NEIGHBORHOOD STREET DESIGN GUIDELINES

Commission on Connecticut's Development and Future
Model Codes Working Group

May 13, 2022

EXISTING GUIDELINES

Connecticut Highway Design Manual

- Principally intended for use on facilities that serve a transportation rather than property-access purpose
- Last released in 2003, with revisions through 2020
- Often deferred to by municipalities for design of local roads

(CTDOT) Guidelines for Subdivision Streets

- Commissioned by CT General Assembly
- Intended to address need for design guidelines appropriate to neighborhood contexts
- Released in 1987, no updates since then
- Unclear if it is being used by anybody

AASHTO Guidelines for Geometric Design of Low-Volume Local Roads

- National design guidance
- First released in 2001, updated in 2019

COST IMPACTS (CAPITAL)

Cost Element	Estimating Units	Unit costs			High		Medium		Low	
		High	Medium	Low	Quanity	Cost	Quanity	Cost	Quanity	Cost
Clearing and Grubbing	LS	$15,000.00	$9,000.00	$7,000.00	1	$15,000	1	$9,000	1	$7,000
Earthwork	CY	$20.00	$20.00	$20.00	5,763	$115,263	1,483	$29,667	400	$8,000
Pavement Structure	SY	$72.23	$52.45	$25.89	4,415	$318,902	2,635	$138,223	1,556	$40,287
Curb	LF	$50.00	$9.00		2,432	$121,600	1,000	$9,000		$0
Sidewalk (inc ramps)	SF	$20.00	$20.00		12,300	$246,000	5,000	$100,000		$0
Street Lighting	EA	$10,000.00	$6,000.00		5	$50,000	1	$6,000		$0
TOTAL						$866,765		$291,890		$55,287
Assumed street length (ft)	1,000									
High = Highly engineered subdivison Medium = Conventional subdivison Low = Private Neighborhood										

ENVIRONMENTAL IMPACTS (ONGOING)

Annual surface runoff generation (→ flooding, water pollution)

- High: 1.24 million gallons (184% more than low)
- Medium: .74 million gallons (69% more than low)
- Low: .44 million gallons

More asphalt → higher summer temperatures (heat island effect)

More asphalt → more need for pre/de-icers (salinification)

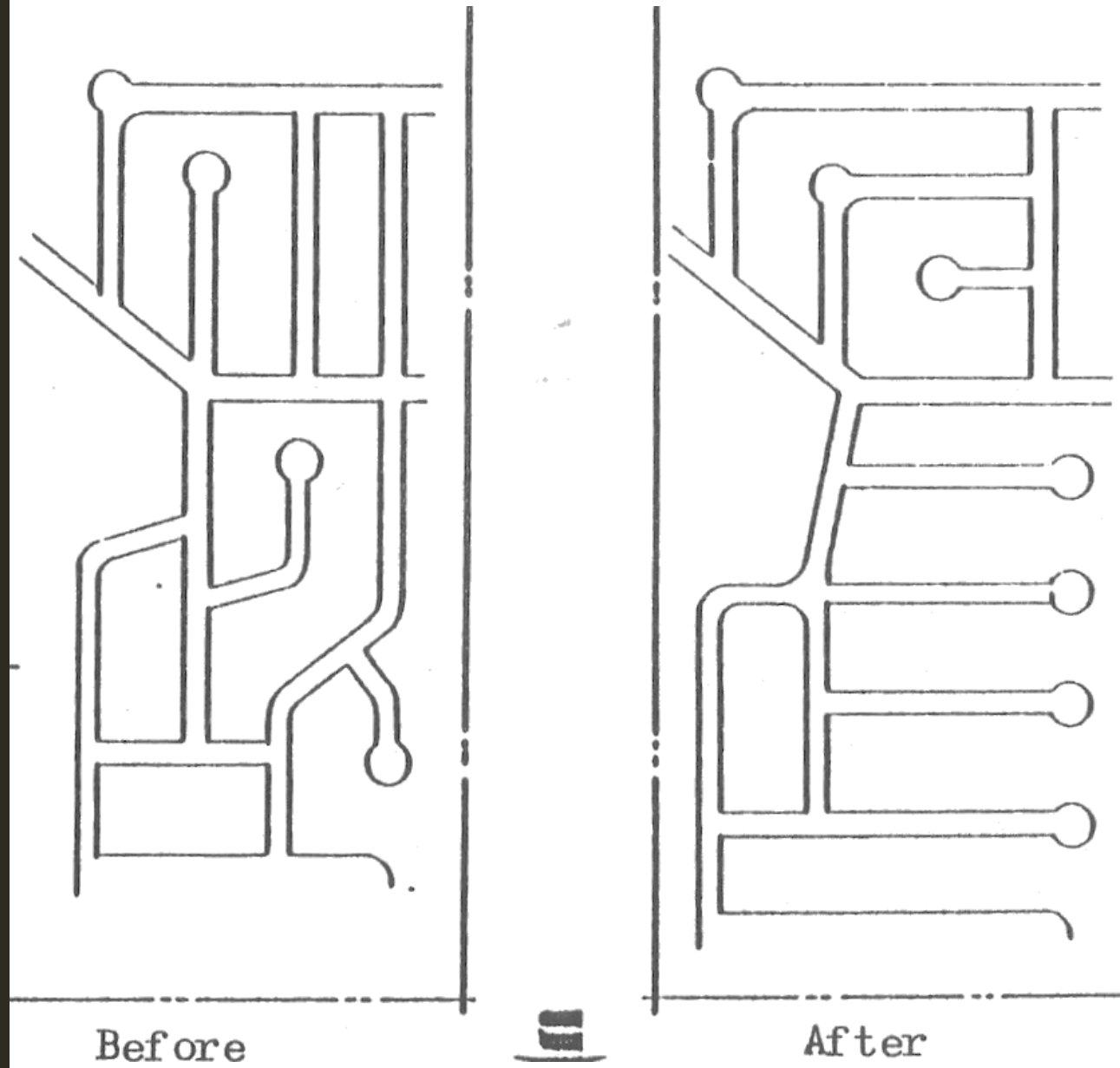
More asphalt → more GHG emissions

STREET DESIGN AND ENERGY USE

Street designs can be reoriented without decreasing overall project density

(*Source: California Energy Commission Site Planning for Solar Access, Project Report No. 11 June 1980*)

East-West Streets Enable Rooftop Photovoltaics Panels and Provide Passive Solar Benefits



FISCAL BENEFITS OF STREET & LOT ORIENTATION

Economic Advantages of Solar for "Non-Solar" Dwellings*

Orientation: 19% reduction in building heating demand	**Micro-climate:** 21% reduction heating demand on south-facing slope (18%) vs. flatland	**Solar access:** 28% reduction in heating demand vs. shaded house

Enablers of a Solar Conscious Future

Street and lot orientation enable optimum use of solar energy for space heating and electricity	Building and roof orientation enable retrofitting of photovoltaics

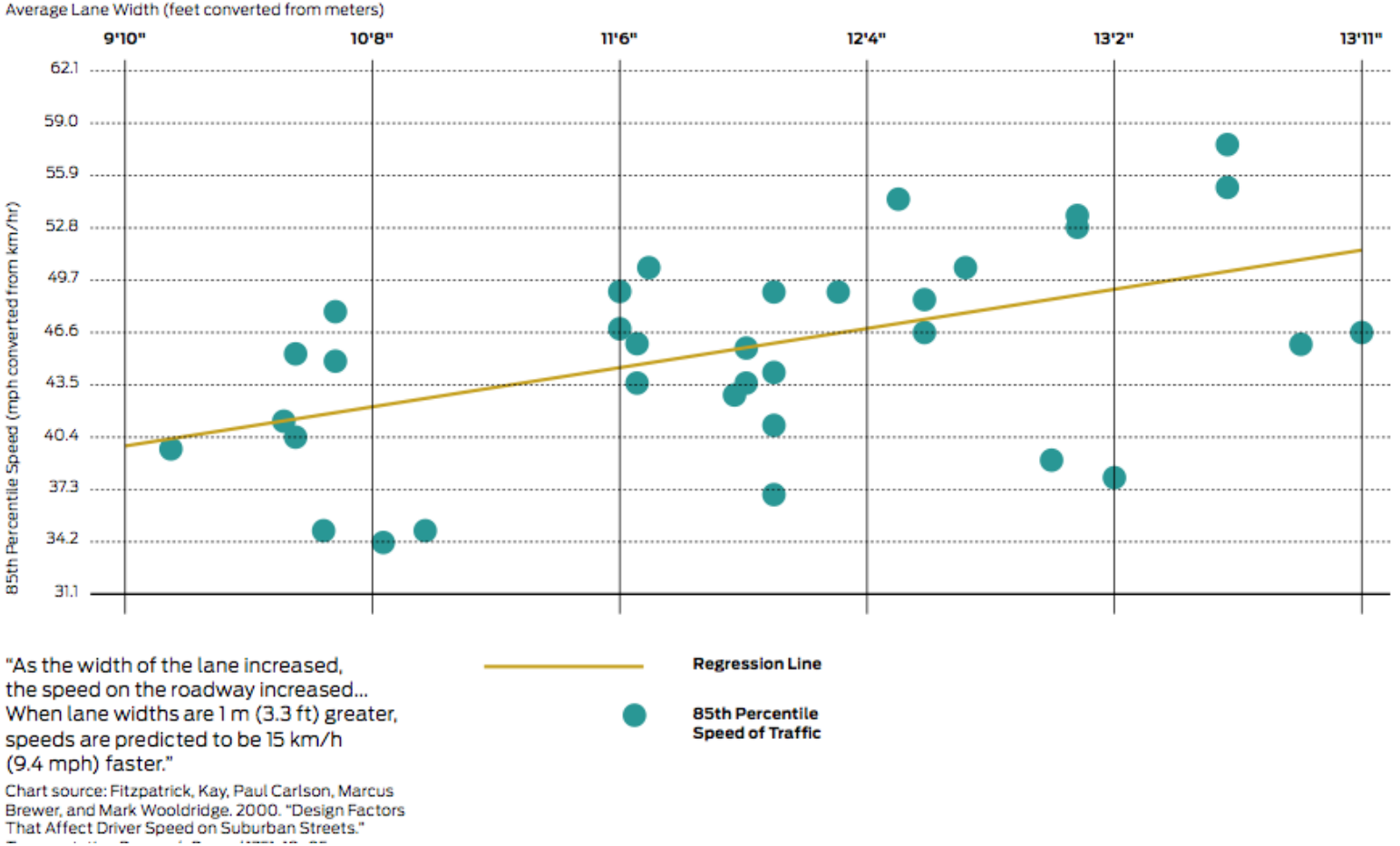
** By definition, all dwellings benefit from solar – some plan for it; others can only take what they failed to plan for.*

ENERGY BENEFITS OF SOLAR DESIGN COMPOUND IN SUPERINSULATED HOMES

South-oriented building reduced 55% less heating compared to east or west building orientations with same window plan

South-oriented building reduced 38% less cooling compared to east or west building orientations with same window plan

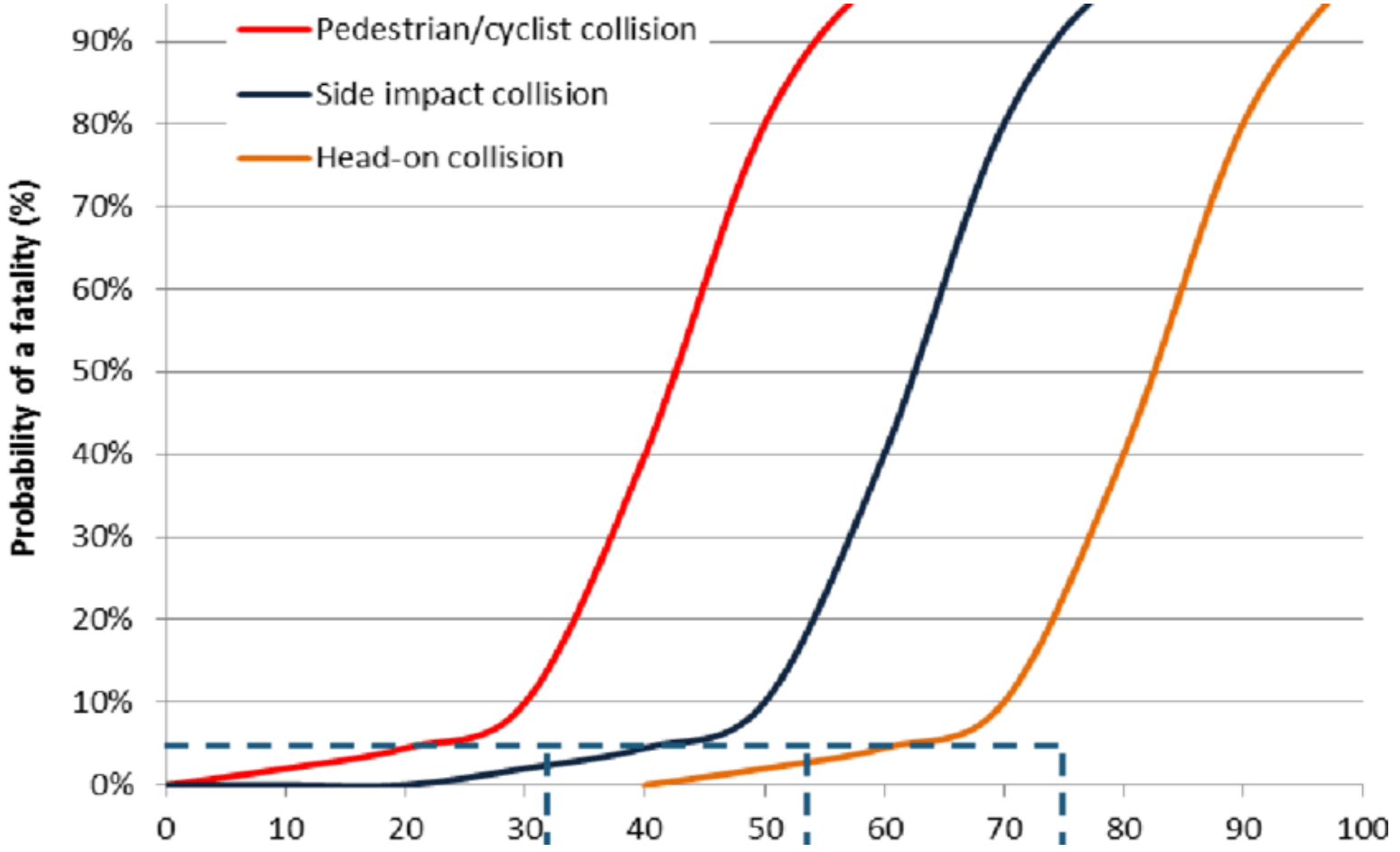
Source: Detailed Engineering Analysis of Illinois Low-Cal House, May 1979



SAFETY IMPACTS (ONGOING)

Wider, flatter, straighter → higher speeds

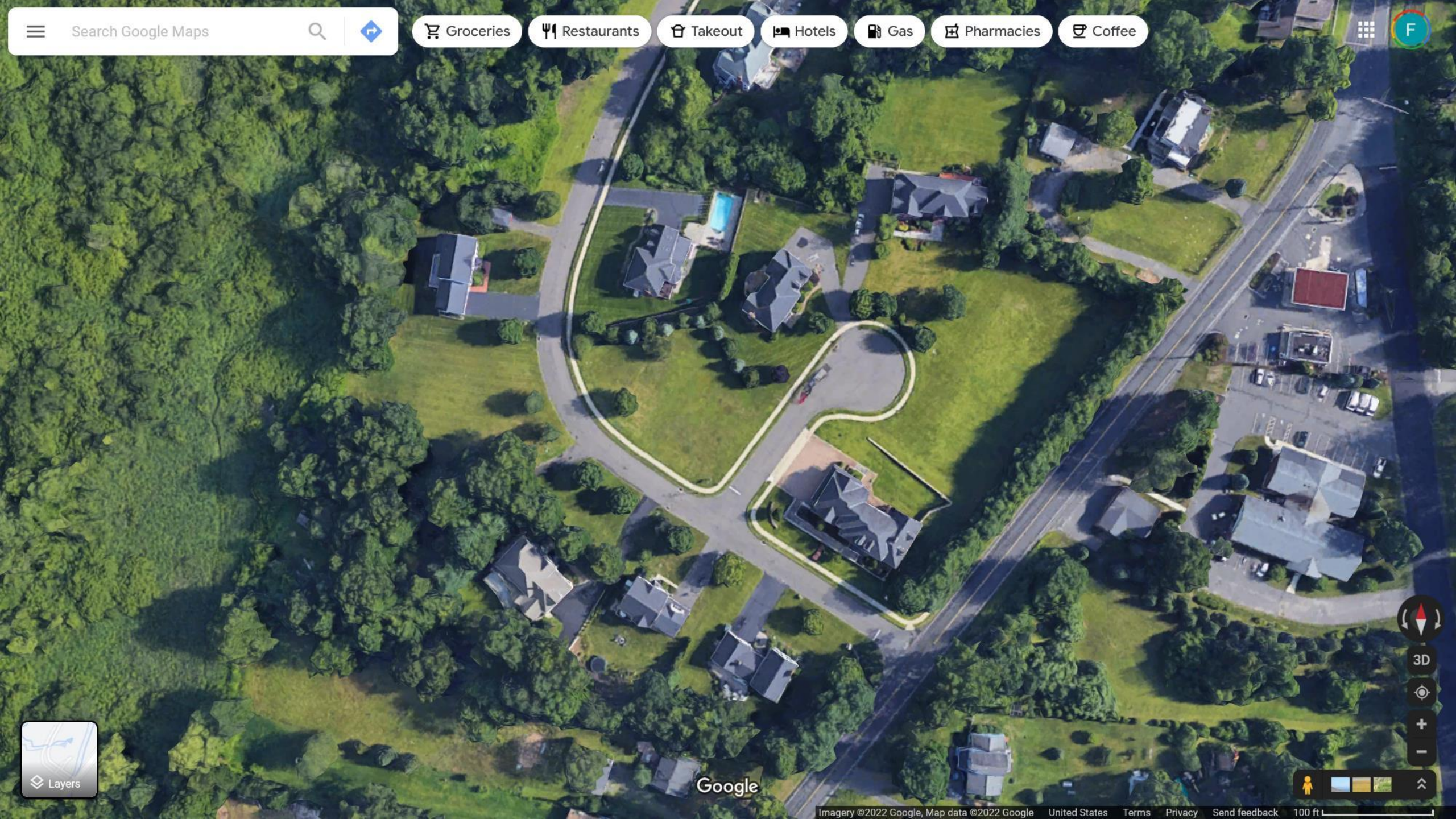
Higher speeds increase risk of crash AND…



SAFETY IMPACTS (ONGOING)

Effects of a crash scale nonlinearly with speed

Probability of death climbs rapidly above 30 km/h (18 mph)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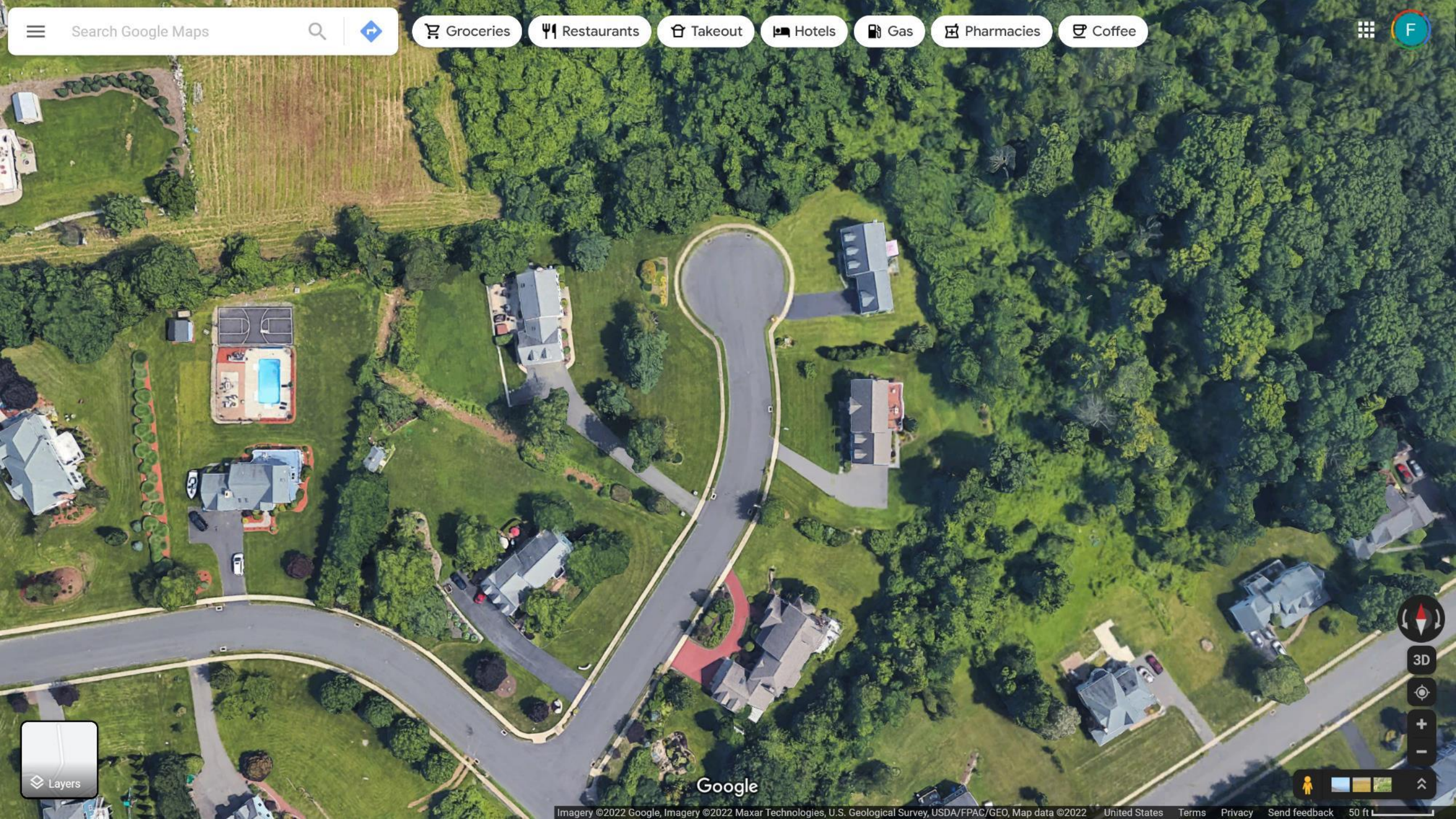
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47 Country Club Woods Cir
Waterbury, Connecticut
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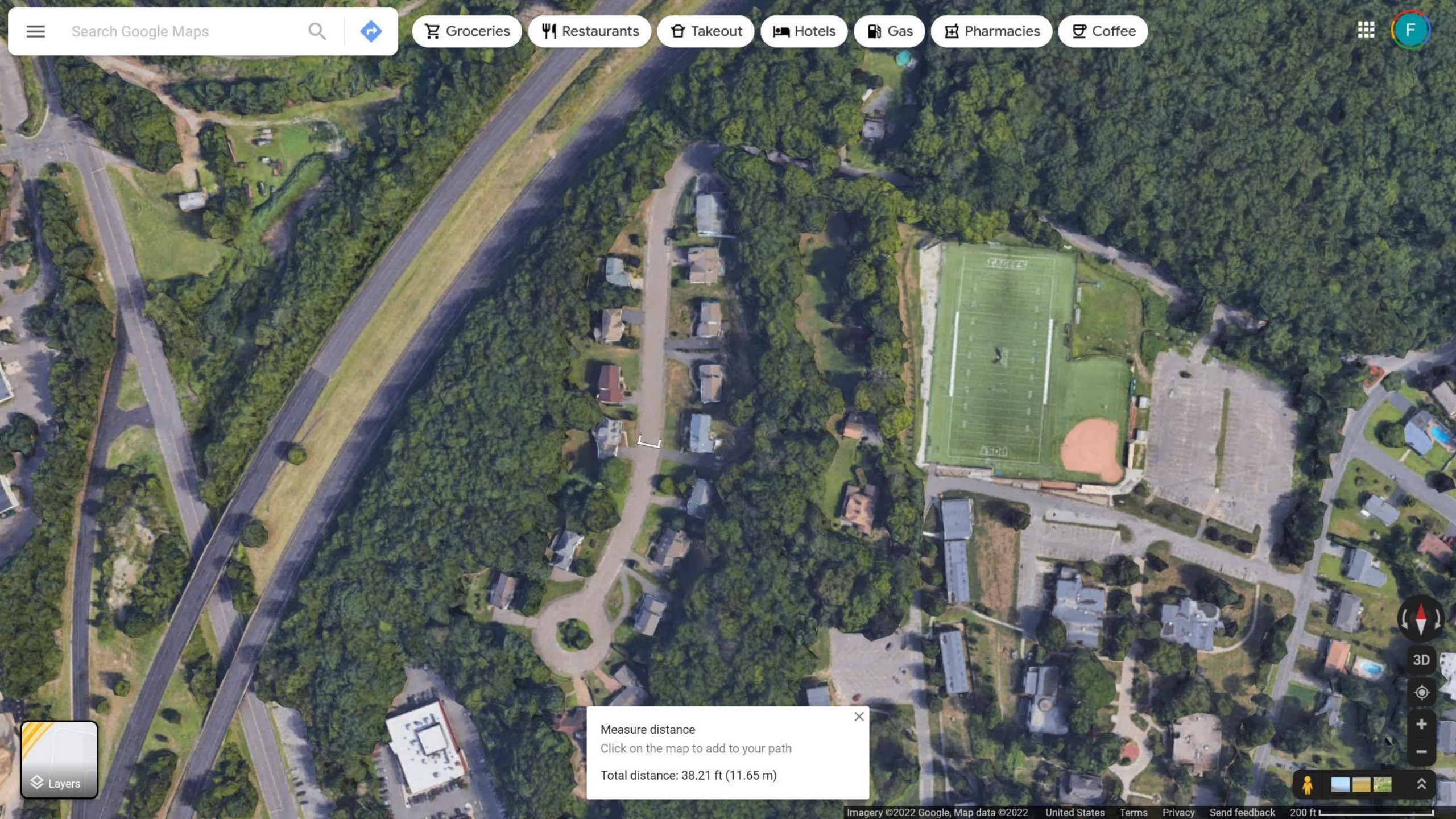
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Measure distance
Click on the map to add to your path
Total distance: 38.21 ft (11.65 m)
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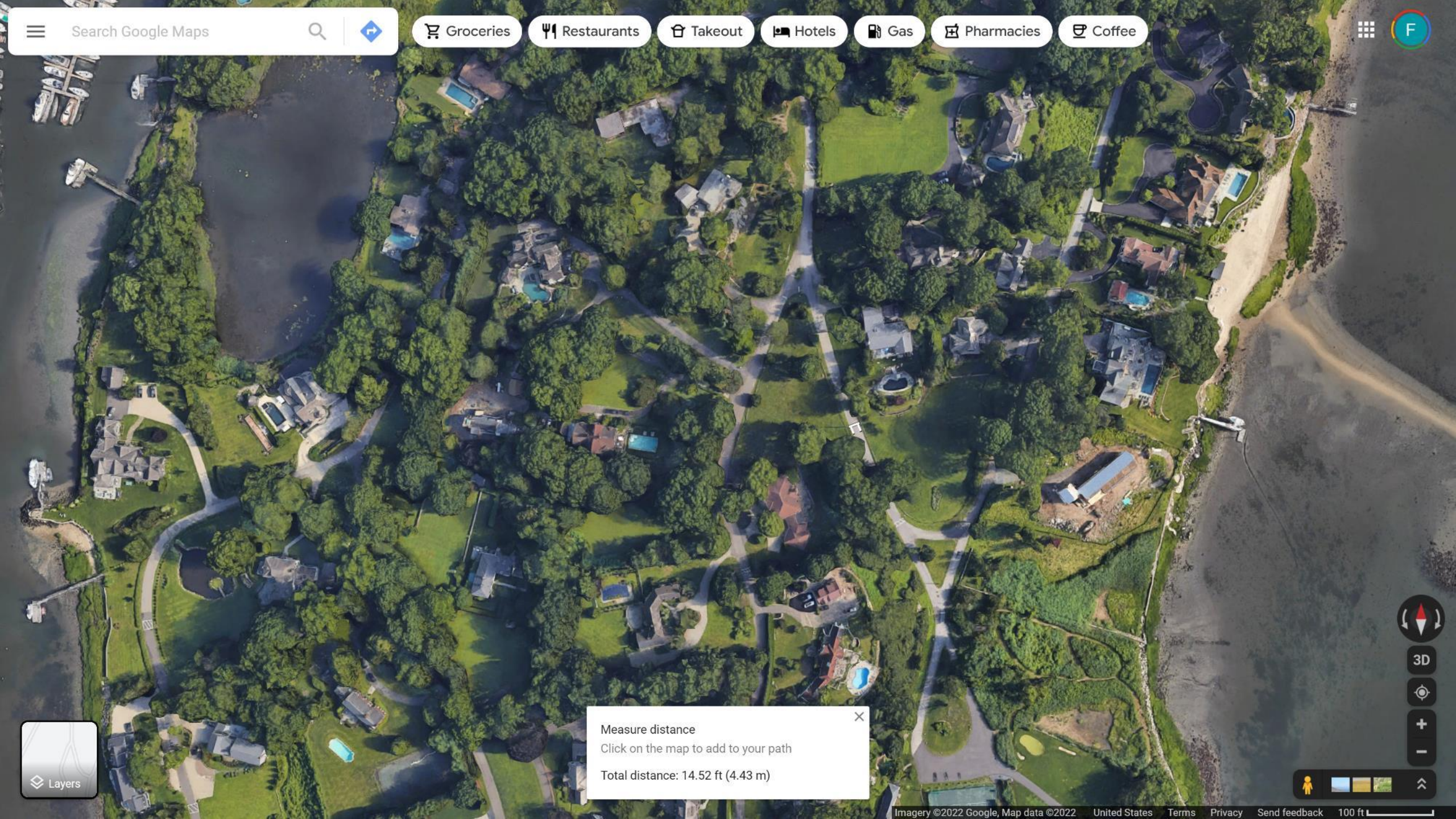
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Click on the map to add to your path
Total distance: 14.52 ft (4.43 m)
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To exit full screen, move mouse to top of screen or press F11
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PROPOSAL MAIN POINTS

Design manual for residential streets and access roads and driveways

Based on objective information and reflect best practices

Apply to

lower-speed (<40 mph) roads and streets functionally classified as “local”

access roads/driveways

Based on consideration of

safety and mobility of all users (i.e., motorists, pedestrians, bicyclists, emergency responders)

environmental sustainability

economy of construction and maintenance

community cohesion

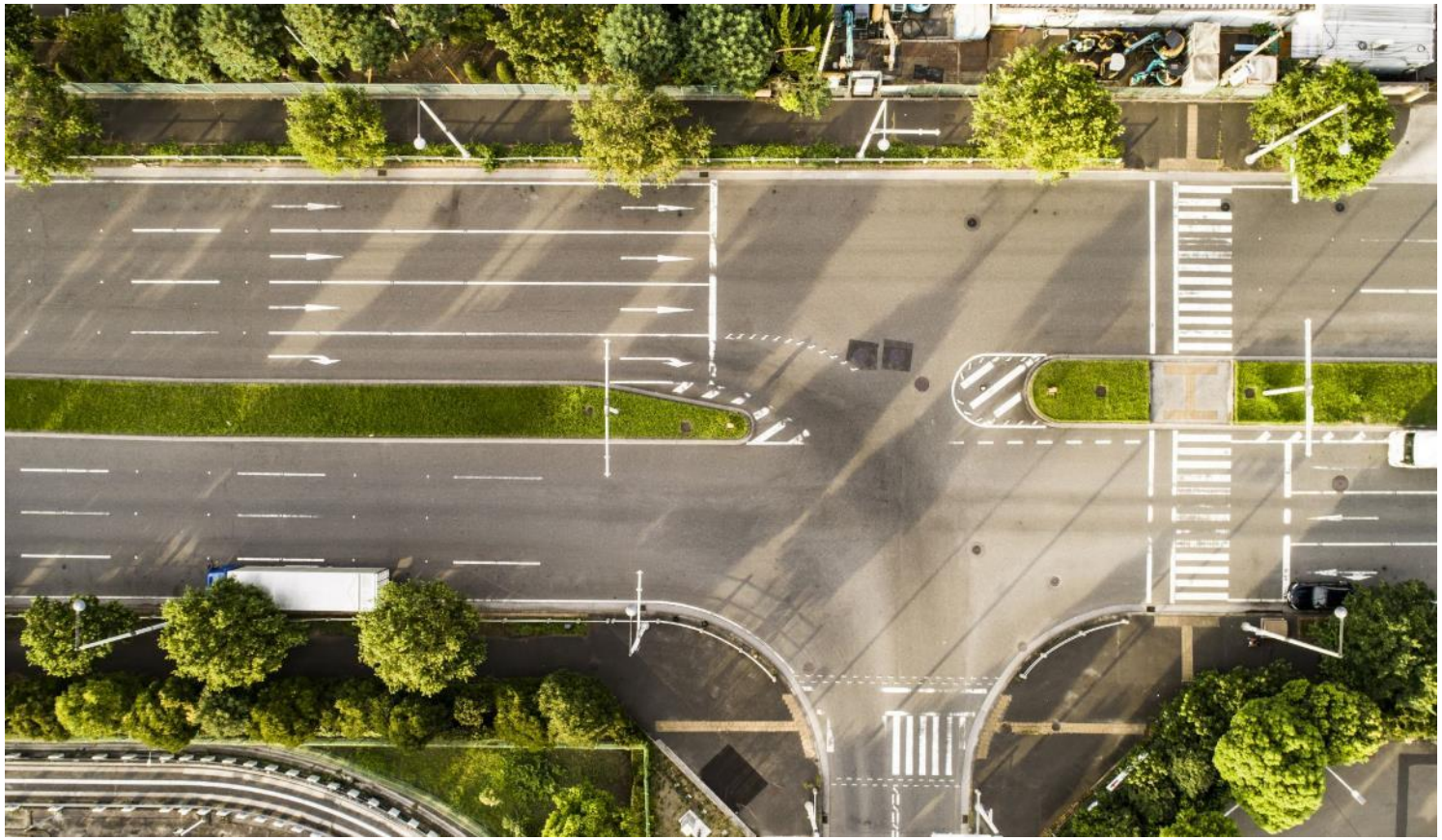
land use

utility accommodation

SPECIAL CONSIDERATIONS

May consider approaches/factors beyond what is treated in conventional design documents, e.g.:

- Domestic and international experiences with traffic calming, such as *woonerven* and *verkehrsberuhighte Bereiche*, and private roads and historic roads in comparable contexts.
- Minimization of impervious surface, surface runoff, and water pollution; and light, noise, and air pollution; and elevated summer temperatures.
- Impacts on the cost and affordability of adjacent developments.



INCLUDED ELEMENTS

geometric design and criteria (i.e., horizontal and vertical alignment, cross section elements and dimensions), for street and road segments

geometric design and criteria for at-grade intersections, including roundabouts

geometric design and criteria for bridges

roadside design

flexible pavement structures for two-levels of traffic loading and 20-year design lives consisting of bound and unbound layers commonly used in the region

design features that encourage driver-selected operating speeds that align with desired/design speeds, including but not limited to conventional traffic calming

discretionary decisions (i.e., not mandatory or “shall” imperative) of decisions within the scope of the Manual of Uniform Traffic Control Devices (MUTCD)

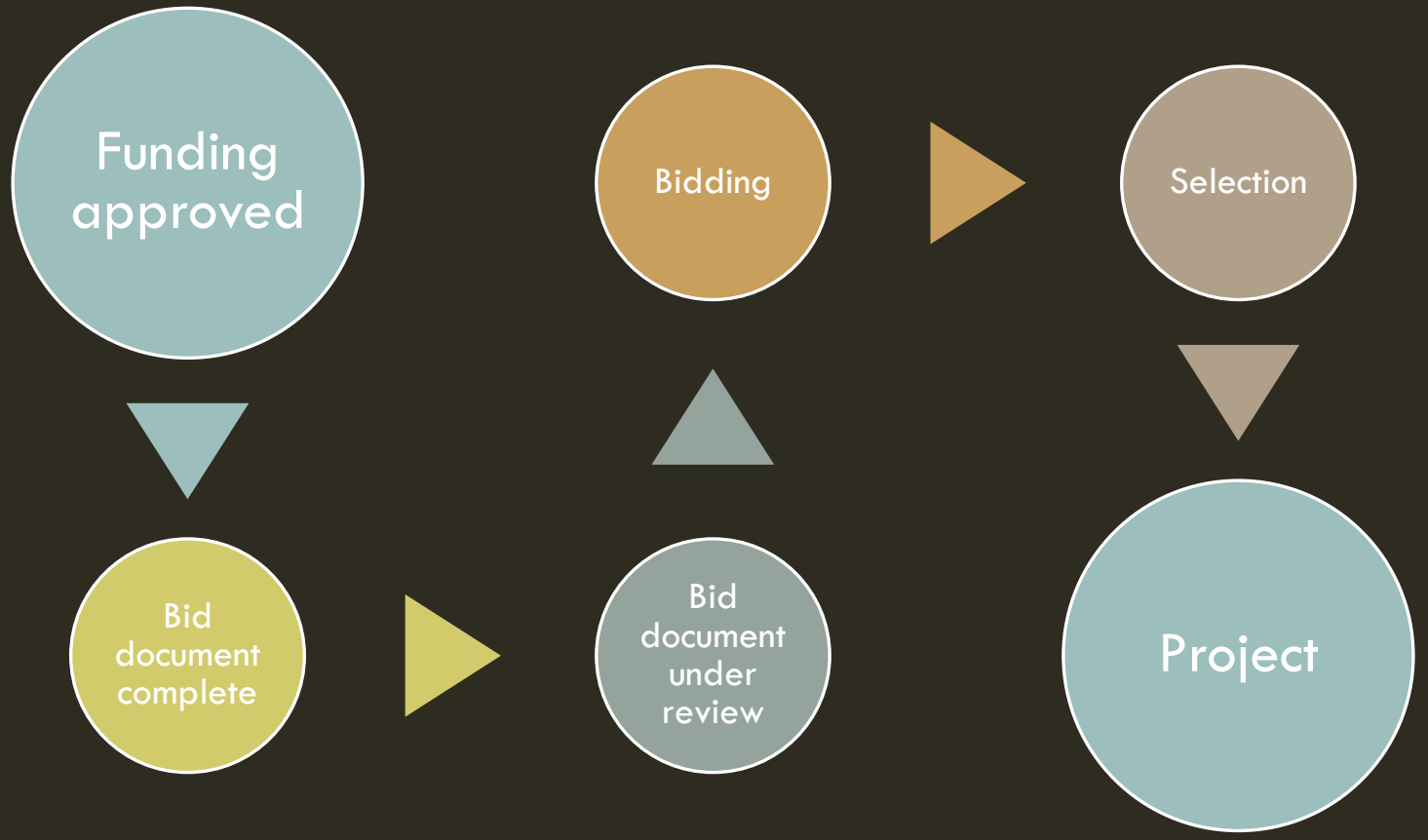
summary information on the documented consequences of design decisions (primarily from research used to develop the Highway Safety Manual) on safety

INTENDED USES

Be used as a drop-in replacement for the Highway Design Manual, Design Guidelines for Subdivision Streets, or other federal, state, or local design manuals/guidelines, for neighborhood streets

Create no additional legal liability for local governments or private entities that adopt or use it in place of the aforesaid documents

PROCESS


Funding approved
Bid document complete
Bid document under review
Bidding
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Project