Turbo Roundabouts: Support Safety, Efficiency, and Increased Capacity

U.S. Department of Transportation
Federal Highway Administration

Office of International Programs

The Office of International Programs works to access, promote, and disseminate global best practices and technical innovations to ensure a safe and efficient United States highway transportation system.

ORIGINS

The turbo roundabout was invented in the Netherlands in 1996, with the initial design guidelines developed by the Dutch Information and Technology Platform. The term "turbo" is descriptive of the spiral geometry utilized and not the speed of cars traveling through the roundabout (see figure 1). In fact, speeds are significantly reduced in a turbo roundabout.

Through collaborative work with the Netherlands, the Federal Highway Administration (FHWA) developed the *Advancing Turbo Roundabouts in the United States: Synthesis Report*. The document reviews existing published resources (e.g., reports, papers, presentations, videos, and tools) on the topic of turbo roundabouts from international and domestic sources. The synthesis has three major sections: 1) geometric design, 2) capacity and operational performance, and 3) safety performance. The synthesis provides specifics regarding the treatment of various users, including motorists, pedestrians, cyclists, heavy vehicles, and motorcyclists. The synthesis also includes information on education and public outreach approaches targeting non-technical audiences.

After more than a decade of promotion by various organizations, the first operational turbo roundabout in the United States has been built in Jacksonville, Florida. FHWA is helping guide the implementation of turbo roundabouts in the United States in several ways, including publications such as the synthesis and technical primer, language translation of analysis tools, and the Global Benchmarking Program.

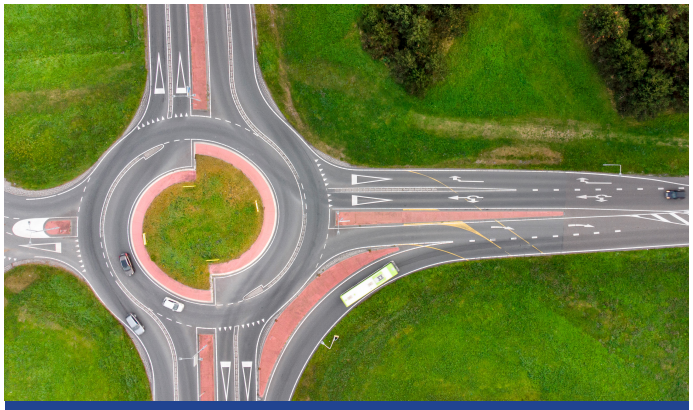

FIGURE 1. AERIAL VIEW OF A TURBO ROUNDABOUT IN THE NETHERLANDS. **SOURCE:** USDOT/GETTY

WHAT ARE TURBO ROUNDABOUTS?

- A traditional Dutch turbo roundabout has a multilane design that uses a radial approach and discourages lane changing on the approach and within the roundabout through robust channelization, center island geometry, and lanes that are separated by raised lane dividers (see figure 2).
- By reducing speeds and enhancing separation between users, turbo roundabouts support the Safe System Approach to reduce the severity and incidence of crashes.

FIGURE 2. APPROACH CHARACTERISTICS OF TURBO ROUNDABOUT IN JACKSONVILLE, FLORIDA. **SOURCE:** FHWA

According to the Stichting Wetenschappelijk Onderzoek Verkeersveiligheid (SWOV) Institute for Road Safety Research in the Netherlands,[1] after adjusting for traffic volumes, the safety benefits from turbo roundabouts are comparable to the safety benefits of single lane roundabouts. Practitioners in the United States are contemplating a hybrid approach, which incorporates elements of the original Dutch turbo design with features from traditional roundabout design.

USER CONSIDERATIONS

When considering turbo roundabouts, several factors must be evaluated. Safety performance should inform decisions on geometry, channelization, lane dividers (see figure 3), and capacity. Additionally, the needs of pedestrians and bicycle users, as well as trucks and motorcycles, should be taken into consideration.

HOW ARE TURBO ROUNDABOUTS RELATED TO THE SAFE SYSTEM APPROACH?

The Safe System Approach (see figure 4) has origins in the Sustainable Safety program from the Netherlands, where turbo roundabouts were invented. These early adopters experienced impressive decreases in road traffic fatalities—each with at least a 50-percent reduction in fatalities between 1994 and 2015. The concept has spread to other countries in Europe and beyond, with notable success in Australia and New Zealand.

This approach involves anticipating human mistakes by designing and managing road infrastructure to keep the risk of a mistake low. Road design and management should encourage safe speeds and manipulate appropriate crash angles to reduce injury severity.

FIGURE 3. RAISED PAVEMENT CHARACTERISTICS OF TURBO ROUNDABOUT. **SOURCE:** FHWA

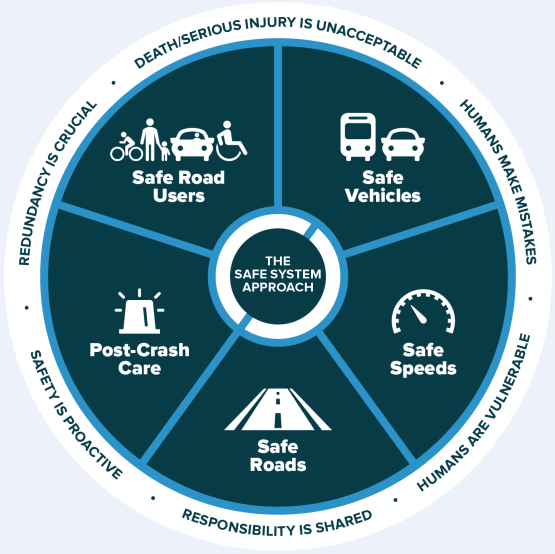

FIGURE 4. SAFE SYSTEM APPROACH. **SOURCE:** FHWA

[1] https://swov.nl/sites/default/files/bestanden/downloads/FS%20Roundabouts%20and%20other%20intersections_0.pdf

1200 New Jersey Avenue, SE
8th Floor, E83-462
Washington, DC 20590

Office: 202-366-9636
Fax: 202-366-3590

U.S. Department of Transportation
Federal Highway Administration