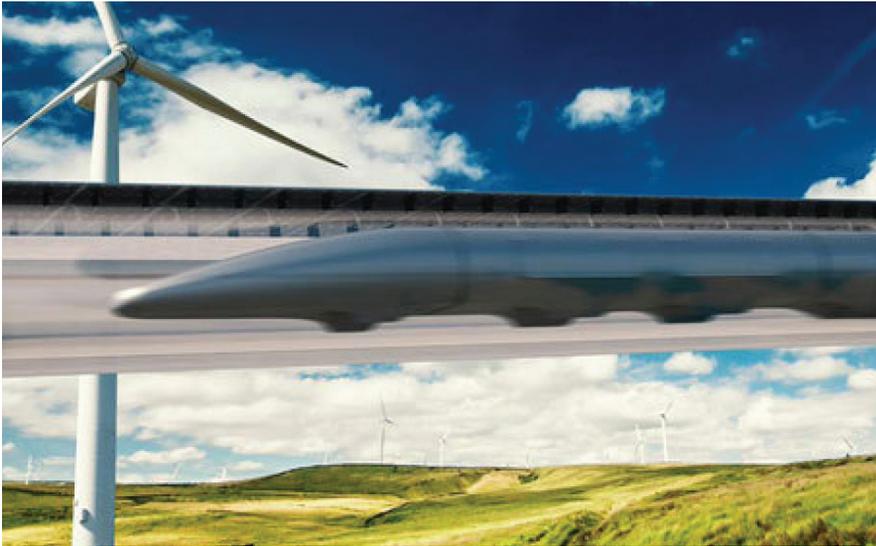


The Future is NOW

When it comes to transforming infrastructure, the possibilities are endless

BY KATE SHIRLEY



Infrastructure needs change fast. Consider this - in the early 20th century, 93 percent of roads in the United States were unpaved, and the vast majority of those roads were rural. But then the Model T was produced and the automobile industry took off, and Americans started demanding more convenient travel options. Within 50 years the country boasted 40,000 miles of paved highways crisscrossing the nation, and 50 years after that, we now have 160,000 total miles of highways. These developments fundamentally changed the way society lived and moved in a relatively short period of time. Transportation needs evolve in ways you can't always predict, which begs the question – where will we be in another fifty years, and what kind of infrastructure will we need to support our future society?

The construction of modern infrastructure comes in many shapes and forms – a highway to relieve street congestion, a pipeline to ferry crude oil to ships at port, a transmission line to power the lights in your home. No matter why or where it is built, infrastructure represents an important societal investment, but how long will any given project be useful in today's rapidly changing world? Taking a look at anticipated future technologies may help answer that question, and help right of way professionals prepare for what's to come.

Driverless Cars

Promising to be safer, faster and more convenient than human-driven vehicles, this transportation option is sure to proliferate in the coming decade. When it comes to driverless technology, the future of infrastructure will be transformed in terms of communication potential. To compensate for the loss of a driver, vehicles will need to become more aware of their surroundings – and their surroundings more aware of them. While engineers are developing these vehicles are working on vehicle-to-vehicle (V2V) systems that will let cars communicate with

each other, states and developers will soon have to work have to lay the groundwork for vehicle-to-infrastructure (V2I) systems, connecting cars and roadways. For example, if a bridge is unexpectedly shut down, or a traffic signal is malfunctioning, it can alert driverless cars to take an alternate route. New road construction may include in-pavement sensors for traffic control, communications as well as weather and pollution monitoring.

According to the National Highway Traffic Safety Administration, V2V and V2I technology could eliminate as many as 80 percent of the 33,000 annual accidents involving non-impaired drivers, and can also make roads less congested and cars more efficient. What this means is the way planners think about roads will need to evolve. For example, future congestion needs could be met simply by narrowing lanes and making cars drive closer together rather than building new freeways. And while lawmakers want to push states to evolve their roads, they don't want to force them to integrate inadequate or untested technology. Additionally, driverless cars could change the way people live and work. People may be more willing to commute further distances if they could relax or get some work done instead of battle rush hour. As a result, urban sprawl may increase, impacting regional planning and urban design. Another consequence of driverless transportation may be less reliance on public transit as well as bicycling and walking. No matter what, changes to the way our society operates and moves is a certainty.

Tube Transportation Networks

In 2013, Elon Musk released a white paper proposing a new form of ultra-fast travel – the Hyperloop. Utilizing pneumatic tubes placed either above or under ground, hyperloop technology has the capability to move passengers in large capsules at speeds of around 600 miles per hour. The capsules would be propelled by powerful vacuums and magnets, and would rise on air, providing a nearly frictionless experience with an expected g-force range between 1 and 5g, similar to that experienced by a Formula One racecar driver. Musk's initial scheme proposed covering a 400-mile route between Los Angeles and San Francisco in 30 minutes, providing a much quicker and cheaper alternative to road, rail and air travel in the future.

Hyperloop Technologies, a startup company looking to commercialize the concept, announced in late 2015 that it would commence testing on an open-air track in Nevada early this year, with the goal of having an operational hyperloop system available by 2020. Other companies are currently conducting similar testing. Needless, to say the infrastructure needs of this technology will be monumental, requiring the construction of a revolutionary infrastructure system, currently envisioned to combine well over 100,000 miles of connected links. Some see this as a huge obstacle toward system realization, but to others, it presents an enormous opportunity. Constructing the tube network will be the biggest infrastructure project the earth has ever seen, with a projected 50-year build-out employing in excess of 100 million people along the way.

But besides the staggering amount of new infrastructure a tube system would require, we should also consider the disruption potential it has regarding other forms of transportation, including air travel systems and high-speed rail. The infrastructure challenges that would result from this technology are practically infinite.

Drone Delivery Networks

With online retailers jockeying for ever-faster service, talk of drone delivery

has been cropping up more and more in recent years. However, considering the availability of increasingly sophisticated technology, and a soon-expected ruling by the Federal Aviation Administration clarifying commercial drone usage, this may become a reality sooner rather than later. Although the FAA has not yet granted approval for the commercial application of drones, and such uses are banned until the policy is finalized, a ruling is expected within the next six months. Under current law, drones are only allowed to fly with human supervision.

Companies like Amazon, Google and Wal-Mart are eager to put this technology to use, and when they do, the skies will be humming with the small, automated flying machines. When this happens, questions regarding airspace rights will inevitably arise. Until now, few property owners have paid attention to the airspace rights within a few hundred feet of the ground, but that is poised to change. The issues get particularly thorny when you consider a 1946 Supreme Court ruling that says the landowners have “exclusive control of the immediate reaches” above their land, although the Court did not clarify how much of the actual airspace below the FAA’s 500-foot regulatory ceiling belongs to the landowner. The Court held that in the event that airliners flew so low and with a frequency that interfered with the enjoyment of the

land, it would constitute a taking. In the past, frequent problems with low-flying aircraft was not much of an issue, but with the growth of drone use, it is clear that the debate has been reignited and will need to be addressed formally. And with the distinct possibility of tens of thousands of these devices cluttering the air above our backyards and school playgrounds, the FAA policy is becoming increasingly urgent. With the proliferation of drone use, courts and legislators will be faced with the some of the same challenges regarding low-altitude airspace as they were with high-altitude airspace when modern aviation was born.

Conclusion

In order to keep up with rapidly developing technology, infrastructure professionals must remain nimble and open to the changes that are sure to come. With the rapid development of so many different types of technologies and the real possibility of a fundamental shift in the way we think about rights and construct infrastructure, the ensuing projects may not only define how our near-future society functions, but also raise the bar for future generations of infrastructure professionals. By being aware of and prepared for the changes to come, we can plan for infrastructure that fulfills both current and anticipated needs. ✪

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