND POSSIBLY DELAY EXPECTATIONS OF THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE. IT IS EXTREMELY IMPORTANT EACH SUBMITTAL RECEIVE AN INTERNAL CONTRACTOR QUALITY CONTROL REVIEW, INDEPENDENT TECHNICAL REVIEW, AND CORRECTIONS **BEFORE** SUBMITTING TO THE GOV'T.

7.3 CAUTION: THE GOVT'S QUALITY ASSURANCE REVIEW IS DESIGNED TO BE A SPOT CHECK --- IT WILL NOT BE A TECHNICAL REVIEW --- ADEQUATE RESOURCES TO ACCOMPLISH ANYTHING MORE ARE NOT PROVIDED. THE CONTRACTOR MUST PERFORM QUALITY CONTROL ON ALL SUBMITTALS. THE CONTRACTOR IS CAUTIONED --- THE GOVERNMENT DOES NOT PLAN TO CONDUCT TECHNICAL REVIEW OF DESIGN DELIVERABLES SUBMITTED FOR REVIEW. THE GOVERNMENT REVIEW WILL NOT FOCUS ON THE CALCUALTIONS, CODE COMPLIANCE, OR ANY OTHER TECHNICAL ASPECT RELATED TO CONTRACT COMPLIANCE. NEVERTHELESS --- THE GOVERNMENT DOES RESERVE THE RIGHT TO MAKE SUCH COMMENTS SHOULD THE SITUATION ARISE.

8 Design and Construction Schedule

8.1 The contractor shall have the freedom to establish the design and construction schedule within contract period of service. However, the **schedule needs to consider an up to one hundred twenty (120) calendar day review period delay for the Final Design approval by the Department of Defense Explosive Safety Board (DDESB).** The Hill AFB explosives safety office will provide the design to DDESB for review. The design will not be allowed to proceed in Construction without final DDESB approval of the design. Both design schedule and construction

schedule data shall be placed on a single overall schedule to facilitate an overall understanding of the presented logic.

8.1.1 The contractor shall include on the schedule a ***15 WORKING*** day period for the government to conduct a quality assurance compliance review for each submittal.

8.1.2 The contractor shall include on the schedule a 1 calendar day period for a compliance review conference related to each submittal with the exception of the Charrette submittal. These conferences shall not be scheduled during a weekend or holiday or on a day of the week that is adjacent to a day of a weekend or holiday. This typically will leave Tuesdays, Wednesdays, or Thursdays (except as holidays impact) for these conferences.

8.2 The Contractor shall submit one schedule; consisting of both the design activities and the construction activities.

8.2.1 The design schedule shall be submitted within the first 20 calendar days after the date of Notice To Proceed. The design schedule shall include all activities associated with the design. On this schedule include as much clarity as can be provided of construction activities with appropriate logic.

8.2.2 The Contractor shall refine the schedule with finalized construction activities not later than 90 calendar days prior to the desired start of the construction activities; which includes any applicable site work. The construction schedule shall contain all activities associated with the design and construction of the project, complete and useable for its intended purpose. Construction performance shall not begin until a 15 calendar day period following the Contracting Officer's acceptance of the construction schedule has occurred. Re-submittals due to Contractor controlled deficiencies will not constitute a time or cost change to the contract. The Contracting Officer will have ***15 WORKING*** days to conduct review and provide comments to the Contractor for the submittal and each re-submittal. The Contractor is encouraged to discuss deficiencies with the Contracting Officer prior to re-submission.

9 Design Submittal Requirements

9.1 The contractor may be able to follow 'Fast-tracking' of construction, with contracting officer authority to proceed, however this is not a specific project requirement. This would be applied only on portions of the work for which the Government has reviewed the final design submission (on that portion of the work) and all Government review questions/concerns having been satisfactorily addressed by the contractor --- and the Contracting Officer provides authorization to proceed. If this portion of the work is sensitive to weather (heat, cold, rain, snow, wind, or any other weather situation) or any other situation precluding normal construction techniques, the contractor shall also submit to the Contracting Officer a plan to conduct this work (referencing and following industry standards or more stringent government standards) for compliance review. Therefore, construction on this project will not be held due to any typical inclement weather or other scenario conditions as long as the contractor first demonstrates the ability to construct in such condition with the above described plan and the Contracting Officer has provided authorization to proceed.

9.2 The Contractor and Contracting Officer will coordinate meetings with the Hill AFB Base Civil Engineer Staff/Representative and with the facility End-User to further discuss the requirements herein. The Contractor has the responsibility to establish the design of this project in accordance with the contract, including discussions with Hill AFB Organizations through proper coordination with the Contracting Officer. Such meetings are intended to allow the Contractor an opportunity to discuss, clarify, and obtain an understanding, in a face- to-face setting, on issues, opportunities, or mission restraints still in question. The spirit of this meeting is not intended to adjust the contract in any manner but rather to allow the Contractor/Customer relationship to begin and grow. This meeting can be associated with a partnering session or can be a stand-alone meeting but needs to occur early in the design phase of the contract.

9.3 Design deliverables will be submitted as identified within this section, during the design phase. However, for construction deliverables, refer to Section 01 33 00 for submittals that are required during the construction phase.

9.3.1 Every new construction feature of this project must be **fully** designed **and "For Construction" drawings submitted and approved** prior to the start of construction for that feature or interfacing features. The contractor shall try to minimize the number of design submittals. The Contractor can submit design deliverables from multiple tracks in the same submittal, when possible.

9.3.2 It's acceptable to take major areas of the design and put each on a minimum of two but no more than three submittal tracks (plus the Charrette Track), i.e., major area items vs percent complete for each track:

MAJOR AREA / Submittals →	1	2	3	4	5
Charrette Track	90%				
Civil/Architectural/Structural Track		60%	90%		
Mech/Fire Protection/Elec/Comm Track		60%	90%		

Where: 60% = Preliminary Design Submittal Compliance Review Submittal
90% = Charrette track --- or --- Final Design Complete, Fully Coordinated by Contractor, Ready to Build, Compliance Review Submittal
See Paragraph 1.1.1 above for URL to locate the description of:
60% is equivalent to Preliminary
90% is equivalent to Final

9.4 The contractor shall ensure applicable features of the Final design are developed to a further design level and submitted for compliance review a minimum of two times, but not more than three times. Every project feature shall be submitted in final form. The Contractor shall ensure all details be included in the design documents before start of construction; with exception of those items/features allowed to be submitted at a later date during construction by the Contracting Officer.

9.5 Every design submittal shall include a separately bound Contract Status Booklet of all

SF-30 contract modifications executed from contract award date to present on the contract. Included in this booklet shall be a copy of all RFIs submitted and the official clarification/recommendation responses (note --- RFI responses are not contract altering documents). Also include any official document(s) changing the conditions of the contract. This is an important booklet for the reviewers --- it'll give the reviewer a better understanding as to where the project has been since the contract was authored.

9.6 Each design submittal for review shall be distributed per the distribution matrix.

9.7 Each design submittal shall be completed to the stage/level commensurate with the stage of completion, i.e., 60%/90%, etc. All submittals for review shall be a required submittal. The Contractor shall determine his submittal scenario. For three submittals on a track, follow the distribution matrices below. For two submittals on a track, combine the 1st and 2nd round submittal matrix requirements into the 1st submittal. All of these deliverables shall be stamped "For Compliance Review Only --- %)"; and each sheet of the drawings shall have the same stamp. The back check submittal(s), following the Government reviews of the 90 percent final submittal, shall be packaged and stamped "For Compliance Back Check Review Only - 90% --- each sheet of the drawings shall be stamped.

9.8 The contractor shall ensure every feature of the design is developed to a further design level on subsequent submittals unless already fully designed. Every project feature shall be submitted in final form.

9.9 Each design submittal shall include a submittal register. This submittal register shall be developed commensurate with the level of the design submittal. The submittal register is further discussed in the RFP.

9.10 The construction submittal shall be stamped "For Construction" — each sheet of the drawings shall be stamped with this statement. In addition, each sheet of the drawings shall be stamped and signed by the valid Registered Engineer or valid Registered Architect responsible for the design shown. Included shall be the certifications from each of the independent technical reviewers. In addition --- each drawing shall also be stamped and signed by the responsible licensed professional technical reviewer (two signed stamps required on each drawing). CRITICAL --- the "For Construction" documents shall not be developed until all DrChecks comments for the related track have been appropriately addressed and cleared back check process and no further comments exist for the track. Then and only then shall the "For Construction" documents be created and distributed.

9.11 Each submittal shall include appropriate drawings, specifications and design analysis including calculations along with other requirements as noted herein and in the appendices. The Contractor shall prepare all drawing documents in AutoDesk AutoCAD, release 2015 format. The design drawings and technical specifications shall be dimensioned and specified using English traditional units of measure.

9.12 A compact disc of the entire submittal shall be developed and a single copy submitted to each addressee shown in the distribution matrix with each deliverable. It is paramount for

all specification sections on the CD to be searchable by either MSWord or Adobe Acrobat --- the specifications shall not be scanned files.

9.13 The Contractor shall use the Unified Federal Guide Specification (UFGS) system to develop appropriate specifications for the design. The Contractor shall not delete sections of the specifications without first coordinating with the Contracting Officer.

9.14 The Contractor shall follow the A/E/C Cadd Standards version 4.0 for layering, line weights, color assignments, etc., with local modifications, mainly in file naming, since we have base codes published. The other exception to the standards relates to the order of the drawings. The order of the drawings shall be in the following order: GSGCLSAIFMPE = General --- Surveys --- Geotechnical --- Civil --- Structural --- Architectural ---Interior Design--- Fire Protection --- Mechanical --- Plumbing --- Electrical --- Communications.

9.15 The use of shop drawings or continuation/extension of design (design defined, as requiring a design analysis, plans, and specifications) submittals once a design track has been finalized for construction shall not be allowed. The Contractor shall ensure the design is complete in all aspects before construction begins on the related track unless otherwise directed by the Contracting Officer.

10 Compliance Review Comments

10.1 Automated review management system: All review comments shall be processed via the Government program called DrChecks. The Contractor shall prepare for any appropriate comment review conference/meetings, by reviewing the comments in the DrChecks file(s). The Contractor shall print and bind ten (10) copies of comments and distribute them to attendees at the review conference. Unresolved comments/issues at the conference shall be resolved by immediate follow-on action. Valid comments shall be incorporated. The Contractor shall annotate the DrChecks file prior to the next design submittal. Annotations shall be entered for each comment in DrChecks. Annotations shall explain if the comment is accepted along with what was done and where it was done --- or --- if the comment is denied, an explanation as to why. The Contractor is encouraged to contact the comment maker of any comments not fully understood to enhance the accuracy of the response to the comment.

10.2 Assistance with DrChecks can be received by calling Mr. Steve Freitas at (916) 557-7296. Following contract award, the Contractor will need to contact Mr. Freitas to register and receive a login and password.

10.3 The design documents will not be considered 100% complete and ready for construction, until all comments for correction have been incorporated to the Government's satisfaction and further back check reviews are deemed no longer necessary. Review comments for correction will be based on compliance with the RFP document requirements.

10.4 Each design submittal shall be accompanied with all previous DrChecks files for the project on compact disc in "Word" or .pdf format.

11 Compliance Review Conferences

11.1 All compliance review conferences shall be held at Hill AFB --- location to be determined prior to each conference.

11.2 The contractor shall be represented at these review conferences by each design discipline and the construction manager as a minimum.

11.3 Each conference shall be planned to occur over a 1.0-day period.

11.4 The Contractor shall prepare for and provide a briefing of the project to a Hill AFB audience during each compliance comment review conference. This briefing should focus on the functional and Customer mission related features of the project. The briefing will occur within the 1.0-day conference schedule. Overhead slides or other briefing materials are not required or preferred in support of this activity. Already-prepared project drawings, project renderings, and project color boards are the preferred briefing materials.

11.5 The Contractor shall prepare the confirmation notice (meeting minutes) for each conference within 14 calendars following each conference and email a copy to all attendees and stake holders listed on the distribution listing in this section. The confirmation notices shall list all action items discussed along with taskings (Contractor or Gov't), all issues discussed with decisions, and latest schedule of upcoming events as a minimum.

12 Environmental Permits

12.1 Contractor shall pay for and obtain all permits required for the successful execution of this project. Submittal of the Environmental Permits to the Regulatory Agencies shall be accomplished with coordination of the Contracting Officer and the Hill AFB Environmental Shop.

13 Design Team Qualifications

13.1 After award of the contract, the Contractor shall demonstrate to the Contracting Officer for comment (with resumes and other appropriate documentation) the required qualifications of the following key design-related personnel. Important Note: The resumes must provide sufficient detail and documentation to clearly substantiate that all minimum qualification criteria are met. The Contracting Officer will make final acceptance/non-acceptance of the personnel proposed. Prior to the start of the design charrette meeting the Contractor shall propose and receive acceptance/selection of the entire design team by the Contracting Officer. The independent technical reviewers shall receive acceptance from the Contracting Officer prior to the submittal of the first design submittal following the charrette meeting. The Contractor shall continue to propose qualified design team members until such time as the Contracting Officer determines the individuals meet the minimum qualifications for the related position. The minimum qualifications are:

13.1.2 **Project Site Safety and Health Officer (SSHO):** See Section 01 35 26 for related submittal requirements.

13.1.4 **Design Team Discipline Leads:**

13.1.4.1 **Structural Engineer**: Structural engineer licensed to practice in the State of Utah and with minimum of 6 years design experience in this type of building construction.

13.1.4.2 **Civil Engineer, Electrical Engineer and Other Engineering Disciplines**: The design of architectural, structural, mechanical, fire protection, electrical, civil, and other engineering features of the work shall be accomplished, independently reviewed, and approved by engineers, and architects, licensed to practice in their respective professional field in a state or possession of the United States, in Puerto Rico, and the District of Columbia. They each shall have knowledge of local building and seismic codes. The lead designer for each discipline of the design team shall be a licensed professional Engineer/Architect with a minimum of six years' experience. The overall Design Team Leader shall be the appropriate discipline, involved in most of the work, on this project.

13.1.5 **Independent Technical Reviewers:**

13.1.5.1 This team of professionals shall meet the same minimum requirements as the Design Team Discipline Leads.

13.1.6 **Design Quality Control Manager:** (See Section 01 45 00):

13.1.6.1 The Design Quality Control Manager shall be a person who has verifiable engineering or architectural design experience and is a registered professional engineer or architect. This individual shall not perform duties listed in paragraph 13.1.2 above.

13.1.7 **Design Coordination Manager:** (See Section 01 45 00):

13.1.7.1 The Design Coordination Manager is an employee of the construction contractor. This individual shall be a person who has verifiable engineering or architectural design experience and is a registered professional engineer or architect.

14 Independent Technical Review:

14.1 The Contractor shall include an independent technical review process with reviewers/organizations in the Design Quality Control Plan. The Contractor shall require the design documents for each track deliverable to undergo an independent technical review by engineers, architects, and interior designers licensed to practice in their respective professional field in a state or possession of the United States, in Puerto Rico, and the District of Columbia. These reviews shall be accomplished by other than the qualified design personnel identified in Paragraph No. 13 above, so the ITR will truly be an 'Independent' review.

14.2 For each track deliverable, the Contractor shall provide a signed certification letter from each independent technical reviewer --- with professional license number. This certification shall document the independent technical review procedure performed (per the approved Design Quality Control Plan) and certify the submittal meets the minimum requirements set forth in the contract.

14.3 For the "For Construction" set of plans and specifications, the Contractor shall provide a signed certification letter from each independent technical reviewer --- with license number. This certification shall document the independent technical review procedure performed (per the approved Design Quality Control Plan) and certify the submittal meets the minimum requirements set forth in the contract. In addition, each drawing in the set shall be stamped and signed by the individual Architect/Engineer responsible for the design on each sheet --- **AND** --- shall be stamped and signed by the independent technical reviewer responsible for the independent technical review for that sheet and associated specifications. Each drawing sheet shall be stamped and signed twice --- no exceptions.

15 "For Construction" set of Plans and Specifications

15.1 Seven calendar days following the conclusion of all design processing (when all DrChecks comments have been addressed in all DrChecks files associated with all submittal tracks of the design effort) the Contractor shall assemble the comprehensive set of drawings and specifications deliverable (include all data provided in earlier "for construction" documents). This deliverable shall be submitted per the distribution matrix herein.

16 TRANSMITTAL TO GOVERNMENT AGENCIES:
16.1 SUBMITTAL DISTRIBUTION REQUIREMENTS

TITLE: 649 MUNS Munitions Storage Magazines **LOCATION:** HILL AFB, UT
FY: 17 **PROJ NO.:** KRSM 143007

Charrette Submittal all drawings to be (ANSI "B") size/format	MAJ	DIST	RES	CONS	BCE								
Include 1 cd of entire submittal to each addressee	1	2	3	4	5								
CONTEXTUAL PHOTOS			6	2	6								
ANALYSIS PLAN			6	2	6								
SITE/LAYOUT PLANS			6	2	6								
CROSS SECTIONS/ELEVATIONS/DETAILS			6	2	6								
MEETING MINUTES W/COMPLETED DES CHECKLIST (ETL 01-1)	1	1	6	2	6								
DESIGN QUALITY CONTROL PLAN (SHORTLY AFTER NTP)			2	2	2								

1st Round Design Submittal for this Project Feature (60% Quality/Compliance Assurance Review Submittal) (DrChecks comments, as appropriate, from Charrette to be annotated prior to shipping this submittal)	MAJ	DIST	RES	CONS	BCE								
Include 1 cd of entire submittal to each addressee	1	2	3	4	5								
60% DRAWINGS (ANSI "B")	1	1	6	2	6								
60% DRAWINGS (ANSI "D")			1	1	2								
SPECS/CATALOG CUTS			6	2	6								
DESIGN ANALYSIS WITH CALCULATIONS			6	2	6								
CONTRACT STATUS BOOKLET			2	2	2								
DRAFT DD FORM 1354 AND REAL PROPERTY FORM			1	1	2								
SUBMITTAL REGISTER			6	1	6								
CERTIFICATION LETTERS			1	1	1								
KEY SUBS/CONSULT'S LETTER OF INVOLVEMENT			1	1	1								
DRCHECKS FILE ANNOTATED (IN DRCHECK SYSTEM)													

2nd Round Design Submittal for this Project Feature (90% Final Quality/Compliance Assurance Review Submittal) (DrChecks comments from 1st Round submittal have been annotated prior to shipping this submittal)	MAJ	DIST	RES	CONS	BCE								
Include 1 cd of entire submittal to each addressee	1	2	3	4	5								
FINAL DRAWINGS (ANSI "B")	1	1	6	2	6								
FINAL DRAWINGS (ANSI "D")			1	1	2								
SPECS/CATALOG CUTS			6	2	6								
DESIGN ANALYSIS WITH CALCULATIONS			6	2	6								
CONTRACT STATUS BOOKLET			2	2	2								
DD FORM 1354 AND REAL PROPERTY FORM			2	1	2								
SUBMITTAL REGISTER			6	1	6								
ELECTRONIC WORD PROCESSING FILES OF ALL OTHER DOCS			2	1	2								
CERTIFICATION LETTERS			2	1	2								
KEY SUBS/CONSULT'S LETTER OF INVOLVEMENT			2	1	2								
DRCHECKS FILE ANNOTATED (IN DRCHECK SYSTEM)			2	1	2								

Design Back check Submittal *Repeat as needed* (Includes all other requirements noted)(Submit only shts/pgs of changes for each submittal cycle along with other documentation needed by the reviewer to complete back check) (DrChecks comments from previous submittal have been annotated prior to shipping this submittal)	MAJ	DIST	RES	CONS	BCE								
Include 1 cd of entire submittal to each addressee	1	2	3	4	5								
DRAWINGS (ANSI “B”)	1	1	6	2	6								
DRAWINGS (ANSI “D”)			1	1	2								
SPECS/CATALOG CUTS			6	2	6								
DESIGN ANALYSIS WITH CALCULATIONS			6	2	6								
DD FORM 1354			1	1	2								
SUBMITTAL REGISTER			2	1	2								
ELECTRONIC FILES (DRAWINGS/DOCUMENTS) (AUTOCAD 2015 VERSION COMPATIBLE)	1	1	1	1	1								
DEMOLITION PLAN			2	1	2								
CERTIFICATION LETTERS			2	1	2								
DRCHECKS FILE ANNOTATED (IN DRCHECK SYSTEM)													

*

For Construction set (Provide 7 days after notification of all compliance review comments in all DrChecks files on the project have been adequately addressed)	**MAJ**	**DIST**	RES	**CONS**	**BCE**								
Include 1 cd of entire submittal to each addressee	**1**	**2**	**3**	4	5								
DRAWINGS (Each discipline lead drawing sheet shall be stamped and signed by the responsible Professional Engineer or Architect licensed to do so, i.e., "G" and "A" etc). Combine and coordinate into a single drawing and spec set the drawings and specs sections for all tracks.													
CONSTRUCTION DRAWINGS (ANSI "B")	**1**	**1**	**6**	**2**	**6**								
CONSTRUCTION DRAWINGS (ANSI "D")			**1**	**1**	**2**								
CONSTRUCTION SPECS/CATALOG CUTS			**6**	**2**	**6**								
ELECTRONIC CADD FILES OF ALL DRAWINGS (BIM & AUTOCAD 2015 VERSION COMPATIBLE AND .pdf FORMAT)	**1**	**1**	**1**	**1**	**2**								
DD FORM 1354 AND REAL PROPERTY FORM			**1**	**1**	**4**								
DESIGN ANALYSIS WITH CALCULATIONS			**6**	**1**	**6**								

As-Built Drawings Submittal (Provide 21 calendar days after final inspection and project acceptance)	MAJ	DIST	RES	CONS	BCE								
	1	2	3	4	5								
AS-BUILT DRAWINGS (paper) (ANSI “D”)			1	1	2								
ELECTRONIC FILES OF ALL DRAWINGS (BIM & AUTOCAD 2015 VERSION COMPATIBLE)	1	1	1	1	2								
UPDATED DD FORM 1354 DATA AND UPDATED PROPERTY DATA FORM (SEE SECTION 01 33 16)			1	1	2								

16.2 Offices for Distribution

Code Number	Agency	Mailing Address
1	MAJ	HQ AFCEE/CMC ATTN: Jaime Cantu 3515 S. General McMullen San Antonio TX 78226-2018 (210) 395-8240
2	DIST	US Army Corps of Engineers ATTN: PM-M, Arianna Raymundo 1325 "J" Street Sacramento, CA 95814-2922 (916) 557-6748
3	RES	US Army Corps of Engineers Utah Resident Office ATTN: Drasa Maciunas 7227 6th Street, Bldg. 366 Hill AFB, UT 84056 (801) 586-3296
4	CONS	US Army Corps of Engineers ATTN: CO-C, Julito Ganchero 1325 "J" Street Sacramento, CA 95814-2922 (916) 557-7779
5	BCE	75 CEG/CEPM ATTN: Mr. Christopher Paxman 5713 Lahm Lane, B/593 North Hill AFB, UT 84056-5410 (801) 777-0982

16.3 Hill AFB DD FORM 1354 additional requirements to be submitted with each DD FORM 1354 submittal requirement:

REQUIRED REAL PROPERTY DATA

1. **New Construction/Additions – Facility**
2. **New Construction - Infrastructure**
3. **Demolition - Facility**
4. **Demolition - Infrastructure**

1. **New Construction/Additions** **Project#**_____ **Work Order #** _____
Facility#_____ **Installation**_____ **Category Code**_____

Total Unit of Measure (SF, SY, Other)_____ (_____) $_____
(cost excludes systems)

Dimensions

Outside _____x FT
_____

Wings _____x_____FT
Offsets _____x_____FT

Number of floors _____

Type Construction (Concrete, block, metal, etc.)
Foundation _____
Floor _____
Wall _____
Roof _____

Utilities (Check when applicable)
Water ____
Sewage ____
Electric ____
Gas ____
Steam ____
Heat Source (Specify type: Gas, Steam, Fuel Oil, Electric, etc.)
_____

Fire Detection
Automatic Fire Detection System _____EACH_____SF
$_____
Automatic Fire Alarm/Reporting _____EACH_____SF
$_____
Manual Alarm System

Exterior _____BOXES 2093
$_____
Interior _____BOXES
$_____

Sprinkler Systems

Closed Head Automatic _____HDS_____SF
$_____

Open Head Deluge _____HDS _____SF
$_____

Pre-Action _____HDS_____SF
$_____

AFFF Pre-Action _____HDS_____SF
$_____

Other Fire Suppression System

High Expansion Foam _____EACH
$_____

Carbon Dioxide _____EACH
$_____

Protein Foam/Water Deluge _____EACH
$_____

Halon _____EACH
$_____

Dry Chemical System _____EACH
$_____

Foam Systems (Tank Farm) _____EACH
$_____

Other _____EACH
$_____

Air Conditioning /Evaporative Cooler

Less than 5 ton	_____SF	_____TN	$_____
5 to 25 ton	_____# of Units	_____TN	$_____
25 to 100 ton	_____# of Units	_____TN	$_____
Over 100 ton	_____# of Units	_____TN	$_____

Heating

750/3500 MB	_____MB	$_____	
Over 3500 MB	_____MB	$_____	
From Central Plant	_SF	$_____	Fuel Oil
Storage	_____GA	$_____	Gas
Source	_____SF	_____MB	$_____

Energy Monitoring and Control Systems (EMCS)

Central Station Equipment	_____EACH	$_____
Field Equipment	_____EACH	$_____
Data Lines	_____LF	$_____

2093

Security Alarm System _____EACH $_____

Air Compressor _____HP $_____

Compressed Air Distribution Lines _____LF $_____

Electric Emergency Power Generator _____KW $_____

Storage Tank for Fuel (Type) _____GA
$_____

2.New Construction/Additions- Infrastructure

Installation_____ Project#_____ Work Order #_____

Roads _____SY _____LF $_____

Curb & Gutter _____LF $_____

Driveway _____SY $_____

Vehicle Parking Areas
Organization Vehicles _____SY $_____
Private Owner Vehicles _____SY $_____
Refueling Vehicles _____SY $_____

Sidewalk _____SY $_____

Street Lights _____EACH $_____

Boundary Fence
Chain Link _____LF $_____
Block Wall _____LF $_____

Interior Fence
Chain Link _____LF $_____
Block Wall _____LF $_____

Security Fence			
Chain Link	_____	LF	$_____
Block Wall	_____	LF	$_____
Exterior Lighting			
Street Lights	_____	EACH	$_____
Security Lights	_____	EACH	$_____
Apron Floodlighting	_____	EACH	$_____
Electric Aircraft Outlets	_____	EACH	$_____

Water Distribution Mains			LF	$
Non potable Fire			LF	$
Protection Main			LF	$
Fire Hydrants			EACH	$
Fire Pumps	GM	SF		$
(internal combustion, steam or electric drivers)				
Fire Protection Water Storage			KG	$
Storm Drains			LF	$
Sanitary Sewage Main			LF	$
Industrial Waste Main			LF	$
Industrial Waste Fuel Spill Collector			KG	$
Gas Mains			LF	$
Primary Electrical Distribution Lines				
Overhead			LF	$
Underground			LF	$
Secondary Electrical Distribution Lines				
Overhead			LF	$
Underground			LF	$
Utility Line Ducts			LF	$
Steam Heat Mains			LF	$
Sanitary Sewage Mains			LF	$

Pad (for propane tank)	_____SY	$_____2093
Pre-Engineered Revetment	_____LF	$_____
Other	_____	$_____

3. **Demolition - Facility** **Project#**_____ **Work Order #** _____

Facility#_____ **Installation**_____

4. **Demolition - Infrastructure** **Installation**_____ **Project#**_____
Work Order # _____

Roads	_____SY	_____LF	$_____
Curb & Gutter		_____LF	$_____
Driveway		_____SY	$_____
Vehicle Parking Areas			
Organization Vehicles		_____SY	$_____
Private Owner Vehicles		_____SY	$_____
Refueling Vehicles		_____SY	$_____
Sidewalk		_____SY	$_____
Street Lights		_____EACH	$_____
Boundary Fence			
Chain Link		_____LF	$_____
Block Wall		_____LF	$_____
Interior Fence			
Chain Link		_____LF	$_____
Block Wall		_____LF	$_____
Security Fence			
Chain Link		_____LF	$_____
Block Wall		_____LF	$_____
Exterior Lighting		Apron Floodlighting	
Street Lights			
Security Lights			

		$_____		
_____EACH		_____	EACH	$_____
		_____	EACH	$_____
Electric Aircraft Outlets		_____	EACH	$_____
Water Distribution Mains		_____	LF	$_____
Non potable Fire		_____	LF	$_____
Protection Main		_____	LF	$_____
Fire Hydrants		_____	EACH	$_____
Fire Pumps	_____GM	_____	SF	$_____

(internal combustion, steam or electric drivers)

Fire Protection Water Storage	_____	KG	$_____
Storm Drains	_____	LF	$_____
Sanitary Sewage Main	_____	LF	$_____
Industrial Waste Main	_____	LF	$_____
Industrial Waste Fuel Spill Collector	_____	KG	$_____
Gas Mains	_____	LF	$_____
Primary Electrical Distribution Lines			
Overhead	_____	LF	$_____
Underground	_____	LF	$_____
Secondary Electrical Distribution Lines			
Overhead	_____	LF	$_____
Underground	_____	LF	$_____
Utility Line Ducts	_____	LF	$_____
Steam Heat Mains	_____	LF	$_____
Sanitary Sewage Mains	_____	LF	$_____
Pad (for propane tank)	_____	SY	$_____
Pre-Engineered Revetment	_____	LF	$_____
Other	_____		$_____

17 Contractor Processing of DrChecks File

17.1 Unresolved problems will be resolved by immediate follow-on action at end of conferences. The Contractor shall submit to the Contracting Officer within five (5) calendar days, two (2) copies of a Confirmation Notice for the Compliance Assurance Review Conference summarizing major decision points and issues which requires resolution and the action office.

17.2 On receipt of corrected submittal documents and at the point at which all comments in the DrChecks System have been adequately addressed (to Sacramento District's satisfaction), the Sacramento District will provide notification to the Contracting Officer noting that all comments have been addressed. Withholding payment for unsatisfactory performance shall be made in accordance with CONTRACT CLAUSE, FAR 52.232-5, PAYMENTS UNDER FIXED-PRICE CONSTRUCTION CONTRACTS.

17.3 The Contractor shall annotate the respective DrChecks File for each phase of the design showing page or sheet and verse where the correction was made and what the correction consists of — this to assist the reviewers to quickly find the adjustment. These Contractor annotated DrChecks files shall be made on the DrChecks web site before the next submittal is received by the reviewers — therefore action is a part of the submittal requirements.

17.4 The Contractor shall submit corrected submittal documents (back check) as noted above. Again — the appropriate DrChecks file shall be annotated and ready on the web site on or before the day the reviewers receive the back check submittal.

17.5 The Back check process along with the availability of the Contractor annotated DrChecks file on the web site shall continue until all comments in the DrChecks file have been adequately addressed to the satisfaction of the Government Reviewers.

--End of Section--

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SECTION 01 33 29

SUSTAINABILITY REPORTING
02/15

PART 1 GENERAL

1.1 REFERENCES

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

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

ASHRAE 189.1	(2011; Errata 1-2 2012; INT 1 2013; Errata 3-8 2013) Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings

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

ANSI/SMACNA 008	(2007) IAQ Guidelines for Occupied Buildings Under Construction, 2nd Edition

U.S. DEPARTMENT OF ENERGY (DOE)

ISWG Guiding Principles	(2008) High Performance and Sustainable Buildings Guidance

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

40 CFR 247	Comprehensive Procurement Guideline for Products Containing Recovered Materials

1.2 SUMMARY

This specification includes general requirements and procedures for this project to be constructed and documented per the federally mandated "Guiding Principles" (GP), Third Party Certification (TPC) requirements, UFC 1-200-02 High Performance and Sustainable Building Requirements, and other requirements identified in this specification.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor QC approval. Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance to this section. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Preliminary Sustainability Notebook; G, DO

Preliminary High Performance and Sustainable Building Checklist

SD-07 Certificates

Third Party Certification (TPC)

SD-11 Closeout Submittals

Final Sustainability Notebook; G

Final High Performance and Sustainable Building Checklist; G, DO

Amended Final Sustainability Notebook; G, DO

Third Party Certification Certificates; G, RO

1.4 GUIDING PRINCIPLES VALIDATION (GPV)

Provide sustainability documentation to verify achievement of ISWG Guiding Principles Validation (GPV). Provide the following for GPV:

a. Refer to Attachment 1, HPSB Checklist at the end of this specification section.

b. Obtain approval of any changes to the HPSB Checklist from the Contracting Officer at the Initial Design Conference. Contracting Officer's approval establishes identified ISWG Guiding Principles Requirements as the project's sustainability goals.

No variations or substitutions to the HPSB Checklist are allowed without written consent from the Contracting Officer. Immediately bring to the attention of the Contracting Officer any changes that impact meeting the approved ISWG Guiding Principles Requirements for this project and demonstrate that change will not incur additional construction cost or increase the life cycle cost.

c. Include all work required to incorporate the applicable ISWG Guiding Principles Requirements indicated on the HPSB Checklist and in this contract.

d. Include construction related documentation to maintain an up-to-date Sustainability Notebook. Supplement construction related documentation containing the following components;

(1) HPSB Checklist

(2) Sustainability Action Plan

(3) Documentation illustrating Guiding Principle (GP) Requirements compliance

(4) Commissioning Plan and Reports

1.4.1 Sustainability Action Plan

Include the following information in the Sustainability Action Plan:

a. Contractor's planned method to achieve each GP requirement.

b. For each designated construction related ISWG Guiding Principles Requirements that is not achieved, provide narrative explaining how mission or activity precludes achieving specific sustainability requirement or goal. Provide analysis of particular requirement and level to which project is able to comply.

c. Name and contact information for: Contractor's POC responsible for ensuring sustainability goals are accomplished and documentation is assembled.

1.4.2 Costs

Contractor is responsible for all costs associated with constructing and demonstrating that project complies with approved ISWG Guiding Principles Requirements.

1.4.3 Calculations

Provide calculations, product data, and certifications required in this section to demonstrate compliance with the ISWG Guiding Principles Requirements.

1.4.4 Third Party Certification (TPC) Documentation

This project must be designed and constructed to achieve a compliant rating using the GBCI GP Assessment. Provide all documentation in the format required by the TPC Organization to the Contracting Officer for approval and for final approval by the TPC organization. Third Party Certification is met when Government receives TPC organization certificate. Include the following:

a. The TPC Checklist as approved by the Contracting Officer at the Initial Design Conference.

No variations or substitutions to the approved TPC checklist are allowed without written consent from the Contracting Officer. Immediately bring to the attention of the Contracting Officer any project changes that impact meeting the approved TPC Requirements for this project. Demonstrate that change will not: incur additional construction cost; increase the life cycle cost; impact previous TPC Design Review; or impact required TPC certification level.

b. All work required to incorporate the applicable TPC Requirements into the design and construction of the project.

c. All related information, and provide replacement pages, in the Sustainability Notebook pertaining to additions and changes to the approved sustainability requirements. The Sustainability Notebook is in electronic format and is explained in the paragraph entitled "SUSTAINABILITY NOTEBOOK". The Sustainability Notebook contains the following components in addition to the GPV components above:

(1) TPC Checklist

(2) Sustainability Action Plan

(3) Completed TPC documentation for each identified prerequisite and credit. Upload onto the TPC Online documentation website.

(4) Copy of all correspondence with the TPC organization.

d. Include the following information in the Sustainability Action Plan. Provide this TPC information in addition to the GPV Sustainability Action Plan items above:

(1) Contractor's planned method to achieve each TPC requirement.

(2) For each required TPC credit that is attempted but not achieved, provide narrative explaining how mission or activity precludes achieving specific sustainability requirement or goal. Provide analysis of particular requirement and level to which project is able to comply.

(3) Provide the commissioning plan and schedule for performance testing.

(4) Name and contact information for: Contractor's Sustainability POC and other names of sustainability professionals on the Contractor's Staff responsible for ensuring TPC sustainability goals are accomplished and documentation is assembled. Contractor's Sustainability POCs are also responsible for ensuring GPV required in paragraph GUIDING PRINCIPLES VALIDATION (GPV) above.

e. Contractor is responsible for all costs associated with constructing and demonstrating that project complies with approved TPC requirements, including but not limited to:

(1) TPC coordination with Government's AE and other consultants, TPC website requirements, and management of related documentation.

(2) Submittals required to demonstrating compliance with Government approved TPC checklists.

f. Provide all calculations, product data, and certifications required in this contract to demonstrate compliance with the TPC Requirements of this section.

1.4.5 Third Party Certification (TPC)

Contractor is responsible for registering and meeting all requirements to achieve Third Party Certification (TPC) GP compliance certification using the GBCI GP Assessment, or other Government-approved equivalent TPC sustainability certification. An equivalent TPC organization must demonstrate equivalency for Government consideration, prior to use on the project. Third Party Certification is met when Government receives TPC organization certificate

Register project with TPC organization using the following format and content:

a. Project Title First Line: US Air Force, Building Name (if known)

b. Project Title Second Line: MILCON P#, DD1391 Project Name

c. Project Address: UIC (Installation code), Category code, RPUID (Real Property Unique Identifier) Number

d. Project Owner Organization: US Air Force

e. Primary Contact, Owner: Agency Project Manager

f. Additional Contact, Building Owner: Civil Engineering Officer or Designee

The TPC Certification requires the following:

a. Refer to Attachment 1, HPSB Checklist at the end of this specification section.

b. Complete all work required to incorporate the applicable TPC Requirements.

c. Maintain related information, and provide replacement pages, in the Sustainability Notebook pertaining to additions and changes to the approved sustainability requirements. The Sustainability Notebook is in electronic format and is explained in the paragraph entitled "SUSTAINABILITY NOTEBOOK". The Sustainability Notebook contains the following components in addition to the GPV components above:

(1) TPC Checklist

(2) Completed TPC Online forms for each GP requirements

(3) Copy of all correspondence with the TPC organization including proof of TPC registration

(4) Documentation illustrating compliance with TPC requirements

(5) TPC Award Certificate

d. Include the following information in the Sustainability Action Plan. Provide this TPC information in addition to the GPV Action Plan items above:

(1) Contractor's planned method to achieve each TPC requirement.

(2) For each required TPC credit that is attempted but not achieved, provide narrative explaining how mission or activity precludes achieving specific sustainability requirement or goal. Provide analysis of particular requirement and level to which project is able to comply.

(3) Name and contact information for: Contractor's Sustainability POC and other names of sustainability professionals on the Contractor's Staff responsible for ensuring TPC sustainability goals are accomplished and documentation is assembled

(4) Provide the plan and schedule for performance testing, data collection, and commissioning to take place during first year of facility usage.

e. Contractor is responsible for all costs associated with constructing and demonstrating that project complies with approved TPC requirements, including but not limited to:

(1) Initial TPC registration fees

(2) Final TPC review and certification fees

(3) Online TPC management and documentation.

(4) Obtaining TPC certification based on Government-approved sustainability goals.

(5) Construction work required to incorporate TPC prerequisites and credits.

(6) Submittals required to demonstrate compliance with Government approved TPC checklists.

f. Provide all calculations, product data, and certifications required in this specification to demonstrate compliance with the TPC Requirements.

g. Provide all online TPC management and documentation.

h. Contractor is responsible for all required responses to TPC.

i. Provide TPC Certificates. Use format below to create the Certificate and Letter of Congratulations. Forward to parties designated by Contracting Officer:

Certificate:

Project Title, first line: P-(X); Form DD1391 Project Name).

Project Title, second line: UIC (Installation code)

(2) Letter Congratulations:

Address letter to Facility's Installation commander Name. Address the letter to an individual person.

1.5 SUSTAINABILITY SUBMITTALS

Provide documentation in the Sustainability Notebook and the HPSB Checklist to indicate compliance with the sustainability requirements of the project.

1.5.1 "S" Submittals for Sustainability Documentation

Submit the GPV and TPC sustainability documentation required in this specification as "S" submittals. Highlight GPV and TPC compliance data in "S" submittal.

1.5.2 SUSTAINABILITY NOTEBOOK

Provide and maintain a comprehensive Sustainability Notebook to document compliance with the sustainability requirements identified in the approved HPSB and TPC Checklists. Sustainability Notebook must contain all required data to support full compliance with the ISWG Guiding Principles Requirements and TPC requirements. Sustainability Notebook is in the form of an Adobe PDF file, bookmarked at each ISWG Guiding Principles and TPC requirement, and sub-bookmarked at each document. Match format to ISWG Guiding Principles numbering system indicated in UFC 1-200-02 Maintain up to date information, spreadsheets, templates, and other

required documentation with each current submittal. For TPC projects, provide a second Table of contents using TPC numbering system. Locate documentation unique to TPC here. Where TPC documentation would repeat GP documentation, insert note referring reviewer to GP documentation.

Contracting Officer may deduct from the monthly progress payment accordingly if Sustainability Notebook information is not current, until information is updated and on track per project goals.

1.5.2.1 Sustainability Notebook Submittal Schedule

Provide Sustainability Notebook Submittals at the following milestones of the project:

a. Preliminary Sustainability Notebook

Submit preliminary Sustainability Notebook for approval at the Pre-construction conference. Include Preliminary High Performance and Sustainable Building Checklist.

b. Construction Progress Meetings. Update GP and TPC documentation in the Sustainability Notebook and TPC Online tool for each meeting.

c. Final Sustainability Notebook

Submit updated Sustainability Notebook within 60 days after the Beneficial Occupancy Date (BOD). Final progress payment retainage may be held by Contracting Officer until final sustainability documentation is complete. Submit three (3) electronic copies of the Final Sustainability Notebook on DVDs to the Government. Include Final High Performance and Sustainable Building Checklist.

d. Amended Final Sustainability Notebook

Amend and resubmit the Final Sustainability Notebook to include commissioning, testing and balancing, and collection of performance requirements. Submit three (3) final electronic copies of the Amended Final Sustainability Notebook Submittal on DVDs to the Government no longer than 30 days after the GP, TPC, and Cx designated data collection period.

1.5.3 HIGH PERFORMANCE SUSTAINABLE BUILDING (HPSB) CHECKLIST

Provide construction documentation that provides proof of and supports compliance with the completed HBSP Checklist.

1.5.3.1 HPSB Checklist Submittals

Submit an updated copy of the HPSB Checklist with each Sustainability Notebook submittal. Attach HPSB Checklist to DD1354 Real Property Record Submittal.

1.5.3.2 HPSB Checklist Public Access

Where not included as attachment to this specification section, use the following as HPSB Checklist for respective service branch. Where Internet address appears on two lines, copy full address into Internet browser.

a. Air Force - Air Force MILCON Sustainability Requirements

Scoresheet, Attachment 3 of "AF Sustainable Design Development Implementing Guidance Memo"
http://www.wbdg.org/ccb/browse_cat.php?c=265

1.6 DOCUMENTATION REQUIREMENTS

Documentation used to demonstrate TPC compliance may be used to demonstrate GP compliance.

Incorporate each of the following ISWG Guiding Principles Requirements into project design and construction and provide documentation that proves compliance with each listed requirement. Items below are organized according to the ISWG Guiding Principles. For projects that require TPC, refer to Third Party Certifier's reference manuals for TPC requirements.

1.6.1 Commissioning

Work with the Commissioning Authority (CxA) to achieve requirements of the Commissioning plan and other contract document requirements at each stage of commissioning. Maintain up-to-date records of commissioning activities in the Sustainability Notebook, to include commissioning plan and summary commissioning report.

1.6.2 Energy Efficient Equipment

Provide only energy-using equipment that is Energy Star rated, or has the Federal Energy Management Program (FEMP) recommended efficiency. Where Energy Star or FEMP recommendations have not been established, provide equipment with efficiency in the top 25 percent for the type of equipment procured. Provide only energy using equipment that meets FEMP requirements for low standby power consumption. Energy efficient equipment can be found at: http://www1.eere.energy.gov/femp/ and http://www.energystar.gov/. Provide the following documentation:

Proof that equipment is energy efficient and complies with the cited requirements.

1.6.3 Benchmarking

Provide report of initial actual energy performance with the energy design targets. Provide the following documentation:

Prefinal Performance Report with data collected from the first 60 days of operation of the facility after Beneficial Occupancy Date (BOD). Submit this information with the Final Sustainability Notebook Submittal.

1.6.4 Reduce Volatile Organic Compounds (VOC)

Provide materials and products with low pollutant emissions, including composite wood products, adhesives, sealants, interior paints and finishes, carpet systems, and furnishings. Meeting the requirements of ASHRAE 189.1 Sections 8.4.2 (Prescriptive Option: Materials) or Section 8.5.2 (Performance Option: Materials) demonstrates compliance. Provide the following documentation:

a. Demonstrate that materials do not exceed maximum VOC emissions of cited standards. VOC averaging is allowed where coatings are subject to human contact or harsh environmental conditions.

b. Demonstrate that flooring materials comply with VOC emissions of cited

standards.

c. Demonstrate that composite wood and agrifiber products and associated laminating adhesives contain no added urea-formaldehyde.

d. Demonstrate that furniture and seating complies with low emissions requirements.

e. Create and maintain a list of above listed products used on the project within the building vapor barrier. Demonstrate how product meets cited standards.

1.6.5 Indoor Air Quality During Construction

Prior to construction, create indoor air quality plan. Implement IAQ plan during construction and flush building air before occupancy.

a. Construction submittal documentation required:

(1) For new construction and for renovation of unoccupied existing buildings, comply with ASHRAE 189.1 Section 10.3.1.4. (Indoor Air Quality (IAQ) Construction Management), with maximum outdoor air consistent with achieving relative humidity no greater than 60 percent. For renovation of occupied existing buildings, comply with ANSI/SMACNA 008 IAQ Guidelines for Occupied Buildings Under Construction.

(2) Provide required documentation showing that after construction ends and prior to occupancy, new HVAC filters were installed, and building air was flushed out in accordance with UFC 1-200-02.

1.6.6 Recycled Content

Provide materials on this project with aggregated total recycled content greater than 10 percent. In addition, comply with 40 CFR 247. Refer to http://www.epa.gov/cpg/products.htm for assistance identifying products cited in 40 CFR 247. Provide the following documentation:

a. Total amount of recycled content contained in building materials as a percentage of total cost of all building materials on the project (mechanical, electrical, and plumbing components, fire protection equipment and transportation are excluded).

b. Substitutions: Contractor may submit for Government approval, proposed alternative products or systems that provide equivalent performance and appearance and have greater contribution to project recycled content requirements. For all such proposed substitutions, submit with the Sustainability Action Plan accompanied by product data demonstrating equivalence.

1.6.7 Bio-Based Products

Utilize products and material made from biobased materials to the maximum extent possible without jeopardizing the intended end use or detracting from the overall quality delivered to the end user. Use only supplies and materials of a type and quality that conform to applicable specifications and standards.

Biobased products that are designated for preferred procurement under the

USDA BioPreferred Program must meet the required minimum biobased content. Refer to http://www.biopreferred.gov for the product categories and BioPreferred Catalog. Provide the following documentation:

a. For biobased products used on this project, provide biobased content and biobased source of material. Indicate name of the manufacturer, cost of each product and the use of each product on this project.

1.6.8 Landfill Disposal

Divert construction debris from landfill disposal in accordance with Section 01 74 19 CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT. Provide the following documentation:

a. Documentation showing total amount of construction debris diverted from landfill as a percentage of all construction debris on the project.

b. Include project's Construction Waste Management Plan and all dumpster haul tickets.

1.6.9 Ozone Depleting Substances

Eliminate the use of ozone depleting substances during and after construction where alternative environmentally preferable products are available. Meet the requirements of ASHRAE 189.1 Section 9.3.3 Refrigerants for no CFC-based refrigerants in heating ventilation, air conditioning and refrigeration systems (except for fire suppression system requirements, covered elsewhere in this specification). Provide the following documentation:

a. MSDS sheets for all refrigerants provided

b. Products that meet the criteria of U.S. EPA Significant New Alternatives Policy, available at http://www.epa.gov/ozone/snap/index.html.

1.6.10 Validation and Certification Restrictions

The Contractor's purchase of renewable energy certificates (RECs) specifically to meet project sustainability goals is prohibited.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 SUSTAINABILITY COORDINATION

3.1.1 Coordinating Sustainability Documentation Progress

Provide sustainability focus and coordination at the following meetings to achieve sustainability goals. Contractor's designated TPC accredited sustainability professional responsible for GP and TPC documentation must participate in the following meetings to coordinate documentation completion.

a. Pre-Construction Conference: Discuss the following: TPC and HPSB Checklists, Sustainability Action Plan, Construction submittal

requirements and schedule, individuals responsible for achieving each Guiding Principle Requirement and TPC prerequisite and credit.

b. Construction Progress Meetings: Review GP and TPC sustainability requirements with project team including contractor and sub-contractor representatives. Demonstrate GP and TPC documentation is being collected and updated to the Sustainability Notebook and TPC Online tool.

(1) Facility Turnover Meetings: Review Sustainability Notebook, and TPC Online submission for completeness and identify any outstanding issues relating to final documentation requirements.

(2) Final Sustainability Notebook Review

3.2 SUSTAINABILITY AWARD

Finalize the sustainability certification process and obtain the TPC Certification Certificates, indicating completion of the projects sustainability goals.

3.2.1 Third Party Certification Certificates

Obtain and install plaque and provide one original framed copy of the certificate. Mount certificates in 1 inch deep metal frames, with double matt, and wire hangers. Obtain 3 additional certificates, and deliver to Contractor Officer, unless otherwise instructed. Hang the Plaque in a prominent interior location approved by the Contracting Officer.

-- End of Section --

Air Force MILCON Sustainability Requirements Scoresheet

version LEED® 2009 (Updated September 2013)

* required entry

General Information

	KRSM143007	Project ID (e.g. ABCD12345)
	xxxxxxxxxxxxxxxxx	Real Property Unique ID (RPUID)
	649 MUNS Munitions Storage Mag.	Building Name
	New Building Construction	Project Type
	Hill AFB	Installation
	Ogden	City
	UT	State
	Yes	CONUS
Please complete NA justifications	Air Force Materiel Command	MAJCOM
Federal Requirements Complete	Arianna Raymundo	PM Name
	$999,999,999.00	PA ($k)
	10,400	Building Size (SF)
	2017	Program Year (FY####)
	RFP/35% Design	Project Phase
	2017	Design Started (FY####)
	1/1/2001	BOD (MM/DD/YY)
	Not in pursuit of LEED	Pursuing formal LEED® Certification
		Date Project Registered (MM/DD/YY)
		Date Project Certified by GBCI (MM/DD/YY)
		LEED Points Awarded by GBCI (e.g. 42)
		LEED Energy and Water Points Awarded by GBCI
		[Select] LEED Certification Level Awarded by GBCI
		Fees ($) Registration / Certification
	LEED® 2009	LEED® Rating System
	0	LEED® Points Status
	Prerequisites Not Achieved	LEED® Certification Level Status
		LEED® Energy and Water Points Status
	100%	HPSB Compliant
	30%	Energy Efficiency Achieved (% below ANSI/ASHRAE/IESNA Standard 90.1-2010)
	1/20/2017	Date Scoresheet Completed or Revised
	2013_V0	Scoresheet version

Color Coding: See Instructions Tab for more detail	
Drop-Down Box	**Recommended** (not required)
No Entry Required	Yes or N/A
Custom Entry	Maybe
LEED Prerequisite	No

* required entry

Federal Requirements for High Performance and Sustainable Buildings (HPSB) & UFC 1-200-02

HPSB I: Employ Integrated Design Principles (UFC 1-200-02 para 2-2)

Total Points	2		Possible Points	2
Yes	HPSB I.1	**Integrated Design**		1
Yes	HPSB I.2	**Commissioning**		1

UFC 1-200-02 para 2-3. Promote Sustainable Location and Site Development

Total Points	1		Possible Points (HPSB only)	1
Yes	UFC para 2-3.1	**Site selection**		1
Yes	UFC para 2-3.2	**Mitigation of Heat Island Effect**		1
Yes	UFC para 2-3.3	**Reduction of Light Pollution**		1
Yes	HPSB III.3-4	**Stormwater Management**		1

Air Force MILCON Sustainability Requirements Scoresheet

version LEED® 2009 (Updated September 2013)

* required entry

HPSB II: Optimize Energy Performance (UFC 1-200-02 para 2-4)				
Total Points	**4**		Possible Points	4
Yes	HPSB II.1	**Energy Efficiency**		1
		Yes	Reduce energy use 30% below ANSI/ASHRAE/IESNA Standard 90.1-2010 or if not - achieve maximum energy efficiency that is lifecycle cost effective	
		30.0%	Insert percentage below ANSI/ASHRAE/IESNA Standard 90.1-2010 in terms of energy use (e.g. 32)	
		0	Insert building energy intensity (kBtu/yr-sqft) calculated IAW 10 CFR 433	
Yes	HPSB II.2	**On-site Renewable Energy - Solar Hot Water Heater System**		1
		Yes	Installed solar hot water heater system or found installation not lifecycle cost effective	
		0.0	Insert generation capacity (MMBtu/yr)	
		30.0%	Insert percentage of demand	
Yes	HPSB II.3	**On-site Renewable Energy**		1
		Yes	Installed renewable energy elements or projects were not lifecycle cost effective	
		0	Renewable energy types (check below)	
		☐ Solar PV ☐ Geothermal ☐ Hydro ☐ Waste to Energy ☐ Solar CP ☐ GSHP ☐ Wind ☑ Renewables were not ☐ Solar Thermal Electric		
		0.0	Insert generation capacity (kW)	
		0.0%	Insert percentage of total building	
Yes	HPSB II.4	**Measurement and Verification**		1
		N/A	Water Metering: Select N/A if no service	
		N/A	Electric Metering: Select N/A if no service	
		N/A	Natural Gas Metering: Select N/A if no service	
		N/A	Steam Metering: Select N/A if no service	
HPSB III: Protect and Conserve Water (UFC 1-200-02 para 2-5)				
Total Points	**3**		Possible Points	3
Yes	HPSB III.1	**Indoor Water**		1
Yes	HPSB III.2	**Outdoor Water**		1
N/A	HPSB III.4	**Water used for heating and cooling**		1
		N/A	Water efficient measures were implemented with heating and cooling equipment when life cycle effective	
HPSB IV: Enhance Indoor Environmental Quality (UFC 1-200-02 para 2-6)				
Total Points	**6**		Possible Points	6
Yes	HPSB IV.1	**Thermal Comfort**		1
Yes	HPSB IV.2	**Ventilation**		1
Yes	HPSB IV.3	**Moisture Control**		1
Yes	HPSB IV.4	**Daylighting**		1
Yes	HPSB IV.5	**Low Emitting Materials**		1
Yes	HPSB IV.6	**Protect Indoor Air Quality during Construction**		1
Yes	HPSB IV.7	**Environmental Tobacco Smoke**		
HPSB V: Reduce Environmental Impact of Materials (UFC 1-200-02 para 2-6)				
Total Points	**6**		Possible Points	6
Yes	HPSB V.1	**Recycled Content**		1
Yes	HPSB V.2	**Biologically-based Products**		1
Yes	HPSB V.3	**Environmentally Preferable Products**		1
Yes	HPSB V.4	**Waste and Materials Management - Recycling**		1
Yes	HPSB V.5	**Waste and Materials Management - Divert 50% from Disposal**		1
		60.0%	Insert percentage diverted from landfill	
		Maybe	Data element is not applicable	
Yes	HPSB V.6	**Ozone Depleting Substances**		1
HPSB Totals			Possible Points	**22**
22	**Federal Requirements - Yes or N/A**			
0	**Federal Requirements - Maybe**			
0	**Federal Requirements - No**			
100%	**Percentage of Federal Requirements Met**			

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* required entry

LEED® 2009 Checklist

LEED® Credits and/or Prerequisites that meet HPSB/UFC Requirements
LEED® Credits and/or Prerequisites that align closely with HPSB/UFC Requirements
LEED® Credits that meet USAF Energy & Water Criteria (may depend on technologies & strategies)

Sustainable Sites			
Achievable Points	0	Sustainable Sites	Possible Points 26
	Prereq 1	Construction Activity Pollution Prevention (HPSB GP3)	Required
	Credit 1	Site Selection	1
	Credit 2	Development Density & Community Connectivity	5
	Credit 3	Brownfield Redevelopment	1
	Credit 4.1	Alternative Transportation - Public Transportation Access	6
	Credit 4.2	Alternative Transportation - Bicycle Storage & Changing Rooms	1
	Credit 4.3	Alternative Transportation - Low-Emitting & Fuel Efficient Vehicles	3
	Credit 4.4	Alternative Transportation - Parking Capacity	2
	Credit 5.1	Site Development - Protect or Restore Habitat	1
	Credit 5.2	Site Development - Maximize Open Space	1
	Credit 6.1	Stormwater Design - Quantity Control (HPSB GP3)	1
	Credit 6.2	Stormwater Design - Quality Control (HPSB GP3)	1
	Credit 7.1	Heat Island Effect - Non-Roof (UFC)	1
	Credit 7.2	Heat Island Effect - Roof (UFC)	1
	Credit 8	Light Pollution Reduction	1
		Select which LEED® Interior Lighting Option was used	

Water Efficiency			
Achievable Points	0		Possible Points 10
	Prereq 1	Water Use Reduction - 20% Reduction (HPSB GP3)	Required
	Credit 1	Water Efficient Landscaping (HPSB GP3)	2 to 4
		2 Reduce Potable Water Use by 50% (HPSB GP3)	2
		4 No Potable Use or Irrigation (HPSB GP3)	2
	Credit 2	Innovative Wastewater Technologies	2
	Credit 3	Water Use Reduction (HPSB GP3)	2 to 4
		2 30% Reduction (HPSB GP3)	2
		3 35% Reduction (HPSB GP3)	1
		4 40% Reduction (HPSB GP3)	1

Energy & Atmosphere			
Achievable Points	0		Possible Points 35
	Prereq 1	Fundamental Commissioning of the Building Energy Systems (HPSB GP1)	Required
	Prereq 2	Minimum Energy Performance (HPSB GP2)	Required
	Prereq 3	Fundamental Refrigerant Management (HPSB GP5)	Required
	Credit 1	Optimize Energy Performance (HPSB GP2)	1 to 19
		1 12% for New Buildings/8% for Existing Building Renovations	1
		2 14% for New Buildings/10% for Existing Building Renovations	1
		3 16% for New Buildings/12% for Existing Building Renovations	1
		4 18% for New Buildings/14% for Existing Building Renovations	1
		5 20% for New Buildings/16% for Existing Building Renovations	1
		6 22% for New Buildings/18% for Existing Building Renovations	1
		7 24% for New Buildings/20% for Existing Building Renovations	1
		8 26% for New Buildings/22% for Existing Building Renovations	1
		9 28% for New Buildings/24% for Existing Building Renovations	1
		10 30% for New Buildings/26% for Existing Building Renovations	1
		11 32% for New Buildings/28% for Existing Building Renovations	1
		12 34% for New Buildings/30% for Existing Building Renovations	1
		13 36% for New Buildings/32% for Existing Building Renovations	1
		14 38% for New Buildings/34% for Existing Building Renovations	1
		15 40% for New Buildings/36% for Existing Building Renovations	1
		16 42% for New Buildings/38% for Existing Building Renovations	1
		17 44% for New Buildings/40% for Existing Building Renovations	1
		18 46% for New Buildings/42% for Existing Building Renovations	1
		19 48%+ for New Buildings/44%+ for Existing Building Renovations	1
	Credit 2	On-Site Renewable Energy (HPSB GP2)	1 to 7
		1 On-site 1%	1
		2 On-site 3%	1
		3 On-site 5%	1
		4 On-site 7%	1
		5 On-site 9%	1
		6 On-site 11%	1
		7 On-site 13%	1
	Credit 3	Enhanced Commissioning (HPSB GP1)	2
	Credit 4	Enhanced Refrigerant Management (HPSB GP5)	2
	Credit 5	Measurement & Verification (HPSB GP2)	3
	Credit 6	Green Power	2

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Materials & Resources				
Achievable Points	**0**		Possible Points	14
	Prereq 1	**Storage & Collection of Recyclables (HPSB GP5)**		Required
	Credit 1.1	**Building Reuse -** Maintain Existing Walls Floors & Roof		1 to 3
		1	Maintain 55% of Existing Walls Floors & Roof	1
		2	Maintain 75% of Existing Walls Floors & Roof	1
		3	Maintain 95% of Existing Walls Floors & Roof	1
	Credit 1.2	**Building Reuse -** Maintain 50% of Interior Non-Structural Elements		1
	Credit 2	**Construction Waste Management (HPSB GP5)**		1 to 2
		1	50% Recycled or Salvaged	1
		2	75% Recycled or Salvaged	1
	Credit 3	**Materials Reuse**		1 to 2
		1	5% of value of material reused content	1
		2	10% of value of material reused content	1
	Credit 4	**Recycled Content (HPSB GP5)**		1 to 2
		1	10% of value of material recycled content	1
		2	20% of value of material reused content	1
	Credit 5	**Regional Materials**		1 to 2
		1	10% Extracted, Processed & Manufactured	1
		2	20% Extracted, Processed & Manufactured	1
	Credit 6	**Rapidly Renewable Materials (HPSB GP5)**		1
	Credit 7	**Certified Wood (HPSB GP5)**		1
Indoor Environmental Quality				
Achievable Points	**0**		Possible Points	15
	Prereq 1	**Minimum IAQ Performance (HPSB GP4)**		Required
	Prereq 2	**Environmental Tobacco Smoke (ETS) Control (HPSB GP4)**		Required
	Credit 1	**Outside Air Delivery Monitoring**		1
	Credit 2	**Increased Ventilation**		1
	Credit 3.1	**Construction IAQ Management Plan, During Construction (HPSB GP4)**		1
	Credit 3.2	**Construction IAQ Management Plan, Before Occupancy (HPSB GP4)**		1
	Credit 4.1	**Low Emitting Materials, Adhesives & Sealants (HPSB GP4)**		1
	Credit 4.2	**Low Emitting Materials, Paints & Coatings (HPSB GP4)**		1
	Credit 4.3	**Low Emitting Materials, Flooring Systems (HPSB GP4)**		1
	Credit 4.4	**Low Emitting Materials, Composite Wood & Agrifiber Products (HPSB GP4)**		1
	Credit 5	**Indoor Chemical & Pollutant Source Control**		1
	Credit 6.1	**Controllability of Systems, Lighting (HPSB GP4)**		1
	Credit 6.2	**Controllability of Systems,** Thermal Comfort		1
	Credit 7.1	**Thermal Comfort, Design (HPSB GP4)**		1
	Credit 7.2	**Thermal Comfort,** Verification		1
	Credit 8.1	**Daylight & Views - Daylight 75% of Spaces (HPSB GP4)**		1
	Credit 8.2	**Daylight & Views** - Views for 90% of Spaces		1
Innovation & Design Process				
Achievable Points	**0**		Possible Points	6
	Credit 1.1	**Innovation in Design 1.1**		1
			Select if ID 1.1 was for energy and/or water	
	Credit 1.2	**Innovation in Design 1.2**		1
			Select if ID 1.2 was for energy and/or water	
	Credit 1.3	**Innovation in Design 1.3**		1
			Select if ID 1.3 was for energy and/or water	
	Credit 1.4	**Innovation in Design 1.4**		1
			Select if ID 1.4 was for energy and/or water	
	Credit 1.5	**Innovation in Design 1.5**		1
			Select if ID 1.5 was for energy and/or water	
	Credit 2	**LEED® Accredited Professional**		1
Regional Priority Credits				
Achievable Points	**0**		Possible Points	4
	Credit 1.1	**Regional Priority 1.1**		1
			Select if RP 1.1 was for energy and/or water	
	Credit 1.2	**Regional Priority 1.2**		1
			Select if RP 1.2 was for energy and/or water	
	Credit 1.3	**Regional Priority 1.3**		1
			Select if RP 1.3 was for energy and/or water	
	Credit 1.4	**Regional Priority 1.4**		1
			Select if RP 1.4 was for energy and/or water	

LEED Project Totals	**(pre-certification estimates)**	Possible Points 110
0	Total LEED® Yes Points	
0	Total LEED® Maybe Points	
0	Total LEED® No Points	
	Total LEED® Energy and Water Related Points	
Prerequisites Not Achieved	**LEED® Certification Status**	
N/A	**LEED® Horizontal Benchmark Level**	
N/A	**LEED® Utility Benchmark Level**	
N/A	**LEED® Industrial Benchmark Level**	

LEED®: Certified: 40-49 points, **Silver:** 50-59 points, **Gold:** 60-79 points, **Platinum:** 80-110

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GOVERNMENTAL SAFETY REQUIREMENTS
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PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH 0112	(2011) TLVs and BEIs

AMERICAN INDUSTRIAL HYGIENE ASSOCIATION (AIHA)

AIHA Z88.6	(2006) Respiratory Protection - Respirator Use-Physical Qualifications for Personnel

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)

ASSE/SAFE A10.34	(2001; R 2012) Protection of the Public on or Adjacent to Construction Sites
ASSE/SAFE A10.44	(2014) Control of Energy Sources (Lockout/Tagout) for Construction and Demolition Operations
ASSE/SAFE Z244.1	(2003; R 2014) Control of Hazardous Energy Lockout/Tagout and Alternative Methods
ASSE/SAFE Z359.0	(2012) Definitions and Nomenclature Used for Fall Protection and Fall Arrest
ASSE/SAFE Z359.1	(2007) Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components
ASSE/SAFE Z359.11	(2014) Safety Requirements for Full Body Harnesses
ASSE/SAFE Z359.12	(2009) Connecting Components for Personal Fall Arrest Systems
ASSE/SAFE Z359.13	(2013) Personal Energy Absorbers and Energy Absorbing Lanyards
ASSE/SAFE Z359.14	(2014) Safety Requirements for Self-Retracting Devices for Personal Fall Arrest and Rescue Systems
ASSE/SAFE Z359.15	(2014) Safety Requirements for Single Anchor Lifelines and Fall Arresters for Personal Fall Arrest Systems

ASSE/SAFE Z359.2	(2007) Minimum Requirements for a Comprehensive Managed Fall Protection Program
ASSE/SAFE Z359.3	(2007) Safety Requirements for Positioning and Travel Restraint Systems
ASSE/SAFE Z359.4	(2013) Safety Requirements for Assisted-Rescue and Self-Rescue Systems, Subsystems and Components
ASSE/SAFE Z359.6	(2009) Specifications and Design Requirements for Active Fall Protection Systems
ASSE/SAFE Z359.7	(2011) Qualification and Verification Testing of Fall Protection Products

ASME INTERNATIONAL (ASME)

ASME B30.20	(2013; INT Oct 2010 - May 2012) Below-the-Hook Lifting Devices
ASME B30.22	(2010) Articulating Boom Cranes
ASME B30.26	(2015; INT Jun 2010 - Jun 2014) Rigging Hardware
ASME B30.3	(2016) Tower Cranes
ASME B30.5	(2014) Mobile and Locomotive Cranes
ASME B30.9	(2014; INT Feb 2011 - Nov 2013) Slings

ASTM INTERNATIONAL (ASTM)

ASTM F855	(2015) Standard Specifications for Temporary Protective Grounds to Be Used on De-energized Electric Power Lines and Equipment

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 1048	(2003) Guide for Protective Grounding of Power Lines
IEEE C2	(2012; Errata 1 2012; INT 1-4 2012; Errata 2 2013; INT 5-7 2013; INT 8-10 2014; INT 11 2015; INT 12 2016) National Electrical Safety Code

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10	(2013) Standard for Portable Fire Extinguishers
NFPA 241	(2013; Errata 2015) Standard for Safeguarding Construction,Alteration, and

	Demolition Operations
NFPA 51B	(2014) Standard for Fire Prevention During Welding, Cutting, and Other Hot Work
NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3-4 2014; AMD 4-6 2014; AMD 1-2 2016; Errata 1-2 2016; 2017) National Electrical Code
NFPA 70B	(2016) Recommended Practice for Electrical Equipment Maintenance
NFPA 70E	(2015; ERTA 1 2015) Standard for Electrical Safety in the Workplace

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-560-01	(2015; Change 5; 2006) Electrical Safety, O & M

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

29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1910.38	Emergency Action Plans
29 CFR 1910.134	Respiratory Protection
29 CFR 1910.146	Permit-required Confined Spaces
29 CFR 1910.147	Control of Hazardous Energy (Lock Out/Tag Out)
29 CFR 1910.333	Selection and Use of Work Practices
29 CFR 1915.89	Control of Hazardous Energy (Lockout/Tags-Plus)
29 CFR 1926	Safety and Health Regulations for Construction
29 CFR 1926.59	Hazard Communication
29 CFR 1926.1400	Cranes and Derricks in Construction
29 CFR 1926.450	Scaffolds
29 CFR 1926.500	Fall Protection
29 CFR 1926.652	Safety and Health Regulations for Construction; Subpart P, Excavations;

	Requirements for Protective Systems
CPL 2.100	(1995) Application of the Permit-Required Confined Spaces (PRCS) Standards, 29 CFR 1910.146

1.2 DEFINITIONS

1.2.1 Competent Person (CP)

The CP is a person designated in writing, who, through training, knowledge and experience, is capable of identifying, evaluating, and addressing existing and predictable hazards in the working environment or working conditions that are dangerous to personnel, and who has authorization to take prompt corrective measures with regards to such hazards.

1.2.2 Competent Person, Confined Space

The CP, Confined Space, is a person meeting the competent person requirements as defined EM 385-1-1 Appendix Q, with thorough knowledge of OSHA's Confined Space Standard, 29 CFR 1910.146, and designated in writing to be responsible for the immediate supervision, implementation and monitoring of the confined space program, who through training, knowledge and experience in confined space entry is capable of identifying, evaluating and addressing existing and potential confined space hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

1.2.3 Competent Person, Cranes and Rigging

The CP, Cranes and Rigging, as defined in EM 385-1-1 Appendix Q, is a person meeting the competent person, who has been designated in writing to be responsible for the immediate supervision, implementation and monitoring of the Crane and Rigging Program, who through training, knowledge and experience in crane and rigging is capable of identifying, evaluating and addressing existing and potential hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

1.2.4 Competent Person, Excavation/Trenching

A CP, Excavation/Trenching, is a person meeting the competent person requirements as defined in EM 385-1-1 Appendix Q and 29 CFR 1926, who has been designated in writing to be responsible for the immediate supervision, implementation and monitoring of the excavation/trenching program, who through training, knowledge and experience in excavation/trenching is capable of identifying, evaluating and addressing existing and potential hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

1.2.5 Competent Person, Fall Protection

The CP, Fall Protection, is a person meeting the competent person requirements as defined in EM 385-1-1 Appendix Q and in accordance with ASSE/SAFE Z359.0, who has been designated in writing by the employer to be responsible for immediate supervising, implementing and monitoring of the fall protection program, who through training, knowledge and experience in fall protection and rescue systems and equipment, is capable of identifying, evaluating and addressing existing and potential fall hazards and, who has the authority to take prompt corrective measures with regard

to such hazards.

1.2.6 Competent Person, Scaffolding

The CP, Scaffolding is a person meeting the competent person requirements in EM 385-1-1 Appendix Q, and designated in writing by the employer to be responsible for immediate supervising, implementing and monitoring of the scaffolding program. The CP for Scaffolding has enough training, knowledge and experience in scaffolding to correctly identify, evaluate and address existing and potential hazards and also has the authority to take prompt corrective measures with regard to these hazards. CP qualifications must be documented and include experience on the specific scaffolding systems/types being used, assessment of the base material that the scaffold will be erected upon, load calculations for materials and personnel, and erection and dismantling. The CP for scaffolding must have a documented, minimum of 8-hours of scaffold training to include training on the specific type of scaffold being used (e.g. mast-climbing, adjustable, tubular frame), in accordance with EM 385-1-1 Section 22.B.02.

1.2.7 Competent Person (CP) Trainer

A competent person trainer as defined in EM 385-1-1 Appendix Q, who is qualified in the material presented, and who possesses a working knowledge of applicable technical regulations, standards, equipment and systems related to the subject matter on which they are training Competent Persons. A competent person trainer must be familiar with the typical hazards and the equipment used in the industry they are instructing. The training provided by the competent person trainer must be appropriate to that specific industry. The competent person trainer must evaluate the knowledge and skills of the competent persons as part of the training process.

1.2.8 High Risk Activities

High Risk Activities are activities that involve work at heights, crane and rigging, excavations and trenching, scaffolding, electrical work, and confined space entry.

1.2.9 High Visibility Accident

A High Visibility Accident is any mishap which may generate publicity or high visibility.

1.2.10 Load Handling Equipment (LHE)

LHE is a term used to describe cranes, hoists and all other hoisting equipment (hoisting equipment means equipment, including crane, derricks, hoists and power operated equipment used with rigging to raise, lower or horizontally move a load).

1.2.11 Medical Treatment

Medical Treatment is treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does not include first aid treatment even through provided by a physician or registered personnel.

1.2.12 Near Miss

A Near Miss is a mishap resulting in no personal injury and zero property damage, but given a shift in time or position, damage or injury may have occurred (e.g., a worker falls off a scaffold and is not injured; a crane swings around to move the load and narrowly misses a parked vehicle).

1.2.13 Operating Envelope

The Operating Envelope is the area surrounding any crane or load handling equipment. Inside this "envelope" is the crane, the operator, riggers and crane walkers, other personnel involved in the operation, rigging gear between the hook, the load, the crane's supporting structure (i.e. ground or rail), the load's rigging path, the lift and rigging procedure.

1.2.14 Qualified Person (QP)

The QP is a person designated in writing, who, by possession of a recognized degree, certificate, or professional standing, or extensive knowledge, training, and experience, has successfully demonstrated their ability to solve or resolve problems related to the subject matter, the work, or the project.

1.2.15 Qualified Person, Fall Protection (QP for FP)

A QP for FP is a person meeting the requirements of EM 385-1-1 Appendix Q, and ASSE/SAFE Z359.0, with a recognized degree or professional certificate and with extensive knowledge, training and experience in the fall protection and rescue field who is capable of designing, analyzing, and evaluating and specifying fall protection and rescue systems.

1.2.16 Recordable Injuries or Illnesses

Recordable Injuries or Illnesses are any work-related injury or illness that results in:

a. Death, regardless of the time between the injury and death, or the length of the illness;

b. Days away from work (any time lost after day of injury/illness onset);

c. Restricted work;

d. Transfer to another job;

e. Medical treatment beyond first aid;

f. Loss of consciousness; or

g. A significant injury or illness diagnosed by a physician or other licensed health care professional, even if it did not result in (a) through (f) above.

1.2.17 USACE Property and Equipment

Interpret "USACE" property and equipment specified in USACE EM 385-1-1 as Government property and equipment.

1.2.18 Load Handling Equipment (LHE) Accident or Load Handling Equipment Mishap

A LHE accident occurs when any one or more of the eight elements in the operating envelope fails to perform correctly during operation, including operation during maintenance or testing resulting in personnel injury or death; material or equipment damage; dropped load; derailment; two-blocking; overload; or collision, including unplanned contact between the load, crane, or other objects. A dropped load, derailment, two-blocking, overload and collision are considered accidents, even though no material damage or injury occurs. A component failure (e.g., motor burnout, gear tooth failure, bearing failure) is not considered an accident solely due to material or equipment damage unless the component failure results in damage to other components (e.g., dropped boom, dropped load, or roll over). Document any mishap that meets the criteria described in the Contractor Significant Incident Report (CSIR) using the Crane High Hazard working group mishap reporting form.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Accident Prevention Plan (APP); G, DO

SD-06 Test Reports

Monthly Exposure Reports

Notifications and Reports

Accident Investigation Reports; G, DO

LHE Inspection Reports

Health Hazard Control Plan; G

Regulatory Citations and Violations

Emergency Action Plan; G

SD-07 Certificates

Crane Operators/Riggers

Standard Lift Plan; G

Critical Lift Plan; G, DO

Activity Hazard Analysis (AHA)

Confined Space Entry Permit

Hot Work Permit

Certificate of Compliance

Excavation Permit

Proof of Current Qualification

1.4 REGULATORY REQUIREMENTS

Abide by all local, state, Air Force and federal environmental, occupational health and safety standards (i.e. noise, dust, etc). Also the contractor will be required to procure, maintain, calibrate and provide personnel properly trained to use contaminant specific industry recognized monitoring devices/instruments to validate to the GDA that they are within said standards (federal standards are typically found in 29 CFR and 40 CFR; Air and Noise standards vary by state and municipality). In addition to the detailed requirements included in the provisions of this contract, comply with the most recent edition of USACE EM 385-1-1, and all applicable federal, state, Air Force and local laws, ordinances, criteria, rules and regulations including the following: 29 CFR 1910 & 29 CFR 1926. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements govern.

1.5 SITE QUALIFICATIONS, DUTIES, AND MEETINGS

1.5.1 Personnel Qualifications

1.5.1.1 Site Safety and Health Officer (SSHO)

The Contractor shall employ a minimum of one Competent Person at each project site to function as the SSHO (primary), depending on job complexity, size and any other pertinent factors. The SSHO shall:

(1) Be a full-time responsibility and shall have no other duties other than safety. The SSHO shall be present at the project site, located so they have full mobility and reasonable access to all major work operations during the shift.

(2) Be an employee other than the supervisor, unless specified differently in the contract and coordinated with the local SOH Office, and

(3) Report to a senior project (or corporate) official.

(4) Administer the Contractor's safety program and government-accepted Accident Prevention Plan.

(5) The SSHO's training, experience, and qualifications shall be as required by EM 385-1-1 paragraph 01.A.17, entitled Contractor Site Safety and Health Officer (SSHO) and all associated sub-paragraphs.

If the SSHO is off-site for a period longer than 24 hours, an equally-qualified alternate SSHO must be provided and must fulfill the same roles and responsibilities as the primary SSHO.

1.5.1.2 Competent Person Qualifications

Provide Competent Persons in accordance with EM 385-1-1, Appendix Q and

herein. Competent Persons for high risk activities include confined space, cranes and rigging, excavation/trenching, fall protection, and electrical work. The CP for these activities must be designated in writing, and meet the requirements for the specific activity (i.e. competent person, fall protection).

The Competent Person identified in the Contractor's Safety and Health Program and accepted Accident Prevention Plan, must be on-site at all times when the work that presents the hazards associated with their professional expertise is being performed. Provide the credentials of the Competent Persons(s) to the Contracting Officer for information in consultation with the Safety Office.

1.5.1.2.1 Competent Person for Confined Space Entry

Provide a Confined Space (CP) Competent Person who meets the requirements of EM 385-1-1, Appendix Q, and herein. The CP for Confined Space Entry must supervise the entry into each confined space.

1.5.1.2.2 Competent Person for Scaffolding

Provide a Competent Person for Scaffolding who meets the requirements of EM 385-1-1, Section 22.B.02 and herein.

1.5.1.2.3 Competent Person for Fall Protection

Provide a Competent Person for Fall Protection who meets the requirements of EM 385-1-1, Section 21.C.04 and herein.

1.5.1.3 Qualified Trainer Requirements

Individuals qualified to instruct the 40 hour contract safety awareness course, or portions thereof, must meet the definition of a Competent Person Trainer, and, at a minimum, possess a working knowledge of the following subject areas: EM 385-1-1, Electrical Standards,Lockout/Tagout, Fall Protection, Confined Space Entry for Construction; Excavation, Trenching and Soil Mechanics, and Scaffolds in accordance with 29 CFR 1926.450, Subpart L.

Instructors are required to:

a. Prepare class presentations that cover construction-related safety requirements.

b. Ensure that all attendees attend all sessions by using a class roster signed daily by each attendee. Maintain copies of the roster for at least five (5) years. This is a certification class and must be attended 100 percent. In cases of emergency where an attendee cannot make it to a session, the attendee can make it up in another class session for the same subject.

c. Update training course materials whenever an update of the EM 385-1-1 becomes available.

d. Provide a written exam of at least 50 questions. Students are required to answer 80 percent correctly to pass.

e. Request, review and incorporate student feedback into a continuous course improvement program.

1.5.1.4 Crane Operators/Riggers

Provide Operators meeting the requirements in EM 385-1-1, Section 15.B for Riggers and Section 16.B for Crane Operators. In addition, for mobile cranes with Original Equipment Manufacturer (OEM) rated capacities of 50,000 pounds or greater, designate crane operators qualified by a source that qualifies crane operators (i.e., union, a government agency, or an organization that tests and qualifies crane operators). Provide proof of current qualification.

1.5.2 Personnel Duties

1.5.2.1 Duties of the Site Safety and Health Officer (SSHO)

The SSHO must:

a. Conduct daily safety and health inspections and maintain a written log which includes area/operation inspected, date of inspection, identified hazards, recommended corrective actions, estimated and actual dates of corrections. Attach safety inspection logs to the Contractors' daily production report.

b. Conduct mishap investigations and complete required accident reports. Report mishaps and near misses.

c. Use OSHA's Form 300 to log work-related injuries and illnesses occurring on the project site for Prime Contractors and subcontractors. Post and maintain the Form 300A on the site Safety Bulletin Board. Use OSHA Form 301 to report injuries.

d. Maintain applicable safety reference material on the job site.

e. Attend the pre-construction conference, pre-work meetings including preparatory meetings, and periodic in-progress meetings.

f. Review the APP and AHAs for compliance with EM 385-1-1, and approve, sign, implement and enforce them. Ensure they are reflective of the work being done.

g. Establish a Safety and Occupational Health (SOH) Deficiency Tracking System that lists and monitors outstanding deficiencies until resolution.

h. Be empowered to stop work when necessary and to ensure subcontractor compliance with safety and health requirements.

i. Maintain a list of hazardous chemicals on site and their material Safety Data Sheets (SDS).

j. Maintain a weekly list of high hazard activities involving energy, equipment, excavation, entry into confined space, and elevation, and be prepared to discuss details during QC Meetings.

k. Provide and keep a record of site safety orientation and indoctrination for Contractor employees, subcontractor employees, and site visitors.

Superintendent, QC Manager, and SSHO are subject to dismissal if the above duties are not being effectively carried out. If Superintendent, QC

Manager, or SSHO are dismissed, project work will be stopped and will not be allowed to resume until a suitable replacement is approved and the above duties are again being effectively carried out.

1.5.3 Meetings

1.5.3.1 Preconstruction Conference

a. Contractor representatives who have a responsibility or significant role in accident prevention on the project must attend the preconstruction conference. This includes the project superintendent, Site Safety and Occupational Health officer, alternate SSHO, quality control manager, or any other assigned safety and health professionals who participated in the development of the APP (including the Activity Hazard Analyses (AHAs) and special plans, program and procedures associated with it).

b. Discuss the details of the submitted APP to include incorporated plans, programs, procedures and a listing of anticipated AHAs that will be developed and implemented during the performance of the contract. This list of proposed AHAs will be reviewed at the conference and an agreement will be reached between the Contractor and the Contracting Officer as to which phases will require an analysis. In addition, establish a schedule for the preparation, submittal, and Government review of AHAs to preclude project delays.

c. Deficiencies in the submitted APP, identified during the Contracting Officer's review, must be corrected, and the APP re-submitted for review prior to the start of construction. Work is not permitted to begin until an APP is established that is acceptable to the Contracting Officer.

1.5.3.2 Safety Meetings

Conduct safety meetings to review past activities, plan for new or changed operations, review pertinent aspects of appropriate AHA (by trade), establish safe working procedures for anticipated hazards, and provide pertinent Safety and Occupational Health (SOH) training and motivation. Conduct meetings at least once a month for all supervisors on the project location. The SSHO, supervisors, foremen, or CDSOs must conduct meetings at least once a week for the trade workers. Document meeting minutes to include the date, persons in attendance, subjects discussed, and names of individual(s) who conducted the meeting. Maintain documentation on-site and furnish copies to the Contracting Officer on request. Notify the Contracting Officer of all scheduled meetings 7 calendar days in advance.

1.5.3.3 Training

a. New employee indoctrination. New employees (prime and sub-contractor) must be informed of specific site hazards before they begin work. Documentation of this orientation must be kept on file at the project site.

b. Periodic training. Provide Safety and Health Training in accordance with USACE EM 385-1-1 and the accepted APP. Ensure all required training has been accomplished for all onsite employees.

c. Activity Hazard Analysis (AHA). Prior to beginning a new Definable Features of Work (DFOW), training must be provided to all affected

employees to include a review of the AHA to be implemented.

1.6 ACCIDENT PREVENTION PLAN (APP)

A qualified person must prepare the written site-specific APP. Prepare the APP in accordance with the format and requirements of EM 385-1-1, Appendix A, and as supplemented herein. Cover all paragraph and subparagraph elements in EM 385-1-1, Appendix A. The APP must be job-specific and address any unusual or unique aspects of the project or activity for which it is written. The APP must interface with the Contractor's overall safety and health program referenced in the APP in the applicable APP element, and made site-specific. Describe the methods to evaluate past safety performance of potential subcontractors in the selection process. Also, describe innovative methods used to ensure and monitor safe work practices of subcontractors. The Government considers the Prime Contractor to be the "controlling authority" for all work site safety and health of the subcontractors. Contractors are responsible for informing their subcontractors of the safety provisions under the terms of the contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out. The APP must be signed IAW EM 385-1-1 Appendix A. The SSHO must provide and maintain the APP and a log of signatures by each subcontractor foreman, attesting that they have read and understand the APP, and make the APP and log available on-site to the Contracting Officer. If English is not the foreman's primary language, the Prime Contractor must provide an interpreter.

Submit the APP to the Contracting Officer 15 calendar days prior to the date of the preconstruction conference for acceptance. Work cannot proceed without an accepted APP. Once reviewed and accepted by the Contracting Officer, the APP and attachments will be enforced as part of the contract. Disregarding the provisions of this contract or the accepted APP is cause for stopping of work, at the discretion of the Contracting Officer, until the matter has been rectified. Continuously review and amend the APP, as necessary, throughout the life of the contract. Changes to the accepted APP must be made with the knowledge and concurrence of the Contracting Officer, project superintendent, SSHO and Quality Control Manager. Incorporate unusual or high-hazard activities not identified in the original APP as they are discovered. Should any severe hazard exposure (i.e. imminent danger) become evident, stop work in the area, secure the area, and develop a plan to remove the exposure and control the hazard. Notify the Contracting Officer within 24 hours of discovery. Eliminate and remove the hazard. In the interim, take all necessary action to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public (as defined by ASSE/SAFE A10.34), and the environment.

1.6.1 Names and Qualifications

Provide plans in accordance with the requirements outlined in Appendix A of EM 385-1-1, including the following:

a. Names and qualifications (resumes including education, training, experience and certifications) of site safety and health personnel designated to perform work on this project to include the designated Site Safety and Health Officer and other competent and qualified personnel to be used. Specify the duties of each position.

b. Qualifications of competent and of qualified persons. As a minimum, designate and submit qualifications of competent persons for each of the following major areas: excavation; scaffolding; fall protection; hazardous energy; confined space; health hazard recognition, evaluation and control of chemical, physical and biological agents; and personal protective equipment and clothing to include selection, use and maintenance.

1.6.2 Plans

Provide plans in the APP in accordance with the requirements outlined in Appendix A of EM 385-1-1, including the following:

1.6.2.1 Confined Space Entry Plan

Develop a confined or enclosed space entry plan in accordance with EM 385-1-1, applicable OSHA standards 29 CFR 1910, and 29 CFR 1926, OSHA Directive CPL 2.100, and any other federal, state and local regulatory requirements identified in this contract. Identify the qualified person's name and qualifications, training, and experience. Delineate the qualified person's authority to direct work stoppage in the event of hazardous conditions. Include procedure for rescue by contractor personnel and the coordination with emergency responders. (If there is no confined space work, include a statement that no confined space work exists and none will be created.)

1.6.2.2 Standard Lift Plan (SLP)

Plan lifts to avoid situations where the operator cannot maintain safe control of the lift. Prepare a written SLP in accordance with EM 385-1-1, Section 16.A.03, using Form 16-2 for every lift or series of lifts (if duty cycle or routine lifts are being performed). The SLP must be developed, reviewed and accepted by all personnel involved in the lift in conjunction with the associated AHA. Signature on the AHA constitutes acceptance of the plan. Maintain the SLP on the LHE for the current lift(s) being made. Maintain historical SLPs for a minimum of 3 months.

1.6.2.3 Critical Lift Plan - Crane or Load Handling Equipment

Provide a Critical Lift Plan as required by EM 385-1-1, Section 16.H.01, using Form 16-3. Critical lifts require detailed planning and additional or unusual safety precautions. Develop and submit a critical lift plan to the Contracting Officer 30 calendar days prior to critical lift. Comply with load testing requirements in accordance with EM 385-1-1, Section 16.F.03.

In addition to the requirements of EM 385-1-1, Section 16.H.02, the critical lift plan must include the following:

a. For lifts of personnel, demonstrate compliance with the requirements of 29 CFR 1926.1400 and EM 385-1-1, Section 16.T.

b. Multi-purpose machines, material handling equipment, and construction equipment used to lift loads that are suspended by rigging gear, require proof of authorization from the machine OEM that the machine is capable of making lifts of loads suspended by rigging equipment. Demonstrate that the operator is properly trained and that the equipment is properly configured to make such lifts and is equipped with a load chart.

1.6.2.4 Fall Protection and Prevention (FP&P) Plan

The plan must comply with the requirements of EM 385-1-1, Section 21.D and ASSE/SAFE Z359.2, be site specific, and address all fall hazards in the work place and during different phases of construction. Address how to protect and prevent workers from falling to lower levels when they are exposed to fall hazards above 6 feet. A competent person or qualified person for fall protection must prepare and sign the plan documentation. Include fall protection and prevention systems, equipment and methods employed for every phase of work, roles and responsibilities, assisted rescue, self-rescue and evacuation procedures, training requirements, and monitoring methods. Review and revise, as necessary, the Fall Protection and Prevention Plan documentation as conditions change, but at a minimum every six months, for lengthy projects, reflecting any changes during the course of construction due to changes in personnel, equipment, systems or work habits. Keep and maintain the accepted Fall Protection and Prevention Plan documentation at the job site for the duration of the project. Include the Fall Protection and Prevention Plan documentation in the Accident Prevention Plan (APP).

1.6.2.5 Rescue and Evacuation Plan

Provide a Rescue and Evacuation Plan in accordance with EM 385-1-1 Section 21.N and ASSE/SAFE Z359.2, and include in the FP&P Plan and as part of the APP. Include a detailed discussion of the following: methods of rescue; methods of self-rescue; equipment used; training requirement; specialized training for the rescuers; procedures for requesting rescue and medical assistance; and transportation routes to a medical facility.

1.6.2.6 Hazardous Energy Control Program (HECP)

Develop a HECP in accordance with EM 385-1-1 Section 12, 29 CFR 1910.147, 29 CFR 1910.333, 29 CFR 1915.89, ASSE/SAFE Z244.1, and ASSE/SAFE A10.44. Submit this HECP as part of the Accident Prevention Plan (APP). Conduct a preparatory meeting and inspection with all effected personnel to coordinate all HECP activities. Document this meeting and inspection in accordance with EM 385-1-1, Section 12.A.02. Ensure that each employee is familiar with and complies with these procedures.

1.6.2.7 Excavation Plan

Identify the safety and health aspects of excavation, and provide and prepare the plan in accordance with EM 385-1-1.

1.6.2.8 Occupant Protection Plan

Identify the safety and health aspects of lead-based paint removal, prepared in accordance with Section 02 83 13 LEAD IN CONSTRUCTION.

1.6.2.9 Asbestos Hazard Abatement Plan

Identify the safety and health aspects of asbestos work, and prepare in accordance with Section 02 82 13 ASBESTOS ABATEMENT.

1.6.2.10 Site Demolition Plan

Identify the safety and health aspects, and prepare in accordance with Section 02 41 00 DEMOLITION and referenced sources.

1.6.2.11 Drug Prevention Program

Conduct a proactive drug and alcohol use prevention program for all workers, prime and subcontractor, on the site. Ensure that no employee uses illegal drugs or consumes alcohol during work hours. Ensure there are no employees under the influence of drugs or alcohol during work hours. After accidents, collect blood, urine, or saliva specimens and test the injured and involved employees for the influence of drugs and alcohol. A copy of the test must be made available to the Contracting Officer upon request.

1.6.2.12 Training Records and Requirements

Training Records and Requirements. List of mandatory training and certifications which are applicable to this project (e.g. explosive actuated tools, confined space entry, fall protection, crane operation, vehicle operator, forklift operators, personal protective equipment); list of requirements for periodic retraining/certification; outline requirements for supervisory and employee safety meetings.

1.6.2.13 Hazard Communication Program

Because of the various hazards, the contractor must include a hazard communication program in accordance with 29 CFR 1926.59. The Hazard Communication Program must address all hazardous materials brought to the site in support of site activities.

1.6.2.14 Health Hazard Control Plan

The Contractor must designate a competent and qualified person to establish and oversee a Health Hazard Control Program in accordance with EM 385-1-1, Section 6. The program must ensure that employees, on-site Government representatives, and others, are not adversely exposed to chemical, physical and biological agents and the necessary controls and protective actions are instituted to ensure health.

1.6.2.15 Emergency Action Plan

Develop an emergency action plan in accordance with 29 CFR 1910.38 to cover those designated action employers and employees must take to ensure employee safety from fire and other emergencies.

1.7 ACTIVITY HAZARD ANALYSIS (AHA)

Before beginning each activity, task or Definable Feature of Work (DFOW) involving a type of work presenting hazards not experienced in previous project operations, or where a new work crew or subcontractor is to perform the work, the Contractor(s) performing that work activity must prepare an AHA. AHAs must be developed by the Prime Contractor, subcontractor, or supplier performing the work, and provided for Prime Contractor review and approval before submitting to the Contracting Officer. AHAs must be signed by the SSHO, Superintendent, QC Manager and the subcontractor Foreman performing the work. Format the AHA in accordance with EM 385-1-1, Section 1 or as directed by the Contracting Officer. Submit the AHA for review at least 15 working days prior to the start of each activity task, or DFOW. The Government reserves the right to require the Contractor to revise and resubmit the AHA if it fails to effectively identify the work sequences, specific anticipated hazards, site conditions, equipment, materials,

personnel and the control measures to be implemented.

AHAs must identify competent persons required for phases involving high risk activities, including confined entry, crane and rigging, excavations, trenching, electrical work, fall protection, and scaffolding.

1.7.1 AHA Management

Review the AHA list periodically (at least monthly) at the Contractor supervisory safety meeting, and update as necessary when procedures, scheduling, or hazards change. Use the AHA during daily inspections by the SSHO to ensure the implementation and effectiveness of the required safety and health controls for that work activity.

1.7.2 AHA Signature Log

Each employee performing work as part of an activity, task or DFOW must review the AHA for that work and sign a signature log specifically maintained for that AHA prior to starting work on that activity. The SSHO must maintain a signature log on site for every AHA. Provide employees whose primary language is other than English, with an interpreter to ensure a clear understanding of the AHA and its contents.

1.8 DISPLAY OF SAFETY INFORMATION

1.8.1 Safety Bulletin Board

Within one calendar day(s) after commencement of work, erect a safety bulletin board at the job site. Where size, duration, or logistics of project do not facilitate a bulletin board, an alternative method, acceptable to the Contracting Officer, that is accessible and includes all mandatory information for employee and visitor review, may be deemed as meeting the requirement for a bulletin board. Include and maintain information on safety bulletin board as required by EM 385-1-1, Section 01.A.07. Additional items required to be posted include:

a. Confined space entry permit.

b. Hot work permit.

c. Map denoting the route to the nearest emergency care facility.

d. Copy of the most up-to-date APP

e. Emergency phone numbers.

f. Current AHAs

g. OSHA 300 Form

h. OSHA Safety and Health Protection-On-The-Job Poster

i. A sign indicating the number of hours worked since last lost workday accident.

j. Safety and Health Warning Posters

k. Prop 65 Notification

l. Code of Safe Practices

1.8.2 Safety and Occupational Health (SOH) Deficiency Tracking System

Establish a SOH deficiency tracking system that lists and monitors the status of SOH deficiencies in chronological order. Use the tracking system to evaluate the effectiveness of the APP. A monthly evaluation of the data must be discussed in the QC or SOH meeting with everyone on the project. The list must be posted on the project bulletin board and updated daily, and provide the following information:

a. Date deficiency identified;

b. Description of deficiency;

c. Name of person responsible for correcting deficiency;

d. Projected resolution date;

e. Date actually resolved.

1.9 SITE SAFETY REFERENCE MATERIALS

Maintain safety-related references applicable to the project, including those listed in paragraph REFERENCES. Maintain applicable equipment manufacturer's manuals.

1.10 EMERGENCY MEDICAL TREATMENT

Contractors must arrange for their own emergency medical treatment. Government has no responsibility to provide emergency medical treatment.

1.11 NOTIFICATIONS and REPORTS

1.11.1 Mishap Notification

Notify the Contracting Officer as soon as practical, but no more than twenty-four hours, after any mishaps, including recordable accidents, incidents, and near misses, as defined in EM 385-1-1 Appendix Q, any report of injury, illness, load handling equipment (LHE) or rigging mishaps, or any property damage. The Contractor is responsible for obtaining appropriate medical and emergency assistance and for notifying fire, law enforcement, and regulatory agencies. Immediate reporting is required for electrical mishaps, to include Arc Flash; shock; uncontrolled release of hazardous energy (includes electrical and non-electrical); load handling equipment or rigging; fall from height (any level other than same surface); and underwater diving. These mishaps must be investigated in depth to identify all causes and to recommend hazard control measures.

Within notification include Contractor name; contract title; type of contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (for example, type of construction equipment used and PPE used) using SPK Form 385-1-R. Preserve the conditions and evidence on the accident site until the Government investigation team arrives on-site and Government investigation is conducted. Assist and cooperate fully with the Government's investigation(s) of any mishap. Report all accidents, incidents and Near Miss/Close Calls as soon as possible to the Government

Designated Authority (GDA).

1.11.2 Accident Investigation Reports

a. Conduct an accident investigation for recordable injuries and illnesses, property damage, and near misses as defined in EM 385-1-1, to establish the root cause(s) of the accident. Complete the applicable USACE Accident Investigation Report Form 3394, and provide the report to the Contracting Officer within 5 calendar day(s) of the accident. The Contracting Officer will provide copies of any required or special forms.

b. Near Misses: For Army projects, report all "Near Misses" to the GDA, using local mishap reporting procedures, within 24 hrs. The Contracting Officer will provide the Contractor the required forms. Near miss reports are considered positive and proactive Contractor safety management actions.

c. Conduct an accident investigation for any load handling equipment accident (including rigging gear accidents) to establish the root cause(s) of the accident. Complete the LHE Accident Report (Crane and Rigging Gear) form and provide the report to the Contracting Officer within 30 calendar days of the accident. Do not proceed with crane operations until cause is determined and corrective actions have been implemented to the satisfaction of the Contracting Officer. The Contracting Officer will provide a blank copy of the accident report form.

d. In addition to the above, any mishap occurring in any of the following high hazard areas shall be immediately reported to the GDA IAW EM 385-1-1 par 01.D.05. These mishaps shall be investigated in depth to identify all causes and to recommend hazard control measures.

(1) Electrical - to include Arc Flash, electrical shock, etc.;
(2) Uncontrolled Release of Hazardous Energy (includes electrical and non-electrical);
(3) Load Handling Equipment (LHE) or Rigging;
(4) Fall-from-Height (any level other than same surface), and
(5) Underwater Diving.

1.11.3 Monthly Exposure Reports

Attach monthly exposure reporting to the monthly billing request. This report is a compilation of employee-hours worked each month for all site workers, both prime and subcontractor. The Contracting Officer will provide copies of any special forms.

1.11.4 LHE Inspection Reports

Submit LHE inspection reports required in accordance with EM 385-1-1 and as specified herein with Daily Reports of Inspections.

1.11.5 Certificate of Compliance and Pre-lift Plan/Checklist for LHE and Rigging

Provide a FORM 16-1 Certificate of Compliance for LHE entering an activity under this contract and in accordance with EM 385-1-1. Post certifications on the crane.

Develop a Standard Lift Plan (SLP) in accordance with EM 385-1-1, Section 16.H.03 using Form 16-2 Standard Pre-Lift Crane Plan/Checklist for each lift planned. Submit SLP to the Contracting Officer for approval within 15 calendar days in advance of planned lift.

1.11.6 Regulatory Citations and Violations

Contact the Contracting Officer immediately of any OSHA or other regulatory agency inspection or visit, and provide the Contracting Officer with a copy of each citation, report, and contractor response. Correct violations and citations promptly and provide written corrective actions to the Contracting Officer.

1.11.7 Contamination Control

During project activities, protect against contamination of soil, water, plant life, and all adjacent building areas, and must ensure that there is no airborne release of hazardous materials and dust. The Contracting Officer may collect air and wipe samples in adjacent areas to evaluate the Contractor's performance. Evidence of settled dust or airborne levels of contaminants above background will require the implementation of additional controls at no increase to contract price.

1.12 HOT WORK

1.12.1 Permit and Personnel Requirements

Submit and obtain a written permit prior to performing "Hot Work" (i.e. welding or cutting) or operating other flame-producing/spark producing devices, from the Fire Division. A permit is required from the Explosives Safety Office for work in and around where explosives are processed, stored, or handled. CONTRACTORS ARE REQUIRED TO MEET ALL CRITERIA BEFORE A PERMIT IS ISSUED. Provide at least two 20 pound 4A:20 BC rated extinguishers for normal "Hot Work". The extinguishers must be current inspection tagged, and contain an approved safety pin and tamper resistant seal. It is also mandatory to have a designated FIRE WATCH for any "Hot Work" done at this activity. The Fire Watch must be trained in accordance with NFPA 51B and remain on-site for a minimum of one hour after completion of the task or longer as specified on the hot work permit.

When starting work, require personnel to familiarize themselves with the location of the nearest fire alarm boxes and place in memory the emergency Fire Division phone number. REPORT ANY FIRE, NO MATTER HOW SMALL, TO THE RESPONSIBLE FIRE DIVISION IMMEDIATELY.

1.12.2 Work Around Flammable Materials

Obtain services from a NFPA Certified Marine Chemist for "HOT WORK" within or around flammable materials (such as fuel systems or welding/cutting on fuel pipes) or confined spaces (such as sewer wet wells, manholes, or vaults) that have the potential for flammable or explosive atmospheres.

Whenever these materials, except beryllium and chromium (VI), are encountered in indoor operations, local mechanical exhaust ventilation systems that are sufficient to reduce and maintain personal exposures to within acceptable limits must be used and maintained in accordance with manufacturer's instruction and supplemented by exceptions noted in EM 385-1-1, Section 06.H

1.13 PERSONAL PROTECTIVE EQUIPMENT (PPE)

1.13.1 Site Specific PPE Program

Onsite personnel exposed to contaminants and safety hazards must be provided with appropriate PPE. PPE must be relevant to site-specific conditions, including heat and cold stress potential and safety hazards. Only respirators approved by NIOSH must be used. Protective equipment and clothing must be kept clean and well maintained. The PPE section of the APP must include site-specific procedures for onsite fit testing of respirators, cleaning, maintenance, inspection, and storage. Mandatory PPE includes:

a. Hard Hats. IAW EM 385-1-1 par 05.D.01, all persons working in or visiting hard hat areas shall be provided with and required to wear Type I or Type II, Class G (General - not to exceed 2,200 volts) or Class E (Electrical-not to exceed 20,000 volts) headgear as appropriate. The selection of the type of hardhat shall be based on the activity and identified in the AHA.

b. Protective Footwear. IAW EM 385-1-1 par 05.E.05, personnel shall, as a minimum, wear safety-toed boots meeting ASTM Standard F2413 while working on construction sites unless it can be demonstrated by a PHA/AHA to the GDA's satisfaction that a different type of foot protection is required.

c. High-visibility vests. IAW EM 385-1-1 par 05.F.01, high-visibility apparel meeting, at minimum, ANSI/ISEA 107, Performance Class 2 requirements, shall be worn by workers.

d. Other PPE i.e safety glasses, hearing protection etc. as required.

1.13.2 Levels of Protection

The SSHO must establish and evaluate the levels of protection for each work activity as the work progresses. The SSHO must also establish action levels for upgrade or downgrade in the levels of PPE. Protocols and the communication network for changing the level of protection must be described in the APP. The PPE evaluation protocol must address air monitoring results, potential for exposure, changes in site conditions, work phases, job tasks, weather, temperature extremes, individual medical considerations, etc.

1.13.3 Respiratory Protection Program

Establish in writing, and implement a respiratory protection program in accordance with 29 CFR 1910.134 and AIHA Z88.6. The Contractor must establish minimum respiratory protection requirements based on measured or anticipated levels of chemical and biological hazards encountered during the performance of the work.

1.14 EXPOSURE MONITORING/AIR SAMPLING PROGRAM

Prepare and implement an exposure monitoring/air sampling program (personal and area) to identify and quantify safety and health hazards and airborne levels of hazardous substances (i.e. dust, silica, drilling fluids, etc.) in order to assure proper selection of engineering controls, work practices and personal protective equipment for affected site personnel. Personal exposures must not equal or exceed the OSHA permissible exposure limits

(PELs) or the ACGIH 0112.

1.15 SAFETY DATA SHEETS

Include in the APP a Safety Data Sheet (SDS) for each known or anticipated chemical brought to the site in support of the construction activities.

1.16 PROTECTION OF EXISTING AREAS

All project-associated activities must be performed without damaging or contaminating adjacent work and areas. Where such work or areas are damaged or contaminated, restore work and areas to the original condition at no additional cost to the Government.

1.17 COORDINATION WITH OTHER WORK

Coordinate project activities with work being performed in adjacent areas. Explain coordination procedures in the APP and describe how to prevent exposures to other contractors and/or government personnel performing work unrelated to activities associated with this project.

1.18 CONFINED SPACE ENTRY REQUIREMENTS.

Confined space entry must comply with Section 34 of EM 385-1-1, OSHA 29 CFR 1926, OSHA 29 CFR 1910, OSHA 29 CFR 1910.146, and OSHA Directive CPL 2.100. Any potential for a hazard in the confined space requires a permit system to be used.

1.18.1 Entry Procedures

Prohibit entry into a confined space by personnel for any purpose, including hot work, until the qualified person has conducted appropriate tests to ensure the confined or enclosed space is safe for the work intended and that all potential hazards are controlled or eliminated and documented. Comply with EM 385-1-1, Section 34 for entry procedures. Hazards pertaining to the space must be reviewed with each employee during review of the AHA.

1.18.2 Forced Air Ventilation

Forced air ventilation is required for all confined space entry operations and the minimum air exchange requirements must be maintained to ensure exposure to any hazardous atmosphere is kept below its action level.

1.18.3 Sewer Wet Wells

Sewer wet wells require continuous atmosphere monitoring with audible alarm for toxic gas detection.

1.18.4 Rescue Procedures and Coordination with Local Emergency Responders

Develop and implement an on-site rescue and recovery plan and procedures. The rescue plan must not rely on local emergency responders for rescue from a confined space.

1.19 FACILITY OCCUPANCY CLOSURE

Streets, walks, and other facilities occupied and used by the Government must not be closed or obstructed without written permission from the

Contracting Officer.

1.20 SEVERE STORM PLAN

In the event of a severe storm warning, the Contractor must:

a. Secure outside equipment and materials and place materials that could be damaged in protected areas.

b. Check surrounding area, including roof, for loose material, equipment, debris, and other objects that could be blown away or against existing facilities.

c. Ensure that temporary erosion controls are adequate.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 CONSTRUCTION AND OTHER WORK

Comply with EM 385-1-1, NFPA 70, NFPA 70E, NFPA 241, the APP, the AHA, Federal and State OSHA regulations, and other related submittals and activity fire and safety regulations. The most stringent standard prevails.

PPE is governed in all areas by the nature of the work the employee is performing. Use personal hearing protection at all times in designated noise hazardous areas or when performing noise hazardous tasks. Safety glasses must be worn or carried/available on each person. Mandatory PPE includes:

a. Hard Hat

b. Long Pants

c. Appropriate Safety Shoes

d. Appropriate Class Reflective Vests

3.1.1 Worksite Communication

Employees working alone in a remote location or away from other workers must be provided an effective means of emergency communications (i.e., cellular phone, two-way radios, land-line telephones or other acceptable means). The selected communication must be readily available (easily within the immediate reach) of the employee and must be tested prior to the start of work to verify that it effectively operates in the area/environment. An employee check-in/check-out communication procedure must be developed to ensure employee safety.

3.1.2 Hazardous Material Exclusions

Notwithstanding any other hazardous material used in this contract, radioactive materials or instruments capable of producing ionizing/non-ionizing radiation (with the exception of radioactive material and devices used in accordance with EM 385-1-1 such as nuclear density meters for compaction testing and laboratory equipment with radioactive

sources) as well as materials which contain asbestos, mercury or polychlorinated biphenyls, di-isocyanates, lead-based paint, and hexavalent chromium, are prohibited. The Contracting Officer, upon written request by the Contractor, may consider exceptions to the use of any of the above excluded materials. Low mercury lamps used within fluorescent lighting fixtures are allowed as an exception without further Contracting Officer approval. Notify the Radiation Safety Officer (RSO) prior to excepted items of radioactive material and devices being brought on base.

3.1.3 Unforeseen Hazardous Material

Contract documents identify materials such as PCB, lead paint, and friable and non-friable asbestos and other OSHA regulated chemicals (i.e. 29 CFR Part 1910.1000). If material(s) that may be hazardous to human health upon disturbance are encountered during construction operations, stop that portion of work and notify the Contracting Officer immediately. Within 14 calendar days the Government will determine if the material is hazardous. If material is not hazardous or poses no danger, the Government will direct the Contractor to proceed without change. Do not continue with any work that would create a hazardous condition or violate federal, or state regulations regarding asbestos, lead, or LBP. If material is hazardous and handling of the material is necessary to accomplish the work, the Government will issue a modification pursuant to FAR 52.243-4, "Changes" and FAR 52.236-2, "Differing Site Conditions."

3.2 PRE-OUTAGE COORDINATION MEETING

Apply for utility outages at least 5 days in advance. As a minimum, the request must include the location of the outage, utilities being affected, duration of outage and any necessary sketches. Special requirements for electrical outage requests are contained elsewhere in this specification section. Once approved, and prior to beginning work on the utility system requiring shut down, attend a pre-outage coordination meeting with the Contracting Officer and the Public Utilities representative to review the scope of work and the lock-out/tag-out procedures for worker protection. No work will be performed on energized electrical circuits unless proof is provided that no other means exist.

3.3 CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)

Provide and operate a Hazardous Energy Control Program (HECP) in accordance with EM 385-1-1 Section 12, 29 CFR 1910.333, 29 CFR 1915.89, and paragraph HAZARDOUS ENERGY CONTROL PROGRAM (HECP).

(1) Contractor shall ensure that each employee is familiar with and complies with these procedures and USACE EM 385-1-1, Section 12, Control of Hazardous Energy.

(2) Contracting Officer will, at the Contractor's request, apply lockout/tagout tags and take other actions that, because of experience and knowledge, are known to be necessary to make the particular equipment safe to work on for government owned and operated systems.

(3) No person, regardless of position or authority, shall operate any switch, valve, or equipment that has an official lockout/tagout tag attached to it, nor shall such tag be removed except as provided in this section. No person shall work on any energized equipment including, but not limited to activities such as erecting, installing, constructing, repairing, adjusting, inspecting, un-jamming, setting up,

trouble shooting, testing, cleaning, dismantling, servicing and maintaining machines equipment of processes until an evaluation has been conducted identifying the energy source and the procedures which will be taken to ensure the safety of personnel. All work on electrical circuits shall be performed by trained and qualified electricians.

(4) Any supervisor required to enter an area protected by a lockout/tagout tag will be considered a member of the protected group. He/she must notify the holder of the tag stub each time they enter and depart from the protected area.

(5) Identification markings on building light and power distribution circuits shall not be relied on for established safe work conditions.

(6) Before clearance will be given on any equipment other than electrical (generally referred to as mechanical apparatus), the apparatus, valves, or systems shall be secured in a passive condition with the appropriate vents, pins, and locks.

(7) Pressurized or vacuum systems shall be vented to relieve differential pressure completely. Vent valves shall be tagged open during the course of the work.

(8) Where dangerous gas or fluid systems are involved, or in areas where the environment may be oxygen deficient, system or areas shall be purged, ventilated, or otherwise made safe prior to entry.

(9) Tag Placement

a. Lockout/tagout tags shall be completed in accordance with the regulations printed on the back thereof and attached to any device which, if operated, could cause an unsafe condition to exist.

b. If more than one group is to work on any circuit or equipment, the employee in charge of each group shall have a separate set of lockout/tagout tags completed and properly attached.

c. When it is required that certain equipment be tagged, the Government will review the characteristics of the various systems involved that affect the safety of the operations and the work to be done; take the necessary actions, including voltage and pressure checks, grounding, and venting, to make the system and equipment safe to work on; and apply such lockout/tagout tags to those switches, valves, vents, or other mechanical devices needed to preserve the safety provided. This operation is referred to as "Providing Safety Clearance."

(10) Tag Removal

When any individual or group has completed its part of the work and is clear of the circuits or equipment, the supervisor, project leader, or individual for whom the equipment was tagged shall turn in his signed lockout/tagout tag stub to the Contracting Officer. That group's or individual' lockout/tagout tags on equipment may then be removed on authorization by the Contracting Officer.

3.4 FALL PROTECTION PROGRAM

Establish a fall protection program, for the protection of all employees exposed to fall hazards. Within the program include company policy, identify roles and responsibilities, education and training requirements, fall hazard identification, prevention and control measures, inspection, storage, care and maintenance of fall protection equipment and rescue and evacuation procedures in accordance with ASSE/SAFE Z359.2 and EM 385-1-1, Sections 21.A and 21.D.

3.4.1 Training

Institute a fall protection training program. As part of the Fall Protection Program, provide training for each employee who might be exposed to fall hazards. Provide training by a competent person for fall protection in accordance with EM 385-1-1, Section 21.C. Document training and practical application of the competent person in accordance with EM 385-1-1, Section 21.C.04 and ASSE/SAFE Z359.2 in the AHA.

3.4.2 Fall Protection Equipment and Systems

Enforce use of personal fall protection equipment and systems designated (to include fall arrest, restraint, and positioning) for each specific work activity in the Site Specific Fall Protection and Prevention Plan and AHA at all times when an employee is exposed to a fall hazard. Protect employees from fall hazards as specified in EM 385-1-1, Section 21.

Provide personal fall protection equipment, systems, subsystems, and components that comply with EM 385-1-1 Section 21.I, 29 CFR 1926.500 Subpart M,ASSE/SAFE Z359.0, ASSE/SAFE Z359.1, ASSE/SAFE Z359.2, ASSE/SAFE Z359.3, ASSE/SAFE Z359.4, ASSE/SAFE Z359.6, ASSE/SAFE Z359.7, ASSE/SAFE Z359.11, ASSE/SAFE Z359.12, ASSE/SAFE Z359.13, ASSE/SAFE Z359.14, and ASSE/SAFE Z359.15.

3.4.2.1 Additional Personal Fall Protection

In addition to the required fall protection systems, other protection such as safety skiffs, personal floatation devices, and life rings, are required when working above or next to water in accordance with EM 385-1-1, Sections 21.O through 21.O.06. Personal fall protection systems and equipment are required when working from an articulating or extendible boom, swing stages, or suspended platform. In addition, personal fall protection systems are required when operating other equipment such as scissor lifts. The need for tying-off in such equipment is to prevent ejection of the employee from the equipment during raising, lowering, travel, or while performing work.

3.4.2.2 Personal Fall Protection Harnesses

Only a full-body harness with a shock-absorbing lanyard or self-retracting lanyard is an acceptable personal fall arrest body support device. The use of body belts is not acceptable. Harnesses must have a fall arrest attachment affixed to the body support (usually a Dorsal D-ring) and specifically designated for attachment to the rest of the system. Snap hooks and carabiners must be self-closing and self-locking, capable of being opened only by at least two consecutive deliberate actions and have a minimum gate strength of 3,600 lbs in all directions. Use webbing, straps, and ropes made of synthetic fiber. The maximum free fall distance when using fall arrest equipment must not exceed 6 feet, unless the proper

energy absorbing lanyard is used. Always take into consideration the total fall distance and any swinging of the worker (pendulum-like motion), that can occur during a fall, when attaching a person to a fall arrest system. All full body harnesses must be equipped with Suspension Trauma Preventers such as stirrups, relief steps, or similar in order to provide short-term relief from the effects of orthostatic intolerance in accordance with EM 385-1-1, Section 21.I.06.

3.4.3 Fall Protection for Roofing Work

Implement fall protection controls based on the type of roof being constructed and work being performed. Evaluate the roof area to be accessed for its structural integrity including weight-bearing capabilities for the projected loading.

a. Low Sloped Roofs:

(1) For work within 6 feet of an edge, on a roof having a slope less than or equal to 4:12 (vertical to horizontal), protect personnel from falling by use of personal fall arrest/restraint systems, guardrails, or safety nets. A safety monitoring system is not adequate fall protection and is not authorized. Provide in accordance with 29 CFR 1926.500.

(2) For work greater than 6 feet from an edge, erect and install warning lines in accordance with 29 CFR 1926.500 and EM 385-1-1, Section L.

b. Steep-Sloped Roofs: Work on a roof having a slope greater than 4:1 (vertical to horizontal) requires a personal fall arrest system, guardrails with toe-boards, or safety nets. This requirement also applies to residential or housing type construction.

3.4.4 Horizontal Lifelines (HLL)

Provide HLL in accordance with EM 385-1-1, Section 21.I.08.d.2. Commercially manufactured horizontal lifelines (HLL) must be designed, installed, certified and used, under the supervision of a qualified person, for fall protection as part of a complete fall arrest system which maintains a safety factor of 2 (29 CFR 1926.500). The competent person for fall protection may (if deemed appropriate by the qualified person) supervise the assembly, disassembly, use and inspection of the HLL system under the direction of the qualified person. Locally manufactured HLLs are not acceptable unless they are custom designed for limited or site specific applications by a Registered Professional Engineer who is qualified in designing HLL systems.

3.4.5 Guardrails and Safety Nets

Design, install and use guardrails and safety nets in accordance with EM 385-1-1, Section 21.F.01 and 29 CFR 1926 Subpart M.

3.4.6 Rescue and Evacuation Plan and Procedures

When personal fall arrest systems are used, ensure that the mishap victim can self-rescue or can be rescued promptly should a fall occur. Prepare a Rescue and Evacuation Plan and include a detailed discussion of the following: methods of rescue; methods of self-rescue or assisted-rescue; equipment used; training requirement; specialized training for the

rescuers; procedures for requesting rescue and medical assistance; and transportation routes to a medical facility. Include the Rescue and Evacuation Plan within the Activity Hazard Analysis (AHA) for the phase of work, in the Fall Protection and Prevention (FP&P) Plan, and the Accident Prevention Plan (APP). The plan must comply with the requirements of EM 385-1-1, ASSE/SAFE Z359.2, and ASSE/SAFE Z359.4.

3.5 WORK PLATFORMS

3.5.1 Scaffolding

Provide employees with a safe means of access to the work area on the scaffold. Climbing of any scaffold braces or supports not specifically designed for access is prohibited. Comply with the following requirements:

a. Scaffold platforms greater than 20 feet in height must be accessed by use of a scaffold stair system.

b. Ladders commonly provided by scaffold system manufacturers are prohibited for accessing scaffold platforms greater than 20 feet maximum in height.

c. An adequate gate is required.

d. Employees performing scaffold erection and dismantling must be qualified.

e. Scaffold must be capable of supporting at least four times the maximum intended load or without appropriate fall protection as delineated in the accepted fall protection and prevention plan.

f. Stationary scaffolds must be attached to structural building components to safeguard against tipping forward or backward.

g. Special care must be given to ensure scaffold systems are not overloaded.

h. Side brackets used to extend scaffold platforms on self-supported scaffold systems for the storage of material are prohibited. The first tie-in must be at the height equal to 4 times the width of the smallest dimension of the scaffold base.

i. Scaffolding other than suspended types must bear on base plates upon wood mudsills (2 in x 10 in x 8 in minimum) or other adequate firm foundation.

j. Scaffold or work platform erectors must have fall protection during the erection and dismantling of scaffolding or work platforms that are more than six feet.

k. Delineate fall protection requirements when working above six feet or above dangerous operations in the Fall Protection and Prevention (FP&P) Plan and Activity Hazard Analysis (AHA) for the phase of work.

3.5.2 Elevated Aerial Work Platforms (AWPs)

Workers must be anchored to the basket or bucket in accordance with manufacturer's specifications and instructions (anchoring to the boom may only be used when allowed by the manufacturer and permitted by the CP).

Lanyards used must be sufficiently short to prohibit worker from climbing out of basket. The climbing of rails is prohibited. Lanyards with built-in shock absorbers are acceptable. Self-retracting devices are not acceptable. Tying off to an adjacent pole or structure is not permitted unless a safe device for 100 percent tie-off is used for the transfer.

Use of AWPs must be operated, inspected, and maintained as specified in the operating manual for the equipment and delineated in the AHA. Operators of AWPs must be designated as qualified operators by the Prime Contractor. Maintain proof of qualifications on site for review and include in the AHA.

3.6 EQUIPMENT

3.6.1 Material Handling Equipment (MHE)

a. Material handling equipment such as forklifts must not be modified with work platform attachments for supporting employees unless specifically delineated in the manufacturer's printed operating instructions. Material handling equipment fitted with personnel work platform attachments are prohibited from traveling or positioning while personnel are working on the platform.

b. The use of hooks on equipment for lifting of material must be in accordance with manufacturer's printed instructions. Material Handling Equipment Operators must be trained in accordance with OSHA 29 CFR 1910, Subpart N.

c. Operators of forklifts or power industrial trucks must be licensed in accordance with OSHA.

3.6.2 Load Handling Equipment (LHE)

a. Equip cranes and derricks as specified in EM 385-1-1, Section 16.

b. Notify the Contracting Officer 15 working days in advance of any LHE entering the activity, in accordance with EM 385-1-1, Section 16.A.02, so that necessary quality assurance spot checks can be coordinated.Contractor's operator must remain with the crane during the spot check. Rigging gear must comply with OSHA, ASME B30.9 Standards safety standards.

c. Comply with the LHE manufacturer's specifications and limitations for erection and operation of cranes and hoists used in support of the work. Perform erection under the supervision of a designated person (as defined in ASME B30.5). Perform all testing in accordance with the manufacturer's recommended procedures.

d. Comply with ASME B30.5 for mobile and locomotive cranes, ASME B30.22 for articulating boom cranes, ASME B30.3 for construction tower cranes, ASME B30.9 for slings, ASME B30.20 for below the hook lifting devices and ASME B30.26 for rigging hardware.

e. Under no circumstance must a Contractor make a lift at or above 90 percent of the cranes rated capacity in any configuration.

f. When operating in the vicinity of overhead transmission lines, operators and riggers must be alert to this special hazard and follow the requirements of EM 385-1-1 Section 11, and ASME B30.5 or ASME B30.22 as applicable.

g. Do not use crane suspended personnel work platforms (baskets) unless the Contractor proves that using any other access to the work location would provide a greater hazard to the workers or is impossible. Do not lift personnel with a line hoist or friction crane. Additionally, submit a specific AHA for this work to the Contracting Officer. Ensure the activity and AHA are thoroughly reviewed by all involved personnel.

h. Inspect, maintain, and recharge portable fire extinguishers as specified in NFPA 10, Standard for Portable Fire Extinguishers.

i. All employees must keep clear of loads about to be lifted and of suspended loads.

j. Use cribbing when performing lifts on outriggers.

k. The crane hook/block must be positioned directly over the load. Side loading of the crane is prohibited.

l. A physical barricade must be positioned to prevent personnel access where accessible areas of the LHE's rotating superstructure poses a risk of striking, pinching or crushing personnel.

m. Maintain inspection records in accordance by EM 385-1-1, Section 16.D, including shift, monthly, and annual inspections, the signature of the person performing the inspection, and the serial number or other identifier of the LHE that was inspected. Records must be available for review by the Contracting Officer.

n. Maintain written reports of operational and load testing in accordance with EM 385-1-1, Section 16.F, listing the load test procedures used along with any repairs or alterations performed on the LHE. Reports must be available for review by the Contracting Officer.

o. Certify that all LHE operators have been trained in proper use of all safety devices (e.g. anti-two block devices).

p. Take steps to ensure that wind speed does not contribute to loss of control of the load during lifting operations. At wind speeds greater than 20 mph, the operator, rigger and lift supervisor must cease all crane operations, evaluate conditions and determine if the lift may proceed. Base the determination to proceed or not on wind calculations per the manufacturer and a reduction in LHE rated capacity if applicable. Include this maximum wind speed determination as part of the activity hazard analysis plan for that operation.

3.6.3 Machinery and Mechanized Equipment

a. Proof of qualifications for operator must be kept on the project site for review.

b. Manufacture specifications or owner's manual for the equipment must be on-site and reviewed for additional safety precautions or requirements that are sometimes not identified by OSHA or USACE EM 385-1-1. Incorporate such additional safety precautions or requirements into the AHAs.

3.6.4 USE OF EXPLOSIVES

Explosives must not be used or brought to the project site without prior written approval from the Contracting Officer. Such approval does not relieve the Contractor of responsibility for injury to persons or for damage to property due to blasting operations.

Storage of explosives, when permitted on Government property, must be only where directed and in approved storage facilities. The Contractor may use fastener guns provided a minimal number of rounds are stored; in the event of storing 1000 rounds or more of fastener gun charges the contractor shall obtain an explosive license from the HAFB Civil Engineering Weapons Safety Manager. These facilities must be kept locked at all times except for inspection, delivery, and withdrawal of explosives.

3.7 EXCAVATIONS

Soil classification must be performed by a competent person in accordance with 29 CFR 1926.652, 29 CFR 1926 and EM 385-1-1. Obtain an excavation permit for any excavation in excess of 5 feet into which a person is required to enter.

3.7.1 Utility Locations

Provide a third party, independent, private utility locating company to positively identify underground utilities in the work area in addition to any station locating service and coordinated with the station utility department. Any markings made during the utility investigation must be maintained throughout the contract.

3.7.2 Utility Location Verification

Physically verify underground utility locations, including utility depth, by hand digging using wood or fiberglass handled tools when any adjacent construction work is expected to come within three feet of the underground system.Use hand digging within 2 feet of a known utility. If construction is parallel to an existing utility, expose the utility by hand digging every 100 feet if parallel within 5 feet of the excavation.

3.7.3 Trenching/Shoring Systems

Trench and shoring systems must be identified in the accepted safety plan and AHA. Manufacture tabulated data and specifications or registered engineer tabulated data for shoring or benching systems must be readily available on-site for review. Job-made shoring or shielding must have the registered professional engineer stamp, specifications, and tabulated data. Extreme care must be used when excavating near direct burial electric underground cables.

Trenching machines with digging chain drives must be operated only when the spotters/laborers are in plain view of the operator. Operator and spotters/laborers must be provided training on the hazards of the digging chain drives with emphasis on the distance that needs to be maintained when the digging chain is operating. Documentation of the training must be kept on file at the project site.

3.7.4 Utilities Within and Under Concrete, Bituminous Asphalt, and Other Impervious Surfaces

Utilities located within and under concrete slabs or pier structures, bridges, parking areas, and the like, are extremely difficult to identify. Whenever contract work involves chipping, saw cutting, or core drilling through concrete, bituminous asphalt or other impervious surfaces, the existing utility location must be coordinated with station utility departments in addition to location and depth verification by a third party, independent, private locating company. The third party, independent, private locating company must locate utility depth by use of Ground Penetrating Radar (GPR), X-ray, bore scope, or ultrasound prior to the start of demolition and construction. Outages to isolate utility systems must be used in circumstances where utilities are unable to be positively identified. The use of historical drawings does not alleviate the Contractor from meeting this requirement.

3.8 ELECTRICAL

Perform electrical work in accordance with EM 385-1-1, Appendix A, Sections 11 and 12.

3.8.1 Conduct of Electrical Work

As delineated in EM 385-1-1, electrical work is to be conducted in a de-energized state unless there is no alternative method for accomplishing the work. In those cases obtain an energized work permit from the Contracting Officer. The energized work permit application must be accompanied by the AHA and a summary of why the equipment/circuit needs to be worked energized. Underground electrical spaces must be certified safe for entry before entering to conduct work. Cables that will be cut must be positively identified and de-energized prior to performing each cut. Attach temporary grounds in accordance with ASTM F855 and IEEE 1048. Perform all high voltage cable cutting remotely using hydraulic cutting tool. When racking in or live switching of circuit breakers, no additional person other than the switch operator is allowed in the space during the actual operation. Plan so that work near energized parts is minimized to the fullest extent possible. Use of electrical outages clear of any energized electrical sources is the preferred method.

When working in energized substations, only qualified electrical workers are permitted to enter. When work requires work near energized circuits as defined by NFPA 70, high voltage personnel must use personal protective equipment that includes, as a minimum, electrical hard hat, safety shoes, insulating gloves and electrical arc flash protection for personnel as required by NFPA 70E. Insulating blankets, hearing protection, and switching suits may also be required, depending on the specific job and as delineated in the Contractor's AHA. Ensure that each employee is familiar with and complies with these procedures and 29 CFR 1910.147.

Underground electrical spaces must be certified safe for entry before entering to conduct work. Cables that will be cut must be positively identified and de-energized prior to performing each cut. Positive cable identification must be made prior to submitting any outage request for electrical systems. Arrangements are to be coordinated with the Contracting Officer and Base Utilities for identification. The Contracting Officer will not accept an outage request until the Contractor satisfactorily documents that the circuits have been clearly identified. Perform all high voltage cable cutting remotely using hydraulic cutting tool. When racking in or

live switching of circuit breakers, no additional person other than the switch operator will be allowed in the space during the actual operation. Plan so that work near energized parts is minimized to the fullest extent possible. Use of electrical outages clear of any energized electrical sources is the preferred method. Contractor shall comply with applicable electrical safety requirements contained in the Unified Facilities Criteria(UFC) UFC 3-560-01. This document also references ANSI C2, National Electrical Safety Code (NESC); NFPA 70, National Electrical Code (NEC); NFPA 70B, Electrical Equipment Maintenance; NFPA 70E, Electrical Safety in the Workplace; and AFI 32-1064, Electrical Safe Practices. All assigned personnel are required to wear the appropriate PPE according to the conditions and task at hand. Guidelines set forth in NFPA 70E, Unified Facilities Criteria, and the NEC shall be adhered to at all times. Proper use of appropriate PPE protects you from the devastating effect of arc flash/blast. The level of PPE required for each instance may be different and is dependent on voltage and approach distance.

Some general guidelines are as follows:

1. 0-240 Volts: Work on energized parts including testing, removal/installation of circuit breakers or fused switches or removal of bolted covers exposing live parts, or work in an energized light fixture. This work is classified as Category 1: FR lightweight coveralls or heavyweight pants and long sleeved shirt, safety glasses, and low voltage gloves are required.

2. 277-480 Volts: Turning circuit breakers or fused switches on and off with covers off, or opening hinged covers to expose live parts is classified as (Category 1 see above). Removing bolted covers to expose bare and energized parts and testing or working on energized equipment is classified as Category 2: FR coveralls over cotton pants and shirt, sock hood, face shield, safety glasses, and low voltage gloves are required.

3. Over 1000 volts without hot stick: Category 2: Flame Resistant coveralls over cotton pant and long sleeve shirt, sock hood, face shield, safety glasses, and high voltage gloves are required for: Work on 120 volt control circuits while exposed to over 1000 volts, inspection of insulated cable in open area, operation of S&C type switch, circuit breaker with doors closed, or air switch operation.

4. Over 1000 volts without hot stick: Category 4: Flame Resistant NFPA 70E compliant Arc Clothing such as FR Carhartts, sock hood, face shield, safety glasses, and high voltage gloves are required for: Switch operation with doors open, opening high voltage side of transformer, removing bolted parts to expose live parts, testing, insulated cable examination in a manhole or confined area, and all substation work including breaker operations and racking in/out breakers with doors open or closed.

5. 7200/12470 volts at greater than 8 feet hot stick distance: Category 2: Flame Resistant lightweight coveralls, high voltage gloves, hardhat, safety glasses (or face shield hardhat combo), arc flash rated safety harness are required for: Phasing/testing of lines, ground set installation, fused cutout operation, saddle/tap installation on overhead lines.

6. 7200/12470 volts at less than 8 feet hot stick distance: Category 4: Flame Resistant NFPA 70E compliant Arc Clothing such as FR Carhartts,

sock hood, face shield, safety glasses, high voltage gloves, and arc flash rated safety harness are required for all operations at less than 8 feet hot stick distance.

3.8.2 Qualifications

Electrical work must be performed by QP personnel with verifiable credentials who are familiar with applicable code requirements. Verifiable credentials consist of State, National and Local Certifications or Licenses that a Master or Journeyman Electrician may hold, depending on work being performed, and must be identified in the appropriate AHA. Journeyman/Apprentice ratio must be in accordance with State, Local requirements applicable to where work is being performed.

3.8.3 Arc Flash

Conduct a hazard analysis/arc flash hazard analysis whenever work on or near energized parts greater than 50 volts is necessary, in accordance with NFPA 70E.

All personnel entering the identified arc flash protection boundary must be QPs and properly trained in NFPA 70E requirements and procedures. Unless permitted by NFPA 70E, no Unqualified Person is permitted to approach nearer than the Limited Approach Boundary of energized conductors and circuit parts. Training must be administered by an electrically qualified source and documented.

3.8.4 Grounding

Ground electrical circuits, equipment and enclosures in accordance with NFPA 70 and IEEE C2 to provide a permanent, continuous and effective path to ground unless otherwise noted by EM 385-1-1.

Check grounding circuits to ensure that the circuit between the ground and a grounded power conductor has a resistance low enough to permit sufficient current flow to allow the fuse or circuit breaker to interrupt the current.

3.8.5 Testing

Temporary electrical distribution systems and devices must be inspected, tested and found acceptable for Ground-Fault Circuit Interrupter (GFCI) protection, polarity, ground continuity, and ground resistance before initial use, before use after modification and at least monthly. Monthly inspections and tests must be maintained for each temporary electrical distribution system, and signed by the electrical CP or QP.

3.9 WORK IN CONFINED SPACES

Comply with the requirements in Section 34 of USACE EM 385-1-1, OSHA 29 CFR 1910, OSHA 29 CFR 1910.146, OSHA Directive CPL 2.100 and OSHA 29 CFR 1926. Any potential for a hazard in the confined space requires a permit system to be used.

a. Entry Procedures. Prohibit entry into a confined space by personnel for any purpose, including hot work, until the qualified person has conducted appropriate tests to ensure the confined or enclosed space is safe for the work intended and that all potential hazards are controlled or eliminated and documented. (See Section 34 of USACE EM 385-1-1 for entry procedures.) All hazards pertaining to the space

must be reviewed with each employee during review of the AHA.

b. Forced air ventilation is required for all confined space entry operations and the minimum air exchange requirements must be maintained to ensure exposure to any hazardous atmosphere is kept below its' action level.

c. Sewer wet wells require continuous atmosphere monitoring with audible alarm for toxic gas detection.

3.10 WORK IN EXPLOSIVE CLEAR ZONES

a. When working in the Explosive Clear Zone (MAMS I, MAMS II, as well as areas of the Airfield, Little Mountain and UTTR as described) special requirements apply:

1. Smoking permited only in posted "Designated Smoking Areas."

2. "Hot Work" (welding, cutting, brazing, open flames, spark producing equipment, high heat appliances, tools, etc.) requires AF Form 592 issued by the HAFB Fire department before work begins.

3. A maximum speed limit of 25 mph shall be enforced.

4. Park vehicles 50 feet from any explosive facility on a surface free of combustibles. If the vehicle is not required as part of the work effort, it shall be parked in established parking areas or lots.

5. The use of cell phones pagers or radios is prohibited within 10 feet of any explosive facility.

6. Explosive laden vehicles shall have the right of way at all times.

7. Roads posted "Explosive Operation in Progress" are closed to traffic and shall not be used.

8. Every work site shall have a minimum two (2), Type ABC, fire extinguishers.

9. Work on facilities with explosives or in areas with explosives requires the prior approval of the facility supervisor and OO-ALC/SEW.

b. When working in the explosive areas, use only the minimum number of workers to accomplish the job. Remain in the explosive areas for the minimum amount of time to complete the job. Leave the explosive areas for breaks and lunches. The cardinal rule for the explosive areas: Limit exposure to a minimum number of persons, for a minimum amount of time, to the minimum amount of ammunition and explosives consistent with safe and efficient operations. When lightning is within 5 nautical miles (5.75 land Miles) of HAFB, ALL personnel shall evacuate the Explosive Clear Zone, which is determined as the gated areas of these zones.

c. Emergency procedures in the event of accident, fire, and/or electrical storm:

1. Maintain a capability to communicate with OO-ALC emergency

services (telephone 911).

2. Maintain a capability to be contacted by emergency services or the Project Manager.

3. Only tasks consistent with the contract shall be accomplished in explosive areas.

4. Contact shall be made with the 75 CEG Weapons Safety Manager to determine if the contractor and his men will be required to attend a briefing before work begins.

3.11 CRYSTALLINE SILICA

Construction operations encountering materials containing crystalline silica, comply with OSHA regulations and EM 385-1-1, Sect 06.N. Develop and implement effective exposure control and elimination procedures to include dust control systems, engineering controls, and establishment of work area boundaries, as well as medical surveillance, training, air monitoring, and personal protective equipment.

3.12 HOUSEKEEPING

All debris in work areas must be cleaned up daily or more frequently if necessary. Construction debris may be temporarily located in an approved location, however garbage accumulation must be removed each day.

3.13 BIOLOGICAL HAZARDS

Raw Water may contain bacteria, funguses, parasites, and viruses that can cause intestinal, lung and other infections. Develop a standard operating procedure (SOP) addressing engineering controls, work practices, PPE, hygiene, training and medical surveillance to protect workers from exposures to biological hazards.

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SOURCES FOR REFERENCE PUBLICATIONS
11/14

PART 1 GENERAL

1.1 REFERENCES

Various publications are referenced in other sections of the specifications to establish requirements for the work. These references are identified in each section by document number, date and title. The document number used in the citation is the number assigned by the standards producing organization (e.g. ASTM B564 Standard Specification for Nickel Alloy Forgings). However, when the standards producing organization has not assigned a number to a document, an identifying number has been assigned for reference purposes.

1.2 ORDERING INFORMATION

The addresses of the standards publishing organizations whose documents are referenced in other sections of these specifications are listed below, and if the source of the publications is different from the address of the sponsoring organization, that information is also provided. Documents listed in the specifications with numbers which were not assigned by the standards producing organization should be ordered from the source by title rather than by number.

U.S. ARMY CORPS OF ENGINEERS, SACRAMENTO DISTRICT (CESPK)
1325 J Street
Sacramento, CA 95814
Ph: 916-557-7670
E-mail: CESPK-ED-EQS

U.S. ARMY CORPS OF ENGINEERS, SOUTH PACIFIC DIVISION (CESPD)
1455 Market Street
San Francisco, CA 94103-1398

Ph: 415-503-6517
Internet: http://www.spd.usace.army.mil/

AACE INTERNATIONAL (AACE)
1265 Suncrest Towne Centre Drive
Morgantown, WV 26505-1876 USA
Ph: 304-296-8444
Fax: 304-291-5728
E-mail: info@aacei.org
Internet: http://www.aacei.org

AIR-CONDITIONING, HEATING AND REFRIGERATION INSTITUTE (AHRI)
2111 Wilson Blvd, Suite 500
Arlington, VA 22201
Ph: 703-524-8800
Fax: 703-562-1942
Internet: http://www.ahrinet.org

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)
1330 Kemper Meadow Drive
Cincinnati, OH 45240
Ph: 513-742-2020 or 513-742-6163
Fax: 513-742-3355
E-mail: mail@acgih.org
Internet: http://www.acgih.org

AMERICAN INDUSTRIAL HYGIENE ASSOCIATION (AIHA)
3141 Fairview Park Dr, Suite 777
Falls Church, VA 22042
Tel: 703-849-8888
Fax: 703-207-3561
E-mail: infonet@aiha.org
Internet http://www.aiha.org

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)
1800 East Oakton Street
Des Plaines, IL 60018
Ph: 847-699-2929
Internet: http://www.asse.org

AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE)
18927 Hickory Creek Drive, Suite 220
Mokena, IL 60448
Ph: 708-995-3019
Fax: 708-479-6139
E-mail: staffengineer@asse-plumbing.org
Internet: http://www.asse-plumbing.org

AMERICAN WATER WORKS ASSOCIATION (AWWA)
6666 West Quincy Avenue
Denver, CO 80235-3098
Ph: 303-794-7711
E-mail: distribution@awwa.org
Internet: http://www.awwa.org

ASME INTERNATIONAL (ASME)
Two Park Avenue, M/S 10E
New York, NY 10016-5990
Ph: 800-843-2763
Fax: 973-882-1717
E-mail: customercare@asme.org
Internet: http://www.asme.org

ASTM INTERNATIONAL (ASTM)
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428-2959
Ph: 877-909-2786
Internet: http://www.astm.org

COMPRESSED GAS ASSOCIATION (CGA)
14501 George Carter Way, Suite 103
Chantilly, VA 20151-1788
Ph: 703-788-2700
Fax: 703-961-1831
E-mail: cga@cganet.com
Internet: http://www.cganet.com

FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH (FCCCHR)
University of South California
Research Annex 219
3716 South Hope Street
Los Angeles, CA 90089-7700
Ph: 213-740-2032 or 866-545-6340
Fax: 213-740-8399
E-mail: fccchr@usc.edu
Internet: http://www.usc.edu/dept/fccchr

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)
445 and 501 Hoes Lane
Piscataway, NJ 08854-4141
Ph: 732-981-0060 or 800-701-4333
Fax: 732-562-9667
E-mail: onlinesupport@ieee.org
Internet: http://www.ieee.org

INTERNATIONAL CODE COUNCIL (ICC)
500 New Jersey Avenue, NW
6th Floor, Washington, DC 20001
Ph: 800-786-4452 or 888-422-7233
E-mail: order@iccsafe.org
Internet: www.iccsafe.org

INTERNATIONAL SAFETY EQUIPMENT ASSOCIATION (ISEA)
1901 North Moore Street
Arlington, VA 22209-1762
Ph: 703-525-1695
Fax: 703-528-2148
Internet: http://www.safetyequipment.org/

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
1 Batterymarch Park
Quincy, MA 02169-7471
Ph: 617-770-3000
Fax: 617-770-0700
Internet: http://www.nfpa.org

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)
395 E Street, S.W.
Suite 9200
Patriots Plaza Building
Washington, DC 20201
Ph: 800-232-4636
Fax: 513-533-8347
E-mail: nioshdocket@cdc.gov
Internet: http://www.cdc.gov/niosh/

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS)
Publication Distribution Unit
1801 30th Street
Sacramento, CA 95816-8041
Ph: 916-227-8396
E-mail: michael_campos@dot.ca.gov
Internet: http://www.dot.ca.gov/hq/esc/techpubs/

UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY (UDEQ)

195 North 1950 West
South Lake City, Utah 84114
Phone: (801)536-4400
Internet:http://www.deq.utah.gov/

U.S. ARMY (DA)
U.S. Army Publishing Directorate
Ph: 703-614-3634
Internet: http://www.apd.army.mil

U.S. ARMY CORPS OF ENGINEERS (USACE)
CRD-C DOCUMENTS available on Internet:
http://www.wbdg.org/ccb/browse_cat.php?c=68
Order Other Documents from:
USACE Publications Depot
Attn: CEHEC-IM-PD
2803 52nd Avenue
Hyattsville, MD 20781-1102
Ph: 301-394-0081
Fax: 301-394-0084
E-mail: pubs-army@usace.army.mil
Internet: http://www.publications.usace.army.mil/
or
http://www.hnc.usace.army.mil/Missions/Engineering/TECHINFO.aspx

U.S. DEFENSE LOGISTICS AGENCY (DLA)

Fort Belvoir, VA

Internet: http://www.dla.mil

U.S. DEPARTMENT OF DEFENSE (DOD)
Order DOD Documents from:
Room 3A750-The Pentagon
1400 Defense Pentagon
Washington, DC 20301-1400
Ph: 703-571-3343
FAX: 215-697-1462
E-mail: customerservice@ntis.gov
Internet: http://www.ntis.gov
Obtain Military Specifications, Standards and Related Publications from:
Acquisition Streamlining and Standardization Information System (ASSIST)
Department of Defense Single Stock Point (DODSSP)
Document Automation and Production Service (DAPS)
Building 4/D
700 Robbins Avenue
Philadelphia, PA 19111-5094
Ph: 215-697-6396 - for account/password issues
Internet: http://assist.daps.dla.mil/online/start/; account registration required
Obtain Unified Facilities Criteria (UFC) from:
Whole Building Design Guide (WBDG)
National Institute of Building Sciences (NIBS)
1090 Vermont Avenue NW, Suite 700
Washington, CD 20005

Ph: 202-289-7800
Fax: 202-289-1092
Internet: http://www.wbdg.org/references/docs_refs.php

U.S. DEPARTMENT OF ENERGY (DOE)
1000 Independence Avenue Southwest
Washington, D.C. 20585
Internet: www.eere.energy.gov

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)
HUD User
P.O. Box 23268
Washington, DC 20026-3268
Ph: 800-245-2691 or 202-708-3178
TDD: 800-927-7589
Fax: 202-708-9981
Internet: http://www.huduser.org

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)
Ariel Rios Building
1200 Pennsylvania Avenue, N.W.
Washington, DC 20004
Ph: 202-272-0167
Internet: http://www2.epa.gov/libraries
--- Some EPA documents are available only from:
National Technical Information Service (NTIS)
5301 Shawnee Road
Alexandria, VA 22312
Ph: 703-605-6050 or 1-688-584-8332
Fax: 703-605-6900
E-mail: info@ntis.gov
Internet: http://www.ntis.gov

U.S. FEDERAL AVIATION ADMINISTRATION (FAA)
Order for sale documents from:
Superintendent of Documents
U.S. Government Printing Office (GPO)
710 North Capitol Street, NW
Washington, DC 20401
Ph: 202-512-1800
Fax: 202-512-2104
E-mail: contactcenter@gpo.gov
Internet: http://www.gpoaccess.gov
Order free documents from:
Federal Aviation Administration
Department of Transportation
800 Independence Avenue, SW
Washington, DC 20591
Ph: 1-866-835-5322
Internet: http://www.faa.gov

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)
FHWA, Office of Safety
1200 New Jersey Ave., SE
Washington, DC 20590
Ph: 202-366-4000
Internet: http://www.fhwa.dot.gov
Order from:
Superintendent of Documents

U. S. Government Printing Office (GPO)
710 North Capitol Street, NW
Washington, DC 20401
Ph: 202-512-1800
Fax: 202-512-2104
E-mail: contactcenter@gpo.gov
Internet: http://www.gpoaccess.gov

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)
8601 Adelphi Road
College Park, MD 20740-6001
Ph: 866-272-6272
Fax: 301-837-0483
Internet: http://www.archives.gov
Order documents from:
Superintendent of Documents
U.S.Government Printing Office (GPO)
710 North Capitol Street, NW
Washington, DC 20401
Ph: 202-512-1800
Fax: 202-512-2104
E-mail: contactcenter@gpo.gov
Internet: http://www.gpoaccess.gov

UNDERWRITERS LABORATORIES (UL)
2600 N.W. Lake Road
Camas, WA 98607-8542
Ph: 877-854-3577
E-mail: CEC.us@us.ul.com
Internet: http://www.ul.com/
UL Directories available through IHS at http://www.ihs.com

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

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07/14

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Preparatory Inspection Report Form

CESPK FORM 437 - Materials Test Summary

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QUALITY CONTROL
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PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM C1077	(2016) Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM D3666	(2013) Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
ASTM D3740	(2012a) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM E329	(2014a) Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2015) International Building Code

U.S. ARMY CORPS OF ENGINEERS (USACE)

ER 1110-1-12	(2006; Change 1) Engineering and Design -- Quality Management

U.S. ARMY CORPS OF ENGINEERS, SOUTH PACIFIC DIVISION (CESPD)

CESPD R 1110-1-8	(2002) Quality Management Plan

U.S. ARMY CORPS OF ENGINEERS, SACRAMENTO DISTRICT (CESPK)

CESPK PAM 415-1-2	(1989) Construction Control Manual
CESPK FORM 437	(1988) Materials Test Summary

1.2 PAYMENT

Separate payment will not be made for providing and maintaining an

effective Quality Control program, and all associated costs will be included in the applicable Bid Schedule unit or job prices.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Contractor Quality Control (CQC) Plan; G
Design Quality Control (DQC) plan; G
MTC validation; G

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Establish and maintain an effective quality control (QC) system in compliance with the Contract Clause titled "Inspection of Construction." QC consist of plans, procedures, and organization necessary to produce an end product which complies with the contract requirements. Cover all design and construction operations, both onsite and offsite, and be keyed to the proposed design and construction sequence. The project superintendent will be held responsible for the quality of work and is subject to removal by the Contracting Officer for non-compliance with the quality requirements specified in the contract. In this context the highest level manager responsible for the overall construction activities at the site, including quality and production is the project superintendent. The project superintendent must maintain a physical presence at the site at all times and is responsible for all construction and related activities at the site, except as otherwise acceptable to the Contracting Officer.

3.2 QUALITY CONTROL PLAN

Submit no later than 90 days prior to start of construction, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause titled "Inspection of Construction." The Government will consider an interim plan for the first 60 days of operation. Design and construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional work.

3.2.1 Content of the CQC Plan

Include, as a minimum, the following to cover all design and construction operations, both onsite and offsite, including work by subcontractors, designers of record, consultants, architect/engineers (AE), fabricators, suppliers, and purchasing agents:

a. A description of the quality control organization, including a chart

showing lines of authority and acknowledgment that the CQC staff will implement the three phase control system for all aspects of the work specified. Include a CQC System Manager who reports to the project superintendent.

b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.

c. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract. Letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities will be issued by the CQC System Manager. Copies of these letters must be furnished to the Government.

d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, designers of record, consultants, architect engineers (AE), offsite fabricators, suppliers, and purchasing agents. These procedures must be in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

e. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. (Laboratory facilities approved by the Contracting Officer must be used.)

f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

g. Procedures for tracking design and construction deficiencies from identification through acceptable corrective action. Establish verification procedures that identified deficiencies have been corrected.

h. Reporting procedures, including proposed reporting formats.

i. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks, has separate control requirements, and may be identified by different trades or disciplines, or it may be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable features under a particular section. This list will be agreed upon during the coordination meeting.

j. Any special inspection requirements as required in accordance with ICC IBC

3.2.2 Additional Requirements for Design Quality Control (DQC) Plan

The following additional requirements apply to the Design Quality Control (DQC) plan:

a. Provide and maintain a DQC Plan as an effective quality control program which will assure that all services required by this design-build

contract are performed and provided in a manner that meets professional architectural and engineering quality standards. Prepare the DQC Plan in accordance with CESPD R 1110-1-8, Appendix D. As a minimum, all documents must be technically reviewed by competent, independent reviewers identified in the DQC Plan. The same element that produced the product must not perform the independent technical review (ITR). Correct errors and deficiencies in the design documents prior to submitting them to the Government.

b. Include the design schedule in the master project schedule, showing the sequence of events involved in carrying out the project design tasks within the specific contract period. This should be at a detailed level of scheduling sufficient to identify all major design tasks, including those that control the flow of work. Include review and correction periods associated with each item. This should be a forward planning as well as a project monitoring tool. The schedule reflects calendar days and not dates for each activity. If the schedule is changed, submit a revised schedule reflecting the change within 7 calendar days. Include in the DQC Plan the discipline-specific checklists to be used during the design and quality control of each submittal. Submit at each design phase as part of the project documentation these completed checklists. ER 1110-1-12 provided some useful information in developing checklists.

c. Implement the DQC Plan by an DQC Manager who has the responsibility of being cognizant of and assuring that all documents on the project have been coordinated. This individual must be a person who has verifiable engineering or architectural design experience and is a registered professional engineer or architect. Notify the Contracting Officer, in writing, of the name of the individual, and the name of an alternate person assigned to the position.

The Contracting Officer will notify the Contractor in writing of the acceptance of the DQC Plan. After acceptance, any proposed changes are subject to the acceptance of the Contracting Officer.

3.2.2.1 Additional Requirements for Hill AFB DQC Plan

Follow the approved DQC Plan throughout the course of the project to assure a quality end product. Should future events dictate revisions to the approved DQC Plan, notify the Contracting Officer in writing and submit the revised plan for approval. The plan must be prepared in 8-1/2" x 11" format. Any charts or schedules included in the plan that are larger than this size must be folded to conform to an 8-1/2" x 11" format. Include a title page and table of contents in the DQC Plan. Include the following elements in the DQC Plan:

a. Management Approach. Define the specific management methodology to be followed during the course of the contract including such aspects as design coordination procedures, quality control, communications, managerial continuity, flexibility and the following:

1. Identify competent, independent reviewers in the DQC Plan to technically review all documents. The same element that produced the product must not perform the independent technical review (ITR).

2. The following elements must affix a personal stamp to each drawing and specification section verifying their review and general

compliance with the contract documents, as well as compliance as indicated:
- Design discipline - Compliance to the RFP
- Independent Technical Reviewer - Compliance to the RFP
- CQC Staff member for each discipline identified in paragraph CQC Personnel - Constructability and Operability.
- Prime and Key Subcontractors - Constructability and Operability

3. Correct errors and deficiencies in the design documents prior to submitting them to the Government.

b. Management Structure. Delineate the organizational composition of the firm to clearly show the interrelationship of the management and design team components including all consultants. Include an organization chart to identify the key design and review team members showing their specific responsibilities.

c. Planning and Scheduling. Include the design schedule, showing the sequence of events involved in carrying out the project tasks within the specific contract period. Provide sufficient detail of scheduling to identify all major tasks including those that control the flow of work. Include review and correction periods associated with each in the schedule. This should be a forward planning as well as a project-monitoring tool. The schedule reflects calendar days and not dates for each activity. Submit a revised schedule reflecting changes within seven calendar days of the change.

d. Contractor Review Effort. The Design Quality Control Plan must include, but not be limited to the following contractor performed review elements:

Design Development Review
Criteria Review
Presentation of Data Review
Editing of Guide Specification Review
Inter-Disciplinary Review
Final Review

e. Quality Control. The professional quality, technical accuracy and the coordination of all design documents and other services to be provided by the Architect-Engineer and any subcontractors/consultants used is of major importance. It is therefore a requirement to have a logical and functional quality control program to assure that errors and deficiencies in all submittals are minimal. To meet this requirement, perform technical and inter-disciplinary reviews and correct all errors and deficiencies in the design documents prior to submitting them to for review. The cover letter, which transmits the design documents for review, must include a statement of certification, co-signed by both the Design Quality Control Manager and the Design Coordination Manager, that a detailed review and coordination of the submitted documents was performed.

f. Design Quality Control Checklists. The DQC Plan must include the checklist and lessons learned. Discipline-specific checklists and lessons learned are to be used during the design and quality control of each submittal. The purpose of these lists is to provide a useful tool for the contractor to assure a quality contract package. The lists point out numerous areas which, when appropriately considered during the design, will help ensure a quality project. The lists should not

be taken as covering all aspects of the project. These completed checklists must be submitted at each design phase as part of the project documentation. If, during COE review of the final design documents, it becomes apparent that items initialed off have in fact not been completed/coordinated, the COE will notify the Prime Contractor and appropriate action taken. Possible actions include return of the final design package to the contractor for correction, withholding of contract payments and/or completion of an interim "unfavorable" contractor evaluation.

g. Design Review Check-off Matrix. In addition to the Design Quality Control Checklist noted above, prepare a Quality Control Review Matrix. This Matrix must be developed from SECTION 01 10 10 SPECIFIC TECHNICAL ENGINEERING AND DESIGN CRITERIA. Each individual paragraph must be entered into the matrix and signed off by the Construction Design Coordination Manager, Design Quality Control Manager, and the Independent Technical Reviewer, indicating that the requirements identified have been incorporated in the design documents. See example below:

Administrative RFP Requirements	Reviewing Office					
	Discipline	CDC Manager	DQC Manager	ITR	Designer	Location in Docs

h. Design Quality Control Manager. The Design Quality Control Manager must implement the DQC Plan. The DQC Manager is an assigned person within the Design Team organization who is present at all internal design reviews, design review conferences, weekly meetings during construction, and cognizant of and assure that all documents on the project have been coordinated. During construction the Design Quality Control Manager must also coordinate all field changes with respective design disciplines. This individual must have verifiable engineering or architectural design experience and is a registered professional engineer or architect (See requirements in Section 01 10 10).

i. Design Coordination Manager. The DQC Plan must identify key subcontractors and a Design Coordination Manager who is an employee of the construction contractor. The Design Coordination Manager assures all requirements of the RFP are incorporated into the design. The Design Coordination Manager coordinates the design and review process within his own organizations with all key subcontractors, and with the design team members. Describe in the DQC Plan how this process is to be performed. This individual must have verifiable engineering or architectural design experience and is a registered professional engineer or architect. (See requirements in Section 01 10 10).

j. Design Quality Control Manager-Design Coordination Manager. Clearly demonstrate in the DQC Plan the interface and responsibilities of the designer (Design Quality Control Manager) and the constructor (Design Coordination Manager).

3.2.3 Acceptance of Plan

Acceptance of the Contractor's plan is required prior to the start of design and construction. Acceptance is conditional and will be predicated on satisfactory performance during the design and construction. The Government reserves the right to require the Contractor to make changes in his CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.4 Notification of Changes

After acceptance of the CQC Plan, notify the Contracting Officer in writing of any proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

3.3 COORDINATION MEETING

After the Postaward Conference, before start of design or construction, and prior to acceptance by the Government of the CQC Plan, meet with the Contracting Officer or Authorized Representative and discuss the Contractor's quality control system. Submit the CQC Plan a minimum of 14 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details must be developed, including the forms for recording the CQC operations, design activities, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. Minutes of the meeting will be prepared by the Government, signed by both the Contractor and the Contracting Officer and will become a part of the contract file. There may be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

3.4 QUALITY CONTROL ORGANIZATION

3.4.1 Personnel Requirements

The requirements for the CQC organization are a CQC System Manager, a Design Quality Manager, and sufficient number of additional qualified personnel to ensure safety and contract compliance. The Safety and Health Manager must report directly to a senior project (or corporate) official independent from the CQC System Manager. The Safety and Health Manager will also serve as a member of the CQC Staff Personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly will also be included as part of the CQC organization. The Contractor's CQC staff must maintain a presence at the site at all times during progress of the work and have complete authority and responsibility to take any action necessary to ensure contract compliance. The CQC staff will be subject to acceptance by the Contracting Officer. Provide adequate office space, filing systems and other resources as necessary to maintain an effective and fully functional CQC organization. Promptly complete and furnish all letters, material submittals, shop drawing submittals, schedules and all other project documentation to the CQC organization. The CQC organization must be responsible to maintain these documents and records at the site at all times, except as otherwise acceptable to the Contracting Officer.

3.4.2 CQC System Manager

Identify as CQC System Manager an individual within the onsite work organization who is responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System Manager must be a graduate engineer, or a graduate architect with a minimum of 5 years construction experience on construction similar to this contract. This CQC System Manager must be on the site at all times during construction and be employed by the prime Contractor. The CQC System Manager must be assigned no other duties. Identify in the plan an alternate to serve in the event of the CQC System Manager's absence. The requirements for the alternate are the same as the CQC System Manager.

3.4.3 CQC Personnel

In addition to CQC personnel specified elsewhere in the contract, provide as part of the CQC organization specialized personnel to assist the CQC System Manager for the following areas: electrical, civil, structural, environmental, and architectural. These individuals must be directly employed by the prime Contractor and may not be employed by a supplier or subcontractor on this project ; be responsible to the CQC System Manager; be physically present at the construction site during work on their areas of responsibility; have the necessary education and/or experience in accordance with the experience matrix listed herein. These individuals may perform other duties but must be allowed sufficient time to perform their assigned quality control duties as described in the Quality Control Plan.

Experience Matrix	
Area	Qualifications
Civil	Graduate Civil Engineer with 5 years experience in the type of work being performed on this project
Electrical	Graduate Electrical Engineer with 2 yrs related experience or person 5 years of experience supervising electrical features of work in the field with a construction company
Structural	Graduate Civil Engineer (with Structural Track or Focus) or Construction Manager with 2 yrs experience or person 5 years of experience supervising structural features of work in the field with a construction company
Architectural	Graduate Architect with with 5 yrs related experience
Environmental	Graduate Environmental Engineer with 3 yrs experience
Design Quality Control Manager	Registered Architect or Professional Engineer

3.4.4 Additional Requirement

In addition to the above experience and/or education requirements the CQC System Manager must have completed the course entitled "Construction Quality Management For Contractors." This course is periodically offered by the Sacramento District, contact the Contracting Officer for more information.

3.4.5 Organizational Changes

Maintain the CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff, revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

3.5 SUBMITTALS AND DELIVERABLES

Submittals, if needed, must comply with the requirements in Section 01 33 00 SUBMITTAL PROCEDURES. The CQC organization is responsible for certifying that all submittals and deliverables are in compliance with the contract requirements. When Section 23 08 00 COMMISSIONING OF HVAC SYSTEMS is included in the contract, the submittals must be coordinated with Section 01 33 00 SUBMITTAL PROCEDURES to ensure adequate time is allowed for each type of submittal required.

3.6 CONTROL

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. At least three phases of control must be conducted by the CQC System Manager for each definable feature of the construction work as follows:

3.6.1 Preparatory Phase

This phase is performed prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase includes:

a. A review of each paragraph of applicable specifications, reference codes, and standards. Make available during the preparatory inspection a copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field. Maintain and make available in the field for use by Government personnel until final acceptance of the work.

b. Review of the contract drawings.

c. Check to assure that all materials and/or equipment have been tested, submitted, and approved.

d. Review of provisions that have been made to provide required control inspection and testing.

e. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.

f. Examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.

g. Review of the appropriate activity hazard analysis to assure safety requirements are met.

h. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.

i. Check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.

j. Discussion of the initial control phase.

k. The Government must be notified at least 48 hours in advance of beginning the preparatory control phase. Include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. Document the results of the preparatory phase actions by separate minutes prepared by the CQC System Manager and attach to the daily CQC report. Instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.6.2 Initial Phase

This phase is accomplished at the beginning of a definable feature of work. Accomplish the following:

a. Check work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.

b. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.

c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.

d. Resolve all differences.

e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.

f. The Government must be notified at least 48 hours in advance of beginning the initial phase. Prepare separate minutes of this phase by the CQC System Manager and attach to the daily CQC report. Indicate the exact location of initial phase for future reference and comparison with follow-up phases.

g. The initial phase should be repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.

3.6.3 Follow-up Phase

Perform daily checks to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. Record the checks in the CQC documentation. Conduct final follow-up checks and correct all

deficiencies prior to the start of additional features of work which may be affected by the deficient work. Do not build upon nor conceal non-conforming work.

3.6.4 Additional Preparatory and Initial Phases

Conduct additional preparatory and initial phases on the same definable features of work if: the quality of on-going work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision or work crew; if work on a definable feature is resumed after a substantial period of inactivity; or if other problems develop.

3.7 TESTS

3.7.1 Testing Procedure

Perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements. Upon request, furnish to the Government duplicate samples of test specimens for possible testing by the Government. Testing includes operation and/or acceptance tests when specified. Procure the services of a Corps of Engineers approved testing laboratory or establish an approved testing laboratory at the project site. Perform the following activities and record and provide the following data:

a. Verify that testing procedures comply with contract requirements.

b. Verify that facilities and testing equipment are available and comply with testing standards.

c. Check test instrument calibration data against certified standards.

d. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.

e. Record results of all tests taken, both passing and failing on the CQC report for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test. If approved by the Contracting Officer, actual test reports may be submitted later with a reference to the test number and date taken. Provide an information copy of tests performed by an offsite or commercial test facility directly to the Contracting Officer. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract.

3.7.2 Testing Laboratories

The listing of validated testing laboratories is available at http://gsl.erdc.usace.army.mil/SL/MTC/.

3.7.2.1 Capability Check

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel must meet criteria detailed in ASTM D3740,

ASTM C1077, ASTM D3666, and ASTM E329.

Use an independent commercial laboratory that has been validated by abbreviated audit by the Corps of Engineers, Materials Testing Center (MTC), for the required test methods. To receive validation by abbreviated audit by the MTC, the laboratory must complete the required form and submit copies of its AASHTO accreditation certificate, applicable AMRL and/or CCRL inspection reports, and responses to any deficiencies to the MTC no later than 7 days after the Notice to Proceed. The cost for the validation by the MTC is the responsibility of the Contractor.

Any on-site laboratory that is used by the Contractor will require a separate validation by this MTC. All costs associated with this validation will be the responsibility of the Contractor.

Submit the above MTC validation for Government Approval as part of the Contractor's Quality Control Plan. No materials testing must be performed until the laboratory has been validated by the MTC and approved by the Resident Engineer. Include the inspection report(s) and the written response(s) to any noted deficiencies with the Contractor Quality Control Plan and is subject to approval by the Contracting Officer.

3.7.2.2 Capability Recheck

If the selected laboratory fails the capability check, the Contractor will be assessed a charge to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the contract amount due the Contractor.

3.7.3 Onsite Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests, and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.7.4 Furnishing or Transportation of Samples for Testing

Costs incidental to the transportation of samples or materials are borne by the Contractor. Samples of materials for test verification and acceptance testing by the Government must be delivered to the QA laboratory designated by the Contracting Officer.

Coordination for each specific test, exact delivery location, and dates will be made through the Area Office.

3.8 COMPLETION INSPECTION

3.8.1 Punch-Out Inspection

Conduct an inspection of the work by the CQC Manager near the end of the work, or any increment of the work established by a time stated in the SPECIAL CONTRACT REQUIREMENTS Clause, "Commencement, Prosecution, and Completion of Work", or by the specifications. Prepare and include in the CQC documentation a punch list of items which do not conform to the approved drawings and specifications, as required by paragraph DOCUMENTATION. Include within the list of deficiencies the estimated date by which the deficiencies will be corrected. Make a second inspection the

CQC System Manager or staff to ascertain that all deficiencies have been corrected. Once this is accomplished, notify the Government that the facility is ready for the Government Pre-Final inspection.

3.8.2 Pre-Final Inspection

The Government will perform the pre-final inspection to verify that the facility is complete and ready to be occupied. A Government Pre-Final Punch List may be developed as a result of this inspection. Ensure that all items on this list have been corrected before notifying the Government, so that a Final inspection with the customer can be scheduled. Correct any items noted on the Pre-Final inspection in a timely manner. These inspections and any deficiency corrections required by this paragraph must be accomplished within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates.

3.8.3 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative must be in attendance at the final acceptance inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups, and major commands may also be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the Pre-Final inspection. Notify the Contracting Officer at least 14 days prior to the final acceptance inspection and include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with the contract clause titled "Inspection of Construction".

3.9 DOCUMENTATION

Maintain current records providing factual evidence that required quality control activities and/or tests have been performed. Include in these records the work of subcontractors and suppliers on an acceptable form that includes, as a minimum, the following information:

a. Contractor/subcontractor and their area of responsibility.

b. Operating plant/equipment with hours worked, idle, or down for repair.

c. Work performed each day, giving location, description, and by whom. When Network Analysis Schedule (NAS) is used, identify each phase of work performed each day by NAS activity number.

d. Test and/or control activities performed with results and references to specifications/drawings requirements. Identify the control phase (Preparatory, Initial, Follow-up). List of deficiencies noted, along with corrective action.

e. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings

requirements.

f. Submittals and deliverables reviewed, with contract reference, by whom, and action taken.

g. Offsite surveillance activities, including actions taken.

h. Job safety evaluations stating what was checked, results, and instructions or corrective actions.

i. Instructions given/received and conflicts in plans and/or specifications.

j. Provide documentation of design quality control activities. For independent design reviews, provide, as a minimum, identification of the Independent Technical Review (ITR) team, the ITR review comments, responses and the record of resolution of the comments.

k. Contractor's verification statement.

Indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. Cover both conforming and deficient features and include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. Furnish the original and one copy of these records in report form to the Government daily within 24 hours after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, prepare and submit one report for every 7 days of no work and on the last day of a no work period. All calendar days must be accounted for throughout the life of the contract. The first report following a day of no work will be for that day only. Reports must be signed and dated by the CQC System Manager. Include copies of test reports and copies of reports prepared by all subordinate quality control personnel within the CQC System Manager Report.

3.10 IMPLEMENTATION OF GOVERNMENT RESIDENT MANAGEMENT SYSTEM

Use the Government furnished CQC Daily Report Form. This form may be in addition to other Contractor desired reporting forms. However, all other such reporting forms are consolidated into this one Government furnished Daily CQC Report Form. Complete Government furnished Input Forms which lists but is not limited to, Prime Contractor staffing; letter codes; planned cumulative progress earnings; subcontractor information showing trade, name, address,and insurance expiration dates; definable features of work; pay activity and activity information; required Quality Control tests tied to individual activities; planned User Schooling tied to specific specification paragraphs and Contractor activities; and submittal information relating to specification section, description, activity number, review period and expected procurement period. The sum of all activity values must equal the contract amount, and all Bid Items separately identified, in accordance with the PRICING SCHEDULE. Complete these forms to the satisfaction of the Contracting Officer prior to any contract payment (except for Bonds, Insurance and/or Mobilization, as approved by the Contracting Officer) and must be updated as required.

a. During the course of the contract, the Contractor will receive various Quality Assurance comments from the Government that will reflect corrections needed to Contractor activities or reflect outstanding or future items needing the attention of the Contractor. Acknowledge

receipt of these comments by specific number reference on the Daily CQC Report, and also reflect on the Daily CQC Report when these items are specifically completed or corrected.

b. The schedule system must include, as specific and separate activities, all Preparatory Phase Meetings (inspections); all O&M Manuals; and all Test Plans of Electrical and Mechanical Equipment or Systems that require validation testing or instructions to Government representatives.

3.11 SAMPLE FORMS

Sample forms enclosed at the end of this section.

1. Test Report Form
2. Daily Contractor Quality Control Form
3. Preparatory Inspection Report Form
4. CESPK FORM 437 - Materials Test Summary. One set of this form (6 pages), is included in the bid package issued by the Sacramento District Office. This form will be used to summarize the minimum number of materials testing to be made during construction. Submit three copies of the form to the Contracting Officer during the preconstruction meeting. To complete the form, the use of the Construction Control Manual is mandatory.

3.12 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. Take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, will be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders will be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

3.13 CONSTRUCTION CONTROL MANUAL

In addition to the requirements specified in the various Technical Specifications hereinafter, test procedures and minimum number of tests will be performed in accordance with CESPK PAM 415-1-2. Neither the specified minimum number of tests nor the lack of them must in any way limit or relieve the Contractor of his responsibility to perform adequate tests to assure compliance with the quality requirements of these specifications. The referenced standards listed in this Construction Control Manual must be of the latest issue unless otherwise specified.

-- End of Section --

(Sample of typical Contractor's Test Report)

TEST REPORT

STRUCTURAL OR BUILDING _____

CONTRACT NO. _____

DESCRIPTION OF ITEM, SYSTEM OR PART OF SYSTEM TESTED: _____

_____

_____

_____

DESCRIPTION OF TEST: _____

_____

_____

_____

_____

NAME AND TITLE OF PERSON IN CHARGE OF PERFORMING TESTS FOR CONTRACTOR:

NAME _____

TITLE _____

SIGNATURE _____

I HEREBY CERTIFY THAT THE ABOVE DESCRIBED ITEM, SYSTEM OR PART OF SYSTEM HAS BEEN TESTED AS INDICATED ABOVE AND FOUND TO BE ENTIRELY SATISFACTORY AS REQUIRED IN THE CONTRACT SPECIFICATIONS.

_____

SIGNATURE OF CONTRACTOR QUALITY CONTROL INSPECTOR

DATE _____

REMARKS: _____

_____

_____

_____

_____

(Sample of Typical DAILY CONSTRUCTION QUALITY CONTROL REPORT)

CONTRACTOR'S NAME
(Address)

DAILY CONSTRUCTION QUALITY CONTROL REPORT

Date: _____ Report No. _____

Contract No.: _____

Name and Location of Project: _____

WEATHER: (Clear) (P. Cloudy) (Cloudy) Temperature: _____

Rainfall _____ Inches Min., _____ Max., _____

Contractor/Subcontractors	Area of Responsibility
a. _____	_____
b. _____	_____
c. _____	_____
d. _____	_____
e. _____	_____
f. _____	_____
g. _____	_____

1. WORK PERFORMED TODAY: (Indicate location and description of work performed. Refer to work performed by prime and/or subcontractors by letter in Table above.)

2. PREPARATORY INSPECTION FOR NEXT ITEM OF WORK: (Materials/shop drawings approved, required control testing arranged, all preliminary work has been accomplished as per plans and specifications.)

3. INITIAL INSPECTION: (Address quality of workmanship, assure control testing and materials being used in all work are in compliance with plans and specifications).

---

4. FOLLOW-UP INSPECTIONS: (Assure control testing performed as required and all work performed continues to be in compliance with plans and specifications).

---

5. VERBAL INSTRUCTIONS RECEIVED: (List any instructions given by Government personnel on construction deficiencies, retesting required, etc., with action to be taken.)

---

6. REMARKS: (Cover any conflicts in plans, specifications, or instructions or any delay to the job attributable to weather conditions.)

7. RESULTS OF SAFETY INSPECTION: (Note safety violations and corrective action taken. Indicate phase of work where violations occurred.)

---

8. UPCOMING WORK: (Indicate next major phase of work anticipated and approximate date of Preparatory Inspection meeting to cover this work.)

EQUIPMENT DATA: (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used.)

CONTRACTOR'S VERIFICATION: The above report is complete and correct and all material and equipment used and work performed during this reporting period area in compliance with the contract plans and specifications except as noted above.

Contractor's Approved/Authorized Representative

(Sample of Typical Form)

PREPARATORY INSPECTION OUTLINE
(PART-I)

Contract No.: _____ Date: _____

Title and No. of Technical Section: _____

_____

Reference Contract Drawings: _____

A. PLANNED ATTENDANTS:

	NAME	POSITION	COMPANY
1.			
2.			
3.			
4.			

B. SUBMITTALS REQUIRED TO BEGIN WORK:

	ITEM	SUBMITTAL NO.	ACTION CODE
a.			
b.			
c.			
d.			

I HEREBY DECLARE THAT THE ABOVE REQUIRED MATERIALS DELIVERED TO THE JOBSITE ARE CERTIFIED TO BE THE SAME AS THOSE SUBMITTED AND APPROVED.

_____
QUALITY CONTROL REPRESENTATIVE

C. EQUIPMENT TO BE USED IN EXECUTING WORK:

a. _____
b. _____
c. _____

D. WORK AREAS EXAMINED TO ASCERTAIN THAT ALL PRELIMINARY WORK HAS BEEN COMPLETED:

_____

_____

E. METHODS AND PROCEDURES FOR PERFORMING QUALITY CONTROL - INCLUDING SPECIFIC TESTING REQUIREMENTS:

_____

_____

F. COMPLIANCE WITH AND UPGRADING OF THE SAFETY PLAN AND ACTIVITY HAZARD ANALYSIS INCLUDING REVIEW OF THE ACTIVITY ANALYSIS WITH EACH WORKER:

_____

_____

THE ABOVE METHODS AND PROCEDURES OUTLINED ARE CERTIFIED TO COMPLY WITH THE CONTRACT REQUIREMENTS AND WILL BE PERFORMED AS PLANNED AND SPECIFIED.

_____
QUALITY CONTROL REPRESENTATIVE

(Sample of Typical Form)

PREPARATORY INSPECTION OUTLINE
(PART - II)

A. PERSONS IN ATTENDANCE:

	NAME	POSITION	COMPANY
1.			
2.			
3.			
4.			
5.			
6.			

B. ITEMS OF MUTUAL UNDERSTANDING DEVELOPED DURING REVIEW OF PREPARATORY OUTLINE AND CONTRACT REQUIREMENTS: (Contract items not specifically covered during the preparatory inspection conference are assumed to be in strict conformance with the contract requirements.)

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

THE ITEMS NOTED ABOVE CONSTITUTE A MEMORANDUM OF MUTUAL UNDERSTANDING AND WILL BE PERFORMED AS PLANNED AND SPECIFIED.

_____
CONTRACTOR'S APPROVED/AUTHORIZED REPRESENTATIVE

(Sample of Typical Form)

INITIAL PHASE CHECK LIST

Contract No.: _____ Date: _____

Specification Paragraph or Section: _____

Description and Location of Work Inspected: _____

_____

REFERENCE CONTRACT DRAWINGS: _____

A. PERSONNEL PRESENT:

	NAME	POSITION	COMPANY
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____

B. MATERIALS BEING USED ARE IN STRICT COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS: YES_____ NO_____

IF NOT, EXPLAIN: _____

_____

_____

C. PROCEDURES AND/OR WORK METHODS WITNESSED ARE IN STRICT COMPLIANCE WITH THE CONTRACT SPECIFICATIONS: YES_____ NO_____

IF NOT, EXPLAIN: _____

_____

_____

D. WORKMANSHIP IS ACCEPTABLE: YES_____ NO_____

STATE AREAS WHERE IMPROVEMENT IS NEEDED: _____

_____

_____

E. SAFETY VIOLATIONS NOTED: YES_____ NO_____

IF YES, CORRECTIVE ACTION TAKEN: _____

_____

_____

_____

QUALITY CONTROL REPRESENTATIVE

MATERIALS TEST SUMMARY

(See reverse for instructions)

CONTRACT NUMBER	PROJECT	DATE

SECTION/TITLE	TEST	MINIMUM TESTS *(Estimated)*		TOTAL TESTS			
				CQC		QA	
		CQC	CQC	PASS	FAIL	PASS	FAIL
2 _____ GRADING	A. LAB-MOISTURE DENSITY W/GRADATION						
	& ATTERBERG LIMITS						
	B. FIELD DENSITY*						
	** (Select materials with gradation)*						
2 _____ BUILDINGS	A. LAB-MOISTURE DENSITY W/GRADATION						
	& ATTERBERG LIMITS						
	B. FIELD DENSITY*						
	** (Select materials with gradation)*						
2 _____ UTILITIES SYSTEM	A. LAB-MOISTURE DENSITY W/GRADATION						
	& ATTERBERG LIMITS						
	B. FIELD DENSITY*						
	** (Select materials with gradation)*						
2 _____ DRAINAGE SYSTEM	A. LAB-MOISTURE DENSITY W/GRADATION						
	& ATTERBERG LIMITS						
	B. FIELD DENSITY*						
	** (Select materials with gradation)*						

MATERIALS TEST SUMMARY

CONTRACT NUMBER	PROJECT	DATE

SECTION/TITLE	TEST	MINIMUM TESTS *(Estimated)*		TOTAL TESTS			
				CQC		QA	
		CQC	CQC	PASS	FAIL	PASS	FAIL
2 _____ SUBGRADE ROADWAYS	A. LAB-MOISTURE DENSITY W/GRADATION						
	& ATTERBERG LIMITS						
	B. FIELD DENSITY						
2 _____ SUBBASE COURSE	A. LAB-MOISTURE DENSITY W/GRADATION						
	& ATTERBERG LIMITS						
	B. FIELD DENSITY						
2 _____ BASE COURSE	A. LAB-MOISTURE DENSITY W/GRADATION						
	& ATTERBERG LIMITS						
	B. FIELD DENSITY						
2 _____ BITUMINOUS COURSE	A. MARSHALL METHOD						
	B. EXTRACTION (HOT MIX)						
	C. GRADATION (HOT MIX)						
	D. GRADATION (HOT BINS)						
	E. FIELD COMPACTION (CORES)						

MATERIALS TEST SUMMARY

(See reverse for instructions)

CONTRACT NUMBER	PROJECT	DATE

SECTION/TITLE	TEST	MINIMUM TESTS *(Estimated)*		TOTAL TESTS			
				CQC		QA	
		CQC	CQC	PASS	FAIL	PASS	FAIL
2 _____ CONCRETE-PAVEMENT *(Compressive) *(Flexural)	A. *STRENGTH						
	B. SLUMP						
	C. ENTRAINED AIR						
	D. GRADATION						
2 _____ SIDEWALK, CURB, & GUTTER	A. COMPRESSIVE STRENGTH						
	B. SLUMP						
	C. ENTRAINED AIR						
	D. GRADATION						
2 _____							
2 _____							

MATERIALS TEST SUMMARY

(See reverse for instructions)

CONTRACT NUMBER	PROJECT	DATE

SECTION/TITLE	TEST	MINIMUM TESTS *(Estimated)*		TOTAL TESTS			
				CQC		QA	
		CQC	CQC	PASS	FAIL	PASS	FAIL
3 _____ CONCRETE-BUILDING	A. COMPRESSIVE STRENGTH						
	B. SLUMP						
	C. ENTRAINED AIR						
	D. GRADATION						
3 _____ CONCRETE - LITEWEIGHT	A. COMPRESSIVE STRENGTH						
	B. SLUMP						
	C. ENTRAINED AIR						
	D. UNIT WEIGHT (PLASTIC)						
	E. UNIT WEIGHT (28-DAY DRY)						
	F GRADATION						
3 _____ CONCRETE - TILT UP	A. COMPRESSIVE STRENGTH						
	B. SLUMP						
	C. ENTRAINED AIR						
	D. GRADATION						
3 _____							

MATERIALS TEST SUMMARY

(See reverse for instructions)

CONTRACT NUMBER	PROJECT	DATE

SECTION/TITLE	TEST	MINIMUM TESTS *(Estimated)*		TOTAL TESTS			
				CQC		QA	
		CQC	CQC	PASS	FAIL	PASS	FAIL
4 _____ MASONRY	A. MORTAR COMPRESSIVE STRENGTH						
	B. GROUT COMPRESSIVE STRENGTH						
	C. GRADATION						
	D. CMU - SHRINKAGE, AIR DRY						
	CONDITION, UNIT WEIGHT &						
	COMPRESSIVE STRENGTH						

INSTRUCTIONS FOR COMPLETION OF CESPK FORM 437

1. ***ALL ENTRIES SHALL BE MADE WITH PEN***.

2. SECTION/TITLE: Sections which require contractor quality control testing during the placement of construction materials are listed. The titles are condensed versions of the full specification title. Review the technical specifications and complete as follows:

A. Insert after a number the applicable letter to complete the section designation. For example, 2 ___ grading to 2 __A_ grading.

B. If a section is not a part of the technical specifications, insert "N/A" (not applicable) after a number. For example, 2 ___ grading to 2 _N/A_ grading.

C. Blank spaces are provided to permit the addition of other sections as required by the specifications.

3. TEST: Tests that are specified to be performed by the technical specifications are listed for each section. Blank spaces are provided for additional tests as required by the specifications. An asterisk indicates that action should be taken as noted. For example, gradation must be taken when testing field density for select materials in **SECTION: GRADING**.

4. MINIMUM TESTS (ESTIMATED): Under the Contractor Quality Control (CQC) column, enter the minimum number of tests required to accomplish the specified work. For the prelisted selections, the test frequencies are specified in the Construction Control Manual (CCM). For an additive section, the CCM may not indicate the test frequency. In this case, check the technical specifications or the contract drawings for requirements. Quality Assurance (DQA) column will be completed by the Contracting Officer Representative (COR).

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07/14

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SECTION 01 45 00.10

QUALITY CONTROL SYSTEM (QCS)
07/14

PART 1 GENERAL

1.1 PAYMENT

No separate payment will be made for the work covered under this section and all costs in connection therewith will be considered a subsidiary obligation of the Contractor.

1.2 CONTRACT ADMINISTRATION

The Government will use the Resident Management System for Windows (RMS) to assist in its monitoring and administration of this contract. The Contractor must use the Government-furnished Construction Contractor Module of RMS, referred to as QCS, to record, maintain, and submit various information throughout the contract period. The Contractor module, user manuals, updates, and training information can be downloaded from the RMS web site (http://rms.usace.army.mil). This joint Government-Contractor use of RMS and QCS will facilitate electronic exchange of information and overall management of the contract. QCS provides the means for the Contractor to input, track, and electronically share information with the Government in the following areas:

Administration
Finances
Quality Control
Submittal Monitoring
Scheduling
Import/Export of Data

1.2.1 Correspondence and Electronic Communications

For ease and speed of communications, both Government and Contractor will, to the maximum extent feasible, exchange correspondence and other documents in electronic format. Correspondence, pay requests and other documents comprising the official contract record will also be provided in paper format, with signatures and dates where necessary. Paper documents will govern, in the event of discrepancy with the electronic version.

1.2.2 Other Factors

Particular attention is directed to Contract Clause, "Schedules for Construction Contracts", Contract Clause, "Payments", Section 01 32 01 PROJECT SCHEDULE, Section 01 33 00 SUBMITTAL PROCEDURES, and Section 01 45 00 QUALITY CONTROL, which have a direct relationship to the reporting to be accomplished through QCS. Also, there is no separate payment for establishing and maintaining the QCS database; all costs associated therewith will be included in the contract pricing for the work.

1.3 QCS SOFTWARE

QCS is a Windows-based program that can be run on a stand-alone personal

computer or on a network. The Government will make available the QCS software to the Contractor after award of the construction contract. Prior to the Pre-Construction Conference, the Contractor will be responsible to download, install and use the latest version of the QCS software from the Government's RMS Internet Website. Upon specific justification and request by the Contractor, the Government can provide QCS on optical disk. Any program updates of QCS will be made available to the Contractor via the Government RMS Website as they become available.

1.4 SYSTEM REQUIREMENTS

The following is the minimum system configuration required to run QCS:

Minimum QCS System Requirements	
Hardware	
Windows-based PC	1000 MHz Pentium or higher processor
RAM	256+ MB for workstation / 512+ MB for server
Hard drive disk	1 GB space for sole use by the QCS system
Optical Disk (CD or DVD) Reader	8x speed or higher
Monitor	SVGA or higher resolution (1024x768, 256 colors)
Mouse or other pointing device	
Windows compatible printer	Laser printer must have 4 MB+ of RAM
Connection to the Internet	minimum 56k BPS
Software	
MS Windows	2000, XP, Vista or Windows 7
Word Processing software	MS Word 2000 or newer
Internet browser	Netscape Navigator, Microsoft Internet Explorer, or other browser that supports HTML 4.0 or higher
Email	MAPI compatible
Virus protection software	regularly upgraded with all issued manufacturer's updates

1.5 RELATED INFORMATION

1.5.1 QCS User Guide

After contract award, download instructions for the installation and use of QCS from the Government RMS Internet Website. In case of justifiable

difficulties, the Government will provide an optical disk (CD/DVD) containing these instructions.

1.5.2 Contractor Quality Control (CQC) Training

The use of QCS will be discussed with the QC System Manager during the mandatory CQC Training class.

1.6 CONTRACT DATABASE

Prior to the pre-construction conference, the Government will provide the Contractor with basic contract award data to use for QCS. The Government will provide data updates to the Contractor as needed, generally by using the Government's SFTP repository built into QCS import/export function. These updates will generally consist of submittal reviews, correspondence status, QA comments, and other administrative and QA data.

1.7 DATABASE MAINTENANCE

Establish, maintain, and update data in the QCS database throughout the duration of the contract at the Contractor's site office. Submit data updates to the Government (e.g., daily reports, submittals, RFI's, schedule updates, payment requests, etc.) using the Government's SFTP repository built into QCS export function. If permitted by the Contracting Officer, email or optical disk may be used instead of QCS (see Paragraph DATA SUBMISSION VIA OPTICAL DISK). The QCS database typically includes current data on the following items:

1.7.1 Administration

1.7.1.1 Contractor Information

Contain within the database the Contractor's name, address, telephone numbers, management staff, and other required items. Within 14 calendar days of receipt of QCS software from the Government, deliver Contractor administrative data in electronic format.

1.7.1.2 Subcontractor Information

Contain within the database the name, trade, address, phone numbers, and other required information for all subcontractors. A subcontractor must be listed separately for each trade to be performed. Assign each subcontractor/trade a unique Responsibility Code, provided in QCS. Within 14 calendar days of receipt of QCS software from the Government, deliver subcontractor administrative data in electronic format.

1.7.1.3 Correspondence

Identify all Contractor correspondence to the Government with a serial number. Prefix correspondence initiated by the Contractor's site office with "S". Prefix letters initiated by the Contractor's home (main) office with "H". Letters must be numbered starting from 0001. (e.g., H-0001 or S-0001). The Government's letters to the Contractor will be prefixed with "C".

1.7.1.4 Equipment

Contain within the Contractor's QCS database a current list of equipment planned for use or being used on the jobsite, including the most recent and

planned equipment inspection dates.

1.7.1.5 Management Reporting

QCS includes a number of reports that Contractor management can use to track the status of the project. The value of these reports is reflective of the quality of the data input, and is maintained in the various sections of QCS. Among these reports are: Progress Payment Request worksheet, QA/QC comments, Submittal Register Status, Three-Phase Control checklists.

1.7.1.6 Request For Information (RFI)

Exchange all RFI using the Built-in RFI generator and tracker in QCS.

1.7.2 Finances

1.7.2.1 Pay Activity Data

Include within the QCS database a list of pay activities that the Contractor must develop in conjunction with the construction schedule. The sum of all pay activities must be equal to the total contract amount, including modifications. Group pay activities Contract Line Item Number (CLIN); the sum of the activities must equal the amount of each CLIN. The total of all CLINs equals the Contract Amount.

1.7.2.2 Payment Requests

Prepare all progress payment requests using QCS. Complete the payment request worksheet, prompt payment certification, and payment invoice in QCS. Update the work completed under the contract, measured as percent or as specific quantities, at least monthly. After the update, generate a payment request report using QCS. Submit the payment request, prompt payment certification, and payment invoice with supporting data using the Government's SFTP repository built into QCS export function. If permitted by the Contracting Officer, email or a optical disk may be used. A signed paper copy of the approved payment request is also required, which will govern in the event of discrepancy with the electronic version.

1.7.3 Quality Control (QC)

QCS provides a means to track implementation of the Three-phase QC Control System, prepare daily reports, identify and track deficiencies, document progress of work, and support other Contractor QC requirements. Maintain this data on a daily basis. Entered data will automatically output to the QCS generated daily report. Provide the Government a Contractor Quality Control (CQC) Plan within the time required in Section 01 45 00 QUALITY CONTROL. Within seven calendar days of Government acceptance, submit a QCS update reflecting the information contained in the accepted CQC Plan: schedule, pay activities, features of work, submittal register, QC requirements, and equipment list.

1.7.3.1 Daily Contractor Quality Control (CQC) Reports.

QCS includes the means to produce the Daily CQC Report. The Contractor may use other formats to record basic QC data. However, the Daily CQC Report generated by QCS must be the Contractor's official report. Summarize data from any supplemental reports by the Contractor and consolidate onto the QCS-generated Daily CQC Report. Submit daily CQC Reports as required by Section 01 45 00 QUALITY CONTROL. Electronically submit reports to the

Government within 24 hours after the date covered by the report. Also provide the Government a signed, printed copy of the daily CQC report.

1.7.3.2 Deficiency Tracking.

Use QCS to track deficiencies. Deficiencies identified by the Contractor will be numerically tracked using QC punch list items. Maintain a current log of its QC punch list items in the QCS database. The Government will log the deficiencies it has identified using its QA punch list items. The Government's QA punch list items will be included in its export file to the Contractor. Regularly update the correction status of both QC and QA punch list items.

1.7.3.3 QC Requirements

Develop and maintain a complete list of QC testing and required structural and life safety special inspections required by the International Code Council (ICC), transferred and installed property, and user training requirements in QCS. Update all data on these QC requirements as work progresses, and promptly provide this information to the Government via QCS.

1.7.3.4 Three-Phase Control Meetings

Maintain scheduled and actual dates and times of preparatory and initial control meetings in QCS.

1.7.3.5 Labor and Equipment Hours

Log labor and equipment exposure hours on a daily basis. This data will be rolled up into a monthly exposure report.

1.7.3.6 Accident/Safety Reporting

The Government will issue safety comments, directions, or guidance whenever safety deficiencies are observed. The Government's safety comments will be included in its export file to the Contractor. Regularly update the correction status of the safety comments. In addition, utilize QCS to advise the Government of any accidents occurring on the jobsite. This brief supplemental entry is not to be considered as a substitute for completion of mandatory reports, e.g., ENG Form 3394 and OSHA Form 300.

1.7.3.7 Features of Work

Include a complete list of the features of work in the QCS database. A feature of work may be associated with multiple pay activities. However, each pay activity (see subparagraph "Pay Activity Data" of paragraph "Finances") will only be linked to a single feature of work.

1.7.3.8 Hazard Analysis

Use QCS to develop a hazard analysis for each feature of work included in the CQC Plan. Address any hazards, or potential hazards, that may be associated with the work.

1.7.4 Submittal Management

The Government will provide the initial submittal register in electronic format. Thereafter, maintain a complete list of all submittals, including completion of all data columns. Dates on which submittals are received and

returned by the Government will be included in its export file to the Contractor. Use QCS to track and transmit all submittals. ENG Form 4025, submittal transmittal form, and the submittal register update must be produced using QCS. QCS and RMS will be used to update, store and exchange submittal registers and transmittals, but will not be used for storage of actual submittals.

1.7.5 Schedule

Develop a construction schedule consisting of pay activities, in accordance with Section 01 32 01 PROJECT SCHEDULE. Input and maintain in the QCS database this schedule either manually or by using the Standard Data Exchange Format (SDEF) (see Section 01 32 01 PROJECT SCHEDULE). Include with each pay request the updated schedule.

1.7.6 Import/Export of Data

QCS includes the ability to export Contractor data to the Government and to import submittal register and other Government-provided data from RMS, and schedule data using SDEF.

1.8 IMPLEMENTATION

Contractor use of QCS as described in the preceding paragraphs is mandatory. Ensure that sufficient resources are available to maintain its QCS database, and to provide the Government with regular database updates. QCS shall be an integral part of the Contractor's management of quality control.

1.9 DATA SUBMISSION VIA OPTICAL DISK

The Government-preferred method for Contractor's submission of QCS data is by using the Government's SFTP repository built into QCS export function. Other data should be submitted using email with file attachment(s). For locations where this is not feasible, the Contracting Officer may permit use of optical disk for data transfer. Export data onto optical disks using the QCS built-in export function. If used, submit optical disks in accordance with the following:

1.9.1 File Medium

Submit in English required data on optical disk conforming to industry standards used in the United States.

1.9.2 Optical Disk Labels

Affix a permanent exterior label to each optical disk submitted. Indicate on the label in English, the QCS file name, full contract number, contract name, project location, data date, name and telephone number of person responsible for the data.

1.9.3 File Names

The files will be automatically named by the QCS software. The naming convention established by the QCS software must not be altered.

1.10 MONTHLY COORDINATION MEETING

Update the QCS database each workday. At least monthly, generate and

submit an export file to the Government with schedule update and progress payment request. As required in Contract Clause "Payments", at least one week prior to submittal, meet with the Government representative to review the planned progress payment data submission for errors and omissions.

Make all required corrections prior to Government acceptance of the export file and progress payment request. Payment requests accompanied by incomplete or incorrect data submittals will be returned. The Government will not process progress payments until an acceptable QCS export file is received.

1.11 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the requirements of this specification. Take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, will be deemed sufficient for the purpose of notification.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

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-- End of Section Table of Contents --

SECTION 01 50 00

TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS
03/04

PART 1 GENERAL

1.1 SUMMARY

Requirements of this Section apply to, and are a component of, each section of the specifications.

1.2 REFERENCES

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

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C511	(2007) Standard for Reduced-Pressure Principle Backflow Prevention Assembly

FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH (FCCCHR)

FCCCHR List	(continuously updated) List of Approved Backflow Prevention Assemblies
FCCCHR Manual	(10th Edition) Manual of Cross-Connection Control

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 241	(2013; Errata 2015) Standard for Safeguarding Construction,Alteration, and Demolition Operations
NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3-4 2014; AMD 4-6 2014; AMD 1-2 2016; Errata 1-2 2016; 2017) National Electrical Code

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS)

CDT MUTCD	(2014) California Manual of Uniform Traffic Control Devices

U.S. ARMY CORPS OF ENGINEERS (USACE)

EP 310-1-6a	(2006) Sign Standards Manual, VOL 1
EP 310-1-6b	(2006) Sign Standards Manual, VOL 2, Appendices

U.S. FEDERAL AVIATION ADMINISTRATION (FAA)

FAA AC 70/7460-1	(2015; Rev L) Obstruction Marking and Lighting

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

MUTCD	(2009) Manual on Uniform Traffic Control Devices

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Site Plan and Access; G

Temporary Earthwork Plan; G

Traffic Control Plan; G

A temporary earthwork plan shall be submitted to the Contracting Officer.

SD-06 Test Reports

Backflow Preventer Tests; G

SD-07 Certificates

Backflow Tester Certification; G

Backflow Preventers Certificate of Full Approval

1.4 GENERAL REQUIREMENTS

1.4.1 Site Plan and Access

Prior to the start of work, submit a site plan showing the locations and dimensions of temporary facilities (including layouts and details, equipment and material storage area (onsite and offsite), and access and haul routes, avenues of ingress/egress to the fenced area and details of the fence installation. Identify any areas which may have to be graveled to prevent the tracking of mud. Indicate if the use of a supplemental or other staging area is desired. Show locations of safety and construction fences, site trailers, construction entrances, trash dumpsters, temporary sanitary facilities, and worker parking areas. A 100-foot standoff is required from adjacent buildings.

1.4.2 Temporary Earthwork Plan

Prepare and submit a Temporary Earthwork Plan. Indicate the proposed location of temporary access ramps and detail any temporary earthwork to be done.

1.4.3 Identification of Employees

Furnish each employee and require each employee engaged on the work to display identification as approved and directed by the Contracting Officer. Deliver prescribed identification immediately to the Contracting Officer for cancellation upon release of any employee. When required, obtain and provide fingerprints of persons employed on the project. Contractor and subcontractor personnel must wear identifying markings on hard hats clearly identifying the company for whom the employee works.

1.4.4 Employee Parking

Contractor employees shall park privately owned vehicles in an area designated by the Contracting Officer. This area will be within reasonable walking distance of the construction site. Contractor employee parking shall not interfere with existing and established parking requirements of the military installation.

1.5 BACKFLOW PREVENTERS CERTIFICATE

Certificate of Full Approval from FCCCHR List, University of Southern California, attesting that the design, size and make of each backflow preventer has satisfactorily passed the complete sequence of performance testing and evaluation for the respective level of approval. Certificate of Provisional Approval will not be acceptable.

1.5.1 Backflow Tester Certificate

Prior to testing, submit to the Contracting Officer certification issued by the State or local regulatory agency attesting that the backflow tester has successfully completed a certification course sponsored by the regulatory agency. Tester must not be affiliated with any company participating in any other phase of this Contract.

1.5.2 Backflow Prevention Training Certificate

Submit a certificate recognized by the State or local authority that states the Contractor has completed at least 10 hours of training in backflow preventer installations. The certificate must be current.

PART 2 PRODUCTS

2.1 TEMPORARY SIGNAGE

Provide project, safety, bulletin board, and hard hat signs at locations designated by the Contracting Officer. The Construction Project Signs requirements are shown in Section 16 of EP 310-1-6a and specified in EP 310-1-6b Appendix B. Erect signs within 15 days after receipt of the notice to proceed.

TEMPORARY SIGNAGE							
Sign	Sign Type	Number of Signs	Panel Size	Post Size	Specification Code	Mounting Height	Color Bkg/Lgd
Project Sign	CID-01	1	4'x6'	4"x4"	HDO-3	48 inches	WH-RD/BK
Safety Sign	CID-02	1	4’x4’	4"x4"	HDO-3	48 inches	WH/BK-SG
Hard Hat Signs	SDA-13	1 each site	2'x2'	4"x4"	HDO-5	48 inches	SR-SW/SK
Bulletin Board	CID-02	1	3'x4'	4"x4"	HDO-3	48 inches	WH/BK

2.1.1 Bulletin Board

Immediately upon beginning of work, provide a weatherproof glass-covered bulletin board not less than 36 by 48 inches in size for displaying the Equal Employment Opportunity poster, a copy of the wage decision contained in the contract, Wage Rate Information poster, and other information approved by the Contracting Officer. Locate the bulletin board at the project site in a conspicuous place easily accessible to all employees, as approved by the Contracting Officer.

2.1.2 Project,and Hard Hat Signs

2.1.2.1 Construction

(1) Signs shall be constructed as detailed in EP 310-1-6a.

(2) Painting: All exposed surfaces and edges of plywood shall be given one coat of linseed oil and be wiped prior to applying primer. All exposed surfaces of signs and supports shall be given one coat of primer and one finish coat as indicated. All lettering shall be sized as indicated. Width of letter stroke shall be 1/6 of the letter height, except as noted.

2.1.2.2 Maintenance and Disposal

Maintain the signs in good condition throughout the life of the project. Signs remain the property of the Contractor and removed from the site upon completion of the project.

2.2 TEMPORARY TRAFFIC CONTROL

Provide access and temporary relocated roads as necessary to maintain traffic. Maintain and protect traffic on all affected roads during the construction period except as otherwise specifically directed by the Contracting Officer. Provide measures to protect and divert traffic, including watchmen and flagmen, barricades, lights around and in front of equipment and the work, and the adequate warning, danger, and direction

signs, as required by the State and local authorities having jurisdiction. Protect the traveling public from damage to person and property. The Contractor's traffic on roads selected for hauling material to and from the site must interfere as little as possible with public traffic. Investigate the adequacy of existing roads and the allowable load limit on these roads. Repair any damage to roads caused by construction operations.

2.2.1 Access and Haul Roads

At contractors expense construct access and haul roads necessary for proper prosecution of the work under this contract. Construct with suitable grades and widths; avoid sharp curves, blind corners, and dangerous cross traffic. Provide necessary lighting, signs, barricades, and distinctive markings for the safe movement of traffic. Provide adequate dust control, to ensure safe operation at all times. Location, grade, width, and alignment of construction and hauling roads are subject to approval by the Contracting Officer. Lighting must be adequate to assure full and clear visibility for full width of haul road and work areas during any night work operations. Remove access and haul roads upon completion of the work, unless otherwise directed by the Contracting Officer.

2.2.2 Barricades

Erect and maintain temporary barricades to limit public access to hazardous areas. Whenever safe public access to paved areas such as roads, parking areas or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic barricades will be required. Securely place barricades clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night.

2.2.3 Fencing

a. Provide fencing along the construction site at all open excavations and tunnels to control access by unauthorized people. Fencing must be installed to be able to restrain a force of at least 250 pounds against it.

2.2.4 Temporary Wiring

Provide temporary wiring in accordance with NFPA 241 and NFPA 70, Article 305-6(b), Assured Equipment Grounding Conductor Program. Include frequent inspection of all equipment and apparatus.

2.2.5 Backflow Preventers

Reduced pressure principle type conforming to the applicable requirements AWWA C511. Provide backflow preventers complete with 150 pound flanged cast iron, bronze mounted gate valve and strainer, 304 stainless steel or bronze, internal parts. The particular make, model/design, and size of backflow preventers to be installed must be included in the latest edition of the List of Approved Backflow Prevention Assemblies issued by the FCCCHR List and be accompanied by a Certificate of Full Approval from FCCCHR List. After installation conduct Backflow Preventer Tests and provide test reports verifying that the installation meets the FCCCHR Manual Standards.

PART 3 EXECUTION

3.1 AVAILABILITY AND USE OF UTILITY SERVICES

3.1.1 Temporary Utilities

Provide temporary utilities required for construction. Materials may be new or used, must be adequate for the required usage, not create unsafe conditions, and not violate applicable codes and standards.

3.1.2 Payment for Utility Services

a. The Government will make all reasonably required utilities available to the Contractor from existing outlets and supplies, as specified in the contract. Unless otherwise provided in the contract, the amount of each utility service consumed will be charged to or paid for by the Contractor at prevailing rates charged to the Government or, where the utility is produced by the Government, at reasonable rates determined by the Contracting Officer.

b. Reasonable amounts of the following utilities will be made available to the Contractor at the prevailing rates.

c. The point at which the Government will deliver such utilities or services and the quantity available is as indicated. Pay all costs incurred in connecting, converting, and transferring the utilities to the work. Make connections, including providing backflow-preventing devices on connections to domestic water lines; providing meters; and providing transformers; and make disconnections.

3.1.3 Meters and Temporary Connections

At the Contractors expense and in a manner satisfactory to the Contracting Officer, provide and maintain necessary temporary connections, distribution lines, and meter bases required to measure the amount of each utility used for the purpose of determining charges. Construction water is available through the hydrant system. A formal request process through Base CE and American water is required to have access to this system.Notify the Contracting Officer, in writing, 5 working days before final electrical connection is desired so that a utilities contract can be established. Provide a meter and make the final hot connection after inspection and approval of the temporary wiring installation. The Contractor will make the final electrical connection.

3.1.4 Advance Deposit

An advance deposit for utilities consisting of an estimated month's usage or a minimum of $50.00 will be required. The last monthly bills for the fiscal year will normally be offset by the deposit and adjustments will be billed or returned as appropriate. Services to be rendered for the next fiscal year, beginning 1 October, will require a new deposit. Notification of the due date for this deposit will be mailed to the Contractor prior to the end of the current fiscal year.

3.1.5 Final Meter Reading

Before completion of the work and final acceptance of the work by the Government, notify the Contracting Officer, in writing, 5 working days before termination is desired. The Government will take a final meter

reading, disconnect service, and remove the meters. Then remove all the temporary distribution lines, meter bases, and associated paraphernalia. Pay all outstanding utility bills before final acceptance of the work by the Government.

3.1.6 Sanitation

a. Provide and maintain within the construction area minimum field-type sanitary facilities approved by the Contracting Officer and periodically empty wastes into a municipal, district, or station sanitary sewage system, or remove waste to a commercial facility. Obtain approval from the system owner prior to discharge into any municipal, district, or commercial sanitary sewer system. Any penalties and / or fines associated with improper discharge will be the responsibility of the Contractor. Coordinate with the Contracting Officer and follow station regulations and procedures when discharging into the station sanitary sewer system. Maintain these conveniences at all times without nuisance. Include provisions for pest control and elimination of odors. Government toilet facilities will not be available to Contractor's personnel.

3.1.7 Telephone

Make arrangements and pay all costs for telephone facilities desired.

3.1.8 Obstruction Lighting of Cranes

Provide a minimum of 2 aviation red or high intensity white obstruction lights on temporary structures (including cranes) over 100 feet above ground level. Light construction and installation must comply with FAA AC 70/7460-1. Lights must be operational during periods of reduced visibility, darkness, and as directed by the Contracting Officer.

3.1.9 Fire Protection

Provide temporary fire protection equipment for the protection of personnel and property during construction. Remove debris and flammable materials daily to minimize potential hazards.

3.1.10 TRAFFIC PROVISIONS

3.1.10.1 Maintenance of Traffic

a. Conduct operations in a manner that will not close any thoroughfare or interfere in any way with traffic on railways or highways except with written permission of the Contracting Officer at least 15 calendar days prior to the proposed modification date, and provide a Traffic Control Plan detailing the proposed controls to traffic movement for approval. The plan must be in accordance with CDT MUTCD and local regulations and the MUTCD, Part VI. Make all notifications and obtain any permits required for modification to traffic movements outside Station's jurisdiction.. Contractor may move oversized and slow-moving vehicles to the worksite provided requirements of the highway authority have been met.

b. Conduct work so as to minimize obstruction of traffic, and maintain traffic on at least half of the roadway width at all times. Obtain approval from the Contracting Officer prior to starting any activity that will obstruct traffic.

c. Provide, erect, and maintain, at contractors expense, lights, barriers, signals, passageways, detours, and other items, that may be required by the Life Safety Signage, overhead protection authority having jurisdiction.

3.1.10.2 Protection of Traffic

Maintain and protect traffic on all affected roads during the construction period except as otherwise specifically directed by the Contracting Officer. Measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of barricades, placing of lights around and in front of equipment the work, and the erection and maintenance of adequate warning, danger, and direction signs, will be as required by the State and local authorities having jurisdiction. Protect the traveling public from damage to person and property. Minimize the interference with public traffic on roads selected for hauling material to and from the site. Investigate the adequacy of existing roads and their allowable load limit. Contractor is responsible for the repair of any damage to roads caused by construction operations.

3.2 CONTRACTOR'S TEMPORARY FACILITIES

Contractor-owned or -leased trailers must be identified by Government assigned numbers. Size and location of the number will comply with the Contracting Officer. Apply the number to the trailer within 14 calendar days of notification, or sooner, if directed by the Government.

3.2.1 Safety

Protect the integrity of any installed safety systems or personnel safety devices. If entrance into systems serving safety devices is required, the Contractor must obtain prior approval from the Contracting Officer. If it is temporarily necessary to remove or disable personnel safety devices in order to accomplish contract requirements, provide alternative means of protection prior to removing or disabling any permanently installed safety devices or equipment and obtain approval from the Contracting Officer.

3.2.2 Administrative Field Offices

Provide and maintain administrative field office facilities within the construction area at the designated site. Government office and warehouse facilities will not be available to the Contractor's personnel.

3.2.3 Storage Area

Construct a temporary 6 foot high chain link fence around trailers and materials. Include plastic strip inserts, colored green, so that visibility through the fence is obstructed. Fence posts may be driven, in lieu of concrete bases, where soil conditions permit. Do not place or store Trailers, materials, or equipment outside the fenced area unless such trailers, materials, or equipment are assigned a separate and distinct storage area by the Contracting Officer away from the vicinity of the construction site but within the installation boundaries. Trailers, equipment, or materials must not be open to public view with the exception of those items which are in support of ongoing work on any given day. Do not stockpile materials outside the fence in preparation for the next day's work. Park mobile equipment, such as tractors, wheeled lifting equipment, cranes, trucks, and like equipment within the fenced area at the end of

each work day.

3.2.4 Supplemental Storage Area

Upon Contractor's request, the Contracting Officer will designate another or supplemental area for the Contractor's use and storage of trailers, equipment, and materials. This area may not be in close proximity of the construction site but shall be within the military boundaries. Fencing of materials or equipment will not be required at this site; however, the Contractor is responsible for cleanliness and orderliness of the area used and for the security of any material or equipment stored in this area. Utilities will not be provided to this area by the Government.

3.2.5 Appearance of Trailers

a. Trailers utilized by the Contractor for administrative or material storage purposes must present a clean and neat exterior appearance and be in a state of good repair. Trailers which, in the opinion of the Contracting Officer, require exterior painting or maintenance will not be allowed on installation property.

b. Paint using suitable paint and maintain the temporary facilities. Failure to do so will be sufficient reason to require their removal.

3.2.6 Maintenance of Storage Area

Keep fencing in a state of good repair and proper alignment. Grassed or unpaved areas, which are not established roadways, will be covered with a layer of gravel as necessary to prevent rutting and the tracking of mud onto paved or established roadways, should the Contractor elect to traverse them with construction equipment or other vehicles; gravel gradation will be at the Contractor's discretion. Mow and maintain grass located within the boundaries of the construction site for the duration of the project. Grass and vegetation along fences, buildings, under trailers, and in areas not accessible to mowers shall be edged or trimmed neatly.

3.2.7 New Building

In the event a new building is constructed for the temporary project field office, it will be a minimum 12 feet in width, 16 feet in length and have a minimum of 7 feet headroom. Equip the building with approved electrical wiring, at least one double convenience outlet and the required switches and fuses to provide 110-120 volt power. Provide a work table with stool, desk with chair, two additional chairs, and one legal size file cabinet that can be locked. The building must be waterproof, supplied with a heater, have a minimum of two doors, electric lights, a telephone, a battery operated smoke detector alarm, a sufficient number of adjustable windows for adequate light and ventilation, and a supply of approved drinking water. Approved sanitary facilities must be furnished. Screen the windows and doors and provide the doors with dead bolt type locking devices or a padlock and heavy duty hasp bolted to the door. Door hinge pins will be non-removable. Arrange the windows to open and to be securely fastened from the inside. Protect glass panels in windows by bars or heavy mesh screens to prevent easy access. In warm weather, furnish air conditioning capable of maintaining the office at 50 percent relative humidity and a room temperature 20 degrees F below the outside temperature when the outside temperature is 95 degrees F. Any new building erected for a temporary field office must be maintained by the Contractor during the life of the contract and upon completion and acceptance of the work become

the property of the Contractor and removed from the site. All charges for telephone service for the temporary field office will be borne by the Contractor, including long distance charges up to a maximum of $75.00 per month.

3.2.8 Security Provisions

Provide adequate outside security lighting at the Contractor's temporary facilities. The Contractor will be responsible for the security of its own equipment; in addition, the Contractor will notify the appropriate law enforcement agency requesting periodic security checks of the temporary project field office.

3.2.9 Weather Protection of Temporary Facilities and Stored Materials

Take necessary precautions to ensure that roof openings and other critical openings in the building are monitored carefully. Take immediate actions required to seal off such openings when rain or other detrimental weather is imminent, and at the end of each workday. Ensure that the openings are completely sealed off to protect materials and equipment in the building from damage.

3.2.9.1 Building and Site Storm Protection

When a warning of gale force winds is issued, take precautions to minimize danger to persons, and protect the work and nearby Government property. Precautions must include, but are not limited to, closing openings; removing loose materials, tools and equipment from exposed locations; and removing or securing scaffolding and other temporary work. Close openings in the work when storms of lesser intensity pose a threat to the work or any nearby Government property.

3.3 TEMPORARY PROJECT SAFETY FENCING

As soon as practicable, but not later than 15 days after the date established for commencement of work, furnish and erect temporary project safety fencing at the work site. The safety fencing must be a high visibility orange colored, high density polyethylene grid or approved equal, a minimum of 42 inches high, supported and tightly secured to steel posts located on maximum 10 foot centers, constructed at the approved location. Maintain the safety fencing during the life of the contract and, upon completion and acceptance of the work, will become the property of the Contractor and be removed from the work site.

3.4 RESTORATION OF STORAGE AREA

Upon completion of the project remove the bulletin board, signs, barricades, haulroads, and any other temporary products from the site. After removal of trailers, materials, and equipment from within the fenced area, remove the fence that will become the property of the Contractor. Restore to the original or better condition, areas used by the Contractor for the storage of equipment or material, or other use. Gravel used to traverse grassed areas must be removed and the area restored to its original condition, including top soil and seeding as necessary.

-- End of Section --

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SECTION 01 57 20

ENVIRONMENTAL PROTECTION
04/06

PART 1 GENERAL

1.1 REFERENCES

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

U.S. ARMY (DA)

DA AR 200-1	(2007) Environmental Protection and Enhancement

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual
WETLANDS DELINEATION MANUAL	(1987) Corps of Engineers Wetlands Delineation Manual

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

33 CFR 328	Definitions of Waters of the United States
40 CFR 150 - 189	Pesticide Programs
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 279	Standards for the Management of Used Oil
40 CFR 302	Designation, Reportable Quantities, and Notification
40 CFR 355	Emergency Planning and Notification
40 CFR 68	Chemical Accident Prevention Provisions
49 CFR 171 - 178	Hazardous Materials Regulations

1.2 DEFINITIONS

1.2.1 Environmental Pollution and Damage

Environmental pollution and damage is the presence of chemical, physical,

or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade the environment aesthetically, culturally and/or historically.

1.2.2 Environmental Protection

Environmental protection is the prevention/control of pollution and habitat disruption that may occur to the environment during construction. The control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2.3 Contractor Generated Hazardous Waste

Contractor generated hazardous waste means materials that, if abandoned or disposed of, may meet the definition of a hazardous waste. These waste streams would typically consist of material brought on site by the Contractor to execute work, but are not fully consumed during the course of construction. Examples include, but are not limited to, excess paint thinners (i.e. methyl ethyl ketone, toluene etc.), waste thinners,excess paints, excess solvents, waste solvents, and excess pesticides, and contaminated pesticide equipment rinse water.

1.2.4 Installation Pest Management Coordinator

Installation Pest Management Coordinator (IPMC) is the individual officially designated by the Installation Commander to oversee the Installation Pest Management Program and the Installation Pest Management Plan.

1.2.5 Project Pesticide Coordinator

The Project Pesticide Coordinator (PPC) is an individual that resides at a Civil Works Project office and that is responsible for oversight of pesticide application on Project grounds.

1.2.6 Land Application for Discharge Water

The term "Land Application" for discharge water implies that the Contractor must discharge water at a rate which allows the water to percolate into the soil. No sheeting action, soil erosion, discharge into storm sewers, discharge into defined drainage areas, or discharge into the "waters of the United States" must occur. Land Application must be in compliance with all applicable Federal, State, and local laws and regulations.

1.2.7 Pesticide

Pesticide is defined as any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, or intended for use as a plant regulator, defoliant or desiccant.

1.2.8 Pests

The term "pests" means arthropods, birds, rodents, nematodes, fungi, bacteria, viruses, algae, snails, marine borers, snakes, weeds and other organisms (except for human or animal disease-causing organisms) that

adversely affect readiness, military operations, or the well-being of personnel and animals; attack or damage real property, supplies, equipment, or vegetation; or are otherwise undesirable.

1.2.9 Surface Discharge

The term "Surface Discharge" implies that the water is discharged with possible sheeting action and subsequent soil erosion may occur. Waters that are surface discharged may terminate in drainage ditches, storm sewers,creeks, and/or "waters of the United States" and would require a permit to discharge water from the governing agency.

1.2.10 Waters of the United States

All waters which are under the jurisdiction of the Clean Water Act, as defined in 33 CFR 328.

1.2.11 Wetlands

Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, and bogs. Official determination of whether or not an area is classified as a wetland must be done in accordance with WETLANDS DELINEATION MANUAL.

1.3 GENERAL REQUIREMENTS

Minimize environmental pollution and damage that may occur as the result of construction operations. The environmental resources within the project boundaries and those affected outside the limits of permanent work must be protected during the entire duration of this contract. Comply with all applicable environmental Federal, State, and local laws and regulations. Any delays resulting from failure to comply with environmental laws and regulations will be the Contractor's responsibility.

1.4 SUBCONTRACTORS

Ensure compliance with this section by subcontractors.

1.5 PAYMENT

No separate payment will be made for work covered under this section. Payment of fees associated with environmental permits, application, and/or notices obtained by the Contractor, and payment of all fines/fees for violation or non-compliance with Federal, State, Regional and local laws and regulations are the Contractor's responsibility. All costs associated with this section must be included in the contract price.

1.6 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Environmental Protection Plan; G

1.7 ENVIRONMENTAL PROTECTION PLAN

Prior to commencing construction activities or delivery of materials to the site, submit an Environmental Protection Plan for review and approval by the Contracting Officer. The purpose of the Environmental Protection Plan is to present a comprehensive overview of known or potential environmental issues which the Contractor must address during construction. Issues of concern must be defined within the Environmental Protection Plan as outlined in this section. Address each topic at a level of detail commensurate with the environmental issue and required construction task(s). Topics or issues which are not identified in this section, but are considered necessary, must be identified and discussed after those items formally identified in this section. Prior to submittal of the Environmental Protection Plan, meet with the Contracting Officer for the purpose of discussing the implementation of the initial Environmental Protection Plan; possible subsequent additions and revisions to the plan including any reporting requirements; and methods for administration of the Contractor's Environmental Plans. The Environmental Protection Plan must be current and maintained onsite by the Contractor.

1.7.1 Compliance

No requirement in this Section will relieve the Contractor of any applicable Federal, State, and local environmental protection laws and regulations. During Construction, the Contractor will be responsible for identifying, implementing, and submitting for approval any additional requirements to be included in the Environmental Protection Plan.

1.7.2 Contents

Include in the environmental protection plan, but not limit it to, the following:

a. Name(s) of person(s) within the Contractor's organization who is(are) responsible for ensuring adherence to the Environmental Protection Plan.

b. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site, if applicable.

c. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel.

d. Description of the Contractor's environmental protection personnel training program.

e. An erosion and sediment control plan which identifies the type and location of the erosion and sediment controls to be provided. The plan must include monitoring and reporting requirements to assure that the control measures are in compliance with the erosion and sediment control plan, Federal, State, and local laws and regulations. A Storm Water Pollution Prevention Plan (SWPPP) may be substituted for this plan.

f. Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil

materials including methods to control runoff and to contain materials on the site.

g. Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Plan shall include measures to minimize the amount of mud transported onto paved public roads by vehicles or runoff.

h. Work area plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Plan should include measures for marking the limits of use areas including methods for protection of features to be preserved within authorized work areas.

i. Drawing showing the location of borrow areas.

j. Include in the Spill Control plan the procedures, instructions, and reports to be used in the event of an unforeseen spill of a substance regulated by 40 CFR 68, 40 CFR 302, 40 CFR 355, and/or regulated under State or Local laws and regulations. The Spill Control Plan supplements the requirements of EM 385-1-1 . Include in this plan, as a minimum:

(1) The name of the individual who will report any spills or hazardous substance releases and who will follow up with complete documentation. This individual will immediately notify the Contracting Officer and the local Fire Department in addition to the legally required Federal, State, and local reporting channels (including the National Response Center 1-800-424-8802) if a reportable quantity is released to the environment. Include in the plan a list of the required reporting channels and telephone numbers.

(2) The name and qualifications of the individual who will be responsible for implementing and supervising the containment and cleanup.

(3) Training requirements for Contractor's personnel and methods of accomplishing the training.

(4) A list of materials and equipment to be immediately available at the job site, tailored to cleanup work of the potential hazard(s) identified.

(5) The names and locations of suppliers of containment materials and locations of additional fuel oil recovery, cleanup, restoration, and material-placement equipment available in case of an unforeseen spill emergency.

(6) The methods and procedures to be used for expeditious contaminant cleanup.

k. A non-hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris and schedules for disposal.

(1) Identify any subcontractors responsible for the transportation and disposal of solid waste. Submit licenses or permits for solid waste disposal sites that are not a commercial operating facility.

(2) Evidence of the disposal facility's acceptance of the solid waste must be attached to this plan during the construction. Attach a copy of each of the Non-hazardous Solid Waste Diversion Reports to the disposal plan. Submit the report for the previous quarter on the first working day after the first quarter that non-hazardous solid waste has been disposed and/or diverted (e.g. the first working day of January, April, July, and October).

(3) Indicate in the report the total amount of waste generated and total amount of waste diverted in cubic yards or tons along with the percent that was diverted.

(4) A recycling and solid waste minimization plan with a list of measures to reduce consumption of energy and natural resources. Detail in the plan the Contractor's actions to comply with and to participate in Federal, State, Regional, and local government sponsored recycling programs to reduce the volume of solid waste at the source.

l. An air pollution control plan detailing provisions to assure that dust, debris, materials, trash, etc., do not become air borne and travel off the project site.

m. A contaminant prevention plan that: identifies potentially hazardous substances to be used on the job site; identifies the intended actions to prevent introduction of such materials into the air, water, or ground; and details provisions for compliance with Federal, State, and local laws and regulations for storage and handling of these materials. In accordance with EM 385-1-1, a copy of the Material Safety Data Sheets (MSDS) and the maximum quantity of each hazardous material to be onsite at any given time must be included in the contaminant prevention plan. Update the plan as new hazardous materials are brought onsite or removed from the site.

n. A waste water management plan that identifies the methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines. If a settling/retention pond is required, the plan must include the design of the pond including drawings, removal plan, and testing requirements for possible pollutants. If land application will be the method of disposal for the waste water, the plan must include a sketch showing the location for land application along with a description of the pretreatment methods to be implemented. If surface discharge will be the method of disposal, include a copy of the permit and associated documents as an attachment prior to discharging the waste water. If disposal is to a sanitary sewer, the plan must include documentation that the Waste Water Treatment Plant Operator has approved the flow rate, volume, and type of discharge.

o. A historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands known to be on the project site: and/or identifies procedures to be followed if historical archaeological, cultural resources, biological resources and wetlands not previously known to be onsite or in the area are discovered during construction. Include in the plan methods to assure the protection of known or

discovered resources, identifying lines of communication between Contractor personnel and the Contracting Officer.

p. Include and update a pesticide treatment plan, as information becomes available. Include in the plan: sequence of treatment, dates, times, locations, pesticide trade name, EPA registration numbers, authorized uses, chemical composition, formulation, original and applied concentration, application rates of active ingredient (i.e. pounds of active ingredient applied), equipment used for application and calibration of equipment. Federal, State, Regional and Local pest management record keeping and reporting requirements as well as any additional Installation Project Office specific requirements are the Contractor's responsibility in conformance with DA AR 200-1 Chapter 5--Pest Management, Section 5-4 "Program requirements" for data required to be reported to the Installation.

1.7.3 Appendix

Attach to the Environmental Protection Plan, as an appendix, copies of all environmental permits, permit application packages, approvals to construct, notifications, certifications, reports, and termination documents.

1.8 PROTECTION FEATURES

This paragraph supplements the Contract Clause PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS. Prior to start of any onsite construction activities, the Contractor and the Contracting Officer will make a joint condition survey. Immediately following the survey, the Contractor will prepare a brief report including a plan describing the features requiring protection under the provisions of the Contract Clauses, which are not specifically identified on the drawings as environmental features requiring protection along with the condition of trees, shrubs and grassed areas immediately adjacent to the site of work and adjacent to the Contractor's assigned storage area and access route(s), as applicable. This survey report will be signed by both the the Contractor and the Contracting Officer upon mutual agreement as to its accuracy and completeness. The Contractor must protect those environmental features included in the survey report and any indicated on the drawings, regardless of interference which their preservation may cause to the work under the contract.

1.9 ENVIRONMENTAL ASSESSMENT OF CONTRACT DEVIATIONS

Any deviations from the drawings,plans and specifications, requested by the Contractor and which may have an environmental impact, will be subject to approval by the Contracting Officer and may require an extended review, processing, and approval time. The Contracting Officer reserves the right to disapprove alternate methods, even if they are more cost effective, if the Contracting Officer determines that the proposed alternate method will have an adverse environmental impact.

1.10 NOTIFICATION

The Contracting Officer will notify the Contractor in writing of any observed noncompliance with Federal, State or local environmental laws or regulations, permits, and other elements of the Contractor's Environmental Protection plan. After receipt of such notice, the Contractor will inform the Contracting Officer of the proposed corrective action and take such action when approved by the Contracting Officer. The Contracting Officer

may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions will be granted or equitable adjustments allowed for any such suspensions. This is in addition to any other actions the Contracting Officer may take under the contract, or in accordance with the Federal Acquisition Regulation or Federal Law.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 ENVIRONMENTAL PERMITS AND COMMITMENTS

Obtaining and complying with all environmental permits and commitments required by Federal, State, Regional, and local environmental laws and regulations is the Contractor's responsibility.

3.2 LAND RESOURCES

Confine all activities to areas defined by the drawings and specifications. Identify any land resources to be preserved within the work area prior to the beginning of any construction. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without approval, except in areas indicated on the drawings or specified to be cleared. Ropes, cables, or guys will not be fastened to or attached to any trees for anchorage unless specifically authorized. Provide effective protection for land and vegetation resources at all times, as defined in the following subparagraphs. Remove stone, soil, or other materials displaced into uncleared areas.

3.2.1 Work Area Limits

Mark the areas that need not be disturbed under this contract prior to commencing construction activities. Mark or fence isolated areas within the general work area which are not to be disturbed. Protect monuments and markers before construction operations commence. Where construction operations are to be conducted during darkness, any markers must be visible in the dark. The Contractor's personnel must be knowledgeable of the purpose for marking and/or protecting particular objects.

3.2.2 Landscape

Trees, shrubs, vines, grasses, land forms and other landscape features indicated and defined on the drawings to be preserved must be clearly identified by marking, fencing, or wrapping with boards, or any other approved techniques. Restore landscape features damaged or destroyed during construction operations outside the limits of the approved work area. Refer to the guidance provided within the Hill AFB Integrated Natural Resources Management Plan for appropriate plantings and seed mixes

3.2.3 Erosion and Sediment Controls

Providing erosion and sediment control measures in accordance with Federal, State, and local laws and regulations is the Contractor's responsibility. Select and maintain the erosion and sediment controls such that water quality standards are not violated as a result of construction activities.

The area of bare soil exposed at any one time by construction operations should be kept to a minimum. Construct or install temporary and permanent erosion and sediment control best management practices (BMPs) as specified in Section 01 57 23 TEMPORARY STORM WATER POLLUTION CONTROL. BMPs may include, but not be limited to, vegetation cover, stream bank stabilization, slope stabilization, silt fences, construction of terraces, interceptor channels, sediment traps, inlet and outfall protection, diversion channels, and sedimentation basins. The Contractor's best management practices must also be in accordance with the Installation's National Pollutant Discharge Elimination System (NPDES) Storm Water Pollution Prevention Plan (SWPPP) which may be reviewed at the Installation Environmental Office. Remove any temporary measures after the area has been stabilized.

3.2.4 Contractor Facilities and Work Areas

Place field offices, staging areas, stockpile storage, and temporary buildings in areas designated on the drawings or as directed by the Contracting Officer. Temporary movement or relocation of Contractor facilities will be made only when approved. Erosion and sediment controls must be provided for onsite borrow and spoil areas to prevent sediment from entering nearby waters. Temporary excavation and embankments for plant and/or work areas must be controlled to protect adjacent areas.

3.3 WATER RESOURCES

Monitor all water areas affected by construction activities to prevent pollution of surface and ground waters. Do not apply toxic or hazardous chemicals to soil or vegetation unless otherwise indicated. For construction activities immediately adjacent to impaired surface waters, the Contractor must be capable of quantifying sediment or pollutant loading to that surface water when required by State or Federally issued Clean Water Act permits.

3.4 AIR RESOURCES

Equipment operation, activities, or processes will be in accordance with all Federal and State air emission and performance laws and standards.

3.4.1 Particulates

Dust particles; aerosols and gaseous by-products from construction activities; and processing and preparation of materials, such as from asphaltic batch plants; must be controlled at all times, including weekends, holidays and hours when work is not in progress. Maintain excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and other work areas within or outside the project boundaries free from particulates which would cause the Federal, State, and local air pollution standards to be exceeded or which would cause a hazard or a nuisance. Sprinkling, chemical treatment of an approved type, baghouse, scrubbers, electrostatic precipitators or other methods will be permitted to control particulates in the work area. Sprinkling, to be efficient, must be repeated to keep the disturbed area damp at all times. Provide sufficient, competent equipment available to accomplish these tasks. Perform particulate control as the work proceeds and whenever a particulate nuisance or hazard occurs. Comply with all State and local visibility regulations.

3.4.2 Odors

Odors from construction activities must be controlled at all times. The odors must be in compliance with State regulations and/or local ordinances and may not constitute a health hazard.

3.4.3 Sound Intrusions

Keep construction activities under surveillance and control to minimize environment damage by noise. Comply with the provisions of the State of Utah rules.

3.4.4 Burning

Burning is prohibited on the Government premises.

3.5 HTRW AIR EMISSION CONTROL

Implement the following control(s) to meet or exceed performance levels identified in HTRW PERIMETER AIR MONITORING.

3.5 CHEMICAL MATERIALS MANAGEMENT AND WASTE DISPOSAL

Disposal of wastes will be as directed below, unless otherwise specified in other sections and/or shown on the drawings.

3.5.1 Solid Wastes

Place solid wastes (excluding clearing debris) in containers which are emptied on a regular schedule. Handling, storage, and disposal must be conducted to prevent contamination. Employ segregation measures so that no hazardous or toxic waste will become co-mingled with solid waste. Waste materials will be hauled to the Government landfill site designated by the Contracting Officer.

3.5.2 Chemicals and Chemical Wastes

Dispense chemicals ensuring no spillage to the ground or water. Perform and document periodic inspections of dispensing areas to identify leakage and initiate corrective action. This documentation will be periodically reviewed by the Government. Collect chemical waste in corrosion resistant, compatible containers. Collection drums must be monitored and removed to a staging or storage area when contents are within 6 inches of the top. Wastes will be classified, managed, stored, and disposed of in accordance with Federal, State, and local laws and regulations.

3.5.3 Contractor Generated Hazardous Wastes/Excess Hazardous Materials

Hazardous wastes are defined in 40 CFR 261, or are as defined by applicable State and local regulations. Hazardous materials are defined in 49 CFR 171 - 178. At a minimum, manage and store hazardous waste in compliance with 40 CFR 262 in accordance with the Installation hazardous waste management plan. Take sufficient measures to prevent spillage of hazardous and toxic materials during dispensing. Segregate hazardous waste from other materials and wastes, protect it from the weather by placing it in a safe covered location, and take precautionary measures such as berming or other appropriate measures against accidental spillage. Storage, describing, packaging, labeling, marking, and placarding of hazardous waste and hazardous material in accordance with 49 CFR 171 - 178, State, and

local laws and regulations is the Contractor's responsibility. Transport Contractor generated hazardous waste off Government property within 60 days in accordance with the Environmental Protection Agency and the Department of Transportation laws and regulations. Dispose of hazardous waste in compliance with Federal, State and local laws and regulations. Spills of hazardous or toxic materials must be immediately reported to the Contracting Officer and the Facility Environmental Office. Cleanup and cleanup costs due to spills are the Contractor's responsibility. Coordinate the disposition of hazardous waste with the Facility's Hazardous Waste Manager and the Contracting Officer.

3.5.4 Fuel and Lubricants

Storage, fueling and lubrication of equipment and motor vehicles must be conducted in a manner that affords the maximum protection against spill and evaporation. Manage and store fuel, lubricants and oil in accordance with all Federal, State, Regional, and local laws and regulations. Used lubricants and used oil to be discarded must be stored in marked corrosion-resistant containers and recycled or disposed in accordance with 40 CFR 279, State, and local laws and regulations. Storage of fuel on the project site will be in accordance with all Federal, State, and local laws and regulations.

3.5.5 Waste Water

Disposal of waste water will be as specified below.

a. Waste water from construction activities, such as onsite material processing, concrete curing, foundation and concrete clean-up, water used in concrete trucks, forms, etc. will not be allowed to enter water ways or to be discharged prior to being treated to remove pollutants. Dispose of the construction related waste water in accordance with all Federal, State, Regional and Local laws and regulations.

b. For discharge of ground water, the Contractor will surface discharge in accordance with all Federal, State, and local laws and regulations.

c. Water generated from the flushing of lines after hydrostatic testing will be discharged into the sanitary sewer with prior approval and/or notification to the Waste Water Treatment Plant's Operator.

3.6 RECYCLING AND WASTE MINIMIZATION

Participate in State and local government sponsored recycling programs. The Contractor is further encouraged to minimize solid waste generation throughout the duration of the project. .

3.7 NON-HAZARDOUS SOLID WASTE DIVERSION REPORT

Maintain an inventory of non-hazardous solid waste diversion and disposal of construction and demolition debris. Submit a report to USACE Resident Office through the Contracting Officer on the first working day after each fiscal year quarter, starting the first quarter that non-hazardous solid waste has been generated. Include the following in the report:

a. Construction and Demolition (C&D) Debris Disposed = report in

cubic yards or tons, as appropriate.

b. Construction and Demolition (C&D) Debris Recycled = report in cubic yards or tons, as appropriate.

c. Total C&D Debris Generated = report in cubic yards or tons, as appropriate.

d. Waste Sent to Waste-To-Energy Incineration Plant (This amount should not be included in the recycled amount) = report in cubic yards or tons, as appropriate.

3.8 HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

If during excavation or other construction activities any previously unidentified or unanticipated historical, archaeological, and cultural resources are discovered or found, all activities that may damage or alter such resources will be temporarily suspended. Resources covered by this paragraph include but are not limited to: any human skeletal remains or burials; artifacts; shell, midden, bone, charcoal, or other deposits; rock or coral alignments, pavings, wall, or other constructed features; and any indication of agricultural or other human activities. Upon such discovery or find, immediately notify the Contracting Officer so that the appropriate authorities may be notified and a determination made as to their significance and what, if any, special disposition of the finds should be made. Cease all activities that may result in impact to or the destruction of these resources. Secure the area and prevent employees or other persons from trespassing on, removing, or otherwise disturbing such resources. Refer to the Hill AFB's Integrated Cultural Resources Management Plan's Standard Operating Procedures for Inadvertent Discovery.

3.9 BIOLOGICAL RESOURCES

Minimize interference with, disturbance to, and damage to fish, wildlife, and plants including their habitat. The protection of threatened and endangered animal and plant species, including their habitat, is the Contractor's responsibility in accordance with Federal, State, Regional, and local laws and regulations. Refer to Hill AFB's Integrated Natural Resources Management Plan for guidance regarding Biological Resources Protection.

3.10 INTEGRATED PEST MANAGEMENT

In order to minimize impacts to existing fauna and flora, the Contractor through the Contracting Officer, must coordinate with the Installation Pest Management Coordinator (IPMC) Project Pesticide Coordinator (PPC)at the earliest possible time prior to pesticide application. Discuss integrated pest management strategies with the IPMC and receive concurrence from the IPMC through the COR prior to the application of any pesticide associated with these specifications. Installation Project Office Pest Management personnel will be given the opportunity to be present at all meetings concerning treatment measures for pest or disease control and during application of the pesticide. The use and management of pesticides are regulated under 40 CFR 150 - 189.

3.10.1 Pesticide Delivery and Storage

Deliver pesticides to the site in the original, unopened containers bearing legible labels indicating the EPA registration number and the

manufacturer's registered uses. Store pesticides according to manufacturer's instructions and under lock and key when unattended.

3.10.2 Qualifications

For the application of pesticides, use the services of a subcontractor whose principal business is pest control. The subcontractor must be licensed and certified in the state where the work is to be performed.

3.10.3 Pesticide Handling Requirements

Formulate, treat with, and dispose of pesticides and associated containers in accordance with label directions and use the clothing and personal protective equipment specified on the labeling for use during all phases of the application. Furnish Material Safety Data Sheets (MSDS) for all pesticide products.

3.10.4 Application

Apply pesticides using a State Certified Pesticide Applicator in accordance with EPA label restrictions and recommendation. The Certified Applicator must wear clothing and personal protective equipment as specified on the pesticide label. The Contracting Officer will designate locations for water used in formulating. Do not allow the equipment to overflow. All equipment must be inspected for leaks, clogging, wear, or damage and repaired prior to application of pesticide.

3.11 PREVIOUSLY USED EQUIPMENT

Clean all previously used construction equipment prior to bringing it onto the project site. Ensure that the equipment is free from soil residuals, egg deposits from plant pests, noxious weeds, and plant seeds. Consult with the USDA jurisdictional office for additional cleaning requirements.

3.12 MAINTENANCE OF POLLUTION FACILITIES

Maintain permanent and temporary pollution control facilities and devices for the duration of the contract or for that length of time construction activities create the particular pollutant.

3.13 MILITARY MUNITIONS

In the event military munitions, as defined in 40 CFR 260, are discovered or uncovered, the Contractor will immediately stop work in that area and immediately inform the Contracting Officer.

3.14 TRAINING OF CONTRACTOR PERSONNEL

The Contractor's personnel must be trained in all phases of environmental protection and pollution control. Conduct environmental protection/pollution control meetings for all personnel prior to commencing construction activities. Additional meetings must be conducted for new personnel and when site conditions change. Include in the training and meeting agenda: methods of detecting and avoiding pollution; familiarization with statutory and contractual pollution standards; installation and care of devices, vegetative covers, and instruments required for monitoring purposes to ensure adequate and continuous environmental protection/pollution control; anticipated hazardous or toxic chemicals or wastes, and other regulated contaminants; recognition and

protection of archaeological sites, artifacts, wetlands, and endangered species and their habitat that are known to be in the area.

3.15 POST CONSTRUCTION CLEANUP

The Contractor will clean up all areas used for construction in accordance with Contract Clause: "Cleaning Up". Unless otherwise instructed in writing by the Contracting Officer, obliterate all signs of temporary construction facilities such as haul roads, work area, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other vestiges of construction prior to final acceptance of the work. The disturbed area must be graded, filled and the entire area seeded unless otherwise indicated.

-- End of Section --

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04/08

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SECTION 01 57 23

TEMPORARY STORM WATER POLLUTION CONTROL
04/08

PART 1 GENERAL

1.1 SUMMARY

The work consists of implementing the storm water pollution prevention measures to prevent sediment from entering streams or water bodies as specified in this Section in conformance with the requirements of Section 01 57 20 ENVIRONMENTAL PROTECTION, and the requirements of the National Pollutant Discharge Elimination System (NPDES).

1.2 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM D4439	(2014) Geosynthetics
ASTM D4491/D4491M	(2017) Standard Test Methods for Water Permeability of Geotextiles by Permittivity
ASTM D4533	(2011) Trapezoid Tearing Strength of Geotextiles
ASTM D4632	(2008) Grab Breaking Load and Elongation of Geotextiles
ASTM D4751	(2012) Determining Apparent Opening Size of a Geotextile
ASTM D4873	(2015) Identification, Storage, and Handling of Geosynthetic Rolls and Samples

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 832-R-92-005	(1992) Storm Water Management for Construction Activities Developing Pollution Preventions and Plans and Best Management Practices

Utah Department of Environmental Quality (UDEQ)

UCGP UTRC00000	(2014) Utah Pollutant Discharge Elimination System (UPDES) General Permit for Discharges from Construction Activities UPDES Permit No. UTRC00000

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

40 CFR 122.26	Storm Water Discharges (Applicable to State NPDES Programs, see section 123.25)

1.3 EROSION AND SEDIMENT CONTROLS

The controls and measures required of the Contractor are described below.

1.3.1 Stabilization Practices

The stabilization practices to be implemented include temporary seeding, mulching, geotextiles, sod stabilization, vegetative buffer strips, erosion control matts, protection of trees, preservation of mature vegetation, etc. On the daily CQC Report, record the dates when the major grading activities occur, (e.g., clearing and grubbing, excavation, embankment, and grading); when construction activities temporarily or permanently cease on a portion of the site; and when stabilization practices are initiated. Except as provided in paragraphs UNSUITABLE CONDITIONS and NO ACTIVITY FOR LESS THAN 21 DAYS, initiate stabilization practices as soon as practicable, but no more than 14 days, in any portion of the site where construction activities have temporarily or permanently ceased.

1.3.1.1 Unsuitable Conditions

Where the initiation of stabilization measures by the fourteenth day after construction activity temporarily or permanently ceases or is precluded by unsuitable conditions caused by the weather, initiate stabilization practices as soon as practicable after conditions become suitable.

1.3.1.2 No Activity for Less Than 21 Days

When the total time period in which construction activity is temporarily ceased on a portion of the site is 21 days minimum, stabilization practices do not have to be initiated on that portion of the site until 14 days have elapsed after construction activity temporarily ceased.

1.3.1.3 Burnoff

Burnoff of the ground cover is not permitted.

1.3.1.4 Protection of Erodible Soils

Immediately finish the earthwork brought to a final grade, as indicated or specified, and protect the side slopes and back slopes upon completion of rough grading. Plan and conduct earthwork to minimize the duration of exposure of unprotected soils.

1.3.2 Erosion, Sediment and Stormwater Control

a. Submit "Erosion and Sediment Controls" (E&S) (form provided at the pre-construction conference) and Storm Water Inspection Reports for General Permit to the Contracting Officer once every 7 calendar days and within 24 hours of a storm event that produces 0.5 inch or more of rain.

b. Storm Water Notice of Intent for Construction Activities

c. Submit a Storm Water Notice of Intent for NPDES coverage under the

general permit for construction activities UCGP UTRC00000 and a Storm Water Pollution Prevention Plan (SWPPP) for the project to the Contracting Officer prior to the commencement of work. The SWPPP shall meet the requirements of the EPA general permit for storm water discharges from construction sites. Submit the SWPPP along with any required Notice of Intents, Notice of Termination, and appropriate permit fees, via the Contracting Officer, and in coordination with the military installation environmental staff, to the appropriate Utah Department of Environmental Quality (UDEQ) for approval, a minimum of 14 calendar days prior to the start of any land disturbing activities. Maintain an approved copy of the SWPPP at the construction on-site office, and continually update as regulations require, to reflect current site conditions. Include within the SWPPP:

(1) Identify potential sources of pollution which may be reasonably expected to affect the quality of storm water discharge from the site.

(2) Describe and ensure implementation of practices which will be used to reduce the pollutants in storm water discharge from the site.

(3) Ensure compliance with terms of the State of Utah general permit for storm water discharge, UCGP UTRC00000 .

(4) Select applicable best management practices from EPA 832-R-92-005.

(5) Include a completed copy of the Registration Statement, BMP Inspection Report Template and Notice of Termination except for the effective date.

(6) Storm Water Pollution Prevention Measures and Notice of Intent 40 CFR 122.26, EPA 832-R-92-005. Provide a "Storm Water Pollution Prevention Plan" (SWPPP) for the project. Construction SWPPPs must be submitted to Scott Stoddard, 75 CEG/CEIE, 775-6893, for approval prior to construction startup. The SWPPP will meet the requirements of the State of Utah general permit for storm water discharges from construction sites UCGP UTRC00000 . Submit the SWPPP along with any required Notice of Intents, Notice of Termination, and appropriate permit fees, via the Contracting Officer, to the appropriate Federal agency for approval, a minimum of 14 calendar days prior to the start of construction. A copy of the approved SWPPP will be kept at the construction on-site office, and continually updated as regulations require to reflect current site conditions.

(7) Following SWPPP approval, submit Registration Statement and appropriate permit fees to the Utah Department of Environmental Quality prior to the commencement of any earth-disturbing activities. To be covered Utah Construction General permit, the contractor must coordinate with the installation and submit to the Utah Department of Water Quality a complete and accurate NOI and the permit fee prior to commencing construction activity. In every case a Storm Water Pollution Prevention Plan (SWPPP) consistent with the permit UCGP UTRC00000 must be completed prior to submitting your NOI for coverage under the permit..

(8) Install, inspect, and maintain best management practices (BMPs) as required by the general permit. Prepare and submit to DCR, BMP

Inspection Reports as required by the general permit.

(9) Once construction is complete and the site has been stabilized with a final, sustainable cover, and meets all permite requirements, submit the Notice of Termination to the UDEQ within 30 days after all land disturbing activities end.

(10) Information on the permit application, SWPPP requirements, Registration Statement, BMP Inspection Reports, and Notice of Termination can be found in the Utah Construction General Permit, UCGP UTRC00000. The Registration Statement, Notice of Termination, and permit fee forms can be found on the UDEQ website . This website also contains the permit regulations and information on how to obtain coverage online.

(11) Once construction is complete and the site has been stabilized with a final, sustainable cover, submit the Notice of Termination to UDEQ within 30 days after all land disturbing activities end.

1.3.3 Structural Practices

Implement structural practices to divert flows from exposed soils, temporarily store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Implement structural practices in a timely manner, during the construction process, to minimize erosion and sediment runoff. Location and details of installation and construction must be shown on the SWPPP drawings. All BMPs selected and SWPPP document preparation must be done in accordance with the Utah Construction General Permit, UCGP UTRC00000. The structural practices listed below are only for consideration and do not encompass the range of BMPs available for selection.

1.3.3.1 Silt Fences

Provide silt fences as a temporary structural practice to minimize erosion and sediment runoff. Properly install silt fences to effectively retain sediment immediately after completing each phase of work where erosion would occur in the form of sheet and rill erosion (e.g. clearing and grubbing, excavation, embankment, and grading). Install silt fences in the locations indicated on the drawings. Obtain approval from the Contracting Officer prior to final removal of silt fence barriers.

1.3.3.2 Straw Bales

Provide bales of straw as a temporary structural practice to minimize erosion and sediment runoff. If bales are used, properly place the bales to effectively retain sediment immediately after completing each phase of work (e.g., clearing and grubbing, excavation, embankment, and grading) in each independent runoff area (e.g., after clearing and grubbing in a area between a ridge and drain, place the bales as work progresses, remove/replace/relocate the bales as needed for work to progress in the drainage area). Show on the drawings areas where straw bales are to be used. The Contracting Officer will approve the final removal of straw bale barriers. Provide rows of bales of straw as follows:

a. Along the downhill perimeter edge of all areas disturbed.

b. Along the top of the slope or top bank of drainage ditches, channels, swales, etc. that traverse disturbed areas.

c. Along the toe of all cut slopes and fill slopes of the construction areas.

d. Perpendicular to the flow in the bottom of existing drainage ditches, channels, swales, etc. that traverse disturbed areas or carry runoff from disturbed areas. Space the rows as shown on the drawings.

e. Perpendicular to the flow in the bottom of new drainage ditches, channels, and swales. Space the rows as shown on the drawings.

f. At the entrance to culverts that receive runoff from disturbed areas.

1.3.4 Fiber Rolls

Fiber Rolls are highly versatile and the most frequently used sedimentation BMP used on mondern construction sites. Install and maintain fiber rolls as a sediment control BMP in accordance with the manufacterers instructions. Preferred over silt fences, fiber rolls (or straw wattles) consists of straw, flax, or other similar materials bound into a tight tubular roll. Use fiber rolls containing biodegradable materials with photodegradable netting. Properly trench and stake fiber rolls for full effectiveness. Repair split, torn, unraveling or slumping fiber rolls within timeframes noted in the Utah Construction General Permit. Remove sediment when sediment accumulation reaches 1/3 the designed sediment storage depth. When installing on a slope, the slope inclination controls the required spacing as detailed in the manufacturing instructions and Utah CGP references.

1.3.5 Sediment Basins

Trap sediment in temporary sediment basins. Select a basin size to accommodate the runoff of a local -year storm. Pump dry and remove the accumulated sediment, after each storm. Use a paved weir or vertical overflow pipe for overflow. Remove collected sediment from the site. Institute effluent quality monitoring programs. Install, inspect, and maintain best management practices (BMPs) as required by the general permit. Prepare BMP Inspection Reports as required by the general permit. If required by the permit, include those inspection reports.

1.3.6 Vegetation and Mulch

a. Provide temporary protection on sides and back slopes as soon as rough grading is completed or sufficient soil is exposed to require erosion protection. Protect slopes by accelerated growth of permanent vegetation, temporary vegetation, mulching, or netting. Stabilize slopes by hydroseeding, anchoring mulch in place, covering with anchored netting, sodding, or such combination of these and other methods necessary for effective erosion control.

b. Seeding and site landscaping: Provide new landscaping to limit erosion where ground is disturbed. Include topsoil or nutriment if applicable during any seeding operation if needed to establish a suitable stand of grass.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When

used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Storm Water Pollution Prevention Plan

Storm Water Notice of Intent

SD-03 Product Data

BMP Product Data

Manufacturere's installation instructions of Best Management Practices (BMPs) to be used.

Geotextiles and Mats; G, DO

SD-06 Test Reports

Storm Water Inspection Reports for General Permit

Erosion and Sediment Controls

SD-07 Certificates

Mill Certificate or Affidavit

SD-11 Closeout Submittals

Final SWPPP; G, DO

NOPT Application; G, DO

Notice of Termination (NOT) Application

1.5 DELIVERY, STORAGE, AND HANDLING

Identify, store and handle filter fabric in accordance with ASTM D4873.

1.6 Required Stormwater Meetings

Conduct required stormwater meeting the week after execution of the NTP. Conduct the meeting at the USACE Resident office. At a minimum, the Contractor's Project Manager, ora appropriate technical person are required to be present.

This meeting is the equivalent of a preparatory meeting for the SWPPP submittal. The proposed stormwater management plan for this project must be discussed. This meeting is required prior to government approval of the SWPPP submittal.

Hold additional meetings for the comletion of the SWPPP or other required information as needed.

1.7 Training Requirements

Thte contractor must meet the staff training requirements in Chapter 6 of

UCGP UTRC00000

1.8 SWPPP Development

Guidance for creating a SWPPP can be found in the Utah General Permit UCGP UTRC00000. Once the SWPPP has been completed, submit it to USACE for government approval not later than 15 days upon execution of the NTP. Government approval will be based on the docment meeting these specifications. Resubmit the SWPPP to the governmetn withint 21 days of receiving governmetn review comments until an acceptable action code is issued.

Includ a narrative section as well as figures in the Site Maps. At a minimum, includ the locatios of all BMPs (temporary and post-construction), discharge points, sampling collection points, drainage patterns aacross the project area, storm drain inlets and temporary concentrated flow drainage patters in the Site Maps. Due to the nature of the project where footprints are separate, include individual storm water site maps for each prject footprint and associated staging area.

PART 2 PRODUCTS

2.1 COMPONENTS FOR SILT FENCES

2.1.1 Filter Fabric

Provide geotextile that complies with the requirements of ASTM D4439, and consists of polymeric filaments which are formed into a stable network such that filaments retain their relative positions. The filament shall consist of a long-chain synthetic polymer composed of at least 85 percent by weight of ester, propylene, or amide, and contains stabilizers and/or inhibitors added to the base plastic to make the filaments resistant to deterioration due to ultraviolet and heat exposure. Provide synthetic filter fabric that contains ultraviolet ray inhibitors and stabilizers to assure a minimum of six months of expected usable construction life at a temperature range of 0 to 120 degrees F. The filter fabric shall meet the following requirements:

FILTER FABRIC FOR SILT SCREEN FENCE		
PHYSICAL PROPERTY	TEST PROCEDURE	STRENGTH REQUIREMENT
Grab Tensile Elongation (percent)	ASTM D4632	100 lbs. min. 30 percent max.
Trapezoid Tear	ASTM D4533	55 lbs. min.
Permittivity	ASTM D4491/D4491M	0.2 sec-1
AOS (U.S. Std Sieve)	ASTM D4751	20-100

2.1.2 Silt Fence Stakes and Posts

Use either wooden stakes or steel posts for fence construction. Wooden stakes utilized for silt fence construction, shall have a minimum cross section of 2 by 2 inches when oak is used and 4 by 4 inches when pine is used, and have a minimum length of 5 feet. Steel posts (standard "U" or

"T" section) utilized for silt fence construction, shall have a minimum weight of 1.33 pounds/linear foot and a minimum length of 5 feet.

2.1.3 Mill Certificate or Affidavit

Provide a mill certificate or affidavit attesting that the fabric and factory seams meet chemical, physical, and manufacturing requirements specified above. Specify in the mill certificate or affidavit the actual Minimum Average Roll Values and identify the fabric supplied by roll identification numbers. Submit a mill certificate or affidavit signed by a legally authorized official from the company manufacturing the filter fabric.

2.2 COMPONENTS FOR STRAW BALES

The straw in the bales shall be stalks from oats, wheat, rye, barley, rice, or from grasses such as byhalia, bermuda, etc., furnished in air dry condition. Provide bales with a standard cross section of 14 by 18 inches. Wire-bound or string-tie all bales. Use either wooden stakes or steel posts to secure the straw bales to the ground. Wooden stakes utilized for this purpose, shall have a minimum dimensions of 2 by 2 inches in cross section and have a minimum length of 3 feet. Steel posts (standard "U" or "T" section) utilized for securing straw bales, shall have a minimum weight of 1.33 pounds/linear foot and a minimum length of 3 feet.

PART 3 EXECUTION

3.1 INSTALLATION OF SILT FENCES

Extend silt fences a minimum of 16 inches above the ground surface without exceeding 34 inches above the ground surface. Provide filter fabric from a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are unavoidable, splice together filter fabric at a support post, with a minimum 6 inch overlap, and securely sealed. Excavate trench approximately 4 inches wide and 4 inches deep on the upslope side of the location of the silt fence. The 4 by 4 inch trench shall be backfilled and the soil compacted over the filter fabric. Remove silt fences upon approval by the Contracting Officer.

3.2 INSTALLATION OF STRAW BALES

Place the straw bales in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another. Install straw bales so that bindings are oriented around the sides rather than along the tops and bottoms of the bales in order to prevent deterioration of the bindings. Entrench and backfill the barrier. Excavate a trench the width of a bale and the length of the proposed barrier to a minimum depth of 4 inches. After the bales are staked and chinked (gaps filled by wedging with straw), backfill the excavated soil against the barrier. Conform the backfill soil with the ground level on the downhill side and build up to 4 inches against the uphill side of the barrier. Scatter loose straw over the area immediately uphill from a straw bale barrier to increase barrier efficiency. Securely anchor each bale by at least two stakes driven through the bale. Drive the first stake or steel post in each bale toward the previously laid bale to force the bales together. Drive stakes or steel pickets a minimum 18 inches deep into the ground to securely anchor the bales.

3.3 FIELD QUALITY CONTROL

Maintain the temporary and permanent vegetation, erosion and sediment control measures, and other protective measures in good and effective operating condition by performing routine inspections to determine condition and effectiveness, by restoration of destroyed vegetative cover, and by repair of erosion and sediment control measures and other protective measures. Use the following procedures to maintain the protective measures.

3.3.1 Silt Fence Maintenance

Inspect the silt fences in accordance with paragraph, titled "Inspections," of this section. Any required repairs shall be made promptly. Pay close attention to the repair of damaged silt fence resulting from end runs and undercutting. Should the fabric on a silt fence decompose or become ineffective, and the barrier is still necessary, replace the fabric promptly. Remove sediment deposits when deposits reach one-third of the height of the barrier. Remove a silt fence when it is no longer required. The immediate area occupied by the fence and any sediment deposits shall be shaped to an acceptable grade. The areas disturbed by this shaping shall receive erosion control .

3.3.2 Straw Bale Maintenance

Inspect straw bale barriers in accordance with paragraph, titled "Inspections". Pay close attention to the repair of damaged bales, end runs and undercutting beneath bales. Accomplish necessary repairs to barriers or replacement of bales in a promptly manner. Remove sediment deposits when deposits reach one-half of the height of the barrier. At the each end of each row turn bales uphill when used to retain sediment. Remove a straw bale barrier when it is no longer required. The immediate area occupied by the bales and any sediment deposits shall be shaped to an acceptable grade. Seed the areas disturbed by this shaping in accordance with Section 32 92 19 SEEDING.

3.3.3 Diversion Dike Maintenance

Inspect diversion dikes in accordance with paragraph, titled "Inspections," of this section. Pay close attention to the repair of damaged diversion dikes and accomplish necessary repairs promptly. When diversion dikes are no longer required, shape to an acceptable grade. Seed the areas disturbed by this shaping in accordance with Section 32 92 19 SEEDING.

3.4 MAINTENANCE, MONITORING AND INSPECTIONS

3.4.1 General

The Contracting Officer will notify the Contractor in writing of any observed noncompliance with the Federal, State or local laws or regulations, permits, and other elements of the SWPPP. Upon receipt of this notice, inform the Contracting Officer of proposed corrective actions and take such action when approved. If the Contractor fails to begin correcting deficiencies within 24 hours of the Contracting Officer's notification, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions will be granted or costs or damages allowed for any such suspensions.

Initiate stabilization practices no more than 14 days where construction

activities have ceased, in any portion of the site. It is prohibited to keep construction activities active to prevent start of stabilization. In areas requiring seeding, seed all grasses at the earliest available time after completion of final grade and complete by the interim and final completion dates listed elsewhere in the contract. No variance to the start date will be allowed unless given in writing by the Contracting Officer.

Implement good site management (i.e., "housekeeping") measures that could potentially be a threat to water quality if discharged. These measures include, but are not limited to: construction materials, waste management, vehicle storage and maintenance, landscape materials, potential pollutant sources, and air deposition of site materials and from site operations. The discharge of any debris (litter, rubble, discarded refuse, and remains of destroyed inorganic anthropogenic waste) is prohibited. Document all housekeeping BMPs in the SWPPP in accordance with the nature and phase of the construction project.

Provide 100% soil cover for inactive areas and all finished slopes, open spaces, utility backfill, and completed lots to eliminate sediment transportation. Inactive areas of construction are areas of construction activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days. Inactive areas must not be deliberately kept active for the sole purpose of avoiding stabilization requirements. Use sustainable and environmentally friendly materials; use plastic material only where deemed necessary and approved by the Contracting Officer. Cover waste disposal containers at the end of every business day and during rain events.

Establish and maintain effective perimeter controls. Implement appropriate erosion control BMPs (runoff control and soil stabilization) in conjunction with sediment control BMPs for areas under active construction. Active areas of construction are areas undergoing land surface disturbance.

Ensure that all storm drain inlets and perimeter controls, runoff control BMPs, and pollutant controls at entrances and exits (e.g. tire wash off locations) are maintained and protected from activities that reduce their effectiveness. The CSWRCB will require the Contractor to conduct all required sampling, inspections, and reports as well as implement additional site specific sediment control requirements if the implementation of the requirements in this section is not adequately protecting the receiving waters. Inspect all immediate access roads daily, remove sediment or other construction activity related materials deposited on the roads immediately by vacuuming or sweeping.

Inspect disturbed areas of the construction site, areas that have not been finally stabilized used for storage of materials exposed to precipitation, stabilization practices, structural practices, other controls, and area where vehicles exit the site at the frequencies detailed in the Utah Construction General Permit UCGP UTRC00000

3.4.2 SWPPP And Amendments

The Contractor is responsible for complete, year-round, implementation and modification of the SWPPP throughout the duration of this contract. The SWPPP must remain onsite and available until the Contractor is released specifically from the storm water management responsibilities.

An accurate copy of the SWPPP must be available onsite during working hours

while construction is occurring and must be made available upon request by USACE, or Municipal inspectors. When the original SWPPP is retained by a crew member in a construction vehicle and is not currently at the construction site, current copies of the BMPs and map/drawing will be left with the field crew and the original SWPPP must be available via a request by radio/telephone.

The SWPPP is to be considered a "living" document, and amended as often as needed . SWPPP Amendmenst include, but are not limited to: inspection and maintenance sheets, BMP design changes/updates, exceedance reports, sampling reports, Change of Informations (COIs), and any change of authorization. Submit SWPPP Amendments often as needed to ensure the SWPPP reflects current site conditions in electronic PDF form. Provide updated project schedules as SWPPP Amendment submittals as often as available. The SWPPP must be continuously updated to include all amendments.

Submit the Final SWPPP upon completion of all construction activities. The final SWPPP must provide the records of all storm water monitoring information throughout the life of the project. It must include all amendments, inspection and maintenance sheets, BMP design changes and updates, exceedance reports, sampling reports, annual reports and any change of authorization.

3.4.3 Inspections Details

Inspect disturbed areas for evidence of, or the potential for, pollutants entering the drainage system. Observe erosion and sediment control measures identified in the Storm Water Pollution Prevention Plan to ensure that they are operating correctly. Inspect discharge locations or points to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Inspect locations where vehicles exit the site for evidence of offsite sediment tracking.

3.4.4 Inspection Reports

For each inspection conducted, prepare a report summarizing the scope of the inspection, name(s) and qualifications of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the Storm Water Pollution Prevention Plan, maintenance performed, and actions taken. Furnish the report to the Contracting Officer within 24 hours of the inspection as a part of the Contractor's daily CQC REPORT. A copy of the inspection report shall be maintained on the job site.

3.5 Low Impact Development

Projects disturbing one or more acres must incorporate best management practices (BMPs) for long-term storm water management. The use of Low Impact Development (LID) methods must be evaluated. If an LID approach cannot be utilized, documentation must be provided to the CEG/CEIE office with an explanation as to why LID methods cannot be implemented and rationale for the chosen alternative controls. This documentation must be adequate to address State Permit requirements.

Projects with a footprint of greater than 5,000 square feet shall be designed such that predevelopment hydrology is maintained (i.e. no net increase in storm water runoff) per the Energy Independence and Security Act, Section 438. Best Management Practices engineered to accomplish this

requirement must be documented, including selection criteria and design calculations. Design calculation will incorporate data from the rain gauge located on base (NOAA Atlas 14, Volume 1, Version 5, Location name: Hill AFB, Utah, US) Documentation must be returned to the 75 CEG/CEIE offices for record keeping and regulatory agency All projects must be designed to contain the 90% storm on site in accordance with the Municipal Separate Storm Sewer System permit requirements of the State of Utah. In addition, any new flood management control must be assessed for water quality impacts, and include consideration of controls that can be used to minimize the impacts to site water quality and hydrology.

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SECTION 01 74 19

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT
01/07

PART 1 GENERAL

1.1 GOVERNMENT POLICY

Government policy is to apply sound environmental principles in the design, construction and use of facilities. As part of the implementation of that policy: (1) practice efficient waste management when sizing, cutting, and installing products and materials and (2) use all reasonable means to divert construction and demolition waste from landfills and incinerators and to facilitate their recycling or reuse. Divert a minimum of 60 percent by weight of total project solid waste from the landfill.

1.2 MANAGEMENT

Develop and implement a waste management program. Take a pro-active, responsible role in the management of construction and demolition waste and require all subcontractors, vendors, and suppliers to participate in the effort. Construction and demolition waste includes products of demolition or removal, excess or unusable construction materials, packaging materials for construction products, and other materials generated during the construction process but not incorporated into the work. In the management of waste, consider the availability of viable markets, the condition of the material, the ability to provide the material in suitable condition and in a quantity acceptable to available markets, and time constraints imposed by internal project completion mandates. Implement any special programs involving rebates or similar incentives related to recycling of waste. Revenues or other savings obtained for salvage, or recycling accrue to the Contractor. Appropriately permit firms and facilities used for recycling, reuse, and disposal for the intended use to the extent required by federal, state, and local regulations. Also, provide on-site instruction of appropriate separation, handling, recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Waste Management Plan; G;

SD-11 Closeout Submittals

Records;

1.4 MEETINGS

Conduct Construction Waste Management meetings. After award of the

Contract and prior to commencement of work, schedule and conduct a meeting with the Contracting Officer to discuss the proposed Waste Management Plan and to develop a mutual understanding relative to the details of waste management. The requirements for this meeting may be fulfilled during the coordination and mutual understanding meeting outlined in Section 01 45 00 QUALITY CONTROL. At a minimum, discuss environmental and waste management goals and issues at the following additional meetings:

a. Pre-bid meeting.

b. Preconstruction meeting.

c. Regular QC meetings.

d. Work safety meetings.

1.5 WASTE MANAGEMENT PLAN

Submit a waste management plan within 15 days after notice to proceed and not less than 10 days before the preconstruction meeting. The plan demonstrates how to meet the the project waste diversion goal. Also, include the following in the plan:

a. Name of individuals on the Contractor's staff responsible for waste prevention and management.

b. Actions that will be taken to reduce solid waste generation, including coordination with subcontractors to ensure awareness and participation.

c. Description of the regular meetings to be held to address waste management.

d. Description of the specific approaches to be used in recycling/reuse of the various materials generated, including the areas on site and equipment to be used for processing, sorting, and temporary storage of wastes.

e. Characterization, including estimated types and quantities, of the waste to be generated.

f. Name of landfill and/or incinerator to be used and the estimated costs for use, assuming that there would be no salvage or recycling on the project.

g. Identification of local and regional reuse programs, including non-profit organizations such as schools, local housing agencies, and organizations that accept used materials such as materials exchange networks and Habitat for Humanity. Include the name, location, and phone number for each reuse facility to be used, and provide a copy of the permit or license for each facility.

h. List of specific waste materials that will be salvaged for resale, salvaged and reused on the current project, salvaged and stored for reuse on a future project, or recycled. Identify the recycling facilities by name, location, and phone number, including a copy of the permit or license for each facility.

i. Identification of materials that cannot be recycled/reused with an explanation or justification, to be approved by the Contracting Officer.

j. Description of the means by which any waste materials identified in item (h) above will be protected from contamination.

k. Description of the means of transportation of the recyclable materials (whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site).

l. Anticipated net cost savings determined by subtracting Contractor program management costs and the cost of disposal from the revenue generated by sale of the materials and the incineration and/or landfill cost avoidance.

Revise and resubmit Plan as required by the Contracting Officer. Approval of Contractor's Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations or meeting project cumulative waste diversion requirement. Distribute copies of the Waste Management Plan to each subcontractor, the Quality Control Manager, and the Contracting Officer.

1.6 RECORDS

Maintain records to document the quantity of waste generated; the quantity of waste diverted through sale, reuse, or recycling; and the quantity of waste disposed by landfill or incineration. Make the records available to the Contracting Officer during construction, and a copy of the records.

1.7 REPORTS

Provide quarterly reports and a final report. Include project name, information for waste generated this quarter, and cumulative totals for the project in quarterly and final reports. Also include in each report, supporting documentation to include manifests, weight tickets, receipts, and invoices specifically identifying the project and waste material. Include timber harvest and demolition information, if any.

1.8 COLLECTION

Separate, store, protect, and handle at the site identified recyclable and salvageable waste products in a manner that maximizes recyclability and salvagability of identified materials. Provide the necessary containers, bins and storage areas to facilitate effective waste management and clearly and appropriately identify them. Provide materials for barriers and enclosures around recyclable material storage areas which are nonhazardous and recyclable or reusable. Locate out of the way of construction traffic. Provide adequate space for pick-up and delivery and convenience to subcontractors. Recycling and waste bin areas are to be kept neat and clean, and handle recyclable materials to prevent contamination of materials from incompatible products and materials. Clean contaminated materials prior to placing in collection containers. Use cleaning materials that are nonhazardous and biodegradable. Handle hazardous waste and hazardous materials in accordance with applicable regulations and coordinate with Section 01 57 20 ENVIRONMENTAL PROTECTION. Separate materials by one of the following methods:

1.8.1 Source Separated Method.

Separate waste products and materials that are recyclable from trash and

sorted as described below into appropriately marked separate containers and then transported to the respective recycling facility for further processing. Deliver materials in accordance with recycling or reuse facility requirements (e.g., free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process). Separate materials into the following category types as appropriate to the project waste and to the available recycling and reuse programs in the project area:

a. Land clearing debris.

b. Asphalt.

c. Concrete and masonry.

d. Metal (e.g. banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized, stainless steel, aluminum, copper, zinc, lead brass, bronze).

(1) Ferrous.

(2) Non-ferrous.

e. Wood (nails and staples allowed).

f. Debris.

g. Glass (colored glass allowed).

h. Paper.

(1) Bond.

(2) Newsprint.

(3) Cardboard and paper packaging materials.

i. Plastic.

Type	
1	Polyethylene Terephthalate (PET, PETE)
2	High Density Polyethylene (HDPE)
3	Vinyl (Polyvinyl Chloride or PVC)
4	Low Density Polyethylene (LDPE)
5	Polypropylene (PP)
6	Polystyrene (PS)
7	Other. Use of this code indicates that the package in question is made with a resin other than the six listed above, or is made of more than one resin listed above, and used in a multi-layer combination.

j. Gypsum.

k. Non-hazardous paint and paint cans.

l. Carpet.

m. Ceiling tiles.

n. Insulation.

o. Beverage containers.

1.8.2 Co-Mingled Method.

Place waste products and recyclable materials into a single container and then transport to a recycling facility where the recyclable materials are sorted and processed.

1.8.3 Other Methods.

Other proposed methods may be used when approved by the Contracting Officer.

1.9 DISPOSAL

Control accumulation of waste materials and trash. Recycle or dispose of collected materials off-site at intervals approved by the Contracting Officer and in compliance with waste management procedures. Except as otherwise specified in other sections of the specifications, dispose of in accordance with the following:

1.9.1 Reuse.

Give first consideration to salvage for reuse since little or no re-processing is necessary for this method, and less pollution is created when items are reused in their original form. Coordinate reuse with the Contracting Officer. Consider sale or donation of waste suitable for reuse.

1.9.2 Recycle.

Recycle waste materials not suitable for reuse, but having value as being recyclable. Recycle all fluorescent lamps, HID lamps, and mercury-containing thermostats removed from the site. Arrange for timely pickups from the site or deliveries to recycling facilities in order to prevent contamination of recyclable materials.

1.9.3 Waste.

Dispose of materials with no practical use or economic benefit to waste-to-energy plants where available. As the last choice, dispose of materials at a landfill or incinerator.

1.9.4 Return

Set aside and protect misdelivered and substandard products and materials and return to supplier for credit.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used. -- End of Section --

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draft DD FORM 1354

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SECTION 01 78 00

CLOSEOUT SUBMITTALS
08/14

PART 1 GENERAL

1.1 PAYMENT

No separate payment will be made for record drawings required under this contract, and all costs accrued in connection with such drawings are considered a subsidiary obligation of the Contractor.

1.2 REFERENCES

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

U.S. ARMY CORPS OF ENGINEERS (USACE)

ERDC/ITL TR-12-1	(2015) A/E/C Graphics Standard, Release 2.0
ERDC/ITL TR-12-6	(2015) A/E/C CAD Standard - Release 6.0

U.S. DEPARTMENT OF DEFENSE (DOD)

DD FORM 1354	(2013) TRANSFER AND ACCEPTANCE OF DoD REAL PROPERTY
UFC 1-300-08	(2009, with Change 2) Criteria for Transfer and Acceptance of DoD Real Property

1.3 DEFINITIONS

1.3.1 Markup Drawings

Drawings that are marked and annotated, also known as redlined, to show the project As-Built or As-Constructed condition. They are part of the working as-built set.

1.3.2 As-Built Drawings

The revised as-designed drawings that show the project as it was built and constructed, primarily buildings and vertical structures. The revisions from Markup Drawings and field inspection notes are transferred to the Final as-built drawings. The final as-built drawings include Revisions during construction, field requested changes, shop drawing Revisions, and contractor designs.

1.3.3 As-Constructed Drawings

The revised as-designed drawings that show the project as it was constructed, primarily Civil Works Projects covering large areas, including flood control, roads, parking lots, and recreational areas. The term

As-Built used in these instructions is synonymous.

1.3.4 Working As-Built Drawings

Two sets of paper drawings and specifications (markup) to track changes, additions or deletions from the as-designed drawings during construction. Update working as-built drawings on a weekly basis and keep at least one paper set available on the jobsite at all times.

1.3.5 Record Drawings

The final PDF record drawings are the PDF files produced from the revised electronic Computer Aided Design and Drafting (CADD) ANSI D size drawing files in the specified format, showing the revisions of the approved Working As-Built Record Drawings. All hard copy prints of the final as-built record drawings must be produced from the PDF record drawings files.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Warranty Management Plan
Warranty Tags
Spare Parts Data

SD-06 Test Reports

working as-built markup drawings; G
final as-built record drawings; G, DO

SD-08 Manufacturer's Instructions

Preventative Maintenance
Condition Monitoring (Predictive Testing)
Inspection
Posted Instructions

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals

SD-11 Closeout Submittals

As-Built Record of Equipment and Materials
Record Drawings; G, DO
Certification of EPA Designated Items; G
Interim DD FORM 1354; G
Checklist for DD FORM 1354; G
Equipment-In-Place List
classroom and field instructions
Preventative Maintenance
Final Approved Shop Drawings

1.5 SPARE PARTS DATA

Submit two copies of the Spare Parts Data list.

a. Indicate manufacturer's name, part number, nomenclature, and stock level required for maintenance and repair. List those items that may be standard to the normal maintenance of the system.

b. Supply two items of each part for spare parts inventory. Provision of spare parts does not relieve the Contractor of responsibilities listed under the contract guarantee provisions.

1.6 QUALITY CONTROL

Only employ personnel proficient in the preparation of CADD drawings to modify the contract drawings or prepare additional new drawings. Additions and corrections to the contract drawings must be equal in quality and detail to that of the originals. Line colors, line weights, lettering, layering conventions, and symbols must be the same as the original line colors, line weights, lettering, layering conventions, and symbols.

1.7 WARRANTY MANAGEMENT

1.7.1 Warranty Management Plan

Develop a warranty management plan which contains information relevant to the clause Warranty of Construction. At least 30 days before the planned pre-warranty conference, submit one set of the warranty management plan. Include within the warranty management plan all required actions and documents to assure that the Government receives all warranties to which it is entitled. The plan must be in narrative form and contain sufficient detail to render it suitable for use by future maintenance and repair personnel, whether tradesmen, or of engineering background, not necessarily familiar with this contract. The term "status" as indicated below must include due date and whether item has been submitted or was accomplished. Warranty information made available during the construction phase must be submitted to the Contracting Officer for approval prior to each monthly pay estimate. Assemble approved information in a binder and turn over to the Government upon acceptance of the work. The construction warranty period will begin on the date of project acceptance and continue for the full product warranty period. A joint 4 month and 9 month warranty inspection will be conducted, measured from time of acceptance, by the Contractor, Contracting Officer and the Customer Representative. Include within the warranty management plan , but not limited to, the following:

a. Roles and responsibilities of all personnel associated with the warranty process, including points of contact and telephone numbers within the organizations of the Contractors, subContractors, manufacturers or suppliers involved.

b. Furnish with each warranty the name, address, and telephone number of each of the guarantor's representatives nearest to the project location.

c. Listing and status of delivery of all Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, pumps, motors, transformers, and for all commissioned systems such as fire protection and alarm systems, sprinkler systems, lightning protection

systems, etc.

d. A list for each warranted equipment, item, feature of construction or system indicating:

(1) Name of item.
(2) Model and serial numbers.
(3) Location where installed.
(4) Name and phone numbers of manufacturers or suppliers.
(5) Names, addresses and telephone numbers of sources of spare parts.
(6) Warranties and terms of warranty. Include one-year overall warranty of construction, including the starting date of warranty of construction. Items which have extended warranties must be indicated with separate warranty expiration dates.
(7) Cross-reference to warranty certificates as applicable.
(8) Starting point and duration of warranty period.
(9) Summary of maintenance procedures required to continue the warranty in force.
(10) Cross-reference to specific pertinent Operation and Maintenance manuals.
(11) Organization, names and phone numbers of persons to call for warranty service.
(12) Typical response time and repair time expected for various warranted equipment.

e. The Contractor's plans for attendance at the 4 and 9 month post-construction warranty inspections conducted by the Government.

f. Procedure and status of tagging of all equipment covered by extended warranties.

g. Copies of instructions to be posted near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

1.7.2 Performance Bond

The Contractor's Performance Bond must remain effective throughout the construction period .

a. In the event the Contractor fails to commence and diligently pursue any construction warranty work required, the Contracting Officer will have the work performed by others, and after completion of the work, will charge the remaining construction warranty funds of expenses incurred by the Government while performing the work, including, but not limited to administrative expenses.

b. In the event sufficient funds are not available to cover the construction warranty work performed by the Government at the Contractor's expense, the Contracting Officer will have the right to recoup expenses from the bonding company.

c. Following oral or written notification of required construction warranty repair work, respond in a timely manner. Written verification will follow oral instructions. Failure of the Contractor to respond will be cause for the Contracting Officer to proceed against the Contractor.

1.7.3 Pre-Warranty Conference

Prior to contract completion, and at a time designated by the Contracting Officer, meet with the Contracting Officer to develop a mutual understanding with respect to the requirements of this section. Communication procedures for Contractor notification of construction warranty defects, priorities with respect to the type of defect, reasonable time required for Contractor response, and other details deemed necessary by the Contracting Officer for the execution of the construction warranty will be established/reviewed at this meeting. In connection with these requirements and at the time of the Contractor's quality control completion inspection, furnish the name, telephone number and address of a licensed and bonded company which is authorized to initiate and pursue construction warranty work action on behalf of the Contractor. This point of contact will be located within the local service area of the warranted construction, be continuously available, and be responsive to Government inquiry on warranty work action and status. This requirement does not relieve the Contractor of any of its responsibilities in connection with other portions of this provision.

1.7.4 Contractor's Response to Construction Warranty Service Requirements

Following oral or written notification by the Contracting Officer, respond to construction warranty service requirements in accordance with the "Construction Warranty Service Priority List" and the three categories of priorities listed below. Submit a report on any warranty item that has been repaired during the warranty period. Include within the report the cause of the problem, date reported, corrective action taken, and when the repair was completed. If the Contractor does not perform the construction warranty within the timeframes specified, the Government will perform the work and backcharge the construction warranty payment item established.

a. First Priority Code 1. Perform onsite inspection to evaluate situation, and determine course of action within 4 hours, initiate work within 6 hours and work continuously to completion or relief.

b. Second Priority Code 2. Perform onsite inspection to evaluate situation, and determine course of action within 8 hours, initiate work within 24 hours and work continuously to completion or relief.

c. Third Priority Code 3. All other work to be initiated within 3 work days and work continuously to completion or relief.

d. The "Construction Warranty Service Priority List" is as follows:

Code 1-Life Safety Systems
(1) Fire suppression systems.
(2) Fire alarm system(s) in place in the building.

Code 1-Air Conditioning Systems
(1) Recreational support.
(2) Air conditioning leak in part of building, if causing damage.
(3) Air conditioning system not cooling properly.

Code 1-Doors
(1) Overhead doors not operational, causing a security, fire, or safety problem.
(2) Interior, exterior personnel doors or hardware, not functioning properly, causing a security, fire, or safety problem.

Code 3-Doors
(1) Overhead doors not operational.
(2) Interior/exterior personnel doors or hardware not functioning properly.

Code 1-Electrical
(1) Power failure (entire area or any building operational after 1600 hours).
(2) Security lights
(3) Smoke detectors

Code 2-Electrical
(1) Power failure (no power to a room or part of building).
(2) Receptacle and lights (in a room or part of building).

Code 3-Electrical
Street lights.

Code 1-Gas
(1) Leaks and breaks.
(2) No gas to family housing unit or cantonment area.

Code 1-Heat
(1) Area power failure affecting heat.
(2) Heater in unit not working.

Code 2-Kitchen Equipment
(1) Dishwasher not operating properly.
(2) All other equipment hampering preparation of a meal.

Code 1-Plumbing
(1) Hot water heater failure.
(2) Leaking water supply pipes.

Code 2-Plumbing
(1) Flush valves not operating properly.
(2) Fixture drain, supply line to commode, or any water pipe leaking.
(3) Commode leaking at base.

Code 3 -Plumbing
Leaky faucets.

Code 3-Interior
(1) Floors damaged.
(2) Paint chipping or peeling.
(3) Casework.

Code 1-Roof Leaks
Temporary repairs will be made where major damage to property is occurring.

Code 2-Roof Leaks
Where major damage to property is not occurring, check for location of leak during rain and complete repairs on a Code 2 basis.

Code 2-Water (Exterior)
No water to facility.

Code 2-Water (Hot)
No hot water in portion of building listed.

Code 3-All other work not listed above.

1.7.5 Warranty Tags

At the time of installation, tag each warranted item with a durable, oil and water resistant tag approved by the Contracting Officer. Attach each tag with a copper wire and spray with a silicone waterproof coating. Also, submit two record copies of the warranty tags showing the layout and design. The date of acceptance and the QC signature must remain blank until the project is accepted for beneficial occupancy. Show the following information on the tag.

Type of product/material	
Model number	
Serial number	
Contract number	
Warranty period from/to	
Inspector's signature	
Construction Contractor	
Address	
Telephone number	
Warranty contact	
Address	
Telephone number	
Warranty response time priority code	
WARNING - PROJECT PERSONNEL TO PERFORM ONLY OPERATIONAL MAINTENANCE DURING THE WARRANTY PERIOD.	

PART 2 PRODUCTS

2.1 GOVERNMENT FURNISHED MATERIALS

The Government will provide an optical disk at the preconstruction conference that contains the following:

a. One set of "as-designed" electronic CADD files in the specified software and format revised to reflect all amendments to enable preparation of as-built/as-constructed drawings.

b. A submittal register data file in comma separated value (CSV) format for import into the Resident Management System (RMS).

2.2 SYSTEM DESCRIPTION

Prepare the CADD drawing files in AutoCAD Release 2013 format compatible with a Windows 7 operating system.

2.2.1 Additional Drawings

If additional drawings are required, prepare them using the specified electronic file format applying ERDC/ITL TR-12-6 and ERDC/ITL TR-12-1. The title block and drawing border to be used for any new final record drawings must be identical to that used on the contract drawings.

2.2.1.1 Sheet Numbers

If a sheet needs to be added between two sequential sheets, append a Supplemental Drawing Designator (i.e. W91238-15-C-10A-102A.DWG, W91238-15-C-10A-102B.DWG) to the end of the prior sheet file name.

2.3 CERTIFICATION OF EPA DESIGNATED ITEMS

Submit the Certification of EPA Designated Items as required by FAR 52.223-9, "Certification and Estimate of Percentage of Recovered Material Content for EPA Designated Items". Include on the certification form the following information: project name, project number, Contractor name, license number, Contractor address, and certification. The certification will read as follows and be signed and dated by the Contractor. "I hereby certify the information provided herein is accurate and that the requisition/procurement of all materials listed on this form comply with current EPA standards for recycled/recovered materials content. The following exemptions may apply to the non-procurement of recycled/recovered content materials:

1) The product does not meet appropriate performance standards;
2) The product is not available within a reasonable time frame;
3) The product is not available competitively (from two or more sources);
4) The product is only available at an unreasonable price (compared with a comparable non-recycled content product)."

Record each product used in the project that has a requirement or option of containing recycled or biobased content, noting total price, total value of post-industrial recycled content, total value of post-consumer recycled content, total value of biobased content, exemptions (1, 2, 3, or 4, as indicated), and comments. Recycled and biobased content values may be determined by weight or volume percent, but must be consistent throughout.

2.4 EQUIPMENT

2.4.1 As-Built Record of Equipment and Materials

Furnish one copy of preliminary record of equipment and materials used on the project 15 days prior to final inspection. This preliminary submittal will be reviewed and returned 2 days after final inspection with Government comments. Submit Two sets of final record of equipment and materials 10 days after final inspection. Key the designations to the related area depicted on the contract drawings. List the following data:

RECORD OF DESIGNATED EQUIPMENT AND MATERIALS DATA				
Description	Specification Section	Manufacturer and Catalog, Model, and Serial Number	Composition and Size	Where Used

2.4.2 Real Property Equipment

Submit a list of installed equipment furnished under this contract. Include all information usually listed on manufacturer's name plate. In the Equipment-In-Place List include, as applicable, the following for each piece of equipment installed: description of item, location (by room number), model number, serial number, capacity, name and address of manufacturer, name and address of equipment supplier, condition, spare parts list, manufacturer's catalog, and warranty. Submit a draft list at time of transfer. Submit the final list 30 days after transfer of the completed facility.

PART 3 EXECUTION

3.1 WORKING AS-BUILT DRAWINGS

3.1.1 Markup Guidelines

Markup black line prints of the PDF contract drawings. Make comments and markup the drawing complete without reference to letters, memos, or materials that are not part of the As-Built drawing. Show what was changed, how it was changed, where items(s) were relocated and change related details. These working as-built markup prints must be neat, legible and accurate as follows:

a. Use "base" colors of red, green, and blue. Color code for changes as follows:

(1) Special (Blue) - Items requiring special information, coordination, or special detailing or detailing notes.

(2) Deletions (Red) - Over-strike deleted graphic items (lines), lettering in notes and leaders.

(3) Additions (Green) - Added items, lettering in notes and leaders.

b. Provide a legend if colors other than the "base" colors of red, green, and blue are used.

c. Add and denote any additional equipment or material facilities, service lines, etc., incorporated under As-Built Revisions if not already shown in legend.

d. Use frequent written explanations on markup drawings to describe changes. Do not totally rely on graphic means to convey the revision.

e. Use legible lettering and precise and clear digital values when marking prints. Clarify ambiguities concerning the nature and application of change involved.

f. Wherever a revision is made, also make changes to related section views, details, legend, profiles, plans and elevation views, schedules, notes and call out designations, and mark accordingly to avoid conflicting data on all other sheets.

g. For deletions, cross out all features, data and captions that relate to that revision.

h. For changes on small-scale drawings and in restricted areas, provide large-scale inserts, with leaders to the applicable location.

i. Indicate one of the following when attaching a print or sketch to a markup print:

1) Add an entire drawing to contract drawings

2) Change the contract drawing to show

3) Provided for reference only to further detail the initial design.

j. Incorporate all shop and fabrication drawings into the markup drawings.

3.1.2 Working As-Built Record Drawings

Revise Working As-Built Record Drawings in accordance with ERDC/ITL TR-12-1 and ERDC/ITL TR-12-6. Provide 2 sets of paper drawings by red-line process to show the as-built conditions during the prosecution of the project. Keep these working as-built marked drawings current on a weekly basis and at least one set available on the jobsite at all times. Changes from the contract plans which are made in the work or additional information which might be uncovered in the course of construction must be accurately and neatly recorded as they occur by means of details and notes. Submit the working as-built markup drawings for approval prior to submission of each monthly pay estimate. For failure to maintain the working and final record drawings as specified herein, the Contracting Officer will withhold 10 percent of the monthly progress payment until approval of updated drawings. Show on the working and final as-built record drawings, but not limited to, the following information:

a. The actual location, kinds and sizes of all sub-surface utility lines. In order that the location of these lines and appurtenances may be determined in the event the surface openings or indicators become covered over or obscured, show by offset dimensions to two permanently fixed surface features the end of each run including each change in direction on the record drawings. Locate valves, splice boxes and similar appurtenances by dimensioning along the utility run from a reference point. Also record the average depth below the surface of each run.

b. The location and dimensions of any changes within the building structure.

c. Layout and schematic drawings of electrical circuits and piping.

d. Correct grade, elevations, cross section, or alignment of roads, earthwork, structures or utilities if any changes were made from contract plans.

e. Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor; including but not limited to shop drawings, fabrication, erection, installation plans and placing details, pipe sizes, insulation material, dimensions of equipment foundations, etc.

f. The topography, invert elevations and grades of drainage installed or affected as part of the project construction.

g. Changes or Revisions which result from the final inspection.

h. Where contract drawings or specifications present options, show only the option selected for construction on the final as-built prints.

i. If borrow material for this project is from sources on Government property, or if Government property is used as a spoil area, furnish a contour map of the final borrow pit/spoil area elevations.

j. Systems designed or enhanced by the Contractor, such as HVAC controls, fire alarm, fire sprinkler, and irrigation systems.

k. Changes in location of equipment and architectural features.

l. Actual location of anchors, construction and control joints, etc., in concrete.

m. Unusual or uncharted obstructions that are encountered in the contract work area during construction.

n. Location, extent, thickness, and size of stone protection particularly where it will be normally submerged by water.

3.2 FINAL AS-BUILT RECORD DRAWING PREPARATION

Prepare final as-built record drawings after the completion of each definable feature of work as listed in the Contractor Quality Control Plan (Foundations, Utilities, Structural Steel, etc., as appropriate for the project). Transfer the changes from the approved working as-built marked prints to the original electronic CADD files. Modify the final as-built record drawings to correctly show the features of the project as constructed by bringing the contract set into agreement with approved working as-built prints, and adding such additional drawings as may be necessary. Refer to ERDC/ITL TR-12-1 Chapter 11 Drawing Revisions. Jointly review the working as-built marked prints with printouts from final as-built CADD file drawings for accuracy and completeness. Monthly review of working as-built CADD printouts must cover all sheets revised since the previous review. These drawings are part of the permanent records of this project. Any drawings damaged or lost must be satisfactorily replaced at no expense to the Government.

a. Drawing revisions (include within change order price the cost to change working and final record drawings to reflect revisions) and compliance with the following procedures.

(1) Follow directions in the revision for posting descriptive changes.

(2) The revision delta size must be 5/16 inch diameter unless the area where the delta is to be placed is crowded. Use a smaller size delta for crowded areas.

(3) Place a revision delta at the location of each deletion.

(4) For new details or sections which are added to a drawing, place a revision delta by the detail or section title.

(5) For minor changes, place a revision delta by the area changed on the drawing (each location).

(6) For major changes to a drawing, place a revision delta by the title of the affected plan, section, or detail at each location.

(7) For changes to schedules or drawings, place a revision delta either by the schedule heading or by the change in the schedule.

3.3 Autodesk Revit 2013

Accomplish additions and corrections to the BIM file. Prepare contract record drawings using the specified electronic file format applying ERDC/ITL TR-12-6 and ERDC/ITL TR-12-1. The title block and drawing border to be used for any new final record drawings must be identical to that used on the contract drawings. Provide all program files and hardware necessary to prepare final record drawings. The Contracting Officer will review final record drawings for accuracy and return them to the Contractor for required corrections, changes, additions, and deletions.

3.4 COMPUTER AIDED DESIGN AND DRAFTING (CADD) DRAWINGS

If additional drawings are required, prepare them using the specified electronic file format applying ERDC/ITL TR-12-6 and ERDC/ITL TR-12-1. The title block and drawing border to be used for any new final record drawings must be identical to that used on the contract drawings. Accomplish additions and corrections to the contract drawings using CADD files. Provide all program files and hardware necessary to prepare final record drawings. The Contracting Officer will review final record drawings for accuracy and return them to the Contractor for required corrections, changes, additions, and deletions.

a. Rename the Contract Drawing files using the contract number as the Project Code field,(i.e., W91238-15-C-10A-102.DGN) as instructed in the Pre-Construction conference. Use only those renamed files for the Marked-up changes. Make all changes on the layer/level as the original item.

b. When final revisions have been completed, show the wording "RECORD DRAWINGS / AS-BUILT CONDITIONS" followed by the name of the Contractor in letters at least 3/16 inch high on the cover sheet drawing. Mark all other contract drawings either "Record" drawing denoting no revisions on the sheet or "Revised Record" denoting one or more revisions. Date revised record drawings in the revision block.

c. Within 20 days after Government approval of all of the working record drawings for a phase of work, prepare the final CADD record drawings for that phase of work and submit two sets of prints of these drawings for review and approval. The Government will promptly return one set

of prints annotated with any necessary corrections. Within 10 days revise the CADD files accordingly at no additional cost and submit one set of final prints for the completed phase of work to the Government. Within 20 days of substantial completion of all phases of work, submit the final record drawing package for the entire project. Submit two sets of prints, one set of electronic CADD files, and one set of the approved working record PDF files on an optical disk. The CADD files must be complete in all details and identical in form and function to the contract drawing files supplied by the Government. Prepare AutoCAD files for transmittal using e-Transmit. Make any transactions or adjustments necessary to accomplish this. The Government reserves the right to reject any drawing files it deems incompatible with the customer's CADD system. Paper prints, drawing files and storage media submitted will become the property of the Government upon final approval. Failure to submit final record PDF drawing files, CADD files and marked prints as specified will be cause for withholding any payment due under this contract. Approval and acceptance of final record drawings must be accomplished before final payment is made.

3.5 FINAL APPROVED SHOP DRAWINGS

Submit final approved project shop drawings 30 days after transfer of the completed facility.

3.6 CONSTRUCTION CONTRACT SPECIFICATIONS

Submit final PDF file as-built record construction contract specifications, including revisions thereto, 30 days after transfer of the completed facility.

3.7 COMMISSIONING

3.7.1 Building Commissioning

Complete all contract requirements for building commissioning prior to contract completion.

3.7.2 HVAC Commissioning

Fully complete all contract requirements of Section 23 08 00 COMMISSIONING OF HVAC SYSTEMS, including all testing concurrent with Building Commissioning. Additionally, fully complete all contract requirements of Section 23 05 93 TESTING, ADJUSTING AND BALANCING, including testing and inspection, prior to HVAC commissioning, except as noted otherwise in Section 23 05 93. Include the time required to complete all work and testing as prescribed by Sections 23 08 00 and in the allotted calendar days for completion.

3.8 OPERATION AND MAINTENANCE MANUALS

Submit one PDF file and 6 hard copies of the project operation and maintenance manuals 35 calendar days prior to testing the system involved. Update and resubmit data for final approval no later than 35 calendar days prior to contract completion.

3.8.1 Configuration

Operation and Maintenance Manuals must be consistent with the manufacturer's standard brochures, schematics, printed instructions,

general operating procedures, and safety precautions. Provide manufacturer's PDF files of above and bind information in manual format and grouped by technical sections. Organize data by separate index and tabbed sheets for vendor data and manuals. Test data must be legible and of good quality. Caution and warning indications must be clearly labeled. Hard copy pages must have 0.3937-inch holes and be bound in 3-ring, loose-leaf binders. Binder must lie flat with printed sheets that are easy to read.

3.8.2 Training and Instruction

Submit classroom and field instructions in the operation and maintenance of systems equipment where required by the technical provisions. These services must be directed by the Contractor, using the manufacturer's factory-trained personnel or qualified representatives. Contracting Officer will be given 7 calendar days written notice of scheduled instructional services. Instructional materials belonging to the manufacturer or vendor, such as lists, static exhibits, and visual aids, must be made available to the Contracting Officer.

3.9 CLEANUP

Leave premises "broom clean." Clean interior and exterior glass surfaces exposed to view; remove temporary labels, stains and foreign substances; polish transparent and glossy surfaces; vacuum carpeted and soft surfaces. Clean equipment and fixtures to a sanitary condition. Clean filters of operating equipment. Clean debris from roofs, gutters, downspouts and drainage systems. Sweep paved areas and rake clean landscaped areas. Remove waste and surplus materials, rubbish and construction facilities from the site.

3.10 PREVENTATIVE MAINTENANCE

Submit Preventative Maintenance, Condition Monitoring (Predictive Testing) and Inspection schedules with instructions that state when systems should be retested.

a. Define the anticipated length of each test, test apparatus, number of personnel identified by responsibility, and a testing validation procedure permitting the record operation capability requirements within the schedule. Provide a signoff blank for the Contractor and Contracting Officer for each test feature; e.g., gpm, rpm, psi. Include a remarks column for the testing validation procedure referencing operating limits of time, pressure, temperature, volume, voltage, current, acceleration, velocity, alignment, calibration, adjustments, cleaning, or special system notes. Delineate procedures for preventative maintenance, inspection, adjustment, lubrication and cleaning necessary to minimize corrective maintenance and repair.

b. Repair requirements must inform operators how to check out, troubleshoot, repair, and replace components of the system. Include electrical and mechanical schematics and diagrams and diagnostic techniques necessary to enable operation and troubleshooting of the system after acceptance.

3.11 REAL PROPERTY RECORD

Near the completion of Project, but a minimum of 60 days prior to final acceptance of the work, complete, update draft DD FORM 1354 attached to this section, and submit an accounting of all installed property with

Interim DD FORM 1354. Include any additional assets, improvements, and alterations from the Draft DD FORM 1354. Contact the Contracting Officer for any project specific information necessary to complete the DD FORM 1354. Refer to UFC 1-300-08 for instruction on completing the DD FORM 1354. For information purposes, a blank fillable PDF DD FORM 1354 may be obtained at the following:
http://www.dtic.mil/whs/directives/infomgt/forms/eforms/dd1354.pdf

Submit the completed Checklist for DD FORM 1354 of Installed Building Equipment items. Attach this list to the updated DD FORM 1354.

-- End of Section --

TRANSFER AND ACCEPTANCE OF MILITARY REAL PROPERTY

AUGUST 2002

PAGE OF PAGES

Public reporting burden for this collection of information is estimated to average 60 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to OMB, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. **FROM** (Installation/Activity/District and Zip Code)	2. **DATE FORM PREPARED** *(DD-MMM-YYYY)*	3. **PROJECT/JOB NUMBER**	4. **SERIAL NUMBER**
5. **TO** (Installation/Activity/Service, Zip Code and INSNO)	6. **SITE/INSNO**	7. **CONTRACT NUMBERS**	8. **DRAWING NUMBERS**

9. TRANSACTION DETAILS

A. ☐ New Const. ☐ Existing Fac. ☐ Capital Impr. ☐ Other *(Specify)*

B. ☐ Phys Com/Avail. ☐ BENF/O ☐ Partial BOD ☐ Financial Com ☐ Other *(Specify)*

C. ☐ Draft ☐ Interim ☐ Final

D. EFFECTIVE DATE *(DD-MMM-YYYY)*

10. ITEM NO	11. FACILITY NUMBER	12. CATEGORY CODE	13. *CATCODE* Description	14. Type	AREA 15. UNIT OF MEAS 1	AREA 16. TOTAL QUANTITY UM 1	OTHER 17. UNIT OF MEAS 2	OTHER 18. TOTAL QUANTITY UM 2	19. COST	20. FUND SOURCE	21. ITEM REMARKS

22. STATEMENT OF COMPLETION: The facilities listed hereon are in accordance with maps, drawings, and specifications and change orders approved by the authorized representative of the using agency except for the deficiencies listed on the reverse side.

TRANSFERRED BY *(Signature)*

DATE SIGNED

TITLE *(Area Engr./Base Engr./DPW)*

23. ACCEPTED BY *(Signature)*

DATE SIGNED

TITLE *(DPW/RPAO)*

24. PROPERTY VOUCHER NUMBER

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08/15

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SECTION 01 78 23

OPERATION AND MAINTENANCE DATA
08/15

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance with Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-10 Operation and Maintenance Data

O&M Database ; G

Training Plan; G

Training Outline; G

Training Content; G

SD-11 Closeout Submittals

Training Video Recording; G

Validation of Training Completion; G

1.2 OPERATION AND MAINTENANCE DATA

Submit Operation and Maintenance (O&M) Data for the provided equipment, product, or system, defining the importance of system interactions, troubleshooting, and long-term preventive operation and maintenance. Compile, prepare, and aggregate O&M data to include clarifying and updating the original sequences of operation to as-built conditions. Organize and present information in sufficient detail to clearly explain O&M requirements at the system, equipment, component, and subassembly level. Include an index preceding each submittal. Submit in accordance with this section and Section 01 33 00 SUBMITTAL PROCEDURES.

1.2.1 Package Quality

Documents must be fully legible. Operation and Maintenance data must be consistent with the manufacturer's standard brochures, schematics, printed instructions, general operating procedures, and safety precautions.

1.2.2 Package Content

Provide data package content in accordance with paragraph SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES. Comply with the data package requirements specified in the individual technical sections, including the content of the packages and addressing each product, component, and system designated for data package submission, except as follows. Use Data

Package 3 for commissioned items without a specified data package requirement in the individual technical sections. Provide a Data Package 3 instead of Data Package 1 or 2, as specified in the individual technical section, for items that are commissioned.

1.2.3 Changes to Submittals

Provide manufacturer-originated changes or revisions to submitted data if a component of an item is so affected subsequent to acceptance of the O&M Data. Submit changes, additions, or revisions required by the Contracting Officer for final acceptance of submitted data within 30 calendar days of the notification of this change requirement.

1.3 O&M DATABASE

Develop an editable, electronic spreadsheet based on the equipment in the Operation and Maintenance Manuals that contains the information required to start a preventive maintenance program. As a minimum, provide list of system equipment, location installed, warranty expiration date, manufacturer, model, and serial number.

1.4 OPERATION AND MAINTENANCE MANUAL FILE FORMAT

Assemble data packages into electronic Operation and Maintenance Manuals. Assemble each manual into a composite electronically indexed file using the most current version of Adobe Acrobat or similar software capable of producing PDF file format. Provide compact disks (CD) or data digital versatile disk (DVD) as appropriate, so that each one contains operation, maintenance and record files, project record documents, and training videos. Include a complete electronically linked operation and maintenance directory.

1.4.1 Organization

Bookmark Product and Drawing Information documents using the current version of CSI Masterformat numbering system, and arrange submittals using the specification sections as a structure. Use CSI Masterformat and UFGS numbers along with descriptive bookmarked titles that explain the content of the information that is being bookmarked.

1.4.2 CD or DVD Label and Disk Holder or Case

Provide the following information on the disk label and disk holder or case:

a. Building Number

b. Project Title

c. Activity and Location

d. Construction Contract Number

e. Prepared For: (Contracting Agency)

f. Prepared By: (Name, title, phone number and email address)

g. Include the disk content on the disk label

h. Date

i. Virus scanning program used

1.5 TYPES OF INFORMATION REQUIRED IN O&M DATA PACKAGES

The following are a detailed description of the data package items listed in paragraph SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES.

1.5.1 Operating Instructions

Provide specific instructions, procedures, and illustrations for the following phases of operation for the installed model and features of each system:

1.5.1.1 Safety Precautions and Hazards

List personnel hazards and equipment or product safety precautions for operating conditions. List all residual hazards identified in the Activity Hazard Analysis provided under Section 01 35 26 GOVERNMENT SAFETY REQUIREMENTS. Provide recommended safeguards for each identified hazard.

1.5.1.2 Operator Prestart

Provide procedures required to install, set up, and prepare each system for use.

1.5.1.3 Startup, Shutdown, and Post-Shutdown Procedures

Provide narrative description for Startup, Shutdown and Post-shutdown operating procedures including the control sequence for each procedure.

1.5.1.4 Normal Operations

Provide Control Diagrams with data to explain operation and control of systems and specific equipment. Provide narrative description of Normal Operating Procedures.

1.5.1.5 Emergency Operations

Provide Emergency Procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent further damage to systems and equipment. Provide Emergency Shutdown Instructions for fire, explosion, spills, or other foreseeable contingencies. Provide guidance and procedures for emergency operation of utility systems including required valve positions, valve locations and zones or portions of systems controlled.

1.5.1.6 Operator Service Requirements

Provide instructions for services to be performed by the operator such as lubrication, adjustment, inspection, and recording gauge readings.

1.5.1.7 Environmental Conditions

Provide a list of Environmental Conditions (temperature, humidity, and other relevant data) that are best suited for the operation of each product, component or system. Describe conditions under which the item equipment should not be allowed to run.

1.5.1.8 Operating Log

Provide forms, sample logs, and instructions for maintaining necessary operating records.

1.5.1.9 Additional Requirements for HVAC Control Systems

Provide Data Package 5 and the following for control systems:

a. Narrative description on how to perform and apply functions, features, modes, and other operations, including unoccupied operation, seasonal changeover, manual operation, and alarms. Include detailed technical manual for programming and customizing control loops and algorithms.

b. Full as-built sequence of operations.

c. Copies of checkout tests and calibrations performed by the Contractor (not Cx tests).

d. Full points list. Provide a listing of rooms with the following information for each room:

(1) Floor

(2) Room number

(3) Room name

(4) Air handler unit ID

(5) Reference drawing number

(6) Air terminal unit tag ID

(7) Heating or cooling valve tag ID

(8) Minimum cfm

(9) Maximum cfm

e. Full print out of all schedules and set points after testing and acceptance of the system.

f. Full as-built print out of software program.

g. Marking of system sensors and thermostats on the as-built floor plan and mechanical drawings with their control system designations.

1.5.2 Preventive Maintenance

Provide the following information for preventive and scheduled maintenance to minimize repairs for the installed model and features of each system. Include potential environmental and indoor air quality impacts of recommended maintenance procedures and materials.

1.5.2.1 Lubrication Data

Include the following preventive maintenance lubrication data, in addition to instructions for lubrication required under paragraph OPERATOR SERVICE

REQUIREMENTS:

a. A table showing recommended lubricants for specific temperature ranges and applications.

b. Charts with a schematic diagram of the equipment showing lubrication points, recommended types and grades of lubricants, and capacities.

c. A Lubrication Schedule showing service interval frequency.

1.5.2.2 Preventive Maintenance Plan, Schedule, and Procedures

Provide manufacturer's schedule for routine preventive maintenance, inspections, condition monitoring (predictive tests) and adjustments required to ensure proper and economical operation and to minimize repairs. Provide instructions stating when the systems should be retested. Provide manufacturer's projection of preventive maintenance work-hours on a daily, weekly, monthly, and annual basis including craft requirements by type of craft. For periodic calibrations, provide manufacturer's specified frequency and procedures for each separate operation.

a. Define the anticipated time required to perform each of each test (work-hours), test apparatus, number of personnel identified by responsibility, and a testing validation procedure permitting the record operation capability requirements within the schedule. Provide a remarks column for the testing validation procedure referencing operating limits of time, pressure, temperature, volume, voltage, current, acceleration, velocity, alignment, calibration, adjustments, cleaning, or special system notes. Delineate procedures for preventive maintenance, inspection, adjustment, lubrication and cleaning necessary to minimize repairs.

b. Repair requirements must inform operators how to check out, troubleshoot, repair, and replace components of the system. Include electrical and mechanical schematics and diagrams and diagnostic techniques necessary to enable operation and troubleshooting of the system after acceptance.

1.5.3 Repair

Provide manufacturer's recommended procedures and instructions for correcting problems and making repairs.

1.5.3.1 Troubleshooting Guides and Diagnostic Techniques

Provide step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or require replacement.

1.5.3.2 Wiring Diagrams and Control Diagrams

Provide point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job specific wiring and control work. On diagrams, number electrical and electronic wiring and pneumatic control tubing and the terminals for each type, identically to actual installation configuration

and numbering.

1.5.3.3 Repair Procedures

Provide instructions and a list of tools required to repair or restore the product or equipment to proper condition or operating standards.

1.5.3.4 Removal and Replacement Instructions

Provide step-by-step procedures and a list of required tools and supplies for removal, replacement, disassembly, and assembly of components, assemblies, subassemblies, accessories, and attachments. Provide tolerances, dimensions, settings and adjustments required. Use a combination of text and illustrations.

1.5.3.5 Spare Parts and Supply Lists

Provide lists of spare parts and supplies required for repair to ensure continued service or operation without unreasonable delays. Special consideration is required for facilities at remote locations. List spare parts and supplies that have a long lead-time to obtain.

1.5.3.6 Repair Work-Hours

Provide manufacturer's projection of repair work-hours including requirements by type of craft. Identify, and tabulate separately, repair that requires the equipment manufacturer to complete or to participate.

1.5.4 Real Property Equipment

Provide a list of installed equipment furnished under this contract. Include all information usually listed on manufacturer's name plate. In the "EQUIPMENT-IN-PLACE LIST" include, as applicable, the following for each piece of equipment installed: description of item, location (by room number), model number, serial number, capacity, name and address of manufacturer, name and address of equipment supplier, condition, spare parts list, manufacturer's catalog, and warranty. Submit the final list 30 days after transfer of the completed facility.

Key the designations to the related area depicted on the contract drawings. List the following data:

RECORD OF DESIGNATED EQUIPMENT AND MATERIALS DATA				
Description	Specification Section	Manufacturer and Catalog, Model, and Serial Number	Composition and Size	Where Used

1.5.5 Appendices

Provide information required below and information not specified in the preceding paragraphs but pertinent to the maintenance or operation of the product or equipment. Include the following:

1.5.5.1 Product Submittal Data

Provide a copy of SD-03 Product Data submittals documented with the required approval.

1.5.5.2 Manufacturer's Instructions

Provide a copy of SD-08 Manufacturer's Instructions submittals documented with the required approval.

1.5.5.3 O&M Submittal Data

Provide a copy of SD-10 Operation and Maintenance Data submittals documented with the required approval.

1.5.5.4 Parts Identification

Provide identification and coverage for the parts of each component, assembly, subassembly, and accessory of the end items subject to replacement. Include special hardware requirements, such as requirement to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without further identification. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification of the items. When illustrations omit the part numbers and description, both the illustrations and separate listing must show the index, reference, or key number that will cross-reference the illustrated part to the listed part. Group the parts shown in the listings by components, assemblies, and subassemblies in accordance with the manufacturer's standard practice. Parts data may cover more than one model or series of equipment, components, assemblies, subassemblies, attachments, or accessories, such as typically shown in a master parts catalog.

1.5.5.5 Warranty Information

List and explain the various warranties and clearly identify the servicing and technical precautions prescribed by the manufacturers or contract documents in order to keep warranties in force. Include warranty information for primary componentsof the system. Provide copies of warranties required by Section 01 78 00 CLOSEOUT SUBMITTALS.

1.5.5.6 Extended Warranty Information

List all warranties for products, equipment, components, and sub-components whose duration exceeds one year. For each warranty listed, indicate the applicable specification section, duration, start date, end date, and the point of contact for warranty fulfillment. Also, list or reference the specific operation and maintenance procedures that must be performed to keep the warranty valid. Provide copies of warranties required by Section 01 78 00 CLOSEOUT SUBMITTALS.

1.5.5.7 Personnel Training Requirements

Provide information available from the manufacturers that is needed for use in training designated personnel to properly operate and maintain the equipment and systems.

1.5.5.8 Testing Equipment and Special Tool Information

Include information on test equipment required to perform specified tests and on special tools needed for the operation, maintenance, and repair of components. Provide final set points.

1.5.5.9 Testing and Performance Data

Include completed prefunctional checklists, functional performance test forms, and monitoring reports. Include recommended schedule for retesting and blank test forms. Provide final set points.

1.5.5.10 Field Test Reports

Provide a copy of Field Test Reports (SD-06) submittals documented with the required approval.

1.5.5.11 Contractor Information

Provide a list that includes the name, address, and telephone number of the General Contractor and each Subcontractor who installed the product or equipment, or system. For each item, also provide the name address and telephone number of the manufacturer's representative and service organization that can provide replacements most convenient to the project site. Provide the name, address, and telephone number of the product, equipment, and system manufacturers.

1.6 SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES

Provide the O&M data packages specified in individual technical sections. The information required in each type of data package follows:

1.6.1 Data Package 1

a. Safety precautions and hazards

b. Cleaning recommendations

c. Maintenance and repair procedures

d. Warranty information

e. Extended warranty information

f. Contractor information

g. Spare parts and supply list

1.6.2 Data Package 2

a. Safety precautions and hazards

b. Normal operations

c. Environmental conditions

d. Lubrication data

e. Preventive maintenance plan, schedule, and procedures

f. Cleaning recommendations

g. Maintenance and repair procedures

h. Removal and replacement instructions

i. Spare parts and supply list

j. Parts identification

k. Warranty information

l. Extended warranty information

m. Contractor information

1.6.3 Data Package 3

a. Safety precautions and hazards

b. Operator prestart

c. Startup, shutdown, and post-shutdown procedures

d. Normal operations

e. Emergency operations

f. Environmental conditions

g. Operating log

h. Lubrication data

i. Preventive maintenance plan, schedule, and procedures

j. Cleaning recommendations

k. Troubleshooting guides and diagnostic techniques

l. Wiring diagrams and control diagrams

m. Maintenance and repair procedures

n. Removal and replacement instructions

o. Spare parts and supply list

p. Product submittal data

q. O&M submittal data

r. Parts identification

s. Warranty information

t. Extended warranty information

u. Testing equipment and special tool information

v. Testing and performance data

w. Contractor information

x. Field test reports

1.6.4 Data Package 4

a. Safety precautions and hazards

b. Operator prestart

c. Startup, shutdown, and post-shutdown procedures

d. Normal operations

e. Emergency operations

f. Operator service requirements

g. Environmental conditions

h. Operating log

i. Lubrication data

j. Preventive maintenance plan, schedule, and procedures

k. Cleaning recommendations

l. Troubleshooting guides and diagnostic techniques

m. Wiring diagrams and control diagrams

n. Repair procedures

o. Removal and replacement instructions

p. Spare parts and supply list

q. Repair work-hours

r. Product submittal data

s. O&M submittal data

t. Parts identification

u. Warranty information

v. Extended warranty information

w. Personnel training requirements

x. Testing equipment and special tool information

y. Testing and performance data

z. Contractor information

aa. Field test reports

1.6.5 Data Package 5

a. Safety precautions and hazards

b. Operator prestart

c. Start-up, shutdown, and post-shutdown procedures

d. Normal operations

e. Environmental conditions

f. Preventive maintenance plan, schedule, and procedures

g. Troubleshooting guides and diagnostic techniques

h. Wiring and control diagrams

i. Maintenance and repair procedures

j. Removal and replacement instructions

k. Spare parts and supply list

l. Product submittal data

m. Manufacturer's instructions

n. O&M submittal data

o. Parts identification

p. Testing equipment and special tool information

q. Warranty information

r. Extended warranty information

s. Testing and performance data

t. Contractor information

u. Field test reports

v. Additional requirements for HVAC control systems

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 TRAINING

Prior to acceptance of the facility by the Contracting Officer for Beneficial Occupancy, provide comprehensive training for the systems and equipment specified in the technical specifications. The training must be targeted for the building maintenance personnel, and applicable building occupants. Instructors must be well-versed in the particular systems that they are presenting. Address aspects of the Operation and Maintenance Manual submitted in accordance with Section 01 78 00 CLOSEOUT SUBMITTALS.. Training must include classroom or field lectures based on the system operating requirements. The location of classroom training requires approval by the Contracting Officer.

3.1.1 Training Plan

Submit a written training plan to the Contracting Officer for approval at least 60 calendar days prior to the scheduled training. Training plan must be approved by the Quality Control Manager (QC) prior to forwarding to the Contracting Officer. Also, coordinate the training schedule with the Contracting Officer and QC. Include within the plan the following elements:

a. Equipment included in training

b. Intended audience

c. Location of training

d. Dates of training

e. Objectives

f. Outline of the information to be presented and subjects covered including description

g. Start and finish times and duration of training on each subject

h. Methods (e.g. classroom lecture, video, site walk-through, actual operational demonstrations, written handouts)

i. Instructor names and instructor qualifications for each subject

j. List of texts and other materials to be furnished by the Contractor that are required to support training

k. Description of proposed software to be used for video recording of training sessions.

3.1.2 Training Content

The core of this training must be based on manufacturer's recommendations and the operation and maintenance information. The QC is responsible for overseeing and approving the content and adequacy of the training. Spend 95 percent of the instruction time during the presentation on the OPERATION AND MAINTENANCE DATA. Include the following for each system training presentation:

a. Start-up, normal operation, shutdown, unoccupied operation, seasonal

changeover, manual operation, controls set-up and programming, troubleshooting, and alarms.

b. Relevant health and safety issues.

c. Discussion of how the feature or system is environmentally responsive. Advise adjustments and optimizing methods for energy conservation.

d. Design intent.

e. Use of O&M Manual Files.

f. Review of control drawings and schematics.

g. Interactions with other systems.

h. Special maintenance and replacement sources.

i. Tenant interaction issues.

3.1.3 Training Outline

Provide the Operation and Maintenance Manual Files (Bookmarked PDF) and a written course outline listing the major and minor topics to be discussed by the instructor on each day of the course to each trainee in the course. Provide the course outline 14 calendar days prior to the training.

3.1.4 Training Video Recording

Record classroom training session(s) on video. Provide to the Contracting Officer two copies of the training session(s) in DVD video recording format. Capture within the recording, in video and audio, the instructors' training presentations including question and answer periods with the attendees. The recording camera(s) must be attended by a person during the recording sessions to assure proper size of exhibits and projections during the recording are visible and readable when viewed as training.

3.1.5 Unresolved Questions from Attendees

If, at the end of the training course, there are questions from attendees that remain unresolved, the instructor must send the answers, in writing, to the Contracting Officer for transmittal to the attendees, and the training video must be modified to include the appropriate clarifications.

3.1.6 Validation of Training Completion

Ensure that each attendee at each training session signs a class roster daily to confirm Government participation in the training. At the completion of training, submit a signed validation letter that includes a sample record of training for reporting what systems were included in the training, who provided the training, when and where the training was performed, and copies of the signed class rosters. Provide two copies of the validation to the Contracting Officer, and one copy to the Operation and Maintenance Manual Preparer for inclusion into the Manual's documentation.

3.1.7 Quality Control Coordination

Coordinate this training with the QC in accordance with Section 01 45 00 QUALITY CONTROL.

-- End of Section --

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05/10

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SECTION 02 41 00

DEMOLITION
05/10

PART 1 GENERAL

1.1 REFERENCES

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

AIR-CONDITIONING, HEATING AND REFRIGERATION INSTITUTE (AHRI)

AHRI Guideline K	(2009) Guideline for Containers for Recovered Non-Flammable Fluorocarbon Refrigerants

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)

ASSE/SAFE A10.6	(2006) Safety Requirements for Demolition Operations

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual

U.S. DEFENSE LOGISTICS AGENCY (DLA)

DLA 4145.25	(Jun 2000; Reaffirmed Oct 2010) Storage and Handling of Liquefied and Gaseous Compressed Gases and Their Full and Empty Cylinders http://www.aviation.dla.mil/UserWeb/aviationengineering/

U.S. DEPARTMENT OF DEFENSE (DOD)

DOD 4000.25-1-M	(2006) MILSTRIP - Military Standard Requisitioning and Issue Procedures
MIL-STD-129	(2014; Rev R) Military Marking for Shipment and Storage

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

40 CFR 61	National Emission Standards for Hazardous Air Pollutants
40 CFR 82	Protection of Stratospheric Ozone
49 CFR 173.301	Shipment of Compressed Gases in Cylinders and Spherical Pressure Vessels

1.2 PROJECT DESCRIPTION

1.2.1 Demolition/Deconstruction Plan

Prepare a Demolition Plan and submit proposed salvage, demolition, and removal procedures for approval before work is started. Include in the plan procedures for careful removal and disposition of materials specified to be salvaged, coordination with other work in progress. Coordinate with Waste Management Plan. Provide procedures for safe conduct of the work in accordance with EM 385-1-1. Plan shall be approved by Contracting Officer prior to work beginning.

1.2.2 General Requirements

Do not begin demolition or deconstruction until authorization is received from the Contracting Officer. Remove rubbish and debris from the project site; do not allow accumulations inside or outside the building . In the interest of occupational safety and health, perform the work in accordance with EM 385-1-1, Section 23, Demolition, and other applicable Sections.

1.3 ITEMS TO REMAIN IN PLACE

Take necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the Government. Repair or replace damaged items as approved by the Contracting Officer. Coordinate the work of this section with all other work indicated. Construct and maintain shoring, bracing, and supports as required. Ensure that structural elements are not overloaded. Increase structural supports or add new supports as may be required as a result of any cutting, removal, deconstruction, or demolition work performed under this contract. Do not overload pavements to remain. Provide new supports and reinforcement for existing construction weakened by demolition, deconstruction, or removal work. Repairs, reinforcement, or structural replacement require approval by the Contracting Officer prior to performing such work.

1.3.1 Existing Construction Limits and Protection

Do not disturb existing construction beyond the extent indicated or necessary for installation of new construction. Provide temporary shoring and bracing for support of building components to prevent settlement or other movement. Provide protective measures to control accumulation and migration of dust and dirt in all work areas. Remove snow, dust, dirt, and debris from work areas daily.

1.3.2 Weather Protection

For portions of the building to remain, protect building interior and materials and equipment from the weather at all times. Where removal of existing roofing is necessary to accomplish work, have materials and workmen ready to provide adequate and temporary covering of exposed areas.

1.3.3 Utility Service

Maintain existing utilities indicated to stay in service and protect against damage during demolition and deconstruction operations. Prior to start of work, utilities serving each area of alteration or removal will be shut off by the Government and disconnected and sealed by the Contractor .

1.3.4 Facilities

Protect electrical and mechanical services and utilities. Where removal of existing utilities and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities including steam lines. Floors, roofs, walls, columns, pilasters, and other structural components that are designed and constructed to stand without lateral support or shoring, and are determined to be in stable condition, must remain standing without additional bracing, shoring, or lateral support until demolished or deconstructed, unless directed otherwise by the Contracting Officer. Ensure that no elements determined to be unstable are left unsupported and place and secure bracing, shoring, or lateral supports as may be required as a result of any cutting, removal, deconstruction, or demolition work performed under this contract.

1.4 BURNING

The use of burning at the project site for the disposal of refuse and debris will not be permitted .

1.5 AVAILABILITY OF WORK AREAS

Coordinate with the Contracting Officer for schedule ofaAreas in which the work is to be accomplished..

1.6 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Demolition Plan; G

Existing Conditions

SD-07 Certificates

Notification; G

SD-11 Closeout Submittals

Receipts

1.7 QUALITY CONTROL

Submit timely notification of demolition projects to Federal, State, regional, and local authorities in accordance with 40 CFR 61, Subpart M. Notify the local air pollution control district/agency and the Contracting Officer in writing 10 working days prior to the commencement of work in accordance with 40 CFR 61, Subpart M. Comply with federal, state, and local hauling and disposal regulations. In addition to the requirements of the "Contract Clauses," conform to the safety requirements contained in ASSE/SAFE A10.6. Comply with the Environmental Protection Agency requirements specified. Use of explosives will not be permitted.

1.7.1 Dust Control

Prevent the spread of dust and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution. Sweep pavements as often as necessary to control the spread of debris that may result in foreign object damage potential to aircraft.

1.8 PROTECTION

1.8.1 Traffic Control Signs

a. Where safety is endangered in the area of removal work, use traffic barricades with flashing lights. Notify the Contracting Officer prior to beginning such work.

1.8.2 Protection of Personnel

Before, during and after the demolition work continuously evaluate the condition of the structure being demolished and take immediate action to protect all personnel working in and around the project site. No area, section, or component of floors, roofs, walls, columns, pilasters, or other structural element will be allowed to be left standing without sufficient bracing, shoring, or lateral support to prevent collapse or failure while workmen remove debris or perform other work in the immediate area.

1.9 RELOCATIONS

Perform the removal and reinstallation of relocated items as indicated with workmen skilled in the trades involved. Repair or replace items to be relocated which are damaged by the Contractor with new undamaged items as approved by the Contracting Officer.

1.10 EXISTING CONDITIONS

Before beginning any demolition or deconstruction work, survey the site and examine the drawings and specifications to determine the extent of the work. Record existing conditions in the presence of the Contracting Officer showing the condition of structures and other facilities adjacent to areas of alteration or removal. Photographs sized 4 inch will be acceptable as a record of existing conditions. Include in the record the elevation of the top of foundation walls, finish floor elevations, possible conflicting electrical conduits, plumbing lines, alarms systems, the location and extent of existing cracks and other damage and description of surface conditions that exist prior to before starting work. It is the Contractor's responsibility to verify and document all required outages which will be required during the course of work, and to note these outages on the record document. Submit survey results.

PART 2 PRODUCTS

2.1 FILL MATERIAL

a. Comply with excavating, backfilling, and compacting procedures for soils used as backfill material to fill basements, voids, depressions or excavations resulting from demolition or deconstruction of structures.

PART 3 EXECUTION

3.1 EXISTING FACILITIES TO BE REMOVED

Inspect and evaluate existing structures onsite for reuse. Existing construction scheduled to be removed for reuse shall be disassembled. Dismantled and removed materials are to be separated, set aside, and prepared as specified, and stored or delivered to a collection point for reuse, remanufacture, recycling, or other disposal, as specified. Materials shall be designated for reuse onsite whenever possible.

3.1.1 Structures

a. Remove existing structures indicated to be removed to grade . Interior walls, other than retaining walls and partitions, shall be removed to 3 feet below grade or to top of concrete slab on ground. Break up basement slabs to permit drainage. Remove sidewalks, curbs, gutters and street light bases as indicated.

b. Demolish structures in a systematic manner from the top of the structure to the ground. Complete demolition work above each tier or floor before the supporting members on the lower level are disturbed. Demolish concrete and masonry walls in small sections. Remove structural framing members and lower to ground by means of derricks, platforms hoists, or other suitable methods as approved by the Contracting Officer.

c. Locate demolition and deconstruction equipment throughout the structure and remove materials so as to not impose excessive loads to supporting walls, floors, or framing.

3.1.2 Utilities and Related Equipment

3.1.2.1 General Requirements

Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by the Contracting Officer. Do not interrupt existing utilities serving facilities occupied and used by the Government except when approved in writing and then only after temporary utility services have been approved and provided. Do not begin demolition or deconstruction work until all utility disconnections have been made. Shut off and cap utilities for future use, as indicated.

3.1.2.2 Disconnecting Existing Utilities

Remove existing utilities uncovered by work and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Contracting Officer. When utility lines are encountered but are not indicated on the drawings, notify the Contracting Officer prior to further work in that area. Remove meters and related equipment and deliver to a location in accordance with instructions of the Contracting Officer.

3.1.3 Chain Link Fencing

Remove chain link fencing, gates and other related salvaged items scheduled for removal and transport to designated areas. Remove gates as whole

units. Cut chain link fabric to 25 foot lengths and store in rolls off the ground.

3.1.4 Paving and Slabs

Remove concrete and asphaltic concrete paving and slabs including aggregate base as indicated to a depth of 12 inches below new finish grade. Pavement and slabs designated to be recycled and utilized in this project shall be moved, ground and stored as directed by the Contracting Officer. Pavement and slabs not to be used in this project shall be removed from the Installation at Contractor's expense.

3.1.5 Concrete

Saw concrete along straight lines to a depth of a minimum 2 inch. Make each cut in walls perpendicular to the face and in alignment with the cut in the opposite face. Break out the remainder of the concrete provided that the broken area is concealed in the finished work, and the remaining concrete is sound. At locations where the broken face cannot be concealed, grind smooth or saw cut entirely through the concrete. Salvage removed concrete.

3.1.6 Structural Steel

Dismantle structural steel at field connections and in a manner that will prevent bending or damage. Salvage for recycle structural steel, steel joists, girders, angles, plates, columns and shapes. Do not use flame-cutting torches . Transport steel joists and girders as whole units and not dismantled. Transport structural steel shapes to a designated area as directed by the Contracting Officer, stacked according to size, type of member and length, and stored off the ground, protected from the weather.

3.1.7 Miscellaneous Metal

Salvage shop-fabricated items such as access doors and frames, steel gratings, metal ladders, wire mesh partitions, metal railings, metal windows and similar items as whole units. Salvage light-gage and cold-formed metal framing, such as steel studs, steel trusses, metal gutters, roofing and siding, metal toilet partitions, toilet accessories and similar items. Scrap metal shall become the Contractor's property. Recycle scrap metal as part of demolition and deconstruction operations. Provide separate containers to collect scrap metal and transport to a scrap metal collection or recycling facility, in accordance with the Waste Management Plan.

3.1.8 Patching

Where removals leave holes and damaged surfaces exposed in the finished work, patch and repair these holes and damaged surfaces to match adjacent finished surfaces, using on-site materials when available. Where new work is to be applied to existing surfaces, perform removals and patching in a manner to produce surfaces suitable for receiving new work. Finished surfaces of patched area shall be flush with the adjacent existing surface and shall match the existing adjacent surface as closely as possible as to texture and finish. Patching shall be as specified and indicated, and shall include:

a. Concrete and Masonry: Completely fill holes and depressions, left as a result of removals in existing masonry walls to remain, with an

approved masonry patching material, applied in accordance with the manufacturer's printed instructions.

3.1.9 Locksets on Swinging Doors

Remove all locksets from all swinging doors indicated to be removed and disposed of. Deliver the locksets and related items to a designated location for receipt by the Contracting Officer after removal.

3.1.10 Electrical Equipment and Fixtures

Salvage motors, motor controllers, and operating and control equipment that are attached to the driven equipment. Salvage wiring systems and components. Box loose items and tag for identification. Disconnect primary, secondary, control, communication, and signal circuits at the point of attachment to their distribution system.

3.1.10.1 Fixtures

Remove and salvage electrical fixtures. Salvage unprotected glassware from the fixture and salvage separately. Salvage incandescent, mercury-vapor, and fluorescent lamps and fluorescent ballasts manufactured prior to 1978, boxed and tagged for identification, and protected from breakage.

3.1.10.2 Electrical Devices

Remove and salvage switches, switchgear, transformers, conductors including wire and nonmetallic sheathed and flexible armored cable, regulators, meters, instruments, plates, circuit breakers, panelboards, outlet boxes, and similar items. Box and tag these items for identification according to type and size.

3.1.10.3 Wiring Ducts or Troughs

Remove and salvage wiring ducts or troughs. Dismantle plug-in ducts and wiring troughs into unit lengths. Remove plug-in or disconnecting devices from the busway and store separately.

3.1.10.4 Conduit and Miscellaneous Items

Salvage conduit except where embedded in concrete or masonry. Consider corroded, bent, or damaged conduit as scrap metal. Sort straight and undamaged lengths of conduit according to size and type. Classify supports, knobs, tubes, cleats, and straps as debris to be removed and disposed.

3.2 CONCURRENT EARTH-MOVING OPERATIONS

Do not begin excavation, filling, and other earth-moving operations that are sequential to demolition or deconstruction work in areas occupied by structures to be demolished or deconstructed until all demolition and deconstruction in the area has been completed and debris removed. Fill holes, open basements and other hazardous openings.

3.3 DISPOSITION OF MATERIAL

3.3.1 Title to Materials

Except for salvaged items specified in related Sections, and for materials

or equipment scheduled for salvage, all materials and equipment removed and not reused or salvaged, shall become the property of the Contractor and shall be removed from Government property. Title to materials resulting from demolition and deconstruction, and materials and equipment to be removed, is vested in the Contractor upon approval by the Contracting Officer of the Contractor's demolition, deconstruction, and removal procedures, and authorization by the Contracting Officer to begin demolition and deconstruction. The Government will not be responsible for the condition or loss of, or damage to, such property after contract award. Showing for sale or selling materials and equipment on site is prohibited.

3.3.2 Reuse of Materials and Equipment

Remove and store materials and equipment listed in the Demolition Plan to be reused or relocated to prevent damage, and reinstall as the work progresses.

3.3.3 Disposal of Ozone Depleting Substance (ODS)

Class I and Class II ODS are defined in Section, 602(a) and (b), of The Clean Air Act. Prevent discharge of Class I and Class II ODS to the atmosphere. Place recovered ODS in cylinders meeting AHRI Guideline K suitable for the type ODS (filled to no more than 80 percent capacity) and provide appropriate labeling. Recovered ODS shall be removed from Government property and disposed of in accordance with 40 CFR 82. Products, equipment and appliances containing ODS in a sealed, self-contained system (e.g. residential refrigerators and window air conditioners) shall be disposed of in accordance with 40 CFR 82. Submit Receipts or bills of lading, as specified. Submit a shipping receipt or bill of lading for all containers of ozone depleting substance (ODS) shipped to the Defense Depot, Richmond, Virginia.

3.3.3.1 Special Instructions

No more than one type of ODS is permitted in each container. A warning/hazardous label shall be applied to the containers in accordance with Department of Transportation regulations. All cylinders including but not limited to fire extinguishers, spheres, or canisters containing an ODS shall have a tag with the following information:

a. Activity name and unit identification code

b. Activity point of contact and phone number

c. Type of ODS and pounds of ODS contained

d. Date of shipment

e. National stock number (for information, call (804) 279-4525).

3.3.3.2 Fire Suppression Containers

Deactivate fire suppression system cylinders and canisters with electrical charges or initiators prior to shipment. Also, safety caps must be used to cover exposed actuation mechanisms and discharge ports on these special cylinders.

3.3.4 Transportation Guidance

Ship all ODS containers in accordance with MIL-STD-129, DLA 4145.25 (also referenced one of the following: Army Regulation 700-68, Naval Supply Instruction 4440.128C, Marine Corps Order 10330.2C, and Air Force Regulation 67-12), 49 CFR 173.301, and DOD 4000.25-1-M.

3.3.5 Unsalvageable and Non-Recyclable Material

Dispose of unsalvageable and non-recyclable noncombustible material in the disposal area located off-post. Dispose of unsalvageable and non-recyclable combustible material off the site .

3.4 CLEANUP

Remove debris and rubbish from basement and similar excavations. Remove and transport the debris in a manner that prevents spillage on streets or adjacent areas. Apply local regulations regarding hauling and disposal.

3.5 DISPOSAL OF REMOVED MATERIALS

3.5.1 Regulation of Removed Materials

Dispose of debris, rubbish, scrap, and other nonsalvageable materials resulting from removal operations with all applicable federal, state and local regulations as contractually specified in the Waste Management Plan. . Storage of removed materials on the project site is prohibited.

3.5.2 Burning on Government Property

Burning of materials removed from demolished and deconstructed structures will not be permitted on Government property .

3.5.3 Removal to Spoil Areas on Government Property

Transport noncombustible materials removed from demolition and deconstruction structures to designated spoil areas on Government property.

3.5.4 Removal from Government Property

Transport waste materials removed from demolished and deconstructed structures, except waste soil, from Government property for legal disposal. Dispose of waste soil as directed.

3.6 REUSE OF SALVAGED ITEMS

Recondition salvaged materials and equipment designated for reuse before installation. Replace items damaged during removal and salvage operations or restore them as necessary to usable condition.

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ASBESTOS ABATEMENT
02/10

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE)

ASSE Z9.2	(2012) Fundamentals Governing the Design and Operation of Local Exhaust Ventilation Systems

ASTM INTERNATIONAL (ASTM)

ASTM D4397	(2010) Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
ASTM E1368	(2014) Visual Inspection of Asbestos Abatement Projects

COMPRESSED GAS ASSOCIATION (CGA)

CGA G-7	(2014) Compressed Air for Human Respiration; 6th Edition

INTERNATIONAL SAFETY EQUIPMENT ASSOCIATION (ISEA)

ANSI/ISEA Z87.1	(2015) Occupational and Educational Personal Eye and Face Protection Devices

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 701	(2015) Standard Methods of Fire Tests for Flame Propagation of Textiles and Films

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

NIOSH 2003-154	(2003; 4th Ed; Supple 3) NIOSH Manual of Analytical Methods

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual
EP 1110-1-11	(1992; Change 1 1997) Engineering and Design -- Asbestos Abatement Guideline Detail Sheets

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 340/1-90/018	(1990) Asbestos/NESHAP Regulated Asbestos Containing Materials Guidance

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

29 CFR 1910.134	Respiratory Protection
29 CFR 1910.141	Sanitation
29 CFR 1910.147	Control of Hazardous Energy (Lock Out/Tag Out)
29 CFR 1926.1101	Asbestos
29 CFR 1926.32	Safety and Health Regulations for Construction - Definition
40 CFR 61	National Emission Standards for Hazardous Air Pollutants
40 CFR 763	Asbestos
42 CFR 84	Approval of Respiratory Protective Devices
49 CFR 107	Hazardous Materials Program Procedures
49 CFR 171	General Information, Regulations, and Definitions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 173	Shippers - General Requirements for Shipments and Packagings

UNDERWRITERS LABORATORIES (UL)

UL 586	(2009; Reprint Sep 2014) Standard for High-Efficiency Particulate, Air Filter Units

1.2 DEFINITIONS

1.2.1 Amended Water

Water containing a wetting agent or surfactant with a surface tension of at least 29 dynes per square centimeter.

1.2.2 Asbestos-Containing Material (ACM)

Any materials containing more than one percent asbestos.

1.2.3 Authorized Person

Any person authorized by the Contractor and required by work duties to be present in the regulated areas.

1.2.4 Building Inspector

Individual who inspects buildings for asbestos and has EPA Model Accreditation Plan (MAP) "Building Inspector" training; accreditation required by 40 CFR 763, Subpart E, Appendix C, has EPA/State certification/license as a "Building Inspector".

1.2.5 Class I Asbestos Work

Activities defined by OSHA involving the removal of thermal system insulation (TSI) and surfacing ACM.

1.2.6 Class II Asbestos Work

Activities defined by OSHA involving the removal of ACM which is not thermal system insulation or surfacing material. This includes, but is not limited to, the removal of asbestos - containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastic. Certain "incidental" roofing materials such as mastic, flashing and cements when they are still intact are excluded from Class II asbestos work. Removal of small amounts of these materials which would fit into a glovebag may be classified as a Class III job.

1.2.7 Class III Asbestos Work

Activities defined by OSHA that involve repair and maintenance operations, where ACM, including TSI and surfacing ACM, is likely to be disturbed. Operations may include drilling, abrading, cutting a hole, cable pulling, crawling through tunnels or attics and spaces above the ceiling, where asbestos is actively disturbed or asbestos-containing debris is actively disturbed.

1.2.8 Clean Room

An uncontaminated room having facilities for the storage of employees' street clothing and uncontaminated materials and equipment.

1.2.9 Competent Person

In addition to the definition in 29 CFR 1926.32(f), a person who is capable of identifying existing asbestos hazards as defined in 29 CFR 1926.1101, selecting the appropriate control strategy, has the authority to take prompt corrective measures to eliminate them and has EPA Model Accreditation Plan (MAP) "Contractor/Supervisor" training; has EPA/State certification/license as a "Contractor/Supervisor".

1.2.10 Contractor/Supervisor

Individual who supervises asbestos abatement work and has EPA Model Accreditation Plan "Contractor/Supervisor" training; has EPA/State certification as a "Contractor/Supervisor".

1.2.11 Critical Barrier

One or more layers of plastic sealed over all openings into a regulated area or any other similarly placed physical barrier sufficient to prevent airborne asbestos in a regulated area from migrating to an adjacent area.

1.2.12 Decontamination Area

An enclosed area adjacent and connected to the regulated area and consisting of an equipment room, shower area, and clean room, which is used for the decontamination of workers, materials, and equipment that are contaminated with asbestos.

1.2.13 Demolition

The wrecking or taking out of any load-supporting structural member and any related razing, removing, or stripping of asbestos products.

1.2.14 Disposal Bag

A 6 mil thick, leak-tight plastic bag, pre-labeled in accordance with 29 CFR 1926.1101, used for transporting asbestos waste from containment to disposal site.

1.2.15 Disturbance

Activities that disrupt the matrix of ACM, crumble or pulverize ACM, or generate visible debris from ACM. Disturbance includes cutting away small amounts of ACM, no greater than the amount which can be contained in 1 standard sized glovebag or waste bag, not larger than 60 inches in length and width in order to access a building component.

1.2.16 Equipment Room or Area

An area adjacent to the regulated area used for the decontamination of employees and their equipment.

1.2.17 Fiber

A fibrous particulate, 5 micrometers or longer, with a length to width ratio of at least 3 to 1.

1.2.18 Friable ACM

A term defined in 40 CFR 61, Subpart M and EPA 340/1-90/018 meaning any material which contains more than 1 percent asbestos, as determined using the method specified in 40 CFR 763, Polarized Light Microscopy (PLM), that when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

1.2.19 Glovebag

Not more than a 60 by 60 inch impervious plastic bag-like enclosure affixed around an asbestos-containing material, with glove-like appendages through which material and tools may be handled.

1.2.20 High-Efficiency Particulate Air (HEPA) Filter

A filter capable of trapping and retaining at least 99.97 percent of all

mono-dispersed particles of 0.3 micrometers in diameter.

1.2.21 Intact

ACM which has not crumbled, been pulverized, or otherwise deteriorated so that the asbestos is no longer likely to be bound with its matrix. Removal of "intact" asphaltic, resinous, cementitious products does not render the ACM non-intact simply by being separated into smaller pieces.

1.2.22 Model Accreditation Plan (MAP)

USEPA training accreditation requirements for persons who work with asbestos as specified in 40 CFR 763.

1.2.23 Negative Initial Exposure Assessment

A demonstration by the Contractor to show that employee exposure during an operation is expected to be consistently below the OSHA Permissible Exposure Limits (PELs).

1.2.24 NESHAP

National Emission Standards for Hazardous Air Pollutants. The USEPA NESHAP regulation for asbestos is at 40 CFR 61, Subpart M.

1.2.25 Nonfriable ACM

A NESHAP term defined in 40 CFR 61, Subpart M and EPA 340/1-90/018 meaning any material containing more than 1 percent asbestos that, when dry, cannot be crumbled, pulverized or reduced to powder by hand pressure.

1.2.26 Nonfriable ACM (Category I)

A NESHAP term defined in 40 CFR 61, Subpart E and EPA 340/1-90/018 meaning asbestos-containing packings, gaskets, resilient floor covering, and asphalt roofing products containing more than 1 percent asbestos.

1.2.27 Nonfriable ACM (Category II)

A NESHAP term defined in 40 CFR 61, Subpart E and EPA 340/1-90/018 meaning any material, excluding Category I nonfriable ACM, containing more than 1 percent asbestos.

1.2.28 Permissible Exposure Limits (PELs)

1.2.28.1 PEL-Time Weighted Average(TWA)

Concentration of asbestos not in excess of 0.1 fibers per cubic centimeter of air (f/cc) as an 8 hour time weighted average (TWA).

1.2.28.2 PEL-Excursion Limit

An airborne concentration of asbestos not in excess of 1.0 f/cc of air as averaged over a sampling period of 30 minutes.

1.2.29 Regulated Area

An OSHA term defined in 29 CFR 1926.1101 meaning an area established by the Contractor to demarcate areas where Class I, II, and III asbestos work is

conducted; also any adjoining area where debris and waste from such asbestos work accumulate; and an area within which airborne concentrations of asbestos exceed, or there is a reasonable possibility they may exceed, the permissible exposure limit.

1.2.30 Removal

All operations where ACM is taken out or stripped from structures or substrates, and includes demolition operations.

1.2.31 Thermal System Insulation (TSI) ACM

ACM which contains more than 1 percent asbestos and is applied to pipes, fittings, boilers, breeching, tanks, ducts, or other interior structural components to prevent heat loss or gain or water condensation.

1.2.32 Transite

A generic name for asbestos cement wallboard and pipe.

1.2.33 Worker

Individual (not designated as the Competent Person or a supervisor) who performs asbestos work and has completed asbestos worker training required by 29 CFR 1926.1101, to include EPA Model Accreditation Plan (MAP) "Worker" training; accreditation if required by the OSHA Class of work to be performed or by the state where the work is to be performed.

1.3 SYSTEM DESCRIPTION

This section covers all operations in which asbestos-containing materials (ACM) are encountered during the Hill AFB 649 MUNS Munitions Storage Magazines Project. An asbestos survey was accomplished (see attached survey report) to provide information as to what needs to be abated prior to start of this project. These procedures and equipment are required to protect workers and building occupants from airborne asbestos fibers and ACM dust and debris. Activities include OSHA Class I Class II and Class III work operations. This section also includes containment, storage, transportation and disposal of the generated ACM wastes. Submit Detailed Drawings in accordance with EP 1110-1-11 and containing descriptions, and site layout to include worksite containment area(s), local exhaust systems locations, decontamination units and load-out units, other temporary waste storage facility, location of temporary utilities (electrical, water, sewer) and boundaries of each regulated area.

1.3.1 Abatement Work Tasks

The specific ACM to be abated is identified on the attached Asbestos survey.

1.3.2 Unexpected Discovery of Asbestos

For any previously untested building components suspected to contain asbestos and located in areas impacted by the work, notify the Contracting Officer (CO) who will have the option of ordering up to 3 bulk samples to be obtained at the Contractor's expense and delivered to a laboratory accredited under the National Institute of Standards and Technology (NIST) "National Voluntary Laboratory Accreditation Program (NVLAP)" and analyzed by PLM. If the asbestos content is less than 10 percent, as determined by a method other than point counting, the asbestos content shall be verified

by point counting. Any additional components identified as ACM that have been approved by the CO for removal shall be removed and will be paid for by an equitable adjustment to the contract price under the CONTRACT CLAUSE titled "changes". Sampling shall be conducted by personnel who have successfully completed the EPA Model Accreditation Plan (MAP) "Building Inspector" training course and is EPA/State certified/licensed as a "Building Inspector".

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Detailed Drawings; G

SD-03 Product Data

Asbestos Waste Shipment Records; G
Encapsulants; G
Respiratory Protection Program; G, DO
Cleanup and Disposal; G
Qualifications; G
Training Program
Licenses, Permits and Notifications
Asbestos Management Plan; G, DO

SD-06 Test Reports

Exposure Assessment and Air Monitoring
Local Exhaust System

SD-07 Certificates

Local Exhaust System
Encapsulants; G
Medical Surveillance Requirements

1.5 QUALITY CONTROL

In addition to detailed requirements of this specification, work performed under this contract shall comply with EM 385-1-1, applicable federal, state, and local laws, ordinances, criteria, rules and regulations regarding handling, storing, transporting, and disposing of asbestos waste materials. Matters of interpretation of standards shall be submitted to the appropriate administrative agency for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements shall apply. The following state and local laws, rules and regulations apply: Utah Asbestos Regulations.

1.5.1 Written Qualifications and Organization Report

Submit a written qualifications and organization report providing evidence

of qualifications of the Contractor, Contractor's Project Supervisor, Designated Competent Person, supervisors and workers; Designated IH; independent testing laboratory; all subcontractors to be used including disposal transportation and disposal facility firms, subcontractor supervisors, subcontractor workers; and any others assigned to perform asbestos abatement and support activities. Include in the report an organization chart showing the Contractor's staff organization chain of command and reporting relationship with all subcontractors. The report shall be signed by the Contractor, the Contractor's onsite project manager, Designated Competent Person, Designated IH, designated testing laboratory and the principals of all subcontractors to be used. Include the following statement in the report: "By signing this report I certify that the personnel I am responsible for during the course of this project fully understand the contents of 29 CFR 1926.1101, 40 CFR 61, Subpart M, and the federal, state and local requirements for those asbestos abatement activities that they will be involved in."

1.5.2 Specific Requirements

Designate in writing, personnel meeting the following qualifications:

a. Asbestos Abatement Contractor: Certified/licensed by applicable state agencies to perform asbestos-related activities.

b. Designated Competent Person: Qualified in accordance with 29 CFR 1926.32 and 29 CFR 1926.1101, has EPA MAP "Contractor/Supervisor" training accreditation, has EPA/State certification/license as a "Contractor/Supervisor" and is experienced in the administration and supervision of asbestos abatement projects The Designated Competent Person shall be responsible for compliance with applicable federal, state and local requirements, the Contractor's Accident Prevention Plan (APP) and Asbestos Hazard Abatement Plan (AHAP). Submit the "Contractor/Supervisor" course completion certificate and the most recent certificate for required refresher training, EPA/State certification/license with the employee "Certificate of Worker Acknowledgment". Submit evidence that this person has a minimum of 2 years of on-the-job asbestos abatement experience relevant to OSHA competent person requirements. The Designated Competent Person shall be onsite at all times during the conduct of this project.

c. Project and Other Supervisors: Have EPA MAP "Contractor/Supervisor" training accreditation. Submit the "Contractor/Supervisor" course completion certificate and the most recent certificate for required refresher training, EPA/State certification/license with the employee "Certificate of Worker Acknowledgment". Also submit evidence that the Project Supervisor has a minimum of 2 years of on-the-job asbestos abatement experience relevant to project supervisor responsibilities and the other supervisors have a minimum of 1 year on-the-job asbestos abatement experience commensurate with the responsibilities they will have on this project.

d. Designated Industrial Hygienist: Resume for the Industrial Hygienist (IH) selected to prepare the Contractor's AHAP, prepare and perform training, direct air monitoring and assist the Contractor's Competent Person in implementing and ensuring that safety and health requirements are complied with during the performance of all required work. The Designated IH shall be a person who is board certified in the practice of industrial hygiene as determined and documented by the American Board of Industrial Hygiene (ABIH), has EPA MAP "Contractor/Supervisor"

training accreditation, has EPA/State certification/license, and has a minimum of 2 years of comprehensive experience in planning and overseeing asbestos abatement activities. Submit the "Contractor/Supervisor" course completion certificate and the most recent certificate for required refresher training and EPA/State certification/license with the employee "Certificate of Worker Acknowledgment". The Designated IH shall be completely independent from the Contractor according to federal, state, or local regulations; that is, shall not be a Contractor's employee or be an employee or principal of a firm in a business relationship with the Contractor negating such independent status. A copy of the Designated IH's current valid ABIH certification shall be included. The Designated IH shall be onsite at all times for the duration of asbestos activities and shall be available for emergencies. In addition, submit resumes of additional IH's and industrial hygiene technicians (IHT) who will be assisting the Designated IH in performing onsite tasks. IHs and IHTs supporting the Designated IH shall have a minimum of 2 years of practical onsite asbestos abatement experience. Indicate the formal reporting relationship between the Designated IH and the support IHs and IHTs, the Designated Competent Person, and the Contractor.

e. Asbestos Abatement Workers: Meet the requirements contained in 29 CFR 1926.1101, 40 CFR 61, Subpart M, and other applicable federal, state and local requirements. Worker training documentation shall be provided as required on the "Certificate of Workers Acknowledgment". Training documentation is required for each employee who will perform OSHA Class I, Class II, Class III, or Class IV asbestos abatement operations. Such documentation shall be submitted on a Contractor generated form titled "Certificate of Workers Acknowledgment", to be completed for each employee in the same format and containing the same information as the example certificate at the end of this section. Training course completion certificates (initial and most recent update refresher) required by the information checked on the form shall be attached.

f. Physician: Resume of the physician who will or has performed the medical examinations and evaluations of the persons who will conduct the asbestos abatement work tasks. The physician shall be currently licensed by the state where the workers will be or have been examined, have expertise in pneumoconiosis and shall be responsible for the determination of medical surveillance protocols and for review of examination/test results performed in compliance with 29 CFR 1926.1101. The physician shall be familiar with the site's hazards and the scope of this project.

g. Independent Testing Laboratory: identify the independent testing laboratory selected to perform the sample analyses and report the results. The testing laboratory shall be completely independent from the Contractor as recognized by federal, state or local regulations. Written verification of the following criteria, signed by the testing laboratory principal and the Contractor, shall be submitted:

(1) Phase contrast microscopy (PCM): The laboratory is fully equipped and proficient in conducting PCM of airborne samples using the methods specified by 29 CFR 1926.1101, OSHA method ID-160, the most current version of NIOSH 2003-154 Method 7400 as shown in Table 3 at the end of this Section. The laboratory shall be currently judged proficient (classified as acceptable) in counting airborne asbestos samples by PCM by successful

participation in each of the last 4 rounds in the American Industrial Hygiene Association (AIHA) Proficiency Analytical Testing (PAT) Program or by participating in the AIHA PAT Program, and being judged proficient in counting samples.

(2) Polarized light microscopy (PLM): The laboratory is fully equipped and proficient in conducting PLM analyses of suspect ACM bulk samples in accordance with 40 CFR 763, Subpart E, Appendix E; the laboratory is currently accredited by NIST under the NVLAP for bulk asbestos analysis and will use analysts with demonstrated proficiency to conduct PLM analyses.

(3) Transmission electron microscopy (TEM): The laboratory is fully equipped and proficient in conducting TEM analysis of airborne samples using the mandatory method specified by 40 CFR 763, Subpart E, Appendix E; the laboratory is currently accredited by NIST under the NVLAP for airborne sample analysis of asbestos by TEM; the laboratory will use analysts with demonstrated proficiency under NVLAP.

(4) PCM/TEM: The laboratory is fully equipped and each analyst is proficient in conducting PCM and TEM analysis of airborne samples using NIOSH 2003-154 Method 7400 PCM and NIOSH 2003-154 Method 7402 (TEM confirmation of asbestos content of PCM results) from the same filter.

h. Disposal Facility, Transporter: Written evidence that the landfill to be used is approved for asbestos disposal by the USEPA state and local regulatory agencies. Copies of signed agreements between the Contractor (including subcontractors and transporters) and the asbestos waste disposal facility to accept and dispose of all asbestos containing waste shall be provided. The Contractor and transporters shall meet the DOT requirements of 49 CFR 171, 49 CFR 172, and 49 CFR 173 as well as registration requirements of 49 CFR 107 and other applicable state or local requirements. The disposal facility shall meet the requirements of 40 CFR 61, Sections .154 or .155, as required in 40 CFR 61 150(b), and other applicable state or local requirements.

1.5.3 Preconstruction Conference

The Contractor and the Contractor's Designated Competent Person, Project Supervisor, and Designated IH shall meet with the Contracting Officer (CO) prior to beginning work at a safety preconstruction conference to discuss the details of the Contractor's submitted APP to include the AHAP and AHAs appendices. Deficiencies in the APP will be discussed. Onsite work shall not begin until the APP has been accepted.

1.6 SAFETY

Prepare a written comprehensive site-specific Accident Prevention Plan (APP) at least 30 days prior to the preconstruction conference. The APP shall be in accordance with the format and requirements in Appendix A of EM 385-1-1. The APP shall incorporate an Asbestos Hazard Abatement Plan (AHAP), and Activity Hazard Analyses (AHAs) as separate appendices into one site-specific document. The APP shall take into consideration all the individual asbestos abatement work tasks See Section 01 35 26 GOVERNMENT SAFETY REQUIREMENTS for additional requirements.

1.6.1 Asbestos Hazard Abatement Plan Appendix

The AHAP shall be IAW EM 385-1-1 par 06.C.03 and include, but not be limited to, the following:

a. The personal protective equipment to be used;

b. The location and description of regulated areas including clean and dirty areas, and decontamination unit (clean room, shower room, equipment room, storage areas such as load-out unit);

c. Initial exposure assessment in accordance with 29 CFR 1926.1101;

d. Level of supervision;

e. Method of notification of other employers at the worksite;

f. Abatement method to include containment and control procedures;

g. Interface of trades;

h. Sequencing of asbestos related work;

i. Storage and disposal procedures and plan;

j. Type of wetting agent and asbestos encapsulant;

k. Location of local exhaust equipment;

l. Air monitoring methods (personal, environmental and clearance);

m. Bulk sampling and analytical methods (if required);

n. A detailed description of the method to be employed in order to control the spread of ACM wastes and airborne fiber;

o. Fire and medical emergency response procedures;

p. The security procedures to be used for all regulated areas.

1.6.2 Activity Hazard Analyses Appendix

AHAs for each major phase of work, shall be submitted and updated during the project. The AHAs format shall be in accordance with Figure 1-2 of EM 385-1-1. The analysis shall define the activities to be performed for a major phase of work, identify the sequence of work, the specific hazards anticipated, and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level. Work shall not proceed on that phase until the AHA has been accepted and a preparatory meeting has been conducted by the Contractor to discuss its contents with everyone engaged in the activities, including the onsite Government representatives. The AHAs shall be continuously reviewed and, when appropriate, modified to address changing site conditions or operations.

1.6.3 Local Exhaust System

Local exhaust units shall conform to ASSE Z9.2 and 29 CFR 1926.1101. Filters on local exhaust system equipment shall conform to ASSE Z9.2 and UL 586. Filter shall be UL labeled. Submit pressure differential

recordings and Manufacturer's certifications showing compliance with ASSE Z9.2 for:
a. Vacuums.
b. Water filtration equipment.
c. Ventilation equipment.
d. Other equipment required to contain airborne asbestos fibers.

1.7 SECURITY

Fenced and locked security area shall be provided for each regulated area. A log book shall be kept documenting entry into and out of the regulated area. Entry into regulated areas shall only be by personnel authorized by the Contractor and the CO. Personnel authorized to enter regulated areas shall be trained, medically evaluated, and wear the required personal protective equipment.

1.7.1 Licenses, Permits and Notifications

Obtain necessary licenses, permits and notifications in conjunction with the project's asbestos abatement, transportation and disposal actions and timely notification furnished of such actions as required by federal, state, regional, and local authorities. Notify the Regional Office of the USEPA state's environmental protection agency responsible for asbestos air emissions local air pollution control district/agency state OSHA program and the CO in writing, at least 10 days prior to the commencement of work, in accordance with 40 CFR 61, Subpart M, and state and local requirements to include the mandatory "Notification of Demolition and Renovation Record" form and other required notification documents. Notify by Certified Mail, Return Receipt Requested. Furnish copies of the receipts to the CO, in writing, prior to the commencement of work. Notify the local fire department 3 days before fireproofing material is removed from a building and the notice shall specify whether or not the material contains asbestos. The Contractor is responsible for the associated fees/costs for licenses, permits, and notifications.

1.7.2 Regulated Areas

All Class I, II, and III asbestos work shall be conducted within regulated areas. The regulated area shall be demarcated to minimize the number of persons within the area and to protect persons outside the area from exposure to airborne asbestos. Control access to regulated areas, ensure that only authorized personnel enter, and verify that Contractor required medical surveillance, training and respiratory protection program requirements are met prior to allowing entrance.

1.7.3 Warning Signs and Tape

Warning signs and tape printed bilingually in English and Spanish shall be provided at the regulated boundaries and entrances to regulated areas. Signs shall be located to allow personnel to read the signs and take the necessary protective steps required before entering the area. Warning signs, and displaying the following legend in the lower panel:

DANGER
ASBESTOS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
AUTHORIZED PERSONNEL ONLY
WEAR RESPIRATORY PROTECTION

AND PROTECTIVE CLOTHING IN THIS AREA

1.7.4 Warning Labels

Warning labels shall be affixed to all asbestos disposal containers, asbestos materials, scrap, waste debris, and other products contaminated with asbestos. Containers with preprinted warning labels conforming to requirements are acceptable.

1.8 MEDICAL SURVEILLANCE REQUIREMENTS

Medical surveillance requirements shall conform to 29 CFR 1926.1101. Asbestos workers shall be enrolled in a medical surveillance program that meets 29 CFR 1926.1101 (m) requirements and other pertinent state or local requirements. This requirement shall have been satisfied within the last 12 months. Submit required medical certification and the Physician's written opinion.

1.8.1 Respiratory Protection Program

The Contractor shall establish in writing, and implement a respiratory protection program in accordance with 29 CFR 1926.1101 and 29 CFR 1910.134. The Contractor shall establish minimum respiratory protection requirements based on measured or anticipated levels of airborne asbestos fiber concentrations.

1.8.2 Respiratory Fit Testing

The Contractor shall conduct a qualitative or quantitative fit test conforming to Appendix A of 29 CFR 1910.134 for each worker required to wear a respirator, and any authorized visitors who enter a regulated area where respirators are required to be worn. A respirator fit test shall be performed prior to initially wearing a respirator and every 12 months thereafter. If physical changes develop that will affect the fit, a new fit test shall be performed. Functional fit checks shall be performed each time a respirator is put on and in accordance with the manufacturer's recommendation.

1.8.3 Respirator Selection and Use Requirements

Provide respirators, and ensure that they are used as required by 29 CFR 1926.1101 and in accordance with CGA G-7 and the manufacturer's recommendations. Respirators shall be approved by the National Institute for Occupational Safety and Health NIOSH, under the provisions of 42 CFR 84, for use in environments containing airborne asbestos fibers. The initial respirator selection and the decisions regarding the upgrading or downgrading of respirator type shall be made by the Contractor's Designated IH based on the measured or anticipated airborne asbestos fiber concentrations to be encountered.

1.8.4 Personal Protective Equipment

Three complete sets of personal protective equipment shall be made available to the CO and authorized visitors for entry to the regulated area. The CO and authorized visitors shall be provided with training equivalent to that provided to Contractor employees in the selection, fitting, and use of personal protective equipment and the site safety and health requirements. Provide workers with personal protective clothing and equipment and ensure that it is worn properly. The Designated IH and

Designated Competent Person shall select and approve all the required personal protective clothing and equipment.

1.8.5 Whole Body Protection

Personnel exposed to or having the potential to be exposed to airborne concentrations of asbestos that exceed the PELs, or for all OSHA Classes of work for which a required negative exposure assessment is not produced, shall be provided with whole body protection and such protection shall be worn properly. Disposable whole body protection shall be disposed of as asbestos contaminated waste upon exiting from the regulated area. Reusable whole body protection worn shall be either disposed of as asbestos contaminated waste upon exiting from the regulated area or be properly laundered in accordance with 29 CFR 1926.1101. The Contractor's Designated Competent Person, in consultation with the Designated IH, has the authority to take immediate action to upgrade or downgrade whole body protection when there is an immediate danger to the health and safety of the wearer.

1.8.5.1 Coveralls

Disposable-breathable coveralls with a zipper front shall be provided. Sleeves shall be secured at the wrists, and foot coverings secured at the ankles.

1.8.5.2 Gloves

Gloves shall be provided to protect the hands where there is the potential for hand injuries (i.e., scrapes, punctures, cuts, etc.).

1.8.5.3 Foot Coverings

Cloth socks shall be provided and worn next to the skin. Footwear, as required by OSHA and EM 385-1-1, that is appropriate for safety and health hazards in the area shall be worn. Reusable footwear removed from the regulated area shall be thoroughly decontaminated or disposed of as ACM waste.

1.8.5.4 Head Covering

Hood type disposable head covering shall be provided. In addition, protective head gear (hard hats) shall be provided as required. Hard hats shall only be removed from the regulated area after being thoroughly decontaminated.

1.8.5.5 Protective Eye Wear

Eye protection shall be provided, when operations present a potential eye injury hazard, and shall meet the requirements of ANSI/ISEA Z87.1.

1.9 HYGIENE

Establish a decontamination area for the decontamination of employees, material and equipment. Ensure that employees enter and exit the regulated area through the decontamination area.

1.9.1 3-Stage Decontamination Area

A temporary decontamination unit that is adjacent and attached in a leak-tight manner to the regulated area shall be provided. The

decontamination unit shall have an equipment room and a clean room separated by a shower that complies with 29 CFR 1910.141, unless the Contractor can demonstrate that such facilities are not feasible. Equipment and surfaces of containers filled with ACM shall be cleaned prior to removing them from the equipment room or area. Two separate lockers shall be provided for each asbestos worker, one in the equipment room and one in the clean room. Wastewater shall be collected and filtered to remove asbestos contamination. Filters and residue shall be disposed of as asbestos contaminated material Filtered water shall be discharged to the sanitary sewer system. Wastewater filters shall be installed in series with the first stage pore size of 20 microns and the second stage pore size of 5 microns. The floor of the decontamination unit's clean room shall be kept dry and clean at all times. Proper housekeeping and hygiene requirements shall be maintained. Soap and towels shall be provided for showering, washing and drying. Any cloth towels provided shall be disposed of as ACM waste or shall be laundered in accordance with 29 CFR 1926.1101.

1.9.2 Load-Out Unit

A temporary load-out unit that is adjacent and connected to the regulated area shall be provided . The load-out unit shall be attached in a leak-tight manner to each regulated area.

1.9.3 Single Stage Decontamination Area

A decontamination area (equipment room/area) shall be provided for Class I work involving less than 25 feet or 10 square feet of TSI or surfacing ACM, and for Class II and Class III asbestos work operations where exposures exceed the PELs or where there is no negative exposure assessment. The equipment room or area shall be adjacent to the regulated area for the decontamination of employees, material, and their equipment which could be contaminated with asbestos. The area shall be covered by an impermeable drop cloth on the floor or horizontal working surface. The area must be of sufficient size to accommodate cleaning of equipment and removing personal protective equipment without spreading contamination beyond the area.

1.9.4 Decontamination Area Exit Procedures

Ensure that the following procedures are followed:

a. Before leaving the regulated area, remove all gross contamination and debris from work clothing using a HEPA vacuum.

b. Employees shall remove their protective clothing in the equipment room and deposit the clothing in labeled impermeable bags or containers for disposal and/or laundering.

c. Employees shall not remove their respirators until showering.

d. Employees shall shower prior to entering the clean room. If a shower has not been located between the equipment room and the clean room or the work is performed outdoors, ensure that employees engaged in Class I asbestos jobs: a) Remove asbestos contamination from their work suits in the equipment room or decontamination area using a HEPA vacuum before proceeding to a shower that is not adjacent to the work area; or b) Remove their contaminated work suits in the equipment room, without cleaning worksuits, and proceed to a shower that is not adjacent to the work area.

1.9.5 Smoking

Smoking, if allowed by the Contractor, shall only be permitted in designated areas approved by the CO.

1.10 TRAINING PROGRAM

Establish and submit a training program as specified by EPA MAP, training requirements at 40 CFR 763, OSHA requirements at 29 CFR 1926.1101 (k)(9). Contractor employees shall complete the required training for the type of work they are to perform and such training shall be documented and provided to the CO.

a. Class I and II operations 32 hours Asbestos Worker Training
b. Class II generic removal 8 hour Asbestos Worker Training
c. Class III operations 16 hour O & M Training

Prior to commencement of work the Contractor's Designated IH and Competent Person shall instruct each worker about:

a. The hazards and health effects of the specific types of ACM to be abated; and

b. The content and requirements of the Contractor's APP to include the AHAP and AHAs and site-specific safety and health precautions.

PART 2 PRODUCTS

2.1 ENCAPSULANTS

Encapsulants shall conform to USEPA requirements, shall contain no toxic or hazardous substances and no solvent. Submit certificates stating that encapsulants meet the applicable specified performance requirements.

2.2 EXPENDABLE SUPPLIES

2.2.1 Glovebag

Glovebags shall be provided as described in 29 CFR 1926.1101 . The glovebag assembly shall be 6 mil thick plastic, prefabricated and seamless at the bottom with preprinted OSHA warning label.

2.2.2 Duct Tape

Industrial grade duct tape of appropriate widths suitable for bonding sheet plastic and disposal container.

2.2.3 Disposal Containers

Leak-tight (defined as solids, liquids, or dust that cannot escape or spill out) disposal containers shall be provided for ACM wastes as required by 29 CFR 1926.1101 . Disposal containers can be in the form of:

a. Disposal Bags

b. Fiberboard Drums

c. Cardboard Boxes

2.2.4 Sheet Plastic

Sheet plastic shall be polyethylene of 6 mil minimum thickness and shall be provided in the largest sheet size necessary to minimize seams Film shall be clear, frosted or black and conform to ASTM D4397, except as specified below:

2.2.4.1 Flame Resistant

Where a potential for fire exists, flame-resistant sheets shall be provided. Film shall be frosted or black and shall conform to the requirements of NFPA 701.

2.2.4.2 Reinforced

Reinforced sheets shall be provided where high skin strength is required, such as where it constitutes the only barrier between the regulated area and the outdoor environment. The sheet stock shall consist of translucent, nylon-reinforced or woven-polyethylene thread laminated between 2 layers of polyethylene film. Film shall meet flame resistant standards of NFPA 701.

2.2.5 Mastic Removing Solvent

Mastic removing solvent shall be nonflammable and shall not contain methylene chloride, glycol ether, or halogenated hydrocarbons. Solvents used onsite shall have a flash point greater than 140 degrees F.

2.2.6 Leak-tight Wrapping

Two layers of 6 mil minimum thick polyethylene sheet stock shall be used for the containment of removed asbestos-containing components or materials such as reactor vessels, large tanks, boilers, insulated pipe segments and other materials too large to be placed in disposal bags. Upon placement of the ACM component or material, each layer shall be individually leak-tight sealed with duct tape.

2.2.7 Viewing Inspection Window

Where feasible, a minimum of 1 clear, 1/8 inch thick, acrylic sheet, 18 by 24 inches, shall be installed as a viewing inspection window at eye level on a wall in each containment enclosure. The windows shall be sealed leak-tight with industrial grade duct tape.

2.2.8 Wetting Agents

Removal encapsulant (a penetrating encapsulant) shall be provided when conducting removal abatement activities that require a longer removal time or are subject to rapid evaporation of amended water. The removal encapsulant shall be capable of wetting the ACM and retarding fiber release during disturbance of the ACM greater than or equal to that provided by amended water. Performance requirements for penetrating encapsulants are specified in paragraph ENCAPSULANTS above.

2.2.9 Strippable Coating

Strippable coating in aerosol cans shall be used to adhere to surfaces and to be removed cleanly by stripping, at the completion of work.

2.3 EQUIPMENT

2.3.1 Scales

Scales used for measurement shall be public scales. Weighing shall be at a point nearest the work at which a public scale is available. Scales shall be standard truck scales of the beam type; scales shall be equipped with the type registering beam and an "over and under" indicator; and shall be capable of accommodating the entire vehicle. Scales shall be tested, approved and sealed by an inspector of the State of Utah. Scales shall be calibrated and resealed as often as necessary and at least once every three months to ensure continuous accuracy. Vehicles used for hauling ACM shall be weighed empty daily at such time as directed and each vehicle shall bear a plainly legible identification mark.

2.3.2 Tools

Vacuums shall be equipped with HEPA filters, of sufficient capacity and necessary capture velocity at the nozzle or nozzle attachment to efficiently collect, transport and retain the ACM waste material. Power tools shall not be used to remove ACM unless the tool is equipped with effective, integral HEPA filtered exhaust ventilation capture and collection system. Reusable tools shall be thoroughly decontaminated prior to being removed from regulated areas.

2.3.3 Rental Equipment

If rental equipment is to be used, written notification shall be provided to the rental agency, concerning the intended use of the equipment, the possibility of asbestos contamination of the equipment and the steps that will be taken to decontaminate such equipment.

2.3.4 Air Monitoring Equipment

The Contractor's Designated IH shall approve air monitoring equipment. The equipment shall include, but shall not be limited to:

a. High-volume sampling pumps that can be calibrated and operated at a constant airflow up to 16 liters per minute.

b. Low-volume, battery powered, body-attachable, portable personal pumps that can be calibrated to a constant airflow up to approximately 3.5 liters per minute, and a self-contained rechargeable power pack capable of sustaining the calibrated flow rate for a minimum of 10 hours. The pumps shall also be equipped with an automatic flow control unit which shall maintain a constant flow, even as filter resistance increases due to accumulation of fiber and debris on the filter surface.

c. Single use standard 25 mm diameter cassette, open face, 0.8 micron pore size, mixed cellulose ester membrane filters and cassettes with 50 mm electrically conductive extension cowl, and shrink bands for personal air sampling.

d. A flow calibrator capable of calibration to within plus or minus 2 percent of reading over a temperature range of minus 4 to plus 140 degrees F and traceable to a NIST primary standard.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Asbestos abatement work tasks shall be performed as summarized in the scope of work. Use the engineering controls and work practices required in 29 CFR 1926.1101(g) in all operations regardless of the levels of exposure. Personnel shall wear and utilize protective clothing and equipment. Do not permit eating, smoking, drinking, chewing or applying cosmetics in the regulated area. Personnel of other trades, shall not be exposed at any time to airborne concentrations of asbestos unless all the administrative and personal protective provisions of the Contractor's APP are complied with. Power to the regulated area shall be locked-out and tagged in accordance with 29 CFR 1910.147, and temporary electrical service with ground fault circuit interrupters shall be provided as needed. Temporary electrical service shall be disconnected when necessary for wet removal. Stop abatement work in the regulated area immediately when the airborne total fiber concentration: (1) equals or exceeds 0.01 f/cc, or the pre-abatement concentration, whichever is greater, outside the regulated area; or (2) equals or exceeds 1.0 f/cc inside the regulated area. Correct the condition to the satisfaction of the CO, including visual inspection and air sampling. Work shall resume only upon notification by the CO. Corrective actions shall be documented.

3.2 PROTECTION OF ADJACENT WORK OR AREAS TO REMAIN

Perform asbestos abatement without damage to or contamination of adjacent work or area. Where such work or area is damaged or contaminated, it shall be restored to its original condition or decontaminated at no expense to the Government. When spills occur, work shall stop in all effected areas immediately and the spill shall be cleaned. When satisfactory visual inspection and air sampling analysis results are obtained and have been evaluated by the Contractor's Designated IH and the CO, work shall proceed.

3.3 OBJECTS

3.3.1 Removal of Mobile Objects

The Government will remove Furniture and equipment from the area of work before work begins.

3.3.2 Stationary Objects

Stationary objects, furniture and equipment shall remain in place and shall be precleaned using HEPA vacuum followed by adequate wet wiping. Stationary objects and furnishings shall be covered with 2 layers of polyethylene and edges sealed with duct tape.

3.4 BUILDING VENTILATION SYSTEM AND CRITICAL BARRIERS

Building ventilation system supply and return air ducts in a regulated area shall be isolated by airtight seals to prevent the spread of contamination throughout the system. The airtight seals shall consist of 2 layers of polyethylene. Edges to wall, ceiling and floor surfaces shall be sealed with industrial grade duct tape.

3.5 METHODS OF COMPLIANCE

3.5.1 Mandated Practices

The specific abatement techniques and items identified shall be detailed in the Contractor's AHAP. Use the following engineering controls and work practices in all operations, regardless of the levels of exposure:

a. Vacuum cleaners equipped with HEPA filters.

b. Wet methods or wetting agents except where it can be demonstrated that the use of wet methods is unfeasible due to the creation of electrical hazards, equipment malfunction, and in roofing.

c. Prompt clean-up and disposal.

d. Inspection and repair of polyethylene.

e. Cleaning of equipment and surfaces of containers prior to removing them from the equipment room or area.

3.5.2 Control Methods

Use the following control methods:

a. Local exhaust ventilation equipped with HEPA filter;

b. Enclosure or isolation of processes producing asbestos dust;

c. Where the feasible engineering and work practice controls are not sufficient to reduce employee exposure to or below the PELs, use them to reduce employee exposure to the lowest levels attainable and shall supplement them by the use of respiratory protection.

3.5.3 Unacceptable Practices

The following work practices shall not be used:

a. High-speed abrasive disc saws that are not equipped with point of cut ventilator or enclosures with HEPA filtered exhaust air.

b. Compressed air used to remove asbestos containing materials, unless the compressed air is used in conjunction with an enclosed ventilation system designed to capture the dust cloud created by the compressed air.

c. Dry sweeping, shoveling, or other dry clean up.

d. Employee rotation as a means of reducing employee exposure to asbestos.

3.5.4 Class I Work Procedures

In addition to requirements of paragraphs Mandated Practices and Control Methods, the following engineering controls and work practices shall be used:

a. A Competent Person shall supervise the installation and operation of the control methods.

b. For jobs involving the removal of more than 25 feet or 10 square feet

of TSI or surfacing material, place critical barriers over all openings to the regulated area.

c. HVAC systems shall be isolated in the regulated area by sealing with a double layer of plastic or air-tight rigid covers.

d. Impermeable dropcloths (6 mil or greater thickness) shall be placed on surfaces beneath all removal activity.

e. Where a negative exposure assessment has not been provided or where exposure monitoring shows the PEL was exceeded, the regulated area shall be ventilated with a HEPA unit and employees must use PPE.

3.5.5 Specific Control Methods for Class I Work

3.5.5.1 Negative Pressure Enclosure (NPE) System

The NPE system shall provide at least 4 air changes per hour inside the containment. The local exhaust unit equipment shall be operated 24 hours per day until the containment is removed. The NPE shall be smoke tested for leaks at the beginning of each shift and be sufficient to maintain a minimum pressure differential of minus 0.02 inch of water column relative to adjacent, unsealed areas. Pressure differential shall be monitored continuously, 24 hours per day, with an automatic manometric recording instrument and Records shall be provided daily on the same day collected to the CO. The CO shall be notified immediately if the pressure differential falls below the prescribed minimum. The building ventilation system shall not be used as the local exhaust system for the regulated area. The NPE shall terminate outdoors unless an alternate arrangement is allowed by the CO. All filters used shall be new at the beginning of the project and shall be periodically changed as necessary and disposed of as ACM waste.

3.5.5.2 Glovebag Systems

Glovebags shall be used without modification, smoke-tested for leaks, and completely cover the circumference of pipe or other structures where the work is to be done. Glovebags shall be used only once and shall not be moved. Glovebags shall not be used on surfaces that have temperatures exceeding 150 degrees F. Prior to disposal, glovebags shall be collapsed using a HEPA vacuum. Before beginning the operation, loose and friable material adjacent to the glovebag operation shall be wrapped and sealed in 2 layers of plastic or otherwise rendered intact. At least 2 persons shall perform glovebag removal. Designated boundary limits for the asbestos work shall be established with rope or other continuous barriers and all other requirements for asbestos control areas shall be maintained, including area signage and boundary warning tape .

a. Attach HEPA vacuum systems to the bag to prevent collapse during removal of ACM.

b. The negative pressure glove boxes shall be fitted with gloved apertures and a bagging outlet and constructed with rigid sides from metal or other material which can withstand the weight of the ACM and water used during removal. A negative pressure shall be created in the system using a HEPA filtration system. The box shall be smoke tested for leaks prior to each use.

3.5.5.3 Wrap and Cut Operation

Prior to cutting pipe, the asbestos-containing insulation shall be wrapped with polyethylene and securely sealed with duct tape to prevent asbestos becoming airborne as a result of the cutting process. The following steps shall be taken: install glovebag, strip back sections to be cut 6 inches from point of cut, and cut pipe into manageable sections.

3.5.6 Class II Work

In addition to the requirements of paragraphs Mandated Practices and Control Methods, the following engineering controls and work practices shall be used:

a. A Competent Person shall supervise the work.

b. For indoor work, critical barriers shall be placed over all openings to the regulated area.

c. Impermeable dropcloths shall be placed on surfaces beneath all removal activity.

3.5.7 Specific Control Methods for Class II Work

3.5.7.1 Vinyl and Asphalt Flooring Materials

When removing vinyl and asphalt flooring materials which contain ACM , use the following practices. Resilient sheeting shall be removed by adequately wet methods. Tiles shall be removed intact (if possible); wetting is not required when tiles are heated and removed intact. Flooring or its backing shall not be sanded. Scraping of residual adhesive and/or backing shall be performed using wet methods. Mechanical chipping is prohibited unless performed in a negative pressure enclosure. Dry sweeping is prohibited. Use vacuums equipped with HEPA filter, disposable dust bag, and metal floor tool (no brush) to clean floors.

3.5.7.2 Roofing Material

When removing roofing materials which contain ACM as described in 29 CFR 1926.1101(g)(8)(ii), use the following practices . Roofing material shall be removed in an intact state. Wet methods shall be used to remove roofing materials that are not intact, or that will be rendered not intact during removal, unless such wet methods are not feasible or will create safety hazards. When removing built-up roofs, with asbestos-containing roofing felts and an aggregate surface, using a power roof cutter, all dust resulting from the cutting operations shall be collected by a HEPA dust collector, or shall be HEPA vacuumed by vacuuming along the cut line. Asbestos-containing roofing material shall not be dropped or thrown to the ground, but shall be lowered to the ground via covered, dust-tight chute, crane, hoist or other method approved by the CO. Any ACM that is not intact shall be lowered to the ground as soon as practicable, but not later than the end of the work shift. While the material remains on the roof it shall be kept wet or placed in an impermeable waste bag or wrapped in plastic sheeting. Intact ACM shall be lowered to the ground as soon as practicable, but not later than the end of the work shift. Unwrapped material shall be transferred to a closed receptacle. Critical barriers shall be placed over roof level heating and ventilation air intakes.

3.5.7.3 Cementitious Siding and Shingles or Transite Panels

When removing cementitious asbestos-containing siding, shingles or transite panels use the following work practices . Intentionally cutting, abrading or breaking is prohibited. Each panel or shingle shall be sprayed with amended water prior to removal. Nails shall be cut with flat, sharp instruments. Unwrapped or unbagged panels or shingles shall be immediately lowered to the ground via covered dust-tight chute, crane or hoist, or placed in an impervious waste bag or wrapped in plastic sheeting and lowered to the ground no later than the end of the work shift.

3.5.7.4 Gaskets

Gaskets shall be thoroughly wetted with amended water prior to removal and immediately placed in a disposal container. If a gasket is visibly deteriorated and unlikely to be removed intact, removal shall be undertaken within a glovebag. Any scraping to remove residue shall be performed wet.

3.5.8 Specific Control Methods for Class III Work

Class III asbestos work shall be conducted using engineering and work practice controls which minimize the exposure to employees performing the asbestos work. The work shall be performed using wet methods and, to the extent feasible, using local exhaust. Use impermeable drop cloths and shall isolate the operation, using mini-enclosures or glovebag systems, where the disturbance involves drilling, cutting, abrading, sanding, chipping, breaking, or sawing of TSI or surfacing material.

3.5.9 Specific Control Methods for Class IV Work

Class IV jobs shall be conducted using wet methods and HEPA vacuums. Employees cleaning up debris and waste in a regulated area where respirators are required shall wear the selected respirators.

3.5.10 Sealing Contaminated Items Designated for Disposal

Contaminated items designated for removal shall be coated with an asbestos lockdown encapsulant before being removed from the asbestos control area. The asbestos lockdown encapsulant shall be tinted a contrasting color and shall be spray applied by airless method. Thoroughness of sealing operation shall be visually gauged by the extent of colored coating on exposed surfaces.

3.6 FINAL CLEANING AND VISUAL INSPECTION

After completion of all asbestos removal work and the gross amounts of asbestos have been removed from every surface, any remaining visible accumulations of asbestos shall be collected. For all classes of indoor asbestos abatement projects a final cleaning shall be performed using HEPA vacuum and wet cleaning of all exposed surfaces and objects in the regulated area. Upon completion of the cleaning, conduct a visual pre-inspection of the cleaned area in preparation for a final inspection before final air clearance monitoring. The Contractor and the CO shall conduct a final visual inspection of the cleaned regulated area in accordance with ASTM E1368 and document the results . If the CO rejects the clean regulated area as not meeting final cleaning requirements, reclean as necessary and have a follow-on inspection conducted with the CO. Recleaning and follow-up reinspection shall be at the Contractor's expense.

3.7 LOCKDOWN

Prior to removal of plastic barriers and after final visual inspection, a (lockdown) encapsulant shall be spray applied to ceiling, walls, floors, and other surfaces in the regulated area.

3.8 EXPOSURE ASSESSMENT AND AIR MONITORING

3.8.1 General Requirements

a. Exposure assessment, air monitoring and analysis of airborne concentration of asbestos fibers shall be performed in accordance with 29 CFR 1926.1101, and the Contractor's air monitoring plan. Results of breathing zone samples shall be posted at the job site and made available to the CO. Submit all documentation regarding initial exposure assessments, negative exposure assessments, and air-monitoring results.

b. Worker Exposure.

(1) The Contractor's Designated IH shall collect samples representative of the exposure of each employee who is assigned to work within a regulated area. Breathing zone samples shall be taken for at least 25 percent of the workers in each shift, or a minimum of 2, whichever is greater. Air monitoring results at the 95 percent confidence level shall be calculated as shown in Table 2 at the end of this section.

(2) Workers shall not be exposed to an airborne fiber concentration in excess of 1.0 f/cc, as averaged over a sampling period of 30 minutes. Should a personal excursion concentration of 1.0 f/cc expressed as a 30-minute sample occur inside a regulated work area, stop work immediately, notify the Contracting Officer, and implement additional engineering controls and work practice controls to reduce airborne fiber levels below prescribed limits in the work area. Do not restart work until authorized by the CO.

c. Environmental Exposure

(1) All environmental air monitoring shall be performed by the Contractor's Designated IH .

(2) Environmental and final clearance air monitoring shall be performed using NIOSH 2003-154 Method 7400 (PCM) with optional confirmation of results by TEM.

(3) For environmental and final clearance, air monitoring shall be conducted at a sufficient velocity and duration to establish the limit of detection of the method used at 0.005 f/cc.

(4) When confirming asbestos fiber concentrations (asbestos f/cc) from environmental and final clearance samples, use TEM in accordance with NIOSH 2003-154 Method 7402. When such confirmation is conducted, it shall be from the same sample filter used for the NIOSH 2003-154 Method 7400 PCM analysis. All confirmation of asbestos fiber concentrations, using NIOSH 2003-154 Method 7402, shall be at the Contractor's expense.

(5) Monitoring may be duplicated by the Government at the discretion of the CO and at the Government's expense.

(6) Maintain a fiber concentration inside a regulated area less than or equal to 0.1 f/cc expressed as an 8 hour, time-weighted average (TWA) during the conduct of the asbestos abatement.

(7) At the discretion of the Contracting Officer, fiber concentration may exceed 0.1 f/cc but shall not exceed 1.0 f/cc expressed as an 8-hour TWA. Should an environmental concentration of 1.0 f/cc expressed as an 8-hour TWA occur inside a regulated work area, stop work immediately, notify the Contracting Officer, and implement additional engineering controls and work practice controls to reduce airborne fiber levels below prescribed limits in the work area. Work shall not restart until authorized by the CO.

3.8.2 Initial Exposure Assessment

The Contractor's Designated IH shall conduct an exposure assessment immediately before or at the initiation of an asbestos abatement operation to ascertain expected exposures during that operation. The assessment shall be completed in time to comply with the requirements, which are triggered by exposure data or the lack of a negative exposure assessment, and to provide information necessary to assure that all control systems planned are appropriate for that operation. The assessment shall take into consideration both the monitoring results and all observations, information or calculations which indicate employee exposure to asbestos, including any previous monitoring conducted in the workplace, or of the operations of the Contractor which indicate the levels of airborne asbestos likely to be encountered on the job. For Class I asbestos work, until the employer conducts exposure monitoring and documents that employees on that job will not be exposed in excess of PELs, or otherwise makes a negative exposure assessment, presume that employees are exposed in excess of the PEL-TWA and PEL-Excursion Limit.

3.8.3 Negative Exposure Assessment

Provide a negative exposure assessment for the specific asbestos job which will be performed within 3 days of the initiation of the project and conform to the following criteria:

a. Prior Asbestos Jobs: Where the Contractor has monitored prior asbestos jobs for the PEL and the PEL-Excursion Limit within 12 months of the current job, the monitoring and analysis were performed in compliance with asbestos standard in effect; the data were obtained during work operations conducted under workplace conditions closely resembling the processes, type of material, control methods, work practices, and environmental conditions used and prevailing in the Contractor's current operations; the operations were conducted by employees whose training and experience are no more extensive than that of employees performing the current job; and these data show that under the conditions prevailing and which will prevail in the current workplace, there is a high degree of certainty that the monitoring covered exposure from employee exposures will not exceed the PEL-TWA and PEL-Excursion Limit.

b. Initial Exposure Monitoring: The results of initial exposure monitoring of the current job, made from breathing zone air samples

that are representative of the 8-hour PEL-TWA and 30-minute short-term exposures of each employee. The monitoring covered exposure from operations which are most likely during the performance of the entire asbestos job to result in exposures over the PELs.

3.8.4 Environmental Air Monitoring During Abatement

Until an exposure assessment is provided to the CO, environmental air monitoring shall be conducted at locations and frequencies that will accurately characterize any evolving airborne asbestos fiber concentrations. The assessment shall demonstrate that the product or material containing asbestos minerals, or the abatement involving such product or material, cannot release airborne asbestos fibers in concentrations exceeding 0.01 f/cc as a TWA under those work conditions having the greatest potential for releasing asbestos. The monitoring shall be at least once per shift at locations including, but not limited to, close to the work inside a regulated area; preabatement sampling locations; outside entrances to a regulated area; close to glovebag operations; representative locations outside of the perimeter of a regulated area; inside clean room; and at the exhaust discharge point of local exhaust system ducted to the outside of a containment (if used). If the sampling outside regulated area shows airborne fiber levels have exceeded background or 0.01 f/cc, whichever is greater, work shall be stopped immediately, and the Contracting Officer notified. The condition causing the increase shall be corrected. Work shall not restart until authorized by the CO.

3.8.5 Air-Monitoring Results and Documentation

Air sample fiber counting shall be completed and results provided within 24 hours (breathing zone samples), and 48 hours (environmental/clearance monitoring) after completion of a sampling period. The CO shall be notified immediately of any airborne levels of asbestos fibers in excess of established requirements. Written sampling results shall be provided within 5 working days of the date of collection. The written results shall be signed by testing laboratory analyst, testing laboratory principal and the Contractor's Designated IH . The air sampling results shall be documented on a Contractor's daily air monitoring log. The daily air monitoring log shall contain the following information for each sample:

a. Sampling and analytical method used;

b. Date sample collected;

c. Sample number;

d. Sample type: BZ = Breathing Zone (Personal), P = Preabatement, E = Environmental, C = Abatement Clearance;

e. Location/activity/name where sample collected;

f. Sampling pump manufacturer, model and serial number, beginning flow rate, end flow rate, average flow rate (L/min);

g. Calibration date, time, method, location, name of calibrator, signature;

h. Sample period (start time, stop time, elapsed time (minutes);

i. Total air volume sampled (liters);

j. Sample results (f/cc and S/mm square) if EPA methods are required for final clearance;

k. Laboratory name, location, analytical method, analyst, confidence level. In addition, the printed name and a signature and date block for the Industrial Hygienist who conducted the sampling and for the Industrial Hygienist who reviewed the daily air monitoring log verifying the accuracy of the information.

3.9 CLEARANCE CERTIFICATION

When asbestos abatement is complete, ACM waste is removed from the regulated areas, and final clean-up is completed, the CO will allow the warning signs and boundary warning tape to be removed. After final clean-up and acceptable airborne concentrations are attained, but before the HEPA unit is turned off and the containment removed, the Contractor shall remove all pre-filters on the building HVAC system and provide new pre-filters. Dispose of such filters as asbestos contaminated materials. HVAC, mechanical, and electrical systems shall be re-established in proper working order. The Contractor and the CO shall visually inspect all surfaces within the containment for residual material or accumulated debris. Reclean all areas showing dust or residual materials. The CO will certify in writing that the area is safe before unrestricted entry is permitted. The Government will have the option to perform monitoring to certify the areas are safe before entry is permitted.

3.10 CLEANUP AND DISPOSAL

3.10.1 Title to ACM Materials

ACM material resulting from abatement work, except as specified otherwise, shall become the property of the Contractor and shall be disposed of as specified and in accordance with applicable federal, state and local regulations.

3.10.2 Collection and Disposal of Asbestos

All ACM waste shall be collected including contaminated wastewater filters, scrap, debris, bags, containers, equipment, and asbestos contaminated clothing and placed in leak-tight containers. Waste within the containers shall be wetted in case the container is breeched. Asbestos-containing waste shall be disposed of at an EPA, state and local approved asbestos landfill . For temporary storage, sealed impermeable containers shall be stored in an asbestos waste load-out unit or in a storage/transportation conveyance (i.e., dumpster, roll-off waste boxes, etc.) in a manner acceptable to and in an area assigned by the CO. Procedure for hauling and disposal shall comply with 40 CFR 61, Subpart M, state, regional, and local standards. Submit manufacturer's catalog data for all materials and equipment to be used, including brand name, model, capacity, performance characteristics and any other pertinent information. Test results and certificates from the manufacturer of encapsulants substantiating compliance with performance requirements of this specification. Safety Data Sheets for all chemicals to be used onsite in the same format as implemented in the Contractor's HAZARD COMMUNICATION PROGRAM. Data shall include, but shall not be limited to, the following items:

a. High Efficiency Filtered Air (HEPA) local exhaust equipment

b. Vacuum cleaning equipment

c. Pressure differential monitor for HEPA local exhaust equipment

d. Air monitoring equipment

e. Respirators

f. Personal protective clothing and equipment

g. Glovebags. Written manufacturer's proof that glovebags will not break down under expected temperatures and conditions.

h. Duct Tape

i. Disposal Containers

j. Sheet Plastic

k. Wetting Agent

l. Strippable Coating

m. Prefabricated Decontamination Unit

n. Safety Data Sheets (for all chemicals proposed)

3.10.3 Records and Management Plan

3.10.3.1 Asbestos Waste Shipment Records

Complete and provide the CO final completed copies of the Waste Shipment Record for all shipments of waste material as specified in 40 CFR 61, Subpart M and other required state waste manifest shipment records, within 3 days of delivery to the landfill. Each Waste Shipment Record shall be signed and dated by the Contractor , the waste transporter and disposal facility operator.

3.10.3.2 Asbestos Management Plan

Provide a summary, in electronic form, of site activities (bulk samples, asbestos removed, repaired, encased, etc.) for updating the installation Asbestos Management Plan.

TABLE 2

FORMULA FOR CALCULATION OF THE 95 PERCENT CONFIDENCE LEVEL
(Reference: NIOSH 7400)

Fibers/cc(01.95 percent CL) = X + [(X) * (1.645) * (CV)]

Where: X = ((E)(AC))/((V)(1000))

E = ((F/Nf) - (B/Nb))/Af

CV = The precision value; 0.45 shall be used unless the analytical laboratory provides the Contracting Officer with documentation (Round Robin Program participation and results) that the laboratory's precision is better.

AC = Effective collection area of the filter in square millimeters

V = Air volume sampled in liters

E = Fiber density on the filter in fibers per square millimeter

F/Nf = Total fiber count per graticule field

B/Nb = Mean field blank count per graticule field

Af = Graticule field area in square millimeters

TWA = C1/T1 + C2/T2 = Cn/Tn

Where: C = Concentration of contaminant

T = Time sampled.

TABLE 3
NIOSH METHOD 7400
PCM ENVIRONMENTAL AIR SAMPLING PROTOCOL (NON-PERSONAL)

Sample Location	Minimum No. of Samples	Filter Pore Size (Note 1)	Min. Vol. (Note 2) (Liters)	Sampling Rate (liters/min.
Inside Abatement Area	0.5/140 Square Meters (Notes 3 & 4)	0.45 microns	3850	2-16
Each Room in 1 Abatement Area Less than 140 Square meters		0.45 microns	3850	2-16
Field Blank	2	0.45 microns	0	0
Laboratory Blank	1	0.45 microns	0	0

Notes:
1. Type of filter is Mixed Cellulose Ester.
2. Ensure detection limit for PCM analysis is established at 0.005 fibers/cc.
3. One sample shall be added for each additional 140 square meters. (The corresponding I-P units are 5/1500 square feet).
4. A minimum of 5 samples are to be taken per abatement area, plus 2 field blanks.

TABLE 4
EPA AHERA METHOD: TEM AIR SAMPLING PROTOCOL

Location Sampled	Minimum No. of Samples	Filter Pore Size	Min. Vol. (Liters)	Sampling Rate (liters/min.)
Inside Abatement Area	5	0.45 microns	1500	2-16
Outside Abatement Area	5	0.45 microns	1500	2-16
Field Blank	2	0.45 microns	0	0
Laboratory Blank	1	0.45 microns	0	0

Notes:
1. Type of filter is Mixed Cellulose Ester.
2. The detection limit for TEM analysis is 70 structures/square mm.

CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

PROJECT NAME _____ CONTRACT NO. _____
PROJECT ADDRESS _____
CONTRACTOR FIRM NAME _____
EMPLOYEE'S NAME _____,_____,_____,
(Print) (Last) (First) (MI)

Social Security Number: _____-_____-_____,__(Optional)

WORKING WITH ASBESTOS CAN BE DANGEROUS. INHALING ASBESTOS FIBERS HAS BEEN LINKED WITH TYPES OF LUNG DISEASE AND CANCER. IF YOU SMOKE AND INHALE ASBESTOS FIBERS, THE CHANCE THAT YOU WILL DEVELOP LUNG CANCER IS GREATER THAN THAT OF THE NONSMOKING PUBLIC.

Your employer's contract for the above project requires that you be provided and you complete formal asbestos training specific to the type of work you will perform and project specific training; that you be supplied with proper personal protective equipment including a respirator, that you be trained in its use; and that you receive a medical examination to evaluate your physical capacity to perform your assigned work tasks, under the environmental conditions expected, while wearing the required personal protective equipment. These things are to be done at no cost to you. By signing this certification, you are acknowledging that your employer has met these obligations to you. The Contractor's Designated Industrial Hygienist will check the block(s) for the type of formal training you have completed. Review the checked blocks prior to signing this certification.

FORMAL TRAINING:
_____ a. For Competent Persons and Supervisors: I have completed EPA's Model Accreditation Program (MAP) training course, "Contractor/Supervisor", that meets this State's requirements.

b. For Workers:
_____ (1) For OSHA Class I work: I have completed EPA's MAP training course, "Worker", that meets this State's requirements.
_____ (2) For OSHA Class II work (where there will be abatement of more than one type of Class II materials, i.e., roofing, siding, floor tile, etc.): I have completed EPA's MAP training course, "Worker", that meets this State's requirements.
(3) For OSHA Class II work (there will only be abatement of one type of Class II material):
_____ (a) I have completed an 8-hour training class on the elements of 29 CFR 1926.1101(k)(9)(viii), in addition to the specific work practices and engineering controls of 29 CFR 1926.1101(g) and hands-on training.
_____ (b) I have completed EPA's MAP training course, "Worker", that meets this State's requirements.
_____ (4) For OSHA Class III work: I have completed at least a 16-hour course consistent with EPA requirements for training of local education agency maintenance and custodial staff at 40 CFR 763, Section .92(a)(2) and the elements of 29 CFR 1926.1101(k)(9)(viii), in addition to the specific work practices and engineering controls at 29 CFR 1926.1101, and hands-on training.

CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

_____ (5) For OSHA Class IV work: I have completed at least a 2-hr course consistent with EPA requirements for training of local education agency maintenance and custodial staff at 40 CFR 763, (a)(1), and the elements of 29 CFR 1926.1101(k)(9)(viii), in addition to the specific work practices and engineering controls at 29 CFR 1926.1101(g) and hands-on training.

_____ c. Workers, Supervisors and the Designated Competent Person: I have completed annual refresher training as required by EPA's MAP that meets this State's requirements.

PROJECT SPECIFIC TRAINING:
_____ I have been provided and have completed the project specific training required by this Contract. My employer's Designated Industrial Hygienist and Designated Competent Person conducted the training.

RESPIRATORY PROTECTION:
_____ I have been trained in accordance with the criteria in the Contractor's Respiratory Protection program. I have been trained in the dangers of handling and breathing asbestos dust and in the proper work procedures and use and limitations of the respirator(s) I will wear. I have been trained in and will abide by the facial hair and contact lens use policy of my employer.

RESPIRATOR FIT-TEST TRAINING:
_____ I have been trained in the proper selection, fit, use, care, cleaning, maintenance, and storage of the respirator(s) that I will wear. I have been fit-tested in accordance with the criteria in the Contractor's Respiratory Program and have received a satisfactory fit. I have been assigned my individual respirator. I have been taught how to properly perform positive and negative pressure fit-check upon donning negative pressure respirators each time.

EPA/STATE CERTIFICATION/LICENSE

I have an EPA/State certification/license as:
Building Inspector/Management Planner; Certification #_____
Contractor/Supervisor, Certification # _____
Project Designer, Certification # _____
Worker, Certification # _____

MEDICAL EXAMINATION:
_____ I have had a medical examination within the last twelve months which was paid for by my employer. The examination included: health history, pulmonary function tests, and may have included an evaluation of a chest x-ray. A physician made a determination regarding my physical capacity to perform work tasks on the project while wearing personal protective equipment including a respirator. I was personally provided a copy and informed of the results of that examination. My employer's Industrial Hygienist evaluated the medical certification provided by the physician and checked the appropriate blank below. The physician determined that there:

_____ were no limitations to performing the required work tasks.
_____ were identified physical limitations to performing the required work tasks.

CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

Date of the medical examination _____

Employee Signature _____ date _____

Contractor's Industrial Hygienist Signature _____ date _____

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LEAD IN CONSTRUCTION
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PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN INDUSTRIAL HYGIENE ASSOCIATION (AIHA)

AIHA Z88.6	(2006) Respiratory Protection - Respirator Use-Physical Qualifications for Personnel

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)

HUD 6780	(1995; Errata Aug 1996;Rev Ch. 7 - 1997) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing

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

29 CFR 1926.103	Respiratory Protection
29 CFR 1926.21	Safety Training and Education
29 CFR 1926.33	Access to Employee Exposure and Medical Records
29 CFR 1926.55	Gases, Vapors, Fumes, Dusts, and Mists
29 CFR 1926.59	Hazard Communication
29 CFR 1926.62	Lead
29 CFR 1926.65	Hazardous Waste Operations and Emergency Response
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 268	Land Disposal Restrictions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 178	Specifications for Packagings

UNDERWRITERS LABORATORIES (UL)

UL 586	(2009; Reprint Sep 2014) Standard for High-Efficiency Particulate, Air Filter Units

1.2 DEFINITIONS

1.2.1 Action Level

Employee exposure, without regard to use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter of air averaged over an 8 hour period.

1.2.2 Area Sampling

Sampling of lead concentrations within the lead control area and inside the physical boundaries which is representative of the airborne lead concentrations but is not collected in the breathing zone of personnel (approximately 5 to 6 feet above the floor).

1.2.3 Competent Person (CP)

As used in this section, refers to a person employed by the Contractor who is trained in the recognition and control of lead hazards in accordance with current federal, State, and local regulations and has the authority to take prompt corrective actions to control the lead hazard. A Certified Industrial Hygienist (CIH) certified by the American Board of Industrial Hygiene or a Certified Safety Professional (CSP) certified by the Board of Certified Safety Professionals is the best choice.

1.2.4 Contaminated Room

Refers to a room for removal of contaminated personal protective equipment (PPE).

1.2.5 Decontamination Shower Facility

That facility that encompasses a clean clothing storage room, and a contaminated clothing storage and disposal rooms, with a shower facility in between.

1.2.6 High Efficiency Particulate Arrestor (HEPA) Filter Equipment

HEPA filtered vacuuming equipment with a UL 586 filter system capable of collecting and retaining lead-contaminated particulate. A high efficiency

particulate filter demonstrates at least 99.97 percent efficiency against 0.3 micron or larger size particles.

1.2.7 Lead

Metallic lead, inorganic lead compounds, and organic lead soaps. Excludes other forms of organic lead compounds.

1.2.8 Lead Control Area

A system of control methods to prevent the spread of lead dust, paint chips or debris to adjacent areas that may include temporary containment, floor or ground cover protection, physical boundaries, and warning signs to prevent unauthorized entry of personnel. HEPA filtered local exhaust equipment may be used as engineering controls to further reduce personnel exposures or building/outdoor environmental contamination.

1.2.9 Lead Permissible Exposure Limit (PEL)

Fifty micrograms per cubic meter of air as an 8 hour time weighted average as determined by 29 CFR 1926.62. If an employee is exposed for more than eight hours in a work day, the PEL shall be determined by the following formula:

PEL (micrograms/cubic meter of air) = 400/No. hrs worked per day

1.2.10 Material Containing Lead/Paint with Lead (MCL/PWL)

Any material, including paint, which contains lead as determined by the testing laboratory using a valid test method. The requirements of this section does not apply if no detectable levels of lead are found using a quantitative method for analyzing paint or MCL using laboratory instruments with specified limits of detection (usually 0.01 percent). An X-Ray Fluorescence (XRF) instrument is not considered a valid test method.

1.2.11 Personal Sampling

Sampling of airborne lead concentrations within the breathing zone of an employee to determine the 8 hour time weighted average concentration in accordance with 29 CFR 1926.62. Samples shall be representative of the employees' work tasks. Breathing zone shall be considered an area within a hemisphere, forward of the shoulders, with a radius of 6 to 9 inches and centered at the nose or mouth of an employee.

1.2.12 Physical Boundary

Area physically roped or partitioned off around lead control area to limit unauthorized entry of personnel.

1.3 DESCRIPTION

1.3.1 Description of Work

Construction activities impacting PWL or material containing lead which are covered by this specification include the removal of material containing lead in areas where the Hill AFB 649 MUNS Munitions Storage Magazines Project will be accomplished to prevent worker exposure. A detailed Lead Based Paint Survey was accomplished (see attached Lead Based Paint Survey reports) to provide information as to what needs to be abated prior to

start of this project.

1.3.2 Coordination with Other Work

The contractor shall coordinate with work being performed in adjacent areas. Coordination procedures shall be explained in the Lead Compliance Plan and shall describe how the Contractor will prevent lead exposure to other contractors and/or Government personnel performing work unrelated to lead activities.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Lead Compliance Plan including CP approval (signature, date, and certification number); G

Competent Person qualifications; G

Training Certification of workers and supervisors; G

Lead waste management plan; G

Written evidence that TSD is approved for lead disposal; G

Certification of Medical Examinations; G

SD-06 Test Reports

Sampling results; G

Occupational and Environmental Assessment Data Report; G

SD-07 Certificates

Testing laboratory qualifications;

Clearance Certification;

SD-11 Closeout Submittals

Completed and signed hazardous waste manifest from treatment or disposal facility;

Waste turn-in documents or weight tickets for non-hazardous wastes that are disposed of at sanitary or construction and demolition landfills.

1.5 QUALITY CONTROL

1.5.1 Qualifications

1.5.1.1 Competent Person (CP)

Submit name, address, and telephone number of the CP selected to perform responsibilities specified in paragraph entitled "Competent Person (CP) Responsibilities." Provide documented construction project-related experience with implementation of OSHA's Lead in Construction standard (29 CFR 1926.62) which shows ability to assess occupational and environmental exposure to lead, experience with the use of respirators, personal protective equipment and other exposure reduction methods to protect employee health. Submit proper documentation that the CP is trained and certified in accordance with federal, State and local laws. The competent person shall be a licensed lead-based paint abatement Supervisor/Project Designer in the State of Utah.

1.5.1.2 Training Certification

Submit a certificate for each worker and supervisor, signed and dated by the accredited training provider, stating that the employee has received the required lead training specified in 29 CFR 1926.62(l)and is certified to perform or supervise deleading, lead removal or demolition activities in the state of Utah.

1.5.1.3 Testing Laboratory

Submit the name, address, and telephone number of the testing laboratory selected to perform the air and wipe analysis, testing, and reporting of airborne concentrations of lead. Use a laboratory participating in the EPA National Lead Laboratory Accreditation Program (NLLAP) by being accredited by either the American Association for Laboratory Accreditation (A2LA) or the American Industrial Hygiene Association (AIHA) and that is successfully participating in the Environmental Lead Proficiency Analytical Testing (ELPAT) program to perform sample analysis. Laboratories selected to perform blood lead analysis shall be OSHA approved.

1.5.2 Requirements

1.5.2.1 Competent Person (CP) Responsibilities

a. Verify training meets all federal, State, and local requirements.

b. Review and approve Lead Compliance Plan for conformance to the applicable referenced standards.

c. Continuously inspect PWL or MCL work for conformance with the approved plan.

d. Perform (or oversee performance of) air sampling. Recommend upgrades or downgrades (whichever is appropriate based on exposure) on the use of PPE (respirators included) and engineering controls.

e. Ensure work is performed in strict accordance with specifications at all times.

f. Control work to prevent hazardous exposure to human beings and to the environment at all times.

g. Supervise final cleaning of the lead control area, take clearance wipe samples if necessary; review clearance sample results and make recommendations for further cleaning.

h. Certify the conditions of the work as called for elsewhere in this specification.

1.5.2.2 Lead Compliance Plan

Submit a detailed job-specific plan IAW EM 385-1-1 par 06.C.02 of the work procedures to be used in the disturbance of PWL or MCL. The plan shall include a sketch showing the location, size, and details of lead control areas, critical barriers, physical boundaries, location and details of decontamination facilities, viewing ports, and mechanical ventilation system. Include a description of equipment and materials, work practices, controls and job responsibilities for each activity from which lead is emitted. Include in the plan, eating, drinking, smoking, hygiene facilities and sanitary procedures, interface of trades, sequencing of lead related work, collected waste water and dust containing lead and debris, air sampling, respirators, personal protective equipment, and a detailed description of the method of containment of the operation to ensure that lead is not released outside of the lead control area. Include site preparation, cleanup and clearance procedures. Include occupational and environmental sampling, training and strategy, sampling and analysis strategy and methodology, frequency of sampling, duration of sampling, and qualifications of sampling personnel in the air sampling portion of the plan. Include a description of arrangements made among contractors on multicontractor worksites to inform affected employees and to clarify responsibilities to control exposures.

The plan shall be developed by a certified planner/project designer in the State of Utah with certification.

1.5.2.3 Occupational and Environmental Assessment Data Report

If initial monitoring is necessary, submit occupational and environmental sampling results to the Contracting Officer within three working days of collection, signed by the testing laboratory employee performing the analysis, the employee that performed the sampling, and the CP.

a. The initial monitoring shall represent each job classification, or if working conditions are similar to previous jobs by the same employer, provide previously collected exposure data that can be used to estimate worker exposures per 29 CFR 1926.62. The data shall represent the worker's regular daily exposure to lead for stated work.

b. Submit worker exposure data gathered during the task based trigger operations of 29 CFR 1926.62 with a complete process description. This includes manual demolition, manual scraping, manual sanding, heat gun, power tool cleaning, rivet busting, cleanup of dry expendable abrasives, abrasive blast enclosure removal, abrasive blasting, welding, cutting and torch burning where lead containing coatings are present.

c. The initial assessment shall determine the requirement for further monitoring and the need to fully implement the control and protective requirements including the lead compliance plan per 29 CFR 1926.62.

1.5.2.4 Medical Examinations

Initial medical surveillance as required by 29 CFR 1926.62 shall be made available to all employees exposed to lead at any time (1 day) above the action level. Full medical surveillance shall be made available to all employees on an annual basis who are or may be exposed to lead in excess of the action level for more than 30 days a year or as required by 29 CFR 1926.62. Adequate records shall show that employees meet the medical surveillance requirements of 29 CFR 1926.33, 29 CFR 1926.62 and 29 CFR 1926.103. Provide medical surveillance to all personnel exposed to lead as indicated in 29 CFR 1926.62. Maintain complete and accurate medical records of employees for the duration of employment plus 30 years.

1.5.2.5 Training

Train each employee performing work that disturbs lead, who performs MCL/PWL disposal, and air sampling operations prior to the time of initial job assignment and annually thereafter, in accordance with 29 CFR 1926.21, 29 CFR 1926.62, and State and local regulations where appropriate.

1.5.2.6 Respiratory Protection Program

a. Provide each employee required to wear a respirator a respirator fit test at the time of initial fitting and at least annually thereafter as required by 29 CFR 1926.62.

b. Establish and implement a respiratory protection program as required by AIHA Z88.6, 29 CFR 1926.103, 29 CFR 1926.62, and 29 CFR 1926.55.

1.5.2.7 Hazard Communication Program

Establish and implement a Hazard Communication Program as required by 29 CFR 1926.59.

1.5.2.8 Lead Waste Management

The Lead Waste Management Plan shall comply with applicable requirements of federal, State, and local hazardous waste regulations and address:

a. Identification and classification of wastes associated with the work.

b. Estimated quantities of wastes to be generated and disposed of.

c. Names and qualifications of each contractor that will be transporting, storing, treating, and disposing of the wastes. Include the facility location and a 24-hour point of contact. Furnish two copies of hazardous waste manifests .

d. Names and qualifications (experience and training) of personnel who will be working on-site with hazardous wastes.

e. List of waste handling equipment to be used in performing the work, to include cleaning, volume reduction, and transport equipment.

f. Spill prevention, containment, and cleanup contingency measures including a health and safety plan to be implemented in accordance with 29 CFR 1926.65.

g. Work plan and schedule for waste containment, removal and disposal.

Proper containment of the waste includes using acceptable waste containers (e.g., 55-gallon drums) as well as proper marking/labeling of the containers. Wastes shall be cleaned up and containerized daily.

h. Include any process that may alter or treat waste rendering a hazardous waste non hazardous.

1.5.2.9 Environmental, Safety and Health Compliance

In addition to the detailed requirements of this specification, comply with laws, ordinances, rules, and regulations of federal, State, and local authorities regarding lead. Comply with the applicable requirements of the current issue of 29 CFR 1926.62. Submit matters regarding interpretation of standards to the Contracting Officer for resolution before starting work. Where specification requirements and the referenced documents vary, the most stringent requirement shall apply. Comply with all State laws, ordinances, criteria, rules and regulations regarding removing, handling, storing, transporting, and disposing of lead-contaminated materials as applicable.

1.5.3 Pre-Construction Conference

Along with the CP, meet with the Contracting Officer to discuss in detail the Lead Waste Management Plan and the Lead Compliance Plan, including procedures and precautions for the work.

1.6 EQUIPMENT

1.6.1 Respirators

Furnish appropriate respirators approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services, for use in atmospheres containing lead dust, fume and mist. Respirators shall comply with the requirements of 29 CFR 1926.62.

1.6.2 Special Protective Clothing

Furnish personnel who will be exposed to lead-contaminated dust with proper disposable protective whole body clothing, head covering, gloves, eye, and foot coverings as required by 29 CFR 1926.62. Furnish proper disposable plastic or rubber gloves to protect hands. Reduce the level of protection only after obtaining approval from the CP.

1.6.3 Rental Equipment Notification

If rental equipment is to be used during PWL or MCL handling and disposal, notify the rental agency in writing concerning the intended use of the equipment.

1.6.4 Vacuum Filters

Use UL 586 labeled HEPA filters.

1.6.5 Equipment for Government Personnel

Furnish the Contracting Officer with two complete sets of personal protective equipment (PPE) daily, as required herein, for entry into and inspection of the lead removal work within the lead controlled area. Personal protective equipment shall include disposable whole body

covering, including appropriate foot, head, eye, and hand protection. PPE shall remain the property of the Contractor. The Government will provide respiratory protection for the Contracting Officer.

1.7 PROJECT/SITE CONDITIONS

1.7.1 Protection of Existing Work to Remain

Perform work without damage or contamination of adjacent areas. Where existing work is damaged or contaminated, restore work to its original condition or better as determined by the Contracting Officer.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Protection

3.1.1.1 Notification

Notify the Contracting Officer 20 days prior to the start of any lead work.

3.1.1.2 Lead Control Area

a. Physical Boundary - Provide physical boundaries around the lead control area by roping off the area designated in the work plan or providing curtains, portable partitions or other enclosures to ensure that lead will not escape outside of the lead control area.

b. Warning Signs - Provide warning signs at approaches to lead control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Signs shall comply with the requirements of 29 CFR 1926.62.

3.1.1.3 Furnishings

The Government will remove furniture and equipment from the building before lead work begins. Stationary furniture and equipment will remain in the lead control area. Protect and cover furnishings.

3.1.1.4 Heating, Ventilating and Air Conditioning (HVAC) Systems

Shut down, lock out, and isolate HVAC systems that supply, exhaust, or pass through the lead control areas. Seal intake and exhaust vents in the lead control area with 6 mil plastic sheet and tape. Seal seams in HVAC components that pass through the lead control area. Provide temporary HVAC system for areas in which HVAC has been shut down outside the lead control area.

3.1.1.5 Decontamination Shower Facility

Provide clean and contaminated change rooms and shower facilities in accordance with this specification and 29 CFR 1926.62.

3.1.1.6 Eye Wash Station

Where eyes may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes shall be provided within the work area.

3.1.1.7 Mechanical Ventilation System

a. To the extent feasible, use local exhaust ventilation or other collection systems, approved by the CP. Local exhaust ventilation systems shall be evaluated and maintained in accordance with 29 CFR 1926.62.

b. Vent local exhaust outside the building and away from building ventilation intakes or ensure system is connected to HEPA filters.

c. Use locally exhausted, power actuated tools or manual hand tools.

3.1.1.8 Personnel Protection

Personnel shall wear and use protective clothing and equipment as specified herein. Eating, smoking, or drinking or application of cosmetics is not permitted in the lead control area. No one will be permitted in the lead control area unless they have been appropriately trained and provided with protective equipment.

3.2 ERECTION

3.2.1 Lead Control Area Requirements

Establish a lead control area by completely establishing barriers and physical boundaries around the area or structure where PWL or MCL removal operations will be performed.

Full containment - Contain removal operations by the use of critical barriers and HEPA filtered exhaust . For containment areas larger than 1,000 square feet install a minimum of two 18 inch square viewing ports. Locate ports to provide a view of the required work from the exterior of the enclosed contaminated area. Glaze ports with laminated safety glass.

3.3 APPLICATION

3.3.1 Lead Work

Perform lead work in accordance with approved Lead Compliance Plan. Use procedures and equipment required to limit occupational exposure and environmental contamination with lead when the work is performed in accordance with 29 CFR 1926.62 , and as specified herein. Dispose of all PWL or MCL and associated waste in compliance with federal, State, and local requirements.

3.3.2 Paint with Lead or Material Containing Lead Removal

Manual or power sanding or grinding of lead surfaces or materials is not permitted unless tools are equipped with HEPA attachments or wet methods. The dry sanding or grinding of surfaces that contain lead is prohibited. Provide methodology for removing lead in the Lead Compliance Plan. Select lead removal processes to minimize contamination of work areas outside the control area with lead-contaminated dust or other lead-contaminated debris

or waste and to ensure that unprotected personnel are not exposed to hazardous concentrations of lead. Describe this removal process in the Lead Compliance Plan.

3.3.2.1 Paint with Lead or Material Containing Lead - Indoor Removal

Perform manual removal in the lead control areas using enclosures, barriers or containments . Collect residue debris for disposal in accordance with federal, State, and local requirements.

3.3.2.2 Paint with Lead or Material Containing Lead - Outdoor Removal

Perform outdoor removal as indicated in federal, State, and local regulations and in the Lead Compliance Plan. The worksite preparation (barriers or containments) shall be job dependent and presented in the Lead Compliance Plan.

3.3.3 Personnel Exiting Procedures

Whenever personnel exit the lead-controlled area, they shall perform the following procedures and shall not leave the work place wearing any clothing or equipment worn in the control area:

a. Vacuum all clothing before entering the contaminated change room.

b. Remove protective clothing in the contaminated change room, and place them in an approved impermeable disposal bag.

c. Wash hands and face at the site, don appropriate disposable or uncontaminated reusable clothing, move to an appropriate shower facility, shower.

d. Change to clean clothes prior to leaving the clean clothes storage area.

3.4 FIELD QUALITY CONTROL

3.4.1 Tests

3.4.1.1 Air and Wipe Sampling

Conduct sampling for lead in accordance with 29 CFR 1926.62 and as specified herein. Air and wipe sampling shall be directed or performed by the CP.

a. The CP shall be on the job site directing the air and wipe sampling and inspecting the PWL or MCL removal work to ensure that the requirements of the contract have been satisfied during the entire PWL or MCL operation.

b. Collect personal air samples on employees who are anticipated to have the greatest risk of exposure as determined by the CP. In addition, collect air samples on at least twenty-five percent of the work crew or a minimum of two employees, whichever is greater, during each work shift.

c. Submit results of air samples, signed by the CP, within 72 hours after the air samples are taken.

d. Conduct area air sampling daily, on each shift in which lead-based

paint removal operations are performed, in areas immediately adjacent to the lead control area. Sufficient area monitoring shall be conducted to ensure unprotected personnel are not exposed at or above 30 micrograms per cubic meter of air. If 30 micrograms per cubic meter of air is reached or exceeded, stop work, correct the conditions(s) causing the increased levels. Notify the Contracting Officer immediately. Determine if condition(s) require any further change in work methods. Removal work shall resume only after the CP and the Contracting Officer give approval.

e. Surface Wipe Samples - Collect surface wipe samples on floors at a location no greater than 10 feet outside the lead control area at a frequency of once per day while lead removal work is conducted in occupied buildings. Surface wipe results shall meet criteria in paragraph "Clearance Certification.

3.4.1.2 Sampling After Removal

After the visual inspection, collect wipe samples according to the HUD protocol contained in HUD 6780 to determine the lead content of settled dust in micrograms per square meter foot of surface area .

3.5 CLEANING AND DISPOSAL

3.5.1 Cleanup

Maintain surfaces of the lead control area free of accumulations of dust and debris. Restrict the spread of dust and debris; keep waste from being distributed over the work area. Do not dry sweep or use pressurized air to clean up the area. At the end of each shift and when the lead operation has been completed, clean the controlled area of visible contamination by vacuuming with a HEPA filtered vacuum cleaner, wet mopping the area and wet wiping the area as indicated by the Lead Compliance Plan. Reclean areas showing dust or debris. After visible dust and debris is removed, wet wipe and HEPA vacuum all surfaces in the controlled area. If adjacent areas become contaminated at any time during the work, clean, visually inspect, and then wipe sample all contaminated areas. The CP shall then certify in writing that the area has been cleaned of lead contamination before clearance testing.

3.5.1.1 Clearance Certification

The CP shall certify in writing that air samples collected outside the lead control area during paint removal operations are less than 30 micrograms per cubic meter of air; the respiratory protection used for the employees was adequate; the work procedures were performed in accordance with 29 CFR 1926.62; and that there were no visible accumulations of material and dust containing lead left in the work site. Do not remove the lead control area or roped off boundary and warning signs prior to the Contracting Officer's acknowledgement of receipt of the CP certification. Clear the lead control area of all visible dust and debris.
For exterior work, soil samples taken at the exterior of the work site shall be used to determine if soil lead levels had increased at a statistically significant level (significant at the 95 percent confidence limit) from the soil lead levels prior to the operation. If soil lead levels either show a statistically significant increase above soil lead levels prior to work or soil lead levels above any applicable federal or state standard for lead in soil, the soil shall be remediated.

3.5.2 Disposal

a. All material, whether hazardous or non-hazardous shall be disposed in accordance with all laws and provisions and all federal, State or local regulations. Ensure all waste is properly characterized. The result of each waste characterization (TCLP for RCRA materials) will dictate disposal requirements.

b. Contractor is responsible for segregation of waste. Collect lead-contaminated waste, scrap, debris, bags, containers, equipment, and lead-contaminated clothing that may produce airborne concentrations of lead particles. Label the containers in accordance with 29 CFR 1926.62 and 40 CFR 261.

c. Dispose of lead-contaminated material classified as hazardous waste at an EPA or State approved hazardous waste treatment, storage, or disposal facility off Government property.

d. Store waste materials in U.S. Department of Transportation (49 CFR 178) approved containers. Properly label each container to identify the type of waste (49 CFR 172) and the date the container was filled. For hazardous waste, the collection container requires marking/labeling in accordance with 40 CFR 262 during the accumulation/collection timeframe. The Contracting Officer or an authorized representative will assign an area for interim storage of waste-container. Do not store hazardous waste containers in interim storage longer than 90 calendar days from the date affixed to each container.

e. Handle, store, transport, and dispose lead or lead-contaminated waste in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, and 40 CFR 265. Comply with land disposal restriction notification requirements as required by 40 CFR 268.

3.5.2.1 Disposal Documentation

Submit written evidence to demonstrate the hazardous waste treatment, storage, or disposal facility (TSD) is approved for lead disposal by the EPA, State or local regulatory agencies. Submit one copy of the completed hazardous waste manifest, signed and dated by the initial transporter in accordance with 40 CFR 262. Contractor shall provide a certificate that the waste was accepted by the disposal facility. Provide turn-in documents or weight tickets for non-hazardous waste disposal.

3.5.2.2 Payment for Hazardous Waste

Payment for disposal of hazardous and non-hazardous waste will not be made until a signed copy of the manifest from the treatment or disposal facility certifying the amount of lead-containing materials or non-hazardous waste delivered is returned and a copy is furnished to the Government.

-- End of Section --

005 DRAWINGS

US Army Corps
of Engineers
Sacramento District

649 MUNS MUNITIONS STORAGE MAGAZINES

HILL AFB
UTAH

P2#: 453028
FY-17

FINAL RFP

THIS PROJECT WAS DESIGNED BY THE SACRAMENTO DISTRICT OF THE U. S. ARMY CORPS OF ENGINEERS. THE INITIALS OR SIGNATURES AND REGISTRATION DESIGNATIONS OF INDIVIDUALS APPEAR ON THESE PROJECT DOCUMENTS WITHIN THE SCOPE OF THEIR EMPLOYMENT AS REQUIRED BY ER 1110-1-8152.

Approved
/s/ RICK POEPPELMAN, P.E. — 6 FEB 2017
Chief, Engineering Division — Date:

Prepared Under the Direction of
DAVID RAY, P.E. — 6 FEB 2017
Col, Corps of Engineers — District Engineer

Submittal Status: FINAL RFP
Designed by: P. CHANG
Drawn by: P. CHANG
Spec No.: 2093
Design File No: 160-25-0950

Approved Functional Adequacy
/s/SCOTT TINCHER, P.E. — 6 FEB 2017
Chief, Design Branch — Date:

Prepared by
SACRAMENTO DISTRICT
DESIGN BRANCH

/s/PETER VALENTINE, P.E. — 6 FEB 2017
Chief, Civil Design A Section — Date:

UTAH
HILL AFB
649 MUNS MUNITIONS STORAGE MAGAZINES
PN 453028 (KRSM143007)
COVER SHEET

Sheet reference number:
G-001

Border Rev 03/17/15 FCDESNTD\DWG\SUBMITTAL STATUS

SCHEDULE OF DRAWINGS			
1	G-001	COVER SHEET	
2	G-002	SCHEDULE OF DRAWINGS	
3	G-101	SITE LOCATION MAP	
4	C-131	DEMOLITION PLAN	
5	C-141	CONCEPTUAL SITE PLAN	
6	E-101	ELECTRICAL SITE PLAN	

US Army Corps
of Engineers
Sacramento District

Symbol	Description	Date	Approved

Date: 6 Feb 2017 | Rev:
Design File no: 180-25-0950
Submittal Status: FINAL RFP
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Plot date: 1/17/17
Dwg scale: AS NOTED
Designed by: P. CHANG
Drn by: P. CHANG
Spec No: 8093
Reviewed by: B. SHIN
Submitted by: J.PETER VALENTINE, P.E.
Chief, Civil Dsgn. Sec. A

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

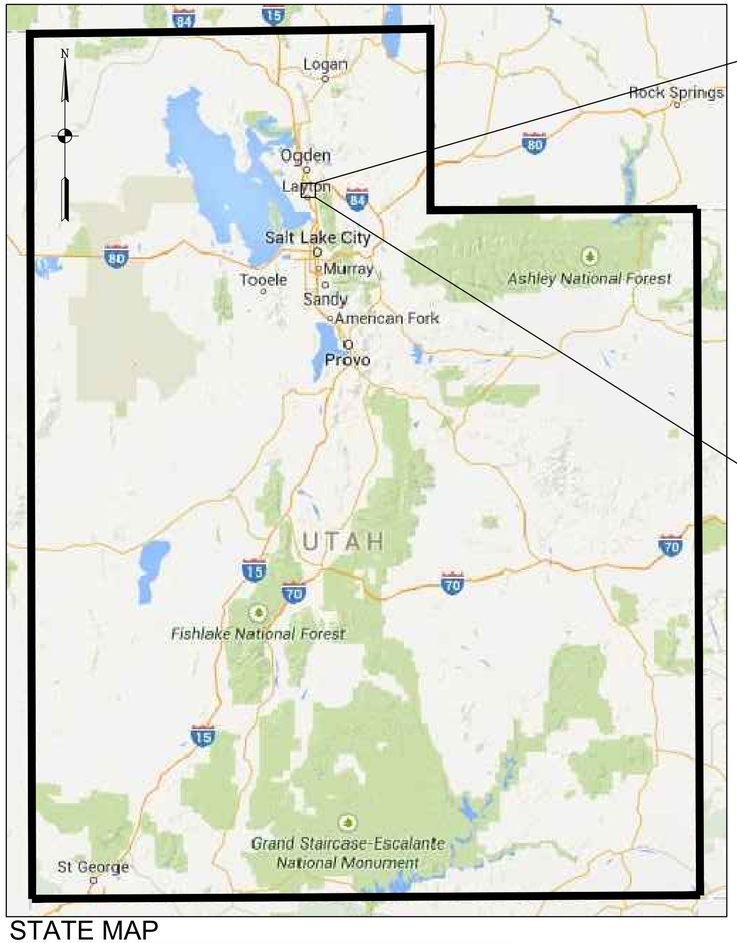
SACRAMENTO DISTRICT
IN-HOUSE DESIGN
1325 "J" STREET
SACRAMENTO, CA 95814-2922

HILL AFB UTAH
649 MUNS MUNITIONS STORAGE MAGAZINES
PN 453028 (KRSM143007)

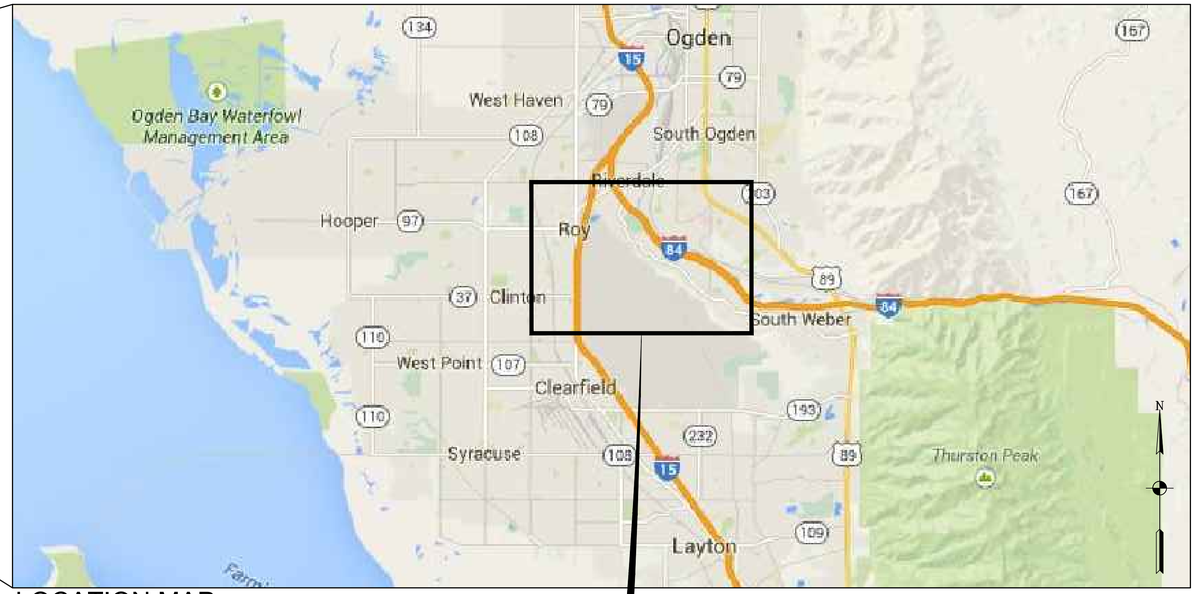
SCHEDULE OF DRAWINGS

Sheet reference number:
G-002

Border Revised 07/15/13, CEERTRDVG



STATE MAP
SCALE: NONE



LOCATION MAP
SCALE: NONE

PROJECT SITE MAP
SCALE: NONE

NOTES:

1. CONSTRUCTION CONTRACTORS MAY ACCESS THE BASE THROUGH THE ROY GATE.
2. UPON ARRIVAL AT A SECURITY GATE, ALL VEHICLE OCCUPANTS WILL BE REQUIRED TO SHOW IDENTIFICATION BEFORE ENTERING THE BASE. A PICTURED IDENTIFICATION SUCH AS A DRIVER'S LICENSE WILL BE REQUIRED.
3. SPEED LIMIT: UNLESS OTHERWISE POSTED, THE SPEED LIMIT ON BASE IS 25 MPH AND IN THE MUNITIONS AND MISSILE STORAGE (MAMS) AREA IS 15 MPH.
4. ALL TRUCKS MUST HAVE COMPANY NAME LOGOS ON THE DOOR SIDES.
5. NO PRIVATELY OWNED VEHICLES (POV) ALLOWED WITHIN THE CONSTRUCTION SITE.
6. THE CONTRACTOR SHALL VERIFY THE WORKING HOURS WITH THE BASE SECURITY FOR APPROVAL PERSONNEL CANNOT SHOW UP AT THE GATE WITHOUT PRIOR NOTIFICATION FOR ACCESS AND EXPECT TO GAIN ACCESS. VERBAL ACCESS CANNOT BE PROVIDED.
7. POINT OF CONTACTS:
   - 7.1. EMERGENCY - □11
   - 7.2. HOSPITAL - (801) 777-5285
   - 7.3. FIRE DISPATCH - (801) 777-3021
   - 7.4. SECURITY POLICE - (801) 777-3056

Border Revised 07/05/13, CEGIS702.dwg

US Army Corps of Engineers
Sacramento District

Rev	Description	Date	Approved

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Design file no: 180-25-9950
Submittal Status: FINAL RFP
File name: 649 MSM_G-101
Plot date: 1/7/2017
Dwg scale: AS NOTED

Designed by: P. CHANG
Drawn by: P. CHANG
Spec No: 2093
Reviewed by: D. DAN
Submitted by: SCOTT VALENTINE, P.E.
Chief, Civil Eng. Des. Sec. A

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

SACRAMENTO DISTRICT
IN-HOUSE DESIGN
1325 "J" STREET
SACRAMENTO, CA 95814-2922

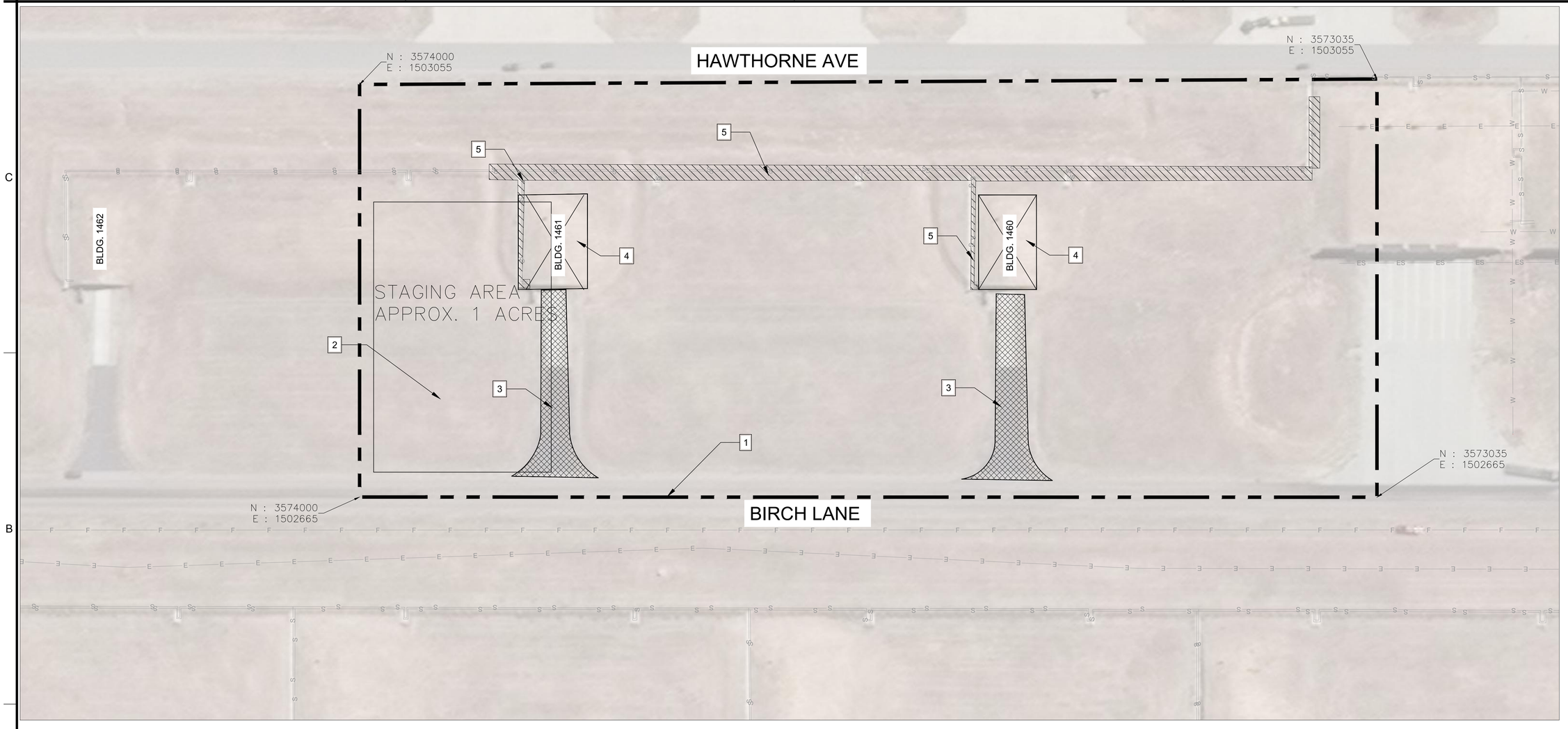
UTAH

HILL AFB
649 MUNS MUNITIONS STORAGE MAGAZINES
PN 453028 (KRSM143007)

SITE LOCATION MAP

Sheet reference number:
G-101

UPDATE



GENERAL NOTES:

1. AERIAL PHOTO IS DATED JANUARY 2014 AND MAY NOT SHOW CURRENT CONDITIONS, IT IS FOR INFORMATIONAL PURPOSES AND MAY NOT ACCURATELY DEPICT ACTUAL GROUND CONDITIONS. CONTRACTOR MUST VERIFY CONDITIONS WHERE WORK WILL OCCUR.
2. IGLOO BLDG. 1460 AND 1461 WILL BE DECOMMISSIONED BY THE GOVERNMENT PRIOR TO CONTRACT AWARD AND WILL BE ABANDONED IN PLACE. CONTRACTOR TO REMOVE AND DISPOSE THE IGLOO.
3. UTILITY INFORMATION SHOWN IS BASED UPON SURFACE OBSERVATION AND PROVIDED BY HAFB. EXACT LOCATION, SIZE, AND MATERIAL OF UTILITY LINES SHALL BE FIELD VERIFIED BY THE CONTRACTOR.
4. SHEET E-101, ELECTRICAL SITE PLAN

KEYNOTES:

1. PROJECT BOUNDARY
2. STAGING AREA
3. REMOVE AND DISPOSE DRIVEWAY
4. REMOVE AND DISPOSE IGLOO BLDG. 1460 AND 1461, NOTE 2
5. REMOVE AND DISPOSE EXISTING STEAM PIPE LINE

LEGEND:

- ES — EXISTING BURIED SECONDARY ELECTRICAL LINE
- E — EXISTING BURIED PRIMARY ELECTRICAL LINE
- W — EXISTING WATER SERVICE PIPE LINE
- S — EXISTING STEAM LINE
- F — EXISTING WATER PIPE
- DEMOLISH EXISTING STEAM LINE
- DEMOLISH EXISTING PAVEMENT
- DEMOLISH EXISTING IGLOO

N

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

US Army Corps of Engineers
Sacramento District

Rev.	Description	Date	Approved

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Plot date: 1/17/17
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Designed by: P. CHANG
Spec No.: 2093
Drawn by: P. CHANG
Reviewed by: D. SHIN
Submitted by: /s/PETER VALENTINE, P.E. Chief, Civil Eng. Div., Sec. A

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

SACRAMENTO DISTRICT
IN-HOUSE DESIGN
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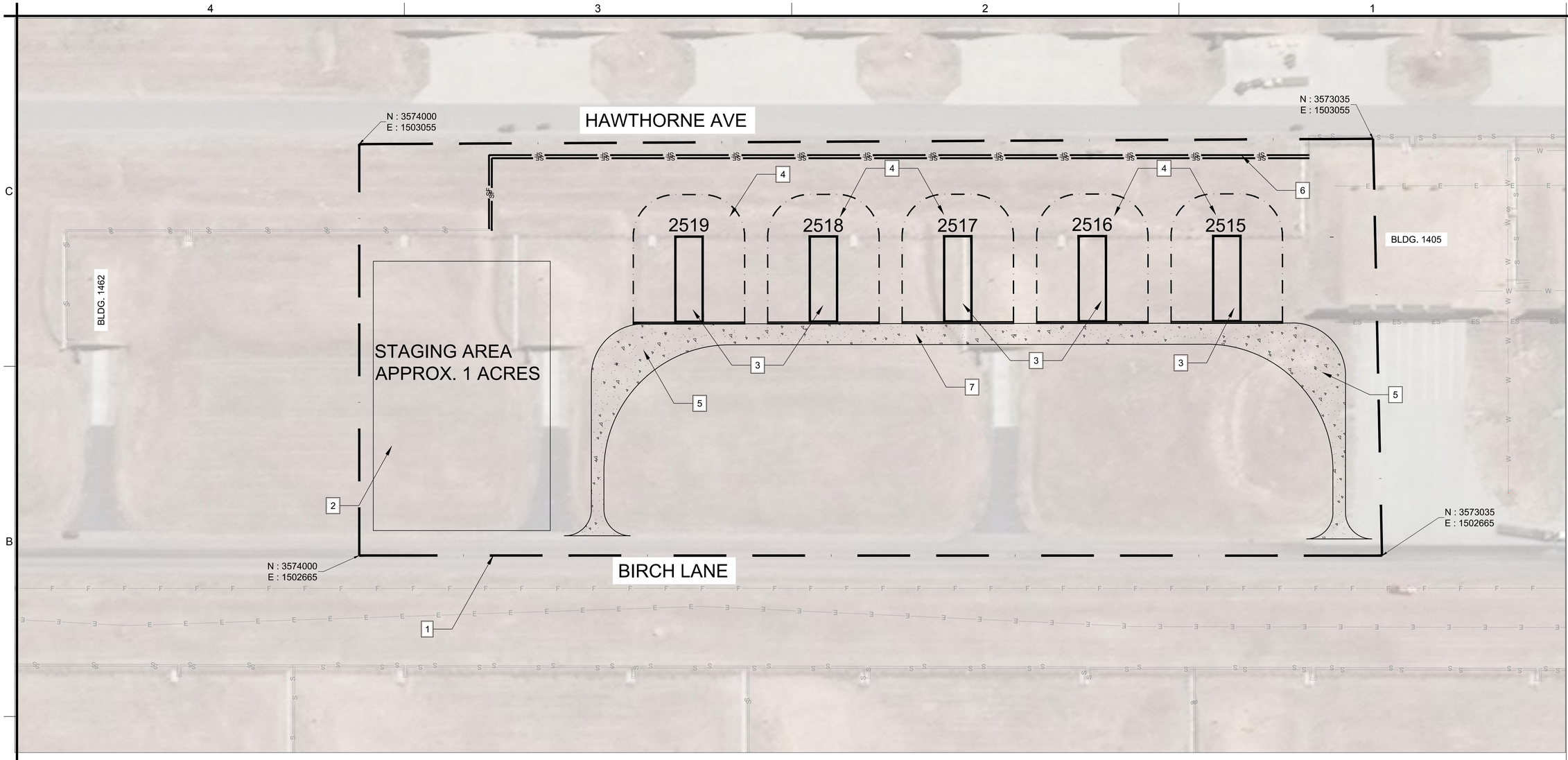
649 MUNS MUNITIONS STORAGE MAGAZINES
PN 453028 (KRSM143007)

DEMOLITION PLAN

Sheet reference number:
C-131

UPDATE

Borax Revised 07/10/13, CCS/ATCELDWG



GENERAL NOTES:

1. AERIAL PHOTO IS DATED JANUARY 2014 AND MAY NOT SHOW CURRENT CONDITIONS, IT IS FOR INFORMATIONAL PURPOSES AND MAY NOT ACCURATELY DEPICT ACTUAL GROUND CONDITIONS. CONTRACTOR MUST VERIFY CONDITIONS WHERE WORK WILL OCCUR.
2. IGLOO SITE-ADAPT DESIGN PER THE MSM BOX-TYPE STANDARD 421-80-08 WHICH REPLACES THE PREVIOUS MUNITIONS STORAGE MAGAZINE (14 FEET CEILING HEIGHT) AS DESIGNED FOR HILL AFB.
3. SITE LAYOUT SHOWN ON THIS SHEET IS CONCEPTUAL IN NATURE AND IS PROVIDED TO SHOW THE GENERAL LAYOUT OF SITE FEATURES AND PROJECT BOUNDARIES. THE CONTRACTOR IS RESPONSIBLE FOR THE FINAL DESIGN OF IGLOOS, UTILITIES AND SITE DESIGN IN ACCORDANCE WITH THE REQUIREMENTS SPECIFIED IN THE RFP DOCUMENTS.
3. SHEET E-101, ELECTRICAL SITE PLAN
4. ALL THE UNITS ARE IN FEET, UNLESS OTHERWISE NOTED.

KEYNOTES:

1	PROJECT BOUNDARY
2	STAGING AREA
3	IGLOO BUILDING FOOTPRINT
4	EARTH BACKFILL FOOTPRINT, TYP.
5	CONCRETE ACCESS DRIVEWAY, TYP.
6	NEW STEAM PIPE LINE
7	REINFORCED CONCRETE LOADING APRON AND ACCESS DRIVEWAY

LEGEND:

—ES—	EXISTING BURIED SECONDARY ELECTRICAL LINE
— E —	EXISTING BURIED PRIMARY ELECTRICAL LINE
—W—	EXISTING WATER SERVICE PIPE LINE
— S —	EXISTING STEAM LINE
— F —	EXISTING WATER PIPE
—SF—	NEW STEAM LINE

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

US Army Corps of Engineers
Sacramento District

Approved	Date	Description

Date: 6 FEB 2016 | Rev:
Design file no: 180-25-6950
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Submittal Status: FINAL RFP
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Plot date: 1/7/17
Dwg Scale: AS_NOTED
Designed by: P. CHANG
Dwn by: P. CHANG
Reviewed by: D. SHIH
Submitted by: /s/PETER VALENTINE, P.E.
Chief, Cost Eng. Sec. A

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

SACRAMENTO DISTRICT
IN-HOUSE DESIGN
1325 J STREET
SACRAMENTO, CA 95814-2922

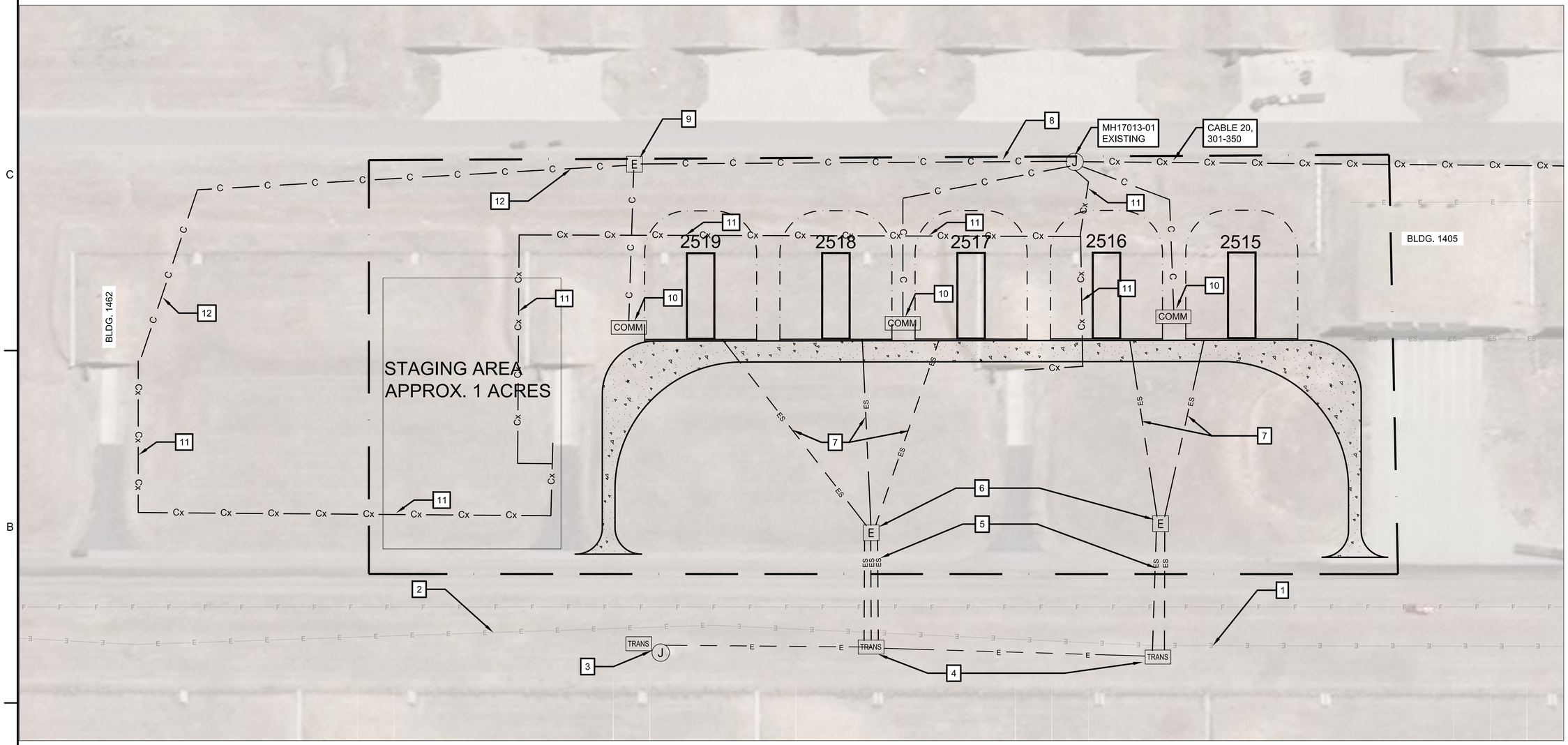
UTAH
HILL AFB
649 MUNS MUNITIONS STORAGE MAGAZINES
PN 453028 (KRSM143007)

CONCEPTUAL SITE PLAN

Sheet reference number:
C-141

UPDATE

Border Revised 8/1/13, CESPKTDZDWG



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3. SITE LAYOUT SHOWN IS CONCEPTUAL AND IS PROVIDED TO SHOW THE GENERAL LAYOUT OF SITE FEATURES AND PROJECT BOUNDARIES. FINAL DESIGN OF SITE FEATURES IS THE RESPONSIBILITY OF THE CONTRACTOR.
4. ALL THE UNITS ARE IN FEET, UNLESS OTHERWISE NOTED.
3. SEE SECTION 01 10 10 PARAGRAPH 14.3 FOR DETAILED DESCRIPTIONS OF EXTERIOR ELECTRICAL WORK.
4. SEE SECTION 01 10 10 PARAGRAPH 17.4 FOR DETAILED DESCRIPTIONS OF EXTERIOR COMMUNICATIONS WORK.
5. CITY LIGHT AND POWER (CL&P) TO PROVIDE PRIMARY CONDUCTORS AND CONDUITS, NEW PAD MOUNTED TRANSFORMERS (INCLUDING PADS), AND NEW PRIMARY SWITCH.
6. CONTRACTOR SHALL PROVIDE NEW SECONDARY CONDUCTORS AND CONDUITS, SERVICE ENTRANCE, LIGHTING, AND ALL INTERIOR ELECTRICAL WORK.

KEYNOTES:

(POWER)

1. APPROXIMATE LOCATION OF EXISTING #2 CU 12 KV UNDERGROUND LINE FROM SWITCH 2A12C.
2. APPROXIMATE LOCATION OF EXISTING #2 CU 12 KV UNDERGROUND LINE TO SWITCH 11456.
3. EXISTING MANHOLE WITH 15 KVA SINGLE PHASE TRANSFORMER ON TOP. CL&P TO MOVE TRANSFORMER 10 FT NORTHEAST, RE-FEED IT FROM EXISTING MANHOLE, AND PROVIDE NEW SWITCH AT MANHOLE.
4. CL&P TO PROVIDE NEW UNDERGROUND 1/0 AL 15 KV EPR FEEDER ALONG BIRCH LANE BETWEEN ALL THREE TRANSFORMERS. NEW TRANSFORMERS SHALL BE TWO (2) NEW 25 KVA 120/240 V SINGLE PHASE PAD MOUNT TRANSFORMERS. LOOP THROUGH FIRST TO SECOND.
5. CONTRACTOR TO PROVIDE NEW SECONDARY FEEDERS TO CROSS UNDER BIRCH LANE.
6. CONTRACTOR TO PROVIDE NEW HAND HOLES ON EAST SIDE OF BIRCH LANE.
7. CONTRACTOR TO PROVIDE NEW SECONDARY FEEDERS FROM NEW TRANSFORMERS TO NEW MODULAR STORAGE MAGAZINES. CONTRACTOR SHALL DETERMINE ELECTRICAL LOADS AND SIZE FEEDERS APPROPRIATELY. POWER PANELS SHALL BE ON EXTERIOR HEADWALL.

(COMMUNICATIONS)

8. PROVIDE NEW 50 PAIR COPPER COMM LINE CONNECTED TO EXISTING CABLE 20, 301-350. PROVIDE IN TWO EACH 4" PVC CONDUITS WITH 4 EACH VACANT FIBER INNERDUCT.
9. PROVIDE NEW 4'X4' COMM HANDHOLE.
10. PROVIDE NEW BURIED DISTRIBUTION LINE PEDESTALS. FEED FROM CLOSEST COMM MANHOLE OR HANDHOLE WITH ONE EACH 4" PVC CONDUIT WITH 3 EACH VACANT FIBER INNERDUCT.
11. DEMOLISH EXISTING COMM LINES FEEDING BUILDINGS 1461 AND 1460 (TO BE DEMOLISHED), AND BUILDING 1462.
12. PROVIDE NEW COMM LINE TO SERVICE EXISTING BUILDING 1462 (TO REMAIN).

LEGEND:

- E — ELECTRICAL HAND HOLE
- J — MAN HOLE
- TRANS — TRANSFORMER
- COMM — BURIED DISTRIBUTION LINE PEDESTAL
- C — C — BURIED COMM LINE, NEW
- Cx — Cx — BURIED COMM LINE, EXISTING
- E — BURIED PRIMARY ELECTRICAL LINE
- ES — BURIED SECONDARY ELECTRICAL LINE

NOTE: GREYED OUT LINES ARE EXISTING

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

US Army Corps of Engineers
Sacramento District

Rev.	Description	Date	Approved

Designed by: D. CARULLI
Drawn by: D. CARULLI
Reviewed by: B. PITT
Submitted by: M. MARTIN-Smith
Chief, Mech/Elec. Des. Sec.

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UTAH

ELECTRICAL SITE PLAN

Sheet reference number:
E-101

Border Sheet 882106 COESHT02.DWG