SECTION 27 10 00
Structured Cabling System

1. STRUCTURED CABLING SYSTEM

The structured cabling system (SCS) shall consist of any or all of the following subsystems in accordance with ANSI/TIA/EIA and BICSI guidelines and shall consist of cable and connecting hardware manufactured by Berk-Tek/Leviton/Corning. For direct assistance in interpreting telecommunications specifications, the services of a Registered Communications Distribution Designer certified by the Building Industry Consulting Service International (BICSI) is recommended.

2. RESIDENTIAL CABLING SYSTEM REQUIREMENTS

2.1 General

- The system established in these Specifications is based upon services that are expected to be supported within each residential unit and to assist in the selection of the cabling infrastructure.
- For home automation and security systems cabling requirements, refer to the manufacturer's recommendations.
- Each cabled location provides a structured cabling system that meets the specified requirements for advanced and multimedia telecommunications services.
- This provides for both current and developing telecommunications services. As an example, this provides for telephone, satellite, community antenna television (CATV) and data services.
- It specifies twisted-pair cable and coaxial cable placed in a star topology.
- Minimum horizontal cabling requirements must consist of two (2) 4-pair UTP Berk-Tek Category 6 cables and (1) Berk-Tek 75-ohm coaxial horizontal cable from the Distribution Center Box (DCB) to each specified/optional outlet location. (The installation of individual telephone, coax, or data cable runs is prohibited).
- All Berk-Tek 75-ohm coaxial horizontal cables tails, pulled into the DCB for termination, shall not hang more than 10" below the bottom edge of the "Voice" patch panel after termination.
- Access service provider connectivity minimum requirements are two (2) Berk-Tek Category 6 cabling and two (2) Berk-Tek 75-ohm coaxial cable from the external service provider box to the DCB.
- Minimum horizontal cabling requirements consist of one (1) each 4-pair UTP Berk-Tek Category 6 cable horizontal cable from the Distribution Center Box

(DCB) to each specified individually located "Connecting System" location. I.e. Security System, Intercom System, Burglar Alarm System, Fire Alarm System, etc. or the specified systems shall be located in same wall bay, directly below the DCB

- Minimum horizontal cabling requirements consist of two (2) each 4-pair UTP Berk-Tek Category 6 cable horizontal cables from the Distribution Center Box (DCB) to the specified jointly located "Connecting System" location. I.e. Security System, Intercom System, Burglar Alarm System, Fire Alarm System, etc. or the specified systems shall be located in same wall bay, directly below the DCB

- Connectivity minimum requirements consist of one (1) Leviton 3-port faceplate, two (2) Leviton Category 6 connectors, and one (1) Berk-Tek 75-ohm coaxial connector at each specified outlet location. During construction, all faceplates must be kept clean and free of all construction related contaminates. I.e. Overspray, drywall plaster, etc.

- Connectivity minimum requirements consist of two (1) Leviton 4-port faceplate, two (2) Leviton Category 6 connectors, and two (2) Berk-Tek 75-ohm coaxial connector at each specified "Media Center" outlet location. During construction, all faceplates must be kept clean and free of all construction related contaminates. I.e. overspray, drywall plaster, etc.

3. SINGLE RESIDENTIAL UNIT CABLING SYSTEM

The following is a sequential trace of the cabling system, from the DCB to the terminal equipment in a single residential unit. The system requirements in this section are applicable to all media types described above. Grounding and bonding shall be performed in accordance with applicable electrical codes.

3.1 DCB – Requirements: See Attached Diagram and Material List

3.1.1 General

- A DCB shall be provided within each residence. The DCB is a cross-connect facility used for the termination and connection of horizontal cables and equipment cords.

- The DCB is used for connection of access providers to the residence and to facilitate moves, additions and changes of premises cabling within the residence.

- The contractor must provide a 2" conduit pathway from the DCB to an industry standard NID, (NEMA-rated flush mount box with cover) to facilitate the entrance of access provider media to each residence, i.e., Telephone/CATV.

- Access service provider connectivity minimum requirements are two (2) Berk-Tek Category 6 cabling and two (2) Berk-Tek 75-ohm coaxial cable from the external service provider box to the DCB.

- The contractor must connect all service provider boxes to the outside industry standard NID (NEMA-rated flush mount box) with a minimum 1" conduit.

- Space should be allocated adjacent to or within the DCB for the installation of a surge protection device for each conductive cable entering or leaving the building.

- Access to the building electrical ground shall be provided within the DCB and in accordance with applicable codes.

- The DCB may consist of a passive cross-connect facility or an active cross-connect facility, or both. As an example, an active cross-connect facility may be embodied in a residential gateway.

3.1.2 Location Requirements for the Distribution Device

- The DCB shall be installed inside the tenant's space in a location that is accessible for cabling maintenance.

- The location should be centralized within the tenant space, where practicable, to minimize the length of outlet cables. Required: Space allocation in the master bedroom closet.

- The DCB shall not be mounted on any exterior wall or garage wall.

- The DCB and associated equipment shall be recessed between stud spaces.

3.1.3 Wall Space Allocation for a Distribution Device and Associated Equipment

- Space allocation for the DCB and associated equipment is to have a width of 14.5" with a minimum overall height of at least 32".

3.1.4 Electrical Power

- A dedicated 15 a, 120 v AC nominal, nonswitchable duplex electrical outlet shall be provided within the DCB and labeled "DCB Power" in the resident's breaker box.

- A dedicated 20 a, 120 v AC nominal, nonswitchable duplex outside rated single gang electrical GFI outlet shall be provided within the NID (top right corner, facing down) and labeled "NID Power" in the resident's breaker box.

- The location and height of the electrical outlet should be appropriate for the DCB, NID and associated equipment being installed and shall be in compliance with applicable codes.

4. Horizontal Cables

Horizontal cables provide the transmission path from the DCB to the telecommunications outlet/connector. A horizontal cable may be connected through a transition point or consolidation point (TIA/EIA TSB-75).

- The length of each horizontal cable shall not exceed 90 m (295 ft.). The 90 m (295 ft.) length allows an operational length of 100 m (328 ft.) including patch cords or equipment cords.

4.1 Recognized Cable Requirements: See Section 27 15 00

Recognized horizontal cable includes:

- Berk-Tek 4-Pair UTP Category 6 (ANSI/TIA/EIA-568-C).
- Corning Single mode fiber (ANSI/TIA/EIA-492CAAA) (intended for outside plant and special case future applications).
- Series 6 coaxial (SCTE IPS-SP-001).

4.2 Cabling Topology For Outlet/Connectors

- Horizontal cabling shall be placed in a star topology.

4.3 Outlet Location Requirement: See Section 27 15 00.

- A minimum of one outlet location consisting of (2) Berk-Tek 4-Pair UTP Category 6 cables and (1) Berk-Tek Series 6 coaxial cable shall be cabled within each of the following rooms or similar living spaces as determined by the Community Development Director.

  Kitchen
  Bedroom
  Den/Study
  Desk/Tech Area
  Living Room
  Dining Room
  Garage

- A minimum of two outlet locations shall be cabled within each of the following rooms:

  Master bedroom

Family/great room; (a minimum of one must be located in the media center area)

A minimum of one outlet location consisting of (2) Berk-Tek 4-Pair UTP Category 6 cables and (2) Berk-Tek Series 6 coaxial cable shall be cabled to each "Media Center" location as determined by the Community Development Director.

- A sufficient number of telecommunications outlet locations should be planned to prevent the need for extension cords.

- Additional outlet locations should be provided so that no point along the floor line in any wall space is more than 7.6 m (25 ft.), measured horizontally from an outlet location in that space.

- Outlet mounting heights shall be in accordance with applicable codes.

4.4 Cable Pathways

- For new construction, a 2" conduit pathway shall be installed for future placement of satellite feeder cables between the DCB and the attic space.

- Horizontal pathways will expose the cable for any and all new construction. (Typically, exposed cabling is accomplished by placing the cables through holes in wall studs and ceiling joists before the walls and ceilings are sheathed). Proper care must be taken to route horizontal cabling a minimum of 1" from all in-wall electrical wiring. Direct contact must be avoided.

4.5 Telecommunications Outlet/Connector

The telecommunications outlet/connector shall be Leviton Category 6 and compatible with the media provided at that location.

- Some networks or services require application-specific electrical components (e.g., splitters, amplifier, impedance matching devices) at the telecommunications outlet/connector.

- These application-specific electrical components shall be placed external to the telecommunications outlet/connector.

4.6 Equipment Cords and Patch Cords

- Equipment cords extend from the telecommunications outlet location to the terminal/equipment connector. These cords are customer provided. Leviton Category 6 Equipment Cords are recommended to maintain Category 6 performance.

- Patch cords or jumpers are used for interconnections or cross-connections at the DCB. Leviton Category 6 Patch Cords are to be provided as part of these Specifications.
- For each channel, a total of 10 m (33 ft.) is allowed for equipment cords and patch cords.

4.7. Main Distribution Frame (MDF)

Construction of the MDF and LLCCP joint trench components, as specified below, must be completed in its entirety prior to the opening of any/all on site Sales Offices or Model Homes/Apartments. This construction is to also include, at a minimum, temporary single-mode fiber optic connectivity from MDF to Sales Offices and Model Homes/Apartments. Contractor must contact the City of Loma Linda for temporary requirement recommendations.

The MDF room is a centralized space for telecommunications equipment, computing equipment, video equipment that serves a designated housing development. The room shall house only equipment directly related to the telecommunications/computing/video systems and its environment support systems.

When selecting the MDF room site, avoid locations that are restricted by building components that limit expansion such as elevators, core, outside walls or other fixed building walls. Special attention for distance separation shall be given to electrical power supply transformers, motors and generators, radio, or radar transmitters, and induction sealing devices. It is desirable to locate the equipment room close to the main backbone pathway.

When designing the MDF room floor space, the room shall be designed to a minimum of 150 sq. ft. (10’ X 15’ with a minimum ceiling height of 9’).

Installation of environmental control equipment, such as power distribution or conditioner, and UPS up to 100 kVA shall be permitted in the MDF room. UPS larger than 100 kVA should be located in a separate room. Equipment not related to the support of the MDF room (e.g., piping, ductwork, pneumatic tubing, etc.) shall not be installed or pass through the MDF room.

Each MDF requires the installation of a FM-200 Fire Suppression System or equivalent. All substitutions must be approved by the City of Loma Linda.

HFC-227 (FM-200), chemically known as heptafluoropropane, is an alternative fire suppression system agent manufactured in the United States by Great Lakes Chemical (FM-200) and DuPont Corporation (HFC-227). It is a replacement for the ozone depleting Halon 1301 used extensively before 1994.

FM-200 (HFC-227) has no ozone depletion potential. Its ODP is zero. FM-200 has found by leading toxicologists to be safe for use when people are present. Just as with Halon 1301, people can be exposed to normal extinguishing concentrations without any fear of health problems.

The MDF room shall be connected to the City owned fiber optic backbone via (2) 4”

conduit pathways. These 4" conduit pathways will be routed separately to accommodate redundant fiber optic cable path requirement. Additional provision can be found in TIA/EIA-569-A and the BICSI Telecommunications Distribution Design Manual.

Access shall be made available to the main telecommunications grounding system specified by ANSI/TIA/EIA-607.

- The MDF or main terminal space may be co-located with the entrance facility. It may also be used to house active equipment.
- The MDF may not be co-located with the Electrical Room.
- The MDF and electrical room may not share a common wall.
- The MDF or main terminal space may house the demarcation point for access providers and campus backbone cable.
- The associated pathways, protection devices, and any other equipment needed to provide a connection from the access providers' access lines, may also be located in the MDF or main terminal space.
- An MDF requires other support facilities such as power, heating, ventilation, and air conditioning (HVAC). For more information on Control Building/Equipment Rooms, see ANSI/TIA/EIA-569-A.
- Each MDF will house a power distribution panel dedicated to all electrical needs of the MDF. This power distribution panel will not house any non MDF related circuits. The MDF power distribution panel may not be subject to control by any other power distribution panel.

Listed below are additional provisions:

- A minimum of two walls should be covered with rigidly fixed (3/4 trade size) A-C plywood preferably void free, 8 ft. high, capable of supporting attached equipment. Plywood should be either fire rated or covered with two coats of fire retardant paint.
- The MDF floor must be painted or sealed with an industry approved concrete sealer.
- Lighting shall be a minimum of 50 foot candles measured 3 ft. above the finished floor.
- False ceiling shall not be provided.
- Access Door: Standard solid core metal door 36" X 80" X 1 ¾" thick door with rigid urethane insulated core. 18-guage steel used for door

construction. Hardware: Door closer LCN Model 1371 or equivalent. 3 each 4 ½" x 4 ½" Ball Bearing Hinges. Reinforcements: Hinges reinforced at all hardware locations. Lockset reinforced at strike. Reinforced hardware mounts. Frame: Pre-Assembled 16-guage steel. Standard Frame Face size 2" Standard Jamb Depth 4 ½" Standard Throat Opening 3 ½". Finish: All doors are finished with one coat primer and two coat exterior latex per manufactures' directions.

- Lockset: Schlage - electrified D80 24VDC Rhodes 626 Dull Chrome Finish.

- Transfer Hinge: - Marray TEF6C Brushed Chrome over steel. Standard weight, 5 knuckle ball bearing.

- Card Reader: - HID ThinLine II Reader (classic black) with 18" pigtail.

- Walls and ceiling shall be treated to eliminate dust. Finishes shall be light in color to enhance room lighting.

- Electrical: A minimum of four (4) dedicated 30A, 110V AC duplex electrical outlets, each on separate circuits, shall be provided for equipment power. Consideration should be given to identifying those outlets dedicated to telecommunications equipment. In addition, convenience duplex outlets shall be placed at 6 ft. intervals around the perimeter walls, at a height of 18 in. above the floor.

- A minimum of (2) 2-ton AC units shall be provided for each MDF Room. Units shall be Carrier Model # 40QAB024-331 Indoor unit, paired with Carreir Model # 38HDC024-3 Out door unit, or City approved alternate.

- These units shall be powered on separate circuits to accommodate redundancy requirements with all HVAC circuit breakers located within MDF.

- HVAC units to be permanently mounted to slab or structure. Exposed elements to be secured and protected from vandalism or theft.

- Exterior wiring or cables servicing HVAC unit to be run in rigid weatherproof conduit.

- Exterior ductwork to be enclosed in protective chase.

- If emergency power is available, consideration shall be given to automatic power backup.HVAC

- If an emergency power source is available in the building, it is desirable that at least one of the duplex outlets be so supplied.

- Floor loading capacity must be sufficient to bear both the distributed and concentrated load of installed equipment.

- The equipment room should not be located below water level; preventative measures should be taken to prevent water infiltration.

- Sources of electromagnetic interference, vibration, and contaminants shall be taken in consideration.

- TIA/EIA-569-A contains fire-stopping, sprinkler requirements, miscellaneous pathways, telecommunications recommendations of separation from less than 480V power lines. Further information of entrance rooms can be found in TIA/EIA-569-A and the BICSI Telecommunications Distribution Methods Manuals.

- An independent telecommunications grounding system as specified by ANSI/TIA/EIA 607, must be provided. Example Diagram 2:

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Single-mode optical fiber

All intra-building, (within the building) fiber optic backbone cables shall meet the appropriate NEC flame and smoke specifications. These include NEC Article 800 for copper cables and Article 770 for fiber optics. All cables shall meet or exceed the electrical specifications of ANSI/TIA/EIA 568-C. In addition, Corning Cabling Systems, an ISO 9000 series manufacturer, is the manufacture of choice for all fiber optic cable and connectivity.

Installers should anticipate intra-building backbone fiber supporting voice/data/video applications shall be single mode fiber, unless otherwise specified by The City of Loma Linda.

Inter-building backbone fiber supporting data applications will also be single mode fiber, as specified by The City of Loma Linda. Fiber counts will also be specified by The City of Loma Linda, though it is suggested backbone cable should allow for a minimum 25% growth.

Optical Fiber Backbone Cable Specifications:

Transmission Parameters (outdoor single-mode):
Attenuation: 0.5dB/km at 1310 nm
.0.5dB/km at 1550 nm
Operating Temperature Range: -40 degrees F to 158 degrees F

All fiber optic cable installed for The City of Loma Linda shall conform to the Corning Cabling Systems manufacturer warranty requirements.

The type of connectors used for all fiber optic cabling shall be "SC" (UPC) uniform polish connector at each residence and "SC" (APC) angle polish connector at each MDF, as determined by the City of Loma Linda for any new installation and shall conform to requirements of Corning cabling Systems.

All splicing of backbone fiber optic cables shall be "Fusion" type.

Backbone Distance in accordance with TIA/EIA 568-B.1 are as follows:

- Single-mode Fiber Applications: 9,840 ft.

While it is recognized that the capabilities of single-mode fiber may allow for backbone link distances of up to 37 miles, this distance is generally considered to extend outside the scope of TIA/EIA 568-B.1.

4.8 Interbuilding Telecommunications Backbone Pathways

- Interbuilding telecommunications backbone pathways provide a means of interconnecting separate buildings and consist of underground, buried, aerial, and tunnel pathways.

- The City of Loma Linda Community Development Department must approve all routing of interbuilding telecommunications backbone pathways during the planning process.

- Minimum conduit sizing for outside plant conduit from the MDF to each splice node vault shall be 2 inches.

- An industry standard splice node vault shall be provided for each eight (8) homes. All vaults shall be sized to accommodate fiber optic splice enclosures.

- The splice node vault shall be a Carson Industries, M-series G2436-18 (medium duty) or Utility Vault Company equal, with a static vertical load rating of Tier 5 – (Design Load 5,200lbf); (Test Load 11,282lbf) or equal.

- Minimum splice node vault size shall be 24”x36”x36”.

- Minimum conduit sizing for an individual residence pathway shall be 2” from the splice node vault to the industry standard NEMA-rated flush mount box at each residence.

- Each splice node vault is to serve a maximum of (8) eight residences.

- The developer shall be responsible for providing two (2), 4” conduits or (1) Quad Duct”, from the MDF to the closest City-owned fiber-optic backbone connection point. This is to be determined at the plan check phase.

- The developer shall be responsible for providing four (4) 1” OSP rated inner ducts or two (2), 1” and one 1.5” OSP rated inner duct in each 4” conduit. This is to be determined at the plan check phase.

- The developer must provide industry standard pull strings in each conduit pathway.

- For more information on interbuilding telecommunications backbone pathways, see ANSI/TIA/EIA-758.

4.9 Interbuilding Fiber-Optic Backbone

- A minimum of one continuous strand, single-mode fiber-optic cable shall be provided from the MDF, through the splice node vault to each individual single family residence and each unit of a multi-dwelling unit.

- Each of the above required, strands of single-mode fiber-optic cable shall have “SC” type (UPC) connectors installed at each residence and “SC” type (APC) connectors installed at the MDFs. The connector shall be the SC-type.

- As an additional requirement, A minimum of one additional continuous strand, single-mode fiber-optic cable shall be provided from the splice node vault to each individual commercial tenant space to allow connectivity access to service providers.

- These additional strands of single-mode fiber-optic cable shall have a “SC” type (UPC) connector installed at the tenant space only. The other ends are to be coiled and left un-terminated in the splice node vault.

- At each individual residence a fiber storage spool shall be provided and utilized within the DCB.

- At the MDF a minimum of one (1) 19” x 8’ industry standard rack and one (1) adjustable depth 4 post rack shall be provided and installed side by side. Additional free room space must be dedicated to allow future install of one (1) additional 19" X 8' industry standard rack and one (1) additional adjustable depth 4 post rack with appropriate vertical wire management. It shall be mounted and braced as per applicable standards and local codes.

- At the MDF on the 19" X 8' standard equipment rack, the top 4 rack units are to be dedicated space for fiber optic backbone termination shelves and splice housings.

- At the MDF a minimum of three (3) vertical wire managers shall be provided and installed. (1) between the (2) racks and (1) at each end of rack row.

- At the MDF all individual single-mode fiber-optic strands shall be terminated with “SC” type (APC) connectors and shall be routed and connected to a Corning rack mount pigtailed closet connector housing panel with a 12-fiber shelf.

- Maximum fiber-optic cable outside diameter shall not exceed 1” in each 2” conduit and ½” in each 1” conduit.

- All single mode fiber-optic strands must be tested, certified and labeled in accordance with industry standards after installation and termination.

- The developer shall be responsible to provide all material and labor to accommodate all necessary fiber-optic splice hardware.

5. MULTITENANT INFRASTRUCTURE

5.1 General

The following is a sequential trace of the cabling system for the multi-tenant/campus infrastructure from the new Control Building MDF to the DCB located in each individual residence in a campus environment.

- The Control Building (MDF) will be located on the development property at a TBD position. Contractors shall contact the City of Loma Linda for location recommendations.
- The DCB will be located in the individual residence or tenant space.
- Access to shared-use space shall be controlled by the building owner or agent.
- Where the total length of cabling from the demarcation point to the furthest outlet exceeds 150 m (492 ft.), the access provider shall be notified at the design stage to accommodate transmission requirements.
- Grounding and bonding shall be performed in accordance with applicable electrical codes. For multi tenant buildings, ANSI/TIA/EIA-607 provides additional bonding and grounding information.

5.2 DCB – Requirements: See Attached Diagram and Material List

5.2.1 General

- A DCB shall be provided within each residence. The DCB is a cross-connect facility used for the termination and connection of horizontal cables and equipment cords.
- The DCB is used for connection of access providers to the residence and to facilitate moves, additions and changes of premises cabling within the residence.
- The contractor must provide a 1" conduit pathway from the DCB to an industry standard NID, (NEMA-rated flush mount box with cover) to facilitate the entrance of access provider media to each residence, i.e., Telephone/CATV.
- Access service provider connectivity minimum requirements are two (2) Berk-Tek Category 6 cabling and two (2) Berk-Tek 75-ohm coaxial cable from the external service provider box to the DCB.

- The contractor must connect all service provider boxes to the outside industry standard NID (NEMA-rated flush mount box) with a minimum 1" conduit.

- Space should be allocated adjacent to or within the DCB for the installation of a surge protection device for each conductive cable entering or leaving the building.

- Access to the building electrical ground shall be provided within the DCB and in accordance with applicable codes.

- The DCB may consist of a passive cross-connect facility or an active cross-connect facility, or both. As an example, an active cross-connect facility may be embodied in a residential gateway.

5.2.2 Location Requirements for the DCB

- The DCB shall be installed inside the tenant's space in a location that is accessible for cabling maintenance.

- The location should be centralized within the tenant space, where practicable, to minimize the length of outlet cables. Required: Space allocation in the master bedroom closet.

- The DCB shall not be mounted on any exterior wall or garage wall.

- The DCB and associated equipment shall be recessed between stud spaces.

5.2.3 Wall Space Allocation for a DCB and Associated Equipment

- Space allocation for the DCB and associated equipment is to have a width of 14.5" with a minimum overall height of at least 36".

5.2.4 Electrical Power

- A dedicated 15 a, 120 v AC nominal, nonswitchable duplex electrical outlet shall be provided within the DCB and labeled "DCB Power" in the resident's breaker box.

- A dedicated 20 a, 120 v AC nominal, nonswitchable duplex outside rated single gang electrical GFI outlet shall be provided within the NID (top right corner, facing down) and labeled "NID Power" in the resident's breaker box.

- The location and height of the electrical outlet should be appropriate for the DCB and associated equipment being installed and shall be in compliance with applicable codes.

- The location and height of the electrical outlet should be appropriate for the NID and associated equipment being installed and shall be in compliance with applicable codes.

5.3 Horizontal Cables

Horizontal cables provide the transmission path from the DCB to the telecommunications outlet/connector. A horizontal cable may be connected through a transition point or consolidation point (TIA/EIA TSB-75).

- The length of each horizontal cable shall not exceed 90 m (295 ft.). The 90 m (295 ft.) length allows an operational length of 100 m (328 ft.) including patch cords or equipment cords.

5.3.1 Recognized Cable Requirements: See Section 27 15 00.

Recognized horizontal cable includes:

- Berk-Tek 4-Pair UTP Category 6 (ANSI/TIA/EIA-568-B).
- Corning Single mode fiber (ANSI/TIA/EIA-492CAAA) (intended for outside plant and special case future applications).
- Series 6 coaxial (SCTE IPS-SP-001).

5.3.2 Cabling Topology For Outlet/Connectors

- Horizontal cabling shall be placed in a star topology.

5.3.3 Outlet Location Requirement: See Section 27 15 00.

- A minimum of one outlet location consisting of (2) Berk-Tek 4-Pair UTP Category 6 cables and (1) Berk-Tek Series 6 coaxial cable shall be cabled within each of the following rooms or similar living spaces as determined by the Community Development Director.

  Kitchen
  Bedroom
  Den/Study
  Desk/Tech Area
  Living Room
  Dining Room
  Garage

- A minimum of two outlet locations shall be cabled within each of the following rooms:

  Master Bedroom
  Family/great room; (a minimum of one must be located in the media center area)

A minimum of one outlet location consisting of (2) Berk-Tek 4-Pair UTP Category 6 cables and (2) Berk-Tek Series 6 coaxial cable shall be cabled to each "Media Center" location as determined by the Community Development Director.

- A sufficient number of telecommunications outlet locations should be planned to prevent the need for extension cords.

- Additional outlet locations should be provided so that no point along the floor line in any wall space is more than 7.6 m (25 ft.), measured horizontally from an outlet location in that space.

- Outlet mounting heights shall be in accordance with applicable codes.

5.3.4 Cable Pathways

- Horizontal pathways will expose the cable for any and all new construction. (Typically, exposed cabling is accomplished by placing the cables through holes in wall studs and ceiling joists before the walls and ceilings are sheathed). Proper care must be taken to route horizontal cabling a minimum of 1" from all in-wall electrical wiring. Direct contact must be avoided.

5.4 Telecommunications Outlet/Connector

The telecommunications outlet/connector shall be Leviton Category 6 and compatible with the media provided at that location.

- Some networks or services require application-specific electrical components (e.g., splitters, amplifier, impedance matching devices) at the telecommunications outlet/connector.

- These application-specific electrical components shall be placed external to the telecommunications outlet/connector.

5.5 Equipment Cords and Patch Cords

- Equipment cords extend from the telecommunications outlet location to the terminal/equipment connector. These cords are customer provided. Leviton Category 6 Equipment Cords are recommended to maintain Category 6 performance.

- Patch cords or jumpers are used for interconnections or cross-connections at the DCB. Leviton Category 6 Patch Cords are to be provided as part of these Specifications.

- For each channel, a total of 10 m (33 ft.) is allowed for equipment cords and patch cords.
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5.6 Main Distribution Frame (MDF)

Construction of the MDF and LLCCP joint trench components, as specified below, must be completed in its entirety prior to the opening of any/all on site Sales Offices or Model Homes/Apartments. This construction is to also include, at a minimum, temporary single-mode fiber optic connectivity from MDF to Sales Offices and Model Homes/Apartments. Contractor must contact the City of Loma Linda for temporary requirement recommendations.

The MDF room is a centralized space for telecommunications equipment, computing equipment, video equipment that serves a designated housing development. The room shall house only equipment directly related to the telecommunications/computing/video systems and its environment support systems.

When selecting the MDF room site, avoid locations that are restricted by building components that limit expansion such as elevators, core, outside walls or other fixed building walls. Special attention for distance separation shall be given to electrical power supply transformers, motors and generators, radio, or radar transmitters, and induction sealing devices. It is desirable to locate the equipment room close to the main backbone pathway.

When designing the MDF internal room floor space, the room shall be designed to a minimum of 150 sq. ft. (10' X 15' with a minimum ceiling height of 9'.).

Installation of environmental control equipment, such as power distribution or conditioner, and UPS up to 100 kVA shall be permitted in the MDF room. UPS larger than 100 kVA should be located in a separate room. Equipment not related to the support of the MDF room (e.g., piping, ductwork, pneumatic tubing, etc.) shall not be installed or pass through the MDF room.

Each MDF requires the installation of a FM-200 Fire Suppression System or equivalent. All substitutions must be approved by the City of Loma Linda.

HFC-227 (FM-200), chemically known as heptafluoropropane, is an alternative fire suppression system agent manufactured in the United States by Great Lakes Chemical (FM-200) and DuPont Corporation (HFC-227). It is a replacement for the ozone depleting Halon 1301 used extensively before 1994.

FM-200 (HFC-227) has no ozone depletion potential. Its ODP is zero. FM-200 has found by leading toxicologists to be safe for use when people are present. Just as with Halon 1301, people can be exposed to normal extinguishing concentrations without any fear of health problems.

The MDF room shall be connected to the City owned fiber optic backbone via (2) 4" conduit pathways. These 4" conduit pathways will be routed separately to accommodate

redundant fiber optic cable path requirement. Additional provision can be found in TIA/EIA-569-A and the BICSI Telecommunications Distribution Design Manual.

Access shall be made available to the main telecommunications grounding system specified by ANSI/TIA/EIA-607.

- The MDF or main terminal space may be co-located with the entrance facility. It may also be used to house active equipment.
- The MDF may not be co-located with the Electrical Room.
- The MDF and electrical room may not share a common wall.
- The MDF or main terminal space may house the demarcation point for access providers and campus backbone cable.
- The associated pathways, protection devices, and any other equipment needed to provide a connection from the access providers' access lines, may also be located in the MDF or main terminal space.
- An MDF requires other support facilities such as power, heating, ventilation, and air conditioning (HVAC). For more information on Control Building/Equipment Rooms, see ANSI/TIA/EIA-569-A.
- Each MDF will house a power distribution panel dedicated to all electrical needs of the MDF. This power distribution panel will not house any non MDF related circuits. The MDF power distribution panel may not be subject to control by any other power distribution panel.

Listed below are additional provisions:

- A minimum of two walls should be covered with rigidly fixed (3/4 trade size) A-C plywood preferably void free, 8 ft. high, capable of supporting attached equipment. Plywood should be either fire rated or covered with two coats of fire retardant paint.
- The MDF floor must be painted or sealed with an industry approved concrete sealer.
- Lighting shall be a minimum of 50 foot candles measured 3 ft. above the finished floor.
- False ceiling shall not be provided.
- Access Door: Standard solid core metal door 36" X 80" X 1 ¾" thick

door with rigid urethane insulated core. 18-guage steel used for door construction. Hardware: Door closer LCN Model 1371 or equivalent. 3 each 4 ½" x 4 ½" Ball Bearing Hinges. Reinforcements: Hinges reinforced at all hardware locations. Lockset reinforced at strike. Reinforced hardware mounts. Frame: Pre-Assembled 16-guage steel. Standard Frame Face size 2" Standard Jamb Depth 4 ½" Standard Throat Opening 3 ½". Finish: All doors are finished with one coat primer and two coat exterior latex per manufactures' directions.

- Lockset: Schlage - electrified D80 24VDC Rhodes 626 Dull Chrome Finish.

- Transfer Hinge: - Marray TEF6C Brushed Chrome over steel. Standard weight, 5 knuckle ball bearing.

- Card Reader: - HID ThinLine II Reader (classic black) with 18" pigtail.

- Walls and ceiling shall be treated to eliminate dust. Finishes shall be light in color to enhance room lighting.

- Electrical: A minimum of four (4) dedicated 30A, 110V AC duplex electrical outlets, each on separate circuits, shall be provided for equipment power. Consideration should be given to identifying those outlets dedicated to telecommunications equipment. In addition, convenience duplex outlets shall be placed at 6 ft. intervals around the perimeter walls, at a height of 6 in. above the floor.

- A minimum of (2) 2-ton AC units shall be provided for each MDF Room. Units shall be Carrier Model # 40QAB024-331 Indoor unit, paired with Carreir Model # 38HDC024-3 Out door unit, or City approved alternate.

- These units shall be powered on separate circuits to accommodate redundancy requirements with all HVAC circuit breakers located within MDF.

- HVAC units to be permanently mounted to slab or structure. Exposed elements to be secured and protected from vandalism or theft.

- Exterior wiring or cables servicing HVAC unit to be run in rigid weatherproof conduit.

- Exterior ductwork to be enclosed in protective chase.

- If emergency power is available, consideration shall be given to

automatic power backup.HVAC

- If an emergency power source is available in the building, it is desirable at at least one of the duplex outlets be so supplied.

- Floor loading capacity must be sufficient to bear both the distributed and concentrated load of installed equipment.

- The equipment room should not be located below water level; preventative measures should be taken to prevent water infiltration.

- Sources of electromagnetic interference, vibration, and contaminants shall be taken in consideration.

TIA/EIA-569-B contains fire-stopping, sprinkler requirements, miscellaneous pathways, telecommunications recommendations of separation from less than 480V power lines. Further information of entrance rooms can be found in TIA/EIA-569-B and the BICSI Telecommunications Distribution Methods Manuals.

Recognized Backbone Cables in accordance with the City of Loma Linda Connected Community Program and ANSI/TIA/EIA 568-B are noted below.

- Single-mode optical fiber

All intra-building, (within the building) fiber optic backbone cables shall meet the appropriate NEC flame and smoke specifications. These include NEC Article 800 for copper cables and Article 770 for fiber optics. All cables shall meet or exceed the electrical specifications of ANSI/TIA/EIA 568-B. In addition, Corning Cabling Systems, an ISO 9000 series manufacturer, is the manufacture of choice for all fiber optic cable and connectivity.

Installers should anticipate intra-building backbone fiber supporting voice/data/video applications shall be singlemode fiber, unless otherwise specified by The City of Loma Linda.

Inter-building backbone fiber supporting data applications will also be singlemode fiber, as specified by The City of Loma Linda. Fiber counts will also be specified by The City of Loma Linda, though it is suggested backbone cable should allow for a minimum 25% growth.

Optical Fiber Backbone Cable Specifications:

Transmission Parameters (outdoor single-mode):

Attenuation: 0.5dB/km at 1310 nm
.0.5dB/km at 1550 nm
Operating Temperature Range: -40 degrees F to 158 degrees F

All fiber optic cable installed for The City of Loma Linda shall conform to the Corning Cabling Systems manufacturer warranty requirements.

The type of connectors used for all fiber optic cabling shall be "SC" (UPC uniform polish connectors at each residence and "SC" (APC) angle polish connector at each MDF, as determined by the City of Loma Linda for any new installation and shall conform to requirements of Corning cabling Systems.

All splicing of backbone fiber optic cables shall be "Fusion" type.

Backbone Distance in accordance with TIA/EIA 568-B.1 are as follows:

- Single-mode Fiber Applications: 9,840 ft.

While it is recognized that the capabilities of single-mode fiber may allow for backbone link distances of up to 37 miles, this distance is generally considered to extend outside the scope of TIA/EIA 568-B.1.

5.7 Equipment Room

- In multi tenant dwellings an equipment room may house the entrance facility, the main terminal space, and a floor-serving terminal.
- An equipment room typically houses more equipment than a floor-serving terminal and it has different space requirements.
- An equipment room requires other support facilities such as power, heating, ventilation and air conditioning (HVAC). For more information on equipment rooms, see ANSI/TIA/EIA-569-A.
- For proper sizing of an equipment room, refer to the ANSI/EIA/ITA-569-A.

5.8 Floor-Serving Terminal

- The floor-serving terminal is the space where backbone and horizontal cables terminate.

- A floor-serving terminal should be located on each floor or every third floor, thus serving the floor it is on and the floors above and below.

- The floor-serving terminal should be in a common area and easily accessible. The minimum size of the space shall be in accordance with Table 4.

- The floor-serving terminal may be required to be expanded in size to accommodate additional hardware.

Table 4 – Minimum Space For Floor-Serving Terminal

- Minimum space for first five (5) tenant units
    - 370 mm (14.5") wide
    - 610 mm (24") high
    - 775 mm (30.5") wide
    - 610 mm (24") high
- Minimum additional space per tenant unit
    - 32270 sq. mm
    - (50 sq. in.)
    - 64540 sq. mm
    - (100 sq. in.)
- If active equipment is placed within the floor-serving terminal, a dedicated unswitched 15 a, 120 v AC nominal outlets shall be provided within 1.5 m (5 ft.) of the floor-serving terminal.
- The height of the electrical outlet should be appropriate for the floor-serving terminal being installed and shall be in compliance with codes.

5.9 Backbone Pathways

5.9.1 General

- Within buildings consideration should be given to establishing spare pathway capacity (i.e., conduit w/pull-string) for future media additions or modifications that would be difficult or impossible to cable.

5.9.2. Intrabuilding Backbone/Horizontal Pathways: See Section 27 05 28.

- Intrabuilding pathways typically employ conduits, sleeves, slots or cable trays (w/pull-string) as a means for placing backbone cable.
- A minimum of one (1) #4 trade size conduit or sleeve (w/pull-string) shall be provided for each backbone pathway where backbone cable

extends from the main Equipment Room to a floor-serving terminal space.

- A minimum of one (1) 1" conduit (w/pull-string) shall be provided from the main Equipment Room or the associated floor-serving terminal to the DCB at each individual residence.

- Where cable bundles with an equivalent diameter of 25 mm (1") or less extend through each apartment closet, a minimum of one (1) (1 ½") trade size conduit or sleeve shall be provided for the backbone pathways.

- For more information on intrabuilding pathways, see ANSI/TIA/EIA-569-A.

5.9.3 Interbuilding Telecommunications Backbone Pathways

- Interbuilding telecommunications backbone pathways provide a means of interconnecting separate buildings and consist of underground, buried, aerial and tunnel pathways.

- Minimum conduit sizing for all outside plant conduit shall be 2".

- An industry standard splice node vault shall be provided for each multti-tenant building. All vaults shall be sized to accommodate fiber optic splice enclosures.

- The splice node vault shall be a Carson Industries, M-series G2436-18 (medium duty) or Utility Vault Company equal, with a static vertical load rating of Tier 5 – (Design Load 5,200lbf); (Test Load 11,282lbf) or equal.

- Minimum splice node vault size shall be 24"x36"x36".

- Minimum conduit sizing for each individual multi-tenant/commercial building shall be 2" from the splice node vault to the main Equipment Room.

- The developer shall be responsible for providing two (2), 4" conduits from the MDF to the closest City-owned fiber-optic backbone connection point. This is to be determined at the plan check phase.

- The developer shall be responsible for providing four (4) 1" OSP rated inner ducts or two (2), 1" and one 1.5" inner duct in each 4" conduit. This is to be determined at the plan-check phase.

- The developer must provide industry standard pull strings in each conduit pathway.

- For more information on interbuilding telecommunications backbone pathways, see ANSI/TIA/EIA-758.

5.10Backbone Cabling

5.10.1 Recognized Cables

Recognized backbone cables include: SEE Section 27 15 00.

- Corning Single mode fiber (ANSI/TIA/EIA-492CAAA).
- Berk-Tek Hard-line coaxial (SCTE IPS-SP-100).
- Berk-Tek Series 6 coaxial (SCTE IPS-SP-001).

5.10.2 Topology

- A star topology should be implemented for optical fiber backbone cabling.
- Coaxial backbone cable may be implemented using a star topology.

5.10.3 Interbuilding Cabling Protection

- When buildings are connected with interbuilding cabling, the applicable fusing and voltage protection codes shall be followed.

5.10.4 Interbuilding Fiber-Optic Backbone

- A minimum of one continuous strand, single-mode fiber-optic cable shall be provided from the MDF, through the splice node vault to each individual residence.
- Each of the above required, strands of single-mode fiber-optic cable shall have “SC” type (UPC) connectors installed at each residence and “SC” type (APC) connectors installed at each MDF. The connector shall be the SC-type.
- As an additional requirement, A minimum of one additional continuous strand, single-mode fiber-optic cable shall be provided from the splice node vault to each individual residence to allow connectivity access to service providers.
- These additional strands of single-mode fiber-optic cable shall have a “SC” type (UPC) connector installed at the residence only. The other ends are to be coiled and left un-terminated in the splice node vault.
- At each individual residence a fiber storage spool shall be provided and utilized within the DCB.

- At the MDF a minimum of one (1) 19" x 8' industry standard rack and one (1) adjustable depth 4 post rack shall be provided and installed side by side. Additional free room space must be dedicated to allow future install of one (1) additional 19" X 8' industry standard rack and one (1) additional adjustable depth 4 post rack with appropriate vertical wire management. It shall be mounted and braced as per applicable standards and local codes.

- At the MDF on the 19" X 8' standard equipment rack, the top 4 rack units are to be dedicated space for fiber optic backbone termination shelves and splice housings.

- At the MDF a minimum of three (3) vertical wire managers shall be provided and installed. (1) between the (2) racks and (1) at each end of rack row.

- At the MDF all individual single-mode fiber-optic strands shall be terminated with "SC" type (APC) connectors and shall be routed and connected to a Corning rack mount pigtailed closet connector housing panel with a 12-fiber shelf.

- Maximum fiber-optic cable outside diameter shall not exceed 1" in each 2" conduit and ½" in each 1" conduit.

- All single-mode fiber-optic strands must be tested, certified and labeled in accordance with industry standards after installation and termination.

- The developer shall be responsible for providing all material and labor to accommodate all necessary fiber-optic splice hardware.

6. COMMERCIAL/CAMPUS INFRASTRUCTURE

6.1 General

The following is a sequential trace of the cabling system for the commercial/campus infrastructure from the new Control Building MDF to the main Equipment Room located in each individual commercial building in a campus environment.

- The Control Building MDF will be located on the development property at a TBD position.

- The main Equipment Room will be located in each building or each tenant space.

- Access to shared-use space shall be controlled by the building owner or agent.

- Grounding and bonding shall be performed in accordance with applicable electrical codes. For multi tenant buildings, ANSI/TIA/EIA-607 provides additional bonding and grounding information.

- Each Control Building MDF will house a power distribution panel dedicated to all electrical needs of the MDF. This power distribution panel will not house any non-MDF related circuits. The MDF power distribution panel may not be subject to control by any other power distribution panel.

6.2 Main Distribution Frame (MDF)

Construction of the MDF and LLCCP joint trench components, as specified below, must be completed in its entirety prior to the opening of any commercial space or on-site Sales Office. This construction is to also include, at a minimum, temporary single-mode fiber optic connectivity from MDF to commercial space or on-site Sales Office. Contractor must contact the City of Loma Linda for temporary requirement recommendations.

The MDF room is a centralized space for telecommunications equipment, computing equipment, video equipment that serves a designated housing development. The room shall house only equipment directly related to the telecommunications/computing/video systems and its environment support systems.

When selecting the MDF room site, avoid locations that are restricted by building components that limit expansion such as elevators, core, outside walls or other fixed building walls. Special attention for distance separation shall be given to electrical power supply transformers, motors and generators, radio, or radar transmitters, and induction sealing devices. It is desirable to locate the equipment room close to the main backbone pathway.

When designing the MDF room floor space, the room shall be designed to a minimum of 150 sq. ft. (10’ X 15’ with a minimum ceiling height of 9’)..

Installation of environmental control equipment, such as power distribution or conditioner, and UPS up to 100 kVA shall be permitted in the MDF room. UPS larger than 100 kVA should be located in a separate room. Equipment not related to the support of the MDF room (e.g., piping, ductwork, pneumatic tubing, etc.) shall not be installed or pass through the MDF room.

Each MDF requires the installation of a FM-200 Fire Suppression System or equivalent. All substitutions must be approved by the City of Loma Linda.

HFC-227 (FM-200), chemically known as heptafluoropropane, is an alternative fire suppression system agent manufactured in the United States by Great Lakes Chemical (FM-200) and DuPont Corporation (HFC-227). It is a replacement for the ozone depleting Halon 1301 used extensively before 1994.

FM-200 (HFC-227) has no ozone depletion potential. Its ODP is zero. FM-200 has found by leading toxicologists to be safe for use when people are present. Just as with Halon 1301, people can be exposed to normal extinguishing concentrations without any fear of health problems.

The MDF room shall be connected to the City owned fiber optic backbone via (2) 4" conduit pathways. These 4" conduit pathways will be routed separately to accommodate redundant fiber optic cable path requirement. Additional provision can be found in TIA/EIA-569-A and the BICSI Telecommunications Distribution Design Manual.

Access shall be made available to the main telecommunications grounding system specified by ANSI/TIA/EIA-607.

- The MDF or main terminal space may be co-located with the entrance facility. It may also be used to house active equipment.
- The MDF may not be co-located with the Electrical Room.
- The MDF and electrical room may not share a common wall.
- The MDF or main terminal space may house the demarcation point for access providers and campus backbone cable.
- The associated pathways, protection devices, and any other equipment needed to provide a connection from the access providers' access lines, may also be located in the MDF or main terminal space.
- An MDF requires other support facilities such as power, heating, ventilation, and air conditioning (HVAC). For more information on Control Building/Equipment Rooms, see ANSI/TIA/EIA-569-A.
- Each MDF will house a power distribution panel dedicated to all electrical needs of the MDF. This power distribution panel will not house any non MDF related circuits. The MDF power distribution panel may not be subject to control by any other power distribution panel.

Listed below are additional provisions:

- A minimum of two walls should be covered with rigidly fixed (3/4 trade size) A-C plywood preferably void free, 8 ft. high, capable of supporting attached equipment. Plywood should be either fire rated or covered with two coats of fire retardant paint.
- The MDF floor must be painted or sealed with an industry approved concrete sealer.
- Lighting shall be a minimum of 50 foot candles measured 3 ft. above the finished floor.

- False ceiling shall not be provided.

- Access Door: Standard solid core metal door 36" X 80" X 1 ¾" thick door with rigid urethane insulated core. 18-guage steel used for door construction. Hardware: Door closer LCN Model 1371 or equivalent. 3 each 4 ½" x 4 ½" Ball Bearing Hinges. Reinforcements: Hinges reinforced at all hardware locations. Lockset reinforced at strike. Reinforced hardware mounts. Frame: Pre-Assembled 16-guage steel. Standard Frame Face size 2" Standard Jamb Depth 4 ½" Standard Throat Opening 3 ½". Finish: All doors are finished with one coat primer and two coat exterior latex per manufactures' directions.

- Lockset: Schlage - electrified D80 24VDC Rhodes 626 Dull Chrome Finish.

- Transfer Hinge: - Marray TEF6C Brushed Chrome over steel. Standard weight, 5 knuckle ball bearing.

- Card Reader: - HID ThinLine II Reader (classic black) with 18" pigtail.

- Walls and ceiling shall be treated to eliminate dust. Finishes shall be light in color to enhance room lighting.

- Electrical: A minimum of four (4) dedicated 30A, 110V AC duplex electrical outlets, each on separate circuits, shall be provided for equipment power. Consideration should be given to identifying those outlets dedicated to telecommunications equipment. In addition, convenience duplex outlets shall be placed at 6 ft. intervals around the perimeter walls, at a height of 6 in. above the floor.

- A minimum of (2) 2-ton AC units shall be provided for each MDF Room. Units shall be Carrier Model # 40QAB024-331 Indoor unit, paired with Carreir Model # 38HDC024-3 Out door unit, or City approved alternate.

- These units shall be powered on separate circuits to accommodate redundancy requirements with all HVAC circuit breakers located within MDF.

- HVAC units to be permanently mounted to slab or structure. Exposed elements to be secured and protected from vandalism or theft.

- Exterior wiring or cables servicing HVAC unit to be run in rigid weatherproof conduit.

- Exterior ductwork to be enclosed in protective chase.
- If emergency power is available, consideration shall be given to automatic power backup HVAC
- If an emergency power source is available in the building, it is desirable that at least one of the duplex outlets be so supplied.
- Floor loading capacity must be sufficient to bear both the distributed and concentrated load of installed equipment.
- The equipment room should not be located below water level; preventative measures should be taken to prevent water infiltration.
- Sources of electromagnetic interference, vibration, and contaminants shall be taken in consideration.
- Access shall be made available to the independent telecommunications grounding system specified by ANSI/TIA/EIA 607.

TIA/EIA-569-A contains fire-stopping, sprinkler requirements, miscellaneous pathways, telecommunications recommendations of separation from less than 480V power lines. Further information of entrance rooms can be found in TIA/EIA-569-A and the BICSI Telecommunications Distribution Methods Manuals.

Recognized Backbone Cables in accordance with the City of Loma Linda Connected Community Program and ANSI/TIA/EIA 568-B are noted below.

- Single-mode optical fiber

All intra-building, (within the building) fiber optic backbone cables shall meet the appropriate NEC flame and smoke specifications. These include NEC Article 800 for copper cables and Article 770 for fiber optics. All cables shall meet or exceed the electrical specifications of ANSI/TIA/EIA 568-B. In addition, Corning Cabling Systems, an ISO 9000 series manufacturer, is the manufacture of choice for all fiber optic cable and connectivity.

Installers should anticipate intra-building backbone fiber supporting voice/data/video applications shall be singlemode fiber, unless otherwise specified by The City of Loma Linda.

Inter-building backbone fiber supporting data applications will also be singlemode fiber, as specified by The City of Loma Linda. Fiber counts will also be specified by The City

of Loma Linda, though it is suggested backbone cable should allow for a minimum 25% growth.

Optical Fiber Backbone Cable Specifications:

Transmission Parameters (outdoor single-mode):
Attenuation: 0.5dB/km at 1310 nm
.0.5dB/km at 1550 nm
Operating Temperature Range: -40 degrees F to 158 degrees F

All fiber optic cable installed for The City of Loma Linda shall conform to the Corning Cabling Systems manufacturer warranty requirements.

The type of connectors used for all fiber optic cabling shall be "SC" (UPC) uniform polish connector at each residence and "SC" (APC) angle polish connector at each MDF, as determined by the City of Loma Linda for any new installation and shall conform to requirements of Corning cabling Systems.

All splicing of backbone fiber optic cables shall be "Fusion" type.

Backbone Distance in accordance with TIA/EIA 568-B.1 are as follows:

- Single-mode Fiber Applications: 9,840 ft.

While it is recognized that the capabilities of single-mode fiber may allow for backbone link distances of up to 37 miles, this distance is generally considered to extend outside the scope of TIA/EIA 568-B.1.

6.3 Entrance Facility considerations

- The building entrance facility consists of the telecommunications service entrance to the building, including the entrance point through the building wall, and continuing to the entrance room or space. The entrance facility may contain the backbone pathways that link to the main Equipment room and to other buildings in campus situations.

- The City of Loma Linda and all carriers and telecommunications providers involved in providing service to the building shall be contacted to establish their requirements and explore alternatives for delivering service.

- An alternate entrance facility should be provided where security, continuity of service, or other special needs exist.

- The location of other utilities, such as electrical, water, gas, and sewer, shall be considered in the selection of the telecommunications entrance facility.

- In single or multi tenant buildings, an equipment room may house the entrance facility.

- For recommendations on all commercial building communication entrance facility infrastructure design requirements such as, proper sizing of an entrance facility, intra-building pathway design and building entrance conduit design, etc., refer to the ANSI/EIA/ITA-569-A.

6.4 Equipment Room

- In single or multi tenant buildings, an equipment room may house the entrance facility, the MDF, and a floor-serving terminal.

- An equipment room typically houses more equipment than a floor-serving terminal and it has different space requirements.

- An equipment room requires other support facilities such as power, heating, ventilation and air conditioning (HVAC). For more information on equipment rooms, see ANSI/TIA/EIA-569-A.

- Each Equipment Room requires the installation of a FM-200 Fire Suppression System.

- HFC-227 (FM-200), chemically known as heptafluoropropane, is an alternative fire suppression system agent manufactured in the United States by Great Lakes Chemical (FM-200) and DuPont Corporation (HFC-227). It is a replacement for the ozone depleting Halon 1301 used extensively before 1994.

- FM-200 (HFC-227) has no ozone depletion potential. Its ODP is zero.

- FM-200 has found by leading toxicologists to be safe for use when people are present. Just as with Halon 1301, people can be exposed to normal extinguishing concentrations without any fear of health problems.

- For recommendations on all commercial building communication infrastructure design requirements such as; proper sizing of an equipment room, floor loading, intra-building pathway design, building entrance conduit design, telecom closet design, etc., refer to the ANSI/EIA/ITA-569-A.

6.5 Backbone Pathways

6.5.1 General

- Within buildings consideration should be given to establishing spare pathway capacity (i.e., conduit w/pull-string) for future media additions or modifications that would be difficult or impossible to cable.

6.5.2. Intrabuilding Backbone/Horizontal Pathways

- For recommendations on all commercial building communication infrastructure intra-building pathway and horizontal pathway design, refer to the ANSI/EIA/ITA-569-B.

6.5.3 Interbuilding Telecommunications Backbone Pathways

- Interbuilding telecommunications backbone pathways provide a means of interconnecting separate buildings and consist of underground, buried, aerial and tunnel pathways.

- An industry standard splice node vault shall be provided for each commercial building. All vaults shall be sized to accommodate fiber optic splice enclosures.

- The splice node vault shall be a Carson Industries, M-series G2436-18 (medium duty) or Utility Vault Company equal, with a static vertical load rating of Tier 5 – (Design Load 5,200lbf); (Test Load 11,282lbf) or equal.

- Minimum splice node vault size shall be 24”x36”x36”.

- The developer shall be responsible for providing two (2), 4” conduits from the MDF to the closest City-owned fiber-optic backbone connection point. This is to be determined at the plan check phase.

- The developer shall be responsible for providing four (4) 1” OSP rated inner ducts or two (2), 1” and one 1.5” OSP rated inner duct in each 4” conduit. This is to be determined at the plan-check phase.

- The developer shall be responsible for providing a minimum of one (1), 4" conduit from the MDF to the associated splice node vault at each commercial building.

- The developer shall be responsible for providing two (2), 1" and one 1.5" inner duct in each 4" conduit. This is to be determined at the plan-check phase.

- The developer shall be responsible for providing a minimum of one (1), 2" conduit from the splice node vault to the associated commercial building entrance facility. This is to be determined at the plan check phase.

- The "Core & Shell" developer shall be responsible for providing two (2), 4" conduits from the MPOE to the closest City-owned fiber-optic backbone connection point. This is to be determined at the plan check phase.

- The developer shall be responsible for providing four (4) 1" OSP rated inner ducts or two (2), 1" and one 1.5" OSP rated inner duct in each 4" conduit. This is to be determined at the plan-check phase.

- The developer must provide industry standard pull strings in each conduit pathway.

- For more information on interbuilding telecommunications backbone pathways, see ANSI/TIA/EIA-758.

6.6 Backbone Cabling

6.6.1 Recognized Cables

Recognized backbone cables include:

- Corning Single mode fiber (ANSI/TIA/EIA-492CAAA).

- Berk-Tek Hard-line coaxial (SCTE IPS-SP-100).

- Berk-Tek Series 6 coaxial (SCTE IPS-SP-001).

6.6.2 Topology

- A star topology should be implemented for optical fiber backbone cabling.

- Coaxial backbone cable may be implemented using a star topology.

6.6.3 Interbuilding Cabling Protection

- When buildings are connected with interbuilding cabling, the applicable fusing and voltage protection codes shall be followed.

6.6.4 Interbuilding Fiber-Optic Backbone

- A minimum of six (6) continuous strands, single-mode fiber-optic cable shall be provided from the MDF, through the splice node vault to each individual commercial space.

- Each of the above required, strands of single-mode fiber-optic cable shall have “SC” type (UPC) connectors at each residence and “SC” type (APC) connectors installed at each MDF. The connector shall be the SC-type.

- As an additional requirement, A minimum of one additional continuous strand, single-mode fiber-optic cable shall be provided from the splice node vault to each individual commercial space to allow connectivity access to service providers.

- These additional strands of single-mode fiber-optic cable shall have a “SC” type (UPC) connector installed at the residence only. The other ends are to be coiled and left un-terminated in the splice node vault.

- At each individual commercial space a fiber storage spool shall be provided and utilized within the DCB.

- At the MDF a minimum of two (2) 19” x 8’ industry standard racks shall be provided and installed. It shall be mounted and braced as per applicable standards and local codes.

- At the MDF a minimum of three (3) vertical wire managers shall be provided and installed. (1) between the (2) racks and (1) at each end of rack row.

- At the MDF all individual single-mode fiber-optic strands shall be terminated with “SC” type (APC) connectors and shall be routed and connected to a Corning rack mount pigtailed closet connector housing panel with a 12-fiber shelf.

- Maximum fiber-optic cable outside diameter shall not exceed 1” in each 2” conduit and 1/2 “ in each 1” conduit.

- All single-mode fiber-optic strands must be tested, certified and labeled in accordance with industry standards after installation and termination.

- The developer shall be responsible for providing all material and labor to accommodate all necessary fiber-optic splice hardware.

7. MULTITENANT COMMERCIAL INFRASTRUCTURE

7.1 General

The following is a sequential trace of the cabling system for the multi-tenant/commercial infrastructure from the new Control Building MDF or MPOE to the DCB located in each individual tenant space.

- If a commercial multi-tenant structure consists of (24) twenty four or more individual suites, a Control Building (MDF) shall be located on the development property at a TBD position. Contractors shall contact the City of Loma Linda for location recommendations.

- If a commercial multi-tenant structure consists of less than twenty four (24) individual suites, a secure environmentally controlled data cabinet with 3 feet of clearance is required at the MPOE.

- Access to shared-use space shall be controlled by the building owner or agent.

- Where the total length of cabling from the demarcation point to the furthest outlet exceeds 150 m (492 ft.), the access provider shall be notified at the design stage to accommodate transmission requirements.

- Grounding and bonding shall be performed in accordance with applicable electrical codes. For multi tenant buildings, ANSI/TIA/EIA-607 provides additional bonding and grounding information.

- A DCB shall be provided within each tenant space. The DCB is a cross-connect facility used for the termination and connection of horizontal cables and equipment cords. The DCB as described earlier in this document, may be replaced by a minimum of one (1) 19" wide wall mount cabinet.

- The DCB is used for connection of access providers to the tenant space and to facilitate moves, additions and changes of premises cabling within the residence.

- The contractor must provide a 1" conduit pathway from the DCB to the building MDF or MPOE to facilitate the entrance of access provider media to each residence, i.e., Telephone/CATV.

- Access service provider connectivity minimum requirements are two (2) Berk-Tek Category 6 cabling and two (2) Berk-Tek 75-ohm coaxial cable from the external service provider box through conduit provided to the DCB.

- Space should be allocated adjacent to or within the DCB for the installation of a surge protection device for each conductive cable entering or leaving the building.

- Access to the building electrical ground shall be provided within or near the DCB and in accordance with applicable codes.

- The DCB may consist of a passive cross-connect facility or an active cross-connect facility, or both. As an example, an active cross-connect facility may be embodied in a residential gateway.

7.1.1 Location Requirements for the DCB

- The DCB shall be installed inside the tenant's space in a location that is accessible for cabling maintenance.

- The location should be centralized within each tenant space, where practicable, to minimize the length of outlet cables. Required: Space allocation in the master bedroom closet.

- The DCB shall not be mounted on any exterior wall or garage wall.

7.1.2 Electrical Power

- A dedicated 20 a, 120 v AC nominal, nonswitchable duplex electrical outlet shall be provided within the DCB and labeled "DCB Power" in the tenant space's breaker box.

- The location and height of the electrical outlet should be appropriate for the DCB and associated equipment being installed and shall be in compliance with applicable codes.