

# Breath of Fresh Air for a Historic Tunnel

New ventilation system improves air quality.

**T**he Detroit Windsor Tunnel officially opened on November 1, 1930 and saw its first traffic on November 3. President Herbert Hoover ushered in a new chapter in U.S.-Canadian relations when he pushed a golden button at the U. S. Capitol to officially open the mile-long Detroit Windsor Tunnel. Construction took 26 months and cost \$23 million.

The Detroit Windsor Tunnel is one of the busiest passenger border crossings between the United States and Canada, and overall ranks in the top 15 crossings nationally. Traffic exceeds six million vehicles per year and the tunnel is one of the busiest passenger border crossings between Canada and the United States. It remains the only underwater international vehicular (automobile) tunnel in the world.

Some 5,000 commuters pass through the tunnel both ways every day. The tunnel is the mode that local drivers choose most because it provides closer access to both downtowns and a more convenient crossing experience. Passenger cars comprise 96 percent of tunnel traffic. Some 850 trucks pass through the tunnel both ways, every day, hauling auto parts, steel, scrap, agri-

cultural products, and road salt. Many suppliers and manufacturers are highly dependent on the tunnel because it is the centerpiece of an integrated U.S.-Canada supply chain, and just-in-time delivery systems play a vital role in both nations' economic health.

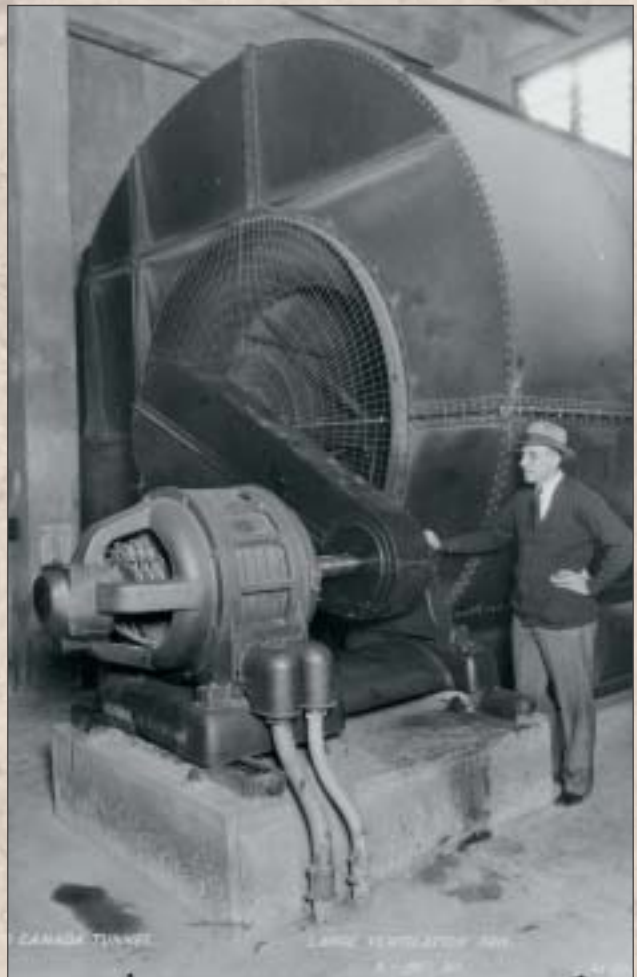
The maximum depth of the 22-ft wide roadway below the river surface is 75 ft. 275,000 cu yd of dirt were excavated and 80,000 cu yd of concrete were poured during construction of the tunnel.

Although opened in 1930, the tunnel continues to undergo improvement. The original ventilation building had 12 fans that circulated air in and out of the structure. In

2001, the tunnel began to retrofit the original mechanical and electrical system with eight fans, creating a more efficient system and improving the quality of air flowing through the tunnel.

Other improved maintenance and cost savings design initiatives include:

- Sealed bearings for all the fans.



*Detroit Windsor Tunnel air supply equipment in 1930.*



*Toll collection has come a long way since the tunnel was opened in 1930.*

- Variable frequency drives located near each fan.
- Direct drive motors for all of the new exhaust fans.
- Cor-Ten™ steel used for the manufacture of the new exhaust fans.
- All fans painted with a highway bridge specified three-coat paint system.
- New motor control centers and



*Controls for the Detroit Windsor Tunnel air supply equipment in 1930.*

transformers for the new 4800, 5kV system.

A new computerized supervisory control and data acquisition system (SCADA) controls the fans and ventilation, based on carbon monoxide levels, and monitors electrical power systems to provide a more energy and cost efficient operation.

There is a tall ventilating tower on the Detroit side and another on the Windsor side. Each tower has 12 fans, six great blowers to force air into the tunnel and six exhausters to draw air out. The fans in each tower may be operated from a power supply from either side of the river. Fresh air goes into the tunnel through a duct alongside the roadway and is released through outlets every 15 ft, exhaust air is drawn out through ports in the roof also 15 ft apart. The tunnel ventilating system can supply 1.5 million cu ft of air a minute and completely change the air in the tunnel every 90 seconds.


The Detroit-side tunnel ventilation system project was completed this year at a cost of \$10.2 million. Similar work is proceeding in the Windsor ventilation building with estimated completion by the end of the year.

The history of sub-aqueous tunnels goes back to the year 1818 when Marc

Brunei, a Frenchman, took out the first patent for the shield and cast-iron lining. About 12 years later in 1830, Sir Thomas Cochrane secured the first patent for compressed air. Between 1825 and 1843 Marc Brunei built the first sub-aqueous tunnel under the Thames and, due to his genius, it was finished under the most difficult conditions without the use of compressed air. But this ambitious enterprise was a financial failure and checked all undertakings of a similar character for the next 25 years. It was not until James H. Greathead developed the circular

one-piece shield, invented the grouting machine, and made use of compressed air and cast-iron lining that sub-aqueous tunnels were economically built.

The first vehicular tunnel of magnitude and capacity was the Blackwall Tunnel under the Thames in London, opened for traffic in 1897. Others were the Glasgow Harbor Tunnel in England, the Elbe Tunnel in Germany, and the Rotherhithe Tunnel in England, the last completed in 1908.

All these tunnels were built previous to the advent of the automobile. As the automobile came into general use, the Holland Tunnel in New York, the Liberty Tunnel in Pittsburgh, the George A. Posey Tube between the cities of Oakland and Alameda, CA, and the Detroit/Windsor Tunnel under the Detroit River were built. 



*Electrical for the Detroit Windsor Tunnel being installed in 1929.*