
USACE / NAVFAC / AFCEC / NASA UFGS-09 69 19 (November 2010)

Preparing Activity: USACE Superseding
UFGS-09 69 19 (August 2010)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated October 2014

SECTION TABLE OF CONTENTS

DIVISION 09 - FINISHES

SECTION 09 69 19

STRINGERLESS ACCESS FLOORING

11/10

PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 SYSTEM DESCRIPTION
 - 1.2.1 Floor Panel Allowable Tolerances
 - 1.2.1.1 Flatness
 - 1.2.1.2 Length
 - 1.2.1.3 Squareness
 - 1.2.1.4 Finish Floor
 - 1.2.2 Floor Panels
 - 1.2.3 Pedestals
 - 1.2.4 Bonding Strength of Pedestal Adhesive
 - 1.2.5 Bond Strength of Factory Installed Covering
 - 1.2.6 Seismic Calculations
 - 1.2.7 Air Leakage
 - 1.2.8 Grounding
 - 1.2.8.1 Metal Grilles
 - 1.2.8.2 Joint Resistance
- 1.3 SUBMITTALS
- 1.4 QUALITY ASSURANCE
- 1.5 DELIVERY, STORAGE, AND HANDLING
 - 1.5.1 Delivery
 - 1.5.2 Storage
 - 1.5.3 Handling
- 1.6 EXTRA MATERIALS

PART 2 PRODUCTS

- 2.1 FLOOR PANELS
 - 2.1.1 Floor System Drawings And Planer Quality
 - 2.1.2 Panel Construction
 - 2.1.2.1 Aluminum
 - 2.1.2.2 Hollow Formed Steel
 - 2.1.2.3 Metal-Clad Cementitious Fill (Composite Panels)
 - 2.1.2.4 Metal-Clad Wood Core
 - 2.1.2.5 Lightweight Concrete Panels

- 2.1.3 Floor Covering
 - 2.1.3.1 High Pressure Laminate
 - 2.1.3.2 Conductive Surfacing
 - 2.1.3.3 Conductive High Pressure Laminate
 - 2.1.3.4 Vinyl Composition Tile
 - 2.1.3.5 Carpet
- 2.1.4 Edge Strip
- 2.1.5 Accessories
- 2.1.6 Resilient Base
- 2.1.7 Lifting Device
- 2.2 PANEL SUPPORT SYSTEM
- 2.3 FASCIA
- 2.4 STEPS AND RAMPS
 - 2.4.1 Steps
 - 2.4.2 Ramps
- 2.5 RAILINGS
- 2.6 FACTORY TESTS
 - 2.6.1 Load Tests
 - 2.6.2 Bond Strength of Covering
- 2.7 COLOR
- 2.8 REGISTERS AND GRILLES
- 2.9 PERFORATED AIR SUPPLY PANELS
- 2.10 CUT OUTS
- 2.11 EDGE CLOSURE

PART 3 EXECUTION

- 3.1 INSTALLATION
 - 3.1.1 Preparation for Installation
 - 3.1.2 Pedestals
 - 3.1.3 Auxiliary Framing
 - 3.1.4 Panels
 - 3.1.5 Resilient Base
 - 3.1.6 Fascia Plates
 - 3.1.7 Repair of Zinc Coating
- 3.2 FIELD TESTS
 - 3.2.1 Acceptance Tests
 - 3.2.2 Electrical Resistance
- 3.3 CLEANING AND PROTECTION
 - 3.3.1 Cleaning
 - 3.3.2 Protection
 - 3.3.3 Surplus Material Removal
- 3.4 FIRE SAFETY
- 3.5 SEISMIC SPECIAL INSPECTION AND TESTING
- 3.6 OPERATION AND MAINTENANCE MANUALS

-- End of Section Table of Contents --

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SECTION 09 69 19

STRINGERLESS ACCESS FLOORING 11/10

NOTE: This Guide Specification covers the requirements for stringerless access flooring.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable items(s) or insert appropriate information.

Remove information and requirements not required in the respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR)

PART 1 GENERAL

NOTE: This specification does not include the floor upon which the elevated floor is superimposed, except to define the nature and condition of the supporting floor.

Access flooring systems include floor panels, pedestals and items such as steps, ramps, closures and trim. Access flooring systems must be designed to accommodate static, rolling and impact loading.

None of the mechanical and electrical services essential to the operation of equipment are included. Coordinate with mechanical and electrical to provide ventilation and cable openings which will be required.

The designer is responsible for identifying and defining requirements for the floors. Drawings must indicate location and limits of the flooring systems, finish floor elevation, panel size, type, finish and anti-static provisions, colors, pedestal mounting and subfloor connection system details.

RIGID GRID ACCESS FLOORING is covered in SECTION 09 69 13.

Stair and/or ramp information, such as tread width and riser height for stairs and width, slope and length of ramps, including railings, are included in this section.

Ancillary components such as floor diffusers and grills, fascias and floor opening trims are also included.

Seismic loadings and any other information required to indicate the extent of work must be considered in designing access flooring systems.

There are three fundamental conditions relative to the design of access flooring installations:

Condition I floors are completely surrounded by building walls. These are the most resistant to seismic loadings.

Condition II floors have part of the edge exposed and not restrained by other structural elements. Condition II floors are less resistive to seismic loadings along the axis of the unconstrained side. Seismic loadings can be resisted by securing the perimeter panels of all floors to the supporting structural framing and fitting the panels tightly together, or by cross bracing the structural frame to resist overturning. The designer must select fascia type and finish for exposed edges.

Condition III floors are free standing without lateral contact with other structural elements. Type III floors are primarily strengthened with cross bracing to resist lateral loads.

Buildings not excluded by UFC 3-301-01 or TI 800-01 Design Criteria will be accessible in accordance with 36 CFR, Part 1191, Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities.

On the drawings, show:

1. Extent and shape of access flooring area. Include details of panel-to-panel and panel-to-wall intersections, edge treatment at openings, expansion joints, elevation(s) above structural floor, and other special features of the elevated floor system.

2. Location and design of ramps, steps, and doors to access floor area; railing heights and design.
3. Location and sizes of registers, grilles, perforated panels, and cable openings through access floor panels.
4. Design and type of plenum fire extinguishing systems, if space under access floor is to be used as air plenum.
5. Layout of plenum dividers.
6. Pattern of access floor panels.
7. Location of building electrode. Coordinate structural grounding connections with appropriate building and electrical systems.

1.1 REFERENCES

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

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 ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

- | | |
|-----------|--|
| AATCC 134 | (2011; E 2013) Electrostatic Propensity of Carpets |
| AATCC 16 | (2004; E 2008; E 2010) Colorfastness to Light |

APA - THE ENGINEERED WOOD ASSOCIATION (APA)

- | | |
|---------|---|
| APA E30 | (2011) Engineered Wood Construction Guide |
|---------|---|

APA L870 (2010) Voluntary Product Standard, PS
1-09, Structural Plywood

ASTM INTERNATIONAL (ASTM)

ASTM A780/A780M (2009) Standard Practice for Repair of
Damaged and Uncoated Areas of Hot-Dip
Galvanized Coatings

ASTM B85/B85M (2013) Standard Specification for
Aluminum-Alloy Die Castings

ASTM E648 (2014c) Standard Test Method for Critical
Radiant Flux of Floor-Covering Systems
Using a Radiant Heat Energy Source

ASTM E84 (2014) Standard Test Method for Surface
Burning Characteristics of Building
Materials

ASTM F1066 (2004; E 2010; R 2010) Standard
Specification for Vinyl Composition Floor
Tile

CEILINGS & INTERIOR SYSTEMS CONSTRUCTION ASSOCIATION (CISCA)

CISCA Access Floors (2007) Recommended Test Procedures for
Access Floors

COMPOSITE PANEL ASSOCIATION (CPA)

CPA A208.1 (2009) Particleboard

CPA A208.2 (2009) Medium Density Fiberboard (MDF) for
Interior Applications

ICC EVALUATION SERVICE, INC. (ICC-ES)

ICC-ES AC300 (2010) Acceptance Criteria for Access
Floors

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC (2012) International Building Code

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI/NEMA LD 3 (2005) Standard for High-Pressure
Decorative Laminates

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 75 (2013; Errata 2013) Standard for the
Protection of Information Technology
Equipment

NFPA 99 (2015) Health Care Facilities Code

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-310-04

(2013) Seismic Design for Buildings

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS TT-C-490

(Rev F; Am 1) Cleaning Methods for Ferrous Surfaces and Pretreatments for Organic Coatings

UNDERWRITERS LABORATORIES (UL)

UL 779

(2011) Standard for Electrically Conductive Floorings

1.2 SYSTEM DESCRIPTION

NOTE: Access flooring support systems are available as either a stringer or stringerless system. Refer to Section 09 69 13 RIGID GRID ACCESS FLOORING for applications using stringers.

Consideration should be given to loads which will be imposed during operation. Some equipment, such as high speed printers require large quantities of paper to be delivered by carts. When in motion, these heavy loads may exceed capacity of floor system. Check with user activity and floor system manufacturer when heavy rolling loads are expected.

Zinc whiskers can occur on the underside of raised floor systems which are treated with a zinc electroplated anti-corrosion coating. Zinc whiskers are small enough (2 microns in diameter up to several millimeters in length) to render normal dust filters on computer equipment ineffective. The result is possible electrical shorts and damage to circuitry and equipment.

Install access flooring at the location and elevation, and in the arrangement shown on the drawings. The floor system shall be of the stringerless type, complete with all supplemental items, and be the standard product of a manufacturer specializing in the manufacture of access flooring systems.

- a. Provide for self-alignment of floor panels, adjustable pedestals and readily removable floor panels covered as specified.
- b. Make lateral stability of floor support system integral with panels. Finished assembly shall be stable and free of vibration, noises, and rocking panels.[Provide stringerless system with equipotential plane grounding.]
- c. Submit certificate of compliance attesting that the installed access floor system meets specification requirements, including all special equipment loads and specific electrical and or cable requirements, and certificates for the complete Access Flooring System including, but not

limited to the following:

- (1) Submit design data substantiating Compliance with ICC-ES AC300. (International Building Code Acceptance Criteria for Access Floors.)
 - (2) Load-bearing capabilities of pedestals, floor panels, and pedestal adhesive resisting force.
 - (3) Supporting independent laboratory test reports. For panel loads, test results include concentrated loads at center of panel, panel edge midpoint, ultimate loads and uniform loads.
 - (4) Floor electrical characteristics.
 - (5) Material requirements
 - (6) Elevated floor system free of defects in materials, fabrication, finish, and installation for a period of not less than [_____] years after completion.
- d. The Contractor warrants that, upon notification by the Government, defective work will be immediately replaced with new work at no additional cost to the Government.
- e. Submit manufacturer's descriptive data, catalog cuts, and installation instructions including information about any design and production techniques, total system including all accessories and finish coatings of under-floor components, procedures and policies used to conserve energy, reduce material, improve waste management or incorporate green building/recycled products into the manufacturer of their components or products. Also include cleaning and maintenance instructions. Systems which contain zinc electroplated anti-corrosion coatings are prohibited.

1.2.1 Floor Panel Allowable Tolerances

1.2.1.1 Flatness

Plus or minus 0.5 mm 0.02 inches on diagonal on top of panel or underneath edge

1.2.1.2 Length

Plus or minus 0.4 mm 0.015 inch

1.2.1.3 Squareness

Plus or minus 0.5 mm 0.02 inch in panel length

1.2.1.4 Finish Floor

Level within plus or minus 1.6 mm in 2 m 0.062 inch in 10 feet, and plus or minus 2.5 mm 0.10 inch for entire floor.

1.2.2 Floor Panels

NOTE: Insert heavier load as required by facility use conditions. The deflection and permanent deformation limits for panels are 610 by 610 mm (24

by 24 inches), and smaller.

Check manufacturer's literature for maximum loadings available. Generally, computer rooms are based on live load of 12 kPa (250 psf) and point load of 450 kg (1000 lbs). Coordinate design loads for access floor with design of structural slab.

For Navy projects design loads will be in accordance with the International Building Code and UFC 1-200-01.

Conduct floor panel testing in accordance with CISCA Access Floors. When tested as specified, make all deflection and deformation measurements at the point of load application on the top surface of the panel. Floor panels shall be capable of supporting the following loads:

- a. Concentrated load of [4450] [5560] [6670] [_____] N [1000] [1250] [1500] [_____] pounds on 645 square mm one square inch, at any point on panel, without a top-surface deflection more than 2.54 mm 0.10 inch, and a permanent set not to exceed 0.25 mm 0.01 inch in any of the specified tests.
- b. Uniform live load of [11.97] [14.36] [16.76] [_____] kPa/square meter [250] [300] [350] [_____] psf, without a top-surface deflection more than 1.5 mm 0.06 inch, and a permanent set not to exceed 0.25 mm 0.01 inch in any of the specified tests.
- c. A rolling load of [3560] [4450] [5340] [_____] N [800] [1000] [1200] [_____] pounds applied through hard rubber surfaced wheel 150 mm 6 inch diameter by 50 mm 2 inch wide for 10,000 cycles over the same path. Permanent set at conclusion of test shall not exceed 1.0 mm 0.040 inch.
- d. A rolling load of [4450] [5560] [6670] N [1000] [1250] [1500] pounds applied through a 75 mm 3 inch diameter by 30 mm 1-13/16 inch wide caster for 10 cycles over the same path, without developing a local overall surface deformation greater than 1 mm 0.04 inch. In accordance with CISCA Access Floors, the permanent deformation limit under rolling load shall be satisfied in all of the specified tests.
- e. An impact load of [670] N [150] pounds anywhere on the panel dropped from a height of 914 mm 36 inches onto a 645 square mm 1 square inch area without failure of the system, according to CISCA Access Floors, Section 8 Drop Impact Load Test.
- f. Ultimate Concentrated Load. Panels shall provide a safety factor of 3 times the specified concentrated load indicated above, when tested in accordance with CISCA Access Floors, Section 2 Ultimate Loading.

1.2.3 Pedestals

NOTE: Pedestals consist of a base plate, post and an adjustable head, and are available in heights from 150 mm (6 inches) to 2400 mm (96 inches).

Pedestals are normally held in place with an adhesive and must be in full contact with the

subfloor surface. Pedestal 600 mm (24 inches) high or higher will be securely anchored to the structural floor in addition to the adhesive.

For Air Force projects, the minimum pedestal height is 300 mm (12 inches).

Provide pedestals capable of supporting a 22.24 kN 5000 pound axial load without permanent deformation.

1.2.4 Bonding Strength of Pedestal Adhesive

NOTE: Use 113 Nm (1,000 lbf-in) for raised floors with a maximum height of 610 mm (24 inches) and 226 Nm (2,000 lbf-in) for raised floor heights greater than 610 mm (24 inches) up to 1219 mm (48 inches) maximum. Raised floor heights greater than 1219 mm (48 inches) require specific structurally designed bracing.

Adhesive for anchoring pedestal bases shall have a bonding strength capable of resisting an overturning moment of [113 Nm 1,000 lbf-in] [_____] when a force is applied to the top of the pedestal in any direction.

1.2.5 Bond Strength of Factory Installed Covering

Bond strength of floor covering shall be sufficient to permit handling of the panels by use of the panel lifting device, and to withstand moving caster loads up to 4.45 kN 1000 pounds, without separation of the covering from the panel.

1.2.6 Seismic Calculations

NOTE: For Navy projects, provide lateral bracing calculations on all installations. Level 1 Contracting Officer's approval was granted for calculations by a registered professional engineer. Occupancy importance factor (I) and seismic zone factor (z) should be deleted in accordance with UFC 1-200-01.

NOTE: Provide seismic requirements, if a Government designer (Corps office or A/E) is the Engineer of Record, and show on the drawings. Delete the second bracketed phrase if seismic details are not provided. Pertinent portions of UFC 3-310-04 and Section 13 48 00 SEISMIC PROTECTION FOR MISCELLANEOUS EQUIPMENT must be included in the contract documents.

Submit seismic calculations for lateral bracing, sealed by a Professional Engineer. Document certifying that access flooring system complies with seismic requirements of ICC IBC and ICC-ES AC308 for Occupancy Importance Factor (I) of [1.5] [1.25] [1.0], Seismic Zone Coefficient (Z) of [0.075]

[0.15] [0.20] [0.30] [0.40] and Horizontal Force Factor (Cp) of 0.75. Submit design calculations for special bracing to resist the effects of seismic or other forces and demonstrate that the proposed floor system meets specified requirements [in accordance with UFC 3-310-04, ICC IBC and ICC-ES AC300] [as shown on the approved detailed installation drawings]. Certified copies of test reports may be submitted in lieu of calculations.

1.2.7 Air Leakage

NOTE: Delete the requirements for air leakage when the space under the finished floor is not used as an air plenum. Concrete floors to be used as air plenums must be sealed and coated.

When the space below the finished floor system is an air plenum, air leakage through the joints between panels and around the perimeter of the floor system shall not exceed 0.15 L/s of air per linear meter 0.1 cubic foot of air per minute per linear foot of joint subjected to 2.5 mm 0.1 inch, water gauge, positive pressure in the plenum. Measure the leakage rate on the finished raised floor system, which may include carpet.

1.2.8 Grounding

NOTE: Access flooring system must be grounded for safety hazard and static control. The three most common static control requirements are:

1. Computer rooms, electronic offices, data centers and control rooms. The access floor system should provide resistance from floor wearing surface to building grounding electrode within range of 0.5 to 20,000 megohms.

2. Clean rooms, laboratories, and other environments which are more sensitive to static discharge. The access floor system should provide resistance within range of 0.2 to 2.0 megohms.

3. Hospitals and other facilities described by NFPA 99 and referenced to UL 779. The access floor system should provide resistance within range of 0.025 to 1.0 megohms.

These limits may be changed if other values are required by the Using Agency. Design the grounded floor system to provide positive contact between all metal components. Grounding details must be shown on the project drawings; the option of using manufacturer's alternate methods of grounding may be included in the project specification.

Ground the access flooring system for safety hazard and static suppression. Provide positive contact between components for safe, continuous electrical grounding of entire floor system. Total system resistance from wearing surface of floor to building grounding electrode

shall be within range of [0.5 to 20,000 megohms] [0.2 to 2.0 megohms]
[0.025 to 1.0 megohms].

1.2.8.1 Metal Grilles

Exposed metal is not allowed at wearing surface of access floor system, except at metal grilles and registers. When grilles and metal registers are provided, insulate as required to provide same grounding resistance as wearing surface.

1.2.8.2 Joint Resistance

NOTE: Coordinate with electrical drawings and specifications to assure that connection to building grounding electrode is shown. Do not use sound deadening materials which prevent grounding of system. Select a total system resistance to comply with user requirements.

Electrical resistance, between pedestals and floor panels as mounted in normal use, shall be less than 3 ohms.

1.3 SUBMITTALS

NOTE: Review submittal description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project.

The Guide Specification technical editors have designated those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item, if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

An "S" following a submittal item indicates that the submittal is required for the Sustainability Notebook to fulfill federally mandated sustainable requirements in accordance with Section 01 33 29 SUSTAINABILITY REQUIREMENTS.

Choose the first bracketed item for Navy, Air Force
and NASA projects, or choose the second bracketed
item for Army projects.

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.] [information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance to Section 01 33 29 SUSTAINABILITY REQUIREMENTS. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Detailed Installation Drawings[; G][; G, [_____]]

SD-03 Product Data

Access Flooring System

SD-04 Samples

Floor Panels
Finish Flooring
Panel Support System
Accessories

SD-05 Design Data

Compliance with ICC-ES AC308
Seismic Calculations

SD-06 Test Reports

Factory Tests
Electrical Resistance
Field Tests

SD-07 Certificates

Access Flooring System

1.4 QUALITY ASSURANCE

Submit drawings showing location, details at floor perimeter, method of anchorage to structural subfloor, grounding, description of [shop] [factory] coating, installation height above structural floor, stairs, ramps, accessories, other details as specified and take measurements from finished areas at site and submit detailed installation drawings indicating:

- a. Location of panels.
- b. Layout of supports, panels, and cutout locations.
- c. Stair, handrail, and ramp framing.

- d. Sizes and details of components.
- e. Lateral bracing.
- f. Typical cutout details.
- g. Gasketing, return air grilles, supply air registers, and perforated panels. Include air transfer capacity of grilles, registers and panels.
- h. Floor finishes.
- i. Location of connection to building grounding electrode.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery

Deliver materials to site in undamaged condition, in original containers or packages, complete with accessories and instructions. Label packages with manufacturer's name and brand designations. Package materials covered by specific references bearing specification number, type and class as applicable.

1.5.2 Storage

Store all materials in original protective packaging in a safe, dry, and clean location. Store panels at temperatures between 4 and 32 degrees C 40 and 90 degrees F, and between 20 and 70 percent humidity. Replace defective or damaged materials.

1.5.3 Handling

Handle and protect materials in a manner to prevent damage during the entire construction period.

1.6 EXTRA MATERIALS

NOTE: To assure matching floor panel which may become damaged and require replacement, supply of extra stock is recommended. Set amount based on conditions of specific project. Do not specify extra stock unless user activity concurs; warehousing may not be available.

Select the appropriate paragraph for the agency indicated, and delete the remaining two.

Furnish spare floor panels and spare complete pedestal assemblies at the rate of one for each 100 or fraction thereof required. Submit [three] [_____] separate samples of the specified finish flooring. Provide [four] [_____] floor panels complete with specified floor covering for future use. Provide four spare panels with identical finish flooring pedestals for each 100 square m 1,000 square feet of access flooring and total of 3 linear m 10 linear feet of cut-out trim. Store extra stock in same manner and location as project materials.

PART 2 PRODUCTS

NOTE: The designer should consider incorporating, when possible, any design provisions which encourage use of innovative construction materials or techniques which are environmentally sensitive, take advantage of recycled materials, and conserve our natural resources.

2.1 FLOOR PANELS

2.1.1 Floor System Drawings And Planer Quality

- a. Submit Fabrication Drawings for elevated floor systems consisting of fabrication and assembly details to be performed in the factory.
- b. Indicate on Location Drawings exact location of pedestals, ventilation openings, cable cutouts, and the panel installation pattern.
- c. Provide Detail Drawings showing details of the pedestals, pedestal-floor interlocks, floor panels, panel edging, floor openings, floor opening edging, floor registers, floor grilles, cable cutout treatment, perimeter base, expansion joints, and peripheral support facilities.
- d. Design and workmanship of the floor, as installed, shall be completely planar within plus or minus 1.5 mm 0.060 inch in 10 feet, 2.5 mm 0.100 inch for the entire floor, and 0.7 mm 0.030 inch across panel joints.
- e. Floor-panel joint-width tolerances shall be 0.43 mm 0.017 inch as measured with a feeler gage at any point in any joint when the panels are in the pressure contact required in final installation and as long as the air leakage requirements above are met.
- f. Submit [three] [_____] complete floor panels.

2.1.2 Panel Construction

NOTE: There are five basic floor panel types: aluminum, hollow formed steel, metal-clad cementitious fill, metal-clad wood core, and concrete. Nonferrous materials should be used in areas where there is potential for damage by rust oxides or paint flakes. In accordance with CISCA Test Method, filled panels must have a safety factor of 3 in terms of ultimate load.

The standard panel size of 600 by 600 mm (24 by 24 inch) will normally be used. Check with user activity and verify product availability before specifying nonstandard panels of 450, 750 and 900 mm (18, 30, and 36 inch) where required to match existing floor systems or to satisfy special requirements.

Use 150 mm (6 inches) as minimum practical height for access floor installation and 300 mm (12 inches) minimum when there is a plenum. Include the five panel types as options except that wood core panels should not be specified for Air Force projects, NASA projects, SPAWARS projects, or other projects where data processing involves highly strategic data having direct bearing on National Defense effort. Check with user activity before specifying wood core panels.

- a. Base access floor system on a 600 by 600 mm 24 by 24 inch square module providing minimum of [150] [300] [_____] mm [6] [12] [_____] inch clearance between structural floor and bottom of finished floor. Fabricate so accurate job cutting and fitting may be done using standard sizes for perimeters and around columns.
- b. Do not expose metal on finished top surface of panels. Provide cutouts and cutout closures to accommodate utility systems and equipment intercabling. Reinforce cutouts to meet design load requirements. Provide extra support pedestals at each corner of cutout for cutout panels that do not meet specified design load requirements.
- c. In the panel design provide for convenient panel removal for underfloor servicing and for openings for new equipment. Use panels of uniform dimensions within specified tolerances. Permanently mark panels to indicate load rating and model number.
- d. Machine square floor panels to within plus or minus 0.13 mm 0.005 inch with edge straightness plus or minus 0.064 mm 0.0025 inch. Tolerances apply to the panel before the plastic edging is applied.

[2.1.2.1 Aluminum

NOTE: Die-cast aluminum panels are lightweight, have very little variation in dimension from panel to panel, and are acceptable in environments where nonferrous materials are required (e.g., Magnetic Resonance Imagery rooms), but they tend to be more expensive than other types of panels.

Die-cast aluminum panels are normally used as a stringerless system.

Provide aluminum panels of die-cast or extruded construction conforming to ASTM B85/B85M.

] 2.1.2.2 Hollow Formed Steel

NOTE: Die-formed hollow steel panels perform best under static loads and should not be used under dynamic (rolling) loads. These panels are more economical than other types of panels and can be provided by most flooring system manufacturers.

Provide steel panels of die-formed construction, consisting of a flat steel top sheet welded to one or more formed steel stiffener sheets or components. Panels shall be chemically cleaned, bonderized, and painted with the manufacturer's standard finish.

] [2.1.2.3 Metal-Clad Cementitious Fill (Composite Panels)

NOTE: Cementitious core filled panels are enclosed in steel sheeting and are designed to provide improved resistance to rolling and impact loads. Specific strength and load requirements should be specified wherever it is a critical concern. These panels are quiet due to their mass.

There is some concern that the fill material may deteriorate when subjected to repeated loading cycles, and the cut edges could introduce dust into the underfloor space. Where the underfloor space will be a plenum, or where dust-sensitive computer equipment is to be installed, verify that the composite panel is acceptable to the Using Agency.

Current Air Force criteria does not permit the composite panel.

Provide composite panels of die-formed steel construction totally enclosing the panel, including the top surface. The void spaces between the top sheet and the formed steel bottom sheet shall be completely filled with an incombustible cementitious or concrete material. Seal cut edges in accordance with manufacturer's recommendations.

] [2.1.2.4 Metal-Clad Wood Core

NOTE: Wood core panels consist of a core of particleboard with an overlapping skin of galvanized steel. The wood core is a good sound deadener and insulator and increases resistance to rolling loads. Wood core panels are the most economical to procure.

Although the core material is combustible, the composite panel with bonded steel for face sheets when tested in accordance with the NFPA 225, revealed the composite panel to be noncombustible with a flame spread index of 0, a smoke developed index of 10, and to have a Class A fire rating.

Wood core panels can be easily cut and trimmed; however, doing so causes loss of fire retardancy and UL rating. The edges of wood core panels must be protected from moisture in order to prevent warping.

Provide wood core panels with cores of wood particleboard conforming to CPA A208.1, Grade 1-M-3, or of plywood conforming to CPA A208.2 , APA E30,

and APA L870, EXT-DFPA-C-C, not less than 25 mm 1 inch thick, and faced on both sides with structurally bonded zinc-coated steel sheets not lighter than 0.70 mm 24 gauge. Seal all edges and corners with zinc-coated steel or extruded aluminum. The completed panels shall have a flame spread rating of 25 or less when tested in accordance with ASTM E84. Provide zinc-coated steel, extruded aluminum, fire resistant vinyl, or other fire resistant edging to protect shop and field edge cuts and cutouts through the face of panels in a manner to meet specified flame spread requirements.

] 2.1.2.5 Lightweight Concrete Panels

NOTE: Lightweight concrete panels are either solid or metal clad. They perform well under dynamic loadings with little deformation and their weight is approximately 195 kg/m^2 (40 psf). They are primarily used in office flooring and are similar in cost to cementitious fill panels.

Provide lightweight concrete panels of lightweight structural concrete with either structural reinforcing or a die-formed, electro-galvanized steel bottom pan. Seal all concrete surfaces, including those resulting from field cuts, with the manufacturer's standard sealer before covering the surfaces with other materials.

] 2.1.3 Floor Covering

Surface floor panels with materials firmly bonded in place with waterproof adhesive. The electrical resistance shall remain stable over the life expectancy of the floor covering. Any anti-static agent used in the manufacturing process shall be an integral part of the material, and not surface applied. Bolt heads or similar attachments shall not rise above the traffic surface.

2.1.3.1 High Pressure Laminate

NOTE: High pressure laminate is the standard surfacing material and is preferred where cost is not an overriding factor.

Grade HW-120, approximately 3 mm (1/8 inch) thick, is recommended on metal floor panels to reduce the possibility of cracking due to impact. On wood core, filled steel and concrete panels, Grade HW-62, 1.5 mm (1/16 inch) thick is sufficient due to absorptive quality of panel material. This option is recommended when there is frequent movement of equipment.

Provide high pressure laminate surfacing conforming to ANSI/NEMA LD 3, Grade [HW 62] [120]. Total system electrical resistance from the wearing surface of the floor to the ground connection shall be between 150,000 ohms and 20,000,000,000 ohms.

2.1.3.2 Conductive Surfacing

NOTE: Conductive floor surfacing material is used where minimal electrical resistance is desired, mainly in clean rooms, hospital operating rooms, etc. The surface does not perform well under the application of heavy concentrated loads.

When conductive floor surfacing is specified, require submittal of maintenance instructions as per paragraph OPERATION AND MAINTENANCE MANUALS to identify special cleaning and maintenance requirements to maintain "conductive" properties of the panel finishes.

Provide conductive surfacing conforming to ANSI/NEMA LD 3, Grade HW 62. The total system electrical resistance from the wearing surface of the floor to the ground connection shall be between 25,000 ohms and 1,000,000 ohms.

2.1.3.3 Conductive High Pressure Laminate

NOTE: Conductive high pressure laminate floor surfaces combine the electrical resistance qualities of the conductive surfacing with the wear characteristics of high pressure laminate.

Provide conductive high pressure laminate floor surfacing conforming to ASTM F1066, Type III, Vinyl Tile and UL 779. The total system electrical resistance from the wearing surface of the floor to the ground connection shall be between 25,000 ohms and 1,000,000 ohms.

2.1.3.4 Vinyl Composition Tile

NOTE: Vinyl composition tile is the lowest cost surfacing tile, however the availability of tile meeting the electrical resistance requirements is limited. Wax build-up on vinyl tile is a prime cause of static problems.

Normally either Composition 1 or 2 will be specified; however Composition 1 should be specified when the Using Agency desires an asbestos-free material. ASTM F1066, Type II - Rubber or Type III - Vinyl tile may be specified when requested; however the electrical resistance characteristics should be verified before use. At installations where operating personnel will be required to wear conductive footwear to prevent static electricity buildup, conductive vinyl tile flooring may be necessary to satisfy the conductivity requirements.

Vinyl composition tile surfacing shall be 3 mm 1/8 inch thick conforming to

ASTM F1066, Type IV, Composition [1] [1 or 2]. Tiles may be approximately 300 mm 12 inches square or may be the full size of the panel.

2.1.3.5 Carpet

NOTE: Carpet should be specified only when requested by the Using Agency. Carpet may be bonded to the panels, or may be installed as loose-laid carpet squares. Where loose-laid carpet squares are used, delete the test for floor covering bond strength specified in paragraph BOND STRENGTH OF FLOOR COVERING. Carpet squares may be placed with carpet joints in alignment with panel joints, or may be placed with carpet joints at the panel midpoint. Color and pattern of carpet will be in accordance with current Air Force or Army carpet policy.

Carpet surfacing shall be [factory] [field] installed using one full carpet square per panel. Provide carpet of nylon filament, loop pile, minimum 0.8 kg/square m 24 ounce per square yard, minimum density 4000, and without cushion. Color fastness shall conform to AATCC 16. Carpet shall conform to ASTM E648 with a minimum average critical radiant flux of 0.25 watts per square centimeter, and static control less than 2.0 kV at 20 percent relative humidity at 21 degrees C 70 degrees F, when tested in accordance with AATCC 134. Provide vinyl edge trim to prevent unraveling.

2.1.4 Edge Strip

Provide panels edged with extruded vinyl edge strips secured in place with mechanical interlock or adhesive bond, or be of a replaceable type. Top of strip shall be approximately 3 mm 1/8 inch wide, and flush with the floor surfacing. Metal edge strips exposed at finish floor surface will be rejected.

2.1.5 Accessories

NOTE: Perforated panels are preferred for use in areas with hard surfaces such as high pressure laminates, and grilles or registers are preferred in areas with carpet

Provide the manufacturer's standard type registers, grilles, perforated panels, and plenum dividers where indicated, designed to support the same static loads as floor panels without structural failure, and capable of delivering the air volumes indicated. Registers and perforated panels shall be 25 percent open area and equipped with adjustable dampers.

[2.1.6 Resilient Base

Base shall be [rubber] [or] [vinyl] [straight style (installed with carpet)] [coved style (installed with resilient flooring)], [100] [150] mm [4] [6] inches high and a minimum 3 mm 1/8 inch thick. Furnish corners [preformed off site] [job Formed].

]2.1.7 Lifting Device

Provide each individual room with one floor panel lifting device standard with the floor manufacturer. Furnish a minimum of two devices.[For AIR FORCE projects provide a total of two suction-type floor panel lifting devices for each floor area.]

2.2 PANEL SUPPORT SYSTEM

Design panel and pedestal support system to allow for 360 degree clearance in laying out cable and cutouts for service to machines. Provide pedestals of steel or aluminum or a combination thereof. Ferrous materials shall have a factory-applied corrosion-resistant finish. Provide pedestal base plates with a minimum of 10,300 square mm 16 square inches of bearing surface and a minimum of 3 mm 1/8 inch thick. Pedestal shafts shall be threaded to permit height adjustment within a range of approximately 50 mm 2 inches, to permit overall floor adjustment within plus or minus 2.5 mm 0.10 inch of the required elevation, and to permit leveling of the finished floor surface within 1.56 mm 0.062 inch in 3000 mm 10 feet in all directions. Provide locking devices to positively lock the final pedestal vertical adjustments in place. Pedestal caps shall interlock with panels to preclude tilting or rocking of the panels. Submit one sample of each panel type and suspension system proposed for use.

2.3 FASCIA

Provide aluminum or steel fascia plates at open ends of floor, at sides of ramps and steps, and elsewhere as required to enclose the free area under the raised floor. Steel plates shall have a factory applied baked enamel finish. Finish on aluminum plates shall be standard with the floor system manufacturer. Provide fascia plates reinforced on the back, and supported using the manufacturer's standard lateral bracing at maximum 1200 mm 4 feet on center. Provide trim, angles, and fasteners as required.

2.4 STEPS AND RAMPS

Securely fasten steps and ramps to the access flooring system and to the structural floor. Perform construction including standard floor system components and custom components as required, and all supports, fasteners, and trim necessary for a finished installation. Provide step nosings, threshold strips, and floor bevel strips made of cast or extruded aluminum with non-slip traffic surfaces.

2.4.1 Steps

Height of risers shall not exceed 180 mm 7 inches. Design steps to support a uniform load of 7.18 kPa 150 psf. Surface treads with the manufacturer's standard non-slip floor finish.

2.4.2 Ramps

Slope of ramps shall not exceed 25 mm 1 inch rise to 300 mm 12 inches of run. Design ramps to support the same loads as specified for floor panels. Surface ramps with the manufacturer's standard non-slip floor finish.

2.5 RAILINGS

NOTE: Where open sides of floors are 1200 mm (4 feet) or more above adjacent ground or floor level, install "standard railing" in accordance with CFR 1910.23(e). Run post through raised floor and bolt to concrete floor for stability.

Provide railings of the double rail and post type, fabricated of at least [25 mm 1 inch] [_____] [round] [square] seamless [aluminum tubing] [_____] with a [satin natural anodized] [_____] finish. At steps and ramps, the top rail shall be a minimum of 900 mm 36 inches high and parallel to the incline. Keep the top rail 1050 mm 42 inches high at open ends of the floor. Provide guardrails with intermediate rails or an ornamental pattern such that a sphere 100 mm 4 inches in diameter cannot pass through. Space posts maximum of [1200] [1500] [1800] mm [4] [5] [6] feet on center. Provide railings complete with anchorages, floor plates, and end caps. [Electronically ground hand rails to raised floor system to prevent static build-up.]

2.6 FACTORY TESTS

Access flooring shall be factory tested by an independent laboratory, at the same position and maximum design elevation and in the same arrangement as shown on the drawings, for installation so as to duplicate service conditions as much as possible.

2.6.1 Load Tests

Conduct floor panel and pedestal testing in accordance with CISCA Access Floors.

2.6.2 Bond Strength of Covering

Support the test panel on pedestals as specified for the installed floor. Brace the pedestal supports as necessary to prevent sideways movement during the test. Impose a test load of 4.45 kN 1000 pounds on the test assembly through a hard plastic caster 75 mm 3 inches in diameter and 25 mm 1 inchwide. Roll the caster completely across the center of the panel. The panel shall withstand 20 passes of the caster with no delamination or separation of the covering.

2.7 COLOR

NOTE: Editing of color reference sentence(s) shall be coordinated with the Government. Generally UFGS 09 06 90 COLOR SCHEDULE or drawing is used when the project is designed by an Architect or Interior designer. Color shall be selected from manufacturer's standard colors or identified as a manufacturer's color in this specification only when the project is very simple and has minimal finishes.

When the Government directs that color be located in the drawings, a note shall be added that states: "Where color is shown as being specific to one manufacturer, an equivalent color by another manufacturer may be submitted for approval. Manufacturers and materials specified are not

intended to limit the selection of equal colors from other manufacturers. The word "color" as used herein includes surface color and pattern."

Prior to specifying a custom color finish, research to determine if additional cost and lead time is feasible. Note there is often a minimum order requirement; this requirement will also affect future orders.

When a manufacturer's name, stock number, pattern, and color is used, be certain that the product conforms to this specification, as edited.

Color shall be [in accordance with Section 09 06 90 COLOR SCHEDULE.] [as indicated on the drawings.] [selected from manufacturers standard colors.] [_____]. Color listed is not intended to limit the selection of equal colors from other manufacturers.

[2.8 REGISTERS AND GRILLES

NOTE: Delete paragraph heading and paragraph if they are not applicable. Size of registers should be stated if applicable.

Registers and grilles shall be [_____] mm inches by [_____] mm inches long with a minimum free area of [_____] square mm inches. Material shall be extruded [aluminum] [_____] , in [mill] [_____] finish, to sustain point loads of 1100 newton 250 pounds per vane without failure or permanent deformation. No part of a grille may project more than 3 mm 1/8 inch above the floor. Registers and grills are not permitted in a laminate floor tile system.

] [2.9 PERFORATED AIR SUPPLY PANELS

NOTE: Delete the paragraph heading and following paragraph if not applicable.

Provide air supply floor panels meeting the design criteria specified for standard panels, fabricated of 2 mm 14-gage perforated steel sheet welded to minimum 1.6 mm 16-gage side channels, covered with plastic laminate to match standard panels, and have a uniform perforated pattern to allow even air distribution

] [2.10 CUT OUTS

NOTE: Delete the paragraph heading and paragraph if cutouts are not applicable.

- a. Provide cable cutouts finished with rigid polyvinylchloride or molded polypropylene edging to conform to the appearance level of the floor surface and to cover raw edges of the cutout panel. Extrusion shall be

of a configuration to permit its effective and convenient use when new cable openings are required. Provide at least 7300 mm 24 feet of additional extrusion for future use.

- b. Provide non-metallic adapter for openings less than 100 mm 4 inches wide. Secure adapter adhesively in cutout to preclude removal from panel. Provide at least two adapters per 10 square m 1000 square feet for future use.
- c. Openings larger than 100 mm 4 inches wide shall use rigid polyvinylchloride or molded polypropylene edging. Perform cutting of panels, including cutouts, outside of the building.

] [2.11 EDGE CLOSURE

NOTE: Delete the paragraph heading and paragraph if
cutouts are not applicable.

Provide 1.5 mm 1/16 inch aluminum closure plate and extruded aluminum nosing at exposed edge of floor. Back up the closure plates with aluminum or steel framing braced diagonally, or anchor at bottom to continuous angle.

] PART 3 EXECUTION

3.1 INSTALLATION

Install the floor system in accordance with the manufacturer's instructions and with the approved detail drawings. At open ends of the floor, where the floor system does not abut wall or other construction, provide positive anchorage and rigid support. Areas to receive access flooring shall be maintained between [16] [4] and 32 degrees C [60] [40] and 90 degrees F, and between 20 and 70 percent humidity for 24 hours prior to and during installation.

3.1.1 Preparation for Installation

NOTE: Section 03 30 00.00 10 CAST-IN-PLACE CONCRETE
should require that concrete floors used as air
plenum surfaces beneath raised floors be sealed with
approved low VOC liquid sealer compound. Sealer
should be compatible with pedestal adhesive, if
pedestals are anchored with adhesive. If a
non-compatible sealer is applied before pedestals
are anchored, specify removal of sealer at pedestal
locations before adhesive is applied. If an
existing subfloor has been painted or otherwise
sealed with non-compatible sealer or paint, specify
removal of coating before applying adhesive.

Clear of all debris the area in which the floor system is to be installed. Remove all dust and thoroughly clean structural floor surfaces. Install floor coatings required for dust or vapor control prior to installation of pedestals, only if the pedestal adhesive will not damage the coating. If the coating and adhesive are not compatible, apply the coating after the pedestals have been installed and the adhesive has cured.

3.1.2 Pedestals

NOTE: Seismic calculations must be made by the designer to determine if adhesives or anchors are to be used; pedestal adhesives must be capable of securing pedestals in place with sufficient bonding strength to resist an overturning force of 113 N-m (1000 inch-pounds). If the calculations indicate the overturning force is greater than 113 N-m (1000 inch-pounds) steel expansion anchors must be used.

Pedestals shall be accurately spaced, set plumb and in true alignment. Set base plates in full and firm contact with the structural floor, [secured to the structural floor with adhesive.] [secured to the structural floor with steel expansion anchors.]

3.1.3 Auxiliary Framing

Provide auxiliary framing or pedestals around columns and other permanent construction, at sides of ramps, at open ends of the floor, and beneath panels that are substantially cut to accommodate utility systems. Provide special framing for additional lateral support as shown on the approved detail drawings. Provide additional pedestals designed to specific heights and lengths to meet structural irregularities and design loads. Connect auxiliary framing to main framing.

3.1.4 Panels

Interlock panels with supports in a manner that will preclude lateral movement. Fasten perimeter panels, cutout panels, and panels adjoining columns, stairs, and ramps to the supporting components to form a rigid boundary for the interior panels. Floors shall be level within the specified tolerances. Cut edges of [steel and wood-core panels shall be [painted] [finished] [_____] as recommended by the panel manufacturer.] [composite panels shall be coated with a silicone rubber sealant or with an adhesive recommended by the panel manufacturer.] Secure extruded vinyl edging in place at all cut edges of all panel cut-outs to prevent abrasion of cables.[Where the space below the floor is a plenum, cutouts for conduit and similar penetrations shall be closed using self-extinguishing sponge rubber.]

3.1.5 Resilient Base

Provide base at vertical wall intersections. Fill cracks and voids in walls and other vertical surfaces to receive base with an approved filler. Apply the base after the floor system has been completely installed with adhesive in accordance with the base manufacturer's recommendations.

3.1.6 Fascia Plates

Cover exposed floor ends and exposed openings of ramps and stairs with [aluminum] [steel closures] [finish material as indicated on the detailed drawings.]

3.1.7 Repair of Zinc Coating

Repair zinc coating that has been damaged, and cut edges of zinc-coated components and accessories, by the application of a galvanizing repair paint conforming to ASTM A780/A780M. Thoroughly clean areas to be repaired prior to application of the paint.

3.2 FIELD TESTS

3.2.1 Acceptance Tests

Conduct acceptance tests after installation of floor system. Make at least one test for each [40] [100] [_____] square meters [400] [1000] [_____] square feet of floor area. Conduct tests in presence of Contracting Officer and representatives of manufacturer and installer. Submit certified copies of test reports from an approved testing laboratory, attesting that the proposed floor system components meet the performance requirements specified.

3.2.2 Electrical Resistance

Conduct testing of electrical resistance in the completed installation in the presence of the Contracting Officer. Perform testing in accordance with NFPA 99 modified by placing one electrode on the center of the panel surface and connecting the other electrode to the metal flooring support. Take measurements at five or more locations. Each measurement shall be the average of five readings of 15 seconds duration at each location. During the tests, relative humidity shall be 45 to 55 percent and temperature 21 to 24 degrees C 69 to 75 degrees F. Select panels used in the testing at random and include two panels most distant from the ground connection. Measure electrical resistance with instruments that are accurate within 2 percent and that have been calibrated within 60 days prior to the performance of the resistance tests. The metal-to-metal resistance from panel to supporting pedestal shall not exceed 10 ohms. The resistance between the wearing surface of the floor covering and the ground connection, as measured on the completed installation, shall be in accordance with paragraph FLOOR COVERING.

3.3 CLEANING AND PROTECTION

3.3.1 Cleaning

Keep the space below the completed floor free of all debris. Before any traffic or other work on the completed raised floor is started, clean the completed floor in accordance with the floor covering manufacturer's instructions. [Do not permit seepage of cleaner between individual panels.] [Cleaning of ferrous surfaces shall conform to FS TT-C-490.]

3.3.2 Protection

Protect traffic areas of raised floor systems with a covering of building paper, fiberboard, or other suitable material to prevent damage to the surface. Cover cutouts with material of sufficient strength to support the loads to be encountered. Place plywood or similar material on the floor to serve as runways for installation of heavy equipment not in excess of design load capacity. Maintain protection until the raised floor system is accepted.

3.3.3 Surplus Material Removal

Clean surfaces of the work, and adjacent surfaces soiled as a result of the work. Remove all installation equipment, surplus materials, and rubbish from the work site.

[3.4 FIRE SAFETY

Install an automatic detection system, below the raised floor, meeting the requirements of NFPA 75 paragraph 5-2.1 to sound an audible and visual alarm. Air space below the raised floor shall be subdivided into areas not exceeding 929 square meters 10,000 square feet by tight, noncombustible bulkheads. Seal all penetrations for piping and cables to maintain bulkhead properties.

] 3.5 SEISMIC SPECIAL INSPECTION AND TESTING

NOTE: Include this paragraph only when special inspection and testing for seismic-resisting systems is required by Appendix 11A of ASCE 7.

This paragraph will be applicable to both new buildings designed according to UFC 3-310-04 SEISMIC DESIGN FOR BUILDINGS, and to existing building seismic rehabilitation designs.

The designer must indicate on the drawings all locations and all features for which special inspection and testing is required in accordance with UFC 3-310-04 and Appendix 11A of ASCE 7. This includes indicating the locations of all structural components and connections requiring inspection.

Add any additional requirements as necessary.

Perform special inspections and testing, for seismic-resisting systems and components, in accordance with UFC 3-310-04 and Section 01 45 35 SPECIAL INSPECTIONS.

] 3.6 OPERATION AND MAINTENANCE MANUALS

Submit maintenance instructions for proper care of the floor panel surface. When conductive flooring is specified, also submit maintenance instructions to identify special cleaning and maintenance requirements to maintain "conductivity" properties of the panel finish.

-- End of Section --