CENTER FOR TRANSPORTATION STUDIES

CTS Research Brief

UNIVERSITY OF MINNESOTA

A Vision for Future Streets:

Leveraging AVs for greater health, equity, livability, and prosperity

"AVs will require a different kind of road than those built for driven vehicles. We need to stop putting in 20th century streets based on out-of-date assumptions about street design."

– Thomas Fisher, Director, Minnesota Design Center

Why was the study needed?

With the passage of a major infrastructure bill, the US is on the brink of significant and potentially transformational infrastructure investments. The auto industry is moving toward a mobility-service business model based on automated vehicles (AVs)—and local governments need to start planning their infrastructure for what is to come. A new Minnesota Design Center project illustrates the nature of AV-ready streets to help communities adapt to this new reality and harness the opportunities it offers, including greater community health, equity, livability, and prosperity.

Envisaging the future

To design AV-ready streets, Minnesota Design Center staff and students used a set of assumptions about what the future will hold.

- **Policy:** AVs will be safer, cleaner, and cheaper than cars and will become prevalent by 2040. They will operate primarily with on-demand platforms, which will greatly reduce the number of vehicles on the road and eliminate the need for parking.
- **Public realm:** AV-ready streets will have concrete, grade-beam tracks with pervious, planted surfaces. They will also have fewer and narrower lanes, be equipped with real-time information and sensor technologies, become community-gathering places, and accommodate diverse modes of transportation.
- **Climate change:** AVs will reduce heat island effects (as streets become healthier and shadier), carbon emissions, and stormwater runoff (as streets become more pervious) while increasing green space and providing storage capacity for major storm events.

Street phases: transition

The transition to AV-ready streets won't happen all at once. Researchers defined four phases in the transition from driver-oriented to AV-ready streets.

Phase One

Local governments assess the location of below-ground utilities and the amount of surface paving materials that can be reused as part of new construction, which will likely be substantial.

Phase Two

Streets will become a hybrid of both driven and AV vehicles, each with their own dedicated lanes. Large parking facilities will start to become superfluous; the land will be repurposed for stormwater retention and other beneficial uses.

Phase Three

AV-ready streets are in place with concrete-grade beam tracks for the AVs and pervious paving or planted medians covering the remainder of the road surface. New development fills in where parking once stood, increasing the tax base.

Phase Four

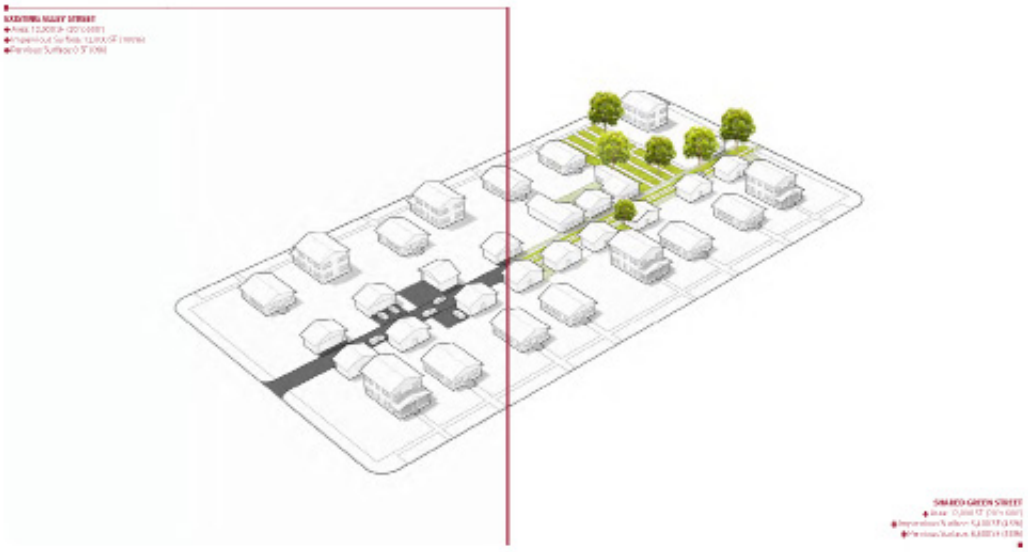
The transition to fully automated streets is complete; driven cars are no longer allowed on urban and suburban streets. Dedicated bike lanes have been added on most streets, and sidewalks have become much wider.

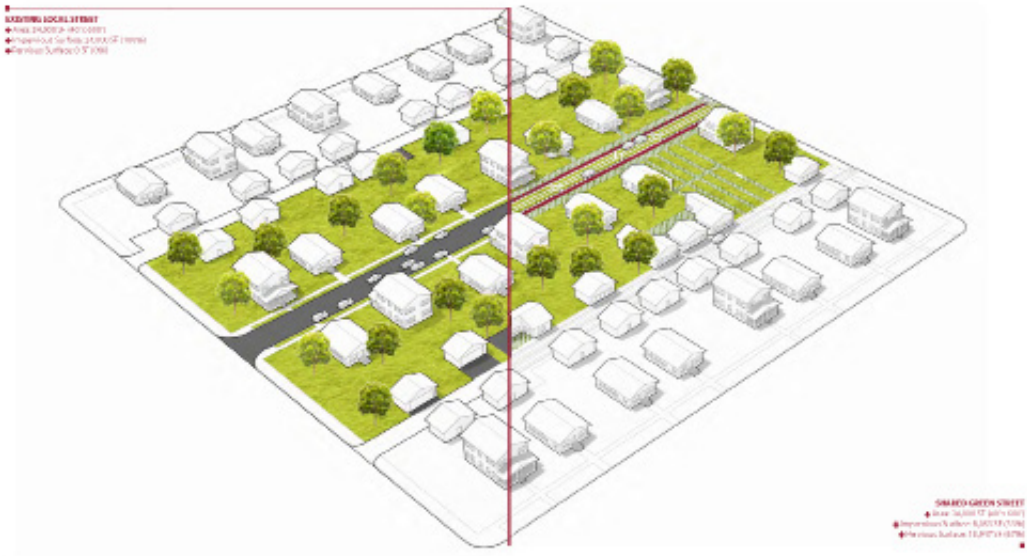
Future street design

The researchers created detailed designs for the four main types of AV-ready streets: alley, local, collector, and arterial. They illustrate materials needed; street elements (such as AV tracks, smart bollards, and pick-up/drop-off zones); zones for AVs, bikes, scooters, and pedestrians; and green infrastructure and planting possibilities.

Alley street

The emergence of mobility services will have a dramatic impact on the nature and role of alleys. Garages will be available for other uses such as accessory dwelling, workshops, businesses, and childcare. The alley will also become greener, with AV tracks leaving the rest of the right-of-way for pervious pavement.





Local street

Today, often-underutilized local streets represent the excess capacity and significant expense that exist in our current transportation system. When AVs become the dominant mode of vehicular transportation, the streets will need only a pair of tracks in each direction and no on-street parking—opening the right-of-way for green space, sidewalks, and bike lanes.

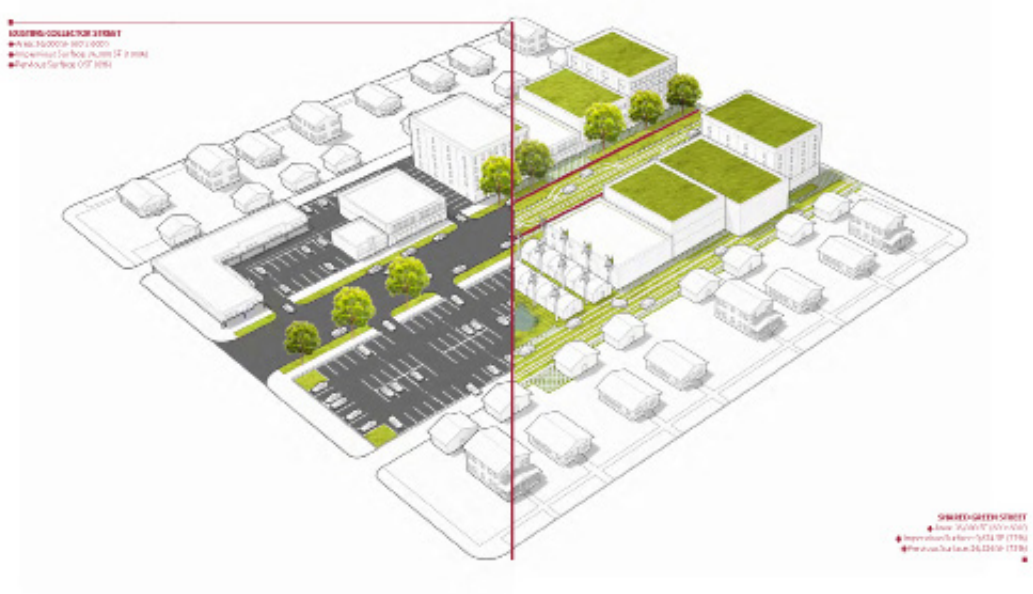
About the Research

This research was funded as part of a National Science Foundation (NSF) Smart and Connected Communities grant (award no. CMMI-1831140): Leveraging Autonomous Shared Vehicles for Greater Community Health, Equity, Livability, and Prosperity (HELP). Support also came from Dayton Hudson Foundation funds at the University of Minnesota Foundation. The research team was led by Thomas Fisher, director and co-principal with the U of M's Minnesota Design Center.

Final report—Future Streets: Leveraging Autonomous Shared Vehicles for Greater Community Health, Equity, Livability, and Prosperity (August 2021).

Collector street

Busy collector streets currently take up much of the right-of-way, making it difficult for other types of multimodal transportation to use or cross the street. They also act as heat islands and are sources for runoff and water pollution. In the future, AVs will substantially alter collector streets: The number of lanes needed will decrease, lanes can be closer together, and parking will not be needed. The additional space will allow for dedicated bike lanes, sidewalk-oriented activities, a denser tree canopy, rain gardens, and more.



Arterial streets

The changes AVs and mobility services will bring to busy arterial streets will be among the most striking: The number of lanes will decrease significantly, turn lanes will largely disappear, and traffic signals will only be needed to control pedestrian crossings. Development can occur where parking lots and garages once stood, increasing density and expanding the tax base.

About the Minnesota Design Center

The Minnesota Design Center engages in system design in Minnesota and the upper Midwest. It seeks innovative solutions to the design of physical systems such as infrastructure and open space as well as non-physical systems such as public health or service delivery, helping our region seize the opportunities that lie in the social, technological, environmental, and economic disruptions of our time.

Image credits: Joseph Hang, Minnesota Design Center

CTS Research Brief 2022-01, March 2022