

SECTION 33 83 07

RADIO NETWORK / MUTUAL AID RADIO SYSTEM

PART 1 – GENERAL

1.01 SECTION INCLUDES

This Section covers the general approach for the design of the Mutual Aid Radio System.

1.02 RELATED SECTIONS:

- A. 33 83 04, Trunked Radio Network / Distributed Amplifier Radiating Cable System

1.03 MEASUREMENT AND PAYMENT

All work required under this Section will be measured separately and will be paid for as part of the Contract lump-sum price, as part of the related item of work, as indicated on the Bid Schedule of the Bid Form.

1.04 REFERENCES

- A. Federal Communications Commission (FCC) Rules
Code of Federal Regulations, 47 CFR
- B. National Public Safety Planning Administration Committee (NPSPAC)
Region 6 (Northern California) planning regulations for 800 MHz Public Safety Agencies
- C. M/A-Com Incorporated:
Document AE/LZT 123 4618/1, Site Grounding and Lightning Protection

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. Shop Drawings: Submit Shop Drawings showing the layout of the system identifying the location of equipment and accessories.
- C. Product Data: Submit manufacturers' Product Data for all manufactured items of materials, equipment, and accessories shown on the Shop Drawings.
- D. Test Reports: Submit Test Reports of all tests conducted by the Contractor.

- E. Certificates: Submit Certificates certifying that the equipment tested is ready for use.

1.06 DESCRIPTION

The Mutual Aid Radio System provides radio communications for inter-agency police, fire, and other emergency operations in BART tunnels, subways and underground passenger stations.

PART 2 – PRODUCTS

2.01 DESIGN

A. General

1. A conventional, analog 800 mhz NPSPAC radio system for mutual aid purposes shall be furnished to provide radio communications coverage in the underground portions of the BART system. As such, it will connect to the Distributed antenna radiating cable system (DAS) that provides radio signal distribution throughout the BART underground area.
2. The RF coverage requirement is for the below ground only, and shall include the trackway, passenger stations, power facilities, ventilation buildings, and emergency passageways within the BART underground. Direct RF radiation above ground, or leakage of RF signals into the above ground environment is to be avoided.
3. For system redundancy, two transmitters for the mutual aid radio system shall be equipped at each tunnel portal. They shall operate on the existing State designated and licensed frequencies.
4. System design shall permit simultaneous operation of and not cause interference or degradation to the Simulcast Enhanced Digital Access Communication System (EDACS) Trunk Radio Communication System used throughout the District, or any other radio communication systems in use.
5. Mutual Aid Radio System design and equipment shall adhere to applicable codes and regulations, including Federal Communications Commission (FCC) Rules, and National Public Safety Planning Administration Committee (NPSPAC) Region 6 (Northern California) planning regulations for 800 MHz Public Safety Agencies. All transmitting equipment shall be FCC type certified.
6. The mutual aid radio system to be provided shall be compatible with and provide the same functions and operability as the existing mutual aid radio system. A remote network management capability shall also be included
7. The planning for any extension to the system shall include an RF Coverage assessment to evaluate the impact of such an extension to the existing radio systems in use within the BART underground. All necessary modifications to existing systems shall be implemented to integrate the new extension

B. Design Modifications and Additions Requirements:

Modifications or additions to the Mutual Aid Radio System shall satisfy the following general design guidance:

1. Modifications or extension to the Mutual Aid Radio System design shall be fully compatible with and become an integral part of the existing radio network.
2. Unless otherwise specified, the Mutual Aid Radio System shall be designed to operate as a conventional, analog. It shall operate in the 800 Mhz radio band, and upon each of the two duplex 800 Mhz NPSPAC radio channels assigned to the State. CTCSS tones shall be provided for unsquelching the radio.
3. Mutual Aid Radio System modifications or additions shall be compatible with and provide the same functions and operability as the existing Mutual Aid radio system. This includes a remote network management capability, redundancy, and interfaces to other elements of the BART Radio Network. If upgrades to any aspect of the existing BART Radio Network are required to establish compatibility or functionality to the new equipment, then those upgrades shall become part of the work.

2.02 SYSTEM REQUIREMENTS

A. General

1. The Mutual Aid Radio System shall be designed for operations on 2 separate channels. Each channel shall be separately equipped. The channels shall be as designated by BART.
2. The Mutual Aid Radio system shall connect to the BART underground Distributed Antenna System to provide radio coverage inside and around all areas along the underground tunnels and subways and stations. This coverage shall be based upon handheld radio performance. All necessary interfaces shall be provided for proper operation and control. The Contractor as a part of this specification shall make modifications to the Distributed Antenna System necessary to add the Mutual Aid Radio System operation.
3. The system reliability shall be with 95% coverage at 95% of the time. All coverage shall deliver performance deemed "loud and clear with occasional background noise" also known as circuit of merit level CM4.

B. System Interface Requirements

1. Audio, data, and control signals to and from each newly proposed transmit site shall interface with the existing EDACS control point radio equipment at Lake Merritt and shall also be configured to be compatible with the requirements of the BARTnet.
2. Dispatch consoles shall be configured to operate and control the Mutual Aid Radio system.

3. Any proposed Mutual Aid Conventional channel shall be compatible with the existing High Level simulcast system, and shall interface with the conventional high-level control point equipment at Lake Merritt.

C. Radio System Site Locations:

1. Newly proposed transmit sites shall be located to obtain the specified system radio coverage and reliability percentages. New transmit site facilities shall be located away from existing source of signal interference to limit or minimize degradation to the trunk radio system.
2. The trunk radio T1 interface signal connections between the transmit site equipment and the control point equipment shall be made in accordance with the requirements of BARTnet.
3. Below ground radio coverage shall be provided to all subway stations and tunnel areas, and shall interface with the control point equipment similar to the existing below ground radio communication equipment throughout the District. Typically fiber optic to tunnel conversion equipment and fiber optic to trunk radio conversion equipment are used to transfer the RF signal between tunnel equipment and above ground equipment. Along each subway track a radiating coaxial cable shall be used as the primary antenna for below ground radio transmission (downlink) and reception (uplink). This antenna system and all of its components shall be provided and installed to be compatible with the existing utilized Andrews Corporation communication portion of the trunk radio system.
 - a. Unless otherwise specified, Mutual Aid coverage in underground trackway, stations, and facilities shall be made by a connection to the Distributed Amplifier System (DAS), an underground amplifier system which is part of the BART radio network, as specified in Sections 33 83 04, Radio Network / Distributed Amplifier Radiating Cable System. Performance and reliability goals of the Mutual Aid coverage deployed underground shall be governed by the DAS system.
 - 1) Two low power, 800 mhz, analog radio transmitter/receiver shall be deployed to couple above ground Mutual Aid RF radio signals into the DAS underground. The transmitter shall be co-located with the trunked radio site feeding the BART underground areas covered by the overlying Mutual Aid (mountain top) simulcast radio site.
 - 2) System design shall be provided in a redundant manner (second set of transmitter equipment) in cases where the tunnel length exceeds 1500 feet.
 - 3) Audio signals to the co-located trunked site Mutual Aid transmitter shall originate from the LMA Central Control equipment. Transmit audio shall come from the audio distribution buss equipment. Receive audio shall be applied to the Mutual Aid voter network. Modifications to this LMA equipment and transport of these signals to the co-located trunked site Mutual Aid transmitter shall be part of the design.
 - 4) Necessary interface port connections for the Mutual Aid connection to the DAS shall be provided by the DAS system. However, the proper RF

signal levels applied to DAS are the responsibility of the Mutual Aid designer.

PART 3 – EXECUTION

NOT USED

END OF SECTION 33 83 07