



CAMBRIDGE CITY COUNCIL

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MEMORANDUM

To: Cambridge City Council

From: Craig A. Kelley, City Councillor; Mark Gutierrez, Council Aide

Date: May 7, 2018

Subject: Bike Lanes, Street Use, and Micro-Mobility Challenges Facing Cambridge

1. Introduction

Cambridge is proudly one of the most walkable and bikeable cities in the U.S., but with the emergence of new technologies and personal transportation devices, sometimes referred to as “micro-mobility,” there is a lot of ambiguity around who can legally ride what where. Human powered and motorized (generally electric) bicycles, tricycles, scooters, one-wheels, and skateboards are in use in Cambridge, but where do they belong? How will the future of last mile delivery be integrated? What should the future of ‘[electric rideables](#)’ be in Cambridge? One [report](#) expects over 150 micro mobility models by 2020, and forecasts the micro-EV/personal transportation device market to reach more than \$33 billion by 2026.¹

This memo reviews current City and State regulations, the types of devices in use and suggests the City focus on creating an appropriate regulatory framework to allow the safe and legal use of micro-mobility devices. Other dense cities such as [Singapore](#) have already started to discuss this issue and it is possible we could learn from them.²

This memo is not intended to be a comprehensive review of applicable laws and regulations (in fact, some of the analysis may not be 100% accurate) but it is, rather, meant to highlight the need to clarify what types of transportation modes should have access to what parts of the City’s Right of Way, and under what conditions, before the City goes much further in its street safety design efforts. Regulations governing these micro-mobility devices [can be confusing](#)



Figure 1

even as they are [increasing in both capabilities and use](#). Something as mundane as parking presents challenges as [Cambridge regulations](#) forbid motorized vehicles from using bicycle parking facilities, although the definition of “motorized vehicles” is not readily clear in the regulations.⁴ [Some research indicates](#) that, for older riders especially, the addition of electric power to a traditional bicycle can be deadly.³

Given the current confusion around the use of these vehicles and the likelihood of their vastly increased use in the near future, it is important for municipalities like Cambridge to get ahead of these regulatory challenges without waiting for other communities to lead the way.

2. **Definitions**

In [Article 1](#) of the Cambridge Traffic, Parking, and Transportation Department (TPTD) Regulations, the City provides a list of definitions, of which relevant terms are copied below.⁴

BICYCLE

Every device propelled by human power upon which any person may ride, having no more than two tandem wheels either of which is 8" or more in diameter.

BIKE LANE

A lane on a street restricted to bicycles and so designated by means of pavement coloring, lines or other appropriate markings.

ELECTRONIC PERSONAL ASSISTIVE MOBILITY DEVICE

A motorized self-balancing device that transports an individual standing on a platform between two wheels and including an upright handle.

INLINE SKATES

Any shoe with an attachment of four or more wheels aligned in a linear fashion.

MOTORIZED BICYCLE⁵

A pedal bicycle which has a helper motor, or a non-pedal bicycle which has a motor, with a cylinder capacity not exceeding fifty cubic

centimeters, an automatic transmission, and which is capable of a maximum speed of no more than thirty miles per hour.

MOTORIZED SCOOTER

A vehicle consisting of any two wheeled device that has handlebars or other steering device, designed to be stood or sat upon by the operator, which is powered by a motor and not defined as a “motor vehicle” or “motorized bicycle” under Chapter 90, except that an electronic personal assistive mobility device or other mobility device for a person with disabilities shall not be considered a motorized scooter under this section.

MOTOR VEHICLE

All motorized conveyances or vehicles that are subject to G.L. c.90 except as may otherwise herein be defined.

G.L. c.90: “All vehicles constructed and designed for propulsion by power other than muscular power...except wheelchairs...[and] motorized bicycles”.⁵

PEDESTRIAN

Any person afoot or riding on a conveyance moved by human power, except bicycles, inline skates, scooters and skateboards.

SCOOTER

A vehicle consisting of a long foot board between two small end wheels, aligned in a linear fashion, controlled by an upright steering handle attached to the front wheel, which is powered by a human.

SKATEBOARD

A non-motorized vehicle consisting of a long foot board between two sets of wheels, with steering controlled by weight distribution.

TAXICAB STAND

An area in the roadway in which certain taxicabs are required to park while waiting to be engaged.

VEHICLE

Every device in, upon or by which any person or property is or may be transported or drawn upon a highway, including bicycles and any attachments thereto when the provisions of these rules are applicable to them, except other devices moved by human power or used exclusively upon stationary rails or tracks.

3. Current Bike Lane Regulation

Cambridge Bicycle Lanes, as discussed above, seem clearly restricted to bicycles, although state law states that “Motorized bicycles may be operated on bicycle lanes adjacent to the various ways, but shall be excluded from off-street recreational bicycle paths”⁶ and that “A person operating a motorized scooter upon a way shall have the right to use all public ways in the

[commonwealth....](#)⁷ However, the Cambridge Community Development Department states bike lanes are “exclusively for use by bicyclists...motorists are not allowed to travel in bike lanes and are subject to a \$100 fine if they do so.”⁸ The term “motorist” is not defined in the TPTD Traffic Regulations nor the MA. G.L. c.90. Nor is it immediately clear what “adjacent” means when it comes to non-grade separated bike lanes.

Under Cambridge’s current regulations then, it seems that anything that is not a bicycle or a motorized bicycle (often referred to as a “moped”) is not allowed in a bicycle lane. This means that skateboards, motorized bicycles of more than 50 CM, electric skateboards, one-wheels and various other micro-mobility devices are apparently not currently legally allowed in designated bicycle lanes.

Skateboard regulation is very confusing as the [Traffic, Parking, and Transportation Regulations](#) (Dec 2017) states that scooters, inline skates, skateboards, and electronic personal assistive mobility devices are to be ridden on sidewalks, except in business districts, and should yield to pedestrians,⁴ but [City Ordinance](#) (Aug 2004) states that traditional skateboards are currently not to be used on City property, such as sidewalks and regular parks.⁹

From an enforcement standpoint, the number of cubic centimeters associated with a motorized bicycle can be difficult to determine simply by looking at the vehicle. Given that even [a 50 cm scooter can go roughly 30 MPH](#), the difference in motor size, as applied to bike lanes, may be irrelevant.¹⁰

Rules of the Road for Bicyclists and Bike Lanes¹¹

- When riding on-street, bicyclists are generally considered vehicles. While City documents say cyclists must follow all traffic rules that drivers follow, this assertion is simply not true as [cyclists do not have to, for example, signal turns if they deem doing that is dangerous.](#)¹²
- Bicyclists are permitted to ride on sidewalks, [except for in business districts](#), and must travel near walking speed and always yield to pedestrians and give an audible warning when passing.
- A white front light (visible at 500 feet), rear red reflector or light (visible at 600 feet), and pedal reflectors must be affixed to the bicycle from 30 minutes after sunset to 30 minutes before sunrise.
- Bicyclists may not carry packages, bundles, or articles unless secured in a basket, rack, or trailer.
- It is illegal to open the door of a parked vehicle unless it is reasonably safe to do so, checking for vehicle, bicycle, and pedestrian traffic.¹³



Figure 2

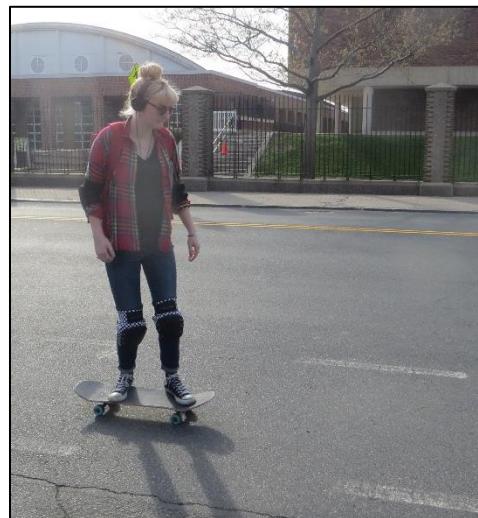


Figure 3

- It is unclear if motorists can stop in bike lanes. “No person shall...stop a vehicle...on the roadway in a manner that will obstruct fully or partially any Bicycle Lane or Bicycle Facility,”⁴ but given the prevalence of bike lanes and relevant regulatory language of “otherwise than for the purpose of, and while actually engaged in receiving or discharging passengers” it is not clear how absolute that prohibition is.

4. Types of Personal Transportation Devices



Figure 4: Motorized wheelchair

Persons using human powered wheelchairs are considered pedestrians and belong on sidewalks, but persons using motorized wheelchairs are not considered pedestrians.

Tricycles are not considered bicycles and do not have a defined space to ride.



Figure 5: Solar and pedal hybrid vehicle

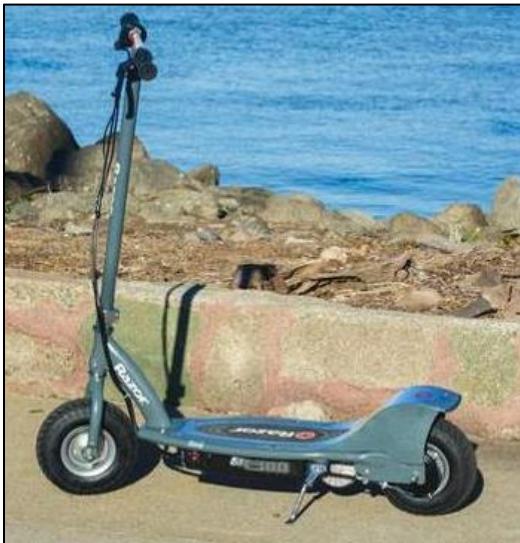


Figure 6: Motorized scooter

Per Cambridge regulations, a motorized scooter is ‘A vehicle consisting of any two wheeled device that has handlebars or other steering device, designed to be stood or sat upon by the operator, which is powered by a motor and not defined as a “motor vehicle” or “motorized bicycle” under Chapter 90, except that an electronic personal assistive mobility device or other mobility device for a person with disabilities shall not be considered a motorized scooter under this section.’⁴ For something to be a motorized bicycle, it must have pedals.



Figure 7: Hoverboard



Figure 8: One-wheel



Figure 9: [Segway](#)



Figure 10: Rocket skates

Many of the above devices are examples of micro-mobility devices that either do not fit any City or State definitions or regulations or are categorized in such a fashion as to only allow legal use in general, and dangerous, street traffic. They vary from one to four wheels, have a wide range of speeds, and, as noted above, add a variety of challenges to already congested sidewalks, bike lanes, bike racks, and roadways.

5. Future Considerations

Travelling the last mile in any transportation industry is often the most expensive and time consuming part of the trip, and the transportation industry has begun overhauling last mile mobility with car sharing, ride hailing and bike sharing. Last mile package and food delivery is also becoming disrupted through services like [Amazon's drone initiative](#) and [UberEats](#).

[Droids](#), drones, [autonomous ground vehicles](#), [crowdsourcing](#), and bike couriers are posed to reinvent last mile delivery in the next decade. McKinsey reports 80% of packages will be delivered by autonomous vehicles.¹⁴ An Estonian company conducted 8,000 miles of droid delivery testing across 40 cities in 12 countries, encountering 1 million pedestrians without injury.^{15, 16} While this memo does not cover these issues, rapid technology and industry changes are already forcing Cambridge to examine the use of its streets, bike lanes, and sidewalks and where autonomous droids and similar vehicles fit in. A static view of cars on streets, bikes in bike lanes, and everything else on sidewalks does not reflect the emerged and emerging micro-mobility options in use today, much less their expanded future use, and will, arguably, compromise our most vulnerable modes of transportation.



Figure 11: Droid delivery

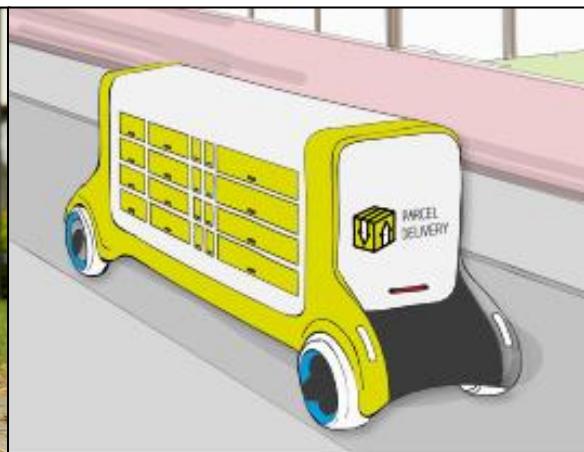


Figure 12: Autonomous ground vehicle

6. Conclusions

The future of transportation in Cambridge is going to include a larger and larger amount of micro-mobility devices such as electric powered one-wheels, electric bicycles, mopeds, hoverboards, electric wheelchairs, and more. These devices, like bicycles, present safety challenges on our sidewalks and, also like bicycles, are vulnerable users of roadways. Subject to existing state law for off-road use of motorized bicycles, they should have access to all areas where bicycles can operate and park but speeds should be limited to roughly 12 miles per hour. They should also be subject to the same lighting, helmet and braking requirements that bicycles are subject to and gas powered vehicles should not exceed more than 40 decibels at the muffler under any conditions. While enforcement of these requirements would be a challenge, they are necessary to ensure that these vehicles do not pose an undue danger to other users or our ROWs.

The City's Department of Traffic, Parking and Transportation should immediately create and implement a regulatory program that meets the above suggestions. If state law does not provide the Department to issue such regulations, the City Council should either ask for home

rule authority to all such a local regulatory program or should work with state officials to create a statewide legal framework to govern these new transportation devices.

The ‘regulatory entrepreneurship’ highlighted by these new micro-mobility devices demonstrates the need for Cambridge to be very aggressive in identifying new trends and developing both regulatory programs and physical infrastructure to make sure they are accommodated in a manner that best meets our dense cities urban mobility challenges.

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