

The MUTCD and Clarity for All! Helping AVs (and Humans) be Good Drivers



Disclaimer: This presentation represents the views, thoughts, and opinions of the presenter and do not necessarily reflect the views, thoughts, and opinions of Nuro, Inc.

Meet Nuro!

- Develops software, designs and operates a fleet of electric, fully autonomous vehicles
- Delivers goods from businesses to consumers
- On-road, zero-occupant
- Company founded in 2016.
700+ employees: CA, TX, NV



The Nuro - our 3rd generation electric, fully autonomous vehicle

Our focus on moving goods instead of people allows us to address community challenges

SAFETY
Zero occupants



ENVIRONMENT
Zero emissions



EQUITY
Serving food deserts & people w/ mobility challenges

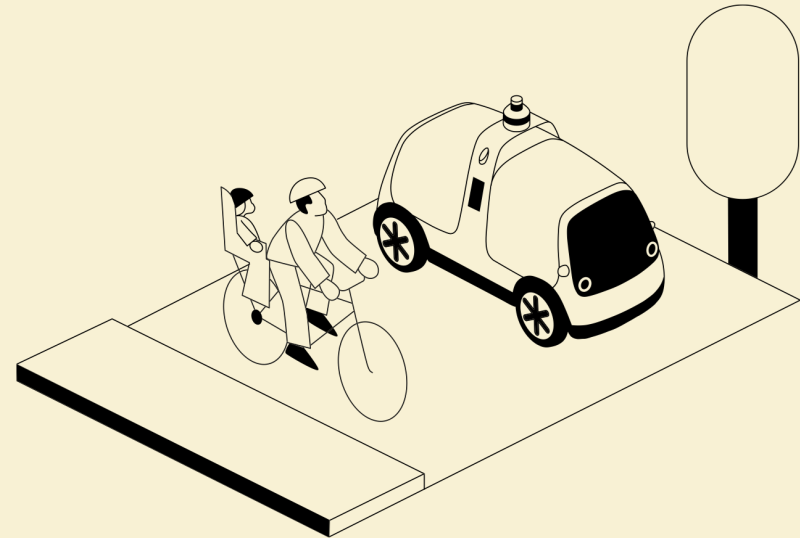


JOBS
Revitalizing local commerce



Meet Amanda!

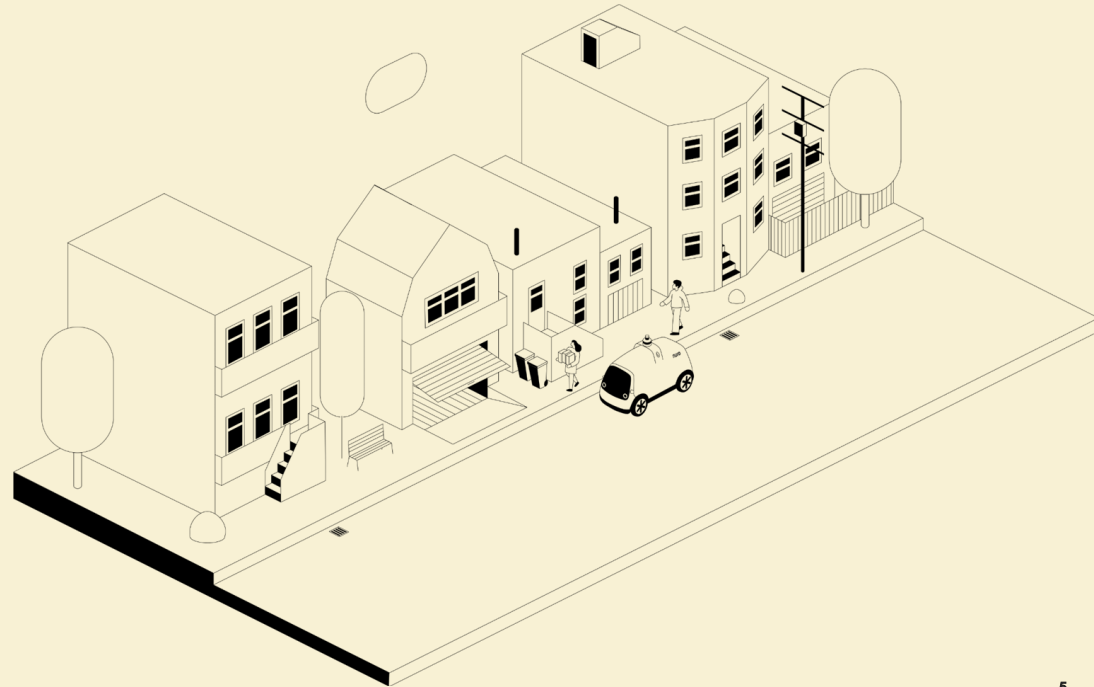
- Virginia Bar licensed attorney in good standing
- ~10 years working with CAVs and rules of the road
- Senior Policy Analyst at Virginia DMV
 - Researched, drafted, reviewed, and implemented the vehicle code
- CAV Program Manager at VDOT
 - Enabled CAV initiatives across the Commonwealth
- Regulatory Counsel at Nuro
 - Provides legal guidance as to rules of the road, compliance with law at all levels



The Importance of the MUTCD

To answer the question of “what’s good driving behavior when...” I review:

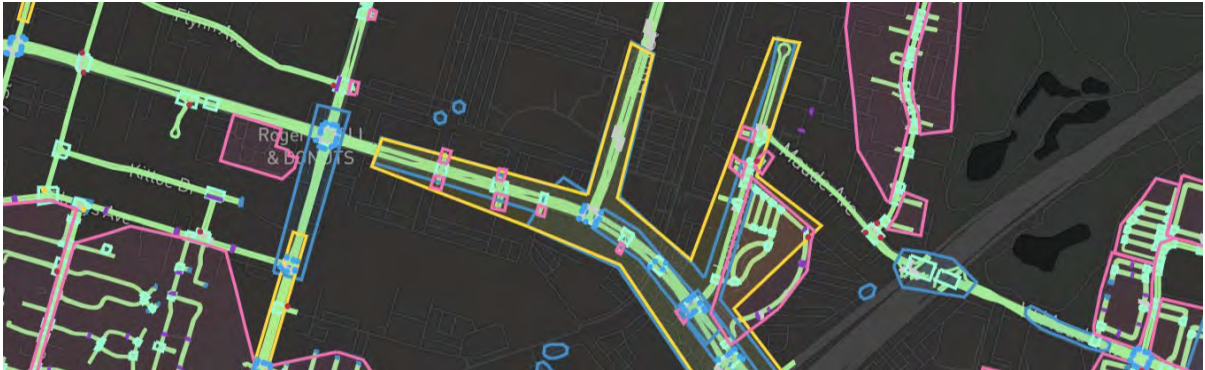
- State vehicle codes
- MUTCD
- State MUTCD appendices
- Local Ordinances
- DMV driver’s manuals
- Court cases
- DMV guidance
- LE guidance
- Safety studies
- Interviews with officials



What I'm looking for from the MUTCD: Clarity

- 1 - What to do
- 2 - How to do it
- 3 - Everyone does it too

- ☑ intersections
 - ☑ stop signs
 - ☑ yield signs
 - ☑ signals
 - ☑ lanes
- -
 -
 -
 -



Clarity Case Study A: School Zones



- What to do
- How to do it?
- Everyone does it too?

Word	Clarity
When	8/10
Children	4/10
Are	10/10
Present	2/10



Clarity Case Study A: School Zones Cont'd

- What to do
- How to do it?
- Everyone does it too?



google.com/search?q=when+children+are+present+sign&oq=when+children+are+present+sign&gs_lcrp=EgZjaH

Google when children are present sign

Images Videos News Shopping Maps Books Flights Finance

About 2,830,000,000 results (0.29 seconds)

The Press Democrat
https://www.pressdemocrat.com › News › Local

What does 'when children are present' mean on speed limit ...
Feb 2, 2016 — A reader asks whether the phrase means during school hours, or when drivers see children.

Everett Herald
https://www.heraldnet.com › news › what-when-childr...

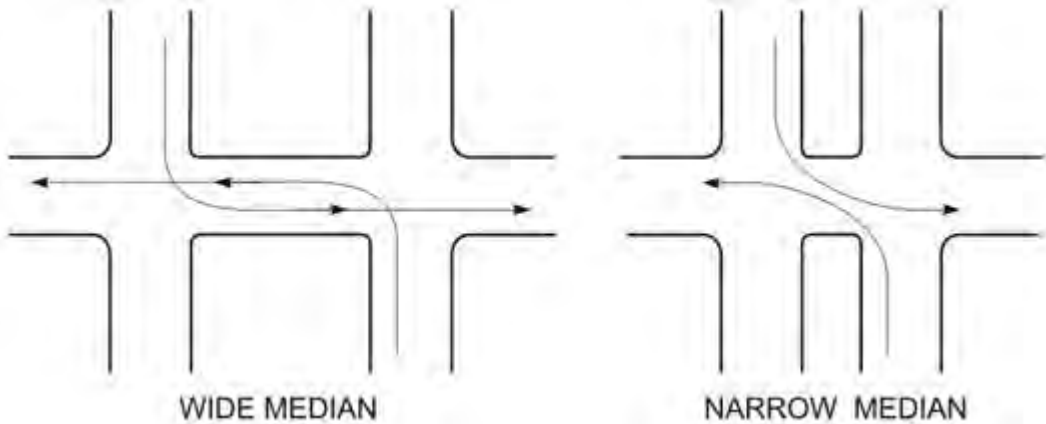
What 'when children are present' means in a school zone
Nov 24, 2015 — It may seem like splitting hairs. But with police departments offering different rules for when school zones are in force, it's worth a closer ...

Orange County Register
https://www.ocregister.com › 2021/08/20 › how-does-...

How does the 'Children are Present' sign work near schools?
Aug 20, 2021 — Honk: With school returning to open campuses, would you please clarify a school sign? By each campus it reads, "School Zone 25 MPH When Children ...



Clarity Case Study B: Wide and Narrow Turns in Medians



- What to do
- How to do it
- Everyone does it too?

According to a Texan.....

Type of Turn	Level of Jerk
Wide	Not a jerk
Narrow	Jerk

- **Wide Median:** the median width is 30 ft or more on at least one of the approaches.
- **Narrow Median:** the median width is less than 30 ft. on both approaches.



Clarity Case Study B: Wide and Narrow Turns in Medians

- What to do
- How to do it
- Everyone does it too?

About 58,400,000 results (0.36 seconds)

Amaro Law Firm
<https://amarolawfirm.com> · how-to-turn-in-a-median-4...

How to Turn in a Median in Texas

Apr 29, 2023 — **Wide** Wider medians in Texas tend to stretch at least 30 feet or more. Consequently, these wider medians are considered to be intersections.

★★★★★ Rating: 5 - 1,118 reviews

People also ask

- How do you turn in a median in Texas?
- What is the turning lane law in Texas?
- Is it legal to stop in the median in Texas?
- How do you turn when there is a median?

KHOU
<https://www.khou.com> · driving-you-crazy-houston

Do you know the right way to turn in a median? In Texas ...

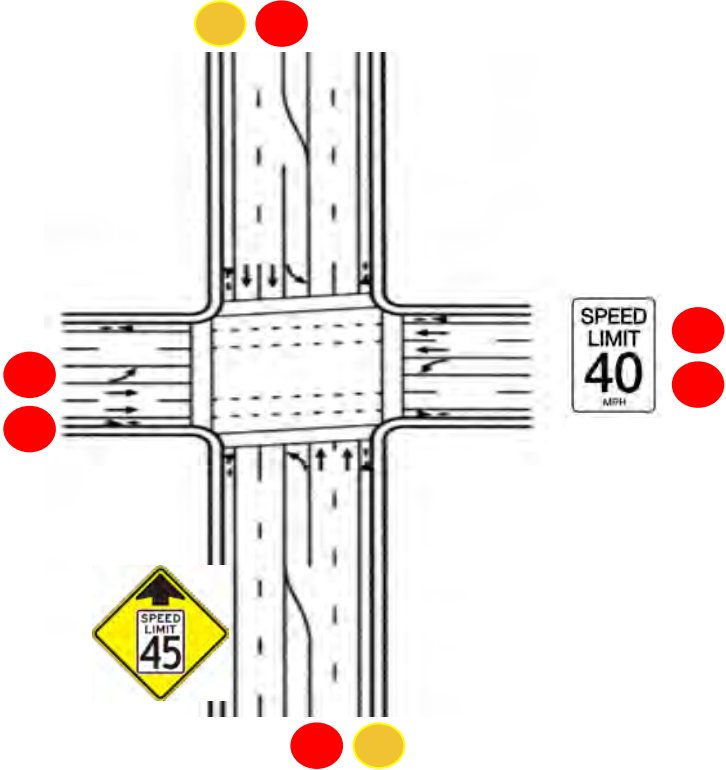
Feb 10, 2020 — In Texas, if the median is 30 feet or wider, the junction on each side is considered its own intersection and you go to the far side. **MORE**...

The screenshot shows a news article from KHOU 11. The headline is "Do you know the right way to turn in a median? In Texas, it's confusing!". Below the headline is a sub-headline: "The big question is do you turn in front of the other car or go around it?". A diagram below the text shows a road with a median and two cars, one red and one blue, illustrating the driving scenario. To the right of the article is a Vrbo advertisement for a house. The browser's address bar shows the URL: [khou.com/article/traffic/driving-you-crazy-houston/how-to-turn-in-a-median-sparks-debate/285-29d9dd00-39f4-44e5-a028-06dcab1b6195](https://www.khou.com/article/traffic/driving-you-crazy-houston/how-to-turn-in-a-median-sparks-debate/285-29d9dd00-39f4-44e5-a028-06dcab1b6195). The browser's top bar shows "Google Chrome" and the date "Fri Jan 6 9:59 PM".



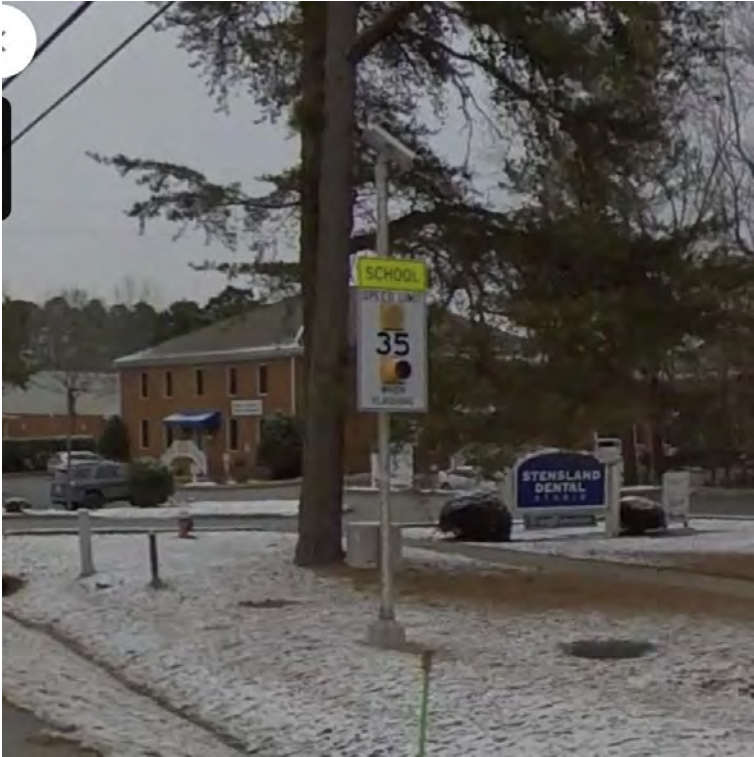
Clarity Case Study C: Flashing Yellows and Reds

- What to do??
- How to do it??
- Everyone does it too??



Clarity Case Study D: When Flashing - Clarity Does Exist

- What to do
- How to do it
- Everyone does it too

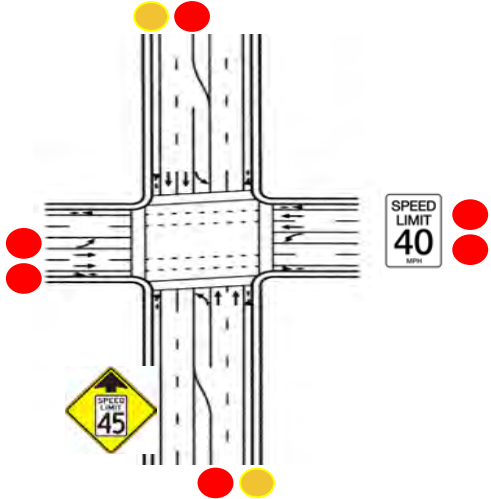
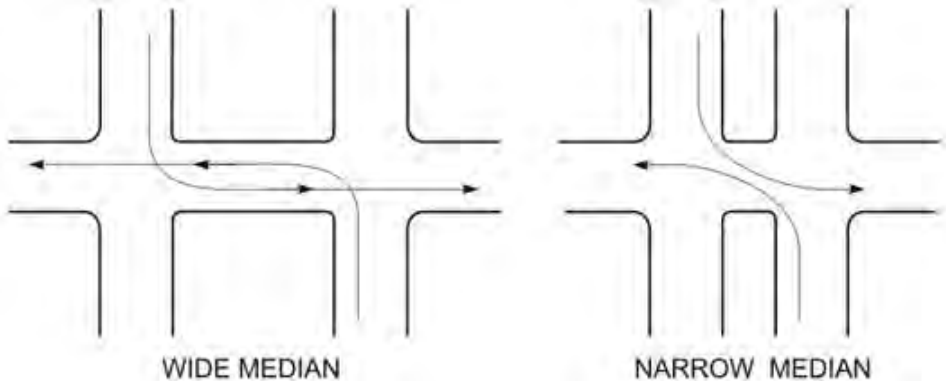


Things I don't need to know and why I love this sign:

- School start times
- School lunch times
- School recess
- School end times
- School calendar
- Before school activities
- After school activities
- Presence of a fence



Do not let perfection be the enemy of the good.



There is a distinct lack of clarity in the rules of the road,

- “Reasonable person standard”
- Permissive language (“may”)
- Conditional language (“if safe to do so, in light of roadway conditions”)



which can be addressed through participating in the MUTCD process





Uniformity is perfect, but clarity is good

- Better informed drivers make better decisions, AV or human
- AV benefits of clarity are even more extensive:
 - ◆ We can let our AV practice good behavior for millions of miles in simulation
 - ◆ We can more accurately measure our AVs' good behavior
 - ◆ AVs' good behavior is continuous - isn't decreased by distraction, lack of sleep, being under the influence



