SOUNDTRANSIT

April 8, 2019

Mr. Todd Malo, Fire Marshal
Shoreline Fire Department
17525 Aurora Avenue North
Shoreline, WA 98133

Mr. Ray Allshouse, Building Official
City of Shoreline
17500 Midvale Avenue North
Shoreline, WA 98133-4905

Lynnwood Link Extension: Letter of Concurrence

AE 0010-15: LOC 11SL PA System for Emergency Voice/Alarm Communications

Dear Fire Marshal Malo and Mr. Allshouse:

Sound Transit requests concurrence for use of an enhanced Public Address system as an Emergency Voice/Alarm Communication System (EVACS) within all areas of the Shoreline South/ 145th Street Station and Shoreline North / 185th Street Station. The proposed design provides for a robust, audible and intelligible system that adheres to the applicable requirements of the International Building & Fire Codes, NFPA 130 and NFPA 72.

NFPA 130 Chapter 5

Scoping for an Emergency Communication System (ECS) is found in the 2014 NFPA 130, Standard for Fixed Guideway and Passenger Rail Systems.

- Section 5.4.3.2 states *"The operations control center and each system station shall be equipped with an approved emergency voice/alarm communication system so that appropriate announcements can be made regarding fire alarms, including provisions for giving necessary information and directions to the public upon receipt of any manual or automatic fire alarm signal."*

IBC/IFC Section 907.5.2.2

The 2015 International Building and Fire Code requires the installation of an Emergency Voice Alarm Communication System when a Group A occupancy load exceeds 1,000 persons (907.2.1.1). While the station occupant load is less than 1,000 occupants, an EVACS system will be provided according to the design requirements of 907.5.2.2.

EVACS requirements of this section include:

- Designed and installed according to NFPA 72
- Alert tones and approved voice instructions given upon activation of fire detectors, sprinkler water flow device or manual fire alarm box.
- Paging zones to include elevator groups, each floor, interior exit stairways and areas of refuge.

Additionally, the EVACS shall be capable of and will be designed to provide:

- Manual override for communication provided on a selective and all-call basis for all paging zones.
- Capability to broadcast live voice messages by paging zones on a selective and all-call basis.
- Alternative announcements (general station announcements and train status) provided the manual fire alarm takes precedence over any other use.
- Announcements will be captioned on station Variable Messaging Signs. Recorded or live captions will be from the Link Control Center, an approved location constantly attended by personnel trained in emergency response.
- Emergency power for a quiescent load duration of not less than 24 hours and an operating load not less than 15 minutes in accordence with Section 2702 and NFPA 72. Emergency power is provided by a station Uninterruptable Power Supply System (UPS).

NFPA 72 National Fire Alarm and Signaling Code 2016, Chapter 24

NFPA 72 Chapter 24 provides requirements for application, installation and performance of Emergency Communication Systems and classifies systems as one-way or two-way communications systems.

A transit station's public address system is considered a one-way voice communication system and is best categorized as an in-building fire emergency voice/alarm communications system (EVACS). In-building fire emergency voice/alarm communications systems are defined in NFPA 72 Subsection 3.3.85.1.2 as *"Dedicated manual or automatic equipment for originating and distributing voice instructions, as well as alert and evacuation signals pertaining to a fire emergency, to the occupants of a building."*

Proposal

Sound Transit will furnish all areas of the station with an in-building fire Emergency Voice/Alarm Communication System (EVACS) as required by the International Building and Fire Codes, NFPA 130 and applicable NFPA 72 Chapter 24 requirements. Sound Transit proposes using a public address system as the sole source of all station audible message annunciation.

Key requirements of NFPA 72, Chapter 24 met by the proposed EVACS system include:

24.3.1:	Intelligible Voice Messages: Capable of prerecorded, synthesized or live messages with voice intelligibility.
24.3.2:	Microphone Use: Posted instructions for use of microphone
24.3.5.1 & .2:	Ancillary Functions: Ancillary functions permitted and shall not impair operation of the emergency communication system. Loudspeakers and audio equipment protected from tampering, misadjustment or unauthorized use. Monitoring integrity maintained while used for non-emergency purposes.
24.3.5.3:	Ancillary functions tested and inspected at least annually.
24.3.6.4:	Evacuation messages preceded by two cycles of a three-tone temporal pulse per 18.4.2.

24.3.13.4.2:	Pathway Survivability: Levels 0, 1, 2, or 3 permitted for systems that do not employ relocation or partial evacuation. Level 0 is the minimum maintained however, Level 1 is achieved in all areas with automatic fire suppression systems.
24.4.1	Automatic Response: Activated upon receipt of a signal of a fire alarm or other emergency. Automatic response not required where system is constantly monitored and there is an acknowledgement of the alarm within 30 seconds.
24.4.2:	Voice Evacuation Messages: Messages preceded and followed by two cycles of a three-tone temporal pulse per 18.4.2 and 18.4.3.
24.4.2.2.1:	Speaker layout designed to ensure intelligibility and audibility.
24.4.2.2.2:	System design incorporated designation of acoustically distinguishable spaces as required by Chapter 18.
24.2.2.3:	Audibility required in all areas per Chapter 18.
24.4.3	Positive Alarm Sequence permitted when complying with 23.8.1.2.
24.4.4:	Tones preceding messages shall be part of the voice message or transmitted automatically from a tone generator meeting audibility requirements of 18.4.3 and 18.4.4.
24.4.5:	Controls: Located within the Fire Control Room, an approved location, and secured to prevent access by unauthorized persons. Live voice instructions override previously initiated signals and have priority over subsequent automatically initiated signals.
24.4.6.1:	Loudspeakers and enclosures installed in accordance with Chapter 18.
24.4.7:	Priority: Notification appliances required to provide special suppression predischarge notification are not overridden by other systems.
24.4.8:	Relocation and Partial Evacuation requirements do not apply as is not used in any transit station.
24.4.2.9:	Evacuation Signal Zoning: Signaling zones do not separate undivided fire or smoke areas and multiple notification appliances circuits in a single zone shall operate simultaneously.

The Emergency Voice/Alarm Communication System will be designed to provide the following:

- All areas of the station will be provided with an Emergency Voice/Alarm Communication System.
- Pre-recorded emergency announcements and ad hoc announcements from Link Control or the Fire Command Room or platform microphones will be broadcast on the EVACS system. Platform and Fire Control Room microphones will broadcast ad hoc messages only.
- The station's Uninterruptable Power Supply System shall be capale of operating the system under quiescent load for a minimum of 24 hours and then shall be capable of operating the system during a fire or other emergency condition for a period of 15 minutes at maximum connected load.
- The EVACS system will have multiple amplifiers powering speakers in "A" and "B" speaker circuitry. Audio will continue to be delivered to a speaker circuit in an area if an amplifier is lost.
- Speaker circuits and system electronics are monitored and will send an alarm to the continuously manned Link Control Center.

- System head end electronics are housed in secured 2-hour rated climate-controlled rooms with clean agent fire extinguishing systems.
- The EVACS system will be utilized for general station announcements with emergency alarms and messaging taking precedence.
- Messaging priority will be highest from the local station platform microphones, then Fire Command Room and then messaging from the Link Control Center.
- UL listed strobes will be provided throughout the station for visual notification.
- Flat panel or LED displays will provide visual emergency messaging in the public areas.

Loudspeaker Listings

NFPA 72 Section 24.3.1.2 permits the use of non-listed speakers where no listed loudspeaker exists to achieve the intelligibility requirements of the Code for a notification zone. Where appropriate, UL 1480 UUMW and UEAY listed speakers will be utilized if capable of meeting intelligibility, design and performance requirements. Note that all speakers are UL listed.

Normal Operations and Emergency Use

NFPA 72 Section 24.3.5.2 (2) permits the use of the emergency communication system for ancillary functions provided safeguards are in place to prevent tampering or misadjustment and that the monitoring integrity be maintained while the system is used for non-emergency purposes.

System Components

A high-performance intelligible communication system for large assembly areas necessarily includes other specialized UL listed electronic components. These include:

- Power amplifiers with digital signal processing
- Ambient Noise Analysis Microphones and Processors
- High performance loudspeakers
- Station Microphones
- Logic controllers interfacing between external devices and DSP controllers
- Audio distribution over Cobranet
- Network switches and cabling
- Fiber optic network cabling, raceways and GBIC interfaces to switches
- Balanced Line Level Audio STP cabling

The attached engineering memo dated August 1, 2018 by LTK Engineering Services provides detailed information for the proposed Emergency Voice/Alarm Communication System.

Inspection and Testing

The emergency communication system and all notification appliances will be inspected semi-annually to verify location and condition per Table 14.3.1 of NFPA 72. Testing of emergency communication equipment and notification appliances will occur annually per Table 14.4.3.2.

Summary

Sound Transit maintains that the Emergency Voice/Alarm Communication System as proposed is robust, intelligible, highly reliable and is suitable for emergency communication meeting the intent of the IBC, NFPA 130 and NFPA 72.

Your review and conditional approval of this Concurrence request is appreciated. Final approval is subject to detailed design information which be submitted as part of the Lynnwood Link Systems Contract Package L800.

Thank you and please do not hesitate to contact me at (206) 903-7473 should you have any questions.

Sincerely,

Peter Brown,
Director, Systems Engineering and Integration
Design, Engineering & Construction Management

Fouad Chihab, Sound Transit
JLloyd Mack, LTK
Jim Schettler, HJ
Andy Moniz, MA+A
Jon Jordan, Sound Transit
John Evans, Sound Transit
Jeff Schutt, HJ
DCC
Jimmy Lassiter, Sound Transit
Richard Nguyen, Sound Transit
Jonnie Thomas, Triunity

Attachments: LTK Engineering Memorandum August 1, 2018

Concurrence:

4-8-2019

~~Chief~~ Todd Malo, Fire Marshal
Shoreline Fire Department
Date

Concurrence:

4/9/2019

Mr. Ray Allshouse, Building Official
City of Shoreline
Date