

Veterans Benefits Administration

Information Technology Design Guide

VBA T/D Spaces & Cable Pathways Design Guide



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Table Of Contents

1. PURPOSE 3

2. GENERAL REQUIREMENTS..... 3

 2.1. GENERAL CONSTRUCTION CONTRACTOR 3

 2.1.1. Drawings 3

 2.2. CABLING CONTRACTOR..... 3

3. APPLICABLE CODES & STANDARDS..... 3

4. TELEPHONE / DATA SPACES..... 4

 4.1. DATA MAIN DISTRIBUTION FRAME (MDF) SPACE - COMPUTER ROOM..... 4

 4.2. TELEPHONE MDF SPACE..... 4

 4.2.1. Sizing 4

 4.2.2. Flooring..... 4

 4.2.3. Walls..... 4

 4.2.4. Equipment Restriction 5

 4.2.5. New Construction - Rack Space 5

 4.2.6. Existing Facility - Rack/Wall Space 5

 4.2.7. Fire Protection - Existing Facility..... 5

 4.2.7.1. Overhead Sprinkler System 5

 4.2.7.2. Underfloor Space..... 5

 4.2.7.3. Smoke Detection 5

 4.2.7.4. Door Requirements..... 5

 4.2.8. Power and Lighting 5

 4.2.8.1. Emergency Backup Power..... 5

 4.2.8.2. 120 VAC Service Receptacles..... 5

 4.2.8.3. Grounding 6

 4.2.8.4. Overhead Lighting..... 6

 4.2.9. Environmental Conditions 6

 4.2.9.1. Minimum Cooling Requirements: 6

 4.2.9.2. Temperature & Humidity 6

 4.2.9.3. HVAC Duty Cycle..... 6

 4.2.9.4. Floor Venting 6

 4.2.9.5. Shared HVAC 6

 4.3. INTERMEDIATE DISTRIBUTION FRAME (IDF) - T/D CLOSETS..... 6

 4.3.1. Number of T/D Closets per Floor 7

 4.3.2. Sizing T/D Closets..... 7

 4.3.3. Ceilings & Finishes 7

 4.3.4. Entrance Clearance..... 7

 4.3.5. Prohibition for New Construction 7

 4.3.6. Existing Facility: Collocation T/D & Electrical Closets 7

 4.3.7. Existing Facility - Insufficient Closet Space..... 7

 4.3.8. Power and Lighting 7

 4.3.8.1. Emergency Power..... 7

 4.3.8.2. 120 VAC Service Receptacles..... 7

 4.3.8.3. Grounding 8

 4.3.8.4. Overhead Lighting..... 8

 4.3.9. Environmental Conditions 8

 4.3.9.1. Maximum Temperature 8

 4.3.9.2. Minimum HVAC Requirements..... 8

 4.3.9.3. HVAC - Standby Power 8

 4.4. WORKSTATION INTERFACE OUTLETS 8

 4.4.1. Locate By Drawing 8

 4.4.2. Type & Mounting..... 8

 4.4.3. Faceplates & Jacks..... 8

4.4.4. *Mounting Heights* 8

4.4.5. *Mounting Prohibition* 8

5. CABLE PATHWAYS & RACEWAYS..... 9

5.1. POWER POLES 9

5.2. UNSHIELDED PATHWAYS 9

5.3. CONDUIT - GENERAL 9

 5.3.1. *Pull Box Location* 9

 5.3.2. *Pull Box Sizing* 9

 5.3.3. *Maximum Number - 90° Bends* 9

 5.3.4. *Maximum Length Between Pull Points* 9

 5.3.5. *End Dressing* 9

 5.3.6. *Bend Restriction* 9

 5.3.7. *Minimum Bend Radius* 10

5.4. CONDUITS - ENTRANCE 10

 5.4.1. *Maximum Length* 10

 5.4.2. *Minimum Number* 10

5.5. VERTICAL RISERS FOR BACKBONE CABLE..... 10

 5.5.1. *Core Drilling* 10

 5.5.2. *Drilling Approval* 10

 5.5.3. *Risers - Minimum Number between Floors* 10

 5.5.4. *T/D Closet Protrusions* 10

 5.5.5. *Vertical Alignment* 10

 5.5.6. *Conduit/Sleeve Position* 10

 5.5.7. *Sealing* 10

5.6. HORIZONTAL PATHWAYS - BACKBONE CONDUITS 11

 5.6.1. *Between T/D Closets* 11

 5.6.2. *MDF To Vertical Risers* 11

 5.6.3. *MDF Transition: Beneath The Access Floor To Overhead Conduit* 11

5.7. HORIZONTAL PATHWAYS - CABLE TRAYS 13

 5.7.1. *Minimum Tray Size* 13

 5.7.2. *Minimum Vertical Access* 13

 5.7.3. *Maximum Distance to Vertical Drop* 13

5.8. HORIZONTAL PATHWAYS - DUCTS/CELLULAR FLOORS 13

 5.8.1. *Cross Section Sizing* 13

 5.8.2. *Header Duct Termination* 14

 5.8.3. *Cross Run Ducts* 14

 5.8.4. *Floor Access to Ducts* 14

 5.8.5. *Interior Wall Access to Ducts* 14

5.9. HORIZONTAL PATHWAYS - CONDUITS 14

 5.9.1. *When Required* 14

 5.9.1.1. *Vertical Fish Not Possible* 14

 5.9.1.2. *Obstructed Exterior Walls* 14

 5.9.1.3. *Tiled or Masonry Walls* 14

 5.9.1.4. *Other Permissible uses of conduits/sleeves or wire mold:* 14

 5.9.2. *Sizing* 14

 5.9.3. *Routing* 15

 5.9.4. *Elevator Telephone Cables* 15

VBA RO Telephone/Data Spaces & Cable Pathways Design Guide

1. Purpose

This guideline identifies the requirements for building the telephone/data spaces and cable pathways for Veterans Benefits Administration Regional Offices (VARO). The following design criteria are, primarily, for “**NEW CONSTRUCTION**”. The criteria, however, serves as a general guide for existing facilities as well. Each station is encouraged to utilize existing space and cable pathways to the maximum extent possible. If unclear about the design specifications, the station should request technical assistance from Hines Information Technology Center (ITC) Engineering (282/32) or VBA’s Telecommunications Staff (20S2B).

2. General Requirements

2.1. General Construction Contractor

Unless otherwise directed, the General Construction Contractor shall install the cable pathways and construct the telephone/data (T/D) spaces for the cable plant using these guidelines. The spaces to be provided are the Main and Intermediate Distribution Frames (MDF & IDF) where telephone & data cabling terminates and related signal processing equipment is housed and the Workstation Interface Outlet boxes where users connect for service. For new construction, the Telephone and Data MDFs shall be collocated in the Computer Room.

2.1.1. Drawings

The General Construction Contractor shall clearly show conduit runs, cable trays, or wireways on the electrical drawings, showing the exact locations of Telephone MDF Space, Data MDF Space, Computer Room, T/D closets, pull boxes and outlet boxes. Drawings must identify originating locations of conduit runs when both originating and terminating points are not shown on the same drawing.

2.2. Cabling Contractor

As the facility nears completion, a Cabling (sub)Contractor shall install the telephone/data cabling in the cable pathways and T/D spaces provided. Typically the Cabling Contractor also provides and connects the required telephone equipment. A separate guideline entitled **VBA Regional Office Cabling Design Guide** is available to describe what is expected of the Cabling Contractor. Throughout the remainder of this document the term Contractor shall, unless otherwise stated, mean the General Construction Contractor.

3. Applicable Codes & Standards

The following standards, as updated, are the applicable specifications to be used for the construction of the Telephone and Data MDFs spaces collocated in the Computer Rooms, the IDFs spaces located in dedicated T/D closets, and the cable pathways used to connect these spaces to each other and the user Outlet boxes located through-out the VARO:

- ANSI/EIA/TIA-569-A Commercial Building Standard for Telecommunications Pathways and Spaces
- ANSI/TIA/EIA-606 Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
- ANSI/EIA/TIA-607 Commercial Building Grounding/Bonding Requirements
- NFPA - National Fire Protection Association
- NEC - National Electrical Code
- BOCA - Building Owners & Contractors Association, National Building Code
- BICSI - Building Industry Consulting Services, International

These codes and standards shall be applied in addition to the requirements of equipment vendors, system and service suppliers, and state and local governments. The T/D spaces and pathways provided must comply with all requirements of the above codes and standards.

4. Telephone / Data Spaces

4.1. Data Main Distribution Frame (MDF) Space - Computer Room

The Data MDF space houses the local area network (LAN) head-end electronics used to terminate fiber optic data backbone cabling from each T/D closet, LAN servers, and interface with the VBA wide area network. The Data MDF space shall be located in the VARO's Computer Room. A VARO Computer Room has requirements which go beyond those required to support Data services. A separate guideline entitled **VBA Computer Room Design Guidelines** is available and shall be referenced to determine those requirements.

4.2. Telephone MDF Space

In new construction, the Telephone MDF space shall be provided in the Computer Room. In existing facilities, if possible, the Telephone MDF space shall be provided in the Computer Room. If that is not possible, a separate Telephone Equipment Room shall provide the Telephone MDF space - ideally it would be located adjacent to the Computer Room. The Telephone MDF space houses the telephone Electronic Automated Private Branch Exchange (EAPBX), its associated equipment, and the demarcation with the telephone company trunks. This space also terminates telephone unshielded twisted pair (UTP) backbone cabling from each T/D closet and provides the means to patch EAPBX ports to these backbones.

4.2.1. Sizing

VBA's Telecommunications Staff (20S2B), in conjunction with the HINES ITC Engineering staff, will review and approve the location, design, and size of the Telephone MDF space during review of the design drawings using the following minimum size:

Number Of Lines	Size
100-899	500 sq. ft.
900-1599	700 sq. ft.
1600-1999	900 sq. ft.
2000-2399	1100 sq. ft.
2400-2799	1300 sq. ft.
2800-3199	1500 sq. ft.
3200-3999	1700 sq. ft.

4.2.2. Flooring

A new Telephone MDF Space shall have a raised floor (computer flooring) with a minimum 12" finished floor height and a suspended ceiling. If adjacent to the Computer Room, the floor shall be the same height. The same specifications as the Computer Room raised floor apply. The Contractor shall verify with the EAPBX provider, that the floor design load is adequate to support the EAPBX, it's UPS system, and associated batteries. The Contractor shall increase the floor loading capacity, as necessary, to meet equipment load requirements.

4.2.3. Walls

All walls shall be painted a light color. If adjacent to the Computer Room, the wall separating the two adjacent rooms shall extend from finished floor to floor above. The common plenum below the wall shall be fitted with security bars to allow cable access and airflow but no personnel access.

4.2.4. *Equipment Restriction*

Equipment not related to the support of the Telephone MDF Space (e.g., water, drainage, steam piping, ductwork, pneumatic tubing, etc.) shall not be installed in, pass through, or enter the room.

4.2.5. *New Construction - Rack Space*

For new construction, sufficient equipment rack space shall be provided so that the cabling contractor may rack mount 19" patch panels to terminate telephone backbone cables and rack mount 19" patch panels to terminate the telephone switch ports. The cabling contractor shall provide RJ-45 Patch cords to program specific switch ports to backbone pairs.

4.2.6. *Existing Facility - Rack/Wall Space*

In existing facilities with insufficient floor space, wall mounted punch-down backboards and cross-connects shall be used to program the switch ports to backbone pairs. The backboards shall be 3/4" plywood, preferably void free, 8 feet high, capable of supporting attached equipment. Plywood should either be fire-rated as defined in NFPA -101, Chapter 3, Life Safety Code (NTE 25 Flame Spread) or covered with two coats of fire retardant paint.

4.2.7. *Fire Protection - Existing Facility*

If the Telephone MDF space is not located in the Computer Room, fire protection of the Telephone MDF Space shall be provided as per applicable code. Apply NFPA 75 if no other applies.

4.2.7.1. Overhead Sprinkler System

A "pre-action" automatic sprinkler system shall be installed. Sprinkler heads shall be provided with wire cages to prevent accidental operation. An appropriate fire extinguisher shall be provided near the exit door.

4.2.7.2. Underfloor Space

If the raised floor is 18 inches or more in height and required by local code, an automatic sprinkler system shall be provided in the underfloor space.

4.2.7.3. Smoke Detection

Smoke detection shall be provided for both the ceiling and under floor and must be connected to the building fire alarm system and pre-action sprinkler system.

4.2.7.4. Door Requirements

The Telephone Equipment Room shall be provided with a Class B fire rated, 40" wide x 84" high self-closing, self-locking door equipped with a deadbolt lock and intrusion alarm.

4.2.8. *Power and Lighting*

4.2.8.1. Emergency Backup Power

Provide an electrical panel for use by Telephone MDF Space with a full capacity isolated neutral bus and isolated ground (IG) bus connected to the emergency backup power supply. The panel shall provide 208/120 VAC, three (3) phase, four (4) wire circuits. The current rating of the panel and number and size of the circuit breakers, circuits and receptacles, etc. will be determined by the requirements of the switching equipment. Receptacles, circuits and panels shall be of the isolated ground (IG) type.

4.2.8.2. 120 VAC Service Receptacles

Install a minimum of one 120 VAC duplex receptacle on each wall surface and every 8 feet minimum to be used for service and test equipment. Each 20A circuit shall power no more than 2 duplex receptacles. Surge protectors, if required, will be provided by the Cabling Contractor.

4.2.8.3. Grounding

Provide access to the telecommunications grounding system as specified by ANSI/TIA/EIA-607, connected by #6 AWG copper wire to the building grounding electrode.

4.2.8.4. Overhead Lighting

Provide sufficient overhead lighting, located to avoid undesirable shadows, to give an average of 30 to 50 foot candles of illumination at desk elevation. An “on/off” switch shall be mounted on the wall adjacent to the door. Lighting fixtures shall be connected to the emergency power system, if emergency power is present. Lighting fixtures should not be powered from the same electrical distribution panel as the telephone/data equipment or service receptacles. If fluorescent lighting fixtures are provided, they must be either louvered or lens type.

4.2.9. *Environmental Conditions*

4.2.9.1. Minimum Cooling Requirements:

Number Of Lines	BTU's	Size
100-899	20,000	500 sq. ft.
900-1599	30,000	700 sq. ft.
1600-1999	40,000	900 sq. ft.
2000-2399	50,000	1100 sq. ft.
2400-2799	70,000	1300 sq. ft.
2800-3199	90,000	1500 sq. ft.
3200-3999	110,000	1700 sq. ft.

4.2.9.2. Temperature & Humidity

Telephone MDF Space shall be equipped with circulation and heating/cooling equipment capable of maintaining the space between 60 and 80 degrees Fahrenheit, with humidity control. The relative humidity should not exceed 50%. Heating and cooling requirements shall also include the heat dissipation of the back-up batteries and associated rectifiers.

4.2.9.3. HVAC Duty Cycle

The HVAC equipment shall be stand-alone in design and accommodate a twenty-four hour, seven days a week, year-around operation.

4.2.9.4. Floor Venting

For raised flooring (computer flooring), every third tile shall be vented to accommodate HVAC equipment.

4.2.9.5. Shared HVAC

In existing facilities, if the Telephone MDF Space is provided by a Telephone Equipment Room adjacent to the Computer Room, the Computer Room air conditioners should be utilized to cool the equipment room if this is possible and if sufficient capacity exists.

4.3. Intermediate Distribution Frame (IDF) - T/D Closets

In new construction, telephone and data IDF functions shall be provided by consolidated T/D Closets. The T/D closets shall provide sufficient floor space to rack mount LAN concentrator electronics, terminate fiber optic data backbone cabling from the Data MDF, terminate UTP telephone backbone cabling from the Telephone MDF, and terminate horizontal UTP cabling routed to each Workstation Interface Outlet box serviced by the closet. For

existing facilities, consolidation should be achieved to the extent possible given existing facility and monetary constraints.

4.3.1. Number of T/D Closets per Floor

There shall be a minimum of one (1) T/D closet per floor for areas of up to 10,000 SF of useable floor space. In any case, closets shall be provided in quantities and locations to limit UTP cable runs from the closet to any of its Workstation Interface Outlets to 290 feet or less. UTP Cable runs, designated as telephone only - i.e. wall phones, may exceed 290 feet, if approved by VBA's Telecommunications Staff (20S2B) or HINES ITC Engineering Staff.

4.3.2. Sizing T/D Closets

The minimum acceptable closet dimensions are as follows. These dimensions are based on areas served up to and not exceeding 10,000 sq. ft.

Serving Area (sq. ft.)	Closet Size (ft.)
10,000	10 x 11
8,000	10 x 9
5,000	10 x 7 (Min w/ Telco & data)
3,000	8 x 4 (Telco only - no data service)

4.3.3. Ceilings & Finishes

Closets shall not have a suspended ceiling. The ceiling will be a minimum of nine (9) feet from the floor. Floors, walls, and ceiling should be treated to eliminate dust. Finishes shall be of light color to enhance room lighting.

4.3.4. Entrance Clearance

Entrance must have a minimum unobstructed area of 48 inches in from the door.

4.3.5. Prohibition for New Construction

Cabinets shall not be used in lieu of closets in new construction. In new construction, T/D closets may be placed adjacent to but shall not be combined with electrical closets.

4.3.6. Existing Facility: Collocation T/D & Electrical Closets

For existing facilities, T/D and electrical equipment closets may be collocated, provided T/D spacing as defined in article 4.3.2 of this document is maintained for the equipment and installation is in accordance with the NEC. If possible locate telephone/data and electrical equipment on opposite walls.

4.3.7. Existing Facility - Insufficient Closet Space

If T/D closet space is unavailable in existing facilities, lockable fan ventilated rack cabinets may be used in lieu of T/D closets for Data IDF's including LAN concentrator electronics, termination of fiber optic data backbone cabling from the Data MDF and termination of horizontal UTP data cabling routed to each Workstation Interface Outlet. Consult with Hines ITC Engineering if necessary.

4.3.8. Power and Lighting

4.3.8.1. Emergency Power

All receptacles shall be connected to the emergency power system if emergency power is present.

4.3.8.2. 120 VAC Service Receptacles

Provide a minimum of one (1) 120 VAC duplex receptacle every 8 linear feet of wall space. Each 20A circuit shall power no more than 2 duplex receptacles. Surge protectors, if required, will be provided by the Cabling Contractor.

4.3.8.3. Grounding

Provide the telecommunications grounding system as specified by ANSI/TIA/EIA-607, connected by #6 AWG copper wire to the building grounding electrode. Receptacles, circuits, and panels shall be of the isolated ground (IG) type.

4.3.8.4. Overhead Lighting

Install at least one (1) ceiling mounted light fixture to provide 50 foot candles measured 3 feet above the finished floor without glare or shadows. Install an “on/off” switch on the inside wall adjacent to the door. Lighting shall be connected to the emergency power system if emergency power is present. Lighting fixtures should not be powered from the same electrical distribution panel as the telephone/data equipment or service receptacles.

4.3.9. *Environmental Conditions*

Active heat producing equipment will be housed within these closets. A sufficient number of air changes should be provided to dissipate sensible heat. A positive pressure shall be maintained with a minimum of one air change per hour.

4.3.9.1. Maximum Temperature

Provision must be made to ensure that closet temperatures do not exceed 90° F during periods when the building is unoccupied and building air is not in use.

4.3.9.2. Minimum HVAC Requirements

HVAC shall be included in the design of the T/D closets to maintain a temperature the same as the adjacent office area. At a minimum, louvers and or vent vans must be provided and meet NFPA requirements.

4.3.9.3. HVAC - Standby Power

If a standby power source is available in the building, the HVAC system serving the T/D closet should be connected to the standby supply.

4.4. Workstation Interface Outlets

4.4.1. *Locate By Drawing*

The Contractor will provide as-built drawing(s) showing location and deviation from standard vertical, flush mount to the Cabling Contractor via the Regional Office Project Team or IRM staff.

4.4.2. *Type & Mounting*

Outlet boxes shall be installed at each wall outlet location with a minimum of a pull string to the interstitial ceiling space for cable installation. Outlet boxes shall be single gang, vertically mounted electrical boxes. Outlet boxes shall be flush-mounted whenever possible. The Contractor shall drill ¾” access holes and install grommets for cable protection.

4.4.3. *Faceplates & Jacks*

Workstation Interface outlet box faceplates and jacks shall be supplied and installed by the Cabling Contractor.

4.4.4. *Mounting Heights*

The mounting heights for Workstation Interface outlets shall be:

• DESK OUTLET	1 foot, 6 inches above finished floor
• PAY STATIONS	4 feet above finished floor.
• WALL OUTLET	4 feet, 6 inches above finished floor
• SPECIAL	As required(Refer to furniture / outlet plan)

4.4.5. *Mounting Prohibition*

Workstation Interface outlets shall not be located within 48 inches of the “swing open” side of the inward opening doors, nor within 18 inches of light switches, thermostats, or other electrical receptacles.

5. Cable Pathways & Raceways

The Contractor shall install empty raceways for the telephone/data system including cable trays or ducts, conduits, outlet boxes, and other items as described herein. For outlets in on-grade concrete floors in open areas not served by a raised access floor or a hollow wall, the Contractor shall provide underfloor cable pathways via conduit, under-floor duct, or a celled floor system imbedded in the concrete with preset inserts.

5.1. Power Poles

Power poles may be considered and approved only by the Regional Office Director or his designated representative as an alternate and should be considered if funding is limited.

5.2. Unshielded Pathways

To avoid electromagnetic interference (EMI), all pathways without conduit between telephone/data cabling and sources of electromagnetic interference, should provide clearances of at least:

- 4 feet from motors or transformers
- 1 foot from electrical power distribution.
- 5 inches from fluorescent lighting. Pathways should cross perpendicular to fluorescent lighting and electrical power cables or conduits whenever practical.

Note: If these clearances cannot be maintained, conduit or enclosed wireways / cable trays with hinged access shall be provided in affected areas.

5.3. Conduit - General

5.3.1. Pull Box Location

Four-inch conduits/ducts within buildings shall be provided with a pull box after 90 degree bends with the exception of termination points.

5.3.2. Pull Box Sizing

Pull boxes shall be sized as required by the NEC.

5.3.3. Maximum Number - 90° Bends

Conduits shall contain no more than two 90° bends between pull points (outlet or pull boxes or T/D closets).

5.3.4. Maximum Length Between Pull Points

No section of conduit shall be longer than 100 feet between pull points.

5.3.5. End Dressing

Conduits shall be equipped with insulated bushings to preclude damage to cable.

5.3.6. Bend Restriction

All conduit bends shall be made so the internal conduit diameter is not reduced.

5.3.7. *Minimum Bend Radius*

Minimum radius of conduit bends shall be as follows:

Conduit Size (in Inches)	Conduit Bend Radius (in Inches)
3/4	8
1	11
1 1/4	14
1 1/2	16
2	21
2 1/2	25
3	31
3 1/2	36
4	40

5.4. Conduits - Entrance

5.4.1. *Maximum Length*

Four-inch conduits/ducts outside buildings shall not exceed 400 feet between maintenance holes or handholes.

5.4.2. *Minimum Number*

Install a minimum of two, 4-inch conduits from the telephone company maintenance hole to the Telephone MDF located in the Computer Room. One of the conduits should be a spare. Verify quantity with Telephone Company and Telephone Switch installation Contractor (typically the Cabling Contractor). Coordinate all conduit entrance locations with the VBA 20S2B Telecommunications Staff in Central Office.

5.5. Vertical Risers for Backbone Cable

5.5.1. *Core Drilling*

Coordinate all core drilling with the Cabling Contractor.

5.5.2. *Drilling Approval*

Caution shall be taken to avoid drilling through structural beams to install conduit/sleeves. Get approval of Project architect / structural engineer in writing prior to drilling.

5.5.3. *Risers - Minimum Number between Floors*

Primary vertical risers between T/D closets on adjacent floors shall be sized to meet the requirements of the building. As a minimum, four 4" sleeves should be installed in each riser, one should be a spare. For further guidance on the required number of conduits/sleeves, consult with the Cabling Contractor through the RO IRM Staff or COTR.

5.5.4. *T/D Closet Protrusions*

Conduit/sleeves entering T/D closets shall protrude one (1) inch above the floor or one (1) inch below the ceiling.

5.5.5. *Vertical Alignment*

Conduit/sleeves shall be aligned to allow a straight and clear vertical pull of cable.

5.5.6. *Conduit/Sleeve Position*

Conduit/sleeves should be adjacent to a wall on which the cable can be supported and should be installed in a manner that will not interfere with full use of the equipment racks for termination equipment.

5.5.7. *Sealing*

All conduit/sleeves located in T/D closets, and all firewall penetrations, shall be sealed with standard UL approved, non-hardening duct seal compound to prevent the entrance or exit of moisture and gasses and to meet the local fire code requirements.

5.6. Horizontal Pathways - Backbone Conduits

5.6.1. Between T/D Closets

Conduit between T./D closets on the same floor shall be sized to house the number of conductors required, including future growth. In the absence of guidance on the number of conductors needed, install a minimum of one (1), four inch (4”) conduit between closets.

5.6.2. MDF To Vertical Risers

A minimum of four 4-inch conduits shall be installed from the Telephone MDF located in the Computer Room to each vertical riser.

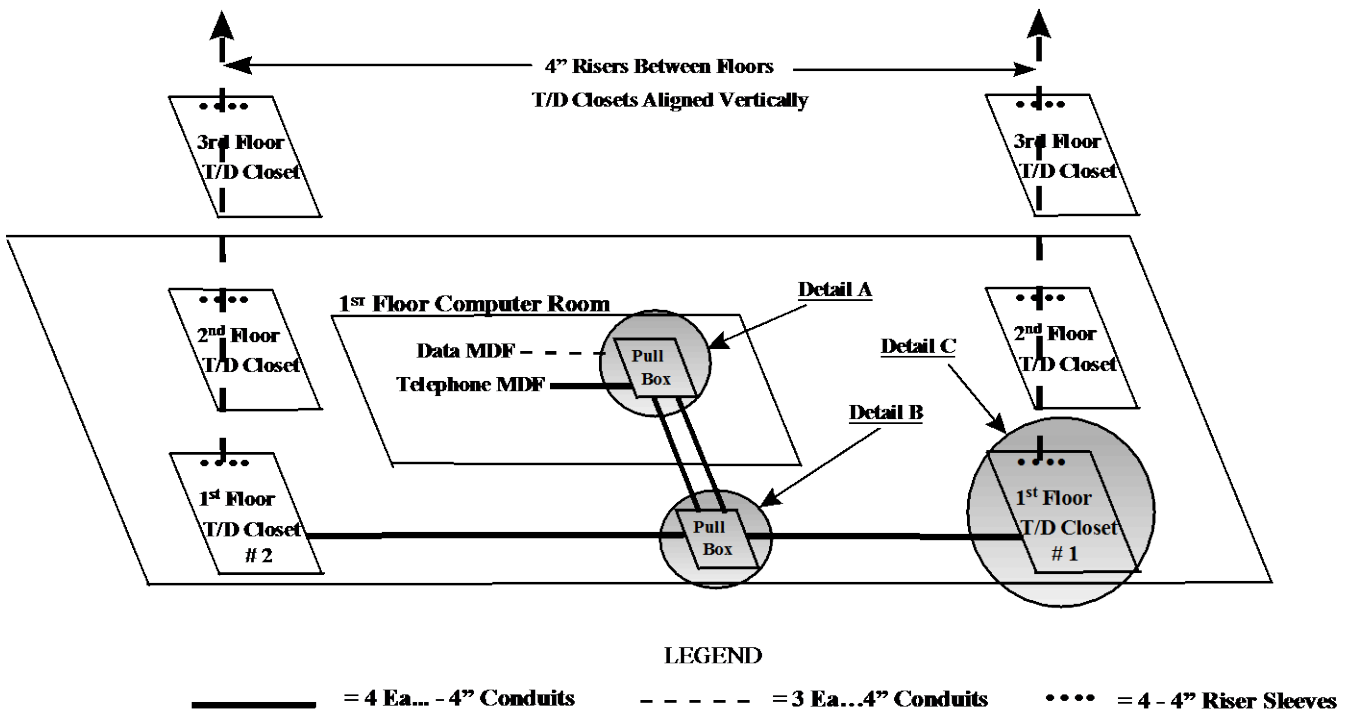
5.6.3. MDF Transition: Beneath The Access Floor To Overhead Conduit

Pull boxes and four 4-inch conduits from Telephone MDF in the Computer Room shall be installed to provide a cable path from under the access floor to the overhead conduit. Locations shall be coordinated with the VARO IRM staff. The figures below graphically portray how the backbone conduit requirements should be implemented.

4” BACKBONE CONDUITS

Note: Typical for New Construction

Conduit quantity and pull box size are dependent upon site-specific cable plant requirements. Refer to the Projects’ cable plant design and floor plans to determine required capacities.



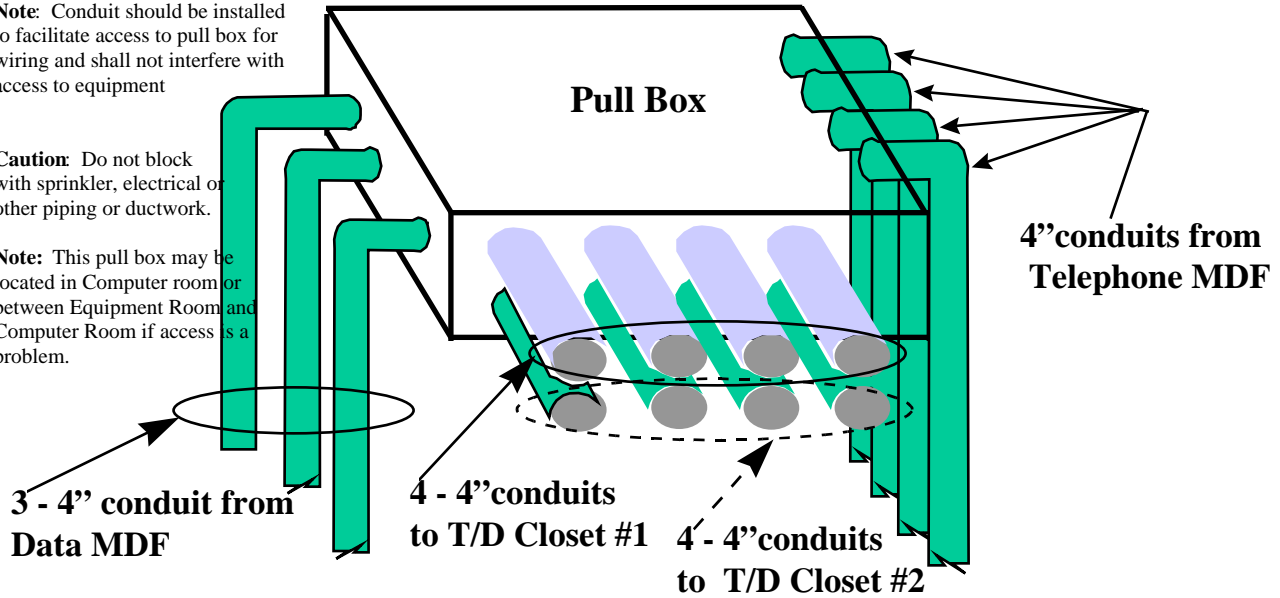
DETAIL A

Computer Room Pull Box - Ceiling mount

Note: Conduit should be installed to facilitate access to pull box for wiring and shall not interfere with access to equipment

Caution: Do not block with sprinkler, electrical or other piping or ductwork.

Note: This pull box may be located in Computer room or between Equipment Room and Computer Room if access is a problem.

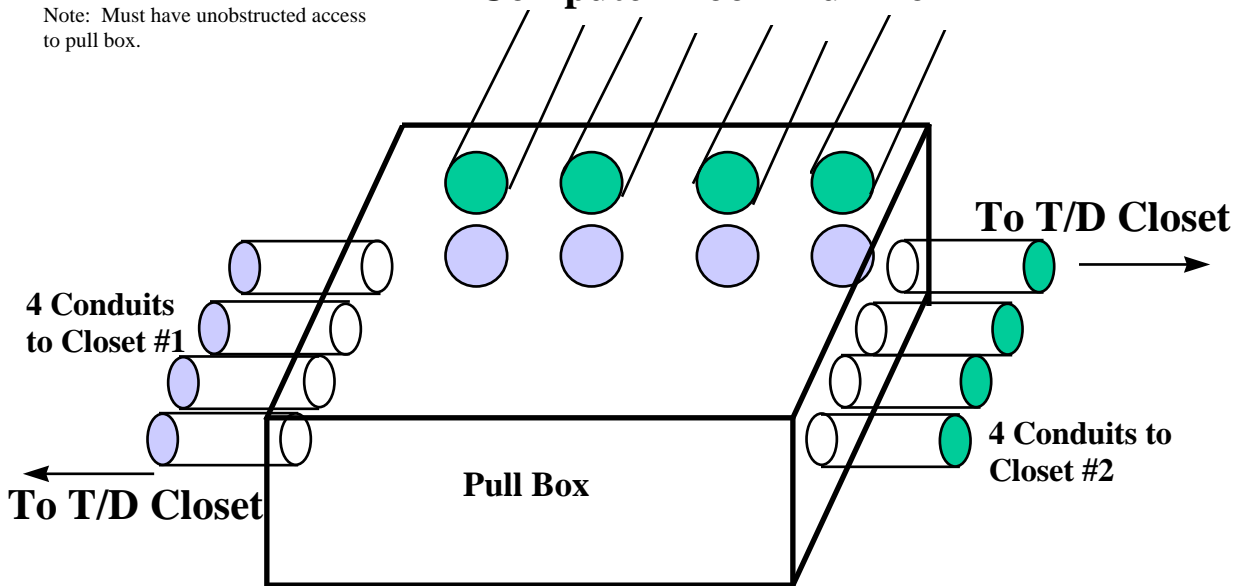


DETAIL B

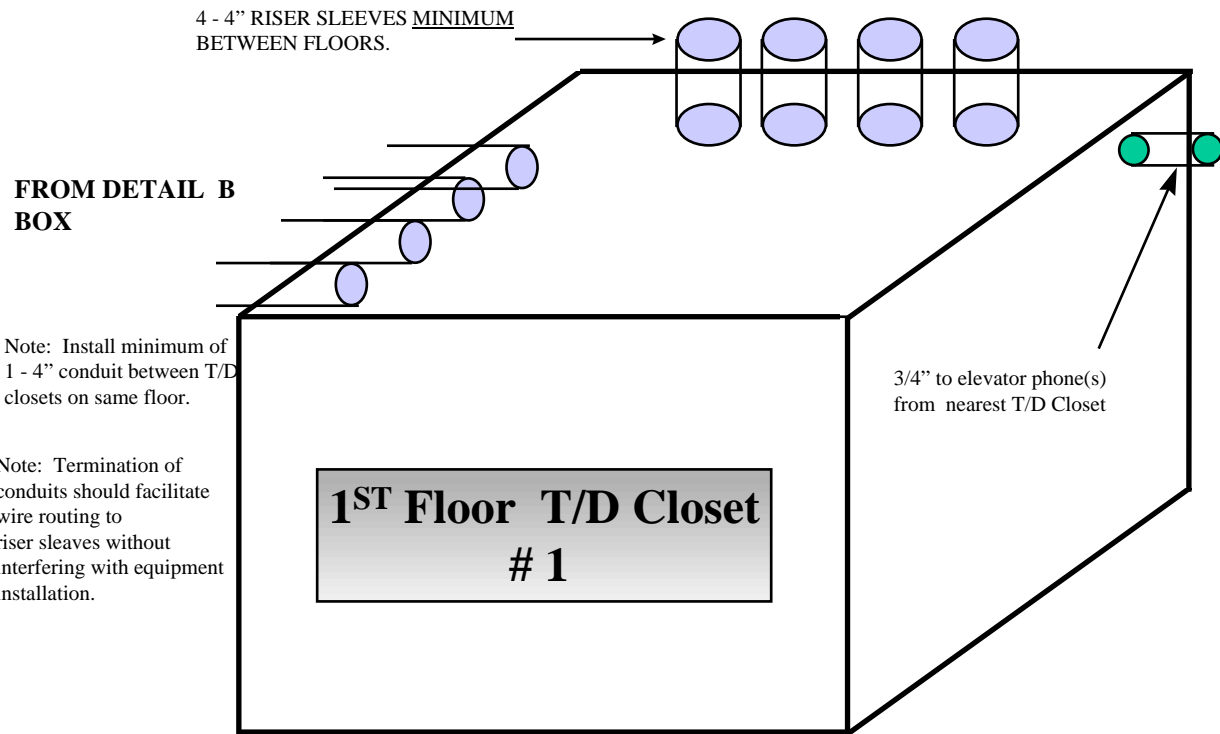
8 Conduits from

Computer Room Pull Box

Note: Must have unobstructed access to pull box.



DETAIL C Typical TELEPHONE / DATA CLOSET



5.7. Horizontal Pathways - Cable Trays

Cable Trays may be provided as the pathway for horizontal cable throughout each floor of the office building. If used, cable trays shall be installed above the suspended ceiling, over corridors or walkways in open office areas whenever possible for ease of access.

5.7.1. Minimum Tray Size

Cable trays shall have a minimum size of 12"x4". They shall originate at the MDF equipment racks in the Computer Room and in IDF equipment racks located in the T/D closets. For areas provided with raised access floors, cable trays shall be installed under the access floor. If necessary, walls, power poles, conduit or furred out chase columns shall be used to provide a transition path from ceiling to floor.

5.7.2. Minimum Vertical Access

Minimum unobstructed vertical access clearance above trays shall be 4 inches. Ceiling mounted cable trays shall be accessible from below.

5.7.3. Maximum Distance to Vertical Drop

Cable tray system shall provide support of horizontal cable to within 30 feet of all Vertical drops to workstation outlets. From tray to vertical drop, cable shall be supported by approved "J-hooks", ceiling grid hooks or other approved method in accordance with ANSI/EIA/TIA standards. "J-hooks" shall be installed by Cabling Contractor when necessary. Vertical distribution of cable shall be within hollow walls, furred out chase columns, utility/furniture poles, conduit, wiremold or other approved means.

5.8. Horizontal Pathways - Ducts/Cellular Floors

Ducts/cellular floors may be provided as an alternate to cable trays. All underfloor duct systems shall be designed in accordance with Section 4.2 of ANSI/TIA/EIA 569-A.

5.8.1. Cross Section Sizing

Ducts/cellular floors shall be sized to provide a minimum cross sectional area of one (1) square inch of underfloor duct area (home run) for every two hundred (200) square feet of usable office floor space served.

5.8.2. Header Duct Termination

Header ducts shall terminate in the Computer Room and T/D closet equipment racks with a slot or elbow as applicable.

5.8.3. Cross Run Ducts

Cross run ducts should be installed at a maximum spacing of 10 - 15 feet to allow access to systems furniture without the need to have awkward cable runs on floor. Each office equipped with under floor ducts or cellular floors should have a minimum of one distribution duct. Consideration should be given to approved furniture layout plans.

5.8.4. Floor Access to Ducts

Access or handhole units shall be placed in duct runs to permit changes in direction and provide access for pulling cables.

5.8.5. Interior Wall Access to Ducts

All under floor ducts/cells must be extended to the wall partition in rooms where installed and provide an access opening to wall interiors. Access plate shall be installed on each wall above duct for wire pull access.

5.9. Horizontal Pathways - Conduits

Conduit is not required for workstation wall outlets. If conduit is not installed, rough edges on drilled access holes on horizontal and vertical joists shall be deburred and grommeted for cable protection.

5.9.1. When Required

Conduit shall be installed for the following circumstances.

5.9.1.1. Vertical Fish Not Possible

If a cable cannot be fished vertically to the outlet box from the interstitial ceiling space. Contractor shall determine this from furniture/outlet drawings.

5.9.1.2. Obstructed Exterior Walls

Conduit, stubbed out in interstitial space, shall be installed for outlet locations on exterior walls to allow horizontal cable routing below window sills or other obstructions. The Contractor shall provide vertically flush-mounted single gang outlet boxes at these locations. Face plates and jacks are to be provided by Cabling Contractor.

5.9.1.3. Tiled or Masonry Walls

Conduit shall be installed for individual station runs serving outlets in tiled or masonry areas such as brick exterior walls, hallways and all locations where unobstructed concealed cable installations are not readily possible.

5.9.1.4. Other Permissible uses of conduits/sleeves or wire mold:

- For wiring and outlet box for wall-mounted pay telephone stations in corridors and lobbies.
- For wiring and outlet box for wall-mounted telephones.
- For wire/cable runs penetrating fire stops, radiation, shear walls and demising partitions.
- For wiring/cabling between radio/PA system equipment cabinets to nearest T/D closet

5.9.2. Sizing

When used, conduit shall be sized based on the number of 4 pair, UTP cables to be pulled to service the requirements shown on the furniture/ Workstation Interface outlet plan drawings in accordance with "Conduit sizing", table 4.4.1 of ANSI/EIA/TIA 569-A and installed in accordance with the NEC.

5.9.3. Routing

Conduit runs shall be stubbed up into interstitial space or routed to the finished walls - color to match wall color. Conduit shall be used for unfinished storage areas, equipment spaces and the like. Conduit runs to/from a closet or interstitial space shall terminate at the closet ceiling.

5.9.4. Elevator Telephone Cables

Elevator telephone cables shall be extended to a terminal box located outside the elevator shaft, approximately midway of the maximum up/down travel range of the elevator car. The terminal box must be easily accessible from the internal RO area and connected by $\frac{3}{4}$ inch conduit to the nearest T/D closet.