Personal Delivery Devices

February 2021

Background

Personal delivery devices ("PDDs", known as automated delivery devices or "sidewalk delivery robots") are being deployed in various parts of the U.S. to deliver packages in residential and commercial areas. Some examples of these devices include the FedEx Roxo, Amazon's Scout in Seattle, and Nuro's Kroger grocery delivery pods in Arizona.

In the 2020 legislative session, FedEx introduced a bill to authorize the widespread use of PDDs on trunk highways. FedEx met with MnDOT to address the safety and other considerations needed to ensure the safe use and deployment of this technology. MnDOT raised concerns related to traffic safety, crashworthiness, accessibility and Americans with Disability Act needs, public health concerns, county and city oversight, enforcement, and other issues. The bill was not passed.

Starship PDD

FedEx Delivery Robot

After the 2020 session, MnDOT convened the Interagency CAV Team to develop a summary framework of all the considerations necessary to prepare MnDOT – and the state – for the deployment of PDDs. The Office of Connected and Automated Vehicles (CAV-X) convened MnDOT and other stakeholders to identify the various safety, active transportation, accessibility, right-of-way, and other issues that would need to be addressed for PDDs to be safely deployed. MnDOT also met with other states who passed PDD laws, including Pennsylvania, which is one of the few states to develop a comprehensive DOT policy on PDDs.

In 2021, legislators introduced a bill to authorize PDDs on Minnesota roads, pedestrian areas, and shoulders. The attached white paper is a summary of the technology and the related transportation and community health impacts of PDDs.

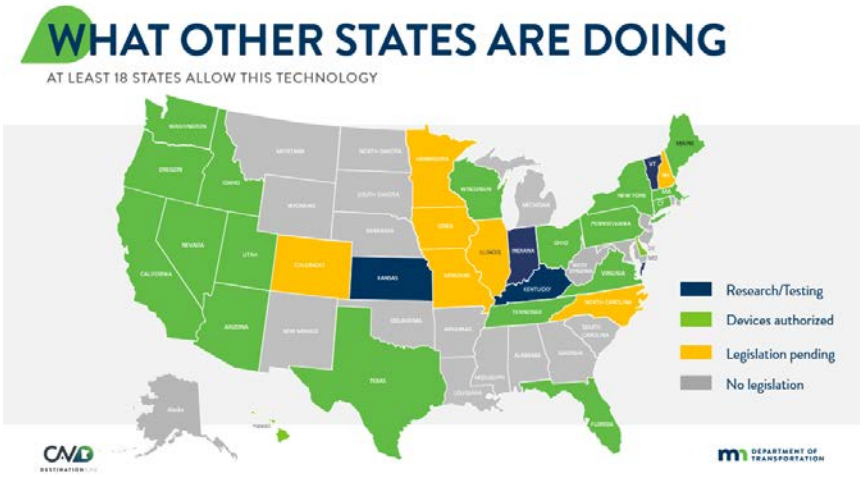
What Are These Devices?

PDDs are known as 'sidewalk delivery robots'. These are small-to-large autonomous robots that delivery packages. PDDs are intended generally for personal delivery but some regions use them for small commercial deliveries. Companies include Nuro (deployed in states like Florida), Starship (deployed in Wisconsin), FedEx (Tennessee), and others. PDDs do not use the same technology as autonomous vehicles and rarely require rigorous safety or crashworthiness testing that is conducted for AVs.

Nuro Delivery Robot

PDDs:

- Typically operate on sidewalks and shoulders
- Range in size from 2 feet to 6 feet and weight from 40 pounds to 500 pounds
- Range in speeds from 8 to 25 MPH
- Allow for contactless delivery
- Have helped the supply chain demand in same day and next day delivery
- Are operating in 18 states
- Use cameras and GPS to navigate.
- Do not have a consistent way to yield to pedestrians, cyclists, people in wheelchairs or other users



PDDs benefits include: (1) fill in gaps in the supply chain, (2) deliver products faster and more efficiently, (3) advance sustainability goals of reducing greenhouse gas emissions, ad reducing our carbon footprint, (4) advance equity goals of providing automation to more neighborhoods, (5) can provide goods to communities more affordably, and (6) can expand access for goods delivery.

Few PDDs have auditory or other signals to indicate turns or have the ability to move off the walkway for other road users however some PDDs have headlights and tail lights to alert adjacent users of its locations.

While companies like Starship claim they have tested over 1M miles, there are very limited deployments across the country – anywhere from 1-15 in each state, with the highest number of deployments in California, followed by Arizona, Texas, Michigan, and Florida.

Nine states have passed laws specifically authorizing these devices to operate on roads, sidewalks, and shoulders; most of these laws were authored by FedEx and other PDD companies.

Proposed PDD Legislation

Minnesota does not have a law that addresses PDDs.[1] House File 270 introduces “personal delivery device”, defining them as a device that is (1) manufactured for transporting cargo and goods in a pedestrian area or other areas as described in section 169.976; and (2) equipped with automated driving technology, including software and hardware, that enables the operation of the device with the remote support and supervision of a human.” PDDs have to be operated by a registered business and a human that helps the PDD comply with traffic laws, however PDDs under this bill are not considered ‘vehicles’ under state law.

[1] Current law defines "motor vehicle" as “every vehicle which is self-propelled and every vehicle which is propelled by electric power obtained from overhead trolley wires. Motor vehicle does not include an electric personal assistive mobility device or a vehicle moved solely by human power.” A vehicle “means every device in, upon, or by which any person or property is or may be transported or drawn upon a highway, excepting devices used exclusively upon stationary rails or tracks.”

The bill requires PDDs to:

1. Operate in compliance with current pedestrian laws
2. Yield/not obstruct traffic or pedestrians
3. Not unreasonably interefere with traffic or pedestrians
4. Display head/rear lights
5. Comply with local laws
6. Not transport hazardous materials
7. Not operate any faster than 12 MPH in a pedestrian area or 20 MPH in on roads
8. Have a label with the name and contact info and a 'unique identification number'
9. Have a braking system that allows it to come to a controlled stop
10. Have a white headlight and red tail light that can be seen from 500 feet away
11. Have insurance of $100,000

The bill prevents local governments from having laws any different from this legislation and allows police to enforce the above.

PDD Stakeholder Policy Recommendations

CAV-X met with internal and external stakeholders and other states to understand their ideas, feedback, concerns, and best practices for PDD policy, safety, equity, access, and technology deployment. A list of these stakeholders includes, but is not limited to, the below groups.

MnDOT Stakeholders	State Agency Stakeholders	City and County Stakeholders	Others
CAV-X Traffic Engineering Land Management ADA Office Transit and Active Transportation State Aid Chief Counsel Gov't Affairs Planning and Risk Mgmt. Freight and Commercial Vehicles Districts Regional Transportation Mgmt. Center	Council on Disability Public Safety Public Health Council on Aging Administration	League of Cities Minnesota County Engineers Association City Engineers Association of Minnesota Counties	Mobility advocates Delivery companies (FedEx, Amazon, etc.) University of Minnesota Other state DOTs MAASTO AASHTO ITS America Community members Policy makers

Key Policy Considerations and Issues to Consider

Below is an overview of key items to consider to ensure PDDs are deployed safely, responsibly, and equitably.

1. How do these devices support ADA and other accessibility requirements?
2. How do we monitor where these devices are?
3. How do we ensure safety and compliance with other laws?
4. What happens if a device is damaged or destroyed? Who is responsible?
5. How would local governments permit, regulate and oversee these devices?
6. How is personal information protected?
7. How does this comply with vehicle, traffic, and pedestrian laws?
8. Are these devices allowed in all areas? In areas with significant crashes?
9. How do companies verify safety?
10. Will these devices be equitably distributed across the state or only in certain areas? How do these promote our livability, mobility, and accessibility goals?

Additional considerations from stakeholders and other states include:

1. **Equity, accessibility, and mobility -** How do these devices comply with Americans with Disability Act (ADA) requirements to ensure that persons in wheelchairs have priority of the sidewalk PDDs? Sidewalks are generally not wide enough to accommodate both a PDD and a wheelchair. Will these devices be distributed equitably across the state? Avoid disproportionate impacts to communities, but also cannot delay these technologies from benefiting communities that could be advantaged. Use an equity lens framework to review bills and ask, "who needs to be involved in developing these policies?" Ask how we can seek ideas and feedback from community members.
2. **Safety -** Research whether PDDs can navigate in winter weather conditions. Restrict PDD routes to only those that do not pose safety challenges and avoid routes with increased crash rates. Look to platooning law to develop restricted routes and limited access areas. PDDs are not allowed to operate on non-motorized paths funded by the Federal Highway Administration (FHWA), including limited use permit trails. PDDs should follow current and future traffic laws and regulations. Address how PDDs interact with railroad crossings. PDDs should not obstruct driveway or other controlled access areas. PDDs must comply with the Manual on Uniform Traffic Control Devices (MUTCD). Policy should address whether PDDs may operate in dense, urban areas. PDDs should run with traffic.
3. **Sustainability** – Assess how PDDs advance our state's sustainability and greenhouse gas (GHG) reduction goals. Understand whether PDDs lead to increased congestion.
4. **Size and weight restrictions** – Some states prohibit anything above 120 pounds. Heavier PDDs could cause damage to transportation infrastructure, personal/commercial properties, or even other pedestrians and vehicles if involved in a crash. There should be a size limitation similar to the scooter laws to ensure safe access to sidewalks for other users.
5. **Oversight, compliance and enforcement** – An oversight agency should be responsible for tracking PDDs and coordinating across governments and industry. Regulators should be able to track where PDDs are in real-time using GPS, similar to the Mobility Data Specification. Industry should have to demonstrate compliance with these policies via a pilot or research before PDDs are authorized. Local governments or the state will need regulatory oversight and enforcement authority, particularly to address crashes associated with traffic or pedestrians.
6. **Privacy and data protection** – Ensure PDD data and camera recordings protect personally identifiable information. Consumers should have to give affirmative consent (opt in) to disclose consumer data.

7. **Local authority** – Local government should have the ability to regulate PDDs. PDDs need to address local curb management policies, including how local governments manage delivery trucks, ridesharing, micro mobility (scooters), and other modes. PDDs should not interfere with bike facilities, outside curb dining, and other way locals use the right-of-way. Look to micro mobility/scooter policies to ensure we regulate technologies uniformly when possible.

Other Considerations

1. **Don't stifle innovation** - We want to build a regulatory framework that encourages innovation without over-regulation.
2. **Industry neutral policy** – We should not develop legislation tailored to one industry or company's technology. Policy should be flexible and adaptable to account for technology changes.
3. **MnDOT right-of-way -** If on a trunk highway, shoulder, MnDOT-owned sidewalk or trail, PDDs will need a MnDOT permit.
4. **Costs** - MnDOT or locals may incur additional costs associated with issuing permits or operational oversight.
5. **Storage** - Where are these stored so as not to block sidewalks and rights-of-way? Is the state required to create parking facilities similar to what cities have done for scooters?

Recommended Next Steps

1. Create a PDD working group with state, county and local representatives
2. Conduct a research pilot to test PDDs in winter weather conditions
3. Host peer exchanges with other states and regions to understand PDD best practices
4. Develop model policy that addresses state and local needs to advance PDD innovation and policy
5. Host informational meetings with policy makers to discuss opportunities and challenges of PDD technology