

EXHIBIT A

STANDARD FINDINGS FOR SAN FRANCISCO ELECTRICAL CODE AMENDMENTS:

1. Certain buildings/occupancies in San Francisco are at increased risk for earthquake-induced structural failure and consequent fire due to local hazardous microzones, slide areas, and local liquefaction hazards. (Geology)
2. Certain buildings/occupancies in San Francisco are at increased risk of fire due to high density of buildings on very small lots, with many buildings built up to the property lines. (Topography)
3. Topography of San Francisco has led to development of a high density of buildings on small lots, necessitating special provisions for exiting, fire separation, or fire-resistive construction. (Topography)
4. Many buildings are built on steep hills and narrow streets, requiring special safety considerations. (Topography)
5. Additional fire, structural and other protection is required due to high building density and crowded occupancy. (Topography)
6. San Francisco has narrow, crowded sidewalks due to building and population density and unusual Topography. (Topography)
7. All rain water in San Francisco drains to the building drains and sewer; unusual geology, occasional extremely high local rainfall amounts, and the configuration of the City as a peninsula restrict the installation of separate storm water and sewer systems. (Topography, Climate, Geology)
8. Moist, corrosive atmosphere of salt-laden fog in San Francisco necessitates additional requirements. (Climate)
9. Not a building standard; no local findings required.
10. Soils conditions in this region induce adverse reactions with some materials, leading to premature failures and subsequent unsanitary conditions. (Climate)
11. The region is subject to fluctuating rainfall due to changes in climatic conditions. (Climate)

2001 San Francisco Electrical Code Findings

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ARTICLE 089 — ADMINISTRATION

089-1 Revise this section as follows:

089-1. Title. The provisions contained in this Code shall be known as the ~~1998~~ 2001 San Francisco Electrical Code,” and may be cited as such and will be referred to as “this code” .

089-3 Revise this section as follows:

089-3 Scope. This code shall apply to the construction, alteration, moving, demolition, repair and use of all electrical equipment, wiring and systems in or on any building or structure or outdoors on any premise or property, except such electrical equipment, wiring and systems which are expressly exempted by Section 089-4. Electrical equipment, wiring and systems in or on any building or structure moved into or within the City and County of San Francisco shall conform to the requirements of this code.

089-12 Add the following new section:

089-12 Suppression: This code shall supersede all previous Electrical Codes and ordinances in the City and County of San Francisco. Nothing herein shall require the revision of electrical installation plans submitted prior to the adoption date of this code. Electrical permits obtained prior to the effective date of this code shall comply with the provisions of the Electrical Code, ordinances, regulations and rulings in effect when the permit was granted.

089-13 Add the following new section:

089-13 Maintenance. All electrical equipment, wiring and systems and installations shall be maintained in a safe operating and code-complying condition. The owner or the owner’s designated agent, or both, shall be legally responsible for the maintenance of all electrical wiring systems and installations.

Nothing contained in this code shall be construed to require any existing electrical equipment, wiring or systems regulated by this code to be altered, reconstructed, removed or demolished, providing such existing electrical

equipment, wiring or system

was installed and maintained in accordance with the adopted code in effect at the time of installation or subsequent alteration.

Unused conductors and cables shall be either removed or suitably identified and terminated in an approved manner.

089-14 Add the following new section:

089-14 Alternate Materials, Design and Methods of Construction.

(a) Alternates require approval: The provisions of this code are not intended to prevent the use of a product or method of construction not specifically prescribed by this code, provided any such alternate has been approved and the use authorized by the Director.

(b) Equivalency of Alternates. The Director may authorize an alternate, provided the Director finds the proposed design is satisfactory for the intended use and complies with the provisions of this code and that the product, method or work offered is, for the purpose intended, at least equivalent to that prescribed by this code in suitability, strength, effectiveness, fire resistance, durability and safety.

(c) Evidence Required. The Director shall require sufficient evidence or proof be submitted to substantiate any claims made regarding the use of alternates. The details if any action granting approval of an alternate shall be recorded and shall be entered in the files of the Department of Building Inspection.

(d) Conditions and Fees. See Building Code Section 104.2.8 for conditions and Section 110, Table I-J -- Miscellaneous Fees -- for applicable fees.

089-15 Add the following new section:

089-15 Change in Occupancy. Electrical equipment, wiring and systems which are part of any building or structure, or portion thereof, undergoing a change in occupancy or use, as defined in the Building Code, shall comply to all requirements of this code which may be applicable to the new occupancy or use.

Exception: The provisions of this section shall not require the change of existing electrical equipment, wiring and systems where such electrical

equipment, wiring and systems are deemed adequate for the new occupancy involved.

089-16 Add the following new section:

089-16 Modifications. When there are practical difficulties involved in carrying out the provisions of this code, the Director may grant modifications for individual cases. The Director shall first find that a special individual reason makes the strict letter of this code impractical and that the modification is in conformance with the intent and purpose of this code and that such modification does not lessen health, life-safety and fire-safe requirements. The details of any action granting modifications shall be recorded and entered in the files of the Department of Building Inspection.

089-17 Add the following new section:

089-17 Permits Required.

(a) General. It shall be unlawful for any person to install, construct, alter, move, add to or replace any electrical installation regulated by this code, except as permitted in Section 089-18 without first obtaining a permit from the Department of Building Inspection.

(b) Nonliability of City and County of San Francisco. Permits issued under the provisions of this code shall contain or be construed to contain an agreement by the owner of the building, structure or premises, or the owner's authorized agent, to save City and County of San Francisco officials and employees harmless from all costs, liability and damages resulting, whether directly or indirectly, from anything in connection with the work included in the permit, including equipment, methods of construction, inspections and approvals.

(c) Application For Permit. Permit applicants shall file with the Department of Building Inspection an application form furnished for that purpose. The permit application shall show a complete itemization of the proposed electrical installation and the correct address of the job site. Electrical permits may be issued to duly licensed contractors who have registered with the Central Permit Bureau by having their State Contractor's License verified by the Department of Building Inspection, or issued to a homeowner subject to Section 089-17(e). A separate permit shall be obtained for each separate building or structure. See Section 110, Table 1-E - Electrical Permit Fees -

of the Building Code for the applicable fees.

(d) **Illegal Use of Permit.** No person, firm, corporation, or State licensed contractor shall file an application for a permit to install any electrical wiring system unless such person, firm corporation, or State licensed contractor shall perform such work. The Director or the Director's authorized representative shall have the authority to cancel any permit upon finding that it is contrary to this section. The permittee shall be responsible for all work performed.

(e) **Homeowner's Permit.** A permit for electrical work in or about a single-family dwelling may be issued by the Director to a homeowner, provided the work to be done will be performed by the homeowner. If the electrical work performed under the homeowner's permit does not comply with the requirements of this Code and if the corrections are not made as required by the Department of Building Inspection, then the work shall be corrected by a State licensed electrical contractor under a separate permit.

(f) **Emergency Work.** Emergency electrical work for the protection of persons or property shall have a permit obtained within one business day of commencing such work.

089-18 Add the following new section:

089-18 Work Exempt From Permits. Electrical permits and fees shall not be required for the following:

(a) Repair or replacement of an electrical lighting fixture weighing 50 pounds or less where no change in existing wiring is involved.

(b) Replacement of fuses, receptacles, controls, motors of less than 2 horsepower, and switches and receptacles of not more than 20 amperes rating where no change in existing wiring is involved.

(c) Replacement of circuit breakers, externally operated switches, and fuse holders of the same type and rating as the part they replace, if not rated in excess of 100 amperes.

Exception: Replacement of main service disconnecting means are subject to permit and inspection regardless of rating.

(d) Wiring for temporary theater stages and platforms, motion picture and television studio sets supplied from fixed electrical outlets installed for

the purpose.

(e) Replacement of component parts for electric signs or gas-tube lighting systems of the same size and rating.

089-19 Add the following new section:

089-19 Permit Issuance.

(a) **General.** An issued permit entitles the permittee to proceed with the installation described therein. Work done in excess of that shown on the application will be subject to Extra Permit Fees as set forth in Section 110, Table 1-F – Specialty Permit Fees – of the Building Code. The issuance of a permit does not constitute an approval or an authorization of the work specified therein. Neither the issuance of a permit, nor the approval by the Director of any document, shall constitute an approval of a violation of any provision of this code or any law or ordinance. A permit or other document purporting to give authority to violate any code, law or ordinance shall not be valid with respect thereto. Permits shall not be transferable. Proposed electrical installations delineated on a permit application shall be performed only by the permittee or bona fide employee thereof. The permit shall be posted on the job site where the work is to be done.

(b) **Expiration of Permit.** Electrical permits expire after 90 days from date of issue, or date of last recorded inspection, unless an extension of time is granted by the Director. Only one 90-day extension may be granted. Permit extension and cancellation requests shall be made in writing to the Director by the permit holder. Permit fees may be refunded if cancellation request is made prior to commencement of the permitted work and within 90-days of the issue date, otherwise, the permit fees shall be retained by the Department of Building Inspection. See Section 110, Table 1-R – Refunds – of the Building Code for refund.

(c) **Commencement of Work on Permit Expired Due to Work Not Started.** Before work may be commenced on an expired permit on which no work was performed, a new permit shall be obtained.

(d) **Recommencement of Work on Permit Expired Due to Work Not Completed.** The

applicant shall secure a new permit for the work not completed. The permit fee shall be based upon items or work remaining to be done.

(e) Cancellation of Permit: *Permits may be canceled by the Director: 1) if after inspection, it is judged by a senior inspector that the permit holder is unable or unwilling to correct an unsafe condition or Code violations. 2) If the permit was obtained fraudulently or under false pretenses.*

089-20 Add the following new section:

089-20 Fees

(a) **General.** Permit and inspection fees, as set forth in Section 110, Table 1-E -- Electrical Permit Fees -- of the Building Code, shall be paid prior to permit issuance. When additional permit or inspection fees are due, they shall be payable prior to issuance of Permission to Connect Current, Certificate of Occupancy, or Declaration of Inspection.

(b) **Other Fees.** A standard hourly inspection fee shall be charged for services provided by Electrical Inspection Division personnel which are not otherwise detailed. See Section 110, Table 1-G - Inspections, Surveys and Reports - of the Building Code.

(c) **Work Without Permit - Investigation Fee.** If the Director finds that a person, company or entity has performed electrical installation work for which a permit is required, without first obtaining an electrical permit and payment of fees, the Director shall require the payment of an investigative fee in addition to the prescribed permit fee. See Section 110, Table 1-K - Penalties, Hearings, Code Enforcement Assessments - of the Building Code for the applicable fees. The payment of such investigation fee shall not exempt any person from compliance with all other provisions of this Code, nor from any penalty prescribed by law. The Director may reduce the investigation fee to two times the amount of the permit fee as called for in Section 110, Table 1-E c Electrical Permit Fees c of the Building Code for work that was constructed prior to the current building ownership if the owner files with the Director a notarized affidavit together with documents substantiating such dates of work.

Appeal of such investigative fee may be filed with the Board of Appeals in the manner provided in Part III of the San Francisco Municipal Code. Such

filing shall be subject to the fees and rules of the Board of Appeals. The Board of Appeals, in reviewing the appeal may reduce the appealed amount to not less than two times (2x) the permit fee as set forth in Section 110, Table 1-E — Electrical Permit Fees — of the Building Code.

089-21 Add the following new section:

089-21 Powers and Duties of Director.

(a) **General.** The Director is hereby authorized and directed to enforce all the provisions of this code. For such purposes, the Director shall have the powers of a law enforcement officer. The Director, when necessary, may call upon the Police Department and other city agencies for aid or assistance in carrying out or enforcing any of the provisions of this code.

(b) **Right of Entry.** When it is necessary to make an inspection to enforce the provisions of this code or other codes or ordinances, or when the Director has reasonable cause to believe that there exists in a building or upon a premises a condition that is contrary to, or in violation of, this code or other codes or ordinances that makes the building or premises unsafe, dangerous or hazardous, the Director may enter the building or premises at reasonable times to inspect or to perform the duties imposed by this code or other codes or ordinances, provided that if such building or premises be occupied, credentials be presented to the occupant and entry requested. If such building or premises be unoccupied, the Director shall first make a reasonable effort to locate the owner or other person having charge or control of the building or premises and request entry. If entry is refused, the Director shall have recourse to the remedies provided by law to secure entry.

(c) **Stop orders.** Whenever any work is being done contrary to the provisions of this code, or other pertinent laws or ordinances implemented through the enforcement of this code, the Director may order the work stopped by notice in writing served on any persons engaged in the doing or causing such work to be done, and any such persons shall forthwith stop such work until authorized by the Director to proceed with the work.

(d) **Temporary Use of Electrical Energy.** The Director may permit the temporary use of electrical energy by any person, firm or corporation in cases

where it does not create a hazard to life or property.

(e) Director may adopt rules and regulations. The Director shall have the power to render interpretations of this code and to adopt and enforce rules and supplemental regulations to clarify the application of its provisions. Such interpretations, rules and regulations shall be in conformance with the intent and purpose of this code. Such rules and regulations, commonly referred to as Code Rulings and Administrative Bulletins, supplemental to this code, shall not take effect until approved by the Building Inspection Commission and signed by the Director except in unusual circumstances where the Director has determined there is an immediate need to protect the public health and safety. When the Director finds that such circumstances exist, the Director may order immediate enforcement of a particular rule or regulation. The Director shall arrange for a subscription service to such rules and regulations, the entire cost of which is to be borne by the subscribers.

(f) Code Revisions. The Director shall transmit to the Building Inspection Commission, at intervals not exceeding three years, recommendations for changes to this code, based on studies of the following:

1. Requests of the Board of Examiners for variances from this code, and for approvals of alternate materials, alternate designs and methods of construction.
2. Code changes recommended by the Board of Examiners.
3. Code changes recommended by the Code Advisory Committee or other bodies subordinate to the Building Inspection Commission.
4. Results obtained and problems encountered from legal actions taken to correct code violations.
5. Changes or improvements in materials, methods of construction or design, and changes proposed by interested persons.
6. Investigations of fire and structural damage to buildings, and of complaints of unsatisfactory electrical system performance.
7. Periodic changes to the California Electrical Code and other State regulations which may affect this code.
8. Administrative Bulletins and Code Rulings currently in effect.
9. Violations of this code found on inspections and investigations.

(g) Disconnection of Electric Service due to Serious and Imminent Hazards. The Director shall have the authority to disconnect electric service to a building, structure, property or equipment regulated by this code when it is necessary to abate a serious and imminent hazard to the life, health or safety

of the occupant or other persons, or such building, structure or property. See Section 102 of the Building Code. Persons shall not reconnect such electrical supply until authorized in writing by the Director.

089-22 Add the following new section:

089-22 Violation

Any person, the owner or the owner's authorized agent, who violates, disobeys, omits, neglects, or refuses to comply with, or resists or opposes the execution of any of the provisions of this code, shall be liable for a civil penalty, not to exceed \$500 for each day such violation is committed or permitted to continue, which penalty shall be assessed and recovered in a civil action brought in the name of the people of the City and County of San Francisco by the City Attorney in any court of competent jurisdiction. Any penalty assessed and recovered in an action brought pursuant to this paragraph shall be paid to the City Treasurer and credited to the Department of Building Inspection's Special Fund.

Any person, the owner or the owner's authorized agent, who violates, disobeys, omits, neglects, or refuses to comply with, or who resists or opposes the execution of any of the provisions of this code, shall be guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine not exceeding \$500, or by imprisonment not exceeding six months, or by both such fine and imprisonment, unless otherwise provided in this code, and shall be deemed guilty of a separate offense for every day such violation, disobedience, omission, neglect or refusal shall continue. Any person who shall do any work in violation of any of the provisions of this code, and any person having charge of such work who shall permit it to be done, shall be liable for the penalty provided.

It shall be unlawful for any person to interfere with the posting of any notice provided for in this code, or to tear down or mutilate any such notice so posted by the Department of Building Inspection.

089-23 Add the following new section:

089-23 Unsafe Buildings or Structures.

Any buildings, structures, or parts thereof, shall be considered unsafe when any of the following conditions are present:

(a) Electrical equipment, wiring and systems deemed hazardous to human life or structure safety;

(b) Electrical equipment, wiring and systems that are in violation of the code that was in effect at the time of construction or installation or such work was performed without permit or approval;

(c) Change in occupancy without complying with the provision of Section 089-15 of this code.

Such unsafe building, structure, property or portion shall be vacated, repaired, altered or demolished in accordance with Section 102 of the Building Code.

089-24 Add the following new section:

089-24 Inspection.

(a) **General.** All electrical equipment, wiring and systems, regulated by this code and for which a permit is required shall be subject to inspection to insure compliance with this code. Upon the completion and final approval of the permitted installation and payment of all permit and inspection fees, a Declaration of Inspection shall be issued. Said declaration shall indicate in concise terms the electrical installation thus approved and the date of approval.

(b) **Unlawful Use of Electrical Energy.** It shall be unlawful to energize an electrical installation in, on or about any building, structure or property in the City and County of San Francisco unless a Certificate to Connect Current (Green Tag) has been issued. The Certificate to Connect Current authorizes the owner of the structure to energize the permitted installation.

(c) **Inspection Requests.** It shall be the responsibility of the permit holder to notify the Electrical Inspection Division orally or in writing when the permitted installation will be ready for inspection. Such notification shall be given at least 24 hours before any inspection is desired. Inspections may be performed outside of normal inspection hours by prior arrangement and prepayment. See Section 110, Table 1-G - Off hours Inspections -of the Building Code for the applicable fees.

(d) **Required Inspections.** Required inspections shall include:

(1) Pre-Cover Inspection. Electrical equipment, wiring and systems

authorized by permit shall be inspected for code compliance prior to covering or concealing.

(2) Final Inspection. Final inspection and demonstration of satisfactory operation shall be made after the installation authorized by permit has been completed.

(3) Other Inspection. As may be required to insure compliance with the provisions of this code.

(e) Electrical Wiring or Installation Unlawful to Conceal. It shall be unlawful to conceal, cover, or put into use electrical wiring, installations, or parts thereof, until such has been inspected and accepted as prescribed in this code. Whenever such work is concealed or covered before first having been inspected and approved, or whenever electrical wiring or systems are installed and concealed or covered without a permit, the Director may require, by written notice to the responsible person(s) that such wiring or installation be exposed for inspection. The work of exposing and reconstructing portions of a structure for such work shall not entail expense to the City and County of San Francisco or any of its officials or employees.

(f) Reinspections. Reinspections shall be required when any of the following conditions occurs:

- (1) When the portion of the work for which inspection is requested is incomplete or not code complying.
- (2) When previously identified deficiencies in the work are not properly corrected.
- (3) When the approved construction documents are not available to the inspector.
- (4) When access is not provided on the date and time of the inspection appointment.
- (5) When there are deviations from the approved construction documents.

The first reinspection for failure to comply with code requirements shall not be assessed an re- inspection fee. All subsequent reinspections on a job for the same or subsequent errors or omissions shall be charged with a reinspection fee. A Certificate of Final Completion and Occupancy or final approval shall not be granted until the required fees are paid. See Section 110, Table 1-G – Inspections, Surveys and Reports – of the Building Code for applicable reinspection fees.

089-25 Add the following new section:

089-25 Survey. An electrical survey may be requested when an electrical inspector=s assistance is desired to establish code compliance of existing or proposed electrical equipment, wiring and installations. See Section 110, Table 1-G of the Building Code for applicable fees.

089-26 Add the following new section:

089-26 Board of Examiners

Application may be made to the Board of Examiners for approval of alternate materials, methods and types of construction and for variances from the provisions of this code. See Building Code, Section 105.1.

Chapter 1. General

ARTICLE 100 – DEFINITIONS

100. Scope. Add the following as the third paragraph of this section:

Where terms, phrases and words are not defined, they shall have the same meaning as provided in the Building Code or shall have their ordinary accepted meanings within the context with which they are used. Webster=s Third New International Dictionary of the English Language, Unabridged, copyright 1986, shall be considered as providing ordinarily accepted meanings.

100 A. General. Add the following new definitions:

Building Official: The Director of the Department of Building Inspection, or the Director=s duly authorized representative. The Director is the authorized representative of the Building Inspection Commission charged with the administration and enforcement of this code.

Building Code: The San Francisco Building Code.

Construction documents, approved: Includes construction documents, permit applications, other required documents and data which comprise the permit approved by the Director.

Director: The Director of the Department of Building Inspection and is the Building Official.

100A. General. Replace the definition with the following:

Qualified Person: *One who has skills and knowledge related to the construction and operation of the equipment and has received safety training on the hazards involved.*

ARTICLE 110 – REQUIREMENTS FOR ELECTRICAL INSTALLATIONS

110-26(a) Revise this section as follows:

(a) Working Space. Working space for equipment operation at 600 volts, nominal, or less to ground and likely to require examination, adjustment, servicing, or maintenance while energized shall be level and comply with the dimensions of (1), (2), and (3) or as required or permitted

elsewhere in this code.

110-26(b). Revise this section as follows:

(b) Clear Spaces. Working space required by this section shall not be used for storage. When normally enclosed live parts are exposed for inspection or servicing, the working space, if in a passageway or general open space, shall be suitably guarded. The standing area of the workspace shall be level.

110-26(c). Revise this section as follows:

(c) Access and Entrance to Working Space. At least one entrance of sufficient area shall be provided to give access to the working space about electric equipment. For equipment rated 1200 amperes or more and over 6 feet (1.83 m) wide that contains overcurrent devices, switching devices, or control devices, there shall be one entrance not less than 24 inches (610 mm) wide and 6 1/2 feet (1.98 m) high at each end of the working space. Where the entrance has a personnel door(s), the door(s) shall open in the direction of egress and equipped with panic bars, pressure plates, or other devices that are normally latched but open under simple pressure.

110-26 (e) Revise and relocate this section as follows:

(e) Headroom. The minimum headroom of working spaces required about service equipment, switchboards, panelboards, or motor control centers shall be 6 1/2 ft (1.98 m). Where the electrical equipment exceeds 6 1/2 ft (1.98 m) in height, the minimum headroom shall not be less than the height of the equipment.

Exception. Service equipment or panelboards that do not exceed 200 amperes may be installed in spaces with a minimum of 6 feet headroom, in existing dwelling units.

(FPN): For higher voltages see Article 710.

110-33(a) Revise this section as follows:

(a) Access and Entrance to Working Space. At least one entrance of sufficient area shall be provided to give access to the working space about electric equipment. Where the entrance has a personnel door(s), the door(s) shall open in the direction of egress and equipped with panic bars, pressure plates, or other devices that are normally latched but open under simple pressure.

Chapter 2. Wiring and Protection

ARTICLE 210 – BRANCH CIRCUITS

210-5(c). Add the following new section:

(c) Ungrounded Conductors. Ungrounded ~~C~~onductor insulation shall be color coded as follows:

~~Ungrounded conductors of branch circuits for new installations and for new branch circuits in existing installations shall be color coded.~~

~~(1) When installed in raceways, in cables, as open wiring, or as knob and tube wiring, the ungrounded conductors of multi-wire branch circuits and 2-wire branch circuits shall conform to the following color code: 120 volt 3-wire circuits – “A” phase black, “B” phase red; 120/208 volt 4-wire 3-phase wye circuits – “A” phase black, “B” phase red, “C” phase blue; 120/240 volt 3-phase delta circuits – “A” phase black, “B” (high leg) phase purple, “C” phase red; 277/480 volt 4-wire 3-phase wye circuits – “A” phase brown, “B” phase orange, “C” phase yellow.~~

~~Exception: Conductors for switch legs may be of a different color than the ungrounded conductors.~~

~~(2) Conductors for switch legs may be of a different color than the phase conductor other than green, white, or grey when suitably identified at pull, junction and outlet boxes with marking tape, tagging, or other equally effective means.~~

~~(3)(2)–~~Conductor insulation shall contain the applicable color pigment for circuit wire #14 AWG through #10 AWG. Ungrounded conductors #8 AWG and larger and ungrounded conductors of any size in cable assemblies may be pigmented colors other than green, white or grey provided they are suitably identified at pull, junction and outlet boxes with marking tape, tagging, or other equally effective means.

(FPN): See Section 200-7 for limitations on the use of white and natural grey colors.

Exception: Extensions of exiting non-color coded wiring systems need not be color coded.

ARTICLE 215 - FEEDERS

215-8. Revise this section as follows:

215-8 Means of Identifying Conductor with Higher Voltage to Ground.

On a 4 wire, delta-connected secondary where the midpoint of one phase winding is grounded to supply lighting and similar loads, the phase conductor having the higher

voltage to ground shall be identified by an outer finish that is ~~orange~~ purple in color or by tagging or other effective means. Such identification shall be placed at each point where a connection is made if the grounded conductor is also present. Identification of ungrounded feeder conductors shall comply with Section 210-5(c).

ARTICLE 220 — BRANCH-CIRCUIT, FEEDER AND SERVICE CALCULATIONS

220-35. Revise the exception as follows:

Exception: If maximum demand data for a one-year period is not available, the calculated load shall be based on the maximum demand (measure of average power demand over a 15-minute period) continuously recorded over a minimum 30 day period using a recording ammeter or power meter connected to the highest loaded phase of the feeder or service, based on the initial loading at the start of the recording. The recording shall reflect the true maximum demand of the feeder or service by being taken when the building or space is occupied and shall include by measurement or calculation the larger of the heating or cooling equipment load, and other loads that may be periodic in nature due to seasonal or similar conditions. The method of recording and the demand conditions shall be approved prior to installation.

ARTICLE 230 – SERVICES

230-43. Revise this section as follows:

230-43. Wiring Methods for 600 Volts Nominal, or Less.

(a) **General.** Service-entrance conductors shall be installed in accordance with the applicable requirements of this Code covering the type of wiring method used and limited to the following methods: (1) ~~rigid metal conduit reserved~~; (2) ~~intermediate metal conduit reserved~~; (3) ~~rigid metal conduit wireways~~; (4) ~~intermediate metal conduit busways~~; ~~(5) auxiliary gutters~~; ~~or (6) rigid non-metallic conduit~~. (5-8) reserved; (9) busways; (10) auxiliary gutters; (11) rigid non-metallic conduit; (12-13) reserved; (14) mineral-insulated, metal sheathed cable; (15-16) reserved.

(b) **Raceway Size.** Minimum raceway size shall comply with the following:

(1) ~~The minimum size raceway installed for service entrance conductor shall be 1 1/4 inch (31.8 mm), E~~ except as provided in Section 230-43(b) (2) and (3) the minimum size raceway installed for service entrance conductor shall be 1 1/4 inch (31.8

mm).

(2) Raceways for service entrance conductors for sign or billboard lighting shall not be smaller than 3/4 inch (19.1 mm) conduit.

(3) Installations consisting of not more than two 2-wire branch circuits may be supplied by No. 8 conductors in 3/4 inch (19.1 mm) conduit.

Exception: New service entrance conductors may be repulled in previously approved service raceways, provided the installation complies with the requirements of SFEC Section 90-3 89-13 and Chapters 1, 2 and 3.

(FPN): Refer to electric utility server requirements for raceway sizes.

230-56. Revise this section as follows:

Section 230-56. Service Conductor with the Higher Voltage-to-Ground.

On a 4 wire delta connected service where the midpoint of one phase winding is grounded, the service conductor having the higher phase voltage to ground shall be durably and permanently marked by an outer finish that is ~~orange~~ **purple** in color or by other effective means, at each termination or junction point.

230-71. (a) Revise this section as follows:

230-71. Maximum Number of Disconnects.

(a) **General.** The service disconnecting means for each service permitted by Section 230-2, or for each set of service entrance conductors permitted by Section 230-40, Exceptions Nos. 1 or 3 shall consist of a single circuit breaker or switch and set of fuses not more than six switches or six circuit breakers mounted in a single enclosure, in a group of separate enclosures, or in or on a switchboard. There shall be no more than six disconnects per service grouped in any one location.

For the purpose of this section, disconnecting means used solely for power monitoring equipment or the control circuit of the ground-fault protection system, installed as part of the listed equipment, shall not be considered a service disconnecting means.

Exception No.1 : In buildings with only residential occupancies not more than six switches or six circuit breakers mounted in a single enclosure, in a group of separate enclosures, or in or on a switchboard shall be allowed. A single overcurrent protection device shall be provided for each dwelling unit.

230-82(1) Revise item (1) this section as follows:

230-82 Equipment Connected to the Supply Side of Service Disconnect

(1) Cable limiters or other current-limiting devices by special permission.

ARTICLE 250 – GROUNDING

250-50. Revise and relocate the first paragraph of this section as follows:

250-~~8150~~. **Grounding Electrode System.** If available on the premises at each building or structure served, each item (a) through (d) below, and any made electrodes in accordance with Sections 250-52(c) and (d), shall be bonded together to form the grounding electrode system. A concrete-encased electrode as defined by 250-50(c) shall be installed at each new building or structure and for existing buildings or structures when a new or replacement foundation footing with a perimeter length of 20 feet is installed. The bonding jumper(s) shall be installed in accordance with Sections 250-64(a),(b), and (e) shall be sized in accordance with Section 250-66, and shall be connected in the manner specified in Section 250-~~70~~ ~~115~~.

250-64 (a) Revise this section as follows: Aluminum or Copper-Clad Aluminum Conductors.

Insulated or bare aluminum or copper-clad aluminum grounding conductors shall not be used where in direct contact with masonry or the earth or where subject to corrosive conditions. ~~Where used outside~~ Aluminum or copper-clad aluminum grounding conductors shall not be installed on the outside of a building or structure or within 18 in. (457mm) of the earth.

250-64(b) Revise this section as follows:

(b) Grounding Electrode Conductor. A grounding electrode conductor or its enclosure shall be securely fastened to the surface on which it is carried. A No. 4, copper or aluminum, or larger conductor shall be protected if exposed to severe physical damage. A No. 6 grounding conductor that is free from exposure to physical damage shall be permitted to be run along the surface of the building construction without metal covering or protection where it is securely fastened to the construction; otherwise, it shall be in rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, electrical metallic tubing, or cable armor. Grounding conductors smaller than No. 6 shall be in rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, electrical metallic tubing, or cable armor. Cable armor shall not be installed on the outside of a building or structure.

Chapter 3. Wiring Methods and Materials

ARTICLE 300 – WIRING METHODS

300-3. (c) (1) Revise this section as follows:

(c) Conductors of Different Systems.

(1) **600 Volts, Nominal, or Less.** Conductors of circuits rated 600 volts, nominal, or less, alternating-current circuits, and direct-current circuits shall be permitted to occupy the same equipment wiring enclosure, cable, or raceway. All conductors shall have an insulation rating equal to at least the maximum circuit voltage applied to any conductor within the enclosure, cable, or raceway.

Exception No. 1: For solar photovoltaic systems in accordance with Section 690-4(b).

Exception No. 2: For (1) separate services, or (2) separately derived systems, conductors shall not be installed within the same enclosure, cable, or raceway unless installed in accordance with Section 700-9 or Article 725.

Exception No. 3: Conductors supplied from different utility meters shall not be installed within the same enclosure, cable, or raceway after they leave the meter enclosure.

(FPN): See Section 725-54(a) (1) for Class 2 and Class 3 circuit conductors.

300-4(g) Add a definition as follows:

300-4(g) Subject to Physical Damage. Premises wiring systems installed less than 8 feet (2.44 m) above a walking surface or finished floor are considered subject to physical damage.

ARTICLE 331 – ELECTRICAL NONMETALLIC TUBING

331-3. Revise this section as follows:

331-3. Uses Permitted. The use of electrical nonmetallic tubing and fittings shall be permitted in the following:

(3) In locations subject to severe corrosive influences as covered in Section 300-6 and where subject to chemicals for which the materials are specifically approved.

(6) Encased in poured concrete, or embedded in a concrete slab on grade where

ENT is placed on sand or approved screenings, provided fittings identified for this purpose are used for connections. **Metal raceways shall be provided when emerging from the concrete.**

- (1) Reserved (4) Reserved (7) Reserved
(2) Reserved (5) Reserved (8) Reserved

(FPN): Extreme cold may cause some types of nonmetallic conduits to become brittle and, therefore, more susceptible to damage from physical contact.

ARTICLE 333 – ARMORED CABLE: TYPE AC

333-21. Revise this section as follows:

333-21. Grounding. Type AC cable shall provide an adequate path for equipment grounding as required by Section 250-2(d). *An equipment grounding conductor, sized as required by Table 250-95, shall be provided within the cable assembly.*

ARTICLE 334 – METAL-CLAD CABLE: TYPE MC

334-4. Revise this section as follows:

334-4. Uses Not Permitted. Type MC cable shall not be used where exposed to destructive corrosive conditions, such as *wet locations*, direct burial in the earth, in concrete, or where exposed to cinder fills, strong chlorides, caustic alkalis, or vapors of chlorine or of hydrochloric acids, *unless* where the metallic sheath is suitable for the conditions or is protected by material suitable for the conditions.

334-10(b) Revise this section as follows:

334-10(b) Unsupported Cables. Type MC cable shall not be required to be supported and secured where the cable is fished between access points, ~~*Where concealed in finished buildings or structures and supporting is impractical,*~~ or where used in lengths not more than 6 feet (2.44 m) from an outlet for connections within an accessible ceiling to lighting fixture(s) or equipment.

334-12. Revise this section as follows:

334-12. Fittings. Fittings used for connecting Type MC cable to boxes, cabinets, or other

equipment shall be listed and identified for such use. Where single conductor cables enter ferrous metal boxes or cabinets, the installation shall comply with Section 300-20 to prevent inductive heating. An approved insulating bushing shall be installed between the conductors and the metallic sheath.

334-23. Revise this section as follows:

334-23. Grounding. Type MC cable shall provide an adequate path for equipment grounding as required by Article 250. An equipment grounding conductor, sized as required by Table 250-122 shall be provided within the cable assembly.

ARTICLE 336 – NONMETALLIC-SHEATHED CABLE

336-5 (a) (10) Add new section as follows:

336-5 (a) (10) Uses Not Permitted.

(10) in any nonresidential structure or occupancy

336-6(b) Add the following to the end of this section:

(FPN): See San Francisco Electrical Code Section 300-4(g)

ARTICLE 339 – UNDERGROUND FEEDER AND BRANCH-CIRCUIT CABLE: TYPE UF

339-3(a)(1) Revise this section as follows:

(a) Uses Permitted.

(1) Type UF cable shall be permitted for use underground, including direct burial in the earth, in as feeder or branch-circuit cable, **in systems not exceeding 50 volts**, where provided with overcurrent protection of the rated ampacity as required in Section 339-4.

ARTICLE 347 – RIGID NONMETALLIC CONDUIT

347-2. Revise this section as follows:

347-2 Uses Permitted. The use of listed rigid nonmetallic conduit and fittings shall be permitted under the following conditions:

(FPN) Extreme cold may cause some nonmetallic conduits to become brittle and therefore more susceptible to damage from physical contact.

(a) **Concealed.** *Embedded* in concrete walls, floors, and ceilings. Metallic raceways shall be used when emerging from the concrete.

(b) **Corrosive Influences.** In locations subject to severe corrosive influences as covered in Section 300-6 and where subject to chemicals for which the materials are specifically approved.

(c) **Cinders.** In cinder fill.

(d) **Wet Locations.** In portions of dairies, laundries, canneries, or other wet locations and in locations where walls are frequently washed, the entire conduit system including boxes and fittings used therewith shall be so installed and equipped as to prevent water from entering the conduit. All supports, bolts, straps, screws, etc., shall be of corrosion-resistant materials or be protected against corrosion by approved corrosion-resistant materials.

(e) ~~**Dry and Damp Locations.** In dry and damp locations not prohibited by Section 347-3.~~ *Reserved.*

~~**Exposed.** For exposed work where not subject to physical damage if identified for such use.~~

(f) *Reserved.*

(g) **Underground Installations.** For underground installations, See Sections 300-5 and 300-50

(h) **Support of Conduit Bodies.** Rigid nonmetallic conduit shall be permitted to support nonmetallic conduit bodies not larger than the largest trade size of an entering raceway. The conduit bodies shall not contain devices or support fixtures or other equipment.

ARTICLE 348- ELECTRICAL METALLIC TUBING

348-5(6) Add the following new section.

348-5(6) In concrete slabs on grade.

348-6 Add a second paragraph as follows:

Where EMT emerges from concrete in a damp or wet location, it shall be protected against corrosion at the point of emergence by a wrapping of PVC tape, or by other approved means.

ARTICLE 350 – FLEXIBLE METAL CONDUIT

350-4. Revise this section as follows:

350-4. Uses Permitted. Flexible metal conduit shall be listed and shall be permitted to be used in ~~exposed and~~ concealed locations and where necessary for flexibility in lengths not to exceed 6 feet (1.829 m).

350-5(1). Revise this section as follows:

350-5(1) In wet locations. ~~Unless the conductors are approved for the specific conditions and the installation is such that liquid is not likely to enter raceways or enclosures to which the conduit is connected.~~

**ARTICLE 351– LIQUIDTIGHT FLEXIBLE METAL CONDUIT AND LIQUIDTIGHT FLEXIBLE
NONMETALLIC CONDUIT**

351-23. (a) Revise this section as follows:

(a) Permitted. Listed liquidtight flexible nonmetallic conduit shall be permitted to be used in exposed or concealed locations ~~for the following purposes:~~ in systems not exceeding 30 volts:

(FPN): Extreme cold may cause some types of nonmetallic conduits to become brittle and therefore more susceptible to damage from physical contact.

- (1) Where flexibility is required for installation, operation, or maintenance;
- (2) Where protection of the contained conductors is required from vapors, liquids, or solids;
- (3) For outdoor locations where listed and marked as suitable for the purpose;
(FPN): For marking requirements, see Section 110-21.
- (4) ~~Reserved For direct burial where listed and marked for the purpose.~~
- (5) Liquidtight flexible nonmetallic conduit as defined in Section 351-22(2)

shall be permitted to be installed in lengths longer than 6 feet (1.829 m) where secured in accordance with Section 351-27.

(6) As listed manufactured prewired assemble, 2 inch (12.7 mm) through 1 inch (15.4 mm) conduit, as defined in Section 351-22(2).

351-23. (b) Revise item 4 of this section as follows:

(4) Where voltage of the contained conductors is in excess of ~~600~~ 50 volts, nominal.

ARTICLE 352 — SURFACE METAL RACEWAYS AND SURFACE NONMETALLIC RACEWAYS

352-22(b)(3) Revise this section as follows:

(3) where the voltage is ~~300~~ 50 volts or more between conductors;

ARTICLE 362 – METAL WIREWAYS AND NONMETALLIC WIREWAYS

362-16 ~~Add~~ Revise item 6 to this section as follows:

(6) Where the voltage is ~~30~~ 50 volts or more between conductors.

ARTICLE 384 - SWITCHBOARDS AND PANELBOARDS

384-3(e) High-Leg Marking. On a switchboard or panelboard supplied from a 4-wire, delta-connected system, where the midpoint of one phase winding is grounded, that phase busbar or conductor having the higher voltage to ground shall be durably and permanently marked by an outer finish that is ~~orange~~ purple in color, or by other effective means.

Chapter 4. Equipment for General Use

ARTICLE 410 – LIGHTING FIXTURES, LAMPHOLDERS, LAMPS, AND RECEPTACLES

410-16. (c) Revise this section as follows:

(c) **Suspended Ceilings.** Framing members of suspended ceiling systems used to support fixtures shall be securely fastened to each other and shall be securely attached to the building structure at appropriate intervals. Fixtures shall be securely fastened to the ceiling framing member by mechanical means, such as bolts, screws, or rivets. Listed clips identified for use with the type of ceiling framing member(s) and fixture(s) shall also be permitted. All lighting fixtures or lighting fixture outlets supported by suspended ceiling systems shall have supplemental support wires (minimum #12 gauge) connected from the fixture housing or fixture support bracket to the structure above. Recessed lighting fixtures measuring 2 feet (610 mm) nominal or larger in any dimension shall have two (minimum #12 gauge) wires. *See Uniform Building Code Standard 25-2.*

ARTICLE 411 – LIGHTING SYSTEMS OPERATING AT 30 VOLTS OR LESS

411-4. Revise this section as follows:

411-4. Locations Not Permitted. Lighting systems operating at 30 volts or less shall not be installed (1) where concealed or extended through a building wall, floor, ceiling or suspended ceiling, unless using a wiring method specified in Chapter

3 or (2) within 10 feet (3.05 m) of pools, spas, fountains, or similar locations, except as permitted by Article 680.

Chapter 5. Special Occupancies

No San Francisco Electrical Code Amendments.

Chapter 6. Special Equipment

ARTICLE 645 -INFORMATION TECHNOLOGY EQUIPMENT

645-5. (d) Revise item 2 of this section as follows:

(2) **Under Raised Floors.** The branch-circuit supply conductors to receptacles or field-wired equipment are in rigid metal conduit, ~~rigid nonmetallic conduit~~, intermediate metal conduit, electrical metallic tubing, metal wireway, surface metal raceway with metal cover, flexible metal ~~or nonmetallic~~ conduit, liquidtight flexible metal conduit, Type MI cable, Type MC cable, or Type AC cable. These supply conductors shall be installed in accordance with the requirements of Section 300-11.

Chapter 7. Special Conditions

ARTICLE 700 – EMERGENCY SYSTEMS

700-12. (e) Revise the third paragraph of this section as follows:

Unit equipment shall be permanently fixed in place (i.e., not portable) and shall have all wiring to each unit installed in accordance with the requirements of ~~any of the approved~~ wiring methods in Chapter 3. Flexible cord and plug connection shall not be permitted ~~provided that the cord does not exceed 3 feet (914 mm) in length~~. The branch circuit feeding the unit equipment shall be the same branch circuit as that serving the normal lighting in the area and connected ahead of any local switches. The branch circuit that feeds unit equipment shall be clearly identified at the distribution panel. Emergency illumination fixtures that obtain power from a unit equipment and are not part of the unit equipment shall be wired to the unit equipment as required by Section 700-9 and by one of the wiring methods of Chapter 3.

700-16. Revise the first paragraph of this section as follows:

700-16. **Emergency Illumination.** Emergency illumination shall include all required means of egress lighting, illuminated exit signs, and all other lights specified as necessary to provide required illumination. Emergency lighting shall be provided for emergency power supply system rooms, central fire control stations, and mechanical rooms containing required smoke control system equipment.

ARTICLE 760 – FIRE ALARM SYSTEMS

760-25. Revise this section as follows:

760-25. **NPLFA Circuit Wiring Methods.** Installations of nonpower-limited fire alarm circuits shall be in accordance with Sections 110-3(b), 300-11(a), 300-15(b) 300-17, and other appropriate articles of Chapter 3 and with this section. Conductors shall be installed in metallic raceways or concrete encased nonmetallic raceways.

Exception No. 1: As provided in Sections 760-26 through 760-~~3028~~.

~~Exception No. 2: Where other articles of this code require other methods.~~

760-52. (a) Revise this section as follows:

(a) **NPLFA Wiring Methods and Materials.** Installation shall be in accordance with Section 760-25, and conductors shall be solid or stranded copper.

Exception No. 1: The derating factors given in Section 310-15(b) (2) (a) shall not apply.

Exception No. 2: Conductors and multiconductor cables described in and installed in accordance with Sections 760-27 ~~and 760-30~~ shall be permitted.

Exception No. 3: Power limited circuits shall be permitted to be reclassified and installed as nonpower-limited circuits if the power-limited fire alarm circuit markings required by Section 760-42 are eliminated and the entire circuit is installed using the wiring methods and materials in accordance with Part B, Nonpower-Limited Fire Alarm Circuits.

FPN: Power-limited circuits reclassified and installed as nonpower-limited circuits are no longer power-limited circuits, regardless of the continued connection to a power -limited source.

760-52. (b) Revise this section as follows:

(b) **PLFA Wiring Methods and Materials.** Power-limited fire alarm conductors and cables described in Section 760-71 shall be installed ~~as detailed in (1), (2), or (3) of this section~~ in ~~metallic raceway in~~ accordance with the appropriate articles of Chapter 3, including Section 300-17; and with Section 760-25.

Devices shall be installed in accordance with Sections 110-3(b), 300-11(a), and 300-15.

770-8 Revise this section as follows:

770-8. Mechanical Execution of Work. Optical fiber cables shall be installed in a neat and workmanlike manner. Cables shall be supported by the building structure in such a manner that the cable will not be damaged by normal building use. Optical fiber cable raceway shall be secured and supported in accordance with Section 300-11 and Article 331 Part B.

Chapter 8. Communication Systems

800-6. Mechanical Execution of Work. Communications circuits and equipment shall be installed in a neat and workmanlike manner. Cables shall be supported by the building structure in such a manner that the cable will not be damaged by normal building use. Where communications cables or conductors are installed in recognized wiring methods permitted in Chapter 3, the wiring shall be secured and supported in accordance with Section 300-11 and requirements of the applicable raceway Article shall apply.

Chapter 9. Tables and Examples

No San Francisco Electrical Code Amendments.