

2045 Considerations Based on Known Trends and Anticipated Technology

1. Aviation

a. Trends

- i. **Consolidation of Airlines:** After great recession there were significant mergers in the major airlines. This was more efficient but less offered less access to regional airports in attempt to stay profitable. Major airlines have seen a growth in enplanements while regional airlines have seen a slight decrease.
- ii. **Larger Planes:** Larger planes have become the norm as they are more efficient. While carrying more passengers airlines are able to spend less on fuel per passenger, employee costs, and landing fees.
- iii. **Reduced Parking Needs:** TNC's (Uber) have reduced parking demand at airports nationwide and reduced parking revenues.

b. Emerging Tech

- i. **Drone Technology:** Drone technology is still in its infancy and will have to be strongly regulated when being used for commercial and private applications due to safety concerns. If these hurdles can be overcome the future of the transportation of not only goods but humans can be limitless.
- ii. **Logistical Innovation:** Airlines run on really tight margins and ensuring that plane seats are full and going to the best destinations will benefit not only airlines but consumers.

2. Bicycle & Pedestrian

a. Trends

- i. **Complete Streets:** NCDOT adopted a complete streets policy in 2009, with a focus on moving people on corridors not exclusively cars. It has been especially useful in urban environments where pedestrians, cyclists, and other modes are more significant.
- ii. **Greenways:** Greenways have been shown in recent years to be more accommodating to multiple modes of transportation and more welcomed by citizens. One concern is safety of surrounding residential and commercial properties.
- iii. **Shared Mobility:** bike share (Lime) and Scooter share (Bird) have become increasingly popular and also seen as a point of controversy. While offering transportation services through the private industry they can be seen as invasive if not regulated.

b. Emerging Tech

- i. **Bike Share:** with the prevalence of mobile phones a new opportunity has presented itself in shared use of bicycles and scooters. Companies have proven that they can successfully rent out these transportation services through the use of apps and credit cards. Regulation has been an issue in some places.
- ii. **Data Collection:** Collecting data on the most used routes and paths will be important for determining the best investment of tax payer dollars. Many cities are still in the process of setting up these systems

3. Ferry & Water Transportation

a. Trends

- i. **Roadway Congestion:** Increased ferry use has seen congestion becoming a problem often backing up on to local streets.
- ii. **New Development:** Expanding populations in locations near ferries may contribute to further ridership increase.
- iii. **Facilities & Operations:** Increased ridership has begun new conversations about how ferry and water transportation systems can meet the new demand.

b. Emerging Tech

- i. **Alternative Fuel Sources:** Like most forms of transportation ferries will be looking to become more fuel efficient and environmentally friendly.
- ii. **Automated Technology:** navigating waters can be unpredictable especially in less than ideal conditions. Future technology can help ship captains get better data on conditions and help with docking and takeoff, improving safety and efficiency.

4. Freight & Rail

a. Trends

- i. **Consumer Growth:** An increase in consumption has led to an increase in the shipping of products with the NCDOT freight plan anticipating a 43% growth by 2045.
- ii. **Increased Congestion:** Increased freight and rail movements means more trucks on the road increasing congestion, and more conflict points for rail interacting with the roadway network.
- iii. **Investment Opportunity:** There has been a significant push for investment of rail at both the federal and state level to accommodate the demands from increased consumption.

b. Emerging Tech

- i. **Autonomous vehicles:** Since trains have their own right of way there are less variables when creating an autonomous system. This would lead to a reduction in operation costs.
- ii. **Alternative Fuel Sources:** Alternative fuel sources will allow trains to be more efficient and environmentally friendly.
- iii. **Maglev Technology:** currently most trains are designed at a track speed of 80 mph limiting the advantages they have over single occupancy vehicles. Using magnets maglev allows speeds between 200 and 400 mph, which would present a strong incentive to ride passenger rail.

5. Public Transportation

a. Trends

- i. **Bus Rapid Transit (BRT) and Light Rail Transit (LRT):** with many cities trending towards increased density, transit options with dedicated lanes have been shown as effective methods in reducing the amount of single occupancy vehicles on the road allowing for more efficient movement of people
 - ii. **Coverage vs. Frequency model:** Historically the 1 hour frequency coverage model has been more prevalent in America due to the popularity of single family homes and sprawl. This contrasts with the frequency model of 30 minutes or less which has been shown to increase choice ridership.
 - iii. **Decreased Ridership:** Transit in smaller cities caters more towards dependent riders who use transit as an affordable transportation solution. A rebound in the economy in recent years has led to less people depending on transit and more people opting for the convenience of a single occupancy vehicles.
- b. Emerging Tech
 - i. **Alternative Fuel Sources:** Many transit authorities are seeing the potential benefits both economically and environmentally of electric buses. Simplified engines leads to more reliable buses that are environmentally friendly.
 - ii. **Autonomous vehicles:** Still in prototype phase, autonomous transit would allow transit authorities to reduce operation costs significantly potentially allowing for additional service.
 - iii. **Payment methods and logistics:** With advancements in technology many systems are opting for pay cards that allow for more efficient boarding and operations. This also allows for better trip level data to help use limited fleets in the most efficient way possible.

6. Roadway

- a. Trends
 - i. **Alternative Intersections:** With recent increases in congestion alternative intersections have proven to be cost and space effective solutions for improving traffic flow. The DDI in Leland is an example.
 - ii. **Intelligent Transportation Systems:** efficient and coordinated signal timing is a cost effective improvement that can improve traffic flow. ITS has also been used to prioritize transit and emergency vehicles.
 - iii. **Alternative Funding Sources:** With inadequate funds for infrastructure improvements many cities are looking for alternative funding sources such as tolls and public private partnerships.
- b. Emerging Tech
 - i. **Autonomous vehicles:** still in its infancy autonomous vehicles will have a profound effect on transportation systems. Reduced accidents, congestion, and pollution are the largest benefits. Safety and regulation concerns are a big problem. It is anticipated that roadways will be similar to accommodate autonomous vehicles. Upgrades that may be needed include roadway paint, sensor technology (in pavement or in signs/signals). Anticipated reduction in parking.

- ii. **Transportation Demand Management:** One way of reducing congestion is increasing supply through expensive road widening and intersection improvements. Many cities are taking the opposite approach and finding ways to reduce demand through carpooling, transit, alternative transportation, and work schedule changes