

A Shared (Yield) Roadway

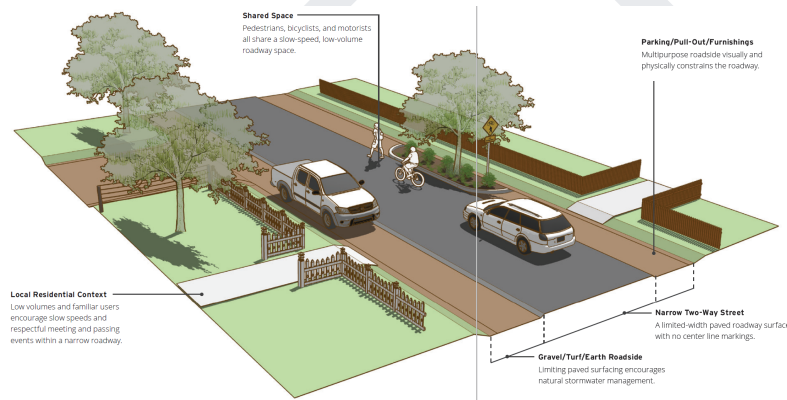
A cost-effective way to make roads comfortable for walking and biking



Guides for designing bicycle and pedestrian facilities (including here in [Chester County](#)) that focus on more developed areas may not provide the same level of details for alternate design options in relatively more rural regions. Small rural roads like those surrounding Kennett can be charming, and so it is no surprise to find residents walking or biking on many of them. The Yield Roadway is one way to improve rural roads for pedestrians and cyclists at a fraction of the cost of shared-use paths common in more developed areas.

What are these?

The [Yield Roadway](#) (see right) is one of several Mixed Traffic designs described in federal guidelines ([FHWA 2016](#)). Pedestrians, bicyclists, and two way motor vehicle traffic share the same, slow-speed travel area without center line markings.



The FHWA recognizes this design as a potentially appropriate option for minor rural roads with low volumes (Average Daily Traffic or ADT < 2000 vehicles/day) of traffic traveling at low speeds (< 30mph) - see figure to the right.

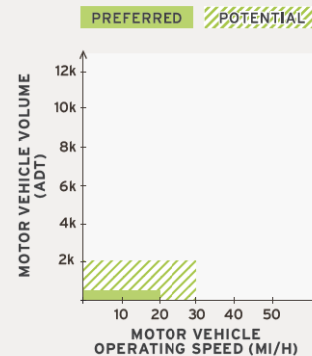
How do they work?

Drivers stay in the middle of the road, but can shift towards

- The edge on their right to allow another car to pass, but they must yield to any cyclists or pedestrians
- The edge on their left to give extra room to a cyclist or pedestrian traveling in the same direction
- Cyclists can shift towards the center to pass pedestrians when cars are absent

Speed and Volume

Appropriate on roads with very low volumes⁶⁾ and low speed.



Drivers do many of these things already - they yield to other drivers every day, all over Kennett; they refrain from passing cyclists on a narrow road when another car is coming; they yield when approaching a one-lane bridge (like on Hillendale next to Chandler Mill);

they yield when a delivery truck blocks their lane. And the current design for the Chandler Mill Trail includes two one-way yield sections.

Some designers have recommended additional markings. For example, adding two dashed 5' edge lanes to suggest a 10' wide center travel lane for cars on a 20' wide roadway can help make this design even safer and more comfortable for cyclists, pedestrians, and drivers. This is like an Edge Lane Road (ELR) except that the edge lane is not designated for - but is shared with - cyclists and pedestrians. And unlike an ELR, there is no need to file a Request to Experiment for a Yield Roadway.

What are the challenges of this design?

Speed is perhaps the most common challenge to implementing a Yield Roadway in a rural region, where people tend to drive fast. Even on small roads, at least some drivers are likely to exceed 30mph. The good news is that there are solutions.

- Begin with a traffic study to understand whether speed is an issue.
- A yield roadway can itself **help to calm traffic**, helping drivers slow down and to be more vigilant. Implementing a pilot study on a section of roadway may demonstrate that a yield roadway design may be all you need to drop the speed below 30mph.
- If not, designers can begin to implement other traffic calming measures until drivers meet the desired speed.

Another significant challenge are **sections with limited sight distance** (e.g., when drivers might not be able to see far enough ahead to safely pull to the side for an oncoming car). Whether or not a section of roadway has limited sight distance [depends partly on the speed of cars](#) (see right): while two cars traveling 30mph need 305 feet to safely stop (the Head On Stopping Distance or HOSD), those traveling at 20mph for two cars need only 165 feet to safely stop. This also suggests some solutions:

1. Bushes/embankments can be shaved to improve visibility;
2. Other traffic calming measures can be added immediately before the section to drop speed such that cars now have enough room to stop safely, based on the revised HOSD.

Speed (MPH)	HOSD (ft)
20	165
25	230
30	305
35	390
40	485
45	590
50	700
55	825
60	960

If neither is successful, **the section can be bypassed** with a short 10' wide off-road shared-use section.

- Though sight distance is not formally included in ratings of the Level of Traffic Stress (see below), it is clear that this impacts the stress experienced by cyclists.

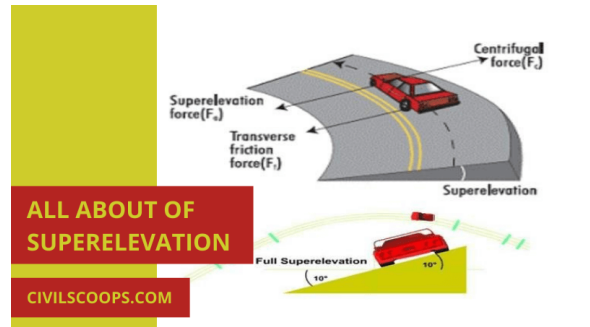
Concerns about speed in relation to limited sight distance should also be re-evaluated on extremely low volume roads (e.g., less than 400 vehicles/day). Research demonstrates that decreasing **traffic volume becomes more important than speed** in determining the

safety and comfort of low-volume, mixed traffic facilities, with the **risk decreasing exponentially** as a function of decreasing in traffic volume - for example **decreasing almost 90%** when volume drops from 1600 to 400/day.

- Consider recalculating the risk for a given section of road. It is possible, for example, that the risk of two speeding cars encountering a cyclist on a specific section of road may only occur once every 5-10 years on an extremely low volume road.

If a Yield Roadway is intended for use by pedestrians, designers must also ensure that it meets accessibility guidelines (see [PROWAG](#)).

- It is possible that sections might not meet full accessibility guidelines (for example, where there are hills with excessive grades, or excessive cross-slopes because of the crown of the road or where curves have been super-elevated - see [right](#)).
- If these features cannot be corrected, it is possible that the design might only meet the needs of cyclists.



What are some of the many advantages of this design?

The FHWA identifies **many potential benefits to yield roadways** (see right). We would also note that, compared to a shared use path running alongside the road, it

- Is a **fraction of the cost**.
- Has **no environmental impact**
- Precludes need to seize private land

BENEFITS

- Less costly to build and/or maintain than fully paved cross sections.
- Encourages slow travel speed when narrower than 20 ft (6.0 m).
- Connects local residential areas to destinations on the network.
- Can support a larger tree canopy when located within wide unpaved roadside areas.
- Limits impermeable surface area and minimizes stormwater runoff.
- Supports on-street or shoulder parking for property access.
- Maintains aesthetic of narrow roads and uncurbed road edges.
- Low maintenance needs over time.

Eliminating center line markings is a key feature of a Yield Roadway that encourages drivers to travel in the center of the road when no one else is present. According to the FHWA, this introduces “helpful traffic friction and ambiguity, contributing to a slow speed operating environment”. [A recent review](#) of similar designs also suggests that driving closer to the center may help to **reduce accidents by 44%**.

- Another advantage? Vehicles traveling in the center of the road **reduce wear** on the vulnerable edge of the roadway!

A Yield Roadway can be comfortably shared with most cyclists according to the Bicycle **Level of Traffic Stress (LTS)** framework in the most [recent ratings](#) .

- It is comfortable for children as young as 8 (LTS 1) even on a street with 1500 vehicles/ day and speeds of 28.5mph.

- Removing the centerline matters - for example, it helps to keep a road with 1000-1500 vehicles/day comfortable for all cyclists under 28.5 mph.

- The LTS model was developed for urban areas, however. Its authors explicitly acknowledge that it does not take into account sight distance (and steep hills), factors that would increase the LTS stress rating.

Level of Traffic Stress Criteria for Road Segments, version 2.2 (May, 2022)

Bikes in mixed traffic

Number of lanes	ADT	Prevailing Speed (mph)				
		0 - 23.5	23.5-28.5	28.5-33.5	33.5-38.5	38.5+
Unlaned 2-way street (no centerline)	0-750	LTS 1	LTS 1	LTS 2	LTS 2	LTS
	751-1500	LTS 1	LTS 1	LTS 2	LTS 3	LTS
	1501-3000	LTS 2	LTS 2	LTS 2	LTS 3	LTS
	3001+	LTS 2	LTS 2	LTS 3	LTS 3	LTS
2-way with 1 lane per direction and centerline, or wide* 1-way, 1-lane	0-1000	LTS 1	LTS 1	LTS 2	LTS 2	LTS
	1001-1500	LTS 2	LTS 2	LTS 2	LTS 3	LTS
	1501+	LTS 2	LTS 3	LTS 3	LTS 3	LTS

Implementing a yield roadway with suggested lane markings can also be a more comfortable traffic calming strategy for drivers than other strategies like speed bumps (especially when calming a longer stretch of roadway), and less noisy than rumble strips for neighbors.

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