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NOTICE
This publication provides Network Equipment Installation Standards for use in Verizon for the installation, rearrangement, or removal of network communications equipment. These guidelines are generic in nature and applicable to all types of network communications systems, and associated peripheral equipment. Verizon reserves the right to revise this document for any reason, including but not limited to conformity with standards promulgated by various state and federal agencies, utilization of new advances in technology, or to reflect changes in the design of equipment or services described herein.

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This document is not to be construed as a suggestion to any manufacturer to modify or change any of its products, nor does this document represent any commitment by Verizon, to purchase any products, whether or not it provides the described characteristics.

Printed copies of the IP72202 are for reference only. The lastest issue is available internally at: https://iweb.verizon.com/elInstall/coei/DisplayDocumentsByDocumentType.einstall?dT=6

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Note: Vertical bars on the outer margins denote changes to this document since the release of the IP72202 Issue 2. An exception is section 22, which has been completely revised. Changes have also been made to many of the IP Forms, which are not denoted by the vertical bars.
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1.0 Introduction

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1.0 Introduction

1.1 General - Introduction

1.1.1 This document provides the requirements for the installation and/or removal of network communications equipment by all installation service providers (referred to as "Installer") in Verizon. The term COEI (Central Office Equipment Installation) Supervisor refers to COEI personnel that manage the installation of internal and external installation service providers, the term Vendor Manager (VM) refers to COEI personnel that manage the work of external installation service providers primarily. This document applies to all internal Verizon organizations and contracted network communications equipment installation suppliers.

1.1.2 This document supersedes the IP72202 Issue 2, dated April 2006. Significant additions and/or changes have been made to reflect new or revised technological standards and requirements of Verizon Telecom.

1.1.3 Changes in this document shall only be made through Verizon’s Central Office Equipment Installation Functional Team.

1.1.4 These standards are applicable to all Verizon Telecom Companies.

1.1.5 The requirements specified herein are aimed primarily at preventing any form or type of product nonconformity due to installation and/or removal processes or procedures and complements any other specified technical standard and requirement.

1.1.6 The standards contained herein require demonstration of an Installation Service Provider to control installation and/or removal processes that determine the acceptability of the product installed or removed.

1.1.7 The standards contained herein are applicable to all types of network communication equipment installations (switching, transport, power, video, and sub-systems) and/or removal services.

1.1.8 The standards contained herein are not necessarily all-inclusive and are intended to be used in conjunction with the most current release of the Telcordia documents GR-1275-CORE and GR-1502-CORE and the most current release of the Verizon Information Publications IP-72013 (Engineering), IP-72250 (Auditing) and GR-2981(Quality) and Verizon West Handbook.

Additional details and clarification may be found in the following reference documents:
• National Electrical Code (NEC)
• VZ 9 digit practices e.g. VZ 790 700 100 Grounding
• VZ standard drawings, T-base drawings
• VZ field support bulletins
• VZ Flashes, M&Ps, Staff Letters, and Technical Aids
• Any local and regional government ordinances

1.1.9 Where common systems standards are found in conflict, the installer is to adhere to the requirement as detailed in this IP72202. Where this IP does not address the conflicting standard, the installer shall refer the problem to the local COEI Supervisor /VM (Vendor Manager) and/or Verizon Engineer for resolution.

1.1.10 The standards contained herein shall be adopted in their present form, but may need to be modified for specific client requirements, technological changes, or improvements to existing methods. Verizon reserves the right to make such changes to the standards and requirements specified herein. In any case, if any change(s) should prove necessary, the Installer shall be given written notice of such change(s). Upon receipt of such change(s), the Installer shall initiate the necessary actions to conform to these standards.
1.1.11 The standards contained herein identify minimum Installer requirements necessary for effective interfacing with Verizon personnel when network equipment is to be installed, removed and/or rearranged. Various Verizon organizations have assigned responsibilities that relate to a given installation, removal and/or rearrangement, and therefore it is imperative that the standards and administrative requirements contained herein are adhered to. Compliance is required to ensure the proper coordination before, during, and upon completion of any installation and/or removal activity.

1.1.12 Forms illustrated or referenced in this document are to be provided by the Installer. Installer must use forms contained herein unless otherwise specified.

1.1.13 There shall be no deviation from the standards contained herein. Any exception item shall be documented in the MOP/Job folder, approved by the local COEI Supervisor/VM and/or Verizon Engineer.

1.1.14 Quality system requirements for installation and engineering service providers shall meet the minimum requirements of Telcordia GR-2981-CORE (Quality) and TL9000 if required by contract.

1.1.15 Installation supplier shall have access to the latest issue of the IP72202 on the job site at all times.

Internal: [https://iweb.verizon.com/eInstall/coei/DisplayDocumentsByDocumentType.einstall?dT=6](https://iweb.verizon.com/eInstall/coei/DisplayDocumentsByDocumentType.einstall?dT=6)


1.1.16 The Installer shall provide status of all Verizon equipment (also referred to as “Installation Material”) necessary for the complete installation to the local COEI Supervisor/VM and/or Verizon engineer as appropriate.
2.0 Building Requirements

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2.0 Building Requirements

2.1 Building Requirements - Introduction

2.1.1 Refer to Section 5 for information concerning hazardous material, e.g., asbestos floor tiles.

2.1.2 This section covers the general requirements for protection, maintenance, and care of buildings, facilities, and equipment during any network telecommunications equipment installation and/or removal activity.

2.1.3 Several items addressed in this section will require joint Verizon and Installer review and mutual agreement during the installation site survey and/or prior to job start.

2.1.4 Should conditions exist that require exception(s) to the requirements prescribed in this section, they are to be resolved by mutual agreement between the Installer and the COEI Supervisor/VM and/or Verizon Engineer and shall be documented and remain with the local job documentation.

2.2 Access to Buildings

2.2.1 The Installer shall make arrangements with Verizon’s Management for access into Central Office locations. This access may require contact by the installer with Verizon Security personnel for keys, key codes, card keys, etc.

2.2.2 The Installation Supplier shall be responsible for the actions of any individual employee, representative, or sub contractor working for that installation supplier.

2.3 Building Security

2.3.1 Building space, provided for the Installer's use, must be vacated at the completion of the installation/removal job unless other arrangements are made with the local Verizon representative.

2.3.2 Verizon issued identification cards are required for all Installation Supplier employees and their subcontractors working on Verizon property. The Installer shall follow local practices for obtaining Verizon identification.

2.3.3 Contracted installers shall visibly wear their company issued identification and their Verizon issued identification card at all times while on Verizon’s premises. Verizon employees shall wear their Verizon issued identification badge at all times. For any exceptions, follow Verizon’s Security Organization requirements.

2.3.4 The installer shall guard against and take steps to prevent unauthorized visitors from entering Verizon premises. Verizon buildings must be protected by properly securing doors and gates (i.e. locking, alarming, etc.). Doors and gates are never to be left propped open when unattended.

2.3.4.1 Keys issued to a Vendor shall be returned at the end of the job unless otherwise approved by Verizon. No duplicate keys shall be made. If keys are lost or stolen, it must be reported immediately to COEI. If Verizon must change locks or replace keys due to the loss or theft, or if keys are not returned upon completion of work, the Vendor will be held responsible for the replacement costs.

2.4 Building Conditions

2.4.1 The Installer must provide temporary protection for stairway treads, floors, walls, columns, etc., where necessary to avoid building damage during any installation and/or removal activity.

2.4.2 The Installer shall determine specific protection requirements and the materials needed to adequately protect the building and equipment during periods of installation. Protection shall be provided for the following:

• Landscape
• Fences
• Walkways
• Driveways
• Lighting fixtures
• Interior and exterior building surfaces
• New and existing equipment.

2.4.3 In all cases where delivery, hauling, and/or hoisting activities are being performed, including the movement of equipment and material into or out of the building, the Installer shall assure the proper protection of all building premises and equipment.

2.4.4 Verizon shall perform relocation of Verizon’s fire fighting apparatus, made necessary by the installation and/or removal work. The Installer shall ensure that fire detection and protection apparatus is accessible at all times.

2.4.5 All fire protection equipment installed to detect and limit the spread of fire within a building shall be in place at all times except when necessary for the installation of equipment as determined by Verizon.

2.4.6 Smoke/fire detectors, fire extinguishers, cable penetration covers, Intumescent sheets and fireproof bags and similar equipment temporarily disabled or removed by the Installer, shall be replaced or reactivated as soon as possible but no later than the end of the each shift. (See Section 12)

2.4.7 Verizon Real Estate approval is required before cutting or drilling completely through any part of the building structure such as, but not limited to: girders, beams, partitions, floors, walls, and columns, etc. (This does not apply to raised floors.)

2.4.8 Cutting of metallic material should be avoided in the Central Office. However, if cutting or drilling is required, the Installer shall obtain Verizon approval and provide appropriate protection to avoid damage to the building and/or equipment. (See Section 2.11.9 of IP 72202)

2.4.9 Drilling into waterproofed floors (see note below) is limited to depths not exceeding 3 inches.

NOTE: Verizon Real Estate approval shall be obtained before drilling into waterproofed floors.

2.4.10 The Installer is responsible for all building damage that they have caused.

2.5 Ceiling Inserts

2.5.1 Verizon will provide all ceiling inserts, embedded ceiling channel, or appropriate fastening arrangements in the areas in which the equipment requires ceiling fastening. Only a Verizon Real Estate approved vendor shall install these items.

2.6 Electric Power, Heat, and Light

2.6.1 Verizon shall provide electric power for Vendor use as stated in the approved Method of Procedure (MOP) document.

2.6.2 Installer shall not adjust controls, thermostats, or cooling plant. Any necessary adjustments must be requested of Verizon.

2.6.3 No type of portable heating, e.g., space heaters, etc., will be allowed in a Verizon building.

2.6.4 U.L. approved portable droplights with a fully insulated body and bulb shield or small fluorescent lamps with hinged hooks may be Installer-provided and used for local illumination and shall be unplugged when not in use.

2.6.5 The addition of temporary lights shall not exceed the wattage capacity of the circuit to which they are connected.
2.6.6 Temporary incandescent and/or fluorescent lighting fixtures and strings shall be securely supported and meet requirements of the National Electrical Code (NEC® NFPA-70).

2.6.7 Temporary lighting shall be disconnected when left unattended.

2.6.8 All requirements of CFR-1910.147, the OSHA Lockout/Tag-Out law, shall be adhered to (see http://www.osha.gov/ for more information).

2.7 Administrative Space

2.7.1 Verizon will designate building space, if available, for Installer related activities. This shall include space required for receiving and erecting frames, unpacking and storing material, desks, file cabinets, tool lockers, etc. The location of such space may be allocated in various locations at the installation site. In any case, the amount of space allotted must be agreed upon between Verizon and the Installer and documented in the MOP before the job start. **Vendors shall not use Verizon desk space administrative equipment without approval.**

2.7.2 Verizon **WILL NOT** be responsible for providing Installation Suppliers with the following:

- Parking facilities for personal and/or company vehicles
- Replacements for private possessions, e.g., tools, jewelry, etc.
- Communications, i.e., telephone service and/or facsimile machines, etc.
- Administrative supplies, duplication facilities (copiers), personal storage, and/or lunch room furniture or supplies

2.7.3 If temporary external storage facilities (i.e., trailers) are required, they must be placed in accordance with Verizon Real Estate, local, state, federal regulations, and the NEC.

2.7.4 Tools, equipment, material, furniture, and other property belonging to the Installation Supplier not necessary for the contracted installation activity is not allowed on Verizon’s premises.

2.8 Sanitary Facilities

2.8.1 The Verizon contracted Installer will have access to toilet, clean up, and meal facilities if available. In any case, where such facilities are limited or unavailable, Verizon will advise the Installer of particular conditions before the job start.

2.9 Building Openings

2.9.1 Before equipment installation, where existing equipment building openings are not sufficient for delivery, the Installer shall provide Verizon written details, drawings, etc., which stipulate their requirements.

2.9.2 Verizon will provide sufficient building openings to allow material and equipment to be delivered. Verizon will provide ducts, floor and wall openings, etc., as required.

2.10 Cleaning of Premises and Equipment

2.10.1 General cleaning of the equipment, facilities, and storage areas (e.g., cleaning floors of debris, packing materials, etc.) shall be performed during and at the end of each shift by the Installer.

2.10.2 Equipment shall be unpacked in the staging/storage area provided. All packing material and other trash shall be removed daily from the central office as described in the MOP.

2.10.3 All material and equipment shall be free of dust and foreign substances before being brought into an equipment area.
2.11 Protection of Personnel, Premises, and Equipment

2.11.1 Protection, such as anti-static plastic dust barriers, shall be provided to avoid dust and particle contamination. The Installer shall exercise care to prevent dirt, dust and other forms of contamination from getting into any new or existing equipment.

2.11.2 Protection of central office equipment from airborne contaminants during any installation and/or removal activity is required.

2.11.3 Care must be taken so that cleaning methods generate minimal amounts of airborne dust. Vacuum cleaners must be equipped with High Efficiency Particulate Arrestor (HEPA) filters.

2.11.4 Refer to Section 5 for information concerning hazardous material.

2.11.5 Where posted, specific types of equipment and/or tools that are not permitted in central offices include, but are not limited to magnetic devices, telecommunications radios, gas-powered tools, flash photography, and torches. Posted information should indicate limits (location, type of equipment etc.) of device usage.

2.11.6 Digital Cell phone usage within the central office equipment room shall be in accordance with the following:

- The use of wireless devices is limited to hand-held portable digital devices, such as dual and tri-mode cell phones.
- Such wireless devices should not be used within three meters (approximately 10 feet) of central office equipment. This would exclude any scenarios where that particular office is in a recovery mode.
- Analog Time Division Multiple Access (TDMA) cell phones, which have increased power output, have a greater risk of interrupting switch operations and are not to be used within central office equipment space. These may be used outside the central office equipment rooms.
- All Code Division Multiple Access (CDMA) cell phones (primary Verizon Wireless & Sprint Products) do not interfere with video channels, and are permitted to be used in VSOs with no distance restrictions.
- Fixed wireless devices should continue to be reviewed for NEBS compliance, as they are directly connected to electrical and telecommunications interfaces.
- See Network Services Group Flash 2006-03003-NOS.

Central Office Wireless Policy can be found internally on the Verizon NEBS compliance web page @http://nebs.verizon.com.

2.11.7 Any compressor to be used by the Installer must meet the following requirements:

- The compressor shall be approved by the American Society of Mechanical Engineers, Factory Mutual, the Underwriters Laboratories, or equivalent.
- An automatic shut-off valve shall be provided.
- A pressure gauge shall be located in such a position as to be easily read. Exit pressure from any attached tool SHALL NOT exceed 30 psi.
- On tank-equipped models, an AMSE-approved safety relief valve shall be provided.
- All moving parts such as gears, drive belts, etc., shall be equipped with protective guards.
- The rated working pressure of all hoses and connections shall be at least 1 to 1 1/2 times the maximum output pressure of the compressor.
- The compressor must be equipped with a power control switch.

2.11.8 Plastic, Styrofoam, or any other material, which may cause an ESD condition, shall not be brought in contact with the equipment or stored in the equipment room.
2.11.9 The cutting/drilling of all material shall be strictly controlled. The method and location of all cutting/drilling activities shall be noted in the MOP and performed outside the equipment area wherever possible. The installer shall protect against dust/particulate matter from contaminating the equipment area by using a High Efficiency Particulate Arrestor (HEPA) vacuum or approved method to collect all particles and dust generated during the cutting/drilling process. (See Section 2.4.8 IP 72202)

2.11.10 Food & Drinks are not to be in the same room as central office equipment.

2.12 Communications Requirements

2.12.1 Verizon telephone sets are for the exclusive use of Verizon employees to conduct company business. Any deviation from this requirement must be documented in the MOP and signed by Verizon representative.
3.0 Regulations

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3.0 Regulations

3.1 Introduction

3.1.1 It is the Installer’s responsibility to adhere to and comply with all federal, state and local laws, ordinances, regulations and codes (building, fire, etc.) during the course of an installation.

3.1.2 Should any federal, state or local law, ordinance, regulation, or code conflict with any requirement in this IP72202, it is the responsibility of the Installer to identify this conflict and to contact the COEI Supervisor / VM and/or Verizon Engineering Representative for joint investigation and resolution.

3.2 Regulations

3.2.1 The Installer shall obtain any local, state, and federal licenses/permits required for the safe and lawful execution of any installation contract.

3.2.2 The Installer must have all proper local, state, and federal permits current and valid as prescribed by law and Verizon Contracts.

3.2.3 Code of Conduct: Should Verizon determine, in its’ opinion, that Installer’s supervisor and/or assistants are not performing in a manner acceptable to Verizon, or otherwise incompatible with Verizon’s operations, Installer shall, upon receipt of Verizon’s request, forthwith remove such employee(s) from Verizon’s premise and from all work activities, and immediately replace with employee(s) acceptable to Verizon.

3.3 Hazardous Materials

3.3.1 Reference Section 5 of this IP72202.

3.4 Collocation

3.4.1 Specifications

3.4.1.1 Specifications for Collocation can be found on the following Verizon Web Sites:

https://www.vzmultimedia.com/coe_practices/
USER NAME = vzvendor PASSWORD = practices

http://www22.verizon.com/wholesale/ (for fBA)
http://coe-support.verizon.com/~netops/netdsgn/switch/colloc/colloc.htm (for fGTE)

3.4.1.2 Collocator’s facilities shall be placed, maintained, relocated and/or removed in accordance with the applicable regulations, requirements and specifications of the following documents:

- National Electrical Code, NEC
- National Electrical Safety Code, NESC
- State and Local Codes and Ordinances
- Occupational Safety and Health Act, OSHA
- FCC Tariffs

3.4.1.3 Collocator’s entrance facilities and splices shall comply with the following:

- Telcordia Generic Specifications for Optical Fiber and Optical Fiber Cable, TR-TSY-00020
- Verizon Cable Placing Handbook
- Verizon Cable Splicing Handbook
- Verizon Cable Maintenance Handbook
3.4.1.4 Equipment located within the Collocator's Partitioned Space shall meet the requirements and specifications of the following:

- Telcordia’s Network Equipment Building System, NEBS, GR-63-CORE
- Telcordia’s Electromagnetic Compatibility & Electrical Safety, GR 1089 CORE
- Telcordia’s Central Office Environment Detail Engineering Generic Requirements GR-1502-CORE
- Verizon Central Office Engineering Standards IP72013
- Verizon NEBS Requirements RNSA-NEB-95-0003
- Verizon Building Requirements (See Section 2)
- FCC Tariffs

3.4.1.5 Equipment shall be installed, rearranged, or removed within the Collocator's partitioned space according to the requirements of the Verizon Network Equipment Installation Standards, IP72202, and other required standards.

3.4.1.6 Collocator's facilities SHALL NOT physically, electronically, or inductively interfere with Verizon's, other Collocator or tenant's facilities.

3.4.1.7 If necessary, the Collocator will be responsible to tap-down -48V DC power feeders to the appropriate size cables for their equipment. These taps shall be located within the Collocator’s cage and not on Verizon cable racks.

3.4.1.8 In certain circumstances, Verizon may authorize a Collocator to perform power taps outside the cage only if a dedicated power cable rack exists. This authorization must be documented in writing and in the MOP.

3.4.2 Periodic Compliance Inspections

3.4.2.1 Compliance inspections may be conducted at random intervals of all or portions of the Collocator's facilities. The inspections shall determine that occupancies are authorized and are installed and maintained in conformance with the requirements of their License Agreement.

3.4.2.2 Verizon shall notify Collocator in advance of compliance inspections.

3.4.2.3 Collocator shall have the right to be present at the time of compliance inspection(s).
4.0 Safety

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4.0 Safety

4.1 Introduction

4.1.1 The information contained in this section provides generic requirements concerning safety. It is not intended to be an all inclusive safety manual.

4.2 General

4.2.1 The Installer is responsible to instruct its’ employees in the appropriate safety procedures and practices and ensure adherence to these procedures and practices while on Verizon premises.

4.2.2 Installer shall ensure that employees conduct all installation/removal operations in a safe manner. Protective equipment shall be used while performing installation/removal operations in the CO environment.

4.2.3 The Installer shall report any hazardous condition to the Verizon’s COEI Supervisor/VM who will refer condition to the appropriate Verizon Engineer and/or Net Ops. It shall be documented in the MOP with detail of procedures to correct the situation or precautions to be taken to prevent injury to personnel, without loss of service to Verizon customers.

4.2.4 All walkways, entrance and exit routes through the equipment area(s) shall be kept clear of tools, equipment, packaging, cable, etc.

4.2.5 Ample passageways shall be maintained through all aisles in accordance with all building and fire code requirements.

4.3 Ladders and Scaffolding

4.3.1 When any portion of ladder track is removed, stop bolts MUST BE reinserted at appropriate locations, to prevent rolling ladders from falling and injuring personnel or damaging equipment.

4.3.2 The use of non-conductive type ladders is required in all Central Office environments.

4.3.3 The Vendor or Contracted Installer shall, not use Verizon ladders, rolling or stationary, without prior approval from the COEI Supervisor/VM. The Vendor or Contracted Installer shall provide ladders required for any installation/removal effort.

4.3.4 All scaffolding must be approved for the use intended and the vendor shall provide all necessary railings or other fall protection as required.

4.4 Microwave Radiation

4.4.1 Any microwave equipment that may be affected by an installation/removal effort in a Central Office is to be identified in the MOP with detailed work precautions and procedures to prevent both injuries to personnel and damage to equipment.

4.5 Eye Protection (Safety Glasses and Goggles)

4.5.1 Eye protection may be required for a variety of Central Office Installation activities. These may be plain, prescription lenses and / or Laser safety glasses depending of the needs of the Installers personnel.

4.5.2 Only lenses made of impact-resistant materials in compliance with ANSI or appropriate OSHA regulations shall be used.
4.5.3 Eye protection may require side shields in accordance with OSHA directives.

4.5.4 All work in power rooms requires Eye protection with side shields and work on flooded cell batteries requires splash proof goggles or a full-face shield.

4.6 Hearing Protection

4.6.1 Ear Protection shall be worn while operating or working near power tools or machinery, which require the use of hearing protection (e.g. running diesel or turbine engines, hammer drills, etc.)

4.7 Insulating Gloves

4.7.1 Insulating gloves shall not be used passed the expiration date and be worn whenever an installer handles wire, terminals, equipment or other objects on which there is the possibility of high voltage/current (A3 voltage type i.e. 140 Volts or greater with a 10 mA max) being present or introduced.

4.7.2 Insulating gloves worn while handling or working on or near storage cells must be rated for protection against any corrosive materials present.

4.8 Safety Headgear (Hard Hats)

4.8.1 Hardhats shall be worn when required by federal, state, or local laws. When required, the Installer will identify in the MOP and post the work area as a hard hat Area in accordance with federal, state, or local laws.

4.9 Safety Footwear

4.9.1 Any installer who performs jobs that require routine handling of material, tools or equipment weighing 30 pounds (includes lifting or rolling) or more shall adhere to the Verizon Footwear Policy (posted on the Verizon Safety, Health, and Environmental webpage @ http://hr.verizon.com/safety_policies/footwear.pdf).

4.10 Cable Vault

4.10.1 Before entering the vault, the Installer shall test for the presence of gas in accordance with Verizon Outside Plant requirements. The Installer shall detail these requirements in the MOP.

4.11 Fire Safety

4.11.1 SMOKING in Verizon buildings is STRICTLY PROHIBITED.

4.11.2 Work clothes such as overalls, etc., when not in use shall be kept in an agreed to location away from flammable materials or outside the building.

4.11.3 Halls, stairs, passageways, fire exits, and space surrounding fire alarm boxes, fire-fighting equipment, fuse boxes, and ac cabinets SHALL NOT be obstructed in any way.

4.11.4 The use of blowtorches is strictly prohibited inside central offices.

4.11.5 Installer employees shall be made aware of the location of fire-fighting equipment.

4.11.6 The Installer must remove all packing material and trash daily.

4.11.7 Oily rags shall be deposited in a safety waste can and disposed of daily.

4.11.8 Combustible materials SHALL NOT be stored near heating equipment (e.g. stovepipes, flues, or uncovered steam pipes).
4.11.9 Catch trays shall be placed under drill presses, pipe cutters, and threaders to collect metal chips and oil drippings. Metal chips and oil dripping shall be removed daily.

4.11.10 Flammable materials SHALL NOT be used for building or equipment protection. Materials such as fire-retardant Masonite and metal shall be used to protect the flooring when moving heavy equipment or cable into and out of a Central Office. These items shall be removed from office after use.

4.11.11 Protection built around working equipment must be made of fire-retardant and ESD resistant material.

4.11.12 All cable penetrations shall be closed as soon as possible but no later than the end of each working shift (See Section 12).

4.11.13 Temporary lighting circuits shall be disconnected when left unattended.

4.11.14 Standard approved fuses of the specified capacity shall be used in all circuits.

4.11.15 Loose, unconnected wires or cables SHALL NOT be left hanging where they could come in contact with live equipment.

4.11.16 Fire-alarm equipment SHALL NOT be disconnected until the Installer verifies with a Verizon representative that another means exists to report any fire occurrence.

4.11.17 Fire doors SHALL NOT be blocked open or obstructed from closing at any time or in any manner.

4.11.18 Any product that is intended for use in the Central Office environment must meet the requirements found in NEBS GR-63-CORE and Verizon NEBS Requirements RNSA-NEB-95-0003. The Installer shall provide the NEBS documentation/ratings of all or any material upon Verizon’s request.

4.12 Optical Fiber Systems

4.12.1 Safety precautions and procedures shall be detailed by the Installer in the MOP to protect themselves and others from accidental exposure to optical laser light energy, fiber cables, and the chemicals used to clean fibers.

4.13 Asbestos

4.13.1 It is the Installer's responsibility to be cognizant of the procedures required when working near asbestos containing materials. These procedures and precautions shall be detailed in the MOP by the installer.

4.13.2 Floor coverings should be presumed to contain asbestos. The installer shall always use OSHA approved procedures when cutting/drilling floor coverings and/or during removals.

4.14 Personnel Protection

4.14.1 Removal operations present certain potentially hazardous conditions; therefore, emphasis shall be placed on the proper use of tools and personal protective equipment.

4.14.2 Walking or standing on cable rack stringers, straps, panning, ducts, cables, wires or fiber optic cables/jumpers is strictly prohibited. When this overhead area is not accessible with a ladder, use caution to avoid dislodging or damaging cable.

4.14.3 Open cable penetrations shall be provided with adequate protection to prevent personnel from falling through or the dropping of tools or materials to the floor below (See Section 12).

4.14.4 All exposed floor obstructions or protrusions, e.g., floor anchors, bolts, etc.; resulting from a removal shall be removed or cut flush with the floor covering.

4.14.5 Holes in the floor because of equipment removal shall be filled with a Verizon-approved substance.

4.14.6 Floors shall be kept clean. Loose wire, screws, etc., shall be swept up and properly disposed of to prevent injury, i.e., trips, falls, etc.
4.14.7 General housekeeping, e.g., cleaning floors of debris, removal of packing materials, etc., is to be performed daily by the Installer during the entire equipment installation/removal period.

4.15 Use of Tools

4.15.1 Refer to section 8.2 for detailed information.
5.0 Hazardous Material/Waste

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5.0 Environmental Compliance and Hazardous Material/Waste

5.1 Introduction

5.1.1 The Installer is required to perform all of its activities in full compliance with all applicable federal, state and local laws that are designed to protect human health and the environment including, but not limited to, those laws regulating the handling, packaging, storage, transportation, disposal or recycling of toxic and hazardous materials.

5.1.2 Installer’s activities shall not modify any Verizon responsibilities under these laws unless (and then only to the extent) that Verizon specifically agrees in writing to accept such modified responsibilities.

5.1.3 The information that is found in this Section shall not be used to replace the requirements of federal, state, or local laws, regulations, codes, etc., governing environmental protection including, but not limited to, regulated or hazardous Waste, hazardous materials, or hazardous substances. It is the Installer’s duty to determine whether any additional requirements are applicable and to comply with any and all such additional requirements. If Installer believes that there are any conflicts between any applicable law and the provisions of this section, Installer shall immediately notify Verizon about such alleged conflict.

5.1.4 Installer shall be fully liable for (and shall hold Verizon, its subsidiaries, successors, officers, employees, agents and assigns, harmless against) any damages, injuries, claims, liabilities, fines etc. alleging or relating to an alleged breach of any environmental law, release of toxic or hazardous substances, disposition of its wastes or failure to meet the terms and/or requirements of this section.

5.1.5 The Installer shall cooperate with Verizon in the elimination of unsafe or toxic materials that may be discovered in the immediate work area. Installer shall notify Verizon Environmental Management group (EM) by utilizing the 24/7 hotline number 1-800-386-9639, menu option #2, when hazardous waste is generated or an incident requires a hazardous materials clean-up crew.

5.2 Hazardous Materials/Hazardous and Regulated Waste

5.2.1 The Installer must consult Verizon before any work activities that involve toxic or hazardous materials or require that such materials be brought onto Verizon premises. Hazardous materials brought onto Verizon property or hazardous or regulated waste generated by work activities must be clearly described in the MOP, which shall include a statement of the associated risks and obligations. (See Section 7).

5.2.2 Hazardous materials must be stored, handled, and used according to applicable legal requirements, Verizon requirements and manufacturer’s specifications.

5.2.3 Installer shall be responsible for all wastes that it generates. All wastes, including non-hazardous wastes, are to be removed from the premises and not mixed with Verizon trash or wastes.

5.2.4 The Installer is responsible for hazardous materials used during work activities and hazardous and regulated waste generated as a result of work activities. These materials are to be removed from Verizon property as promptly as reasonably possible, but in no instance more than two hours after completion of the installation activities. All such materials shall be disposed or recycled according to applicable requirements.

5.2.5 Verizon shall be provided with copies of all manifests and proof of proper disposal or recycling, including but not limited to hazardous waste manifests, that relate to wastes removed from the site by the Installer. Verizon shall not be listed as the generator of any such wastes and if a generator ID number is required for any shipment or manifest, Installer shall obtain an ID number that is not linked to Verizon.

5.2.6 Verizon Environment Management will manage all hazardous or regulated waste, if any, that is the responsibility or property of Verizon, provided that if such wastes were generated because of Installer’s activities, then Installer shall be responsible for all costs associated with such wastes.
Contact Environment Management using the 24-hour Environmental Hotline 800-386-9639, Option 2 to arrange for hazardous or regulated waste disposal.

5.2.7 The Installer shall immediately contact Environment Management using the 24-hour Environmental Hotline 800-386-9639, Option 2 to report a spill or release of hazardous materials on Verizon property.

5.2.8 If environmental issues are encountered during work activities, immediate stop work, and contact Environment Management using the 24-hour Environmental Hotline 800-386-9639, Option 2.

5.2.9 Questions regarding hazardous materials, or hazardous or regulated waste should be forwarded to the Regional Environmental Manager or contact Environment Management using the 24-hour Environmental Hotline 800-386-9639, Option 2. When necessary, the Regional Environmental Manager should be consulted during preparation of the MOP.

5.3 Safety & Hazardous Materials (consolidated from original document, not edited)

5.3.1 The Installer shall educate and issue warnings to all persons at the work site about hazardous materials/waste exposure. These warnings shall be posted at the work site from Job Start until complete removal of all hazardous materials/waste from the job site is accomplished.

5.3.2 The Installer shall make regular inspections during the course of an installation/removal activity to identify and clear any hazardous or potentially hazardous conditions caused by the Installer's activities.

5.3.3 The Installer is responsible for properly supervising its employees and shall take those actions necessary to assure that employees are complying with all of the requirements of this section.

5.3.4 Storage of toxic, hazardous or flammable materials such as lubricants, paints, shellacs and cements must be authorized by Verizon in the MOP. Such materials shall only be stored in a Verizon authorized location.

5.3.5 The installer must have access to the material safety data sheets (MSDS) at all times for all products that have a warning, caution, or danger label used/or stored on Verizon property. (see http://safety.verizon.com/safety/msds.shtml for more information).

5.3.6 Shellac cans, paint pots, paint brushes, etc., which are used daily must be stored in Installer provided steel tool chests, metal safety waste cans, or in metal lockers. These containers must be at least 3 feet from apparatus and material and shall be kept closed and free of rubbish at all times.

5.3.7 Paint, shellac, etc., shall be mixed outside the building over paved surfaces and in accordance with all applicable legal requirements and product directions.

5.3.8 All paint, shellac, etc. containers shall be properly closed when not in use.

5.3.9 Paint spraying (compressor or spray can) SHALL NOT be used in the Central Office except where specifically authorized by Verizon in the MOP.

5.3.10 Gasoline, benzene, naphtha, or turpentine SHALL NOT be used for cleaning any parts of the equipment or for any other operations except where specifically authorized by Verizon in the MOP. When allowed, Installer shall be responsible for protecting against any evaporative or other emissions and shall assure that no Verizon property becomes contaminated with such cleaning product.

5.3.11 Carbon tetrachloride and similar cleaning fluids SHALL NOT be used.

5.3.12 Only cleaning fluids authorized by the Verizon Environmental Affairs Organization may be used in performing the following work operations, i.e., labeling, contact cleaning, etc. If any other cleaning products are proposed for use in an MOP, then such proposal shall be made conspicuously with a description of all relevant hazards and safeguards to be followed.

5.3.13 Verizon is not required to agree to allow Installer to bring, store or use any toxic or hazardous material or substance to the premises if that substance is not required for the installation or operation of the
telecommunications equipment being installed, is a toxic or hazardous material that is not used by
Verizon at the facility, which presents a new, different or increased environmental or safety risk from
those posed by materials used or stored by Verizon at the facility, that increases any Verizon legal
obligations (including but not limited to reporting obligations) or that are otherwise deemed
inappropriate by the Verizon Environmental Organization. When including a product on an MOP,
Installer is required to explicitly state in a conspicuous fashion, any toxic or hazardous material and
specify the hazards associated with that material.

NOTE: Trichloroethylene, 1-1-1 stabilized Trichloroethane (methyl chloroform); methylene
chloride; and Carbon Tetrachloride are prohibited in Verizon buildings.
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6.0 Job Start, In-Progress, Completion Reporting and Acceptance

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6.0 Job Start, In-Progress, Completion Reporting and Acceptance

6.1 Introduction

This section contains installation job start, in-progress, job completion, and acceptance requirements.

6.1.2 Various activities contained herein will require cooperation between the Installer and Verizon.

6.1.3 The Installation Interval is defined as the period after the TEO/WO has been issued beginning with the Initial MOP / Job Start through the ACTUALIZED / CONSTRUCTION COMPLETE date.

6.2 Job Start Notification

6.2.1 Dates for installation intervals (ship, start, complete dates, etc.) are to be agreed upon between Verizon Engineering and Installer before the start of any installation activity. Installer shall meet the TEO requested completion/WO scheduled date agreed upon between Verizon Engineering and Installer.

6.2.2 Before the actual start of an installation activity, the installation supplier shall commit to a “firm schedule” for the entire installation job interval. This firm schedule must be consistent with the dates listed in the TEO/WO. This schedule shall include ship, start, complete, software dumps, loads, freeze periods, etc., for hardware and software. These dates must reflect month, day and year. Coded dates are not acceptable.

6.2.3 Various installation and/or removal operations referred to in this document will require specific approval by Verizon. Approval criteria are prescribed herein.

NOTE: All installation and/or removal work operations must be performed in accordance with Verizon’s Safetime Practice and approved by Verizon by way of a written Method of Procedure per section 7.

6.2.4 Any changes to dates must be communicated to the COEI Supervisor/VM and/or Verizon Engineer. Refer to completion requirements contained in this section for additional information. Before the MOP, date changes must be communicated to the Verizon Engineer and after the MOP, date changes must be communicated to the COEI Supervisor/VM.

6.2.5 High Risk Activity Notice

6.2.5.1 High-risk activity is defined as any activity that has the potential of causing a service interruption. For any work activity identified as a High Risk Activity a High Risk Activity Notice shall be issued.

6.3 Job Plan (MOP)

6.3.1 Verizon requires job information be documented in the Installer’s MOP (see Section 7).

6.4 Job Information Memorandum

6.4.1 The Job Information Memorandum (JIM) or equivalent provides a method for communication between the Installer and Verizon. In the fGTE, any request for changes to scope of work, including scheduling, is documented using a JIM or equivalent. In the fBA, any request for changes to scope of work, including scheduling, is documented in Capacity Creation Process (CCP) or for Contracted Vendors via Vendor Link. All changes shall be agreed to by the COEI Supervisor/VM and/or Verizon Engineer.

NOTE: All significant job changes that alter the scope of work are to be documented in the MOP (see Section 7).

6.5 In-Progress Report
6.5.1 The installation supplier shall provide Verizon a periodic report that details the current status of each active installation order, as requested by Verizon.

6.6 Completion Reporting

6.6.1 General

6.6.1.1 The Installer shall provide written notification to confirm completion of installation (see Form 6-1).

6.6.1.2 The Installer shall issue completion notifications not to exceed three business days after an advance, In Service or final completion, unless otherwise agreed to between Verizon and the Installer.

6.6.2 In Service Notification Form (fGTE)

6.6.2.1 When applicable, In Service Notification Form should be completed.

**NOTE:** When an advance complete, or final completion date is to be extended or rescheduled, the installer shall contact COEI Supervisor/VM to determine what service affecting criteria the job has. Agreement of Verizon Engineering Organization for all "reschedules" must be obtained.

6.6.3 Reschedules

6.6.3.1 The equipment provisioning process requires the ongoing evaluation of customer service needs by Verizon. In order to meet the needs of Verizon customers, changes in schedules are often required. The Installer should understand the necessity for such changes, and when requested provide Verizon with their ability to meet those changes.

6.6.3.2 Mutually agreed upon schedule changes between the Installer, COEI Supervisor/VM, and Verizon Engineering to a completion date is considered a "reschedule" in CCP.

6.6.4 Extensions

6.6.4.1 If the job is unable to complete by the date requested by Verizon, the job is determined to be unacceptable and must be "extended".

6.6.4.2 When an "extension" is required, the Installer will be responsible for notifying Verizon of the specific reasons for the "extension". "Extensions", if Installer caused, **DO NOT** alleviate the Installer of contract obligations associated with previously scheduled completion dates.

6.6.5 Job Holds

6.6.5.1 A "Job Hold" is a result of Verizon imposed conditions. Work on these jobs shall not continue until Verizon Engineering gives approval and new job completion dates are issued.

6.6.5.2 Jobs placed on "Hold" will normally be for the following reasons:

- Building not ready
- Federal Communications Commission approval not obtained
- Pending partial Verizon engineering change
- Pending Monetary Authorization
- Pending Cancellation of Order
- Major Material Shortages
6.6.5.3 Jobs placed on "Hold", after the start date, will require the Verizon Engineer to issue a revised schedule.

6.6.6 Completion Notification (Form 6-1)

6.6.6.1 A "Completion Notification / End of Job Review" Form 6-1 shall be completed and issued to Verizon when reporting:
- Advance Completions (6.6.6.2)
- In Service / Construction Complete (6.6.6.2)
- In Service with Exceptions (6.6.6.3)
- Completion of Exception Item(s) (6.6.6.4)

NOTE: Before the end of the job the Installer shall list the alarms tested and indicate if the alarms were received within the Central Office location (audible & visual) and/or remotely as reported by the surveillance center involved.

6.6.6.2 Advance Completion and In Service / Construction Complete

6.6.6.2.1 Definitions:
- Advance Completion: is completion of a specified portion of the job in advance of the In Service completion date.
- In Service: is one where all major equipment specified in the equipment order is completely installed, and only non-service affecting equipment is not installed.
- Construction Complete: is one where all equipment specified in the equipment order is completely installed and accepted by COEI Supervisor/VM.

6.6.6.2.2 The agreed upon advance and final completion dates are shown on the "Firm Schedule" and committed to by the installation supplier whom the job is awarded.

6.6.6.2.3 The Installer shall report all Advance, In Service and Construction Completion’s to Verizon on a Completion Notification Form 6-1.

6.6.6.2.4 Completion Notification Forms issued by the Installer require review and acceptance of Verizon.

6.6.6.3 In Service with Exceptions

6.6.6.3.1 Minor exception items (non-service affecting) not completed by the completion date may be allowed, but only if mutually agreed to by Verizon and Installer (also Re: Section 9).

6.6.6.3.2 The Installer shall list all minor exception items on the “Completion Notification” Form 6-1 and must finish all items listed within the specified Verizon acceptance interval (normally 30 calendar days).

6.6.6.3.3 The COEI Supervisor/VM and/or Network Operations (fBA) shall indicate acceptance with exceptions by signing and forwarding a copy of the completion notification to the Installer. After the issuance of the job completion form, Verizon will only return the job completion notification if the job is rejected or has exception items.

NOTE: When an advance complete/in service, or construction completion date is to be extended or rescheduled, the installer shall contact COEI Supervisor/VM to determine what service affecting criteria the job has. Agreement of Verizon Engineering Organization for all "reschedules" must be obtained before the completion date is revised.
6.6.6.4 Completion of Exception Items

6.6.6.4.1 Upon completion of the exception items, the Installer shall issue a new "Completion Notification / End of Job Review" Form 6-1.

6.7 Material Disposition Form (Form 6-2)

6.7.1 Any excess installation material/equipment shall be documented by the installer using Material Disposition form. If the material disposition is not provided, the installer will then contact Verizon Engineering for disposition. The Verizon engineer will provide disposition before job completion.

6.7.2 Before Job Completion, the Installer shall turnover all Verizon purchased spare circuit packs, fuses, plug-ins, tools, test equipment, and/or miscellaneous equipment to a Verizon Operations representative and document on the Material Disposition Form. Before job completion, all applicable bar-coding shall be completed (for more information refer to: http://invmgt.verizon.com/regional/staff/processes/methods_procedures/m&p_homepage.shtml).

6.8 Job Acceptance

6.8.1 General

6.8.1.1 Acceptance of an installation requires analysis and verification to assure that the installation services and/or equipment contracted for have been received, properly installed, removed, modified and tested according to specified Verizon and Installer requirements.

6.8.2 Responsibility

6.8.2.1 Assuring that the services and equipment provided are proper and correct is a joint responsibility of the Installer and Verizon.

6.8.2.2 The Installer shall provide Verizon with verification records that indicate that the proper quantity and type of equipment was installed, placed, modified, or removed according to Verizon and Installer specifications and requirements.

6.8.2.3 The Installer shall provide Verizon records of all tests performed on installed or modified equipment.

6.8.2.4 In some cases, Verizon will require that a technical Verizon representative be present during periods of equipment testing.

6.9 Job Documentation (See Section 9 for documentation to be turned over)

6.9.1 Before job acceptance, the Installer shall provide Verizon with specific records that pertain to the installation that are completely filled out and accurate. Such records may include, but are not limited to:

- Marked prints and drawings (e.g., circuit schematics, physical designs, wiring diagrams, plan type drawings, etc.)
- COAR Documentation / COEP
- Engineering Specifications
- Wiring lists
- Initial battery charge reports
- Records and fuse assignments
- Operating instructions
- Material disposition forms
- Technical manuals
- Practices
- Bills of lading

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• Installation instructions
• Circuit descriptions
• Computer generated documents
• Test record (Form 6-3 or equivalent)
• If an equivalent Test Record form is utilized, then the Tool ID of any calibrated tool or test equipment used must be listed.
• Checklist of Pertinent Items (Form 6-4)
• General Checklist and Acceptance Form (Form 6-X)
• Any applicable form required by Verizon

6.9.2 The Installer shall refer to the requirements specified in Verizon Central Office Record Controls and Standards (IP72008, in the fBA) for additional manual CO records information.

6.9.3 The Installation Supplier (in the fBA) shall contact the Verizon CO Record Mechanization coordinators for information pertaining to mechanized CO records information (VENUE).

6.10 End of Job Review (Form 6-1)

6.10.1 A minimum of forty-eight hours before job completion, the Installer shall schedule a Job Completion walk-through and extend an invitation to the COEI Supervisor/VM and Verizon Operations for their participation. If the timeframe between job start and completion date is less than forty-eight hours, then the installer will notify Verizon before leaving. The actual EOJ must be performed within 10 business days of job completion.

6.10.2 A Completion Notification/End of Job Review (Form 6-1) shall be completed by the installer and forwarded to the COEI Supervisor/VM within three business days of job completion. The COEI Supervisor/VM shall then accept or reject the EOJ within 10 business days or less upon receipt of Completion Notification/End of Job Review form.

6.10.2.1 If Verizon Operations is unable to accompany Installer on the walk-through, the Installer shall record Verizon Operations supervisor’s name and check the “Not Available” box then forward the form to the COEI Supervisor/VM.

6.10.3 Any excess WO/TEO installation material/equipment shall be documented as per the local material disposition process.

6.10.4 In the fBA region, if the “EOJ Grade” (line D) is greater than or equaled to 80%, the job will be conforming and the COEI Supervisor/VM shall so indicate in the Capacity Creation Process (CCP).

6.11 Instruction for filling out the Completion Notification/End of Job Review (Form 6-1)

6.11.1 Responsibility {section subject to change with release of CCP / CCP+}

6.11.1.1 The overall responsibility and accountability of this form belongs to the COEI Supervisor/VM. However, filling out this form is a cooperative effort between the Installer, Operations (fBA), and the COEI Supervisor/VM. In fGTE the COEI Supervisor/VM may authorize COEI installers to complete the EOJ.

6.11.2 Installed by

6.11.2.1 If the Installation Supplier is Vendor, check Vendor and indicate the Company name. Moreover, if the installation supplier subcontracts the work to be performed then the subcontractor’s name must be also indicated.

6.11.2.2 Vendor Order # (fBA) / LOA # (fGTE)

6.11.2.3 The order number the supplier uses to track the order must be indicated.

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6.11.3 Start Date
6.11.3.1 Start Date is the date the physical installation began.
6.11.4 This item intentionally left blank.

6.11.5 Issued for
6.11.5.1 This form is used as a completion notice to Operations (fBA) and COEI Supervisor/VM. The types of completions are:
   • Advance Completion
   • In Service with Exceptions
   • In Service / Construction Complete
   • Completion of Exception Items (fBA)

6.11.6 Advance Completion (fBA)
6.11.6.1 If the completion of the job is an Advance completion, then the completion type must be indicated in item 9 and the advance complete date indicated in item 10.

6.11.7 Job Description of Completed Items
6.11.7.1 The installer shall list what was completed in item 12.

6.11.8 Minor Exceptions
6.11.8.1 If the completion has exceptions then those exception items shall be indicated in item 13.

6.11.9 Exception items negotiated with and agreed to by
6.11.9.1 The COEI Supervisor/VM must agree to the exception items in item 13 and the name of that representative must be listed in item 14.

6.11.10 Walk-Through #
6.11.10.1 For every End of Job walk-through that occurs for a particular job, the successive walk-through number must be indicated.

6.11.11 Walk-Through Checklist
6.11.11.1 The COEI Supervisor/VM is responsible for the completion of the checklist. In fGTE, the COEI Supervisor / VM may authorize Installer to complete checklist items.
6.11.11.2 If the supplier did not conform to an item on the checklist at any time during the installation activity” VZ requested Supplier to correct” must be checked and the reason for that determination must be listed in the Comments section.
6.11.11.3 Checklist item 11 allows the user to indicate all required forms by placing a check mark to it. If an additional form is required but not listed, place a check next to the “Other” field and write the form name(s) in space provided. However, if no forms are required, then place a check in the “N/A” column.

6.11.12 Job Conformance
6.11.12.1 This section allows the numeric rating of the Supplier. This section is to be completed by the COEI Supervisor / VM.
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COMPLETION NOTIFICATION / END OF JOB REVIEW

---|---|---|---|

5. Installed by: □ VZ  □ Vendor (Name of Company):  □ Subcontractor Name (if applicable):  6. Vendor Order # / LOA #: |

7. Construction Start Date: | 8. Scheduled In Service Date: |

9. Issued for:

|   |   |
---|---|
□ Advance Completion (AC) | □ In Service with Exceptions |
□ In Service | □ Completion of Exception Items |

10. Advance Completion/In Service Dates (ACD) (Use ACD shown on firm schedule), if applicable.

ACD no. 1  Date:  ACD no. 2  Date:  ACD no. 3  Date:  

11. Final Completion Notification (Actual completion date):

12. Job Description of Completed Items:

13. Minor Exceptions (to be completed within 30 calendar days):

Attach additional sheets as required.

14. Exception items negotiated with and agreed to by

Walk-Through #:  

Comments:

Notice

The overall responsibility of completing this form belongs to the COEI Supervisor/VM. Instructions for completing this form can be found in IP72202 Sect 6.

This form can be found on the VZ COEI Homepage:  
https://iweb.verizon.com/eInstall/coei/DisplayDocumentsByDocumentType.einstall?dT=4

or Contractor internet website:  http://www22.verizon.com/suppliers/
<table>
<thead>
<tr>
<th>Description</th>
<th>IP Section</th>
<th>Yes</th>
<th>VZ requested installer to correct</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Packing Material &amp; Trash removed daily; VZ Property properly protected; HEPA Vacuums used, etc.</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Safety Requirements adhered to</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Hazardous Material/Waste properly handled</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Proper notification made NCC (F02-051); High Risk Completed; Scheduled Activity Request (SAR)</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Engineering Assignments Correct (Capacity Creation Connection, CCC)</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Job documentation completed including but not limited to: Test Records, Material Disposition, and Completion Notification; Spare Pack turned over to operations</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Alarms tested</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 eMOP/DMOP accurately documented and completed</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 Job drawing properly marked</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Aux Framing and Cable Rack Correct</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 All Applicable checklists completed.</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 Framework, Cabinets, and Shelves Correct</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13 Fire stopping Correct</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 Cabling &amp; Wiring Correct</td>
<td>13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 Wire Connections Correct</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16 Equipment Designations and Bar-coding Correct</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17 Power Correct</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 Grounding Correct</td>
<td>18/19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19 Equipment Removed Correct</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 Fiber Optics Installed Correct</td>
<td>22</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 Other Requirements including IPs, GRs, NEC, VZ Practices, etc. [list in comments]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th>IP Section</th>
<th>Yes</th>
<th>VZ requested installer to correct</th>
<th>N/A</th>
</tr>
</thead>
</table>

**Percentage of Conforming Responses**

\[
\text{Job Score} \times 100 = \%
\]
\[
= (\text{Number Yes} \div (21 - \text{N/A})) \times 100
\]

**Job Conforms Yes/No**

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>N/A</th>
<th>Date:</th>
<th>Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td>COE1 Supervisor (or representative) Present for Walkthrough?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operations Present for Walkthrough?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Installer/Vendor Present for Walkthrough?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TEO/WO #:**

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MATERIAL DISPOSITION

(Internal)
https://iweb.verizon.com/eInstall/coei/DisplayDocumentsByDocumentType.einstall?dT=4

(External)
http://www22.verizon.com/suppliers/

Replaces Form 6-2
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# TEST RECORD

<table>
<thead>
<tr>
<th>Frame, Unit, Shelf</th>
<th>Circuit #</th>
<th>Required Test</th>
<th>Trouble Found</th>
<th>Cleared By</th>
<th>Verizon Associate</th>
<th>Installer</th>
<th>Test Set ID</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** Equipment supplied from a vendor other than the installing vendor must be tested in accordance with both the suppliers’ specifications and the installers’ specifications.

**Power Alarms:**
- Equipment Fusing
- Frame Fusing
- BDFB Fusing
- Power Board Fusing
- Plant (Lineage, Lorain, etc.)

**Switch Alarms:**

**Toll Alarms:**
- System -
- System -

**Fire Alarms:**
- AC Power: (Frame outlet polarity)
- Power Connections properly torqued

**Power Drains**
- BDFB Drain:

**NOTE:** If coverage for joint testing of alarms is denied, IMMEDIATELY REFER TO THE COEI SUPERVISOR/VM and/or VERIZON ENGINEERING.
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<table>
<thead>
<tr>
<th>Item#</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Installer and/or subcontractor(s) have valid Verizon ID cards.</td>
</tr>
<tr>
<td>2</td>
<td>Equipment to be installed, removed or modified</td>
</tr>
<tr>
<td>3</td>
<td>What working equipment might be affected and when?</td>
</tr>
<tr>
<td>4</td>
<td>What working equipment will be taken out of service and when?</td>
</tr>
<tr>
<td>5</td>
<td>Where are breakers, fuses, and spare fuses located?</td>
</tr>
<tr>
<td>6</td>
<td>Procedures requiring Verizon coverage</td>
</tr>
<tr>
<td>7</td>
<td>Alarms to be tested, disconnected and when?</td>
</tr>
<tr>
<td>8</td>
<td>Specifications, drawings, Mechanized records</td>
</tr>
<tr>
<td>9</td>
<td>Protection of equipment, floors, walls, etc.</td>
</tr>
<tr>
<td>10</td>
<td>Storage of tools, material, equipment and location of unpacking area</td>
</tr>
<tr>
<td>11</td>
<td>Trash removal at the end of each shift</td>
</tr>
<tr>
<td>12</td>
<td>Verizon telephones, parking facilities, etc. (See Section 2 of this IP practice)</td>
</tr>
<tr>
<td>13</td>
<td>Safety precautions and building security</td>
</tr>
<tr>
<td>14</td>
<td>Service restoration procedure and responsibilities in the event of a service interruption (Form 7-1)</td>
</tr>
<tr>
<td>15</td>
<td>Locations of select, critical and government circuits (Form 7-1)</td>
</tr>
<tr>
<td>16</td>
<td>Hazardous materials associated with this order. (Asbestos floor tile, etc.) (Form 7-1)</td>
</tr>
<tr>
<td>17</td>
<td>Verizon provided information, material, equipment, ladders and tools Safetime</td>
</tr>
<tr>
<td>18</td>
<td>Practice/Maintenance Window Practice</td>
</tr>
<tr>
<td>19</td>
<td>Type of MOP required (i.e. General or Detailed).</td>
</tr>
<tr>
<td>20</td>
<td>HEPA filter vacuum cleaners</td>
</tr>
<tr>
<td>21</td>
<td>ESD protection of equipment</td>
</tr>
<tr>
<td>22</td>
<td>Fire alarm systems (i.e. VESDA)</td>
</tr>
<tr>
<td>23</td>
<td>Properly insulated tools.</td>
</tr>
<tr>
<td>24</td>
<td>Documents which outline general practices, precautions, and procedures to be followed by the installer during the installation period. (Handbooks, Practices, OSHA, etc.)</td>
</tr>
<tr>
<td>25</td>
<td>Changes in this MOP after initial signing</td>
</tr>
<tr>
<td>26</td>
<td>Grounding Requirements</td>
</tr>
<tr>
<td>27</td>
<td>Cable hole(s) to be opened and closed</td>
</tr>
<tr>
<td>28</td>
<td>Special delivery, storage or staging requirements (Fire tarps)</td>
</tr>
<tr>
<td>29</td>
<td>Testing Requirements associated with the job</td>
</tr>
<tr>
<td>30</td>
<td>Potential Hazards associated with facilities or working equipment</td>
</tr>
<tr>
<td>31</td>
<td>Stenciling/Labeling Requirements</td>
</tr>
<tr>
<td>32</td>
<td>The installer shall inventory all material required for this installation at the start of the job</td>
</tr>
<tr>
<td>33</td>
<td>Verify BDFB loads and power plant</td>
</tr>
<tr>
<td>34</td>
<td>Utilize Verizon COEI or Contractor COEI web sites for Central Office Equipment Installation</td>
</tr>
<tr>
<td>35</td>
<td>Verification of test lines/numbers of modem and port assignments for remote testing and applicable alarms testing</td>
</tr>
<tr>
<td>36</td>
<td>Bar-coding verification</td>
</tr>
<tr>
<td>37</td>
<td>PAUSE - Prevent All Unplanned Service Events</td>
</tr>
<tr>
<td>38</td>
<td>Check air filters. If dirty, refer to operations.</td>
</tr>
</tbody>
</table>
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7.0 Prevention of Service Events - eMOP (electronic MOP)

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7.0 Prevention of Service Events - electronic Method of Procedure (eMOP)

7.1 Service Events

7.1.1 Introduction

7.1.2 This section covers basic precautions that must be taken by the Installer to prevent an unplanned service event. This section also establishes proper notification procedures and guidelines for quick restoration.

7.1.3 As a basic part in the prevention of service events, all installation/removal activity shall have an electronic Method of Procedure submitted, appropriately reviewed, and approved prior to any work start.

7.1.4 All eMOPs shall be submitted for review and approved using the eMOP system.

7.1.4 An unplanned service event is any abnormal service condition not specified in the eMOP.

7.1.4 The following is a list of conditions that are most frequently associated with service events caused by installation activities:

- Cable damage
- Cable cut in error
- Foreign objects placed into or between working equipment
- Deviation(s) from prescribed methods contained herein or described in handbooks, drawings change notifications, and Methods of Procedures etc.
- Wiring errors
- Communication breakdown between Installer and Verizon
- Electrostatic Discharge (ESD)
- Incorrect removal/addition of circuit packs, fuses, cable connectors, etc…
- Software Changes
- Human error
- Use of non-insulated tools where insulated tools are required

This list is not all-inclusive but is intended by illustration to reinforce the requirement that the Installer must maintain a constant vigilance in order to prevent a service event.

7.2 Prevent All Unplanned Service Events Policy (PAUSE)

7.2.1 Before any High-Risk work activity being performed on the Verizon network, the following “PAUSE” questions must be reviewed by the installer (refer to form 7-3).

7.2.1.1 For any work activity identified as a High Risk Activity, a High Risk Activity Notice shall be issued before the start of that High-Risk work (see COEI Field Support Bulletin 03-012).

7.2.2 If the Installer identifies a potential service affecting condition that is not previously indicated during the installation interval, all work in the immediate area must stop and the appropriate Verizon contact person identified in the MOP must be notified.

7.2.3 All work must be performed in accordance with the appropriate Safetime Practice.

7.3 Reporting of Service Events

7.3.1 If a service interruption occurs, immediate restoration of service is the joint responsibility of Verizon and Installer. Each shall immediately notify the other of the problem and proceed to restore service.

7.3.2 A service event is identified as an action attributable to COEI or a managed vendor, which results in:

- An unplanned action that causes an outage to a customer regardless of the extent of the disruption (minor or major).
• An unplanned action to in-service equipment while not directly causing a customer outage but if left uncorrected would result in a future outage.
• An unplanned action during which the end result is placing the system in excessive risk due to a direct error by COEI or managed vendor, which causes excessive extended work time to complete the procedure.
• The loss of a system not attributed to the unplanned action by COEI or a managed vendor although they were directly working on the affected equipment.

7.3.3 In the event that COEI or one of its vendors/contractors causes a “service event” on any type of central office/remote terminal equipment, the official service event report will be submitted by the COEI Supervisor/VM via the Service Event Tracking Database:

http://iweb.verizon.com/eInstall/SETD/login.jsp

The report will include a completed Flash and Root Cause Analysis form. The Vendor is required to submit their version of the event to the COEI Supervisor/VM and to their Verizon Quality Auditor. See Form 7-2.

This process should not alter the restoration process established by the NOC. Here are a few examples of severe outages requiring full notification to the Executive Director level:

• FCC reportable. This will be determined by the National Service Management Center (NSMC)
• Any fire related outages.
• Outages affecting special facilities (military installations, key government facilities, nuclear power plants, 911 tandem/PSAP, FAA sites)
• Total switch isolations due to power failure, timing loss, etc…
• Total IOF route isolations due to power failure, timing loss, etc…
• Any major outage affecting SS7 links or sites due to power failure, timing loss, etc.

7.3.4 If the next level of supervision listed below cannot be immediately reached then the Installer/Vendor responsible for the service event should proceed in notifying the next level of Supervision. This would continue up the escalation chain until someone is reached.

<table>
<thead>
<tr>
<th>Step</th>
<th>Person Or Group To Notify</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NOC/NCC *(NOC telephone # required, see bulletin 02-051)</td>
<td>Immediate</td>
</tr>
<tr>
<td>2</td>
<td>COEI Supervisor/VM in charge of job</td>
<td>Immediate</td>
</tr>
<tr>
<td>3</td>
<td>COEI Manager</td>
<td>Immediate</td>
</tr>
<tr>
<td>4</td>
<td>COEI Director</td>
<td>Immediate</td>
</tr>
<tr>
<td>5</td>
<td>COEI/Network Services Vice President (Depending on severity)</td>
<td>Immediate</td>
</tr>
</tbody>
</table>

Table 7A

Information Required:

The Vendor is required to submit their written account of the Service Event. The initial notice called the “COEI Service Event Flash Report” (Form 7-2) shall be completed for all unplanned service events and submitted as soon as possible, but no later than the next business day.

A “COEI Service Event Root Cause Analysis (RCA) Report (Form 7-2) shall be completed and submitted within 10 business days of occurrence. Both the Flash and the RCA shall be submitted to the COEI Supervisor/VM with a copy to the Verizon Quality Auditor.
7.3.5  Verizon may suspend any job until a service interruption or degradation condition is corrected.

7.4  Responsibility -- electronic Method of Procedure (eMOP) and paper MOPs

7.4.1  In August of 2007, Verizon started the transitioned from a paper MOP to an eMOP as described in F07-016. All installation work shall have an eMOP, however, a paper copy of the MOP may be on site to facilitate as an aid for the installer and local Verizon personnel. Changes to the MOP shall be documented in the eMOP. Access to eMOPs is as follows:

Intranet COEI Web site:  https://iweb.verizon.com/eInstall/eMOP/

Vendor COEI Web access  http://www22.verizon.com/suppliers/

7.4.2  The prevention of service problems is the joint interest and responsibility of Verizon and the Installer. The attainment of this objective requires full and continued cooperation before and during the installation/removal period through acceptance testing.

7.4.3  The installer preparing the eMOP shall be a minimum skill level 3 or equivalent (see Section 23).

7.4.4  As part of the eMOP the Installer shall complete a contact list for the on-site coordination of installation/removal activities, i.e. name, title, telephone number, location, etc., before the installation/removal start date. Arrangements shall be made to establish the most expeditious method of communication to eliminate and/or neutralize identified potential service problems.

7.4.5  The installer shall provide emergency contact information as part of the MOP. This list may need to include but is not limited to the organizations listed below:

- Alarm Surveillance  
- Facilities Surveillance  
- Maintenance Center  
- Emergency Control Center  
- Environment Management  
- Safety Management  
- Building Maintenance  
- Emergency Natural Gas  
- Emergency Electric  
- Police  
- Fire  
- Ambulance

7.4.6  As part of the MOP the Installer and Verizon must disclose potential hazards associated with the facilities and existing equipment that may jeopardize personnel safety or restoration procedures.

7.4.7  Verizon and/or the individual authorized by Verizon is responsible for making equipment busy, removing equipment from service, verifying operation of backup systems and returning the equipment to service.

7.4.8  Before installation work being undertaken on the first shift of the job start, a joint test with Verizon of alarm systems for equipment to be worked in, on or over shall be made.

7.4.9  Before the end of the job the Installer shall list the alarms tested and indicate if the alarms were received within the Central Office location (audible & visual) and/or remotely as reported by the surveillance center involved.

7.4.10 The installer shall cover/protect existing equipment where there is any potential of objects/materials being dislodged while working above, in, or around the Central Office environment.
7.4.11 The Installer is responsible to ensure that all persons performing work associated with a MOP are aware of its’ location and content.

7.4.12 If the installer responsible for the execution of the MOP is transferred from the job, he/she must review the MOP with the person assuming that responsibility. The installer assuming responsibility for the job must initial the MOP where the original installer’s signature is located to confirm their review.

7.5 General Requirements -- eMOP-

7.5.1 This section covers the processes and requirements for an Installer electronic Method of Procedure (eMOP). The eMOP is a step-by-step procedure for an installation and/or removal work operation detailing the how, who, what, where and when installation and/or removal work is to be performed.

7.5.2 The Installer is responsible for preparing the eMOP. eMOPs shall be prepared before the start of any installation/removal work activity (including job exceptions, correction of Quality Audit findings, equipment delivery associated with an installation, etc.).

7.5.2.1 If a paper copy of the MOP is on site, the document must be in block print and legible before approval.

7.5.3 All paper MOPs must be thoroughly reviewed, agreed upon, and signed by the appropriate Verizon representative(s) and the Installer (see section 7.7).

7.5.4 The Installer shall prepare a eMOP based on a copy of the specifications and all applicable drawings at the start of the installation.

7.5.5 The Installer shall verify all record assignments (i.e. BDFB, DSX, EDSX, MDF, alarm, etc) before job start. Any assignment changes shall be approved by engineering and COEI Supervisor/VM and noted in the MOP and/or Verizon approved documentation.

7.5.6 If schedule allows, one-week before job start the Installer shall arrange an eMOP/Pre Construction meeting. The installer shall invite (but not limited to) Verizon Operations, COEI Supervisor/VM, and Verizon Engineering to discuss work involved.

7.5.7 The Installation Supplier shall post the approved MOP at a mutually agreed upon location. It shall remain posted during the entire job interval.

7.5.8 The type of eMOP and degree of detail should be discussed and agreed upon between the Installer and Verizon. eMOPs are classified as either GENERAL or DETAILED.

7.5.9 The following shall be mutually understood and agreed upon in addition to any other considerations necessary in establishing a General or Detailed eMOP:

- Service, personnel and environment affecting hazards involved and degree of risks imposed
- Verizon and Installer emergency contact personnel and telephone numbers
- The installation methods, tools and test sets to be used
- The experience of the personnel (Verizon and Installer) required to perform the work tasks involved and to provide assistance in case of a service interruption
- Protection required on the equipment and tools
- The time during which the various steps of the work will be performed and the equipment that will be released
- Which steps of the work will require notification to Verizon before starting
- Procedures to be followed and the tests to be made before additional or modified equipment is connected to any working equipment
- Steps to be taken by the Installer before any alarm associated with the work is disconnected
- Procedures to be followed to ensure that the labeling and/or fuse record will be checked with the proper drawing before any fuse is removed at the request of the Installer
- Time of day or night the equipment removed from service is to be restored
• Reports of progress
• Which steps of work require assistance of Verizon
• Tests that are to be performed
• On power installation, transfer, and removal work, service restoration procedures to follow and assignment of responsibilities are to be made for use in event of a service interruption

7.5.10 All documents (i.e.; installation handbooks, manuals, corporate instructions, practices, methods of installation) referenced in the MOP by the installation supplier shall be provided to Verizon for their review upon request.

7.5.11 **GENERAL MOPs**, if requested by the COEI Supervisor/VM, are required on all installation/removal jobs before the delivery of equipment. General MOPs shall include:

• basic purpose or outline of the installation
• service protection precautions
• emergency contacts and phone numbers (Verizon and Installer)
• location of fusing circuitry and power sources
• availability and location of spare fuses
• definition of alarm responsibilities.
• delivery, hoisting, and staging requirements

7.5.12 **DETAILED MOPs** shall be approved before starting any installation activity. Detailed MOPs shall include all General MOP requirements and the following additional requirements:

• sequential procedures
• specific work steps in chronological order
• definition of responsibilities
• coverage requirements
• test to be performed

7.5.13 The following types of orders will require a **Detailed MOP approved by the appropriate Verizon Power Representative per local requirements**:

• All orders requiring activity on primary power BDFB, power plant, major Grounding or Electrical Protection Systems
• Orders that add circuits powered by an inverter or Uninterrupted Power Supply (UPS)
• Orders that add or alter AC Power Distribution Service Cabinets (AC PDSC), e.g., addition/alteration of fuse blocks, circuit breakers, etc.

The installer shall notify the Network Operations Center (NOC) at the start and completion of each shift involving power connections as detailed in the MOP.

7.6 Preparation of a Detailed eMOP

7.6.1 For each step or group of steps, the Installer shall list the dates, start and complete time, type of protection and where it will be used, and any special precautions that must be observed. The Installer shall also indicate details of the work to be done in each step, how it will be done, and the responsible party (Verizon and/or Installer) for each step.

7.6.2 The **specified steps** should follow a logical sequence of progress based on the following considerations:

• The sequence of steps that will provide advance equipment/service
• The amount of work that can be done and still provide a margin of safety for returning released equipment to service within the specified time
• Work that can be done without affecting live equipment such as erecting, cabling, wiring, connecting, adjusting, and testing
• Work that must be done in light traffic periods Safetime Practice.
• Work that must be done on an "in-service basis" (see also Section 7.9)
• Removal of cross-connections, fuses, patch cords, plug-in units, etc. required to do the work
• Testing requirements

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7.6.3 **Detailed steps** shall be completed as specified below. No deviations are allowed unless prior written authorization is received from Verizon. The Detailed steps must include the following information:

- Verizon operations coverage
- Emergency contact information for specific equipment types
- List and number the detailed step by step procedures (either listed or referenced)
- Indicate if step is a critical work activity
- All critical steps must be performed in the exact order as described in the detailed section
- Who is accountable for the completion of each step? Installer, Verizon or both
- What work action is to be performed? Work action must be a verb such as add, remove, apply, route, wire, connect, operate, adjust, test, observe, verify, etc.
- Indicate what equipment will be installed and its' location
- Identify special test equipment, tools, materials and resources needed to complete the work activity
- Initial and date, on primary/working MOP, when each step or work activity is completed
- An emergency restoration plan or back out procedure shall be listed in the detailed MOP, if applicable.

7.7 **Approvals -- eMOP**

7.7.1 In the FGET, the COEI Supervisor/VM is the only signature required on a MOP. A copy of the MOP should be sent to the appropriate Network Operations personnel before work start.

7.7.2 In the FBA, the COEI Supervisor/VM and Verizon Network Operations signatures are required for approval of any MOP (General or Detailed). Local policy may require additional approvals, such as engineering.

7.7.3 In any case, it is the joint responsibility of both the COEI Supervisor/VM and Installer to discuss and determine if additional approvals are required. Where additional approvals are required, no work shall start until the appropriate approvals are obtained.

7.7.4 Appropriate approval signatures may be substituted with an electronic document (i.e. email, EMOP) to the Installer from the approver as long as the electronic document contains the TEO# and clearly states approval for work to commence. The approved electronic document must be placed at the job site.

7.7.5 The MOP shall be distributed to the signers (after MOP is signed) of the MOP and others as required before Job start.

7.8 **Changes in MOP after Work has Started**

7.8.1 When there is a change in the scope of work a revised MOP shall be submitted and additional steps documented. Appropriate MOP approvals must be obtained (see section 7.7).

7.8.2 The documentation shall include a general description and reason for revision(s) and a detailed step-by-step explanation.

7.9 **Equipment Service Conditions**

7.9.1 **In-Service**

7.9.1.1 Before starting any work affecting in-service equipment, the installer must contact the appropriate Verizon operations representative or the Network Operations Center (NOC).

7.9.1.2 In some cases, the Installer can work on equipment without removing it from service. This work is done on what is known as an “in-service basis”. The installation effort has no effect on the ability of the equipment to handle the service. Verizon Network Operations supervisor shall give final approval before work is started on this basis. Verizon shall be responsible to verify functionality of backup systems.
7.9.1.3 In some cases, it will be necessary to make working and/or in-service equipment busy, permitting the Installer to make changes. When it is necessary to have working equipment made busy, it will be made busy in the standard manner at the agreed upon or specified time by the appropriate Verizon Operations representative. Verizon shall be responsible to verify functionality of backup systems. COEI may only perform this function with Operation’s approval and COEI’s acceptance.

7.9.1.4 If power needs to be removed from the equipment to enable the Installer to perform the required work, Verizon Operations personnel shall busy the equipment and/or remove the power. COEI may perform this function only with Operation’s approval and COEI’s acceptance.

7.9.1.5 Verizon Network Operations personnel are responsible for removing busy conditions to return equipment to service. COEI may perform this function only with Operation’s approval and COEI’s acceptance.
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METHODOFPROCEDURE(MOP)
(Refer toSection7ofIP72202forInstructions.)

☐ General  ☐ Detailed  ☐ Revised/Changes

<table>
<thead>
<tr>
<th>Brief Job Description:</th>
<th>MOP #:</th>
<th>Installation TEO/WO #:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Central Office &amp; Physical Address:</th>
<th>City, State, Zip:</th>
<th>Plant/Remote Code:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floor where work is to be performed:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MOP Preparer &amp; Phone Number:</th>
<th>MOP Preparer Title:</th>
<th>Minimum skill level 3 (fBA) or equivalent:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Yes ☐  No ☐  ☐</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Installation Supplier Order/LOA #:</th>
<th>Is this an FCC Reportable Office*:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes ☐  No ☐  ☐</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Installation Supplier:</th>
<th>COEI Supervisor/VM:</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ VZ</td>
<td>☐ Vendor Name:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Installation Start Date</th>
<th>Advance Complete Date (fBA)</th>
<th>In Service Date</th>
<th>Scheduled complete (MOP Expiration Date):</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

Assignments verified by: Date: Changes required? ☐ Yes ☐ No If Yes corrections by: Date:

| S | T | E | P | # | C | R | I | T | I | C | A | L | R | P | E | A | S | R | P | T | O | Y* | N | S | I | B | L | E | (Y/N) |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

List below the installation activity, equipment involved, and steps in numerical order required to complete the job
(General MOP description can be listed as step 1)

<table>
<thead>
<tr>
<th>W</th>
<th>O</th>
<th>R</th>
<th>K</th>
<th>S</th>
<th>H</th>
<th>I</th>
<th>F</th>
<th>T</th>
<th>(e.g. 7 a.m. - 4 p.m.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>O</td>
<td>M</td>
<td>P</td>
<td>L</td>
<td>D</td>
<td>A</td>
<td>T</td>
<td>E</td>
<td>S</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEO/WO #:</th>
<th></th>
</tr>
</thead>
</table>
**Responsible Party**

- I = Installer
- RE = Real Estate
- OP = Network Operations
- OSP = Outside Plant
- O** = Other (Indicate here ____________________________________________)

<table>
<thead>
<tr>
<th>Cable Hole and Location</th>
<th>Date/Time Opened</th>
<th>Date/Time Closed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**NOTE:** Cable hole(s), sleeves, fiber ducts, conduits, etc. opened during a work shift shall be closed (according to the fire-stopping requirements found in section 12 of IP and/or Manufacturer’s Fire-stopping documentation).
<table>
<thead>
<tr>
<th>Emergency Contacts (Print Name)</th>
<th>Work #</th>
<th>Home #</th>
<th>Cell #</th>
<th>Pager #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation Supplier Supervisor:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COEI Supervisor/VM:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COEI Manager:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COEI Director:</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Verizon Engineer (if applicable):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network Ops Supervisor:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All TEO/WO documentation shall be turned over to __________________________.

All Test Record forms shall be turned over to __________________________.

All Material Disposition forms shall be turned over to __________________________.

The undersigned authorize and approve the requirements stipulated in this MOP as required:

**Network Operations:**

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>COEI Supervisor/VM:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verizon Engineer (if applicable):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vendor Installation Supervisor:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power Specialist:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Page 3 of ____ Form 7-1
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COEI SERVICE EVENT REPORT*

Section 1

☐ Flash Report** ☐ Root Cause Analysis***

<table>
<thead>
<tr>
<th>TEO / WO Number:</th>
<th>Originator &amp; Phone #</th>
<th>Was Event Service Affecting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Yes ☐ No ☐</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date &amp; Time of Event</th>
<th>Company Responsible for Event</th>
<th>Central Office &amp; Physical</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VZ</td>
<td>Address</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date &amp; Time of Flash</th>
<th>Vendor Name:</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>City, State, Zip</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Event Duration</th>
<th>Date &amp; Time Restored</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COEI Supervisor/VM</th>
<th>COEI Manager</th>
<th>COEI Director</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Affected Services: Place X in all appropriate areas.

<table>
<thead>
<tr>
<th>Switch</th>
<th>Toll/Transmission</th>
<th>Power</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eqpt Type:</td>
<td>Eqpt Type:</td>
<td>Eqpt Type:</td>
<td>Eqpt Type:</td>
</tr>
</tbody>
</table>

Causes: Place X in all appropriate areas.

☐ Hardware ☐ Verizon Installer Error
☐ Software ☐ Vendor Installer Error
☐ Procedural ☐ Network Error
☐ Other (indicate below): ☐ Unknown

Flash Report/Basic Description of Event

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td></td>
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<tr>
<td></td>
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<tr>
<td></td>
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<tr>
<td></td>
</tr>
</tbody>
</table>

* Note: Refer to Bulletin 02-035 for detailed instructions and guidelines for completing this form.

** Note: A Flash Report (Section 1) should be completed for all service events and sent as soon as possible.

***Note: The Root Cause Analysis portion (Section 2) should be completed and sent within 10 days of occurrence. RCA report will require both Sections 1 & 2.
## Root Cause Analysis

<table>
<thead>
<tr>
<th>Date</th>
<th>MOP Provided?</th>
<th>High Risk Submitted (if applicable)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NOC Ticket/Event #</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Was this event FCC Reportable?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Degradation</th>
<th># of Blocked Calls</th>
<th># of Customer Trouble Reports</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Outage</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

### Description of equipment involved:

### Service / Equipment Impacted (Be specific, i.e. NDT 380 lines, no SS7, etc):

### Description and cause of event:

### Root Cause (attach additional information if applicable):

### Describe follow up actions to ensure against reoccurrence (below):

<table>
<thead>
<tr>
<th>Action to be taken:</th>
<th>By Who:</th>
<th>And When:</th>
</tr>
</thead>
</table>

Form can be found on the VZ COEI Homepage @ http://iweb.verizon.com/eInstall/coei/index.htm or Contractor Internet website.
“Everyone Agrees!”

PAUSE

Prevent All Unplanned Service Events!

Ask Yourself

- Why am I doing this?
- Should this be done during safe time?
- What is the expected result of my actions?
- Do I have a safe backout procedure?
- Do I know how to contact Tier 1 and Tier 2 support?
- Is this service affecting?
- If service affecting, who do I notify beforehand?
- Does anyone need to be aware of the consequences of my actions?
- Should anyone be online with me?
- Am I comfortable with this method of procedure?
- Do I have all of the tools that I need to complete the task?
- Do I need a pre-test and post-test procedure for this task?
- How do I know that I did this task properly?
- Have I completed appropriate paperwork, labeling, database changes, or other records work?
- Am I willing to sign my work?
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8.0 Commonly Used Tools

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8.2 Use of Tools ................................................................................................................................. 8-1
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8.0 Commonly Used Tools

8.1 Introduction

8.1.1 For all power and hand tools, the Installer shall strictly adhere to the manufacturer’s instructions for application, adjustment, and use.

8.1.2 All measuring or testing equipment and tools shall be serialized and contain maintenance or calibration stickers indicating when it was last calibrated and when it is to be calibrated again.

8.1.3 Gas and/or arc type welding/cutting equipment is not normally permitted in a Central Office Environment. Any use of such equipment must be detailed in the MOP. All permits for such equipment must be acceptable to Verizon Buildings and switch/transport Operations personnel before use.

8.1.4 The location of hoisting centers and hoisting procedures shall be detailed in the MOP.

8.1.5 Hoisting apparatus and associated rigging shall be in good working condition, capable of supporting the load to be hoisted, and meet all OSHA requirements.

8.1.6 At no time shall a load be left on a hoist unattended.

8.1.7 Service elevators shall be identified for use in the MOP. The Installer shall ensure that the load to be carried does not exceed the elevator’s capacity. If material exceeds elevator height dimensions COEI Supervisor / VM and/or Verizon Engineer must be contacted. COEI Supervisor/VM and/or Verizon Engineer will then contact the appropriate organization to facilitate access into the building.

8.1.8 Removal operations present certain potentially hazardous conditions therefore emphasis shall be placed on the proper use of tools and protective equipment.

8.1.9 Hoisting equipment shall be inspected for visible flaws in the hooks, housings, links, ropes, or cables.

8.2 Use of Tools

8.2.1 Before job start Installer shall inspect all tools to prevent potential hazards, i.e., shorts in electrical tools, frayed insulation, loose handles, etc.

8.2.2 All electrical tools shall be double insulated or properly grounded per manufacturer’s specifications. Extension cords shall be grounded and have the proper load rating of the tool and source circuit.

8.2.3 Tools SHALL NOT be placed on unattended ladders, cable rack, finished surfaces, window sills, or any place where they may become dislodged and fall.

8.2.4 Temporary lighting fixtures shall be properly grounded per NEC requirements.

8.2.5 Commercially insulated tools (specifically designed for electrical work being performed) shall be used in all power room areas, power plants, and power distribution bays.

8.2.6 Use of non-commercially insulated hand tools, such as wrenches, (other than what is mentioned in 8.2.5) which could come in contact with live equipment or connections, shall be protected with a minimum of three half lapped layers of electrical tape or made of non conductive material.

8.2.8 Temporary platforms or scaffolding shall be equipped with guardrails.

8.2.9 For Air compressors refer to 2.11.7.
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9.0 General Information

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9.4 Electrostatic Discharge (ESD) Protection ....................................................................................9-2
9.5 Marked Drawings .........................................................................................................................9-2
9.6 Job Coordination and Documentation .........................................................................................9-3
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9.0 General Information

9.1 Introduction

9.1.1 The Installer shall provide at least one person fluent in the language commonly spoken at the location by Verizon personnel at all times.

9.1.2 This section covers the general requirements for the assembly, erection, and location of central office equipment.

9.1.3 The requirements described herein are considered general installation workmanship requirements and cover and/or are applicable to all types of telecommunications equipment.

9.1.4 These are minimum workmanship requirements that shall be adhered to by the Installer, and shall complement any other specified technical standards and requirements that are necessary for the equipment being installed.

9.1.5 Additional details and clarification may be found in the following reference documents:
   • Refer to Sect. 1.1.8 for list of reference documents

9.2 General

9.2.1 The Installer’s on site representative (supervisor or in-charge person) shall have ready access (electronically or by paper copy) to the documentation required to complete the job.

9.2.2 The Installer shall not deviate from the job documentation or from the requirements in this IP72202 unless the deviation is communicated to and approved by the COEI Supervisor/VM and Verizon Engineer and posted at the job site in accordance with local practices.

9.2.2.1 The Installer shall install all material per engineering specifications & mops including:
   a. Auxiliary framing, cable rack, and bracing
   b. Framework, units, and associated miscellaneous material
   c. Conduit, lighting, and AC outlets/receptacles
   d. Fire stopping material
   e. Cable (copper & fiber)
   f. Power Equipment (rectifiers, batteries, BDFBs) and associated material
   g. Ground bars & associated material
   h. Other material that is documented in the engineering specifications or mops

9.2.3 The installer shall inventory and visually inspect all equipment and apparatus shipped to the job site. Any damage, defects, missing materials or other problems shall be identified, and a list provided to the COEI Supervisor/VM, Verizon Engineer, or the appropriate Verizon contact. Damaged items shall not be installed.

9.2.4 The Installer shall identify any non-conformances found with an equipment configuration (e.g. a rack and stack situation) and report them in writing to the COEI Supervisor/VM and Verizon Engineer. The COEI Supervisor/VM and Verizon Engineer shall determine what, if any, actions are required.

9.2.5 Material staging areas must be separated from the equipment areas (wherever possible):
   • Material cannot be staged in equipment aisles.
   • Staged materials should be 10 foot away from working equipment.
   • Staged materials must be arranged so as not to exceed the floor loading.
   • Staging areas are not exempt from fire code requirements.

9.2.6 The Installer shall touch-up painted surfaces that have been marred, scraped or scratched with the same quality and shade of paint originally used on the surface being touched-up.

9.3 Flammable Material
9.3.1 All Flammable materials, such as waste paper, foam plastic, cloth bags, packing material, and similar materials supplied during the installation, shall be removed from the building by the Installer on a daily basis. If any accumulation of such material creates a potential fire hazard, it must be removed more frequently.

9.3.2 Combustible material staged for installation shall be stored either in a fire rated compartmentalized area or under an approved and tested fire retardant and ESD treated tarp at the end of the shift. The storage method shall be determined by Verizon and detailed in the MOP by the installer. This will also minimize particle contamination.

9.4 Electrostatic Discharge (ESD) Prevention

9.4.1 Electrostatic Discharge control measures shall be used during any installation activities that involve electronic equipment. The Installer shall instruct its’ employees in the appropriate step-by-step methods for handling electronic equipment. The following are basic handling requirements:

- Neutralize any difference in potential between Installer and where the unit is being installed.
- Leave all packs in their static-shielding containers until they are to be plugged into their mounting.
- Wear a wrist strap that is connected to a good source of CO ground.
- Always handle packs by the edges, sides, or face plate. Never touch the connector, components, or conductors.
- Circuit packs are never to be stacked on a floor, table, or other surface, especially if not inside static-shielding bags.
- Warning labels shall be mounted on the equipment assembly area stating that the use of grounded wrist straps or their equivalent is required to prevent ESD damage to the equipment.
- Circuit packs and/or frames equipped with circuit packs shall be shipped and/or stored in ESD protective plastic, e.g., bubble-wrap, etc.
- Storage batteries shall be disconnected from charging equipment for at least 24 hours before they are moved.

9.5 Marked Drawings

9.5.1 The installer shall obtain prior approval from the Verizon Engineer and COEI Supervisor/VM before deviating from the installation documentation. When a drawing must be changed, the Installer shall provide marked copies to the Vendor/Verizon Engineer and any additional parties agreed to locally. In the case of Vendor engineered orders, the Vendor engineer will provide a copy of the final marked drawing to the Verizon engineer.

9.5.2 If changes to the drawings alter the scope of work, the MOP should be updated accordingly. If the marked-up drawing was not listed in original specs, the drawing should be added to the MOP to indicate it was changed.

9.5.3 To insure accuracy of the marked drawing, the Installer shall use the following color scheme when changes are required:

- RED - Equipment additions, assignment changes that represent equipment which is being added, reconfigured, reassigned, or modified shall be shown in red.
- YELLOW - Equipment being removed or relocated to another location shall be shown in yellow.
- GREEN or BLUE - Changes which do not reflect equipment being added or removed, and represent new information that affect existing records shall be referred to as RECORD ONLY CHANGES.

9.5.4 The installer shall notify engineering of any drawing changes. Marked prints shall be updated by the installer prior to submitting the Completion Notice/EOJ Review. The Installer shall identify MARKED PRINTS on the outside of the drawing when folded with the following information:

- TEO / Work Order #
- Supplier Name and Order #
9.5.5 Mechanized drawings, i.e.: CCC, COAR, COE MOD, VENUE, etc, must be updated by the Detailed Engineer (Verizon or Contracted Vendor) in the mechanized record system in a timely manner.

9.6 Job Coordination and Documentation

9.6.1 The Installer shall turn over to the Verizon representative, at job completion, the following: Method of Procedures (MOPs), specifications, drawings, copies of mechanized records, manual and mechanized record changes, marked prints, verification and test records, operations and maintenance manuals, barcode verification and material/scrap disposition records. Verizon shall maintain the documentation for the length of the installation warranty period (usually 1-year). The Installer shall place the complete job folder in the designated file cabinet drawer (fBA) or Operation Center (IGTE) depending on local requirements.

9.6.2 In order to facilitate the location of missing Job Documentation, the Installer should maintain their own copy of the Material Disposition Form, or other locally approved form, recording the date and the Verizon representative who accepted the required documentation listed in paragraph 9.6.1.

9.6.4 All documentation used and provided by the Installer shall be of the proper issue for the related equipment being added per the manufacturer's specifications.

9.6.5 The Installer shall stage all documentation per the MOP. Under no circumstances shall paper specs, drawings, etc. be placed in or on equipment, frames or cabinets without written permission in the MOP from Verizon.
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10.0 Auxiliary Framing, Cable Rack and Bracing

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This page intentionally left blank.
10.0 Auxiliary Framing, Cable Rack and Bracing

10.1 Introduction

10.1.1 It is recommended that the Installer have available a copy of Telcordia GR-1275-CORE, Section 10, for detailed requirements upon which this IP72202 Section is based.

10.1.2 The location of auxiliary framing (superstructure), cable racks, and other equipment must conform to the particular plan (base drawings and specifications) for each installation.

10.1.3 Auxiliary framing, cable rack and braces shall be arranged so that they will not obstruct existing lighting, conduit runs, HVAC ducts, vent openings, shut off valves, pull boxes, etc. In those cases where such obstruction is to be avoided, the Installer shall jointly resolve with the COEI Supervisor/VM and Verizon Engineer and document the changes required in the MOP.

10.1.4 Verizon Central Offices that are located in earthquake zones 3 or 4 must adhere to Telcordia GR-1275-CORE and/or Verizon Standards for seismic zones 3 or 4 supporting requirements. Additionally those Verizon central offices that are not located in seismic earthquake zones 3 or 4, but require seismic earthquake zone 3 or 4 installation protection, must also adhere to Telcordia GR-1275-CORE for seismic zone 3 or 4 supporting requirements.

10.1.5 All auxiliary framing, threaded rods, and cable rack used in installations shall be finished with either paint or plating.

10.1.6 When the installer must support new auxiliary framing or cable rack from existing structures, auxiliary framing, threaded rods, ceiling inserts, unistrut etc., those existing structures which will support the new auxiliary framing or cable rack shall be in conformance with the standards contained herein.

10.1.7 If the installer finds any non-conforming structures that appears to pose a safety hazard or service affecting issue the installer shall notify the Verizon Engineer and/or COEI Supervisor/VM to determine the appropriate action required. These non-conformances must be documented in the job folder (via JIM or equivalent) and the Verizon Engineer will determine the appropriate action required.

10.2 General Assembly

10.2.1 Bolts, nuts, and screws used shall be uniform, tight, and/or torqued to manufacturer's specification. Tightening shall not be so great as to distort any part.

10.2.2 The threads on bolts, cap screws, machine screws, rods, and similar threaded parts shall be engaged through to the final thread of the fastening device.

10.2.3 The protrusion of the threaded part shall be no more than an amount equal to the diameter of the bolt, screw, or rod above or below equipment.

10.2.4 Cotter pins must be bent back in a manner that eliminates projecting ends.

10.2.5 When strut systems such as those by Unistrut, Hilti, and others are used, the hanger rod shall protrude at least 3 threads beyond the end of the nut or spring-nut. A washer and lock nut are required in addition to the nut or spring-nut.

10.2.6 Cut ends of auxiliary framing, cable rack, braces, threaded fasteners, etc., shall have sharp or jagged edges removed. Cut ends shall be painted.

10.2.7 Lock washers under the nuts of friction fastenings shall be split ring. They shall be installed where the possibility of movement exists. Split ring washers shall not be used to secure C clips. An external tooth lock washer or no washer may be used to secure a C clip.

10.2.8 All materials (bolts, screws, hanger rods, superstructure, etc.) shall be painted or plated (except aluminum and stainless steel items).

10.2.9 All material must be secure and have no sharp edges or burrs.

10.3 Ceiling Inserts and Fastening Arrangements

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10-1
10.3.1 An approved Verizon Building Contractor shall install additional ceiling anchors per manufacturer’s specifications when required.

10.3.2 For false or suspended ceilings an additional washer and two nuts shall be used on each rod. The additional washer shall be placed below the ceiling with one nut holding it in place against the ceiling while the other serves as a lock nut.

10.3.3 Hanger bolts, used when ceiling inserts are not provided, (GR-1275-CORE, Fig 10-3) require concurrence by Verizon Building Engineering.

10.3.4 Beam Clamps are used to support hanger rod from ceiling “I” beams. The spindles are to be tapped 5/8 X 11 for use with standard threaded ceiling rods.

10.4 Ceiling Hanger Rods

10.4.1 Splicing of hanger rods shall be avoided. When splicing rods cannot be avoided, splices shall be made with a rod coupling equipped with a sight hole with top and bottom lock nuts per GR-1275-CORE Figure 10-7. Under no circumstances shall more than one splice be installed on a hanger rod.

10.4.2 Hanger rods must be screwed into beam clamps, sockets or ceiling inserts at least seven full turns.

10.4.3 A 5/8-11 hex nut and a 1 3/4” OD (outside diameter) washer shall be used at the ceiling on all hanger rods and bolts.

10.4.4 Threaded rods shall not be installed through any HVAC duct without concurrence of the Verizon Building Engineer by signature on the MOP.

10.5 Auxiliary Framing

10.5.1 Exposed, unfinished, cut or marred surfaces shall be repaired and/or painted at the time of installation. This paint must be of the color and type (enamel, oil base, etc.) consistent with the existing or adjacent surfaces.

10.5.2 All materials (bolts, screws, hanger rods, superstructure, etc.) shall be painted or plated (except aluminum and stainless steel items). All material must be secure and have no sharp edges or burrs.

10.5.3 Auxiliary framing bars, channels, strut and/or superstructure used for support purposes shall be uniform, properly positioned, supported, level, aligned and be of sufficient strength to support the known maximum future load.

10.5.4 Auxiliary framing shall be rigid and arranged to support the associated cable racks, frameworks, ladder tracks, conduits, etc.

10.5.5 All fastening details, piece parts and other apparatus used in the assembly of auxiliary framing shall be of the proper manufacturer specified type and assembled in accordance with specific instructions for the framing type used.

10.5.6 Auxiliary framing shall extend a minimum of 6 inches past the last support (maximum 2’-6”), for splicing purposes when it is apparent that additional framing will be installed in the future.

10.5.7 The ends of all auxiliary framing shall be closed with end caps or stiffening clips as follows:

• Auxiliary framing may be cut flush with clips (supporting or finishing).

• Clips (supporting or finishing) shall be installed within six inches of any auxiliary framing ends.

• Framing which extends past the last support shall be long enough to accept stiffening clips or end caps.

• End Caps shall be used when finishing or supporting clips are not flush with the framing bar ends.

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10.5.8 Auxiliary framing shall be supported at a minimum of 5'-0" on center but not to exceed 6'-0" on center.

10.5.9 Auxiliary framing shall not be installed more than 4'-10" from the ceiling or from another level of auxiliary framing.

10.5.10 Each length of high type or low type auxiliary framing shall have at least two (2) support points. An auxiliary framing splice is not considered a point of support. Re: Telcordia GR 1275 CORE, Section 10.

10.5.11 Auxiliary framing **SHALL NOT** be secured directly to the growing end of the building. See floor plan, site plan, building engineer, COEI Supervisor/VM and/or Verizon engineer, etc. as required.

10.5.12 Auxiliary framing **SHALL NOT** block and/or obstruct cable paths and openings, light fixtures, conduits, ladder tracks and other similar equipment units.

10.5.13 The center point of last support **SHALL NOT** exceed 2'-6" from end of framing bars. Framing Bars within 2'-6" of the center point of their last support may be used for supporting purposes.

10.5.14 All auxiliary framing splices shall be 3 or 4 hole splices per GR-1275-CORE. The use of threaded rods installed through splices shall be avoided whenever possible.

10.5.15 Splices, horizontally or vertically, in the same row of ceiling inserts of adjacent pairs of auxiliary framing shall be avoided. In no case shall more than two adjacent pairs be spliced between adjacent rows of inserts. Splices shall be staggered at least one insert row apart or approximately 5 feet on center. **When extending framing adjacent to working equipment, adjacent splices may be placed between the same rows of inserts. This will minimize activity above working equipment.**

10.5.16 The ends of Aux Framing should be staggered, one insert row apart, when it is obvious that the framing will be extended in the future. This will ensure staggered splices without having to cut or re-arrange existing framing.

10.6 Auxiliary Framing Bracing

**NOTE:** The requirements in this paragraph replace those in GR1275 Core except where noted.

10.6.1 The entire auxiliary framing structure shall be braced, reducing sway to a minimum, with either column braces and or ceiling braces of the adjustable rod or angle type. The braces shall be located at column intervals (approximately 20'-0" in a building not having columns) measured in both directions.

10.6.2 Where column bracing is used, the braces shall consist of additional pairs of framing bolted to primary framing to be held tightly against opposite sides of the column. Refer to GR-1275-CORE Figure 10-24.

10.6.3 The outer edges of the building bays adjacent to walls will require supplementary braces in addition to the column braces where the framing extends 10 feet beyond the last column brace. These supplementary braces shall be of the ceiling type.

10.6.4 Where ceiling-type braces are used throughout an area unsuited to column braces or other buildings having columns not suited for attaching braces, or where they are used as supplementary braces, braces shall be installed as follows (Please refer to Figures 10-1 and 10-2 for Double Rod bracing, for other bracing refer to the GR1275):

<table>
<thead>
<tr>
<th>Distance between ceiling and auxiliary framing Or between auxiliary framing and auxiliary framing</th>
<th>Type of brace</th>
</tr>
</thead>
<tbody>
<tr>
<td>1'-0&quot; or less</td>
<td>No bracing required</td>
</tr>
<tr>
<td>More than 1'-0&quot; to 1'-6&quot;</td>
<td>Single-rod brace (5/8&quot;)</td>
</tr>
<tr>
<td>Over 1'-6&quot; through 4'-0&quot;</td>
<td>Double-rod brace (5/8&quot;)</td>
</tr>
<tr>
<td>Over 4'-0&quot;</td>
<td>Double-angle brace (2&quot; x 2&quot; x 3/16&quot;)</td>
</tr>
</tbody>
</table>

Table 10A
10.6.5 The slant of auxiliary framing braces shall (where possible) be parallel and at a 45 degree angle to the auxiliary framing at which it is attached. Where single-rod braces are used, the braces for any one lineup shall slant in the same direction, but adjacent rows of braces shall slant in opposite directions. Braces provided on an order shall be adjusted at the end of the job. When working near an existing brace that is bent, the installer shall adjust the bent brace or contact the Verizon Engineer for resolution.

10.7 Cable Rack

10.7.1 Racks, troughs, and pathways used to support cable shall be of the appropriate type for the system (power, switching, etc.) and cable being supported. Maximum width of any new horizontal or vertical dedicated power cable racks shall be limited to 1'-8". Maximum width of any new horizontal or vertical dedicated cable racks for other than power shall be limited to 2'-1" unless authorized in writing by Verizon. (i.e. 30” cable rack for fiber optic cables).

10.7.2 Cable racks for fiber cables shall be installed so that fiber cables have a minimum-bending radius of 15 inches on all horizontal and vertical planes. All intersecting junctions of fiber cable rack at the same plane must have 45 degree corner brackets per GR-1275-CORE Figure 10-50.

10.7.3 Cable racks shall have solid stringers. **Tubular and “C” channel stringers are not allowed.** Cable racks shall have 1-1/2” stringers minimum. Cable racks over 1'-0" wide shall have 2” stringers (tBA). Note: The first and every other strap of a 2'-1” cable racks requires a 1” X ¼” reinforced steel bar.

10.7.4 Cable racks shall have 1-1/2” stringers minimum. Cable racks over 1'-0" wide shall have 2” stringers (tBA). Note: The first and every other strap of a 2'-1” cable racks requires a 1” X ¼” reinforced steel bar.

10.7.5 Cable racks shall be uniformly supported, rigid, level, and aligned.

10.7.6 Fastening details, piece parts and other apparatus used in the fabrication of cable racks shall be assembled in accordance with specific instructions for the type of cable rack and hardware used i.e., torquing requirements per Telcordia GR-1275-CORE.

10.7.7 Fiber sheet, PVC or other fire-rated (oxygen index >28%) insulating tubes shall be placed on the hanger rods which directly support cable rack stringers or hanger rods that may come in contact with cable.

10.7.8 Horizontal cable racks shall be supported at a distance not to exceed 5'-0" to 6'-0" centers.

10.7.9 Each length of cable rack shall have at least two (2) primary support points. A splice is considered a secondary point of support. There shall be no more than one (1) splice per cable rack between any two supports on a horizontal run. Cable rack splices do not have to be staggered vertically.

10.7.10 Power cable racks within the power plant and between the power plant and the first distribution point, i.e.: BDFB, PRTD, switch power distribution frame, etc, shall be directly attached to auxiliary framing. These power cable racks shall not be supported from “G” clips.

10.7.11 Power cable rack from secondary distribution points, i.e.: BDFB, PRTD, Switch Power Distribution frames, etc, to the network elements may be supported from “G” clips, except in zones 3 and 4.

10.7.12 Exposed ends of all cable racks shall be closed with end caps or closing details.

10.7.13 Exposed ends or sharp edges of cable rack stringers shall be protected with fiber sheets at cross-aisle locations, turns, offsets, and cable break-off points.

10.7.14 Cable rack horns shall be removed at all cross-aisle locations. Welded cable rack horns shall be fiber sheet protected at cross-aisle cable rack locations.

10.7.15 On inverted ladder-type cable rack, in a horizontal or vertical plane, where the wire and cable are in contact with the flange side of the cross straps, provide protection using fiber sheets.

10.7.16 Cable rack may extend a maximum of 3'-0" beyond the last primary support.
10.7.17 Any new cable rack shall terminate at top and bottom of each floor's cable hole sheath/collar. Under no circumstance shall a new vertical cable rack pass through a cable hole in the floor.

10.7.18 Ladder type cable racks installed at a 45-degree angle or less shall be considered as horizontal. Therefore, cable racks for unsecured cables may be equipped with pans or horns at the 45-degree location.

10.7.19 Cable rack horns shall be spaced on 18” centers maximum.

10.7.20 The preferred panning material for cable racks is plastic. Plastic panning is acceptable if it is stamped by the manufacturer to identify its’ oxygen index rating. Any plastic panning installed must have the oxygen index rating of 28% or greater and information facing the underside of the cable rack for immediate visibility and identification.

10.7.21 When it is apparent that cable racks may be extended in the future, the cable rack shall extend a minimum of 6” beyond the center line of the last support.

10.8 Cable Rack Bracing

**Note:** The requirements in this paragraph replace those of GR1275 CORE.

10.8.1 Hanger rod supported horizontal cable rack runs more than 2'-0” below auxiliary framing or ceiling shall be braced sideways to prevent sway. Where practicable, bracing shall be installed in a staggered arrangement on opposite stringers of the cable rack at approximately 20'-0” or at shorter intervals when required to reduce sway as follows:

<table>
<thead>
<tr>
<th>Distance between cable rack and ceiling or auxiliary framing</th>
<th>Type of brace</th>
</tr>
</thead>
<tbody>
<tr>
<td>2'-0” or less</td>
<td>No bracing required</td>
</tr>
<tr>
<td>Over 2'-0” to 4'-0” inclusive</td>
<td>Single rod brace (5/8”)</td>
</tr>
<tr>
<td>More than 4'-0”</td>
<td>Single angle brace (2” x 2” x 3/16”)</td>
</tr>
</tbody>
</table>

Table 10B
Figure 10-1 Double Rod Bracing

Figure 10-2 Double Rod Bracing
11.0 General Assembly, Frameworks, Units, & Miscellaneous

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11.0 General Assembly, Frameworks, Units, & Miscellaneous

11.1 Introduction

11.1.1 In this Section, FRAMEWORK and FRAME are considered synonymous.

11.1.2 An equipment framework consists of welded structural steel and all equipment mounted on or in it. Equipment frames shall meet the requirements specified in Telcordia GR-63-CORE (NEBS) and Verizon NEBS Requirements RNSA-NEB-95-0003. The use of the word "framework" applies to cabinets, bays or other equipment (including power) that occupy floor space.

11.1.3 All PVC products must have an oxygen index rating of 28% or greater per ASTM Standard D 2863-77 and a 94 V-1 or better rating per Underwriters Laboratories Standard 94.

NOTE: The use of plastic doors, covers, or panels on frameworks, cabinets, and/or equipment is not desirable. However, they will be permitted within the CO environment only if they are proven to meet the requirements of 11.1.4, Telcordia GR63-CORE and Verizon NEBS Requirements RNSA-NEB-95-003.

11.1.4 Verizon Central Offices that are located in earthquake zones 3 and 4 must adhere to Telcordia GR-1275-CORE and/or Verizon Standards for seismic zones 3 and 4 supporting requirements supersedes any requirements set forth.

11.2 Assembly of Frameworks (Miscellaneous)

11.2.1 Bolts, nuts, and screws, used to secure any part or unit, shall be tight and/or torqued to manufacturer's specification.

11.2.2 The threads on bolts, cap screws, machine screws, rods, and similar threaded parts shall be engaged through to the final thread and at least flush with the fastening device.

11.2.3 The protrusion of the threaded part shall be no more than an amount equal to the diameter of the bolt, screw, or rod above or below equipment.

11.2.4 Cotter pins must be bent back in a manner that eliminates projecting ends.

11.2.5 All materials (bolts, screws, hanger rods, superstructure, etc.) shall be painted or plated (except aluminum and stainless steel items). All material must be secure and have no sharp edges or burrs.

11.2.6 Lock washers shall be installed as specified in the job documentation and this IP72202. Lock washers shall be used under nuts of friction fastenings where the possibility exists of ironwork members sliding upon one another.

11.3 Equipment Framework/Cabinets

11.3.1 Frameworks, bays, cabinets and associated material (guardrails, end guards, etc.) shall be located, fastened and supported per job specifications and drawings.

11.3.2 The method and location for hoisting and erecting the frames/cabinets shall be specified in an approved MOP.

11.3.3 Protective wrapping that is ESD treated and fire retardant shall remain on the equipment until placed near its’ final location.
11.3.4 The vertical alignment of all frameworks shall be plumb within the following allowable deviations:

**MAXIMUM DEVIATION**

<table>
<thead>
<tr>
<th>HEIGHT</th>
<th>FROM VERTICAL PLUMB</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 feet 6 inches and less</td>
<td>1/16 inch</td>
</tr>
<tr>
<td>Greater than 4 feet 6 inches</td>
<td>1/8 inch</td>
</tr>
<tr>
<td>but less than 7 feet</td>
<td></td>
</tr>
<tr>
<td>7 feet to 9 feet</td>
<td>3/16 inch</td>
</tr>
<tr>
<td>Greater than 9 feet (with or</td>
<td>1/4 inch</td>
</tr>
<tr>
<td>without extenders)</td>
<td></td>
</tr>
</tbody>
</table>

*Table 11A*

11.3.5 Compatible adjacent frameworks shall be bolted together except where otherwise specified by system framework assembly drawings, earthquake zones 3 and 4, and/or different ground planes.

11.3.6 Adjacent frames must not be out of alignment (in or out from a straight line extending the full length of the line-up) more than 1/8 inch at the front of the frame bases. When possible, transition details must be installed between adjacent frameworks whose guardrails do not lineup front or rear.

11.3.7 Equipment frames shall be located per specified floor plan and shall:

- Adhere to minimum aisle spacing for that system.

11.3.8 All cabinet and equipment doors shall open/close properly.

11.3.9 End guards and end of aisle guardrail details are required and shall be as deep as the frame. End guards shall be placed at the ends of lineups. End shields shall be placed on the ends of frames where breaks occur in a lineup. End guards shall be extended to accommodate frame extenders.

11.3.10 The designed thermal cooling, natural air convection or forced-air convection from internal fans **SHALL NOT** be altered from manufacturer specifications.

11.3.11 Appropriate insulators shall be installed as required for the equipment system (framework, cable rack, ground bar, etc.).

11.3.12 Freestanding cabinets, such as power plants, motor starters, power distribution service cabinets, generator controls, rectifiers, etc., shall be secured per manufacturer's specifications.

11.3.13 Figures 11-1 and 11-2 show floor anchors in a line up of frames or cabinets rigidly bolted together installed with four anchors on the end frameworks and a staggered anchor pattern in intermediate frameworks.

Frameworks, which are rigidly bolted to adjacent frames at both uprights with 3 steel junction plates on each upright (one at top, one center and one at the bottom) require 1 top support and 2 floor anchors. Isolated frameworks (frameworks not rigidly bolted at both uprights or any end framework) require 2 top supports and 4 floor supports.

If a framework cannot be rigidly bolted to adjacent frames because the frame uprights do not line up, the frame shall be treated as an isolated frame.

**Frameworks with bay extenders shall require 2 additional junction plates on each bay extender upright.**

11.3.14 Floor and wall anchors shall be secure and not protrude above the concrete, tile or linoleum level.

11.3.15 Floor and wall anchors must be the proper types in accordance with equipment specifications. Types and sizes installed must be in accordance with support requirements of intended load.

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11.3.16 Shields and anchors must not be loose or so tight as to prevent expansion. Anchors must be torqued to manufacturer’s specifications.

11.3.17 Unused holes in floor shall be filled with a latex concrete fill after shields and anchors are removed.

11.3.18 Building penetrations through floor and walls that are no longer used for cable, conduit, etc. shall be permanently sealed only by a Verizon Buildings approved contractor.

11.3.19 When strut systems are used to anchor a frame to the floor, the hanger rod shall protrude at least 3 threads beyond the end of the nut or spring nut. A washer and lock nut are also required against the strut.

11.4 Equipment Units and Apparatus

11.4.1 Units of equipment shall be of the type specified and be positioned, securely fastened, modified or otherwise installed in accordance with specifications and front equipment drawings.

11.4.2 Equipment, apparatus and/or cable mounted to a framework SHALL NOT extend horizontally beyond the front or rear edges of the base (or guardrail) of the frame. Guardrail(s) shall be extended to protect equipment, apparatus, and/or cable.

11.5 Conduit, Lighting, and AC Outlets/Receptacles

**NOTE: The installer shall adhere to all applicable national and local electrical codes.**

11.5.1 Lighting fixtures and appliance outlets shall meet all National Electrical Code (NEC®) wiring requirements.

11.5.2 See Section 17 of this IP72202 for more detail requirements.

11.5.3 Central Office Aisle Lighting Sensors shall be installed per Engineering Specifications and the Engineering & Planning Support Flash, 2008-029-COE.

11.6 Rolling Ladders & Tracks

11.6.1 Ladder stop bolts and bushings shall be installed on all ladder track ends and shall be equipped with cotter pins or lock nuts.

11.6.2 Ladder track stop bolts shall be placed or relocated to ensure accessibility of equipment from rolling ladders.

11.6.3 Ladder track splice screws shall be equipped with washers and burred, staked, or secured with a self-locking nut.

11.6.4 Rubber end caps shall be installed at both ends of the ladder track.

11.6.5 Fenders and wheel guards shall be provided on all ladders.

11.6.6 Ladder brakes shall be adjusted per Verizon standards to ensure proper operation of the brake assembly.

11.6.7 Brake rope ends shall be trimmed and clamped to remove risk of personal injury.

11.6.8 Ladders shall run free and clear of equipment, cable racks, auxiliary framing, etc.

11.6.9 Hanger rods or bolts used for the direct support of ladder track shall be provided with cotter pins or self-locking nuts.
End Framework requires two top supports

Framework rigidly bolted together requires only one top support

End Framework requires two top supports

Three steel framing Brackets per frame upright.

This frame is rigidly bolted with three steel junction plates on each upright. Therefore it requires a minimum of two base anchors and one top support.

Four bolts per framing bracket

Figure 11-1 Frames rigidly bolted together

Endguard Frame upright

Endguard Detail

Junction Brackets - 3 per frame upright

Aisle XXXXX

Figure 11-2. Frame Anchor Pattern
12.0 Fire Stopping (Cable Penetrations)

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12.0 Fire Stopping (Cable Penetrations)

12.1 Introduction

12.1.1 All cable penetrations through floors or walls shall be fire stopped in accordance with the manufacturer’s requirements for the type of fire stop material used. If there is any discrepancy between the manufacturer’s requirement and this IP72202, the manufacturer’s requirement shall prevail. Any discrepancy found between this IP72202 Section and the manufacturer’s requirements must be reported to a Verizon Quality Representative by way of the Installers Quality representative.

12.1.2 Verizon shall determine which manufacturer and type of fire stopping to be used on a cable penetration. Only Verizon approved Fire stopping materials and systems shall be used.

12.1.3 Additional detail requirements may be obtained through Verizon Real Estate.

12.2 General

12.2.1 Cable holes and penetrations to be opened or closed shall be listed in the MOP.

12.2.2 The installation supplier shall provide a qualified installer (through formal documented training) for opening and/or closing of cable holes or penetrations on each job that opens or closes cable holes.

12.2.3 Cables passing through floors or through fire rated walls shall be protected to restrict the spread of smoke and flame (i.e. moldable putty).

12.2.4 Opened cable holes and penetrations require adequate protection for personnel and equipment where there is any danger of material falling to the floor below. Required protection method and procedure shall be detailed in the MOP.

12.2.5 Unused cable slots shall be sealed by a Verizon approved Buildings contractor.

12.2.6 Fire stop materials and methods shall be detailed in the MOP for the applications (e.g. cable hole, sleeve, conduit, etc.) required.

12.2.7 Fire stop materials of different manufacturers shall not be utilized on the same application.

12.2.8 An approved Verizon building contractor shall install structural steel cable hole sheathing/pedestals for new floor penetrations.

12.2.9 Through floor/ceiling cable holes require a 9/10 AWG thick steel plate atop the floor side Intumescent material. This steel plate shall be bolted to the pedestal/sheath of the cable hole.

12.3 Cable Hole Labeling

12.3.1 Two (2) new pressure sensitive labels (see Figure 12-1) or equivalent are required to be applied on opposite sides on the cover / cable penetration in such a manner as to tear or be destroyed upon the opening of the penetration i.e. when the installer routes cable through a wall/floor/sleeve penetration. (see Figure 12-2). All existing labels shall be removed. A minimum of one permanently affixed label is required on the side of the wall/ floor penetration where cover plates are not required. Labels shall indicate:

- Installation Service Provider
- Verizon TEO / WO number
- Date cable penetration was fire-stopped
- Manufacturer Name of the Fire Stop Material
- Product Name and Code # of Material used
- If conduit must be firestopped, one cable hole label is sufficient.
12.3.2 A “Temporary Closure Tag” (see figure 12-3), black lettering on green background, shall be affixed within approximately three feet of the cable hole at the time it is temporarily closed as defined in 12.5.3. The tag shall be on the floor side of a floor penetration cable hole and on one side or the other of a wall penetration cable hole. The tag shall identify:

- Installation Service Provider
- Installers Name
- Contact Telephone Number
- TEO / WO Number
- Date Opened

12.3.2.1 The Temporary Closure Tag will remain until the end of job when the permanent closure label per 12.3.1 is affixed.

12.3.3 The cable penetration designation when provided shall be labeled on the steel cover and face of the sheathing channel when the cable penetration is closed. Cable hole designations can usually be obtained from floor or cable rack plans/prints. Where the designation cannot be found, the Installer shall contact the Verizon Engineer (FBA).

12.3.4 Cable penetration designations shall be black in color and a minimum of 5/8-inch block characters. Designations shall be centered horizontally approximately 2 inches from the front edge of the sheathing cover and just below the top of the sheathing channel assembly.

12.4 Fire Stop Inspections

12.4.1 Fire stopping is a most critical component of the central office environment. If at any time, a cable hole or penetration is found non-conforming per IP72202, the Installer, who closed that hole, shall be contacted. The installer responsible for the non-conformance shall take immediate steps to bring the cable hole or penetration into conformance. (Reference: COEI Bulletins F02-034, F04-029, F07-005, and Real Estate Document RED072001)

12.5 Mineral Wool/Ceramic and Intumescent Products

12.5.1 Upon entering a cable closure sealed with mineral wool/ceramic bags etc, the hole shall be permanently closed at the end of each shift (see section 12.5.3). The cable hole must be retrofitted with a current Verizon approved fire stopping product by the end of the job.

12.5.2 Intumescent and non-intumescent moldable putty SHALL NOT be mixed on a cable penetration. Different intumescent putties SHALL NOT be mixed on a cable penetration. Different manufacturers putty and intumescent sheets SHALL NOT be mixed.

NOTE: 3M red and 3M brown putty are the only two putties that can be mixed on the same cable hole.

12.5.3 Closures:

NOTE: Cable openings shall have the penetrations fire-stopped to their required performance level during periods of inactivity. Penetrations must be permanently closed at the end of each job per manufacturer’s standards.

12.5.3.1 All cable holes must be temporarily closed per manufacturer’s specifications and affixed with a temporarily closure label (Figure 12-2) when no additional cable will be run or by the end of each shift. At the end of the job the permanent closure label (Figure 12-1) is required.
12.5.4 Sleeves:

12.5.4.1 The space between cable sleeves or conduits and the building material through which they run shall be packed with an approved fire proof material and sealed with intumescent moldable putty. Refer to manufacturer’s documentation for specific requirements.

12.5.4.2 A sleeve’s inside diameter shall be sealed at both ends with intumescent material over cable vaults, open-cell battery rooms, power rooms and/or where used through walls.

12.5.4.3 A sleeve’s inside diameter containing cable (i.e. power, switchboard, or fiber) traversing through floors/ceilings, at a minimum, are to be sealed at the top of that sleeve. All fire stopping of sleeves will comply with Verizon and manufacturer’s requirements.

12.6 Fire Protection of Fiber Optic Pathways

12.6.1 Fiber Optic cables on cable rack, not enclosed in an existing fiber duct system, traversing cable holes through floors or walls, shall be fire stopped in accordance with the requirements found in paragraph 12.5 of this IP 72202 document, GR-1275-CORE Section 12, and/or the fire stop Manufacturer’s documentation.

12.6.2 Existing fiber duct systems with Fiber Optic cables traversing cable holes through floors or walls shall be fire-stopped per manufacturer’s specifications to the inside and outside of the duct RE: GR-1275-CORE, Section 12.

12.6.3 Fiber Optic cable/jumpers installed through conduits or sleeves shall be fire stopped with intumescent materials and be fire stopped in accordance with the requirements found in 12.5 above in this IP 72202 document.

12.6.4 All fiber optic cables shall be sewn securely on un-panned cable rack. Where they traverse through cable holes shall be fire stopped per the requirements in 12.5.

12.6.5 All optic jumpers shall be installed in a Fiber Optic Protection System/Duct. The Fiber Optic protection system shall end within 6” of the cable hole (It is not recommended to install fiber protection ducts through fire rated floors and/or walls). The jumpers will then traverse through the hole by themselves or as a group bundled and secured to the nearest first and last strap of the cable rack, which supports the duct system. The hole is to be sealed per the requirements of 12.5.
**FIRE STOPPED CABLE HOLE**

THIS CABLE HOLE HAS BEEN FIRESTOPPED IN ACCORDANCE WITH VERIZON STANDARDS

Date Installed: _________________________

Installation Supplier: ________________________________

Installer’s Name (print) ______________________________________

Installation Supplier Telephone #: _________________________________

Verizon TEO / WO #______________________ VENDOR Order #__________

**FIRE STOP MATERIAL:**

Manufacturer: ______________ Product Name ______________ UL# __________ Hr. Rating ________

---

**Figure 12-1 Cable Hole label**

Note: 3"H X 6" W with red printing on white background with red border.

---

**Figure 12-2 Fire stopping Label Application**
This hole shall be temporarily closed and sealed at the end of each work shift or when no additional cable will be run during that shift. At completion of this TEO, this hole shall be permanently closed and sealed.

**DATE OPENED______________**

Figure 12-3 Cable Hole Opening Tag

Note: 3”H X 6”W with black printing on green background with black border.

Tag shall be affixed with twine or ties.
This page intentionally left blank.
13.0 Workmanship Requirements - Cabling and Wiring

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13.0 Cabling and Wiring

13.1 Introduction

13.1.1 Walking or standing on cable rack stringers, straps, panning, ducts, cables, wires, fiber protection system or fiber optic cables/jumpers is strictly prohibited. When this overhead area is not accessible with a ladder, use caution to avoid dislodging or damaging cable.

13.2 General

13.2.1 All cable and wire installed shall be Verizon approved. Cable and wire shall consist of power, switchboard, coaxial, armored, fiber optic, ABAM, etc.

13.2.2 Cable and wire shall be of the type specified, positioned, and placed according to the applicable job specifications.

13.2.3 A three-inch clearance must be maintained under all building obstructions.

13.2.4 Cable and wire shall be secured or supported so that there is no sag or strain on the cable, connections, apparatus, etc.

13.2.5 The minimum bending radius of cable, i.e., power, switchboard, coaxial, armored, fiber optic, ABAM, etc., SHALL NOT be less than the cable manufacturer’s specification. See Figure 13-1.

13.2.6 Cable and wire shall enter equipment bays/frames/cabinets/units at the location specified per the manufacturers’ drawings and/or cabling specifications.

13.2.7 Additional cabling should be avoided where these situations exist:
- dc power and "BX" cable are presently routed on the same rack
- excessive cable pile up exists (see section 13.15.1.5)

13.2.8 Temporary cable routing tags, wire tags, and/or verification tags shall be removed before turnover to Verizon.

13.2.9 Cable and wire shall be protected with fiber sheet against potential damage at directional change locations, or any "stress point" locations that could cause cable damage.

13.2.10 The Installer shall protect existing equipment, cable, and wire from being damaged during all cabling/installation activities.

13.2.11 All spare and unused cable and wire shall be placed in fiber tubing or secured to existing forms or may be taped to the outer sheath of the cable/conductor.

13.2.12 All spare and unused cables and wire shall be long enough to reach any required termination point. Spare cables and unused wires shall not be shared among multiple relay racks. Spare cables must not be stored in cable rack.

13.2.13 Wire/cable SHALL NOT obstruct access to terminals.

13.2.14 Service loops shall not be placed in cable racks above final frame termination. Service loops may be placed after the last cable support and before the cable butt, if required, and the unit being terminated. Service loops shall be as short as possible without causing deformation of cable.

13.2.15 Excessive slack of cable, manufactured with connectors at both ends, shall not exceed 25% of the total length of run for cables less than 100’ or a maximum of 25’ for cables greater than 100’ in length. All other cables, not manufactured with connectors at both ends, shall not have any excess cable stored in cable racks.

13.2.16 When excessive cable length is unavoidable, the excess cable shall not be coiled on the cable rack. The excess cable shall be spread out over the cable racks to avoid future cable congestion problems.
13.3 Cable Openings

13.3.1 Refer to Section 12 “Workmanship Requirements - General Fire Stopping Considerations”

13.4 Damaged Cables

13.4.1 Damaged cables shall be repaired in accordance with Section 13 of GR-1275-CORE.

13.4.2 The number of splices in switchboard cable SHALL NOT exceed five (5) percent of the cables total conductors. A run of cable shall be replaced if the number of damaged or spliced conductors exceeds 5% of the total conductors in that cable.

13.4.3 Unless otherwise specified, splices shall be located as to be accessible for inspection.

13.4.4 Before splicing of shielded cable, the splices intended must be approved by Verizon Engineer.

13.5 Installation

13.5.1 All wiring shall be protected from hazardous conditions such as metal edges, excessive strain, etc. This can include but is not limited to the use of cable rings and fiber protection at points where cable must be pulled over cable rack stringers and/or other cables.

13.5.2 Installed switchboard/coax/shielded cables hanging unterminated in equipment frameworks shall be coiled above floor level with their exposed ends insulated. The coils shall be secured so as not to come in contact with equipment or personnel.

13.5.3 During cable running operations, the exposed ends of the cable shall be insulated to prevent accidental contact with live circuits.

13.6 Cable Protection

13.6.1 Insulate exposed ends of power cable with appropriate insulating material such as two layers of rubber tape covered with two half-lapped layers of electrical tape or an approved heat shrink nipple.

13.6.2 Cable shall be protected where it bends around or may come in contact with edges or corners of supports, auxiliary framing, cable rack stringer, threaded rods or other metallic edges. This shall be accomplished with the application of sheet fiber to the metallic surface(s) wherever possible or where it cannot be applied to a metallic surface it may then be applied to the cable(s).

13.6.3 Cable connected to or adjacent to moveable parts or equipment shall be protected from contacting those moveable surfaces, i.e. doors, hinges, retractable devices, etc.

13.6.4 Shielded/ABAM cable butts must be covered with 2 half lapped layers of electrical tape or heat shrink tubing.

13.7 Cable and Wire Protection

13.7.1 Sheet fiber, fiber tubing, electrical tape, friction tape, heat shrink, and/or rubber tape shall be used for protection in accordance with the provisions of GR-1275-CORE and this IP72202 Section 13.

13.7.2 Cable and wire shall be protected from contact with movable parts and/or sharp edges.

13.7.3 Power cable and wire without a re-enforced protective jacketing (i.e. soft rubberized, welding cable, locomotive cable) with the fine conductors shall be protected with sheet fiber wraps (equivalent to 1/32-inch thick) wherever sewn/secured. Flex cables or regular cables with the re-enforced protective jacketing shall be protected with sheet fiber where they break off a rack, or come in contact with a threaded rod or overhead ironwork. Refer to Section 13 Tables 13D & 13E for additional information on securing power cables.

For a list of additional Verizon approved power cables in these categories refer to VZ Flash 2002-023F-COE @ http://coe-support.verizon.com/~netops/netdsgn/M&Ps/WEBPAGES/MP- General.htm
13.7.4 Single fiber jumpers shall be protected with wraps of sheet fiber equivalent to 1/32” when secured.

13.7.5 When securing single fiber jumpers, they shall be protected with wraps of sheet fiber equivalent to 1/32”.

13.7.6 Securing of coaxial cable shall not be so tight that they deform the cable sheath.

13.7.7 No cable shall come in contact with any unprotected threaded rod.

13.8 Application of Protection Material

13.8.1 Electrical Tape shall not be used as primary support or protection.

13.8.2 Sheet fiber protection shall be secured with twine or ties.

13.9 Sheet Fiber

13.9.1 Sharp edges of any framework, cable rack strap, stringer, bracket, or horn shall be fiber insulated at locations that come into contact with wire and/or cable. Provide fiber protection on cable/wire and opening where cable/wire pass through or touch edges of sheet metal openings. Ends of metal cable panning must be covered to prevent personal injury and/or cable damage. **Duct tape SHALL NOT be used.**

13.9.2 Cable shall be protected from contact with edges, or corners of supports, auxiliary framing, threaded rods, bolts, nuts, screws, or other sharp edges.

13.9.3 Sheet, Formed, Tubed fiber paper or pvc shall be placed on any hanger/ threaded rod which any cable is in contact.

13.9.4 Where cables drop down to frames, equipment, or other cable racks, sheet fiber insulation shall be placed between cable rack stringers and the cable.

13.9.5 Wire or cable turning off cable racks shall be protected by fiber protection. This protection must be placed over the cable rack stringers between the horns at the points where the wire or cable turn off the rack.

13.9.6 When securing fiber optic cable or fiber optic jumpers with twine the equivalent of 1/32-inch sheet-fiber protection between twine and cable shall be used. The twine shall not be so tight as to deform the cable jacket or the sheet fiber.

13.9.7 When securing coaxial cable with twine, single or multiple, sheet fiber protection is not required. The coax cable shall not be tied so tight as to deform the cable jacket. The stitch shall be loose enough to allow movement of the cable.

13.10 Tape

13.10.1 Tape shall not be used for protection where it might come in contact with heat producing devices, subject to pressure, etc. RE: paragraph 13.8.1.

13.10.2 Tape shall be applied with good adhesion to itself and other surfaces with no possibility of unraveling. The last two turns of tape shall be overlapped and applied without tension.

13.10.3 **TAPE SHALL NOT BE USED TO PROTECT CABLE FROM CONTACT WITH METAL WORK.** Sheet fiber insulation shall be used for that purpose.

13.10.4 For transmission cable (i.e. H.F., ABAM, etc…), tape color shall be limited to gray or black.

13.11 Securing with Twine

13.11.1 Nine-ply (minimum) waxed polyester twine/cord shall be used for sewing and banding cable.

13.11.2 Refer to Tables 13D, 13E, and 13F for specific sewing requirements.
13.11.3 All unused portions of twine shall be cut off between 1/4 to 1/2 inch of the last stitch. Lengths of twine shall not be left hanging from equipment, cable brackets, cable racks, etc. at the end of the job.

13.11.4 Sewing with twine is the preferred method for securing switchboard cables onto vertical cable racks that pass between floors. If the vertical cable rack is currently secured with twine, installer shall continue to be secured in the same manner.

13.12 Sewing Cable Forms

13.12.1 A partial list of stitches with detailed figures can be found in Section 13 of GR-1275-CORE.

13.13 Cable and Wire Forms

13.13.1 Fanned forms should be used for all switchboard cable leads terminating at terminal strips, connector blocks, protectors, DSX panels, etc.

13.13.2 Forms should not be twisted, bunched, or loose fanned.

13.13.3 Forms shall be protected from contact with sharp edges and uninsulated framework.

13.13.4 Forms shall be properly supported by the use of wire fanning rings, fanning brackets and/or form support brackets.

13.13.5 Forms SHALL NOT block access to equipment.

13.13.6 Starting and ending stitches of sewn forms shall be trimmed of excess twine.

13.14 Securing with Nylon Cable Ties

13.14.1 Nylon cable ties installed during the manufacturing process are permitted only when they meet the criteria found in GR-1275-CORE, Section 13.

13.14.2 Nylon cable ties shall not be used to secure Fiber optic jumpers, power or fiber cables.

13.14.3 Nylon cable ties shall not be used to secure cables on the distributing frame (i.e. MDF, CDF, Cosmic, etc...). Nylon cable ties may be used to secure Amphenol type connectors on terminal blocks designed to accept nylon cable ties for this purpose and must be installed per GR1275.

13.15 Routing and Placement

13.15.1 General

13.15.1.1 Routing of cable, critical cable lengths and classified cable segregation requirements shall be in accordance with job documentation.

13.15.1.2 Minimum bending radius of cable shall not be less that the cable manufacturer’s specification.

13.15.1.3 Cable and wire shall be run on cable racks or cable brackets. Any cable and wire sewn shall meet requirements in Table 13D, 13E, or 13F. Cable and/or wire are not to be secured to threaded rods. Cable and wire in a vertical orientation may be secured to auxiliary bar only in those cases where the allowable cable support distance would be otherwise exceeded.

13.15.1.4 All cable designated "future" shall be installed to allow access to the cable until its final use and tagged as such. Unterminated future power, fiber, switchboard / coax shall be tagged within 12 inches of the unterminated end with a 145 tag listing the appropriate far end designation information per section 16. No cables may have gray tape applied to them for the purposes of temporary or permanent designations.

13.15.1.5 Cable and wire shall be routed as to avoid excessive pile-up and/or blockage of cable racks. The installer should notify Verizon Engineering before exceeding these limitations when it appears a safety or cable routing issue exists. The Verizon Engineer will be responsible for determining if new alternate cable racking/cable will be required. Please refer to the following tables for pile-up limitations:
SECURED SWITCHBOARD CABLE:

<table>
<thead>
<tr>
<th>Width of Rack</th>
<th>Max Pileup on Supports with 5’ apart</th>
<th>Max Pileup on supports with 6’ apart</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 - 6”</td>
<td>5”</td>
<td>5”</td>
</tr>
<tr>
<td>12” to 25”</td>
<td>12”</td>
<td>10”</td>
</tr>
</tbody>
</table>

Table 13A

SECURED POWER CABLE:

<table>
<thead>
<tr>
<th>Width of Rack</th>
<th>Max Pileup on Supports with 5’ apart</th>
<th>Max Pileup on Supports with 6’ apart</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 - 6”</td>
<td>5”</td>
<td>5”</td>
</tr>
<tr>
<td>12” to 20”</td>
<td>7”</td>
<td>6”</td>
</tr>
</tbody>
</table>

Table 13B

UNSECURED SWITCHBOARD CABLE:

<table>
<thead>
<tr>
<th>Width of Rack</th>
<th>Max Pileup on Supports with 5’ apart</th>
<th>Max Pileup on Supports with 6’ apart</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 - 6” to 12”</td>
<td>5”, 12” respectively</td>
<td>5”, 12” respectively</td>
</tr>
<tr>
<td>15” to 25”</td>
<td>15”</td>
<td>12”</td>
</tr>
</tbody>
</table>

Table 13C

13.15.1.6 Blocked cable runs shall be reported to the COEI Supervisor/VM and/or Verizon Engineer. The installer shall mark cable rack prints to reflect blocked cable rack locations.

13.15.1.7 Vertical cable runs SHALL NOT exceed an ultimate cable pileup of 12 inches for switchboard cable and 7 inches for power cable.

13.15.1.8 All wire shall be dressed in such a manner as to avoid congestion, to ensure accessibility, and to maintain proper clearance between terminals.

13.15.1.9 Alternate cable paths should be used between the timing supply and the network element. Timing leads should also be run down equipment bays on alternate sides of the bay when possible.

13.15.2 Central Office Ground Cable

13.15.2.1 Refer to Sections 19 and 20 in this IP72202.

13.15.2.2 Spacing for ground lead support brackets installed below cable rack and/or auxiliary framing shall not exceed 1’- 6” on center.

13.15.3 Power Cable and Wire

13.15.3.1 Unfused battery leads and their associated return leads SHALL NOT be run on a rack with any other type of cable.

13.15.3.2 Battery and battery return shall be run as adjacent pairs on a per circuit basis.
13.15.3.3 When “H” taps are used on power cables they shall be used according to job specification or drawing. Power cable shall only be “H” tapped per job specifications and drawings. Those taps shall be located horizontally and always be accessible for inspection. The “H” taps shall be located between cable rack rungs (straps) with main leg continuing through H-tap so as to be sewn to next cable rack rung to add stability unless authorized by COEI Supervisor/VM. End caps shall be placed on dead ended cables. Mechanical connectors shall not be used.

13.15.3.4 Spacing for power cable support (L) brackets installed below cable rack and/or auxiliary framing shall not exceed 1’-6” on center. Goal Posts (fGTE) or any other cable support brackets installed above the cable rack and or auxiliary framing shall not exceed 1’-6” on center.

13.15.3.5 When terminating power cable to equipment the installer shall follow manufacturer’s specifications. In circuits fused at greater than 10 amps, mechanical type connectors are not permitted.

13.15.3.6 All “H” tap covers shall be clear.

13.16 Shielded and Coaxial Cable

13.16.1 Shielded cable and wire shall be ground bonded at the equipment side, unless otherwise directed per specification. Composite clock cable shields shall be ground bonded at the timing source, i.e., TSG, SDE, DCD, etc., unless otherwise directed per specification. Ground bond lead must be insulated where ground lead may come in contact with other connections.

13.16.2 Securing of coaxial cable shall not be so tight that they deform the cable sheath.

13.17 Supporting

13.17.1 General

13.17.1.1 Cable SHALL NOT be unsupported for a distance greater than 2 feet measured from the last support on the cable rack to the first support on the bay/frame/cabinet, except as follows:

- Shall not be unsupported for a distance greater than 4 feet through the floor under a distributing frame
- Shall not be unsupported for a distance greater than 3 feet from a cable rack at the top of a distributing frame
- Vertical cable in floor openings **DO NOT REQUIRE** support within the opening
- Power cable 2/0 or larger that continue from one horizontal rack to another, or into a frame or bay, must be supported at such locations exceeding 3 feet

13.17.1.2 DC power cable within the power plant and between the power plant and the first distribution point of network equipment shall always be run secured (ladder cable rack without pans) on dedicated power cable racks. Beyond the first distribution point, DC power cable shall be segregated and secured on un-panned cable rack. On existing cable racks (panned or un-panned), dc power cable shall be separated from other cable to the extent possible.

13.17.2 Power Cable

13.17.2.1 Refer to Table 13D and 13E for sewing details. Also, Section 17 provides additional information.

13.17.3 Central Office Ground Cable

13.17.3.1 Refer to Sections 18 and 19 of this IP72202 and to Verizon Grounding Practice VZ 790-700-100 for requirements.

13.17.4 Fiber Optic Jumpers

13.17.4.1 Fiber Optic Jumpers shall be installed in protective compartments, enclosures or duct.

13.18 Unsecured Cable/Wire

13.18.1 Cables on horizontal panned/screened cable rack shall be run flat, spread evenly across the entire width of the rack. Secured to the rack where they turn off or exit.
13.18.2 Wire on panned/screened cable rack shall be bundled every 6’ or less.

13.18.3 Cable racks used for unsecured wire and/or cable shall be equipped with screens/panes and horns. Under no circumstance shall the unsecured cable/wire be run at a level higher than the horns meant to retain them.

13.18.4 Cable/wire on existing cable rack where cable has not been previously secured shall be secured every 6’ or less except on panned rack with side horns.

13.19 Secured Cable/Wire

13.19.1 Cable shall be secured per the requirements found in Table 13D, 13E, and 13F.

13.19.2 Cable to Equipment Locations

13.19.2.1 The preferred method of cabling for transmit and receive cable drops is to segregate and route on opposite sides of the bay/frame/cabinet unless otherwise specified on manufacturer’s cabling plan for the equipment.

13.19.2.2 All cables shall be butted approximately 1 inch below the last cable support bracket on the side of the bay/rack or other supporting device for the unit being terminated and after the cable service loop if it is required. Butted ends at DSX, Equipment terminations shall have a min of 1 inch heat shrink or tape. If shields are to be terminated at DSX or Equipment end from said cable, transparent heat shrink shall be placed on shield leaving only the required length needed for termination exposed.

13.19.2.3 Cable and wire must be secured at every support bracket, in the frame upright, until formed into the equipment shelf.

13.19.3 Distributing Frames

13.19.3.1 Cables run down the vertical side shall be secured at all transverse arms that are 13 inches apart or more. For those distributing frames with arms less than 13 inches apart the installer shall secure the cables at every other arm starting from the topmost arm of the frame.

13.19.3.2 Cable/wire shall be run and secured along a transverse arm without causing any impediment to Verizon cross connect activity requirements. A fanning ring shall be installed at the cable butt on the horizontal transverse arm if the cable is being terminated on multiple blocks. Cable shall be butted approximately 1 inch past the last securing point.

13.19.3.3 Cables run to connecting blocks on the horizontal side are to be secured with twine first on the vertical arm before transitioning to the horizontal side. On the horizontal arm, the cable shall be secured within 6” of the vertical arm and within 3” of the connecting block to which the cable is being terminated. A middle stitch will be required if the distance between the two end stitches is greater than 18”.

13.20 Cable Removal and Mining (Refer to Section 20 of this IP72202)

13.21 Cable and Conductor Verification

13.21.1 All leads terminated shall be electrically verified for continuity and correct wiring. The verification shall include testing for shorts, opens, and wiring errors (i.e., flops, transpositions, crosses etc.). The results of all tests shall be entered in the Test Record Form (Form 6-3), as required per Section 6 and 7.

13.21.2 All cable and conductor troubles found shall be identified and corrected by the installer. Once corrected, the installer shall again test to verify for continuity and correct wiring.

13.21.3 Any lead verification testing with the potential for a service outage must be detailed in the MOP.

13.21.4 All fiber optic cables/jumpers added on an order shall be tested per Section 22 of this IP72202.
### Securing Horizontal Power Runs

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<thead>
<tr>
<th>Type</th>
<th>Cable &amp; Wire Size</th>
<th>Sew At</th>
<th># of Twine Strands</th>
<th># of Layers</th>
<th>Wires Per Stitch</th>
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</thead>
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<td>Copper</td>
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<td>2</td>
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<tr>
<td></td>
<td>500 MCM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>350 MCM</td>
<td>Alternate</td>
<td></td>
<td>4</td>
<td>2</td>
</tr>
<tr>
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<td>No. 1/0</td>
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**Table 13D. Securing Horizontal Power Runs**

### Securing Vertical Power Runs

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<th>Type</th>
<th>Cable &amp; Wire Size</th>
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<th># of Twine Strands</th>
<th># of Layers</th>
<th>Wires Per Stitch</th>
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</thead>
<tbody>
<tr>
<td>Copper</td>
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<td>Up to 3</td>
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<td></td>
<td>No. 1/0</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>No. 0000</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No. 1/0</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No. 2</td>
<td></td>
<td></td>
<td>Any #</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>No. 6</td>
<td></td>
<td></td>
<td>Any #</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No. 8</td>
<td></td>
<td></td>
<td>Any #</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No. 14</td>
<td></td>
<td></td>
<td>Any #</td>
<td></td>
</tr>
<tr>
<td>1 to 4 Conductor Armored Cable</td>
<td>No. 0 to 500 MCM</td>
<td></td>
<td>4</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

**Table 13E. Securing Vertical Power Runs (Or Inverted Horizontal Runs)**
<table>
<thead>
<tr>
<th>Type of Cable</th>
<th>Size</th>
<th>Type of Cable Run</th>
<th>Number of Cables (Cu or Fiber) per Stitch</th>
<th># of Twine Strands per stitch</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Horizontal</td>
<td>Vertical</td>
</tr>
<tr>
<td>Round</td>
<td>Up to ½ “ Diameter</td>
<td>6</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>½” to ¾” Diameter</td>
<td>5</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>¾” to 1” Diameter</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Over 1” Diameter</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Oval on edge</td>
<td>All</td>
<td>6</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Oval on Flat</td>
<td>All</td>
<td>10</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

**NOTE:**
1. When securing switchboard, transport or fiber cable on horizontal cable racks, the cable shall be secured every third strap except at turns where cables shall be sewn at intervals that will insure the cables retain their proper position. Vertical runs shall be secured at every strap.
2. Individual coax cables may be bundled up to 1” in diameter.

Table 13F. SECURING TRANSMISSION/SIGNAL CABLE AND FIBER CABLES

**Figure 13-1**

**Definition of minimum bend radius**

Minimum bend radius is defined as the smallest radius to which a fiber may bend before its transmission qualities are adversely affected. For instance, if a fiber has a minimum bend radius of 3 inches, transmission quality through it would not be adversely affected unless it is bent to a radius less than 3 inches.
The page left intentionally blank.
14.0 Installation Report Cards

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14.0 Installation Report Cards

14.1 General

14.1.1 Installation Report Cards (Figure 14-1) are generated for suppliers who provide Installation services to Verizon. Only suppliers who complete 21 jobs or more in the reporting period (4 months) will receive an Official Report Card.

14.1.2 The intent of the Supplier Report Card is to improve supplier performance by identifying areas needing improvement as well as positively reinforcing a supplier’s superior performance.

14.1.3 Supplier performance is rated in on a scale from A to F in the following eight categories (refer to Figure 14-2):
1. Service Events FCC
2. Service Events Non-FCC
3. Audits - Verizon (Verizon Installation Quality Audits)
4. Audits - Supplier
5. VZ Audit Responses Received On Time
6. Installation Backlog
7. End of Job Review
8. % Orders Completed On Time

14.1.4 The overall weighting of the installation report card is as follows: 30% of the total installation report card grade pertains to service events (e.g. FCC and Non-FCC Service Events); 35% is associated with Quality (e.g. Verizon Audits, Supplier Audits, and End of Job Review). The last 35% relates to On Time performance (e.g. Audit responses received on time, Percent on Time Completion and Installation Backlog).

14.2 Service Events

14.2.1 Part 63.100 of the FCC Rules defines an outage as “a significant degradation in the ability of a customer to establish and maintain a channel of communications as a result of failure or degradation in the performance of a carrier's network”.

14.2.2 Service events are categorized as either an outage or a degradation. See COEI bulletin F07-002 for more information.

14.3 Service Events FCC

14.3.1 Any Service Event meeting FCC established criteria must be reported by Verizon to the FCC. Any supplier installation activity which results in an FCC reportable event will be assessed on the report card under this category. FCC Service Events are assessed independently regardless of the number of installation jobs performed. Any supplier assessed with a single FCC event will receive an “F” grade for this category.

14.4 Service Events Non-FCC

14.4.1 Any supplier installation activity which results in a Service Event which does not meet the criteria for FCC reporting will be assessed in the Non-FCC service events category. Non-FCC service events are expressed as a percentage compared to the number of jobs that are In Serviced in the reporting period.

14.5 Audits - Verizon (Verizon Installation Quality Audits)

14.5.2 If Verizon performs audits on fewer than 3 jobs per report card period, the supplier’s internal audits (of their own jobs) will increase in weight with the weight being the sum total of both categories for the official report card. No value will be reported under Verizon audits.

14.5.3 For report card purposes, official audits may be performed on any In Serviced job prior to the end of the reporting quarter.

14.6 Audits - Supplier

14.6.1 Installation suppliers are required to perform internal quality audits and to submit to Verizon a copy of the results. Supplier audits must conform to the same measurement criteria used by Verizon. The installation supplier is required to provide the TEO/WO#, central office name, state, date of audit, # of frame equivalents, # of critical defects, # of major defects, # of minor defects, and conforming or nonconforming (refer to form 14-1). See Verizon Installation Auditing System Handbook - IP72250 for additional information.

14.6.2 If less than 3 Supplier audits are conducted in a quarter, zero points are recorded in this category on the official Report Card. For Report Card purposes, Supplier audits may be performed on any installation job that the supplier views as complete. Verizon may require additional supplier audits based on supplier performance.

14.7 VZ Audit Responses Received On Time

14.7.1 This category measures the Installation Supplier’s promptness to correct defects found in Verizon performed audits. Suppliers are required to correct all defects that are found in the Verizon performed audits. Suppliers are also required to document action taken to correct each defect and submit this documentation to the auditor for review using the defect notification portion of the audit. Correction and notification of defects with a “Minor” rating are due back within 30 calendar days of audit distribution date and defects with a rating of “Critical/Major” are due within 10 calendar days of audit distribution date. All audit documentation, including supplier responses, (original audits & re-issued audits) must be completed within 50 days of the original date the audit was conducted.

14.8 Installation Backlog

14.8.1 This category is a measurement of all open/issued jobs, as of the report card prepared date, where a jeopardy code is assessed to the supplier and the job is not Actualized In Service by the TEO/WO complete date. The base for this category is the number of jobs Actualized In Service in the reporting period.

14.9 Completion Notification/End of Job Review

14.9.1 The End of Job Review is calculated as the number of conforming EOJs compared to the number of jobs Actualized Construction Complete within the reporting period. It is planned to use the numerical average of all EOJs sometime in 2008 for this value.

14.10 Percent On Time Completion

14.10.1 The installation orders measured in this category are orders where the Actualized In Service date falls in the reporting period. A TEO is considered completed on time if the Actualized In-Service date is less than or equal to the TEO Complete Date.

14.10.2 Installations that are overdue, but not under the control of the installation supplier, are not measured in this category. A job is under the supplier’s control unless it has a jeopardy code attributed to Verizon, Customer, or Other Vendor. If the job is late, the jeopardy field must be completed.

14.10.3 A TEO will be measured as on time regardless of the jeopardy code if the TEO is Actualized In-Service prior to the TEO Complete Date.
Sample Installation Report Card:

**Supplier Name - (GROUP CODE)**

*01/01/2006 to 03/31/2006*

<table>
<thead>
<tr>
<th>Category</th>
<th>Points</th>
<th>Data Description</th>
<th>Raw Score</th>
<th>Numeric Score</th>
<th>Letter Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Events FCC</td>
<td>15</td>
<td>0 FCC Service Events</td>
<td>100.00%</td>
<td>15.00</td>
<td>A</td>
</tr>
<tr>
<td>Service Events Non-FCC</td>
<td>15</td>
<td>1 Non-FCC Service Events out of 352 total jobs</td>
<td>99.72%</td>
<td>12.50</td>
<td>B</td>
</tr>
<tr>
<td>Audits - Verizon</td>
<td>15.00</td>
<td>14 Conforming audits out of 16 total VZ audits</td>
<td>97.50%</td>
<td>13.13</td>
<td>B</td>
</tr>
<tr>
<td>Audits - Supplier</td>
<td>5.00</td>
<td>19 Conforming audits out of 20 total Supplier audits</td>
<td>95.00%</td>
<td>4.75</td>
<td>A</td>
</tr>
<tr>
<td>VZ Audit Responses Received On Time (Critical-Major 10 days / Minor 30 days)</td>
<td>5.00</td>
<td>17 On Time responses out of 25 total responses expected</td>
<td>85.00%</td>
<td>4.25</td>
<td>C</td>
</tr>
<tr>
<td>End of Job Review</td>
<td>15.00</td>
<td>238 Conforming results out of 251 total jobs</td>
<td>98.82%</td>
<td>14.22</td>
<td>B</td>
</tr>
<tr>
<td>Installation Backlog</td>
<td>5.00</td>
<td>5 Installation Backlog out of 352 total jobs</td>
<td>98.58%</td>
<td>4.93</td>
<td>A</td>
</tr>
</tbody>
</table>

**Total Rating**

<table>
<thead>
<tr>
<th>Raw Score</th>
<th>Numeric Score</th>
<th>Letter Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>100.00%</td>
<td>15.00</td>
<td>A</td>
</tr>
</tbody>
</table>

**Figure 14-1**

**Installation Metrics**

<table>
<thead>
<tr>
<th>Measurement Category</th>
<th>% of Total Grade</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Service Events FCC</td>
<td>15 Points</td>
<td>100.00%</td>
<td>0</td>
<td>&lt;100.00%</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2 Service Events Non-FCC</td>
<td>15 Points</td>
<td>100.00%</td>
<td>12.5</td>
<td>7.75</td>
<td>2</td>
<td>&lt;98.50%</td>
</tr>
<tr>
<td>3 Audits - Verizon</td>
<td>15</td>
<td>≥90.00%</td>
<td>≥85.00%</td>
<td>≥70.00%</td>
<td>≥60.00%</td>
<td>&lt;60.00%</td>
</tr>
<tr>
<td>4 Audits - Supplier</td>
<td>5</td>
<td>≥90.00%</td>
<td>≥85.00%</td>
<td>≥70.00%</td>
<td>≥60.00%</td>
<td>&lt;60.00%</td>
</tr>
<tr>
<td>5 VZ Audit Responses Received On Time (Critical-Major 10 days / Minor 30 days)</td>
<td>5</td>
<td>≥95.00%</td>
<td>≥90.00%</td>
<td>≥85.00%</td>
<td>≥80.00%</td>
<td>&lt;80.00%</td>
</tr>
<tr>
<td>6 Completion Notification/End of Job Review</td>
<td>15</td>
<td>≥95.00%</td>
<td>≥90.00%</td>
<td>≥85.00%</td>
<td>≥80.00%</td>
<td>&lt;80.00%</td>
</tr>
<tr>
<td>7 Installation Backlog</td>
<td>5</td>
<td>≥95.00%</td>
<td>≥90.00%</td>
<td>≥85.00%</td>
<td>≥80.00%</td>
<td>&lt;80.00%</td>
</tr>
<tr>
<td>8 % Orders Completed On Time</td>
<td>25</td>
<td>≥95.00%</td>
<td>≥90.00%</td>
<td>≥85.00%</td>
<td>≥80.00%</td>
<td>&lt;80.00%</td>
</tr>
</tbody>
</table>

**Total (Total Installation Grade)**

| Total | ≥95.50% | ≥89.50% | ≥79.25% | ≥69.00% | <69.00% |

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14-3
**CCP Backup Data Explanation**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplier A '1'</td>
<td>Displays in the column if the jobs assigned to the vendor that were Act. In-Svc and/or Act. Constr. Compl. within the report period for Installation Jobs that have a TEO status of “issued” and have not been canceled.</td>
</tr>
<tr>
<td>ORD</td>
<td>Displays in the column if the TEO was Actualized In-Svc Completion within the report period and the Supplier Rating = CA (conforms) for Installation Jobs that have a TEO status of “issued” and have not been canceled.</td>
</tr>
<tr>
<td>CONSCO In Svc EOJ CA INST BKLOG</td>
<td>Displays the names of the FE Eng and Manager and the COEI Supervisor / VM and Manager assigned to the TEO.</td>
</tr>
<tr>
<td>VNDR CTRL</td>
<td>Displays the State and the Office Name.</td>
</tr>
<tr>
<td>ON_TIME</td>
<td>Displays the State and the Office Name.</td>
</tr>
<tr>
<td>In Svc DATE</td>
<td>Displays the State and the Office Name.</td>
</tr>
<tr>
<td>CONSCO DATE</td>
<td>Displays the State and the Office Name.</td>
</tr>
<tr>
<td>TEO#</td>
<td>Displays the State and the Office Name.</td>
</tr>
<tr>
<td>OFFICE LOC</td>
<td>Displays the State and the Office Name.</td>
</tr>
</tbody>
</table>

*Figure 14-3*
Supplier’s Audit Data

<table>
<thead>
<tr>
<th>#</th>
<th>TEO # or Work Order #</th>
<th>Central Office</th>
<th>State</th>
<th>COEI Supervisor / VM</th>
<th>Date of Audit</th>
<th>Frame Equiv.</th>
<th>Maj.</th>
<th>Min.</th>
<th>C/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex 1</td>
<td>3UC01XY</td>
<td>Marcsville</td>
<td>TX</td>
<td>John Smith</td>
<td>4/1/2004</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>C</td>
</tr>
<tr>
<td>Ex 2</td>
<td>3TA01YZ</td>
<td>Hillcon Town</td>
<td>CA</td>
<td>Donna Jones</td>
<td>5/10/2004</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>N</td>
</tr>
<tr>
<td>Ex 3</td>
<td>B35100BAX</td>
<td>Hazel Hills</td>
<td>VA</td>
<td>N/A</td>
<td>6/3/2004</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>C</td>
</tr>
</tbody>
</table>

NOTE: Installation Suppliers are required to submit to Verizon a copy of the results of their internal quality audits on a quarterly basis. The sample below indicates the data that is required. It is recommended that this data be submitted to Verizon within seven (7) days following the end of a quarter.

NOTE: The "COEI Supervisor/VM" column ONLY requires an input for Jobs performed in CA & TX.
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15.0 Workmanship Requirements - Connecting

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This page intentionally left blank.
15.0 Connecting

15.1 Introduction
15.1.1 Common system requirements contained herein shall complement the GR-1275-CORE and Suppliers requirements.

15.2 General
15.2.1 Terminations shall be free of corrosion and nonconductive materials at their mating surfaces.
15.2.2 Strain relief on connector, when provided, shall be installed per manufacturer's specifications.
15.2.3 Mounting hardware shall be installed and secured per manufacturer's specifications.
15.2.4 Connectors shall be designated per job specifications.

15.3 Skinning
15.3.1 Tools designed for the skinning of the wire type being prepared for connection shall be used as recommended by the wire manufacturer’s documentation. Care must be taken to prevent the scraping or nicking of the conductor being skinned.

15.4 Wire Wrapped Connections
15.4.1 Wire-wrapped connections must conform to Table 15A.

<table>
<thead>
<tr>
<th>Wire Gauge</th>
<th>Minimum Adjacent Turns</th>
<th>Minimum Number of Turns</th>
<th>Maximum Clearance (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>4</td>
<td>5</td>
<td>0.005</td>
</tr>
<tr>
<td>22</td>
<td>4</td>
<td>5</td>
<td>0.005</td>
</tr>
<tr>
<td>24</td>
<td>4</td>
<td>6</td>
<td>0.005</td>
</tr>
<tr>
<td>26</td>
<td>6</td>
<td>7</td>
<td>0.005</td>
</tr>
<tr>
<td>28</td>
<td>6</td>
<td>7</td>
<td>0.003</td>
</tr>
<tr>
<td>30</td>
<td>6</td>
<td>7</td>
<td>0.003</td>
</tr>
</tbody>
</table>

Table 15A

15.4.2 Insulation must be within 1/8 inch (shiner length) of the terminal. **EXCEPTION:** 28 and 30 gauge wire must have at least one full wrap of insulation before wire wrapping begins.

15.4.3 Connections not meeting the requirements of Table 15A must be soldered. **NOTE:** Soldering is not an approved repair method for 28 and 30 gauge wire wraps.

15.4.4 The wire size **SHALL NOT** exceed the gauge for which the terminal is designed to accept.
15.4.5 Wire end projections **SHALL NOT** jeopardize minimum clearances.
15.4.6 Wire-wrap connections made over solder or on terminals with solder connections shall be soldered.
15.4.7 Connections **SHALL NOT** be made with previously wrapped leads.
15.4.8 Typical wire wrap defects are shown in Figure 15-1.
15.5 Soldered Connections

15.5.1 Solder connections shall provide a secure metallic connection between the parts soldered. Excessive or insufficient solder is unacceptable. Only 60/40 rosin core solder shall be used.

15.5.2 A minimum of 1-1/4 turns shall be made on all solder wrapped connections.

15.5.3 All wired terminals with holes or notches shall have the holes or notches filled with solder.

15.5.4 Exposed un-insulated wire (shiner length) SHALL NOT exceed 1/8 inch.

15.5.5 Wire connections to a vertical #6 bay ground lead shall be wrapped with two to three closely wound turns of bare wire followed by one wrap of that wired insulation. Typically, the wire is then soldered to the vertical #6 lead. Refer to Section 18 for grounding requirements.

15.6 Miscellaneous Connections

15.6.1 Screw type terminals shall be connected as per manufacturer’s documentation. Where no documentation exists, the requirements found in GR-1275-CORE may be employed. However, under no circumstances shall a bare wire end be wrapped around the screw.

15.7 Disconnecting/Reconnecting

15.7.1 Any connector/connection being added which does not meet all requirements must be removed and a new one installed.

15.8 Splicing

15.8.1 Splicing of cable/wire is permitted if documented in the MOP.

15.8.2 If a cable is damaged, the cable must be replaced if the number of wires spliced exceeds 5% of the total conductors in that cable.

15.9 Coaxial Connections

15.9.1 Tools associated with butting, stripping, and termination of coaxial cable and connectors shall be of the type (or equivalent type) specified by the coaxial cable/connector manufacturer.

15.9.2 Coaxial cable and connectors shall be installed to manufacturer’s specifications. The Installer shall utilize the proper coaxial connector as defined by the associated unit or equipment manufacturer.

15.9.3 Re-crimping of the same coaxial connector is not permitted. If first crimp attempt is unsuccessful, connector should be discarded and a new connector installed.

15.9.4 The crimped outer sleeve shall be free of fractures.

15.9.5 The crimped outer sleeve shall be located within 1/32 inch of butting against the jack, plug, etc.

15.9.6 When terminating coaxial cable, the cable may be supported, in bundles not exceeding one inch each, on a cable tie bar to prevent stress on the connector.

15.9.8 Splicing of shielded cable is not recommended and therefore must be approved by the COEI Supervisor/VM and/or a Verizon Engineer for particular situations.

15.9.9 Coaxial testing requirements:

a. Perform end to end continuity test as follows:
   - Center pin to center pin
   - Pin depth
   - Plug body to plug body
b. Perform short/ground test at each end of cable:
   - Center pin to plug body
c. Perform a Bit Error Rate Vibration test:
   • This test is to be performed after installing and connecting coaxial cables to DSX.
   • While sending a T3 signal, with a stress pattern of $2^{23}-1$ for a minimum of 60 seconds, through the cables, and DSX connector, tap, shake and jiggle cables at connectors to ensure no errors are introduced from vibration. **Requirement for final test results is “NO TROUBLE FOUND”**.
   Any of the following test methods are acceptable:
   1. Test set to loop at DSX (preferred method)
   2. Test set to daisy chain at DSX
   3. Test set to test set

d. All test equipment and material to be tested shall be allowed to stabilize at room ambient temperature before commencing any tests.

Test records shall be turned over to Verizon at end of job (Test Record Form 6-4).

15.9.10 Coax connector slot shall be fully engaged to the locking pin of the terminating port.

15.10 Power Compression Connections

15.10.1 Only copper or tin-plated copper connectors, i.e., terminal, C-Tap, H-Tap, etc., listed by a nationally recognized testing laboratory and approved by Verizon shall be used.

15.10.2 The connector manufacturer's requirements and specifications for assembly, e.g., crimp pressure, crimp sequence, crimp tools, etc., shall be strictly adhered to.

15.10.3 Wires shall be inserted to the full depth of the lug.

15.10.4 Space between wire insulation and the body of compression connectors and/or power lugs shall be kept to a maximum 1/4 inch. If the gap exceeds 1/8 inch, transparent heat shrink must cover it. If the gap exceeds ¼ inch, the connector must be cut out and replaced to reduce the gap to no more than ¼ inch.

15.10.5 Compression **SHALL NOT** extend onto the tang area of a connector.

15.10.6 The connector must agree with the wire size.

15.10.7 To assure proper die is used with the specified connector, manufacturer's embossed coding systems shall be adhered to.

15.10.8 Heat shrink tubing is not a requirement but when utilized only transparent tubing shall be used to allow for inspection. When used, heat shrink tubing shall be heated and a minimum of 3/4 inch long. Heat shrink tubing shall cover the connector and the conductor sheathing by a minimum of 1/4 inch each. Electrical tape shall not be used on any compression connections.

15.10.9 **ONLY** two-hole, copper or tin plated copper compression lugs with inspection windows shall be used to terminate frame ground conductors.

15.10.10 CO ground DC power and return compression lugs shall have inspection windows. **EXCEPTION:** Battery cell post lugs **SHALL NOT** have inspection windows.

15.10.11 Connectors **SHALL NOT** be modified in any way.

15.10.12 For newly installed compression connectors, **ONLY** copper or tin-plated copper compression connectors shall be used. (i.e., terminal, C-Tap, H-Tap, etc.). H-Tap connectors are the preferred method.

**NOTE:** Under no circumstances shall threaded pressure mechanical connectors be used for power connections 14 AWG or heavier gauge wire.

15.10.13 Two hole compression connectors shall be secured using both holes.
15.10.14 Power and ground connections SHALL NOT be intermixed in a terminal or connector where physical contact occurs between dissimilar conductive surfaces, i.e., tinned copper and copper, unless an anti-corrosive compound, e.g., NO-OX-ID "A" SPECIAL, is applied.

15.10.15 Power connections shall be installed with manufacturer's recommended hardware and torqued to manufacturer's specification.

15.10.16 Power taps (battery and return) shall be covered with a clear crimp cover kit per manufacturer’s specifications.

15.10.17 When providing power to a shelf from a fuse panel in adjacent bay, unsheathed (single strand plastic coated) wire shall not be used. The power cable used must be a sheathed cable.

15.10.18 When terminating to a copper bar, where lugs are used on either side of the holes, the top lug and bottom lug, or front and back, must go to different network elements, unless specifically directed otherwise by engineering. E.G. the A&B feeds of a mux cannot be on the top & bottom when using the same hole.

Caution: Before making any live power connection, verify that the polarity of the components to be connected is correct. Before establishing the connection, verify that the voltage potential difference is less than the amount specified by the manufacturers of the equipment being connected.

15.11 Quick-Clip Connecting Slotted Beam Type

15.11.1 Only one wire shall be engaged in each terminal slot.

15.11.2 Do not terminate textile-insulated wire in quick-clip terminals.

15.11.3 Conductors SHALL NOT be placed on deformed terminals.

15.11.4 Previously terminated wire ends SHALL NOT be re-terminated; use new wire ends.

15.11.5 The wire gauge is limited to sizes 20 through 26 gauges.

15.11.6 Wire ends shall clear metallic parts by 1/32 inch minimum.

15.11.7 Wire ends shall protrude 1/16 inch beyond the edge of a quick-clip terminal

15.12 Mechanical Thread Pressure

15.12.1 Power and grounding cable terminals, lugs, taps, or splice connectors SHALL NOT use a mechanical - thread pressure connection. If equipment is received with mechanical threaded pressure connections, the installer shall contact the COEI Supervisor / VM.

15.13 AC Wire Connectors

15.13.1 Only AC wire connectors listed by a nationally recognized testing laboratory shall be used and installed per manufacturer’s requirements.

15.13.2 Wire connector size shall be based on the wire size and number of leads to be secured.

15.13.3 Splices shall be made in an enclosed location, i.e., junction box or conduit box and be accessible for inspection and maintenance.
15.13.4 The bared wire portion shall be completely under the wire connector and tightened so that no movement is observed.

Figure 15-1  TYPICAL WIRE WRAP CONNECTION DEFECTS
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## 16.0 Equipment Designations

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16.0 Equipment Designations

16.1 Introduction

16.1.1 Equipment Designations shall be placed in accordance with the requirements contained in this section and in any section of this IP72202. The only variance shall be for specific engineering requirements as issued by Verizon for individual applications, for example: Collocation, ADSL, etc.

16.1.2 All designations shall conform to the specific location and content information given in the job specifications, the MOP, individual application requirements, this IP72202, existing office configuration and equipment manufacturer’s drawings and documentation. See F08-023, “Central Office Equipment Labeling”.

16.2 General

16.2.1 The Installer shall be responsible for providing and/or assuring that all equipment codes and designations are applied per job specifications, drawings, and Verizon requirements.

16.2.2 Rubber stamps and lettering machines are acceptable methods for applying designations. When lettering machines are used the surface of the equipment being labeled shall be cleaned and prepped before application. Hand-drawn representations of characters ARE NOT acceptable unless authorized by Verizon.

16.2.3 Designations shall be legible, the proper color, at the location specified, and conform to the existing office designation pattern. Surface must be cleaned and unimpaired to assure permanency of designation (label).

16.2.4 Space permitting, all stenciling shall be in a horizontal orientation.

16.3 Color Codes

16.3.1 Use black on light surfaces and white on dark surfaces which ever is most legible. Black lettering on white colored label material may be used on light or dark surfaces.

16.3.2 Red shall be used at locations requiring caution notices.

16.3.3 Equipment with moveable apparatus shall be equipped with red caution notices.

16.3.4 Voltage designations, for sources that exceed 120V AC, shall be labeled with red characters (3/16 inch min) on the front or the side of the outlet indicating the voltage.

16.3.5 Black lettering on white tape shall be used when designations are required on transparent type plastic covers.

16.4 Designation Sizes

16.4.1 The installer shall use a labeling size as directed by this IP72202 so that it can be read with standard 20/20 vision without the need for magnifying devices or additional lighting.

16.5 Designation Location

16.5.1 General

16.5.1.1 Codes and designations shall be readable and not obstructed by present/future cable or equipment.

16.5.1.2 Reused equipment shall have all old designations removed before new designations are applied.

16.5.2 Battery Stand
16.5.2.1 Each Battery stand shall be labeled/stamped in plain view with the following information:
• Date Installed (1/4” min)
• Installation Companies Name (1/4” min)
• String Identification (5/8” min)
• String voltage (5/8” min)

16.5.2.2 Battery stand or cell shall be stamped per manufacturer’s requirements with the following cell information:
• Each Cell Numbered
• Temperature Reference Cell shall be stamped “TR” (5/8” min).

16.5.2.3 New Battery string identification shall follow the same naming convention as the existing battery string (e.g. Alpha or Numeric sequence) in that Central Office.

16.6 Designation Content

16.6.1 Where a designation is required, but no information can be found in the job specification, office records, or drawings, as to content, the installer shall contact COEI Supervisor/VM and/or Verizon Engineering for resolution.

16.7 Frequency of Stamping

16.7.1 Labeling will be as required by this IP72202, Job Specifications, drawings, MOP, and specific directive (e.g. CLEC, ADSL, etc).

16.8 Adhesive labels

16.8.1 Labels ordered with equipment shall be verified for accuracy and used by the installer only if the label in question is not in error and has correctly sized characters.

16.9 Examples of Required Labeling

16.9.1 The following is a list of typical designations and letter sizes that shall be labeled on equipment. This list is not all-inclusive but may be used as a guide.

• Label frames, bays, and unit positions with the identification on the front and, when space permits, rear (frames and bays; 5/8” and unit designation or positions; 3/8”). Frame identification shall be labeled on top of guardrails unless units will block the labeling. If units block visual access, the labeling shall be located on front of the guardrails. (e.g. bay label 213.01 (2=Floor, 13=Row Location, .01=Bay Location). The barcode would be 0221301. (See F08-003, Bay Naming Standard)
• Stamp/Label distributing frames with vertical numbers and shelf letters (3/8”).
• Equipment lineups shall have their end guards or end aisle bay flags labeled at both ends (5/8 min” characters) to indicate frame locations from top to bottom starting with the nearest frame location to the most distant. When a column prohibits the use of an end guard, at the end of a line-up, column shall be designated to indicate all equipment in that line-up
• Label aisle switches with a directional arrow if lights are on both sides of lineup.
• Label ac outlets with voltages greater than 120 volts (3/16”).
• Label ac outlets and light switches with lighting panel and circuit designations (1/4”).
• Label fuse panel row designations (letters and numbers) on the front and rear (3/16”).
• Label the fuse capacity on fuse panels or install color-coded fuse capacity pins (3/16”).
• Label fuse amperage and far end terminations on fuse panels (3/16”).
• Label fuse record book with the bay location (1/4”). Fill out Fuse Record Book. It must be in black ink and legible.
• Label power service cabinets with its’ name and number (5/8 min”).
• Label “DISCONNECT AC BEFORE OPENING” on trolley couplings or end caps (3/8”).
• Label “DANGER: AUTO START” designation on automatic-start machines (3/8”).
• Label connecting blocks and/or covers on distributing frames per terminated equipment [frame, bay, group, subgroup, functional, numeric, etc.] (3/16”).
• Label all removable distributing frame block covers with distributing block location.
• Label non-metallic fire retardant cable designation tags with far-end terminations on both ends of all power and return cables (3/16”). Stamping must include bay/frame, panel, fuse, load, and potential.
• Label cross-connect shelves and panels, i.e. DSX, FDF, etc., with far-end cable termination designations (3/16”).
• Label equipment bay or unit with far-end termination points, e.g., cross-connect, dc power source, fuse location, timing, alarms, etc. (3/16”).
• Label cable penetration designations on steel cover and face of sheathing (5/8”) RE: 12.3.4 for details.
• Any dedicated racking or fiber pathways shall be labeled on both stringers at 5’ intervals (5/8” letters min) i.e., DC FUSED LEADS ONLY, AC LEADS ONLY, DC UNFUSED LEADS ONLY, GROUND LEADS ONLY, POWER CABLE, FIBER OPTIC ONLY, etc.
• Label removable equipment shelf covers with relay rack and shelf designation (3/8”)
• Label fuse panel with bay and fuse designation of power source (1/4”)
• Flag type labels are to be used only when specifically requested by Verizon. If requested, Fiber Optic individual jumper or breakout fibers shall be labeled at both ends. Each flag type end label shall be labeled with both the near and far end terminations of that fiber (3/16”).
• Equipment in cabinets or cabinetized racks that have removable doors shall have their designations on both the relay rack and the door(s).
• All ground bars central to the CO Grounding System shall be stenciled as to their use (i.e.: OPGP, COGB, MFGB, CEBG, MGB etc.) RE: NOCIL 0103-13.
• Bar-coding shall be performed in accordance with asset tracking systems (using only Verizon supplied labels and templates) and local standards. Bar-coding shall be visible from the front of the bay. The bar code label is required in addition to a bay label.
• Global Positioning Satellite (GPS) conduit must be labeled as GPS every 10’ (3/8”).
• IP addresses shall NOT be labeled on NE equipment per security bulletin (2007-12010-NOS)

16.9.2 When equipment, i.e., shelf, unit, is fused from a fuse panel located in another frame, the frame and fuse location must be labeled on the equipment.

16.9.3 All far end terminations stenciled shall be directly associated per termination with their near end sources.

16.9.4 The preferred location of stenciling will be done in the following order:
1. Front of equipment
2. Side of the shelf (if front is not available)
3. Rear of equipment (if side is not available)
4. 145c Tag and/or equivalent fire-retardant tag cable (if front and rear are not available)

16.9.5 Far end termination designation stenciling shall include the identity and location information. For example: “COGB Column E3” or “RRXXXXXX.XX, panel Y, ports ZZ-ZZZ”

16.9.6 When far end terminations change, i.e., re-terminating equipment from manual DSX to electronic DSX, replacing old fuse bay with a new one, etc., all far end terminations must be re-labeled to reflect new terminations on the equipment (including 145c tags and/or equivalent fire-retardant tags when required).

16.9.7 Where permanent cable tags with near/far end terminations are provided on a job they shall be permanently affixed to the cable. Tags shall be affixed within 12” of the termination point.

16.9.8 IP (Internet Protocol) addresses shall not be stenciled on equipment.

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17.0 Power

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17.0 Power

17.1 Introduction

17.1.1 The requirements in this section are not all encompassing. It is the Installer’s responsibility to have trained personnel on site who are knowledgeable in the requirements of the NEC, OSHA, and all Federal, State and local laws, rules and regulations regarding AC power, DC power, Hazardous Materials and Safety.

17.1.2 The Installer shall conform to the requirements of the 9 Digit Engineering Practices, Division 290-299 - Central Office Power Systems / Transmission Systems / Batteries, RED160000, RED164001 and GR1502-Core. The installer on site shall be trained in the installation requirements of the equipment being installed.

17.1.3 General common systems workmanship requirements pertaining to power installations are described in the other sections of this document, i.e., ironwork, cabling, connecting, etc.

17.2 General

17.2.1 Installation procedures shall be documented in accordance with Section 6 and 7 of this IP72202.

17.2.2 All equipment installed, removed, or modified shall meet the requirements as specified in the manufacturer’s installation job documentation, all Installer’s specifications, NEC, GR-1275-CORE and this IP 72202. Any conflicts must be brought to the immediate attention of the COEI Supervisor/VM and/or Verizon Engineer for resolution.

17.2.3 The Installer shall provide, at the job site, all manufacturer installation specifications for the equipment being installed. These specifications shall be turned over to Verizon as specified in the MOP.

17.2.4 The Installer shall be responsible for the training of their personnel in procedures for safety and first aid.

17.3 Precautions

17.3.1 The Installation Supplier shall not allow installers to work on AC or DC power until they are familiar with all OSHA and local safety rules. The Installer shall enforce all safety and electrical codes, national and local.

17.3.2 The installer shall remove all exposed metallic items, (e.g.: jewelry, metal tape measures, etc.) from their person during all activities in, above, or near power equipment or sources of potential.

17.3.3 AC and DC power installation requirements:
• Ladders with metal sides are prohibited.
• Polarity shall be verified before any connection being made.
• Verify the voltage potential difference is less than the manufacturer’s requirement for the equipment being connected.
• Wrap bus bars and cover live terminals and lugs with dated rubber blankets or other materials that are not conductive.

17.3.4 The installer shall observe all OSHA Lockout and Tagout requirements.

17.4 Battery Plant

17.4.1 While cells are being moved or are in transport, battery fill and vent holes must be closed to prevent acid spills, and to comply with US DOT rules.

17.4.2 Before charging, explosion proof vents and dust caps shall be installed on the cells.
17.4.3 The Installer shall provide flame retardant neutralizing and absorbing materials sufficient to neutralize and absorb the largest cell in the work area.

17.5 **Prevention of Service Interruption or Degradation**

17.5.1 See Section 7 for specific requirements.

17.6 **Cable Hole/Opening Fire Stoppage**

17.6.1 See Section 12 for specific requirements.

17.7 **Equipment Protection**

17.7.1 Switching equipment, transport equipment, power equipment, batteries, and/or other sources of potential shall be protected during any installation activity. The method and type of protection shall be detailed in the MOP.

17.8 **Waterproof and Sealed Floors**

17.8.1 The Installer shall request at the MOP Meeting, information concerning wall/floors to be drilled in the work area. The COEI Supervisor/VM and/or Verizon Engineer shall provide details for drilling any waterproofed/sealed floor or wall.

17.9 **Assembly**

17.9.1 All power equipment fasteners shall be tight with no stripped threads. All torquing requirements shall be per the manufacturer’s specification.

17.9.2 Equipment Frameworks shall be secured to the floor per manufacturer’s requirements and this IP72202.

17.9.3 **Battery Stands/Racks**

17.9.3.1 Battery stands shall be assembled and placed per manufacturer's specifications. Battery stands shall be engineered and installed with bracing, fasteners, and attachments adequate for the seismic zone in which they are installed.

17.9.3.2 Metal stands shall be finished with an acid-resistant paint.

17.9.3.3 Shelves of metal battery stands shall be protected with a non-conductive, acid-resistant plastic/rubber liner under each tier of batteries.

17.9.3.4 Battery stands must be level in all directions. To provide stability, two or three tier stands shall be securely anchored to either the wall or floor per seismic earthquake requirements or as dictated by manufacturer’s recommendations.

17.9.3.5 Metallic battery stands and support grids shall be grounded with a No.6 AWG grounding conductor using two-hole compression connector e/w an inspection window.

17.9.3.6 The following are the minimum distances between a battery stand (wet cells) and other objects:
   a. Adjacent parallel battery stands - 30 inches apart for floors with a loading capacity of 225 lbs. /sq. ft. and 50 inches apart for floors with a loading capacity of 150 lbs. /sq. ft.
   b. Double row battery stands parallel to wall and/or columns - 30 inches apart from wall or column.
   c. Associated power bays - 30 inches apart for floors with a loading capacity of 225 lbs / sq ft and 50 inches apart for floors with a loading capacity of 150 lbs/ sq ft.

17.9.3.7 The maximum height for battery stand and batteries is 8 feet.
17.9.3.8 Battery stands should not be located in an area where the battery stand will be exposed to direct sunlight. If the location selected is exposed to sunlight, there shall be window shades to shield out sunlight. If shades are not provided, the installer shall contact the COEI Supervisor/VM and/or Verizon Engineer to have shades furnished and installed by Verizon.

17.9.3.9 Battery spill containment shall be provided in accordance with Verizon Practices, Local, State, and National Fire Codes.

17.9.4 Anchors

17.9.4.1 Anchors required for the mounting of equipment, frameworks, stands, and/or racks shall be added in accordance with IP72202, Section 11.

17.9.4.2 Battery racks do not require anchoring unless in an earthquake zone 3 or 4 (refer to Telcordia GR-1275-CORE and/or Verizon Standards for seismic zones 3 or 4 supporting requirements).

17.9.5 Bus Bars

17.9.5.1 Only copper bus bars shall be used on any new power complex installations.

17.9.5.2 Copper bus bars shall not be connected to aluminum bus bars. In cases where growth/maintenance placement is required, continue using the same type metal as previously installed. Deviations must be approved by Verizon Engineering and documented in the TEO/Work Order.

17.9.5.3 Existing aluminum bus bars SHALL NOT be tapped for fastening terminal lugs or for fastening bar to bar. Use through bolts, clamp joints, or threaded inserts for that purpose.

17.9.5.4 A metallic coating or plating is sometimes used on bus bars to reduce the resistance of the connecting joints. These contact surfaces should be cleaned with a cloth to remove grease and other foreign matter but should not be sanded or the surface otherwise scratched.

17.9.5.5 Electrical connection surfaces shall be smooth and treated with a thin coat of a non-corrosive substance, e.g. NO-OX-ID "A" SPECIAL.

17.9.5.6 The maximum spacing between bus bar supports is 6 feet.

17.9.5.7 Bus bars shall be separated from frameworks, cable rack, auxiliary framing, etc., by a minimum of 2 inches.

17.9.5.8 Sharp edges and burrs on bus bars shall be removed to insure a good electrical connection.

17.9.5.9 Bus bar supports shall be insulated. Auxiliary framing shall support the insulators or other details as provided in the bus bar plans.

17.9.5.10 Bus bar clamps are used to join bus bars together without drilling.

17.9.5.11 A locknut shall be installed on each bus bar clamp bolt.

17.9.6 Bus Bar Drop Plates, Cell Post Plates, and Cell Posts

17.9.6.1 Cable lugs connected to cell posts or post terminal-plates shall be plated copper. All other connectors and bus bar associated to battery shall be copper or clad copper.

17.9.6.2 Cable lugs to Cell post plates and Bus Bar drop plates shall be two hole crimp (compression) connectors. Lugs to Cell posts shall be one-hole crimp connectors.

17.9.6.3 Bolts, nuts, washers used to secure power connections shall match the diameter of the hole.

17.9.6.4 Cell connections require corrosion reducing coatings, torqued per cell manufacturer’s requirements.
### 17.10 Cabling

**17.10.1** Vertical and horizontal power cable runs shall be secured on cable racks no greater than 20" wide and **SHALL NOT** exceed a maximum pile-up of 7".

**17.10.2** Continuous vertical power cable racks/runs **SHALL NOT** exceed three (3) floors in length without a stress relief horizontal loop of twenty feet.

**17.10.3** Power cables leaving cable racks and supports and entering, frames, racks, and other equipment, **SHALL NOT** be unsupported for a distance greater than 2 feet for 1/0 AWG power cable or smaller. For cable sizes 2/0 AWG or greater the distance for running unsupported power cable shall not exceed three feet.

**17.10.4** Power cable (battery and battery return leads) shall be run as pairs adjacent to each other and be equipped with identification tags labeled with far end terminations.

**17.10.5** Power cables shall be run and secured on dedicated power rack from the power plant to the point of secondary distribution, e.g. BDFB, PCFD, PRTD, etc. From the secondary point of distribution, it is preferred that power cables be run and secured on dedicated power racks; however job conditions may require that cables be run with other common systems cable. When this occurs, the installer shall segregate the power cables from the common systems cables to the extent possible. Power cables from the power plant which terminate on a network element requiring above 70 amps must be run on dedicated primary power cable rack for the maximum distance that is practical and than may be run with other secondary distribution power cables.

**17.10.6** Unsecured secondary power cable battery and return leads, on a per circuit basis, run on existing panned racks must be secured to each other every six feet (minimum).

**17.10.7** Power cables shall be secured per detailed requirements in Section 13, Tables 13D and 13E.

**17.10.8** Power cable (battery and return) shall be tagged (non-metallic, fire-retardant tag) on both ends and labeled with the far-end terminations. (Conductors smaller than 16 gauge do not require tags.) Runs of intra-bay cables that have both terminations within the same bay do not require tags. Note: If 145C tags are used the metal ring must be removed from the tag and the tag is to be sewn to the cables with twine.

**17.10.9** In Siesmic Zones 3 and above, when cabling to batteries, cable strain relief shall be provided to allow for battery movement of 12 inches in any direction. Appropriately sized flex cables shall be used when terminating on the post or splice plate on the post of all batteries. This may require replacing the existing cables when replacing an existing string of batteries. The same 12 inch directional strain relief is not required for tier-to-tier battery cables.

### 17.11 Fusing and Over current Protection

**17.11.1** Fuses and circuit breakers shall be installed per manufacturer's specifications and job documentation.

**17.11.2** Fuses and circuit breakers shall be of the type, capacity, and current rating specified.

**17.11.3** Fuse and circuit breaker positions shall be designated to indicate their capacity and the equipment served. Fuse and/or circuit breaker shall also be designated with far end termination of equipment served.

**17.11.4** Cartridge type fuse ferrules, blades and the contact area of their associated clips shall be coated with a thin film of corrosion preventative compound.

**17.11.5** Dummy fuses shall be installed in all vacant fuse positions in relay rack distribution panels.

**17.11.6** Non-indicating fuses in power boards, battery distribution fuse bays, fuse holders, etc., shall have their own associated alarm pilot fuse.
17.11.7 Alarm pilot fuse positions shall be connected at the time of installation regardless of whether the associated non-indicating fuse position is fused or vacant.

17.11.8 Spare fuses shall be turned over to the Verizon representative identified in the MOP at job completion.

17.11.9 Fuse record sheets shall be provided, recorded, and placed in fuse record holder.

17.12 Connecting

17.12.1 See Section 15 for connecting methods, procedures, and requirements.

17.12.2 Connections shall be free from dirt and corrosion. A non-corrosive substance shall be applied to the contact mating areas. Connections shall be torqued to manufacturer's specifications.

17.13 Batteries

17.13.1 General

17.13.1.1 Cells of different manufacturers SHALL NOT be placed in the same string(s).

17.13.1.2 Cells from different manufacturers may be placed in parallel strings.

17.13.1.3 When replacing cells in a string, the replacing cells shall have the same ampere-hour capacity, the same number of plates, and shall be of the same manufacturer.

17.13.2 Cell Unpacking, Cleaning and Inspection

17.13.2.1 The installer shall inspect all cells upon delivery to the job site. Any defective cells shall be identified and reported to the COEI Supervisor/VM and/or Verizon engineer.

17.13.2.2 After inspection, the cells shall be wiped down per manufacturer’s installation requirements.

17.13.2.3 Containers and covers shall be free from cracks and leakage or spillage of electrolyte.

17.13.2.4 Battery racks, stands, cabinets, and miscellaneous equipment shall be clean and free from corrosion.

17.13.2.5 Anti-explosion caps shall be dry, clean, and undamaged.

17.13.3 Hardware and Accessories

17.13.3.1 All connection hardware (bolts, nuts, and washers) on cell post connections shall be stainless steel. The washer shall be placed with the rounded edge closest to the terminal post, between the head of the bolt and the connector and between the connector and the nut.

17.13.3.2 Intercell connector straps shall be lead plated copper.

17.13.4 Preparation of Cell Posts, Straps, and Plates

17.13.4.1 The battery manufacturer’s cleaning method/procedure shall be used.

17.13.4.2 Power tools shall not be used when cleaning lead plated surfaces.

17.13.4.3 The Installer shall provide equipment and protective devices for their personnel to clean lead surfaces safely.

17.13.5 Moving and Installing

17.13.5.1 Cells in a string are to be matched and dated.

17.13.5.2 Explosion proof vents with dust caps and shipping plugs shall be fitted to each cell being moved.

17.13.5.3 Use proper hoist to lift cells from shipping crates to battery stand. Do not lift by the posts.
WARNING
Lead-acid batteries generate hydrogen gas. Before batteries are moved, they should be taken off charge to vent for a minimum of 24 hours before the shipping plugs are installed and the cells moved. Precautions shall be taken to avoid electrostatic discharge (ESD) that could initiate explosions within a battery cell.

17.13.6 Cell Charging

17.13.6.1 One cell shall be selected as the "Temperature Reference Cell" within each string. The cell shall be designated "TR". The 1st and/or last cell shall not be a Temperature Reference Cell.

17.13.6.2 Temperature reference cells SHALL NOT be located at the end of a row of cells, next to a heating source, near windows, or over a working counter-cell.

17.13.6.3 When more than one string is charged in parallel, it will be necessary to select a separate temperature reference cell for each string. Record the temperature reference cell number in the appropriate box on the storage battery charge report.

17.13.6.4 Batteries shall be charged per manufacturer's specifications. Use of a temperature compensated battery charger or constantly monitoring by the Installer shall prevent overcharging of batteries.

17.13.6.5 Proper electrolyte levels are as follows:
- Maximum Level - Top of the top line
- Minimum Level - Top of the bottom line

17.13.6.6 Only on initial charge may the electrolyte level rise above the maximum level line. Electrolyte levels are pre-adjusted by the manufacturer to be between the level lines when the cells are floated per manufacturer’s specifications.

17.13.6.7 If necessary, remove excessive electrolyte and store in an approved container. Contact the Verizon Safety, Health, and Environmental organization for disposition of all electrolytes. The Installer shall note removals on the battery initial charge records.

17.13.6.8 Record the following before stopping the initial charge:
- Total hours of charge
- Temperature taken at the "temperature reference cell"
- Presence or absence of crystals for each cell

17.13.6.9 New cells should never be handled during boost charge or for 24 hours thereafter.

17.13.6.10 After a satisfactory initial charge, there should be no lead-sulfate crystals or gray coloration present on the plates or straps when examined with a flashlight. Normally only the positive strap will be accessible for examination. In some arrangements, the edges of the positive plates will also be visible. The visible positive elements shall be black or dark brown and totally free of any diamond-like crystals or gray coloration. The disappearance of crystals normally occurs in three distinct phases:
- Phase 1: Black and crystalline
- Phase 2: Gray and lightly crystalline
- Phase 3: Black or dark brown and crystal free

17.13.6.11 The disappearance of crystals or gray coloration occurs from top to bottom during initial charge. To ensure total absence of crystals or gray coloration, inspection for crystals shall be concentrated at the bottom of the positive plate vertical columns. Crystals can readily be seen on the positive plate. The flashlight is held close to the jar at an angle of approximately 45 degrees. The lead-sulfate crystals will appear as sparkling diamond-like reflecting particles or as a gray coloration.
17.13.6.12 Cells, which are not free of crystals after the initial charge, may be shorted. If some cells are still crystalline after the initial charge, proceed per manufacturer’s recommendations.

17.13.6.13 For cells shipped dry, follow the same requirements for the end of the initial charge.

17.13.6.14 Lead-acid flooded cells shall be equipped with an approved flame arrestor in the vent opening.

17.13.6.15 Vents shall be located on the aisle side.

17.13.6.16 Installed batteries shall be charged to manufacturer's specifications.

17.13.6.17 Float voltage and specific gravity shall be maintained as required by the manufacturer and/or Verizon.

17.13.6.18 Only thermometers approved for use with storage batteries shall be provided and/or used.

17.13.6.19 Batteries left on open circuit voltage, i.e. not on float or other charge, shall be kept in cold storage. Unless recharged at not more than 120-day intervals or kept in cold storage, batteries left off charge for more than 180 days WILL NOT be accepted.

17.13.7 Electrolyte

17.13.7.1 Alkaline and electrolyte solutions shall be maintained at the manufacturer's specified level.

17.13.8 Charging Records

17.13.8.1 A storage battery report must be maintained on each battery throughout the battery installation and charging phases.

17.13.8.2 Completed battery reports shall be distributed to the manufacturer and the Verizon representative as identified in the MOP.

17.13.9 String Transitions

17.13.9.1 Specific requirements for string transitions are to be negotiated between the Installer and the Verizon Engineer or Power Supervisor, and documented in the MOP.

17.13.10 Reused Batteries

17.13.10.1 Charge records shall stay with the batteries that are being relocated.

17.14 BDFB Distribution

17.14.1 Maximum discharge fuse or circuit breaker shall be 70 amperes unless approved by Verizon Engineer. When a 70A fuse is installed, the fuse position directly above must be unequipped when recommended by the Verizon engineer. If left unequipped, the vacant fuse slot shall be labeled “DO NOT Use.”

17.14.2 Before terminating a new piece of equipment to the BDFB or secondary power distribution bay providing power to transmission equipment, the installer shall verify the size of the over current protection device (i.e. fuse or circuit breaker) on the power board and the discharge load at the BDFB. If the feeder drain at the power board is over 40% of the over current protection device, the installer shall contact the COEI Supervisor/VM and/or Verizon Engineer to determine another location to terminate the circuit. In no case shall additional loads be connected to the BDFB when the drain at the power board is 50% or greater than the rated over-current protection device at the power plant unless approval is obtained from a Verizon Engineer.

17.15 AC Power & Conduit

NOTE: The installer shall adhere to all applicable national and local electrical codes.

17.15.1 Lighting fixtures and appliance outlets shall meet all National Electrical Code (NEC®) wiring requirements.
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.15.2</td>
<td>All AC conduits shall be of the size and type specified, positioned, securely fastened, and installed in accordance with specifications and drawings that meet the requirements of the NEC® and local code.</td>
</tr>
<tr>
<td>17.15.3</td>
<td>All exposed conduit ends must be closed with end caps designed for that purpose.</td>
</tr>
<tr>
<td>17.15.4</td>
<td>All unused knockouts of boxes and cabinets shall be closed with metal plugs designed for that purpose.</td>
</tr>
<tr>
<td>17.15.5</td>
<td>Conduits shall be placed so as not to block future cabling, ladders, etc.</td>
</tr>
<tr>
<td>17.15.6</td>
<td>Clearance from exhaust and steam pipes shall be maintained as specified per NEC®.</td>
</tr>
<tr>
<td>17.15.7</td>
<td>Conduits shall be appropriately grounded according to the requirements of the system that it supplies.</td>
</tr>
<tr>
<td>17.15.8</td>
<td>Conduit shall be supported at intervals of 10 feet or less and within three feet of each box, cabinet or the conduit termination when installed on building walls/surfaces. (In certain locales, these distances may be superseded by local regulation; therefore, the installer shall conform to those local regulations.) Conduit shall be supported at intervals of 6 feet or less when installed within central office ironwork arrangements. Flex conduit shall meet the same supporting requires stated in section 13 for cabling.</td>
</tr>
<tr>
<td>17.15.9</td>
<td>The use of any insulated type conduit coupling which results in an interruption of the electrical path of the conduit or raceway for any AC distribution circuit is prohibited.</td>
</tr>
<tr>
<td>17.15.10</td>
<td>The allowable number and gauge of wires in a conduit, pull box, junction box or device box shall be in accordance with the requirements of the NEC®.</td>
</tr>
<tr>
<td>17.15.11</td>
<td>Armored cable as defined by NEC® may be run unsupported three feet (maximum) in length and shall be run only in the manner shown on the equipment manufacturer’s drawings. Armored cable (AC) shall never be run on any cable rack or through the same cable hole as switchboard or power cables. When flexible raceways must be supported by cable racks, Jacketed Metal-Clad cables or jacketed metallic raceway such as Sealite® shall be used.</td>
</tr>
<tr>
<td>17.15.12</td>
<td>Setscrew or compression type fittings shall be used for conduit connections.</td>
</tr>
<tr>
<td>17.15.13</td>
<td>AC conduit routed to and within an Isolated Ground Plane shall be run in accordance with requirements of Verizon’s Grounding Standards VZ 790-700-100.</td>
</tr>
<tr>
<td>17.15.14</td>
<td>AC conduits, raceways, or wireways shall comply with the NEC® for the application and classes appropriate for the circuit and location. Rigid conduit, intermediate conduit, armored cable (see 17.15.11), electrical metallic tubing (EMT), PVC, sheet-metal raceway, or jacketed liquid-tight metallic flexible raceway shall be used for all AC distribution within an equipment area. Sealite shall not be longer then three feet above the relay rack or frame area. See GR1502 R4-7 for more information. When possible, the AC conduit/raceways should maintain the same AC configuration that exists in the CO today.</td>
</tr>
<tr>
<td>17.15.15</td>
<td>When adding branch circuits from the distribution box or extending existing circuits, verify that no Fault current on ACEG. This requirement conforms to the NEC® that allows the neutral wire to be grounded only where the service enters the building or at a separately derived Neutral system.</td>
</tr>
<tr>
<td>17.15.16</td>
<td>No wire splices are permitted within conduits. Splices may only be in authorized boxes, wireways, etc.</td>
</tr>
<tr>
<td>17.15.17</td>
<td>Wire connectors (e.g. wire nuts, etc.) shall be used on all AC wire splices. The proper size wire connector shall be installed as required by the number of conductors and the wire gauge as per NEC.</td>
</tr>
<tr>
<td>17.15.18</td>
<td>Every high-voltage circuit conductor routed by the Installer shall have each end identified (e.g. 277V AC, 480V AC, etc.).</td>
</tr>
<tr>
<td>17.15.19</td>
<td>High-voltage receptacles shall have the receptacle cover plate marked with the appropriate voltage (e.g., 277V AC, 480V AC). Label with 3/16” characters in red ink.</td>
</tr>
<tr>
<td>17.15.20</td>
<td>Conduit, lighting, and AC outlets shall be correctly positioned, installed, assembled, wired and designated as specified in the job documentation, equipment drawings, Verizon Engineering Standards and NEC®.</td>
</tr>
<tr>
<td>Clause</td>
<td>Requirement</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>17.15.21</td>
<td>Installer shall verify AC outlets have the correct polarity and are grounded.</td>
</tr>
<tr>
<td>17.15.22</td>
<td>AC conductors shall include an EG lead and be run in a continuous conduit.</td>
</tr>
<tr>
<td>17.15.23</td>
<td>Branch circuits serving telecommunications equipment shall have individual EG leads.</td>
</tr>
</tbody>
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18.0 Bonding and Grounding (Transmission / Transport Equipment Ground Plane)

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18.0 Bonding and Grounding (Transmission / Transport Equipment Ground Plane)

18.1 Introduction

Because there are two distinct grounding philosophies in the embedded base of systems and they cannot be mixed without safety and reliability degradation, adherence to these standards is mandatory.

Central offices in the fGTE sites will use the 795-805 Series of practices.
Central offices in the fBA sites will use 790-700-100.
Or also refer to: http://myedms.verizon.com/vzp/

Visit the grounding electrode splice plate, if it is stenciled OPGP (fBA) or if stenciled MGB (fGTE).

Visit the ground bar on the equipment floor: if it is stenciled COGB (fBA) or if stenciled FGB (fGTE).

Visit the cable vault if the ground bar is stenciled CEGB (fBA) or if stenciled CVGB (fGTE).

18.1.1 The workmanship requirements in this section are general in nature and not all-inclusive. Where discrepancies exist between this document and Telcordia’s GR-1275-CORE, and any other reference material this document shall prevail.

18.2 General (fBA)

18.2.1 Grounding wires SHALL NOT be used to conduct normal load currents.

18.2.2 Ground connections shall be secure and/or torqued to manufacturer's specifications.

18.2.3 Contact surfaces covered with a non-conductive coating such as paint, shall have the non-conductive coating removed in a manner to allow full metal contact with the entire surface of connector to assure a good electrical connection. Paint shall be removed so that a 1/16" of bare metal surface shall be exposed around the entire lug and in a manner as not to deform the metal surface.

18.2.4 Corrosion preventative compound, e.g., NO-OX-ID "A" SPECIAL, NO-OX, shall be applied between dissimilar metals.

18.2.5 Grounding connectors, terminated on frameworks, bus bars, power distribution panels, etc., shall be two-hole compression, tin-plated copper with inspection windows. (Framework grounds must have a lock-washer between the screw head and the connector).

18.2.6 Individual units shall be grounded to framework per manufacturer’s specifications. Individual units shall each have their own framework ground connection (Reference GR-1089 CORE, R9).

• Individual units that require a discreet ground lead connected to the framework must have an external tooth lock-washer between the screw head and the connector.

• Units requiring thread forming mounting screws must remove any paint or nonconductive coatings and establish metal-to-metal contact. These thread-forming screws must be used at all mounting positions and shall have an external tooth lock washer between the head of the screw and the equipment unit being mounted.

18.2.7 Framework grounding conductors, cabinets, and vertical framework ground risers shall be # 6 AWG copper (minimum). #6 AWG aisle or frame ground conductors must be green or marked with green tape. Covers are not required on aisle ground crimp connections in the integrated ground plane (fBA).
18.2.8 Frameworks, metallic battery stands, plug-in storage cabinets, rectifiers, engine alternators, motors/generators, commercial or emergency power devices, etc. shall be individually grounded. Daisy chaining or frame to frame connecting of these ground conductors is prohibited. Stacking or piggy-backing of ground lugs is prohibited.

18.2.9 Grounding lead/cable requires far-end termination identification at all common ground buses. Examples of common buses are Office Principal Ground Point (OPGP), Main or Supplementary Ground Bus (MGB), Central Office Ground Bar (COGB), and on leads/cables terminating on the originating end of a discharge ground bar of a power plant, GDFP, PCD or Battery Distribution Fuse Board (BDFB).

18.2.10 Grounding conductors shall be identified with non-metallic, fire-retardant tags. The tags must indicate the far end termination. The far end termination/lead number information must be located within 12 inches of the termination and be visible from the floor. When an entire ground cable can be visually identified from framework termination to far end, e.g. COGB, MAGE etc, and not readily obscured by future installation, identification tags are not required.

**NOTE:** Before installation, metal rings must be removed from fire-retardant tags. Tags shall be directly secured to conductors with twine.

18.2.11 Grounding conductors SHALL NOT be run on cable racks with any other cables.

18.2.12 Metallic clamps that encircle the conductor SHALL NOT secure grounding conductors.

18.2.13 A non-metallic, fire-retardant "DO NOT DISCONNECT" tag shall be affixed, with twine, to all Central Office Ground system terminations, i.e., Office Principal Ground Point (OPGP), Central Office Ground Bar (COGB), Vertical Equalizer, etc.

18.2.14 Grounding conductors may be secured to auxiliary framing bars, cable rack stringers or threaded rods when authorized in Verizon MOP.

18.2.15 In single story buildings, with or without a basement, (larger than 100’ x 100’ and less than 200 conductor feet from the COGB to the furthest equipment) the VE shall be a No. 4/0 AWG conductor. The COGB shall be located between the center of the building and the OPGP. In larger buildings, a 750-kcmil conductor must be used for VE. In single story buildings central office ground shall be a 750 AWG equipment ground conductor. This conductor extends earth potential from its’ appearance point within the building (Office Principal Ground Point (OPGP)) to convenient bus bar connection points that contain central office equipment requiring earth potential reference.

18.2.16 In multi-story buildings the central office ground shall be a 750 MCM equipment ground conductor. This conductor extends earth potential from its’ appearance point within the building (Office Principal Ground Point (OPGP)) to convenient bus bar connection points that contain central office equipment requiring earth potential reference.

18.2.17 Vertical Riser (Equalizer) should be installed in one continuous length without bends that violate the minimum bending radius of the cable.

18.2.18 Splices for leads to COGB from the Vertical Riser are permitted with approved “H” taps that use an irreversible compression method.

18.2.19 When adding frames to a lineup that is equipped with a frame junction pipe, the added frames shall not be grounded to the pipe. An aisle ground lead must be installed the full length of the line up from the MAGE/COGB. All new frames added to the lineup must be grounded to the new aisle ground and not the frame junction pipe (refer to VZ790-700-100 Section 5.7).

18.2.20 The vertical equalizer (or riser) shall be routed through PVC plastic or other non-metallic sleeves through floors and walls.

18.2.21 PVC sleeve must extend 4 inches above and 2 inches below floor levels.
18.2.22 Grounding conductors run through metallic conduit or sleeve (maximum 36\textdegree{} in length) shall be bonded at both ends of the conduit or sleeve per GR1275 CORE, Section 18.

18.2.23 Vertical risers shall be supported at intervals of 10 feet or less.

18.2.24 In a multi-story building the connection between the Central Office Ground Bar and the vertical riser shall be a 750 MCM cable less than 20-feet in length.

18.2.25 The maximum length between the CO ground bar and the farthest grounded equipment \textbf{SHALL NOT} exceed 200 conductor feet or extend beyond the perimeter of a square superimposed on a circle of 100-foot radius from the bus location.

18.2.26 Solder type connectors \textbf{SHALL NOT} be used on any Central Office Ground system termination, i.e., Office Principal Ground Point (OPGP), Central Office Ground Bar (COGB), Main Ground Bus (MGB), vertical equalizer, etc.

18.2.27 Tap cable between the CO Ground Bar and the vertical equalizer \textbf{SHALL NOT} have any bends that are less than 90 degrees and a minimum bending radius of 12 inches.

18.2.28 When grounding a frame equipped with a frame extender, the \#6 AWG lead between the frame and frame extender shall run straight between the uprights or as a lazy “S” between the bottom of the frame extender and the top of the frame (see Figure 18-1).

18.3 \textbf{AC Distribution System Grounding (fBA)}

18.3.1 Grounding for AC Power Circuits must conform to Verizon Practice VZ790-700-100 and the NEC®.

18.3.2 The AC Service ground electrode shall be referenced to the OPGP Bar.

18.4 \textbf{Transmission Grounding in a former GTE office (Isolated Single Point Grounded)}

18.4.1 \textbf{General (fGTE)}

18.4.1.1 Grounding wires \textbf{SHALL NOT} be used to conduct normal load currents.

18.4.1.2 Ground connections shall be secure and/or torqued to manufacturer's specifications.

18.4.1.3 Contact surfaces covered with a non-conductive coating such as paint, shall have the non-conductive coating removed in a manner to allow full metal contact with the entire surface of connector to assure a good electrical connection. Paint shall be removed so that a 1/16 “ of bare metal surface shall be exposed around the entire lug and in a manner as not to deform the metal surface.

18.4.1.4 Corrosion preventative compound, e.g., NO-OX-ID "A" SPECIAL, NO-OX, shall be applied between dissimilar metals.

18.4.1.5 Grounding connectors, terminated on frameworks, bus bars, power distribution panels, etc., shall be two-hole compression, tin-plated copper with inspection windows. (Framework grounds must have a lock-washer between the screw head and the connector).

18.4.1.6 If isolated equipment is being installed in a painted aluminum or steel rack a ground strap must be installed between the relay rack mounting face and the equipment shelf. If the relay rack/frame is aluminum and not painted the equipment is fastened directly to the rack face. In this case a separate ground strap is not required but may be installed as optional. See par. 5.4 of 795-805-073.

18.4.1.7 Isolated grounded transmission racks shall be grounded via lead 41A, 58A, & 59A back to the isolated zone of the MGB. See 795-805-071 & 795-805-073.

18.4.1.8 Frameworks, metallic battery stands, plug-in storage cabinets, rectifiers, engine alternators, motors/generators, commercial or emergency power devices, etc. shall be grounded in accordance to GTEP 795-805-071 795-805-073. Frameworks, metallic battery stands, plug-in storage cabinets, rectifiers, engine alternators, motors/generators, commercial or emergency power devices, etc. shall be
individually grounded. Daisy chaining or frame to frame connecting of these ground conductors is prohibited. Stacking or piggy-backing of ground lugs is prohibited.

18.4.1.9 All grounding leads/cables require far-end termination identification information to be labeled (both ends).

18.4.1.10 Grounding conductors shall be identified with non-metallic, fire-retardant tags/labels. The tag must be fastened, with twine, to the conductor at the ground termination and must indicate the far-end termination. Tags/labels must be within 12 inches of the termination and must be visible from the floor.

**NOTE:** Before installation, any metal rings must be removed from fire-retardant tags. Tags shall be directly secured to conductors with twine.

18.4.1.11 Grounding conductors SHALL maintain minimum separation requirements outlined in GTEPs 795-805-071 & 795-805-073.

18.4.1.12 Grounding conductors shall not be secured with metal clamps that fully encircle the cable.

18.4.1.17 Vertical Risers (Equalizers) should be installed in one continuous length without bends that violate the minimum bending radius of the cable.

18.4.1.22 Grounding conductors which must be run through metallic conduit or sleeve (maximum 36” in length) shall be bonded at both ends of the conduit or sleeve per GR1275 CORE, Section 18.

18.4.1.23 Vertical risers shall be supported at intervals of 10 feet or less.

18.4.1.24 When grounding a frame equipped with a frame extender, the #6 AWG lead between the frame and frame extender shall be strapped between the bottom of the frame extender and the top of the frame.

18.5 **AC Distribution System Grounding (fGTE)**

18.5.1 Grounding for AC Power Circuits must conform to GTEP 795-805-071 & 795-805-075.

18.6 **Isolated/SPG transmission grounding in the (fGTE) offices.**

- **Isolated Grounding** - This concept separates battery return from the equipment chassis and relay racks. The isolated single point ground concept requires that the relay racks be electrically isolated from the floor and from the superstructure. This is the preferred method for the Verizon (fGTE) footprint. All equipment capable of isolated/SPG grounding should be installed to this method beginning 1990.

- **Single Point Grounding** - A concept in which the only ground connection between the equipment and the rest of the office is a single point. The path is via lead 41A for the chassis ground on isolated transmission equipment. This concept not only reduces noise interference to the switch, but also helps improve the electrical protection of the switch.

- **Lead 41A** - Is the lead used to bond isolated relay racks and equipment chassis’s to the Master Ground Bar. Lead 41A is terminated to the isolated zone (I) of the MGB and should NEVER carry any current; it is there to provide a safety ground for the equipment chassis.

- **Integrated Grounding** - In this method there is no effort to separate the equipment and framing from incidental ground paths through concrete, building steel or similar. The chassis and + DC battery return will be common on this type equipment. This method should only be used if in fact the equipment is not capable of being isolated/single point grounded.

- **Lead 50** - Is the lead used to ground fully integrated relay racks and equipment. Lead 50 is tied to the positive side of the power board the rack is powered from and is a current carrying lead.

**Installation Details:**
It is critical to the proper implementation of central office grounding that before installing central office equipment we determine if the equipment is isolated or integrated. While usually this information is included in vendor's documentation it is often required to make the tests outlined below to make the final determination. The problem compounds because the grounding scheme of a piece of equipment can change based on what printed wiring cards are installed at any given moment.

As we install equipment in Central Offices, it is crucial that we know the status of the ground integrity of the office before we start an installation.

- **Before we start an installation, we must check for current on lead 41A.**

  When we start an installation, if there is no current on lead 41A then there must be no current on lead 41A when the installation is complete.

- **We check for current on lead 41A using a clamp-on Amp-Meter.**

  The following are standard Meters:

  - **Digisnap Amprobe ®**
  - **Fluke Model 36 ®**

  If there is current on lead 41A at the start of an installation there are a number of alternatives.

  - Troubleshoot the office to determine the source of the current and correct the trouble. (This option would be considered in a small office where the trouble could be isolated quickly.) See GTEP 205-002-501 Isolated Ground Faults -- Detection and Troubleshooting Switching and Transmission

  - Run another lead 41A for the new equipment.

  - Install and ground the equipment properly and ensure the equipment you have added has not contributed to additional current on lead 41A.

  **A quick check can be done to determine if equipment is integrated before installation:**

  - Uses an ohmmeter to test the equipment before it is installed in a relay rack and before any cards are installed in the shelf by reading between battery return and the equipment chassis.

  - If there is continuity between the chassis and + battery return you should check for a strapping option or lead tying those together. Refer to the manufacturer’s installation documentation. In many cases equipment shelves come from the factory capable of meeting both isolated and integrated specifications. If the continuity between the chassis & positive return cannot be removed then refer to Figure 2, which reflects the shelf being physically isolated from the rack.

  - If there is no continuity, the equipment **may be isolated**, but you cannot make that determination until all the cards are installed and powered up and then check lead 41A to ensure there is no current. (Reference GTE 798-805-071 Section 16.5)

  - For equipment, which may come in a rack assembly and is determined to be fully integrated after all checks are completed it will be necessary to ground these racks via the integrated method. In this case the rack is grounded via Ld 50 back to the positive return of the power source.

  **After installation**

  Check for current on lead 41A after power up and cards are slotted. If there is no current or no change in current on Ld 41A then the equipment has been grounded correctly.

  If current is present on lead 41A after installation then you will need to troubleshoot to determine which shelf or piece of equipment is the problem.
References:
GTEPS Network Services Practices
795-805-073 Central Office Grounding Transmission Equipment
795-805-071 Central Office Grounding Systems -- Engineering Applications
205-002-501 Isolated Ground Faults -- Detection and Troubleshooting
Switching and Transmission

Figure 18-1 “Lazy S” Grounding Scheme
Note: “Lazy S” can be run from bottom left of extender to top right of bay (A) or from bottom right of extender to top left of bay (B).
19.0 Isolated Ground Plane

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19.0 Isolated Ground Plane

19.1 Introduction

Because there are two distinct grounding philosophies in the embedded base of systems and they cannot be mixed without safety and reliability degradation, adherence to these standards is mandatory.

Central offices in the fGTE sites will use the 795-805 Series of practices.
Central offices in the fBA sites will use 790-700-100.
Or also refer to: http://myedms.verizon.com/vzp/

If it is unknown whether a given office is a fGTE or fBA site or if there is doubt you may access the following website using the CLLI code:

(need the CLLI code to access information) or check the following:

Visit the grounding electrode splice plate, if it is stenciled OPGP (fBA) or if stenciled MGB (fGTE).

Visit the ground bar on the equipment floor: if it is stenciled COGB (fBA) or if stenciled FGB (fGTE).

Visit the cable vault if the ground bar is stenciled CEGB (fBA) or if stenciled CVGB (fGTE).

19.1.1 The workmanship requirements in this section are general in nature and not all-inclusive. Where discrepancies exist between this document and Telcordia’s GR-1275-CORE, and any other reference material this document shall prevail.

19.2 Former GTE Offices

19.2.1 Switches in the former GTE offices will continue to be grounded in accordance with the 795-805-XXX series of practices. For information on the grounding of Transmission/Transport equipment in an fGTE office refer to Section 18 of this IP.

19.3 Former BA Offices

19.3.1 Common requirements contained herein supersede the Telcordia GR-1275-CORE and Suppliers requirements.

19.3.2 Refer to VZ 790-700-100 for detailed grounding information.

19.3.3 Isolated ground plane systems connect to the integrated (building grounding) system at a single point referred to as the main ground bus (MGB)/ground window. The ground window consists of a spherical zone extending to a radius of three feet from the midpoint of the MGB.

19.3.4 Isolated Ground Plane performance verifications and test procedures shall be strictly adhered to per VZ 790-700-100. Verification and test results shall be documented and turned over to Verizon representative at job completion as directed in the MOP.

19.3.5 The length of the bond lead from all insulated or isolated conduits and/or raceways routed through the ground window to the MGB SHALL NOT exceed three feet. ONLY ONE GROUND WINDOW shall be provided when more than one electronic/digital switch share the same power plant. The ground window shall be located on the same floor or not more than one floor away from all switching systems.

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19.4 Isolated Ground Requirements

19.4.1 The maximum distance from the MGB (Ground Window) to the furthermost point of the Isolated Ground Plane **SHALL NOT** exceed 100 feet straight-line distance.

19.4.2 When a supplementary ground bus is required, this bus shall be installed within three feet of the MGB. This bus shall connect to the MGB with either a 750 MCM copper conductor(s) or a copper bus bar(s) measuring at least 1/4 inch thick and 2 inches wide.

19.4.3 Grounded leads associated with non-switching equipment, e.g., 24, 48 volt returns that share the same power plant and/or ring tone plant, must be routed through ground window and connected to the MGB.

19.4.4 Conduits and metallic raceways connected through the isolated ground plane must be insulated by means of sheet fiber wraps equivalent to 1/32 inch around the conduit/raceway at points of support. Fiber sheets must extend past supports by 2 inches.

19.4.5 A minimum 2-inch air separation between a "member" associated with the integrated (building) ground system and a "member" of the switch isolated ground system shall be maintained.

19.4.6 Approved insulators of 2-inch air gap (minimum) shall be required to separate "members" of the integrated (building) ground system from "members" of the isolated ground system.

**NOTE:** A "MEMBER" is defined as a structural part of the whole ground system, integrated or isolated.

19.4.7 The isolated ground system associated with electronic/digital switching equipment framework shall be maintained by the use of insulators between points where metal work common to the integrated ground system must be secured to metal work common to the isolated ground system.

19.4.8 Frames and cabinets in the Isolated Ground System shall be insulated from the floor and walls.

19.4.9 Insulators shall be placed on all overhead supports such as frames, unistrut channel, fluorescent light fixtures, conduits, and power cable racks that are part of the integrated ground system and which exist within the isolated ground plane.

19.4.10 Continuity of the metallic conduit providing AC service **SHALL NOT** be broken by an air gap or insulated coupling.

19.4.11 All conduits and/or raceways entering the isolated ground plane shall be routed through the ground window. #6 AWG insulated copper (minimum) conductor is required for bonding conduits or raceways to the MGB.
19.4.12 Integrated and isolated ground conductors SHALL NOT be run in the same floor or wall penetration.

19.4.13 Elements of the integrated ground plane, i.e., auxiliary framing, cable rack, vent duct, etc., within 6 feet (see manufacturer’s requirements for allowable distance permitted between integrated and isolated planes), of an isolated electronic switch shall be bonded to the MGB with a two-hole, compression type connector and a # 6 AWG stranded copper conductor.

19.4.15 When more than one ampere of either AC or DC current is found flowing in any isolated ground plane framework ground conductor, the Installer must contact the Verizon representative identified in the MOP. It is an objective that the above circuit violations be located and corrected.

19.4.16 Metallic shields that enclose wires (coax), terminating in the isolated switch equipment, shall be grounded at the far end terminations of the cable as well as at the MGB. The methods employed to ground the shields at the MGB shall be a supplementary ground bar that permits the ground shields to be connected directly to the supplementary ground bar. The supplementary ground bar shall be located within 3 feet of the MGB and be connected to the MGB with a # 6 cable.

19.4.17 Frame ground connections shall be run as a “lazy S” towards the direction of the grounding source. Refer to VZ790-700-100.

19.5 DC Power Supplies (Isolated Ground)

19.5.1 DC power supplies serving an isolated ground plane shall be single point grounded or as otherwise prescribed in VZ790-700-100.

19.5.2 The return side (usually the positive terminal) of the principal power source shall be grounded with a separate grounding electrode at the ground window associated with the isolated ground plane.

19.5.3 External DC power sources, e.g., 130V DC, serving the isolated ground plane shall be grounded at the ground window in the same manner as the principal power source.

19.5.4 Internal DC power supplies, e.g., DC to DC converters and rectifiers, mounted in the isolated switch shall be grounded at the nearest internal reference ground bus of that switch.

19.5.5 Grounding conductors shall conduct line-to-ground fault currents only.

19.5.6 Grounding conductors shall take paths that are as direct and as straight as possible without any sudden changes in direction.

19.6 AC Power Supplies (Isolated Ground)

19.6.1 Grounding conductors and metallic raceways associated with external AC power that feeds loads within the isolated ground plane shall be routed through the ground window and connected to the MGB.

19.6.2 The ACEG conductor SHALL NOT be bonded to the neutral conductor except at the House Service Board.

19.6.3 ACEG conductors shall be insulated and identified with a green color. (These leads are not to be confused with grounding conductors.)

19.6.4 The green insulated lead enclosed in armored (BX) cable shall be used as the ACEG.
19.6.5 An ACEG conductor shall be provided, from source to load, for all AC circuits housed in raceways or conduit.

19.6.6 The ACEG and the neutral leads SHALL NOT be interrupted when receptacles are multiplied from one point to another.

19.7 Commercial AC

19.7.1 In accordance with Verizon RNSA-REQ-96-0008 “There shall be NO COMMERCIAL AC power anywhere in the Isolated Ground Plane.”
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20.0 Equipment Removals

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20.0 Equipment Removals

20.1 Introduction

20.1.1 This section provides standards for removal of telecommunications equipment, which shall apply to the Installer during removal operations. In addition, all requirements contained in this document shall apply to removal orders. Verizon may specify additional requirements at their discretion.

20.2 Definitions

20.2.1 Definitions of terms can be found in the glossary section at the end of IP72202.

20.3 General

20.3.1 The safety precautions and equipment protection information in this section are not intended to be all-inclusive. All requirements of this section shall be adhered to during any removal operations.

20.3.2 All removal operations shall be performed according to safe-time practices as detailed in the MOP.

20.4 Job Documentation

20.4.1 Documentation required for the removal of central office network equipment may include the following:
- Detailed Method of Procedure(s)
- Mechanized records
- Job specifications
- Trucking Manifest (required for hazardous waste material)
- Office drawings
- Hazardous Waste Material manifest

20.5 Hazardous Material/Waste

20.5.1 Refer to IP72202 Section 5 for further details.

20.6 Scrap Material Segregation and Disposition

20.6.1 All scrap accumulated at the job site must be disposed of no later then the TEO / WO complete date.

20.6.2 The Installer shall verify with the Verizon representative that the floor loading capacity will not be exceeded by the placement of the scrap material bins or piles of material.

20.6.3 Shipments of all Verizon owned scrap shall be documented on Verizon's Material manifest.

20.6.4 Any central office equipment to be removed for scrap must be first purged of all hazardous waste materials. The hazardous waste survey must conform to all existing local, state and federal rules and regulations concerning identification, removal, packaging, labeling, and disposition of hazardous waste materials. This includes preparation of hazardous material manifests and any shipping documents, as stipulated in the appropriate Environmental Acts, or as required by Department of Transportation regulations.

20.6.5 Verizon equipment and/or material to be scrapped shall be clearly designated by the installer per the MOP. The Installer SHALL NOT accept verbal instructions as authority to scrap equipment and/or material.

20.6.6 The Installer shall provide a list of removed material to COEI Supervisor/VM (using the Material Disposition form 6-2 or Verizon approved equivalent). This list may be the trucking manifest. Any discrepancies between the specifications and the list shall be documented.
Verizon owned scrap generated at job installation /removal sites may be segregated (at the discretion of the COEI Supervisor) to enhance the value of the scrap. Segregation requires breaking down the scrap into principal Verizon office Scrap Classifications as follows:

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<th>SCRAP CLASSIFICATION</th>
<th>SCRAP</th>
<th>DESCRIPTION</th>
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<tr>
<td>1.12</td>
<td>Circuit Boards (Non-metallic)</td>
<td>To consist of fiber or plastic circuit boards containing some copper, steel, or other contaminants; is NOT ENCASED.</td>
</tr>
<tr>
<td>1.13</td>
<td>Circuit Boards (Metallic)</td>
<td>To consist of metallic circuit boards containing high grade metal contacts. Will contain some copper steel and other contaminants; PARTIALLY ENCASED.</td>
</tr>
<tr>
<td>1.14</td>
<td>Circuit Boards (Metallic)</td>
<td>To consist of metallic circuit boards containing high grade metal contacts. Will contain some copper, steel and other contaminants; COMPLETELY ENCASED.</td>
</tr>
<tr>
<td>1.15</td>
<td>Plug-Ins</td>
<td>Various female connectors on individual housings.</td>
</tr>
<tr>
<td>1.16</td>
<td>Plug-Ins</td>
<td>Mixed male or female connectors.</td>
</tr>
<tr>
<td>1.17</td>
<td>Special Plug-Ins</td>
<td>Mixed high-grade loop type circuit cards.</td>
</tr>
<tr>
<td>1.18</td>
<td>Interrupters</td>
<td>Mixed, loose.</td>
</tr>
<tr>
<td>1.19</td>
<td>Stored Program Control System Frames</td>
<td>Assembled SPCS frames with circuit cards.</td>
</tr>
<tr>
<td>1.2</td>
<td>Copper Bearing Scrap Material Containing High Grade Metal</td>
<td>To consist of central office apparatus, piece parts under 3 feet in length containing high grade metal contacts; EXCLUDING CIRCUIT BOARDS.</td>
</tr>
<tr>
<td>2</td>
<td>Power Cable</td>
<td>Power cable with tinned and un-tinned copper conductors.</td>
</tr>
<tr>
<td>5.1</td>
<td>Miscellaneous Material</td>
<td>To include equipment such as: unit type fuse panels, coils, capacitors, telephones, resistors, terminal strips, jack bays, panel clutches, and mounting plates equipped with less than 3 relays, nonferrous telephone apparatus, and all brass and bronze articles.</td>
</tr>
<tr>
<td>5.2</td>
<td>Irony Brass</td>
<td>To include equipment such as unit type fuse panels, coils, capacitors, telephones, resistors, terminal strips, jack bays, panel clutches and mounting plates equipped with less than 3 relays.</td>
</tr>
<tr>
<td>9</td>
<td>Assembled Equipment</td>
<td>To include such items as central office switchboards, cordless switchboards, motor generator sets, ringing machines relay racks complete with iron framework over 3 feet in length and other similar equipment.</td>
</tr>
<tr>
<td>13</td>
<td>Mercury Relays, Switches And Tubes</td>
<td>All switches containing mercury from coin telephones, circuit boards, central office equipment, and mercury tubes.</td>
</tr>
<tr>
<td>17</td>
<td>Copper Bus Bar And Other Misc. Copper Material</td>
<td></td>
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<td>32</td>
<td>Batteries</td>
<td></td>
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<tr>
<td>53</td>
<td>Miscellaneous Textile And Plastic Covered Switchboard Cable</td>
<td>Miscellaneous plastic textile and rubber covered inside wiring cable, frame wire included.</td>
</tr>
</tbody>
</table>
TABLE 20A

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<th>SCRAP</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
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<td>69</td>
<td>Iron And Steel - Miscellaneous</td>
<td>Includes all kinds of scrap iron and steel, such as central office framework, cable racks, fluorescent lighting fixture and cabinets. May include small amounts of copper, aluminum or wood.</td>
</tr>
</tbody>
</table>

20.6.8 The shipment of Verizon owned scrap shall be documented on a Verizon Material Manifest.

20.6.9 Verizon scrap shall be accumulated at the job site and packaged in appropriate containers suitable for shipment. The containers of scrap must be labeled with TEO Number associated with the removal. The total number and types of containers, along with the associated job accounting information, shall be recorded on the Verizon Material Manifest to accompany shipment. The COEI Supervisor/VM and/or Verizon engineer is responsible for providing the forms and accounting information.

20.6.10 Scrap is a valuable commodity and safeguards must be taken in its handling and storage. All scrap containers shall be stored in a locked building or secured area.

20.6.11 The Installer shall notify the COEI Supervisor/VM and/or Verizon engineer when the scrap is ready for shipment. The Installer shall arrange for and coordinate transportation at the request of the COEI Supervisor / VM and/or Verizon engineer.

20.7 Office Drawings and Records

20.7.1 All affected equipment Central Office drawings must be updated.

20.8 Prevention of Service Interruption or Degradation

20.8.1 The prevention of service interruptions is the joint interest and responsibility of Verizon and the Installer. The Installer shall at all times exercise great care to prevent damage to Verizon's plant and SHALL NOT use any equipment or methods which, in the judgment of the COEI Supervisor/VM and/or Verizon engineer or operations, might endanger or interfere with service.

20.8.2 When removing equipment the installer shall adhere to all safetime guidelines.

20.9 Equipment Protection

20.9.1 Working equipment in aisles through which large objects may be moved shall be protected with rigid fire retardant masonite/plywood.

20.9.2 The Installer shall protect the surrounding live equipment area from contamination with dust and dirt.

20.9.3 Before performing any removal operation above working equipment, the Installer shall install appropriate protection to prevent falling tools or materials from damaging the working equipment. The Installer, while working near the power plant shall follow all Verizon practices to protect the power plant/BDFB i.e., rubber mats, covering material etc.

20.9.4 Wherever possible, tools, and supplies shall be unpacked and workbenches setup, outside the working equipment area, in order to reduce dirt and airborne dust particles.

20.9.5 The installer shall have, on job site, cable splicing material and tools needed to restore any damaged cables. For power cables, only copper or tinplated copper compression splices shall be used.

20.9.6 Any job that would require the severing of cables whether it is a removal, mining or a transition job the installer would be required to have on site, splicing connectors and appropriate crimping tools of
sufficient quantity and type to affect an immediate service restoration should a service carrying cable or wire be cut or broken.

20.9.7 In the event of any live cable or fiber cable/jumper cut, the installer shall cease all work and immediately contact the person identified on the emergency contact list in the MOP.

20.9.8 In the event of damage to "live" cables, frames, or other equipment which still are in use in the removal area, Installer shall suspend all work operations until repairs have been performed, except to the extent that the COEI Supervisor/VM and/or Verizon engineer, by his direction, determines that continuation of the removal effort will not impede repair operations.

20.10 Safety

20.10.1 Installer shall ensure that all employees conduct all removal operations in a safe manner. Protective equipment per OSHA and ANSI requirements such as goggles, hard hats, gloves, overalls, hard-toe shoes, breathing masks etc., shall be used while performing removal operations in the CO environment (see section 4).

20.10.2 Walking or standing on cable rack stringers, straps, panning, ducts, cables, wires or fiber optic cables/jumpers is strictly prohibited. When this overhead area is not accessible with a ladder, use caution to avoid dislodging or damaging cable.

20.10.3 Floors shall be kept clean. Loose wire, screws shall be swept up and properly disposed of to prevent injury.

20.10.4 Temporary lighting fixtures shall be properly grounded. Disconnect them from their power source when left unattended.

20.10.5 Arrangements via the MOP shall be made to eliminate or neutralize identified potential hazards.

20.10.6 Installer must assure that cable mining and equipment removals do not generate hazardous dusts containing lead, arsenic or other toxic materials. Installer must also minimize airborne dust levels that may be harmful to other central office equipment. Installer is responsible for understanding and implementing appropriate dust control methods, including applicable OSHA standards.

20.11 Cable Hole Opening/Fire-stopping

20.11.1 Cable penetrations shall be opened at the completion of all affected cable mining operations. At that time the short lengths of cable can be removed, any live cables can be re-secured and the cable penetration properly closed. This method assures Verizon that optimum safety and fire protection is maintained during the removal period. Where conditions prevent cable opening cable penetration on a one-time operation, the following procedure shall apply:

• Installer shall provide and install temporary protection to prevent material or tools from falling through the cable penetration.
• The cable penetration shall be closed to its required performance level at the end of each shift or whenever it is anticipated that no additional cable will be removed during that shift. See IP 72202 Section 12 for further details.
• Upon completion of cable removal operations, the wire basket shall be removed and the cable penetration permanently closed per IP72202 Section 12.

20.12 Tools and Supplies

20.12.1 Refer to Section 8 of this IP72202 for detailed tool requirements.

20.12.2 Material chutes at an angle of more than 45 degrees shall be enclosed and equipped with a substantial gate at or near the top end of the chute.
20.13 Equipment Alarms

20.13.1 The Installer shall inspect all alarms that may be affected by the removal activity. The alarms shall be inspected and/or tested for proper operation per MOP details.

20.14 Grounding

20.14.1 Grounding integrity shall be maintained during the entire removal process. (See VZ 790-700-100)

20.15 Equipment Removed for Reuse

20.15.1 Equipment removed for reuse shall be visually inspected before shipment to identify and document physical defects or missing parts.

20.15.2 Details concerning physical defects and or missing parts shall be communicated to the removal/receiving COEI Supervisor/VM and/or Verizon engineer before shipment. A determination by the COEI Supervisor/VM and/or Verizon engineer and/or reuse coordinator will be made as to the disposition of the equipment. The equipment may be scrapped if defects will hinder its’ working capabilities when placed into service.

20.16 DC Power Circuit and Fuse Removal

20.16.1 Before removing any fuse the installer shall use a clamp-on amp meter to verify the absence of current on the lead associated with the related fuse position.

20.16.2 The installer must verify that all DC power associated with the equipment to be removed has been powered down and/or fuses removed by Network Operations (CO Maintenance) or COEI as indicated in the MOP.

20.16.3 After the fuses are removed, wait a minimum of 48 hours before removing any equipment to allow time for customer service events/alarms in the case that working equipment was powered down. Only equipment located inside a Physical Collocation cage may be removed without waiting the minimum time period. All other types of collocation equipment (CCOE, SCOPE, Virtual Collocation, CATT, etc.,) must abide by the 48 hour wait period.

20.17 AC Circuit and Conduit Removal

20.17.1 The installer must verify that all AC feeders associated with equipment to be removed have been de-powered per the MOP requirements.

20.17.2 Verizon will operate AC circuit breakers, remove fuses, or authorize per the MOP the installer to act as their representative. If the installer is authorized to do this work, the affected circuits shall be tagged at the power source, e.g., fuse panel: AC cabinet, etc. All AC feeders shall be disconnected at their source.

20.17.3 After the fuses are removed and/or circuit breakers turned off, wait a minimum of 48 hours before removing any equipment to allow time for customer service events/alarms in the case that working equipment was powered down. Only equipment located inside a Physical Collocation cage may be removed without waiting the minimum time period. All other types of collocation equipment (CCOE, SCOPE, Virtual Collocation, CATT, etc.,) must abide by the 48 hour wait period.

20.18 Cable removal and Mining

20.18.1 Electrical or mechanical pullers SHALL NOT be used.
20.18.2 There shall not be any forcible extraction of any dead cable.

20.18.3 Cables shall only be cut with a cable cutter equipped with a cutter guard (protection ring). The following procedures shall be used (*Cable shall never be cut on the rack*):
- All dead cables shall be identified and marked at the location where a planned cut is to take place.
- The dead cables shall be pulled back off the rack to a point where the cables have been marked.
- The free end of the dead cable shall be placed through the protective ring on the cable cutter and pushed through the ring to the cutter markings. Each cable shall be cut, off the rack, at a point just below the cutting mark.

20.18.4 When cable removal and mining is to be done on equipment which may be working, the following precautions shall be taken:
- Any cable to be removed shall be tagged before disconnect.
- Concurrence from Verizon Engineer and/or CO-Operations that tagged cables is correct before disconnecting (if applicable).
- Before cutting cables, disconnect the cables and wait a minimum of 48 hours before mining any cable to allow time for customer service events/alarms in the case that a working circuit was affected. The cables must be disconnected, NOT CUT, at both the far end and at the equipment 48 hours prior to cutting cables.
- If there is an FDF appearance, and it is not possible to trace to the FDF end, disconnect only one fiber at the FDF at a time and transmit an optical signal (such as from a visible red laser) from the equipment end to the FDF to verify that the correct fiber was disconnected. Proceed in a like fashion to disconnect the second fiber and verify that the correct fiber was disconnected until all fibers to be removed have been disconnected.
- The cabling must be removed from the terminals at the far end. Cabling must be mined back as far as practical at both ends.

20.19 Units and Equipment Frame Removal

20.19.1 All floor obstructions or protrusions such as floor anchors, bolts, etc., resulting from the removal of equipment shall be removed or cut flush with floor covering. Floor coverings should be presumed to contain asbestos. In cases where Verizon Engineer can not assure that no asbestos is present, the installer shall leave anchors in place and/or cut flush with floor covering so as not to disturb floor tile. However, if this results in a safety hazard due to protrusion of anchor, the installer shall notify the COEI Supervisor/VM and/or Verizon Engineer.

20.19.2 Holes in the floor shall be filled with a Verizon (Buildings engineer) approved latex concrete material after shields and anchors are removed.

20.20 Mechanical and Crimp Type Power Connections

20.20.1 Refer to IP72202 Section 15 for further details.

20.21 Terminal Block and Circuit Removal

20.21.1 Refer to GR1275 Section 20 and the Verizon Job Contract for further details.

20.22 Appliance Outlets, Lights, Switches and Risers

20.22.1 Refer to IP72202 Section 17 for further details.

20.23 Rolling Ladders

20.23.1 Stop bolts MUST BE reinserted at appropriate locations, to prevent rolling ladders from falling and injuring personnel or damaging equipment, when any portion of the ladder track is removed.
20.24 Overhead Ironwork and Bracing

20.24.1 During removal operations, it may be necessary to temporarily support overhead ironwork. This will be required where ceiling supports have been removed. The temporary support can be accomplished by installing threaded rods and/or stanchions.

20.24.2 Refer to IP72202 Section 10 and 11 for all Ironwork and bracing requirements.

20.25 Battery Removal

20.25.1 Details of battery removals shall be recorded in the MOP.

20.25.1.1 Installer shall take care to prevent spillage of electrolyte while removing from stands and removing from building on truck. Use battery caps, do not tip battery greater than 25 degrees, use proper hoist and clamp per Manufacture instructions. For spills and/or environmental emergencies call the Verizon Environment Management Hotline 800 386-9639 #2 (for more info see IP section 5).

20.25.1.2 Installer shall ensure that all terminals of the used batteries are insulated to prevent short circuiting.

20.25.1.3 Installer shall ensure that used batteries are packaged and labeled according to the US Department of Transportation requirements.

20.25.1.4 Installer shall ensure that all Verizon batteries being sent for recycling are recorded onto Verizon Battery Shipment Control Form (Form 20-1400). Form 20-1400 can be downloaded through Verizon Forms Management in the Work Tools section of the Digital Workplace. Follow all instructions on the form. Used batteries are to be sent to a Verizon approved battery recycler. Locations of Verizon approved battery recyclers can be found on Form 20-1400.

20.25.1.5 Questions regarding hazardous materials, or hazardous or regulated waste including the recycling of Verizon batteries should be forwarded to the Regional Environmental Manager or contact Environment Management using the 24-hour Environmental Hotline 800-386-9639, Option 2.

20.26.1 Labeling

20.26.1.1 The labeling must be removed from the equipment that is at the far end terminations
# 21.0 Equipment Retired In Place (RIP)

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21.0 Equipment Retired In Place (RIP)

21.1 Introduction

21.1.1 Central office equipment may be designated Retired-in-Place (RIP) if there is no intention of reusing the equipment in its present location. The installer shall consult the TEO/WO, MOP, or specific installation instructions as to the work involved. Verbal authorizations are not permitted.

21.2 General

21.2.1 All associated records shall be changed to reflect equipment as RIP. These records may include floor plans, front equipment drawings, assignments, etc.

21.3 Equipment Retired

21.3.1 The installer shall verify that service is removed.

21.3.2 Framework/unit ground lead shall remain intact on equipment designated RIP.

21.3.3 Equipment identified as RIP shall be labeled/tagged as such (see section 16 for labeling requirements).

21.3.4 All far end terminations must be tagged/labeled to reflect equipment RIP (see section 16 for labeling requirements).

21.3.5 All cables terminating on RIP equipment must be removed or cut.

21.4 Power distribution bay

21.4.1 Dummy fuses shall be substituted for removed fuses.

21.4.2 Near end and far end power cable terminations shall be removed per MOP requirements.

21.4.3 The power cable ends shall be insulated.

21.4.4 Verizon will be responsible for removing all fuses before a cable cut.

21.5 Vacated terminal strips

21.5.1 Terminal strips vacated due to retired equipment will be left in place unless otherwise specified in the TEO/WO.

21.6 Distributing frames

21.6.1 Cable requiring cutting at the distribution frame shall be mined up to the cable rack. The cut cable ends shall be insulated.

21.7 Office alarms

21.7.1 The installer to ensure office integrity shall verify functionality of office alarms.

21.8 Hazardous materials

21.8.1 See IP72202 Section 5.
21.9 Circuit packs

21.9.1 Verizon will be responsible for removing circuit packs from equipment designated RIP.

21.10 Documentation

21.10.1 All office records shall indicate the equipment as RIP.
22.0 Fiber Optic Generic Requirements - Central Office Installation

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<td>Permissible Fiber Bend Radius</td>
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22.0 Fiber Optic Generic Requirements - Central Office Installation

22.1 Minimum Bend Radius

22.1.1 Fiber optic assemblies shall employ a bend radius of no less than the manufacturer’s installed minimum bend radius rating. The installed minimum bend radius rating specification of a fiber optic assembly equates to the smallest bend radius to which that fiber optic assembly may be bent without adversely affecting optical transmission. Employing a bend radius to anything less than the minimum bend radius rating will result in detrimental impact upon fiber optic transmission through that fiber optic assembly. See 2006-506F-COE for more information on minimum bend radius.

22.1.2 Fiber optic jumpers shall employ a bend radius of no less than 1-1/2-inch. Note: Fiber Distribution Frames (FDFs) utilize 1 ½ inch bend radius controls to aid in preventing jumpers from employing a bend radius of less than 1 ½ inch at all turns. Fiber Protection Systems (FPSs) utilize 2inch bend radius controls that will also aid in preventing a fiber optic jumper from employing a bend radius of less than 1 ½ inch as they would be prevented from bend to less than 2 inches around any turn within a FPS.

22.1.3 Fiber optic cables shall employ a bend radius of no less than the manufacturer’s installed minimum bend radius rating which is typically a minimum of 10 times the diameter of the cable.

22.2 General

22.2.1 Fiber optic jumpers and cables SHALL NOT be pulled, twisted, or kinked.

22.2.2 Fiber optic cables, jumpers or tie pairs shall be tested by the Installer to meet or exceed current Verizon operating standards either found below or in NPG-99-001 depending on the most current requirements (except for turnkey installations):

The COEI Bulletins F07-004, F05-008, and F05-009 show the Verizon approved method for cleaning, testing and recording of fiber optic cables, jumpers and ties pairs. Optical return loss (ORL) shall be measured at 1310 and 1550 nanometers (nm). This includes the use of a video scope to verify the connector end is clean and not damaged prior to making a connection. This information shall be recorded in the MOP Test Record at the job site and turned over to Verizon at job completion.

22.2.3 All test equipment and material to be tested shall be allowed to stabilize at room ambient temperature before commencing any tests.

22.2.4 Test/data results, electronic, or hard copy, for fiber optic cables/jumpers provided by the manufacturer shall be turned over to Verizon at job completion in addition to the installation test results. Additional test and turn-up testing may be required for specific equipment and may be done jointly with Verizon. All testing shall be documented and turned over at the EOJ.

22.2.5 Fiber optic assemblies to transmit 1310 nm optical signal shall be a minimum of 2.0mm or 6 ½ feet in length in order to avoid intermodal noise. Fiber optic assemblies to transmit higher wavelength optical signals do not fall under this restriction.

22.2.6 Fiber Optic Connectors must be factory installed on cables and jumpers by an approved VZ Fiber Optic Supplier. Optical connectors and / or pigtails shall not be installed in the field unless they are to repair an in-place damaged fiber. (see F08-019) Exception: Single ended cables may be provided as a means of terminating Outside Plant cables at the FDF. In such cases, the connectorized end is terminated in a Fiber Distribution Panel at the FDF & the raw end is spliced to an OSP fiber cable at the designated splice area.
22.2.7 Single fiber breakouts **SHALL NOT** consist of Type II Media (900µm) & Type III Media (250µm) as defined by the GR-326 and **SHALL** be up-jacketed to a minimum of 1.6 mm diameter with dielectric strength members and capable of a sustained tensile load of 10 lbf or more.

**Exception:** Single fiber breakouts consisting of 900 µm buffered fiber without strength members are only allowable to be factory pre-terminated to the rear of a fiber distribution panel such that they would not be subjected to movement or maintenance activity.

22.2.8 Single fiber breakout leg lengths terminating at the rear (inter-connect) side of a Verizon approved FDF (Fiber Distribution Frame) panel shall conform to the routing requirements those panels which are as follows each with a -0.0 inch +3.0 inch tolerance:

<table>
<thead>
<tr>
<th>VZ Approved FDF Panel Type</th>
<th>Breakout Leg Length with -0.0 / +3.0 inch tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>NG3 Standard panel</td>
<td>60 inches</td>
</tr>
<tr>
<td>NG3 VAM panel (used exclusively for video)</td>
<td>45 inches</td>
</tr>
<tr>
<td>72 position LGX panel</td>
<td>25 inches</td>
</tr>
<tr>
<td>144 position LGX panel</td>
<td>25 inches</td>
</tr>
<tr>
<td>144 position LGX panel equipped with WDM Combiner Modules</td>
<td>25 inches</td>
</tr>
</tbody>
</table>

Note: The breakout lengths will be updated in issue 4 of the 2004-045-COE

22.3 **Fiber Optic Pathways**

22.3.1 Fiber optic jumpers shall be run in Verizon approved fiber optic routing and storage systems.

22.3.2 Fiber optic pathways shall be dedicated to the placement of fiber optics only and shall be clearly labeled in accordance with Section 16 of this IP72202 to this effect.

22.3.3 Fiber optic cables shall be segregated from other types of cable. Fiber optic cable shall be secured on dedicated cable rack without pans or horns. When brackets are used to support fiber cable they must be dedicated to fiber optic only and must not contain any fiber optic assemblies that can not meet the minimum bend radius requirements if being placed there. VZ approved fiber optic assemblies with fiber counts of 4 or more may be placed upon dedicated fiber cable rack.

22.3.4 Fiber optic jumpers shall be placed as either cross connects upon an FDF or within an enclosed fiber optic pathway (fiber protection system).
22.3.5 There may be system designs per manufacturer’s specifications that dictate alternate placement of fiber optic jumpers other than within an enclosed pathway. These would be detailed with equipment specific documentation such as an M&P or T-BASD.

22.3.6 Split duct tubing may be used between adjacent bays, for intrabay cabling, or where special circumstances exist (i.e. an M&P or T-BASD). Special circumstances would require approval from Verizon Engineering.

22.3.7 Split duct tubing shall not be used in overhead cable racks. Spiral wrap shall not be used in any circumstance.

22.3.8 Fiber protection systems must be aligned and secured and have all sharp edges and burrs removed.

22.3.9 All shavings must be removed from both inside and outside the fiber protection system.

22.3.10 Fiber protection systems shall be installed per job specifications, drawings, and manufacturer’s requirements.

22.3.11 Where fiber optic cables may sag between the cable racking straps, twine shall be used between the straps to support the fiber optic cable.

22.3.12 Fiber optic cable and SHALL be segregated and protected when routed through floor or wall penetrations with other cable types, i.e., power, switchboard, ABAM, etc.

22.3.13 No fiber jumper or cable with a minimum bend radius rating exceeding 2 inches shall be placed within a fiber protection system. That currently equates to an assembly with a maximum number of fibers within a sheath of no more than four fibers, a quad fiber, in a FPS where the FPS is 4 inches or larger. This is because larger FPSs may still only have a 2 inch bend radius.

22.3.14 A fiber optic cable with a minimum bend radius rating exceeding 2 inches may be placed within a straight section of vertical fiber protection installed upon a bay in which the paths for the breakouts legs of the assembly are within the straight piece of vertical ductwork with individual breakout fibers dressed horizontally out of the vertical fiber duct. This is OK because the cable itself would not incur a bend within the ductwork.

22.3.15 Slack storage for fiber optic assemblies shall not be accomplished within a 2x2 fiber duct. Fiber jumpers shall not be looped in a 2X2 FPS. Fiber duct with at least one dimension at 4” must be available to support storage of slack. See 2004-045-COE or 2006-506F-COE for more on Fiber Protection Systems.
22.4 Securing Fiber Optic Cable

22.4.1 Fiber optic cable shall be secured to cable racking, brackets, framework details, etc. by the following method:

When twine is used to secure fiber optic cable, the twine SHALL NOT come into contact with any type of fiber cable. Sheet fiber wraps equivalent to 1/32 inch shall be used to prevent such contact. Under no circumstance shall the sewing stitch be so tight as to deform the sheet fiber or cable jacket. Fiber optic cable shall be secured every third strap (i.e. skip two straps) on horizontal runs, except at turns, where the cable shall be sewn at intervals that will insure the cables retain their positions. Fiber optic cables shall be sewn to every strap on vertical runs. If panned rack or grid system must be used due to existing conditions, bundle fiber every 5-6 feet with sheet fiber and twine.

22.4.2 Nylon ties shall not be used to secure fiber optic jumpers or cable.

22.4.3 See F08-024, “Fiber Handling, Routing, and Securing”.

22.5 Physical Protection of Fiber Optic Cable and Intrabay Breakout Cable

22.5.1 When running fiber optic jumpers/cables equipped with optical connectors, the connector must be covered with a dust cap to prevent damage and contamination.
22.5.2 Excessive slack (slack not to exceed 10 percent or 10 feet, whichever is smaller, of the required jumper length) in fiber optic jumpers or cables shall be avoided. When unavoidable, the slack for fiber optic jumpers shall be stored in the slack storage area provided in the fiber protection system or storage shelf. When unavoidable, the slack for fiber optic cable shall be neatly stored on dedicated fiber optic cable rack without exceeding the minimum bending radius of the cable. See 2004-045-COE or 2006-506F-COE for more on slack.

22.5.3 Fiber optic cable shall be routed through floor or wall penetrations in accordance with the requirements found in Section 12 of this IP72202.

22.5.4 Fiber optic jumpers shall be routed loose without sewing or tying. When it is necessary to band fiber optic jumpers (in order to hold them in place) they shall be taped to adjacent jumpers with two layers of electrical tape, secured using 1/32" fiber paper and twine (as described in 22.4.1) or a Verizon approved Velcro strap may be used. Alternatively, banded by first wrapping with sheet fiber equivalent to 1/32 inch and then banded.

22.5.5 All unterminated fiber optic adaptors upon an FDF shelf or upon an optical device possessing the possibility of optical transmission at a power level in excess of +16db must have terminator plugs placed upon them. (See engineering & Planning Support Flash 2006-12345701-COE)

22.5.6 Fibers running down a Bay/Frame/Cabinet shall be routed per Verizon Specifications for example T base drawings, planning documentation, and/or COE documentation.

22.6 Bonding /Grounding

22.6.1 Outside plant cable containing a metallic sheath must be bonded/grounded per the NEC® guidelines as close as possible to the Cable Entrance Facility (CEF).

22.7 Corrugated Inner duct

22.7.1 Outside Plant inner duct is considered the least desirable option for fiber optic cable/jumper protection inside the Central Office. If Inner duct is used, it shall be rated at least at 28% oxygen index or UL 94V-1 or better. Corrugated inner duct shall not be used by COEI in the central office.

22.8 Cable Splicing

22.8.1 Outside plant fiber optic cable is not fire retardant and SHALL NOT extend past the cable entrance facility (CEF) or cable vault unless placed in a non-flammable conduit. The outside plant cable shall be spliced to a fire-retardant cable within fifty feet of the building entrance or as close as possible unless placed in non-flammable conduit. See 2004-045-COE or 2006-506F-COE for more on splicing.

22.9 Connector Cleaning

22.9.1 COEI Bulletin F07-004 shall be followed for the ICIC (Inspect, Clean, Inspect, Connect)

22.9.2 Each time a fiber optic connector or the dust cap is removed it shall be considered dirty and must be cleaned using a Verizon approved method per 22.2.2.

22.10 Labeling

22.10.1 A flag type or UL969 rated label shall only be used where authorized by Verizon. See 2004-045-COE or 2006-506F-COE for more on fiber labeling.
Figure 22-1: Permissible fiber bend radius.
23.0 Installer Skill Level Assessment

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23.0 Installer Skill Level Assessment

23.1 Installer Skill Level Assessment

23.1.1 Refer to Telcordia GR-1275-CORE Section 23 for specific requirements.

Installation supplier shall provide documented verification of skill level per installer upon request of Verizon.
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24.0 Raised Floor

24.1.1 Refer to Telcordia GR-1275-CORE Section 24 for specific requirements.
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25.0 Video Hub Office

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25.0 Video Hub Office

25.1 Introduction

25.1.1 Verizon has designated several sites as Video Hub Offices (VHOs), Super Head Ends (SHEs), and Mini Head Ends (MHEs). In this IP, the term VHO will refer to VHOs, SHEs and MHEs, unless otherwise designated. The equipment at these sites may be installed with standards that differ from that of the legacy telecommunications equipment.

25.1.2 Equipment that is designated as VHO Equipment must be installed per the GR1275 and IP72202 unless designated as an exception.

25.1.3 Cell phones shall be powered off in a video office. (See section 2.11.6 of this IP72202)

25.2 Exceptions:

25.2.2 VHO equipment shall comply with Verizon NEBS requirements. A copy of these requirements can be found in Verizon’s Technical Purchasing Requirement Document, VZ.TPR.9203 (http://www.verizonnebs.com/TPRs/VZ-TPR-9203.pdf).

25.2.3 Aluminum cable racking may be substituted for steel except for in earthquake zones 3 or 4. Aluminum cable racking must be installed per manufacturer’s requirements with regards to support, and cable pile-up.

25.2.4 Top supports for cabinets may be eliminated if cable racking is secured to and is perpendicular to the cabinets to form a square. (See figure 25.1)

25.2.5 Bar-coding of video equipment is required.

25.3.1 Raised Floor:

25.3.1 If the VHO is installed in a raised floor environment, the GR1275 section 24 must be adhered to.

25.4.1 Cabling and Wiring:

25.4.2 Verizon approved Velcro straps may be used to dress cables within the cabinets. The Velcro straps must be rated UL 94 V-0 as determined by UL Standard 94 or rated UL 94 V-1 and have an oxygen rating index of 28% or greater as determined by ASTM Standard D2863-77.

25.4.3 Nylon cable ties shall not be used to secure power cable.

25.4.4 If nylon cable ties are used, e.g. for CAT 6 or coax, they must be installed as per GR 1275.

25.5.1 Fiber:

25.5.2 Fiber Cable must be run on a separate cable rack and secured per section 22.4.1. Fiber jumpers must be run in a Fiber Protection System (FPS).
25.5.3 When Twine is used to secure fiber optic cable. The twine SHALL NOT come into contact with the cable. Sheet fiber wraps equivalent to 1/32 inch shall be used to prevent such contact. Under no circumstance shall the sewing stitch be so tight as to deform the sheet fiber or cable jacket. Fiber optic cable shall be secured every third strap on horizontal runs, except at turns, where the cable shall be sewn at intervals that will insure the cables retain their positions. Fiber optic cables shall be sewn to every strap on vertical runs.

25.6.1 Coax:

25.6.2 Sheet fiber protection is not required for securing coaxial cable, which has a hard dielectric material. The twine or nylon tie shall not be tightened so as to deform the cable. The stitch or nylon tie shall be loose enough to allow movement of the cable.

25.7.1 Power:

25.7.2 Power cable is to be segregated from other cables.

25.8.1 Designations:

25.8.2 The end cabinets in the line-up must have all of the equipment frames labeled on the cabinets, starting top to bottom with the closest cabinet at the top.

25.9.1 Grounding:

25.9.2 If the cabinets are equipped with a ground bar, the 6 AWG Aisle Ground shall be terminated directly to the cabinet ground bar. The cabinet shall then be terminated to the ground bar, using 6 AWG copper using a 2 hole lugs with a compression crimp and inspection windows. A dremel or equivalent shall be used to remove paint from the cabinet to ensure metal-to-metal contact. A minimum of 1/16 inch bare metal surface shall be visible around the lug. A corrosion prevention compound, e.g. NO-OX, shall be applied between dissimilar metals i.e. the lug and cabinet.

25.9.3 Chassis grounds shall be terminated to the frame and may use single hole lugs.

25.9.4 The 6 AWG Frame Aisle Ground Conductor of each aisle shall be crimped to a 1/0 AWG Main Aisle Ground Conductor.

25.9.5 Daisy chaining and stacking (piggy backing) of ground lugs is prohibited.

25.9.6 Sections of cable racking in a VHO shall be electrically connected via bonding jumpers. The section of cable racking closest to the MGB shall be grounded to the MGB via a 6 AWG conductor, with a two-hole lug and an inspection window.
Figure 25.1 Cross Aisle Bracing
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REFERENCES

1. 06-220-100-300, Network Maintenance Window
2. 795-805 Series of fGTE Grounding Requirements, Verizon
4. VZ 790-500-200, AC Requirements, Verizon
5. VZ 293-100-000, DC Requirements, Verizon
6. VZ 790-900-100, ESD Requirements, Verizon
7. GR-1089-CORE, Electromagnetic Compatibility & Electrical Safety, Telcordia
10. GR-2981-CORE, Quality Program Analysis for Telecommunications Engineering & Installation Suppliers, Telcordia
11. GR-63-CORE, Network Equipment Building System, NEBS, Telcordia
12. IP72013, Central Office Engineering Standards, Verizon
13. IP72008, Central Office Record Controls and Standards
15. NPG-99-001, Fiber
16. RED072001, Fire Stopping
17. RNSA-95-0003, Verizon NEBS Requirements
18. RNSA-REQ-96-0008, Stored Program Controlled Switches (SPCS) - No Commercial AC Power in Equipment Framework Within Isolated Ground Plane
19. TR-TSY-00020, Generic Specifications for Optical Fiber and Optical Fiber Cable, Telcordia
20. TR-NWT-000295, Isolated Ground Planes, Telcordia
21. TL9000, Quality Management Systems
22. Safetime Practice, Verizon
23. VZ790-700-100, Grounding Requirements, Verizon
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ACRONYMS

ABAM   Multiple pair cable with foil type (non-braided) shield
AC     Alternating Current
ACEG   Alternating Current Equipment Ground
ANSI   American National Standards Institute
ARMD   Armored Cable
ASTM   American Society for Testing and Materials
AWG    American Wire Gauge
BDCBB  Battery Distribution Circuit Breaker Board
BDFB   Battery Distribution Fuse Board
BX     Form of armored cable, used for AC service, where armor is flexible
CEF    Cable Entrance Facility
CEV    Controlled Environmental Vault
CFR    Code of Federal Regulations
CLEC   Collocated Local Exchange Carrier
CLEI   Common Language Equipment Identifier
CLLI   Common Language Location Identifier
CO     Central Office
COEI   Central Office Equipment Installation
COGB   Central Office Ground Bar
DC     Direct Current
DSX    Digital Cross-connect
EAO    Environmental Affairs Organization
EDSX   Electronic Digital Cross-connect
EG     Equipment Ground
EI     Equipment Installation
eMOP   electronic Method of Procedure
EMT    Electrical metallic tubing
EOJ    End of Job
ESD    Electrostatic Discharge
ESS    Electronic Switching System
fBA    Formerly Bell Atlantic and NYNEX
FCC    Federal Communications Commission
FDF    Fiber Distributing Frame
fGTE   Formerly GTE
GMOP   General Method of Procedure
HEPA   High Efficiency Particulate Arrestor Filter
HVAC   Heating, Ventilation and Air Conditioning
IP     Information Publication
<table>
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<th>Acronym</th>
<th>Definition</th>
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<tr>
<td>KVA</td>
<td>Kilovolt Amps</td>
</tr>
<tr>
<td>MCM (KCM)</td>
<td>1,000 Circular Mill</td>
</tr>
<tr>
<td>MDF</td>
<td>Main Distributing Frame</td>
</tr>
<tr>
<td>MGB</td>
<td>Main Ground Bus (fBA)</td>
</tr>
<tr>
<td>MGB</td>
<td>Master Ground Bar (fGTE)</td>
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<td>MOP</td>
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<td>Main Power Bay</td>
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<td>MSDS</td>
<td>Material Safety Data Sheet</td>
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<tr>
<td>NEBS</td>
<td>Network Equipment Building System, GR-63-CORE, Telcordia</td>
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<tr>
<td>NEC</td>
<td>National Electric Code</td>
</tr>
<tr>
<td>NESC</td>
<td>National Electrical Safety Code</td>
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<tr>
<td>VENUE</td>
<td>fBA - North’s Mechanized Record Keeping System</td>
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<tr>
<td>NOC</td>
<td>Network Operations Center</td>
</tr>
<tr>
<td>NO-OX</td>
<td>Anti-corrosive Compound</td>
</tr>
<tr>
<td>OCEF</td>
<td>Optical Cable Entrance Facility</td>
</tr>
<tr>
<td>OCFR</td>
<td>Optical Cable Rearrangement Facility</td>
</tr>
<tr>
<td>OSHA</td>
<td>Occupational Safety and Health Act</td>
</tr>
<tr>
<td>OPGP</td>
<td>Office Principal Ground Point (fBA)</td>
</tr>
<tr>
<td>PCB</td>
<td>Polychlorinated Biphenyls</td>
</tr>
<tr>
<td>PDC</td>
<td>Power Distribution Cabinet</td>
</tr>
<tr>
<td>PDU</td>
<td>Power Distribution Unit</td>
</tr>
<tr>
<td>PDSC</td>
<td>Power Distribution Service Cabinet</td>
</tr>
<tr>
<td>PSI</td>
<td>Pounds per Square Inch</td>
</tr>
<tr>
<td>PVC</td>
<td>Polyvinyl Chloride</td>
</tr>
<tr>
<td>RIP</td>
<td>Retired In Place</td>
</tr>
<tr>
<td>SCC</td>
<td>Switching Control Center</td>
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<tr>
<td>SME</td>
<td>Subject Matter Expert</td>
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<tr>
<td>TEIU</td>
<td>Telephone Equipment Inventory Update</td>
</tr>
<tr>
<td>TEO</td>
<td>Telephone Equipment Order</td>
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<tr>
<td>TEOT</td>
<td>Telephone Equipment Order Tracker</td>
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<tr>
<td>TRCC</td>
<td>T-Carrier Restoration Control Center</td>
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<td>UPS</td>
<td>Uninterrupted Power Supply</td>
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<tr>
<td>VESDA</td>
<td>Very Early Smoke Detector</td>
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<tr>
<td>VZ</td>
<td>Verizon</td>
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<tr>
<td>WO</td>
<td>Work Order</td>
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GLOSSARY

A
ABAM Cable — Multiple pair cable with a foil type (non-braided) shield.
AC — Alternating Current
ALTERNATING CURRENT EQUIPMENT GROUND (ACEG) — Alternating Current Equipment Ground used to provide fault current return path for faults to ground in A.C. power systems.
ANCHOR BOLTS — Fasteners that hold central office equipment to the floor.
APPLIANCE OUTLETS — Alternating current outlets (usually frame mounted, nominally 120 volts AC, 60 hertz)
ARMORED CABLE — Cable with outer metallic flexible protective casing (example: BX cable).
AUXILIARY FRAMING — Framing channels, in a grid arrangement, consisting of primary and secondary level structures. These structures are used to support cable racks, equipment frames, ladder tracks, ground pipes, etc.
AWG — American Wire Gauge A standard for measuring the wire size.

B
BACK PLANE — A printed circuit assembly on the rear of circuit pack shelves where connectors or wiring is terminated. Circuit boards usually plug into the back plane.
BANDING CABLE — The putting together of multiple cables into one bundle.
BATTERY — A group of cells connected together to furnish current by conversion of chemical action into electrical energy.
BATTERY DISTRIBUTION CIRCUIT BREAKER BOARD (BDCBB) - Secondary distribution point for DC power. Associated circuit breakers are located at this point.
BATTERY DISTRIBUTION FUSE BAY (BDFB) — Secondary distribution point for DC power. Associated fuses are located at this point.
BATTERY RETURN CONDUCTOR — The return conductor (usually the positive side of the supply) of a -48 volt or -24 volt plant.
BAY — A unit, also known as a relay rack, into which central office equipment is mounted.
BENDING RADIUS — A measure of the turning of a cable. The radius of a circle of which the arc of a bend follows. The radius is always measured on the inside of the bend.
BONDED — The permanent joining of metallic parts or conductors to form an electrical conductive path that will assure electrical continuity and the capacity to conduct safely any current likely to be imposed.
BRAIDED CABLE — Cable made in the form of a braid that is generally used for grounding.
BRACES/BRACING — That which is used to add rigidity to the auxiliary framing, cable racks, etc. Typically column bracing or a diagonal member which is used to prevent swaying or whipping.
BREAKOUT CABLE - Fiber jumpers
BUTTING — The stripping away of the cable sheathing exposing the inner conductors of the cable.
BX CABLE — A form of armored cable, used for AC service, where the armor is flexible.

C
CABINETS — Framework enclosed with a top, sides, front and rear doors. Cabinets can contain equipment mounted on pre-drilled and taped side rails.
CABLE — A number of insulated conductors assembled in a compact form and covered by a flexible, waterproof protective sheath.
CABLE BINDER — A sector division within a cable, dividing that cable into groups of conductors.
CABLE BUTT — The place where the cable sheath is cut, secured and stripped, exposing the individual wires that will be fanned out and connected.
CABLE ENTRANCE FACILITY — Also may be known as the Cable Vault and is the entrance of subscriber, trunk and fiber optic cables to the facility. The CEF is usually located in the basement of the building; however, it may be located on the first floor near the Main Distributing Frame.
CABLE FANNING — The process of bringing the wires from the butt end of a cable into position to be placed through a fanning strip to a terminal strip or apparatus, or where no fanning strip is provided, the loose wire shall be stitched with break-out points for individual leads to be connected to terminals or apparatus.

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CABLE FORMING — The process of forming cable wiring horizontally or vertically to conform to the arrangement of the associated apparatus. Breakout points will be where skinners are needed to connect to apparatus or terminals.

CABLE HOLE -- An opening through which cables are run. This opening can be in a floor, ceiling, or wall. In most cases cable racks are run to these structures.

CABLE RACK — Metallic structure, in a ladder configuration, on which cables are run.

CABLE RACK STRAPS - metal rungs which support cable located between cable rack stringers which are usually 9 inches apart on center.

CABLE RACK STRINGERS - metal rails on both sides of the cable rack. Generally there are two types: Solid and Tubular.

CABLE ROUTING — The method of running cable from one piece of equipment to another and generally supported by cable racks.

CABLE RUNNING TAGS --- Temporary tags used to reflect terminations, near and far end, for cables being routed. These tags are to be removed before the End of Job walkthrough.

CABLE SECURING — The method of keeping cables or wires fastened to mounting brackets or cable racks in a neat organized fashion.

CABLE SLOT — An elongated opening through which cables are run. These openings can be in the floor, ceiling, or walls, and are usually applied to main distributing frames and secondary power distributing points.

CEILING INSERT — A threaded sleeve used as a point of attachment at the ceiling of a room or building for rods, braces, or other attachments.

CELL — A single containment of electrolyte and lead plates. Individual cells connected in series make up the central office battery supply.

CELL POST PLATES — A flat plate bolted to the first and last cell in a battery string and is used to connect battery and battery return cables to bus bars.

CENTRAL OFFICE (CO) — A location where Switching, Transmission, and Power equipment that provide telephone service is centralized.

Central Office Equipment Installation (COEI) Supervisor -- Central point of contact for all Central Office installations issues. Primarily responsible for assuring quality and timely installs by internal and external workforces.

CENTRAL OFFICE GROUND (CO GRD) — This is a system of conductors designed to provide a low impedance reference to the building's Office Principal Ground Point (OPGP). The system consists primarily of a vertical equalizer, CO GRD buses, and horizontal conductors. The system provides ground reference for frames and power supplies.

CENTRAL OFFICE GROUND BUS (CO GRD BUS) — A Central Office Bus that references the principal ground point through the vertical equalizer. Usually, one of these buses is provided on each floor to permit the grounding of frames and power supplies as required. Larger buildings may have more than one of these buses.

CIRCUIT — A group of electronic components and their interconnections.

CIRCUIT BREAKER — A mechanically resettable unit that disconnects a circuit at a specifically defined current.

CLEI™ — Common Language Equipment Identification: code used to identify equipment.

CLLI™ — Common Language Location Identifier: code used to identify a building or site.

COAXIAL CABLE — A type of cable used for high frequency transmission. It consists of a central conductor surrounded by insulation. This in turn is surrounded by a circular outer conductor.

COMMON SYSTEMS — The equipment that is common to other specific equipment in a telecommunication carrier’s facility. Examples of common equipment are alarm systems, rectifiers or power sources.

CON NUMBER — Control Order Number that identifies a specific job.

CONDUCTOR — A constrained medium for the transfer of electrical charges. Examples of grounding conductors are the Vertical Equalizer, Grounding wires used to interconnect frames in a Stored Program Control Switching System and the Alternating Current Equipment Ground Conductor.

CONDUCTOR FEET — Distance measured along the conductor between points A and B.

CONDUIT — A circular channel which encircles metallic electric conductors by way of compression connections.

CONTROLLED ENVIRONMENT VAULTS — A concrete or fiberglass container that may be buried in the ground and provides permanent housing for telecommunication equipment. The CEV also provides an environmentally controlled environment for the equipment.

CORD - see twine
CORROSION REDUCING AGENT — A specific type of compound that is used in electrical installations to prevent metal corrosion. NOTE - Corrosion reducing compounds that can flow or migrate to a cell top shall not be used on cell post connections. Connections to cell posts shall be treated by application of an anti-corrosive compound to be approved by the TC representative or battery manufacturer.

CRIMP — A mechanical method of compressing a conductor into the barrel of a connector.

CRIMP/COMPRESSION — A connector that is terminated by mechanical means. Can be a threaded, pressure, or crimp type connector.

CRIMPING SLEEVE — An inner and outer circular ring that is crimped to bond the outer sheath of a shielded cable to a ground.

CROSS- AISLE RACK — Cable rack located at a right angle to equipment frame line-ups.

CUSTOMER PREMISES — An area, room, or building that contains the telecommunications equipment for a customer of a TC.

DAISY CHAINING — A series connection that may start at one end of an equipment line-up and connect through each of the subsequent frames to the last equipment. If a frame is removed or the connection opened, the remaining frames would also be disconnected from the source.

DC — Direct Current

DIGITAL — A technology that deals with discrete signal levels rather than constantly varying levels.

DIGITAL SWITCH — A central office switch whose internal workings are based on digital technology.

DISTRIBUTING FRAME — A physical piece of hardware where cross connections are made.

DRESSED CABLE — Cable that is organized by sewing or tie wrapping to support equipment terminations.

DUCT WORK — Channel in which cable is run.

DUMMY BLOCK — Spacers that are used for rigidity in specific types of distributing frames.

DUMMY FUSE — Fuse to fill vacant fuse position.

EARTHQUAKE BRACING — Various methods of supporting central office equipment, whose inherent design is based on surviving earthquakes.

ELECTROMECHANICAL SWITCH — A central office switch whose internal workings are based on analog switching technology such as relays, selectors, and switches.

ELECTROLYTE — A mixture of distilled water and acid that is used in storage batteries.

ELECTRONIC SWITCH — A central office switch whose internal workings are based on electronic switching circuits.

ELECTROSTATIC DISCHARGE (ESD) — The discharge of high voltage, caused by static charging. EMT - Light flexible tubing (up to 4 inches), which uses setscrew connections.

EQUIPMENT FRAMES — Structures of various heights used to mount central office equipment (example: relay racks, bays).

EQUIPMENT SPARES - Equipment provided on an order that is not installed but stored for future use.

ESAC — Electronic Systems Assistance Center used for support of stored program control switches.

ESS — Electronic Switching System

ESSENTIAL SERVICE — Essential service is a service offering where by the service provider guarantees priority protection. This service may be related to safety, security, or priority communications.

EXOTHERMIC WELD — The use of graphite molds and metallic powder to produce molten copper.
F

FAR END DESIGNATION TAG — Cable Designation Tags (usually fire-retardant 145 type) used to identify the opposite terminating ends of switchboard, power and grounding conductors.

FIBER OPTIC CABLE — A combination of more than four fiber encased in a protected jacket.

FIBER OPTIC JUMPER — A single or multiple fiber which is used to cable from one equipment frame to another, or from one unit of equipment to another within an equipment frame.

FIRE STOPPING — Various methods that block openings from passing fire from one side of the opening to the other.

FORMED FIBER PAPER— A protection material to be placed on sharp objects to prevent cable abrasion, e.g., threaded rod, cable rack, etc.

FRAMEWORK GROUND — A protection ground consisting of a conducting path to ground non-current carrying frames, cabinets, and other metallic objects in the communication system.

FRAMEWORK/FRAME — Framework and frame shall be considered to be synonymous, and the metal structure or enclosure which supports equipment and apparatus. (NOTE - Cabinets shall be considered frames, unless separately addressed in this document.)

FUSE — An apparatus that detects excessive current flow and opens a circuit at a preset current flow. Fuses are used for the protection of cable or wire.

FUSE CLIPS — Projections that physically hold fuses in place.

FUSE RECORD SHEETS — Record of equipment assignments to specific fuse positions in a fuse bay.

G

GROUND — A conducting connection, whether intentional or accidental, between an electrical circuit or equipment and the earth, or to some conducting body that serves in place of the earth.

GROUND BARS — A metal bar on which ground cables are terminated.

GROUND BUS — Metal conductor, of various forms, onto which equipment grounds are terminated.

GROUND WINDOW (fBA) — The ground window is a sphere with a three-foot maximum radius centered on the Main Ground Bus (MGB). The ground window is the interface between the buildings integrated ground plane and the isolated ground plane. Any bond to the ground window shall be within three conductor feet of the center point of the sphere.

GROUNDING ELECTRODE CONDUCTOR — The conductor used to connect the grounding electrode to the equipment ground conductor and/or to the grounded conductor of the circuit at the service equipment, or at the source of a separately derived system. Example: In the AC service entrance switchgear of a building, the conductor that interconnects the insulated neutral bus with the office principal ground point bus bar.

H

HEAT SHRINK — A plastic tube insulator placed around conductors, then heated with a heat gun. This heating causes the tubing to shrink around the conductors.

HIGH FREQUENCY CABLE — Transmission rates of T1 and above (Coax, ABAM, shielded cable, etc…).

HORIZONTAL EQUALIZERS — The term “Horizontal Equalizers” has two separate definitions:
  • Conductors of relatively low impedance that interconnect the battery return voltage terminals in separated distribution cabinets. These equalizers keep the return voltage difference between loads in separated frames at an acceptable value during periods of high loads.
  • Conductors that extend from the CO GRD bus on each equipment floor to the ground systems of D.C. power plants and power distribution systems, and to equipment frames, racks, cabinets, and other metallic components on that floor.
I

INCIDENTAL GROUND — An unplanned grounding connection. These ground paths exist within a building through such items as structural steel, water piping, air ducts, superstructure, conduits, raceways, reinforcement rods, cable racks, and other conductive objects that are installed for purposes other than to provide ground paths.

installer — An individual installer

Installer — A contracted vendor and/or COEI.

IN SERVICE - This is the term used indicating equipment is ready for customer assignment.

INSTALLATION SUPPLIER — Any person or organization contracted by the TC to install, modify, remove or otherwise provide a service involving telecommunications equipment.

INSTALLATION ACTIVITY — Any activity including, but not limited to, additions, modification, and/or removal of telecommunications equipment, or any services associated with telecommunications equipment.

INSULATORS — A non-conductive material used to isolate conductors (example: outer covering on wiring, fiber washers mounted on equipment anchors).

INTEGRATED GROUND PLANE — A set of interconnected frames that are grounded by making more than one connection to a ground reference. A multitude of connections to ground reference is made from these objects to reduce voltage drops to acceptable levels.

INTUMESCENT MATERIAL — A chemical composition that expands 8 to 10 times its’ original volume when exposed to heat. Used as a fire barrier typically for cable holes in central offices. Material is available as moldable putty pads, strips or sticks.

IRONWORK — This is a general term used to describe high or low type auxiliary framing and its’ associated support and/or bracing material.

ISOLATED BUSHING — Insulating washers that are installed between equipment frames and equipment frame floor-mounting anchors.

ISOLATED GROUND PLANE — A set of interconnected equipment frames that is intentionally grounded by making only one connection to a given ground reference.

J

JACK BOXES — Electrical boxes containing jacks, on distributing frames, used for testing and communications.

JAR — The bottom and side containment of a cell, made of tough, fire resistant, polycarbonate material.

JOB DOCUMENTATION — All documented information that is used (or provided for use) when installing, removing, and/or modifying equipment. The following examples of job documents should be viewed as examples only and are not intended to be all-inclusive:

- Detailed engineered job specifications (prepared by the TC or an outside supplier)
- TC equipment orders
- Verizon engineered job specifications (prepared by the TC or an outside supplier)
- Central office record drawings (Office Base Drawings)
- TC requirements documents
- Product manufacturers’ standards, assembly, and/or maintenance documents/ drawings
- Method of Procedures (MOP)
- Job Information Memo (JIM).

JOB SUPERVISOR — The TC Supervisor responsible for the equipment after the installation is complete.

K

KILOVOLT-AMPERE (KVA) — A measure of power related to central office power equipment.
L

LABEL MAKER — A commercially manufactured tool used for producing labels. This tool should produce permanent and legible markings in different letter size and color with adhesive backing.

LADDER TROLLEY — That portion of the rolling ladder assembly between the ladder and the rolling ladder track. The trolley assembly rides within the ladder track.

LID — The top of a cell or battery.

LISTED — The process of listing a piece of equipment that has been tested to and complies with the equipment manufacturer’s specification. The testing is accomplished by an independent national testing laboratory and carries the testing laboratories listing as compliant.

LIVE CABLE — Cable that has power or electronic signals going through it.

LIVE CIRCUIT — A circuit that has power connected to it and is working.

LINE-UP RACK — Cable rack located parallel to equipment frame line-ups. A line-up rack may be located over the equipment frames, or over the aisle at the front or rear of the equipment frames (over-aisle).

LOCAL PRACTICES — A local agreement between VZ groups to perform work.

LOCKNUT — A nut screwed tight on another to prevent loosening.

M

MAIN-AISLE RACK — Cable rack that is located above the main cross-aisle of an equipment area.

MAIN GROUND BUS (fBA) (MGB) — A bus bar(s) located within the ground window that provides the electrical interface for connections between the building’s integrated ground plane and isolated ground plane.

MASTER GROUND BAR (fGTE) (MGB) — A bus bar normally located near the entrance switchgear. It functions as the central connection point for all main grounding conductors and earthing electrodes.

MAIN POWER BOARD (MPB) — Primary distribution point usually containing 60 amp or greater fuse protection.

MASONITE HARDBOARD — A sheet of material that is made of Masonite and has an acceptable fire rating.

MATCHED CELLS — Individual batteries or cells, square or round, manufactured by a specific supplier and matched to other cells of the same run or series having the same terminal voltage or specific gravity before delivery. Matched cells reduce the probability of scattered float voltages in a string. Cells are matched by putting them through a constant current float at the factory and then grouping them by voltage. Markings, which identify matched cells, shall be located on the cell. CARE SHALL BE EXERCISED TO AVOID PLACING UNMATCHED CELLS IN BATTERY STRINGS.

MCM (THOUSANDS OF CIRCULAR MILS) — A measure of the diameter of a conductor. This term is generally used to define power cables, example: 350 MCM, 750 MCM cable.

METALLIC SHIELDS — A metallic circular conductor around a central conductor or conductors.

METHOD OF PROCEDURE (MOP) — A document prepared by the Installation Supplier describing the work to be done.

MPB — Main Power Bay

MSDS — Material Safety Data Sheet Forms required by OSHA containing information on hazardous chemical products.

MUST — The word “must” indicates a requirement that is mandatory.
NATIONAL ELECTRIC CODE (NEC) — A code that spells out the requirements for electrical equipment and is applied to central office installations.

NATIONALLY RECOGNIZED TESTING LABORATORY — An independent testing facility, recognized nationally, that could test and evaluate properties of products to standards, features or functions as defined by the product manufacturer. The laboratory is independent of the product manufacturer.

NCC — Network Control Center: maintains tandem switches.

NETWORK ELEMENT — Telecommunication equipment such as multiplexer, digital switching systems, digital cross connection and digital loop carrier systems are examples of network elements.

NEUTRALIZING — A process that mixes bases with acids to result in a neutral solution.

NON-CONDUCTIVE MATERIAL — An insulator such as fiber sheeting, rubber, etc.

NON-CREEP BOLT — A special bolt used at specific locations of the ladder track to keep ladders from creeping.

NON-OXIDIZING COMPOUND — A compound that is used to prevent oxidation.

NYLON TIES — An apparatus that is used to bind together wires, cables, etc.

OFFICE DRAWINGS/ RECORDS — Documentation that supports a job specification related to a specific central office.

OFFICE PRINCIPLE GROUND POINT (OPGP) (OBA) — A bus bar normally located near the entrance switchgear. It functions as the central connection point for all main grounding conductors and earthing electrodes. OHM — A unit of electrical resistance.

OPERATIONS SUPERVISOR — A manager for a telecommunications carrier facility or site. This person might be responsible for the entire building or a specific entity within a building.

OPTICAL CABLE REARRANGEMENT FACILITY (OCRF) — Typically a cabinet used to connect an optical fiber cable from the outside plant facility to the inside house riser cable.

OSHA — Occupational Safety and Health Act. A federal and state program that addresses health and safety in the work place.

PASTE MATERIAL — Paste material is pressed into the plate grids to provide electrochemical power. The paste material is a mixture of lead compounds that gives the paste a porous structure. This porous paste structure will create greater effective surface area and increase the capacity of the cell.

PATHWAY — A distribution system for routing and transporting telecommunication cable and wire including fiber optic cable. Pathways may be rack or fiber containment.

PDC — Power Distribution Cabinet

PERT CHART — Program Evaluation and Review Technique chart that defines a sequence and time in which things must be completed in order to finish a task by a specified completion date.

PHASE LEADS — Electrical conductors that have a specific AC phase. PIA — Plug-in Administrator

PIGGY-BACKING — Terminating more than one ground connection under the same screw; stacking of ground connections.

PLATE GRIDS — The plates of a lead acid cell are composed of the plate grid and plate paste material. The plate grid is lead with alloys of calcium or other metals to keep the plate from stretching under its’ own weight.

POLARITY — Positive or negative in a DC circuit.

POWER AREA — Also may be known as the power room. It is the area in a telecommunication facility where the D.C. potential that powers the telecommunication equipment is assembled. Typically, this area includes batteries, rectifiers and power distribution panels.

POWER CABLE RACK — Cable rack restricted to the routing and support of office power plant distribution cables only.

PROTECTED AC OUTLETS — AC outlets used only for priority equipment (i.e., data set).
PROBLEM CODE - Capacity Creation Process (CCP)
Code 1 - Vendor engineering
Code 2 - Verizon engineering
Code 3 - Verizon operations
Code 4 - Verizon Power
Code 5 - Other

PROTECTIVE RING — A physical ring on a cable cutting tool that prevents loops of cable from being cut.

PROTECTOR — A module that plugs into a protector block, on a distribution frame, that shorts to ground any high voltages that may harm personnel or equipment in a central office.

PROTECTOR FRAME — A type of distributing frame dedicated totally to protector blocks.

PRTD – Power Ringing & Toll Distribution

R

RACEWAYS — An enclosed channel designed expressly for holding wires, cables, or bus bars with additional functions as permitted in the National Electrical Code.

RELAY RACK — An open frame assembly made up of vertical uprights a top and base. Used to mount individual plates or assemblies. It may accommodate 19 or 21-inch wide panels.

RETIRED IN PLACE — Equipment that is still physically in place. This equipment has had its’ power removed and all cables have been cut and disconnected from both ends of the terminations. The equipment is designated “Retired in Place” (RIP).

S

SCC — Switching Control Center: controls maintenance of a group of stored program controlled switches

SCAFFOLDS — Portable platforms.

SCHEMATIC DRAWING — A drawing that depicts an electrical circuit.

SEPARATELY DERIVED SOURCE — A power supply that has electrical isolation between its’ input and output current-carrying members. **NOTE** - This definition is similar to the NEC definition of “Separately Derived System”. Section 250 of the NEC. Example: A standby AC reserve arranged so that the neutral is switched.

SERVICE LOOP - Excess cable/wire left in loop before terminating.

SEWN CABLE — Cable that is secured to a cable rack or support, by sewing with twine.

SHALL — The word “shall” indicates a requirement that is mandatory.

SHEET FIBER PAPER — An insulating material that comes in sheet form.

SHIELDED CABLE — A cable whose outer conductor is made of circular mesh or foil. This outer conductor acts as an electromagnetic shield that minimizes interference to and from external sources.

SHINER — A wire-wrap that has a distended unprotected metallic conductor between the last wire-wrap and the wire insulation.

SHOULD — The word “should” indicates an action that is advisory.

SITE MANAGER — The TC manager responsible for the building or location where the work is being performed.

SKINNER — Section of a cable form where individual wires are fanned out and stripped of their insulation.

SPARE LEADS — Wires that are not connected to anything and are left un-terminated for future use.

SPC FRAMES — Stored Program Control Frames

STAMPING, STENCILING — Stamping, stenciling or labeling are all associated with designating equipment. Stamping and stenciling is generally accomplished by using a rubber stamp, alphanumeric tool, daubed in paint to designate equipment. Labeling is typically accomplished using a commercially manufactured tool to print adhesive labels.

STANCHIONS — Floor support for overhead framing, used when no equipment frames are installed.

STRAPPING — Method of tying terminals together electrically.

STRING — A group of cells or batteries connected together in series.

STRIPPING — Removing the outer insulation from wire conductors or removing the outer sheath on a cable.
SWITCHBOARD CABLE — Multi-conductor cable used to interconnect various equipment.
SWITCHBOARD CABLE RACK — Cable rack used for the routing and support of office switching and transmission cables. Switchboard cable racks may contain certain switching or transmission “system” power distribution cables.

T

TANG AREA - Area on a connector that is flat.

TELECOMMUNICATION CARRIER (TC) — A telecommunication service provider established to provide network communications in the form of local, long distance, internet or data services.

TC REPRESENTATIVE — This would normally be the person responsible for the installation activity (typically the equipment engineer) but this function can be assigned to other personnel or organizations within the TC.

TC PREMISES — Central offices or other TC owned or leased facilities where telecommunications equipment, is presently installed, will be installed, or removed.

TC ENGINEER — The TC Engineer (i.e., Equipment Engineer, Facilities Engineer, Power Engineer, Switching Engineer, Real Estate Building Engineer, Outside Plant Engineer, etc.) who initiated and is responsible for the job.

TC REQUIREMENTS — Requirements that are defined by the TC.

TELEPHONE EQUIPMENT ORDER (TEO) — An order generated by the Network Engineering Center issued to an internal or external supplier.

TELEPHONE EQUIPMENT ORDER TRACKER (TEOT) — A Web based system used to administer and track Telephone Equipment Orders.

TERMINAL BLOCK — A physical unit containing wire-wrap pins, solder points, or punch down terminals that is used to terminate wires.

TERMINAL STRIPS — Same as “Terminal Blocks.”

TINNED WIRE — Copper wire whose outer layer is plated.

TRCC — T-Carrier Restoration Control Center: Control center for the maintenance of T carrier Systems.

TWINE — A wax linen or polyester cord used to lace together cables on a cable rack or equipment. Typically, 9-ply polyester twine is used for this application.

U

UNINTERRUPTED POWER SUPPLY (UPS) — A power source that is arranged such that power to the equipment it supplies should not experience power loss.

UNISTRUT — A form of ironwork that supports equipment cable racks, etc.

UNTINNED WIRE — Bare copper wire

V

VENDOR INSTALLER - Any person or organization contracted by the TC to install, modify, remove, or otherwise provide a service involving telecommunications equipment.

VENDOR MANAGER (VM) - Now called COEI Supervisor/VM

VERIZON ENGINEER — This term addresses various Verizon Engineering Organizations (Central Office Field Engineer, Network Engineer, Power Engineer, Switch Engineer etc.)

VENUE — Verizon Engineering Network Utilities e-Solutions, a mechanized drawing system.

VERTICAL EQUALIZERS — The main vertical grounding conductor used to obtain ground reference between the OPGP and the CO GRD bus bar on each floor in a building (usually called vertical riser).

VMA’d - CCP term meaning Vendor Manager Actualized. The VM actualizes a TEO to indicate all work is essentially complete.

W

**WIRING CODES** — Colors codes used to identify specific wiring sequence. Note that there is several color codes used in the communications industry.

**WRIST STRAPS** — An electrical conductive band that is worn around an individual’s wrist whose other end is terminated through a fixed resistance to ground. This is used to protect equipment from electrostatic discharge.