



UNDERSTANDING Tunnel Ventilation

BACKGROUND

The Baltimore and Potomac (B&P) Tunnel, built in 1873, is nearing the end of its useful life. This two-track railroad tunnel is owned by Amtrak and connects the West Baltimore MARC Station with Penn Station in central Baltimore City. The Federal Railroad Administration (FRA) is working with the Maryland Department of Transportation (MDOT), Baltimore City Department of Transportation (BCDOT) and Amtrak to advance an engineering and environmental study to examine potential renovation or replacement of the existing tunnel.

TUNNEL VENTILATION

All tunnels require ventilation for safe operations. Ventilation may occur passively (through the push and pull of trains moving through a tunnel) or actively (with the aid of fans and operational equipment). Both methods move old air out of the tunnel and circulate fresh air into the tunnel.

CURRENT TUNNEL OPERATIONS

The existing tunnel is made up of three separate shorter tunnels—the John Street Tunnel, the Wilson Street Tunnel and the Gilmore Street Tunnel—and is about 7,500 feet (1.4 miles) long. The average depth of the existing tunnel is 15 feet from the surface to the top of the tunnel. At various points along the tunnel, trains can be seen from the surface through short openings between the three tunnels. The tunnel is passively ventilated by the trains pushing tunnel air through the short openings. This type of air circulation met safety standards at the time of the B&P Tunnel's initial construction.

PROPOSED TUNNEL OPERATIONS

Alternative 3B is the preferred alternative for the B&P Tunnel project. It realigns the tunnel resulting in a four-tunnel and four-track system that would be constructed at depths of up to 150 feet beneath the surface.



Vent plant townhouse

Operations and safety considerations require an active ventilation method to service the proposed new tunnels.

Ventilation plants are above-ground buildings that contain fans, operation and control and fire protection equipment, and emergency exits. They actively ventilate tunnels during operation in one of two modes:

- **Normal** – Fans operate at a relatively low speed to ensure air in the tunnel is always fresh.
- **Emergency** – Fans operate at a high speed that rapidly moves hot and/or smoky air so that, as needed, crews and passengers can evacuate the tunnel safely.

Engineering and safety requirements have identified the need for three ventilation plants for the preferred new tunnel alignment—one near each end of the tunnel and a third intermediate plant. These three plants will operate as a system to keep fresh air circulating throughout the tunnel.

VENTILATION PLANT LOCATIONS

The project team evaluated a number of locations for the ventilation plants as part of the study. The south vent plant will be integrated into the south tunnel portal, and the north vent plant will be located about 300-600 feet from the north tunnel portal.

The intermediate plant is proposed for a site along North Avenue. It will be about 100 feet by 200 feet and 70 feet tall. The size may vary somewhat depending on site-specific considerations. At this time, two sites are under consideration for the intermediate ventilation plant (850 W. North Avenue and a combination of 1000 Linden Avenue, 900-918 W. North Avenue, and 920-940 W. North Avenue).

VENTILATION PLANT DESIGN

The exterior design of the vent plants will be developed with input from the residential and business community. The goal is to create a building that will complement and blend in with the surrounding built environment. Amtrak has successfully designed ventilation plants in urban environments (see rendering on opposite side). The B&P Tunnel ventilation system design, including vent plant equipment and operations, will be completed and implemented in accordance with National Fire Protection Association (NFPA) 130 fire/life/safety codes.

EXPECTED NOISE FROM VENTILATION PLANTS

In general, vent plants are relatively quiet. During normal operations, they emit a low hum (about 45 decibels), about as loud as a quiet urban street at night. Noise decreases quickly with distance from its source, so surrounding residents will generally not hear the noise of a vent plant when fans are running. Under emergency operation, when the fans run at their highest speed, a person could expect to hear a louder hum and the whooshing of air exiting the louvers at a greater distance from the plant.

The project team has conducted a detailed noise analysis and determined the anticipated noise level of the vent plants for the B&P Tunnel Project to be 50 A-weighted decibels (dBA), approximately the noise produced by an indoor air conditioner at a distance of three feet. The use of noise attenuators in the vent plant will be evaluated to reduce the noise to (or below) acceptable Baltimore City noise criteria levels.

AIR QUALITY

The project is not permitted to violate air quality thresholds when discharging emissions into the atmosphere. The ventilation plants would be designed to ensure this environmental requirement is met. Under normal operation, the ventilation system will dilute emissions so that pollutant concentrations remain well below regulatory thresholds. In order to better disperse the emissions from the vent plants, louvers for the B&P Tunnel ventilation plants are being directed upward.

In the very rare event of a tunnel fire, the path from a tunnel fire to the exhaust louvers is long and circuitous, reducing the ability of particles to travel through the fans and louvers. During an extreme event, if the emitted air is determined to be unsafe, evacuation of the areas surrounding the vent plant may be required under direction of Amtrak emergency personnel.



TO REQUEST MORE INFORMATION

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