

APPENDIX F  
LESSONS LEARNED LIST - TYPICAL EXAMPLES

A. GENERAL:

1. Failure of A-E Firm(s) to become thoroughly familiar and to comply with provisions of the A-E Guides, AFR 88-15 and ETL's.
2. Failure of A-E to order Corps of Engineers Guide Specifications (CEGS) at the appropriate time, resulting in use of outdated CEGS on hand or from earlier projects.
3. Use of trade names or proprietary items.
4. Improper cross-referencing or failure to cross-reference details and sections.
5. Failure to read/use technical notes in Guide Specifications.
6. Failure to coordinate all disciplines prior to submittal of projects for review.
7. Failure of designer to identify shop drawings that are extensions of design and, therefore, require designer review.
8. Failure to use CSI numbering system for specifications.
9. Poor legibility of drawings due to improper lettering size, shading, clutter, faintness of drafting, insufficient scale size.
10. Failure to assure that all publications listed in the specifications are up to date, and that those which do not apply to the particular project are deleted.
11. Failure to identify all real estate constraints.
12. Placing information on construction detail in more than one place in construction documents. For example, notes on drawing duplicating information in specifications.
13. Failure to prepare a FIP analysis, and obtain FIP procurement authority.

B. CIVIL:

1. Boring stations and boring logs missing on drawings.
2. Spot elevations at each rigid pavement joint intersection missing.
3. Failure to show invert elevations and points of entry of utility lines into buildings.

4. Failure to provide codification in design analysis for water, sewer and storm drain systems.
5. Separate trench designs for rigid and flexible pipes not shown.
6. Water lines improperly installed in the same trench with sewer lines, gas lines, fuel lines, or electric wiring.
7. Sewer lines not at least 10 feet from potable water lines, (6 ft. if the water line is at least 1 ft. above the sewer line). If the sewer line passes above the water line, sewer line shall be of pressure pipe with the nearest joint at least 3 ft. from the crossing, or concrete encasement shall be installed and the pressure pipe or encasement shall extend at least 10 ft. on either side of the crossing.
8. Failure to provide the following note on the utility plan: "Elevations of utilities are given to the extent of information available. Where elevations are not given at points of existing utilities crossings, such elevations shall be determined by the contractor and reported to the contracting officer. When unknown lines are exposed, their location and elevation shall likewise be reported."
9. Failure to properly edit the various earthwork related specifications so that their paragraphs do not conflict. They must all comply with specific requirements stated in the geotechnical report.
10. Designers often do not consider the ramifications of modifications to existing infrastructure (connections, taps, relocations) that are cathodically protected. This can result in isolating segments of the system, leaving them unprotected from galvanic corrosion.

#### C. ARCHITECTURAL:

1. Handicapped water closet stalls not in accordance with the Uniform Federal Accessibility Standards.
2. Sealant or caulking details not identified by appropriate symbols that relate to full scale illustrations.
3. Improper use of fire-retardant wood. Fire-retardant wood is not noncombustible; its use in buildings that are of noncombustible construction is extremely limited (see UBC for the minor allowable uses). Because of the potential for severe degradation, fire retardant plywood shall not be used in a roof or roofing system, or in structural applications.
4. Trade names used in door hardware specifications in lieu of ANSI numbers.
5. Improper use of gypsum wall board. Water-resistant gypsum wallboard is not to be used on ceilings; in Air Force projects, gypsum wallboard is not to be used behind ceramic tile.
6. Life Safety regulations are sometimes ignored, if work resulting from the regulations is not specifically called out in the scope of work.
7. Size and spacing of the joint reinforcement for CMU walls not shown.

8. Roof and wall designs not detailed to indicate proper vapor retarder installation, air and ventilation spaces. Calculations not provided in the design analysis to indicate that the dew point location within the assembly meets requirements..

9. Materials exposed in return air plenums that are not non-combustible.

D. STRUCTURAL:

1. Excavation and compaction not consistent with the geotechnical report.

2. Steel deck section properties not shown.

3. Steel deck diaphragm connection details not shown.

4. Space between top of partition and the roof deck or structural member not provided for deflection of the roof frames.

5. Horizontal lateral bracing on top of partitions not provided.

6. Alteration and addition to existing buildings:

a. Existing structural deficiencies not reported to the project manager.

b. Structural analysis not made of existing structural members (systems) for additional loads.

7. Footings design inconsistent on architectural and structural drawings.

8. Control joints in CMU walls not shown on both architectural and structural plans, or, are inconsistent.

9. Structural framing for mechanical equipment not provided.

10. "Nondestructive testing (NDT) of welds" notes not shown on drawings.

11. "Pipe at Footing Typical Detail" notes not provided.

12. Recessed or sloped concrete slab not shown on both architectural and structural drawings.

13. Failure to provide floating floor when recommended by geotech report. Typical violations are: (a) slabs bearing on foundation wall/grade beams at doorways, (b) hairpins embedded in column piers and floor slab, (c) dowels between foundation wall and floor slab, (d) turned down slab with line load and/or concentrated load at edge.

14. Failure to follow Corps guidance pertaining to location of CMU control joints at doors and other building openings.

15. Failure to provide a floor joint plan.
16. Failure to identify wall type (e.g., structural/nonstructural) and their locations.

E. MECHANICAL:

1. FIRE PROTECTION:

a. Water flow test not performed as required. Water supply flow tests shall be performed for projects which provide new fire sprinkler system(s). Test data shall consist of static pressure, residual pressure, flow rate and the location of the test. Test data shall be specified or indicated on the fire protection drawings. The designer shall verify by hydraulic calculations, that the water supply is sufficient to supply adequate volume and pressure to meet the system demands. Hydraulic calculations shall be included in the design analysis. REF: NFPA 13, paragraph 3-3.2.3.

b. Control valves not specified. Provide and show the correct type of control valve for the different types of sprinkler system; i.e., dry-pipe, deluge, pre-action wet pipe etc. Confer with NFPA 13 and Fire Protection Handbook.

c. Riser diagram not provided. Show all piping from the point of connection to existing, to the top of the riser(s). Indicate the location of all valves, fire department connections, and inspector's test connections. Sprinkler drain piping and location of drain discharge should be shown and detailed. The extent or limits of each type of system, each different design density, each type and temperature rating of sprinkler heads, and concealed piping shall be clearly specified or indicated.

d. Location of all fire dampers not shown.

2. HEATING, VENTILATION AND AIR CONDITIONING:

a. Correct outside design temperatures not used. These should be in accordance with TM 5-7895, Engineering Weather Data. Use the dry bulb temperature with its corresponding mean coincident wet bulb temperature (MCWB).

b. U factors (Heat Transmission) not in accordance with the AEI.

c. Adequate personnel access around equipment for service and maintenance not provided.

d. Layout of outdoor equipment area/yard does not provide for sufficient airflow to prevent short-circuiting.

e. Cooling tower design: Proper height relationship not maintained between sump outlet circulating pump, and three-way by-pass valve, so that the pump will always have a positive suction head upon shutdown of system or pump.

F. ELECTRICAL:

1. Missing electrical site plan.
2. Missing electrical one-line diagram.
3. Size and type of existing overhead conductors 'often do not match with copper or aluminum wire gauges or available types.
4. Construction details for the transformer slab, handholes and manholes missing.
5. Failure to show adequate overview and details for complex grounding systems.
6. Failure to provide riser diagrams for intrusion detection, telephone, and fire alarm systems.
7. Mounting heights of appropriate devices on the symbol list not shown.
8. Failure to provide adequate TEMPEST requirements (attenuation, frequency, and penetration schedule).
9. Failure to indicate the transformer percent impedance and AIC rating for the power panels.
10. Failure to provide sufficient lighting protection and fixture details and design.
11. Failure to address cathodic protection design when the soil resistivity indicate the requirement for a cathodic protection system.
12. Failure to **identify** the hazardous areas per the National Electrical Code (NEC). Give class, division, and group.
13. Failure to show mounting detail for **RFI** filters and panel boards in computer room.
14. Concrete encased duct detail - failure to provide required horizontal separation between communication and power ducts.
15. Do not specify "copper only" for bussing or conductors on drawing. Let the specification govern. On "mission critical" designated Air Force projects, the sole use of copper conductors only applies to interior wiring. Exterior wiring, including service entrance conductors, may be aluminum for size No. 4 AWG copper and larger.
16. Power to the fire alarm control panel not connected ahead of the main breaker on Air Force projects.
17. Failure to provide lighting and power panel schedules with branch circuit loads balanced and a circuit directory.

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18. Failure to provide lighting fixture schedule as per standard drawings or details and description for fixtures not selected from the standard drawings.

19. Failure to provide designation of all rooms and areas as shown on architectural and other drawings.

20. Failure to provide required anchoring details for electrical equipment in seismic zones.

21. Failure to provide analysis on non-linear loads and required K factor.