PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Optical transmission cable.
B. Non-IP telephone cables.
C. Video cable.
D. Multiple conductor control cables.
E. Thermocouple cables.
F. Ethernet cable.
G. Radio cable.
H. Public Announcement (PA) Cable.

1.02 RELATED SECTIONS

A. Interface and coordinate the work of this Section with:

1. Section 20 70 26, Common Materials and Methods for Electrical Systems.
2. Section 20 50 13, Raceways for Facility Services.
3. Section 26 05 24, Low Voltage Wires and Cables.
4. Section 20 70 13, Common Materials and Methods for Electronic Services.
5. Section 27 13 01, Communication Cables and Related Equipment.

1.03 MEASUREMENT AND PAYMENT

A. General: Electronic circuits, wires, and cables, as specified herein, will not be measured separately for payment but will be paid for as part of the Contract lump-sum price for the related item of work in the Bid Schedule of the Bid Form.

1.04 REFERENCES

A. American Society for Testing and Materials (ASTM):

B. California Code of Regulations (CCR):
   1. CCR Title 24, Part 3, California Electrical Code

C. Telecommunications Industry Association (TIA):
   1. TIA-606 Administration Standard for the Telecommunications Infrastructure

D. Insulated Cable Engineers Association, Inc. (ICEA):
   1. ICEA S-84-608 Telecommunications Cable Filled, Polyolefin Insulated, Copper Conductor Technical Requirements

E. Institute of Electrical and Electronics Engineers (IEEE):
   1. IEEE 383 IEEE Standards for Qualifying Electric Cables and Splices for Nuclear Facilities

F. National Electrical Manufacturers Association (NEMA):
   1. NEMA WC 70 Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy
   2. NEMA WC 71 Nonshielded Cable Rated 2001-5000 V for Use in the Distribution of Electrical Energy
   3. NEMA WC 74 5-46 kV Shielded Power Cable for Use in the Transmission and distribution of Electric Energy

G. Rural Electrification Administration (REA):
   1. REA Bulletin Specification for Filled Telephone Cable 1753F-205

H. Underwriters Laboratories (UL):
   1. UL 1581 Reference Standard for Electrical Wires, Cables, and Flexible Cords
   2. UL 1666 Standard for Test for Flame Propagation Height of Electrical and Optical Fiber Cables Installed Vertically in Shafts

I. Engineering Science Data Unit (ESDU):
   1. ESDU 06018 Temperature Measurement: Thermocouples
1.05 SUBMITTALS

A. General: Refer to Section 01 33 00, Submittal Procedures, and Section 01 33 23, Shop Drawings, Product Data, and Samples, for submittal requirements and procedures.

B. Submittal Requirements: Before installation of wires and cables, submit the following applicable information for each type and size of wire and cable.

1. Manufacturer of wire and cable, and certificate of compliance;

2. Number and size of strands composing each conductor;

3. Conductor insulation composition type in accordance with California Electrical Code and thickness in mils;

4. Average overall diameter of finished wire and cable;

5. Minimum insulation resistance in megohms per 1000 feet at 30 degrees Celsius ambient;

6. Jacket composition and thickness in mils;

7. Total number of conductors per cable;

8. Shield material (if any) and thickness;

9. Conductor resistance and reactance in ohms per 1000 feet at 25 degrees Celsius ambient; and

10. Conductor ampacity at 30 degrees Celsius ambient for 600 V wire and cable, 20 degrees Celsius ambient earth temperature, 100 percent load factor and conductor temperature of 90 degrees Celsius for wire and cable rated two kV to five kV.

C. Fiber optic Cable Samples: For fiber optic cables, a 100-foot sample of each optical cable type, single mode and multimode, of the respective sizes indicated, shall be submitted together with full technical specifications for each cable design and construction.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Provide markings on wire and cable in accordance with applicable NEMA and California Electrical Code requirements. Each item shall be labeled with UL listing approval.

B. Ship each unit securely wrapped, packaged, and labeled for safe handling in shipment and to avoid damage.

C. Store wire and cable in secure and dry storage facility.
PART 2 – PRODUCTS

2.01 OPTICAL TRANSMISSION CABLE
A. Refer to Section 27 13 01, Communication Cables and Related Equipment.

2.02 TELEPHONE CABLES
A. Refer to Section 27 13 01, Communication Cables and Related Equipment.

2.03 VIDEO CABLES
A. Refer to Section 27 13 01, Communication Cables and Related Equipment.

2.04 ETHERNET CABLES
A. Refer to Section 27 13 01, Communication Cables and Related Equipment.

2.05 MULTIPLE CONDUCTOR CONTROL CABLE
A. Refer to Section 27 13 01, Communication Cables and Related Equipment.

2.06 THERMOCOUPLE CABLE
A. Provide thermocouple cable with solid conductors meeting requirements of ESDU 06018 and type-compatible with the thermocouple leads furnished with the motor or temperature sensor. Thermocouple cable shall have flame-retardant insulation, pair-assembled with left-hand lay, with flame-retardant outer jacket, with overall shield, and UL-listed as Type PLTC.

2.07 RADIO CABLE
A. Refer to Section 27 13 01, Communication Cables and Related Equipment.

2.08 PUBLIC ANNOUNCEMENT (PA) CABLE
A. Refer to Section 27 13 01, Communication Cables and Related Equipment.

PART 3 – EXECUTION

3.01 INSTALLATION
A. Coordinate installation of communication circuit wires and cables with the requirements of Section 20 70 26, Common Materials and Methods for Electrical Systems, Section 20 50 13, Raceways for Facility Services, Section 26 05 24, Low
Voltage Wires and Cables, and Section 20 70 13, Common Materials and Methods for Electronic Services.

B. Fiber optic cables for Train Control and Communication Systems shall be installed as follows:

1. Communication cables between Stations shall be installed in one of the five innerducts in the Communications section of the system wide raceway.

2. Train control cables between Train Control Rooms or Houses shall be installed in innerducts in the Train Control section of the systemwide raceway.

3. Lateral cables to Train Control Rooms or Houses shall be installed in separate innerducts.

4. Communication cables between BART facilities and train control cables from Train Control Rooms or Houses to wayside devices may be without innerducts in the systemwide raceway.

3.02 IDENTIFICATION

A. Identification of wires and cables shall be in accordance with Section 26 05 24, Low Voltage Wires and Cables.

B. Labeling: Identification tags or labels shall be provided for each cable. Markers, tags and labels shall use indelible ink or etching which will not fade in sunlight or in duct applications. Markers, tags, and labels shall not become brittle or deteriorate for 30 years. Label termination panels with cable number or pair identifier for cables in accordance with TIA-606 and as specified. The labeling format shall be identified, and a complete record shall be provided to the District with the final documentation. Each cable shall be identified with type of signal being carried and termination points.

3.03 TESTING

A. General: Testing shall be in accordance with Section 01 45 24, Testing Program Requirements.

B. For communication related cables, refer to Section 27 13 01, Communication Cables and Related Equipment.

END OF SECTION 20 70 23