Autonomous Vehicles and Connected Vehicles
HNTB is a leading provider of autonomous and connected vehicle program technical support services to clients throughout the United States. Many state departments of transportation and toll authorities are developing plans that incorporate connected vehicle technologies and applications while also preparing for the effects of autonomous vehicle implementation. HNTB has been supporting clients such as the U.S. Department of Transportation, Michigan DOT, the Florida DOT, the Tampa-Hillsborough Expressway Authority and the Miami-Dade Expressway Authority with technical advice and expert guidance regarding their autonomous and connected vehicle programs.

U.S. DOT ITS STRATEGIC PLAN
HNTB provided expertise to the U.S. DOT to update their ITS Strategic Plan for 2015-2019. The maturation and implementation of connected vehicle technology is expected to transform transportation safety in the future. The ITS Strategic Plan places emphasis on the development of a roadmap for implementation of this game-changing technology. Vehicle automation, the second theme of the ITS Strategic Plan, is the research focus for the U.S. DOT over the next five years. Policy guidance based on the strategic plan will support state and local agencies in their efforts to plan for the impacts of these technologies. The U.S. DOT ITS Strategic Plan can be found at: its.dot.gov/strategicplan.pdf. HNTB’s ITS Practice Leader Jim Barbaresso co-authored the document.

SAFETY PILOT CONNECTED VEHICLE MODEL DEPLOYMENT
The University of Michigan Transportation Research Institute and the U.S. DOT collaborated on the largest deployment of connected vehicle technologies in the world. HNTB led the outreach and communications activities for this ground-breaking program and provided design for connected vehicle infrastructure sites along Ann Arbor, Michigan, freeways. The purpose of the Safety Pilot Model Deployment was to test the effectiveness of connected vehicle safety applications for reducing crashes, and show how real drivers respond to these technologies while operating a vehicle in a real-world, multi-modal environment.

The program involved installation of dedicated short-range communications devices to send and receive data in more than 2,800 cars, trucks and buses, as well as at 27 infrastructure locations along 73 lane-miles of roadway. Dedicated short-range communication equipment has been installed at 21 signalized intersections, three curve locations and three freeway sites. The infrastructure locations were selected to capture the majority of test participant drivers during their daily commutes. The program has been extended indefinitely to provide additional data and opportunities to test applications, and to assess operations and maintenance requirements in real-world conditions. HNTB authored a report called, “Connected Vehicle Infrastructure Deployment Considerations: Lessons Learned from Safety Pilot and other Connected Vehicle Test Programs.” This report has been used as a reference by public agencies as they prepare for connected vehicle infrastructure deployment.

Over the next 30 years, a million people could die in car crashes in the United States. We now have the technical capability to save those lives. Vehicle connectivity and automation are poised to exert a dramatically positive impact on the future of transportation safety and American cities.
HNTB PROJECT EXPERIENCE

TAMPA-HILLSBOROUGH EXPRESSWAY AUTHORITY CONNECTED VEHICLE PROGRAM SUPPORT

Forty agencies competed for the U.S. DOT CV Pilot Program, with THEA having the highest ranking of the three awarded recipients. HNTB staff comprise the program management and technical task leaders for this USDOT funded $17 million project, which consists of three phases.

Phase 1, system development, provides the system engineering for the project that will include CV applications from V2V, V2I and V2X suites. The selected applications – curve speed warning, emergency electronic brake lights, forward collision warning, intelligent traffic signal system, intersection movement assist, probe enabled traffic monitoring, transit signal priority, vehicle turning right in front of bus, pedestrian in signalized X-walk and mobile accessible pedestrian signal – will be applied to six existing, documented use cases/needs. These include morning and evening peak travel periods, peak to off-peak travel periods, and for a range of roadway and traffic conditions.

Subsequent phases will cover implementation and operational change management and technical task leaders for this USDOT funded $17 million project, which consists of three phases.

U.S. DOT CONNECTED VEHICLE TEST BED OPERATIONS MANAGEMENT SUPPORT

HNTB supported the U.S. DOT with its affiliated test bed operations by facilitating information sharing; developing a common technical platform for sustained research, testing and demonstrations; and finding new opportunities to engage a broader spectrum of potential test bed users. These activities helped the U.S. DOT define objectives for test bed collaboration, integration and enhancements. The program also identified current test bed users and assessed their level of participation and collaboration across affiliate test beds. HNTB assisted in the assessment of the current environment for collaboration by engaging stakeholders to identify test bed communications needs and to help define requirements related to collaboration among affiliate test beds and collaborators.

FLORIDA DOT CONNECTED VEHICLE PROGRAM SUPPORT SERVICES

HNTB was one of FDOT’s Connected Vehicle Program support consultants between 2007 and 2011, when Orlando hosted the ITS World Congress. Connected Vehicle Program support services included program development, technical support, and engineering support for the 2011 ITS World Congress in Orlando and the Florida DOT Connected Vehicle Test Bed. For the 2011 ITS World Congress, HNTB developed a project concept for demonstration of a broad array of connected vehicle applications. Although the initial startup coincided with World Congress, the deployment was structured so that the infrastructure deployed and applications demonstrated continued to function after World Congress, creating a test environment for continued evaluation of the Connected Vehicle Program.

FDOT’S AUTOMATED VEHICLE INITIATIVE

HNTB is currently providing general engineering consultant services for FDOT’s Automated Vehicle Initiative. This 3-year/$5 million contract entails providing in-house support for various autonomous and connected vehicle planning activities across all modes of transportation. Tasks currently underway include development of an FDOT Automated Vehicle Strategic Plan and leadership in developing an annual Automated Vehicles Summit as well as an annual Data Symposium. These two conferences draw hundreds of national and international attendees from academia; national, state and local governments; the private sector; as well as industry demonstrators and exhibitors. Additional support services include development of an Automated Vehicle Academy, facilitation of working groups to integrate automated vehicles into the fabric of all departments within the FDOT, management of research projects associated with policy implications, mobility for aging populations, land use implications, effects on transit, connected vehicle messaging through simulators, bridge inspections, and drainage operations. HNTB is also the lead in pilot projects associated with Advanced Driver Assistance Systems and development of projects involving attenuation for improved work zone safety, smart truck parking, truck platooning and public outreach and education.

FDOT’S ADVANCED DRIVER ASSISTANCE SYSTEMS PROGRAM

The goal of the two-year study is to improve the safety and performance of vehicles through using new technology to alert drivers of potential crashes associated with rear-end collisions, bike/pedestrian collisions and lane departures. Since the safe message alerts are geo-located, “near misses” can be identified so engineering improvements can be implemented before crashes occur. Through these alerts, it is also a project goal to have noticeably improved safe driver behavior. The study consists of 100 vehicles equipped with GeoTab Devices and 50 additional vehicles equipped with MobilEye devices. The vehicles were provided by FDOT and local transit agencies.
POTENTIAL BENEFITS OF AN AV/CV PROGRAM

Reduction of fatalities and injuries through various safety applications

Reduced vehicle congestion and delay through improved communications, enhanced traveler information and more efficient system utilization

Decreases in negative environmental impacts such as vehicle emissions, the need for physical expansion and noise

Increased opportunities to partner with non-government groups, such as private industry and universities

Real-time and real-world data to help with transportation planning and transportation system operations and maintenance

Reduced capital and transportation system maintenance costs through improved operational efficiency and data analytics

Enhanced mobility and accessibility for disadvantaged groups

Greater intermodal connectivity to provide a seamless transportation system

Improved goods movement and freight operations

Source: U.S. DOT