

# Initial Findings on Downsizing Large Vehicles

National Association of City Transportation Officials (NACTO)

Alexander Epstein, PhD and Jonah Chiarenza, AICP  
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# Introduction

## USDOT Volpe Center – Cambridge, MA

Mission: Advance transportation innovation for the public good.

- 570 federal staff, 400 onsite contractors
- Objectively address our most pressing and complex transportation challenges

## Why look at vehicle design?

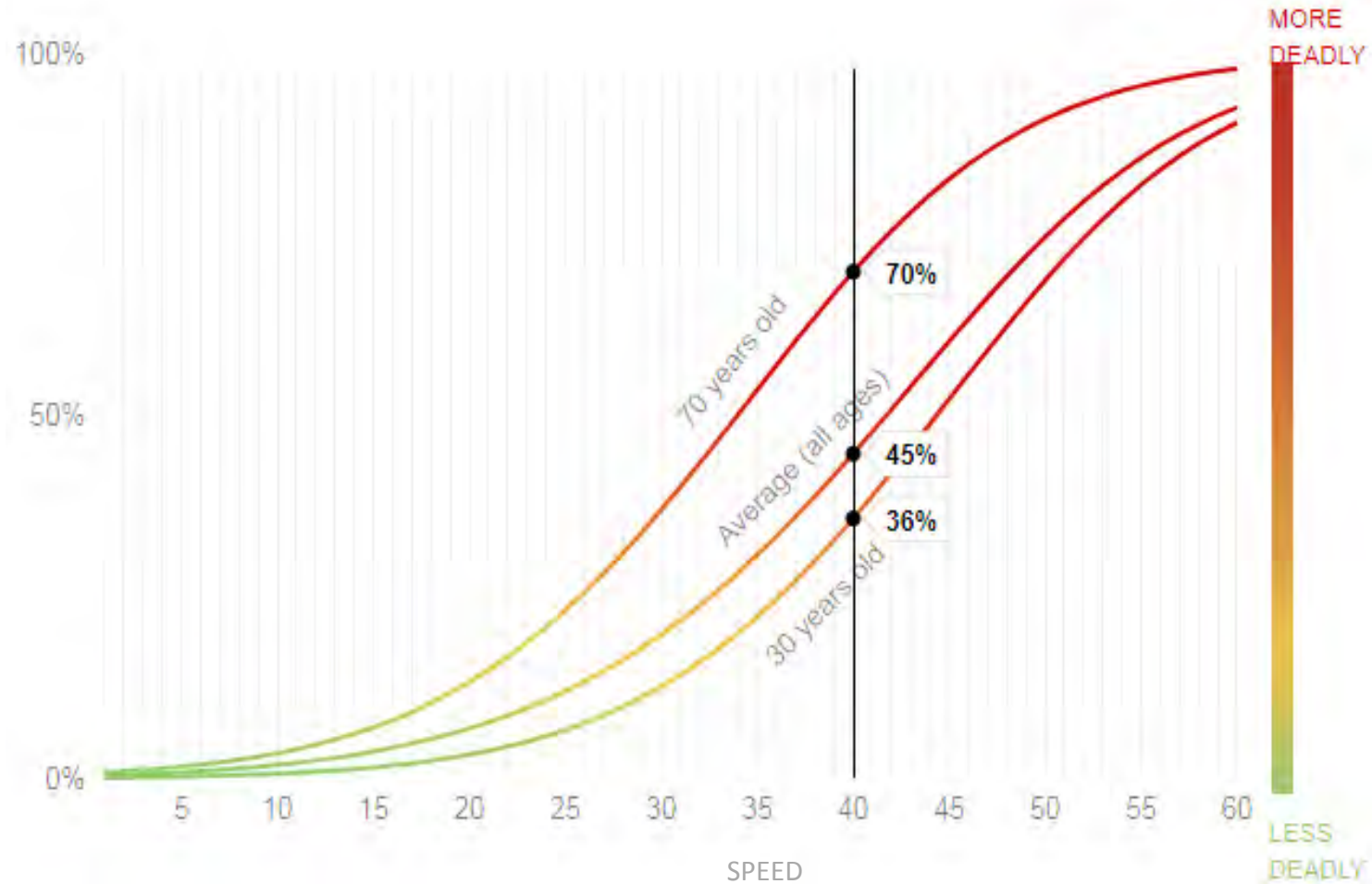
Identify innovative approaches to:

- Decrease emergency vehicle response time and access limitations
- Increase municipal fleet and contracted large vehicle capabilities
- Improve roadway safety
- Expand design flexibility for roadway/streetscape/public space



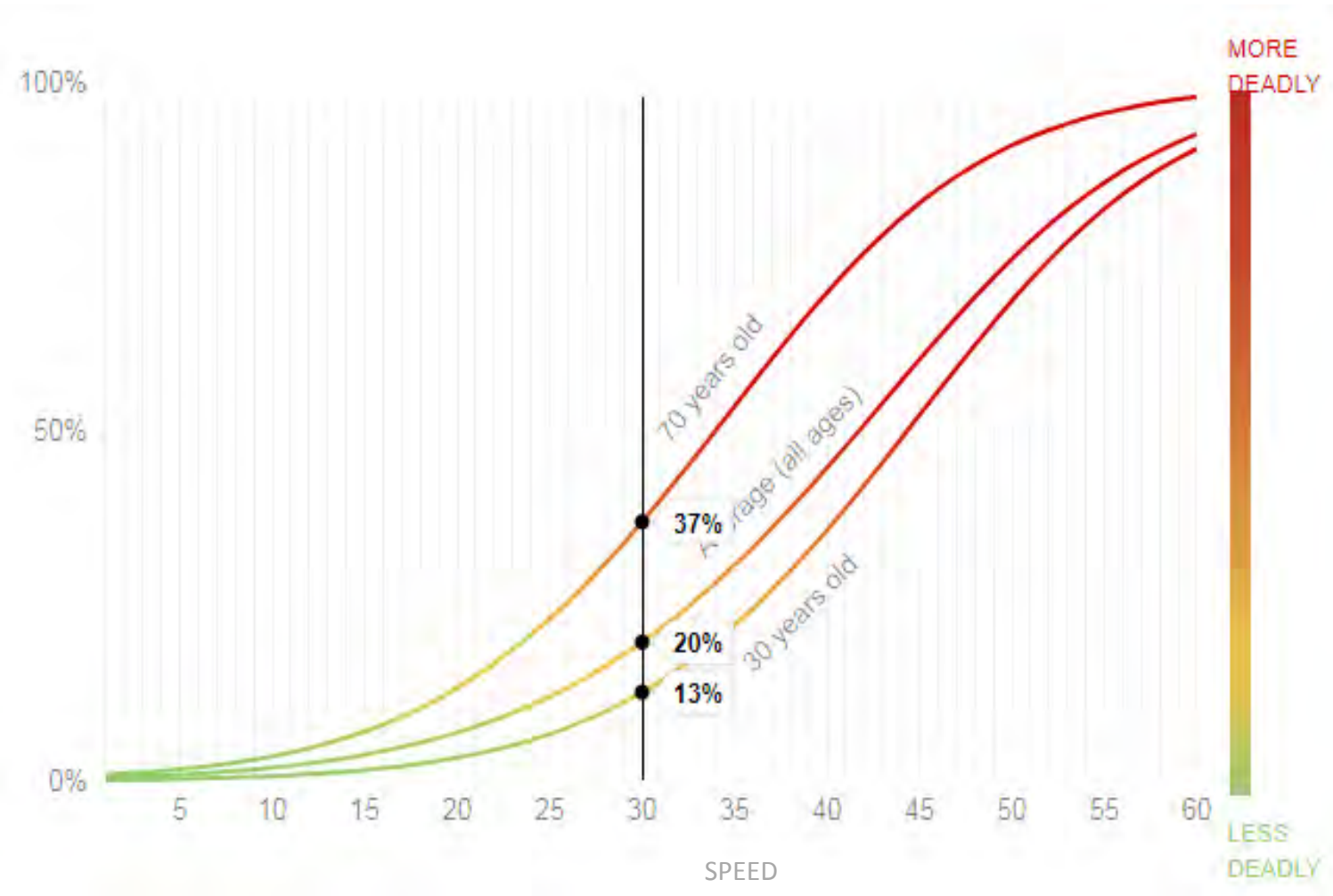
# Why Downsizing?

- ❑ Street design impacts of using a smaller design vehicle
  - Slower speeds
  - Increased visibility & reaction time
  - Decreased crossing distances & times
- ❑ Potential safety benefits of:
  - Street designs for smaller vehicles
  - Smaller vehicles in operation



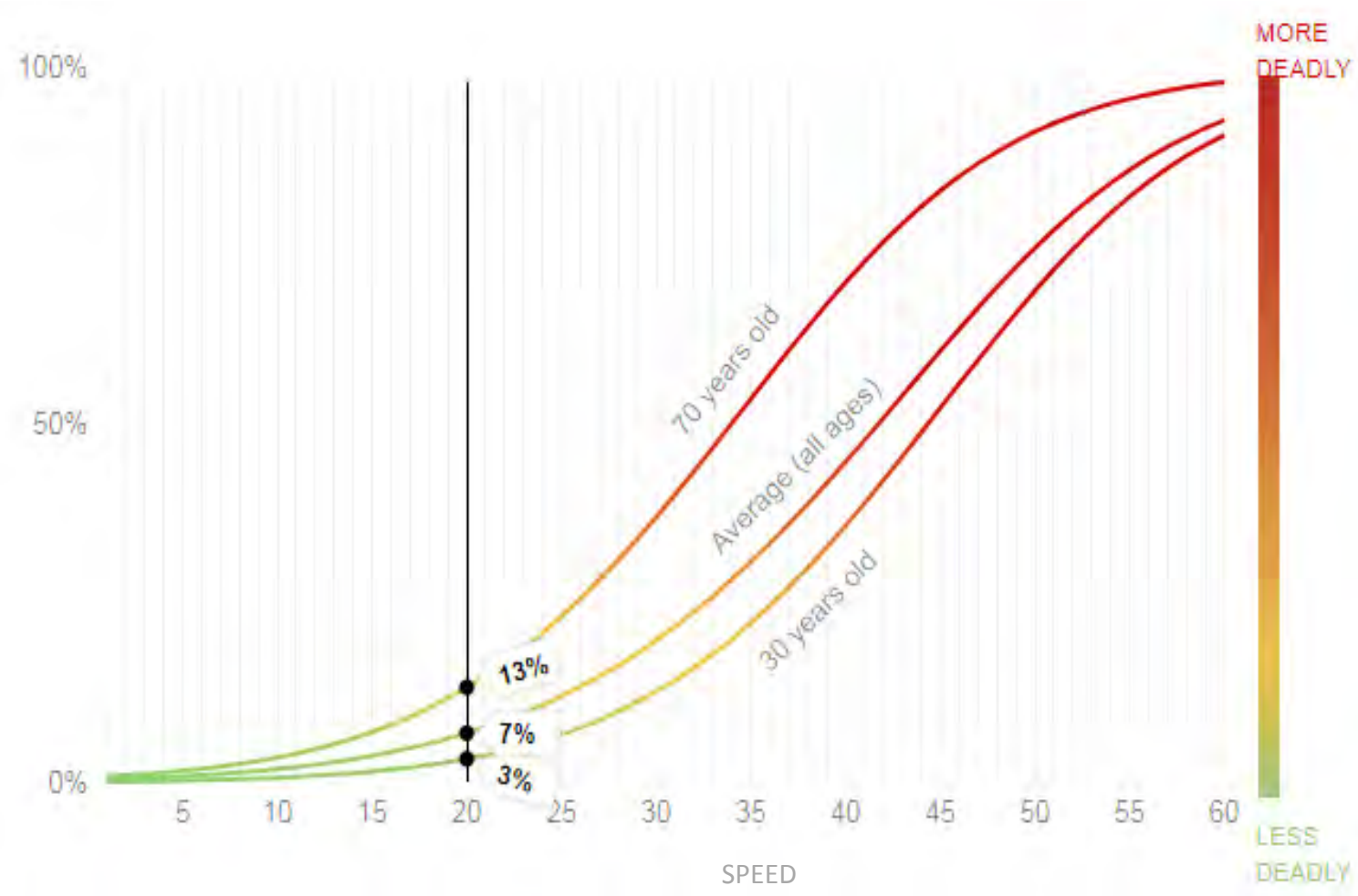
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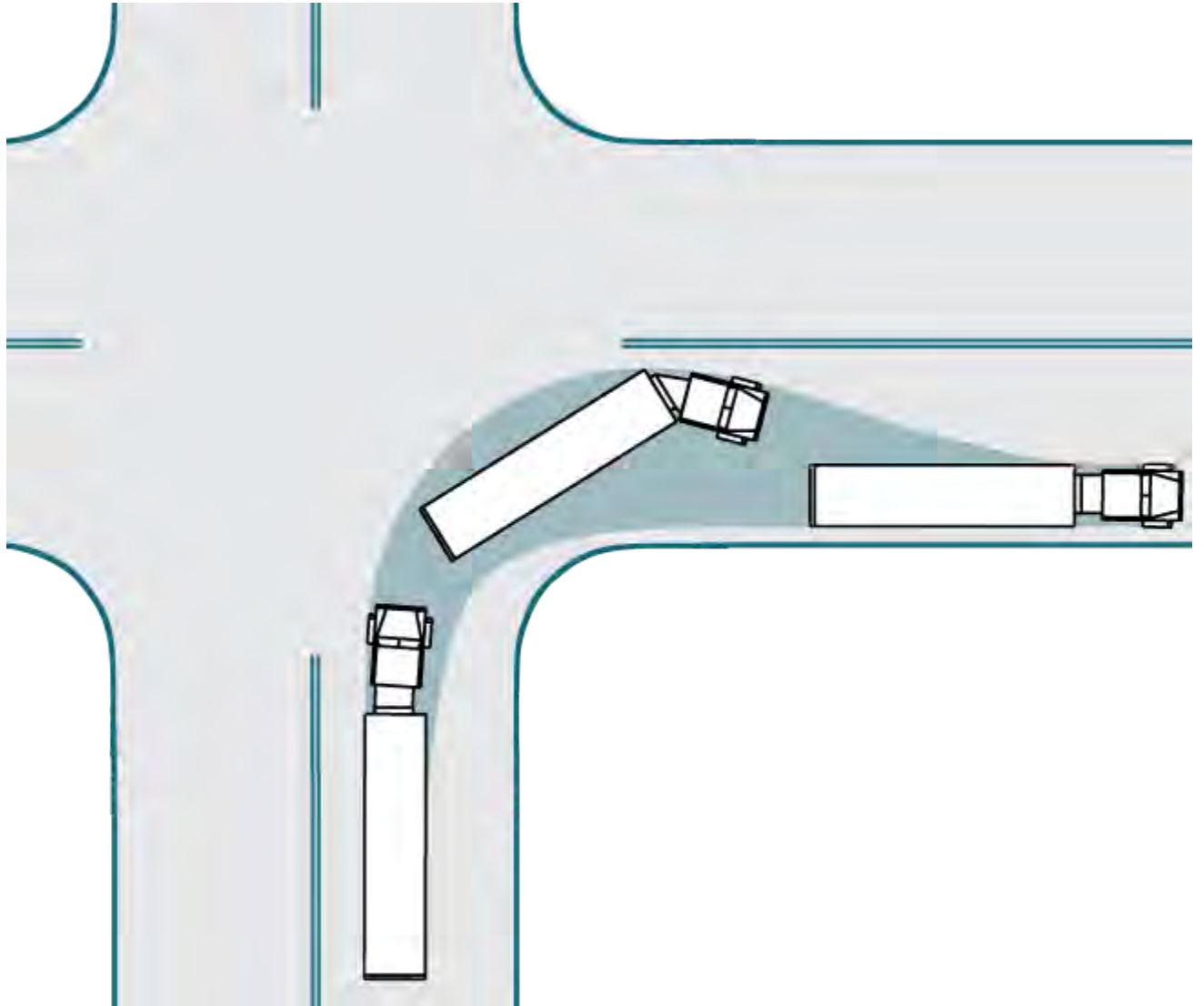
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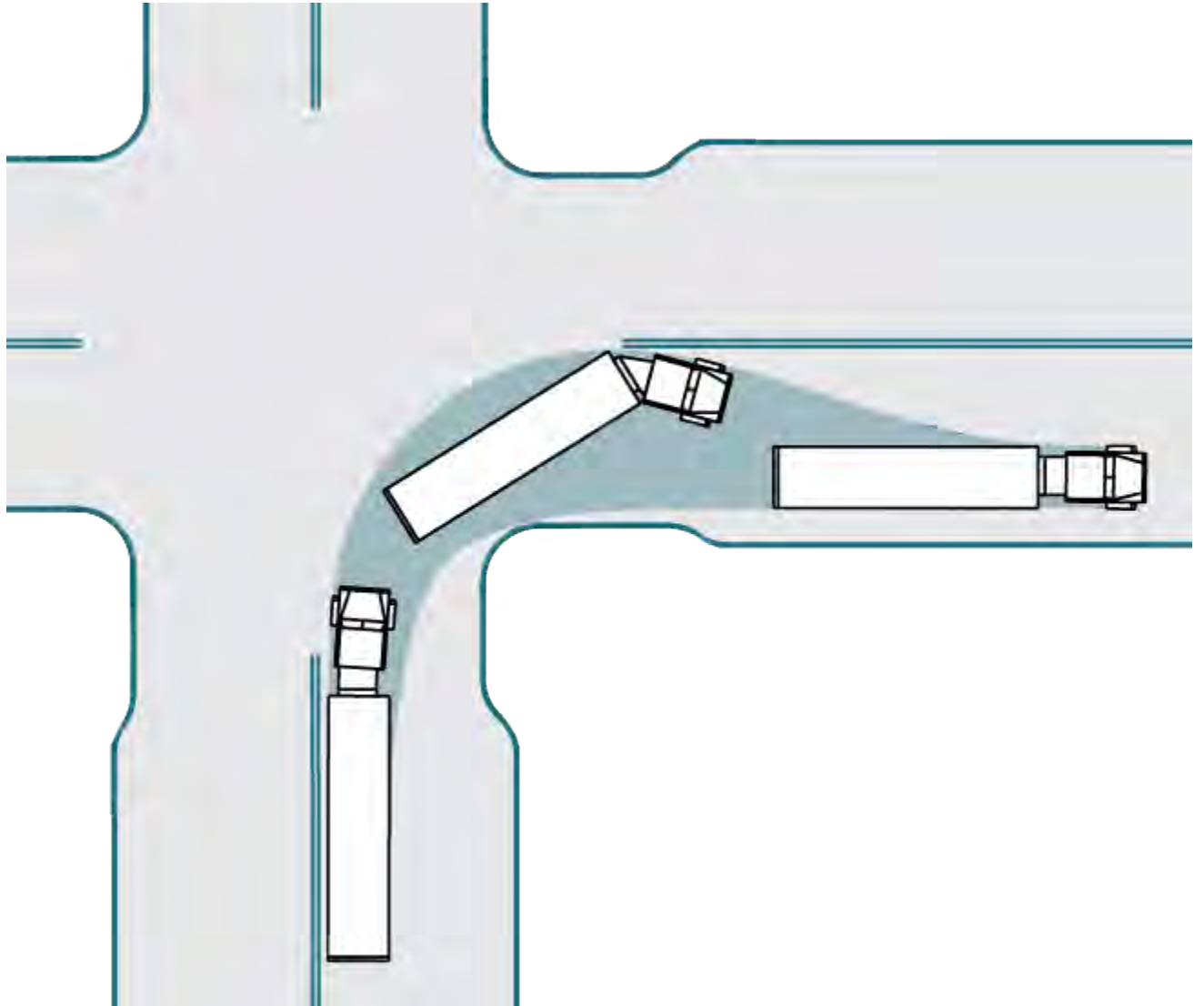
# Why Downsizing?

- ❑ The power of a “design vehicle”



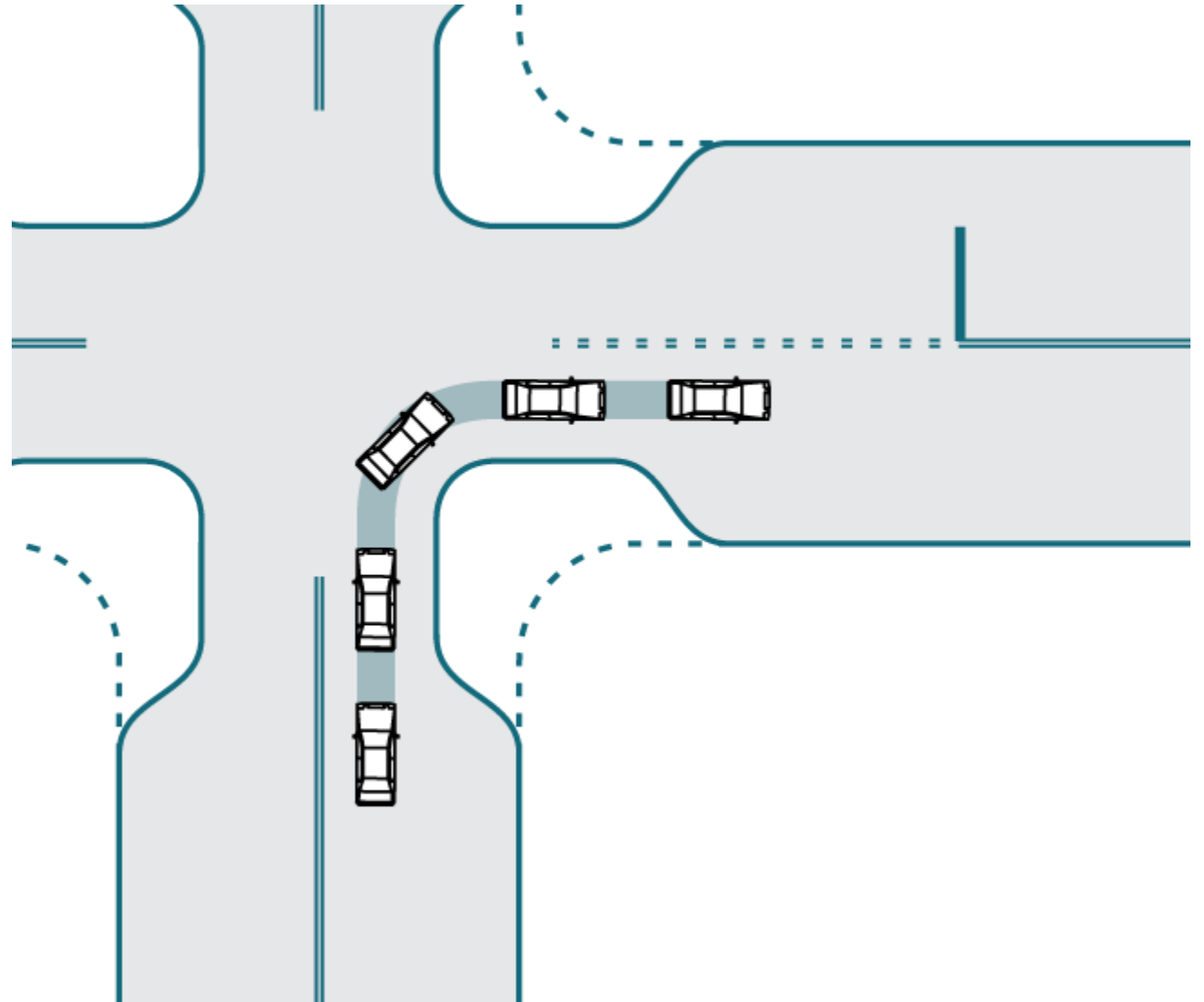
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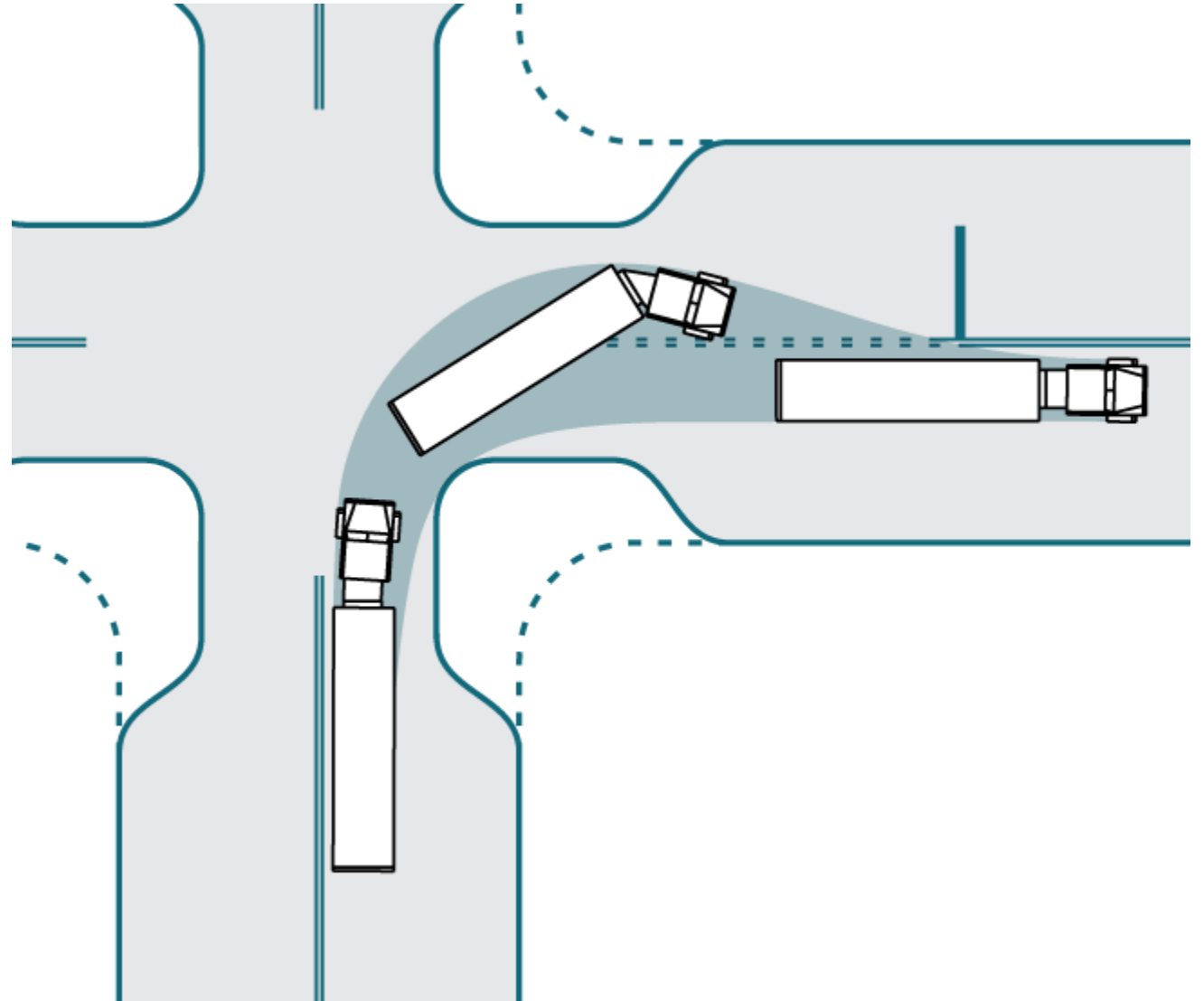
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# Why Downsizing?

- ❑ The power of a “design vehicle”



# The benefits of smaller vehicles are clear

*A change here...*

Vehicle Dimension
Wheelbase
Wheel cut
Steering axle configuration
Width
Driver seat height



*...can mean a reduction here*

Street/Environment Dimension
Turn radius
Turn radius
Turn radius
Lane width
Blind spots

- **Decrease emergency vehicle response time and access limitations**
- **Increase municipal fleet and contracted large vehicle capabilities**
- **Improve roadway safety**
- **Expand design flexibility for roadway/streetscape/public space**

## The million dollar question

*Can a smaller vehicle  
still do the job?*

# Smaller DOESN'T necessarily mean less capable

Box Truck				
Axles	3-axle		2-axle	
Variations	Rigid	Rear steer	Conventional	Cab-over
<b>GVWR (pounds)</b>	<b>52,000</b>	<b>52,000</b>	<b>33,000</b>	<b>33,000</b>
<b>Curb-curb turn radius (feet)</b>	<b>40</b>	<b>33</b>	<b>44</b>	<b>30</b>
<b>Max. cargo body length (feet)</b>	<b>30</b>	<b>25</b>	<b>24</b>	<b>28</b>
<b>Overall length (inches)</b>	454	Not available	463	414



Same GVWR, smaller turning radius




Same GVWR, longer cargo body, smaller turning radius

# Smaller can maintain **OR INCREASE** capability

Fire Truck – Pumper			
Variations	Standard pumper	SFFD pumper	“Rapid Attack Apparatus” pumper
Carrying Capacity (gal.)	750	500	500
Fire pump capacity (gal./minute)	1,500	1,500	1,500
Curb-curb turn radius (feet)	36	25	19
Wheelbase (inches)	201	169	129
Overall length (inches)	384	334	266



Same pumping capacity, smaller turning radius 



# International representative aerial apparatus



Tokyo

Paris



NYC

Alex Epstein

<http://www.fire-engine-photos.com/picture/number26354>







[https://commons.wikimedia.org/wiki/File:Ladder\\_5\\_FDNY\\_on\\_8th\\_Av\\_48th\\_St\\_jeh.jpg](https://commons.wikimedia.org/wiki/File:Ladder_5_FDNY_on_8th_Av_48th_St_jeh.jpg)



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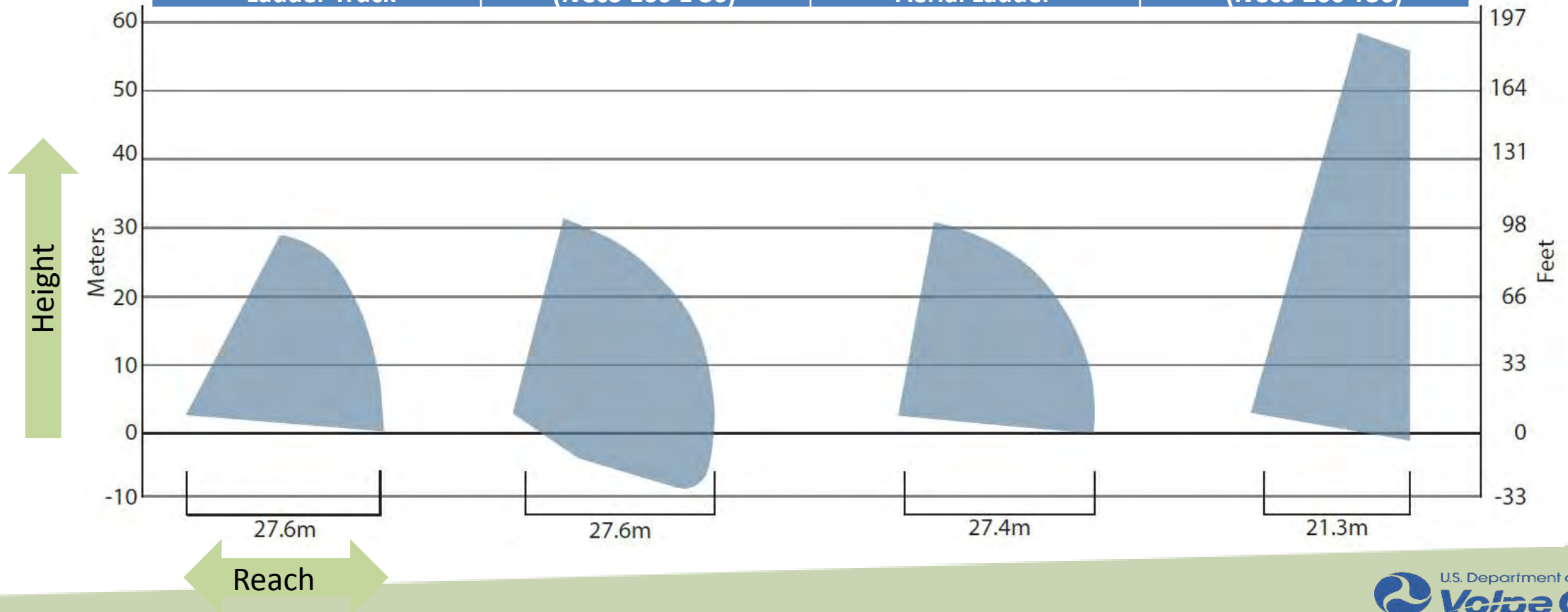
## Aerial Ladder Truck

Variations	Seagrave AerialScope Ladder Truck <a href="#">[7]</a>	Magirus M32L-AS (Iveco 160 E 30) <a href="#">[9]</a>	Seagrave TDA Tiller Aerial Ladder <a href="#">[8]</a>	Magirus M60L Ladder (Iveco 260 T36)
				
Ladder height (feet)	95	105	100	197
Ladder reach (feet)	89	89	91	69
Curb-curb turn radius (feet)	40.5	23	25	31
Wheelbase (inches)	247	190	155 tractor 305-341 trailer <a href="#">[10]</a>	201
Overall length (inches)	546	393	684-720	504

# Fire Aerial Envelope



Seagrave AerialScope Ladder Truck <sup>[7]</sup>	Magirus M32L-AS (Iveco 160 E 30) <sup>[9]</sup>	Seagrave TDA Tiller Aerial Ladder <sup>[8]</sup>	Magirus M60L Ladder (Iveco 260 T36)
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# Conclusion

- ❑ Initial research results indicates:
  - Downsized large emergency and non-emergency vehicles can maintain or increase capability
  - Win-wins are available for key performance metrics, depending on make and model selection
  - Tradeoffs should not automatically be presumed
  
- ❑ Downsized large vehicles can potentially make a positive impact
  - Decrease emergency vehicle response time and access limitations
  - Increase municipal fleet and contracted large vehicle capabilities
  - Improve roadway safety
  - Expand design flexibility for roadway/streetscape/public space