MODEL MUNICIPAL LEGISLATION & TENDER GUIDE

Micromobility Usage & Safety

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PART 1 - Introduction

Safety in the public right of way is an expectation of all citizens within the urban environment. While new modalities such as micromobility (dockless e-scooters and bikes) are introduced into the domain, there come potential conflicts. These conflicts arise between cars, cyclists, pedestrians, and scooter users. Enforcing safe micromobility usage within distinct infrastructure types has also become a challenge for cities to coordinate and manage. However, new sidewalk and parking detection sensing technologies such as AI and computer vision (see Appendix A) can be leveraged to bridge the gap between regulation and compliance. This draft municipal legislation template is intended as a guide for cities that seek new ways to foster cooperation and encourage proactive and positive regulatory outcomes.

PART 2 - General Usage

Micromobility is considered a key mode of transportation, and the expectation is that safe practices are implemented by users to operate in the public right-of-way. As such, users are expected to engage in proper training, abide by all local traffic regulations related to speed and operations, and only operate with one rider per device. In addition, micromobility devices shall be regulated with sidewalk and parking detection sensing technologies such that speed cannot exceed allowable limits in the public right-of-way.

PART 3 - Public Space / Right-of-Way Management

The management of public space and right-of-way shall be enforced by local authorities, in adherence with traffic regulations. Micromobility devices in the public space and right-of-way are subject to enforcement by local authorities and improper riding and parking of devices on pavements (sidewalks), crosswalks, curbs, footpaths, and rights-of-way are subject to penalties and fines.

PART 4 - Pavements (Sidewalks)

Micromobility devices are allowed to be ridden on pavements at a maximum speed of 8-10 km/h. Micromobility devices shall also not be parked, tipped over or generally obstruct pavements or subject to penalties and fines. The only instance where pavement riding is generally allowable is when a device needs to be accessed at the beginning of a ride, or parked at the end of a ride in a marked (or physical) corral located within the pavements.

PART 5 - Bike Lanes

Micromobility devices are allowed to be ridden in bike lanes at a maximum speed of 25 km/h, and are to comply with local traffic regulations related to speed and operations. Proper safety practices are to be implemented while riding in this infrastructure type, and attention to be given to avoiding conflicts with cyclists and pedestrians while sharing this space in the public domain. Micromobility devices are not to be parked, tipped over or generally obstruct bike lanes or subject to penalties and fines.

PART 6 - Roadways

Micromobility devices are allowed to be ridden in roadways at a maximum speed of 25 km/h, and are to comply with local traffic regulations related to speed and operations. However, special attention is to be given while riding to avoid direct conflicts with bicycles, automobiles, and larger vehicles. Micromobility devices are not to be parked, tipped over or generally obstruct roadways or subject to penalties and fines.

PART 7 - Parking & Tip Overs

Micromobility devices shall be parked in designated parking spaces (marked and physical corrals). To ensure proper enforcement, micromobility devices shall be equipped with sensing technology that detects specific parking outcomes and tip over events in real time based upon infrastructure type. Parking detection alerts for bad outcomes shall be used to communicate with operators to proactively manage devices for better placement and storage. Improperly parked or tipped over e-scooters in the public right of way shall be removed within one hour of being detected or subject to penalties and fines.

PART 8 - Infrastructure Distinction & Classification

Micromobility operators shall be equipped with sensing technology that detects specific infrastructure types in real time to audibly communicate with users of improper riding and parking events. Speed control shall also be implemented to reduce to safe speed on sidewalks and other specific infrastructure types.

PART 9 - Privacy and GDPR Compliance

Data sensed and collected by sensing technologies incorporated into micromobility devices shall be GDPR compliant and incorporate redaction of personally identifiable information (faces, license plates, etc). Data shall be used for notifications of improper riding or parking outcomes, and management and visualization of fleet/vehicle behavior through data portals.

PART 10 - Data Sharing & Reporting Requirements to Consider for Tenders

Data and telemetry collected from free-floating shared micromobility fleets should be compliant with the Open Mobility Foundation's (OMF) Mobility Data Specification (MDS) to ensure standardized and uniform management of fleets and compliance methods. MDS 2.0, scheduled for release in May 2023, establishes the framework for responsibly deployed shared micromobility.

A. Operators must provide a City-accessible API that provides the data outlined within, and meets the requirements of the MDS 2.0 as published online at https://github.com/openmobilityfoundation/mobility-data-specification

1) Operators must make data available via the /status_changes endpoint no more than two (2) hours after the occurrence of a state change event and via the /trips endpoint no more than two (2) hours after the end of a trip.

2) The City may, in its sole discretion, require operator support for any optional and/or experimental feature of the MDS. The City will provide a minimum of 30 days' notice for any change in required feature support.

3) The City may, in its sole discretion, release updated versions of MDS and/or require operators to use a version of MDS designated by the City. The City will provide a minimum of 30 days' notice for any required version change.

4) The City is permitted to use all data the operator provides in accordance with the MDS, including, but not limited to, displaying real-time device availability data to the public.

B. Operators must provide the MDS API to a City identified third party researcher or contractor in accordance with City direction.

C. Operators must not change the API URL, API authentication method, or the City's API credentials without notifying the City with at least 30 days' notice.

D. The City shall publish an MDS Policy Requirements feed to clearly state the data required for policy and not allowed to be shared under GDPR.

Further sample policy and tender guidance language related to the implementation of MDS 2.0 can be found in the following OMF link: https://github.com/openmobilityfoundation/governance/blob/main/technical/OMF-MDS-Policy-Language-Guidance.md

PART 11 - Recommended Technical Requirements to Consider for Tenders

Vehicle Technology and System Design

A. Devices must contain the necessary technology to provide location tracking and ensure compliance with the Mobility Data Specification 2.0 (MDS 2.0).
B. Devices must be capable of location-based speed regulation, deactivation, and parking restriction using geo-fencing technology.
C. Devices must be capable of being deactivated or motor speed reduced to a City stipulated top speed in specific locations at the City's discretion
D. The City will provide a map of prohibited riding locations to the Operators, which they must include in their mobile apps.
E. Upon entering a prohibited riding area, Operators must notify users with in-app messaging of the prohibition and encourage compliance with the rules.
F. The City may require speed reduction and deactivation in other areas for special events and emergencies. Operators must implement location-based speed reduction and deactivation strategies in designated areas of the City in accordance with City direction.
G. Operators must prevent devices from being ridden on sidewalks. It is preferred that operators deploy devices that are able to detect and slow down the device when it is being ridden on the sidewalk. This requirement is subject to the following criteria:

- Detection of sidewalks must be performed in real-time with a latency of less than 3 seconds.
- Measurable and verifiable accuracy of 95% or better in the real-time detection of sidewalk riding.
- Vehicle must be able to produce an audible alert (customizable as required) upon detection of sidewalk riding.
- Sidewalk detection and any related alerts or speed control must be able to function 100% of the time, even in the absence of GPS signal or cellular connectivity.
- Sidewalk detection and related functionality must be able to function consistently across different parts of the city, irrespective of geographical or architectural conditions.
- Ability to report sidewalk riding in compliance with MDS 2.0 requirements via real-time telemetry feed.
- Operators shall disclose if proposed technology requires additional supporting technology or availability of precise mapping data in order to function properly. Ex: requiring RTK base stations to augment GPS signal, or the need to create 3D maps of an environment prior to deployment.
- Any add-on technology that is not part of the vehicle as manufactured is required to be tested and certified by appropriate governing bodies. Ex: UL listed, CE marked, FCC compliant, etc.

H. Operators must have the capability of verifying whether a vehicle is being properly returned to a designated "parking zone", indicated by a combination of physical markings

and virtual markings within the user app. This requirement is subject to the following criteria:

- Ability to detect in real-time whether a vehicle is parked in a ‘valid’ or ‘invalid’ location as defined in MDS 2.0.
- Ability to provide a photo correlated with each parking instance (valid or invalid) in real-time.

I. Operators must include designated drop zone locations in their mobile apps. Digital files and APIs of the designated drop zone locations may be provided by the City.

J. Operators can incentivize users to return devices to predesignated parking zones by providing a monetary discount from the current ride, or some other form of incentive to ensure users park in designated areas.

K. Operators should create systems that maximize behavior of users to park in appropriate locations, including parking confirmation photo verification systems, parking rating, parking reporting systems, education/information, and incentives, and could include penalties.

L. Operators must restrict a user’s ability to end their current trip in prohibited parking areas. Digital files and APIs of the prohibited parking areas will be shared by the City.

PART 12 - Technology Evaluation Criteria to Consider for Tenders

Operators shall be required to perform a demonstration of the technology solutions described in the tender at a location to be specified by the City. This requirement should be subject to the following criteria:

- Location selected should be representative of the most challenging real world environment that will be encountered in deployment. Ex: and intersection in a downtown area with sidewalks, street and bike lanes all available in close proximity.
- Technology demonstrated shall be accurately representative of what was described in the written application. Specific unique capabilities to be highlighted and demonstrated live.
- Technology demonstrated on any vehicle shall be exactly what the Operator is capable of deploying on day 1 of the program deployment. Anything other shall be clearly identified and explained. Ex: prototype devices only available on a select few vehicles.
- Technology demonstrated should be available to be deployed at scale on the entire fleet, or however many vehicles are required by the City in the tender, or promised by Operator in the application.
- Operators shall disclose if the technology presented requires any additional supporting infrastructure in order to function as demonstrated across an entire

fleet and geographic area. Ex: certain enhanced GPS solutions required terrestrial RTK base stations to be deployed across an area to boost GPS signal.

- Operators shall disclose whether the technology presented requires extensive pre-mapping of an environment to function - either street level infrastructure mapping or 3D high definition visual mapping.
- Operators shall disclose performance expectations under different conditions - day vs night, seasonal, weather, dense urban canyons, or other.

PART 13 - Conclusion

Micromobility is under stricter regulation on the part of local municipalities. New off-the-shelf sensing technologies that are commercially available should be leveraged to bridge the gap between policy and enforcement, reduce the conflicts between users, operators and local authorities, and deliver better safety outcomes for all stakeholders.

APPENDIX A - AI & Computer Vision Description

Computer vision (CV) is a technical term for a camera connected to a processor. Micromobility devices are now incorporating onboard cameras, sensor fusion and edge-based AI / machine learning processing to recognize their position *precisely* in an urban environment coupled with real-time vehicle control to optimize operational efficiency and prevent regulatory abuses.

Out of the box 'dash cam' IoT modules for micromobility vehicles currently enable granular infrastructure distinction in real time. Using these technologies can accurately and reliably identify the following three infrastructure categories: sidewalk, street, and bike lane. This feature alone dramatically enhances finite geo-fencing capabilities in a granular manner that existing GPS-based solutions simply cannot, particularly in dense urban environments where it matters most.

The most pertinent micromobility applications of this precise locational awareness are 1.) real-time sidewalk detection and the subsequent vehicle control it enables and 2.) accurate parking validation. When these technologies register a vehicle speed below a certain threshold, the AI algorithm transitions from riding functionality (sidewalk detection, etc) to parking functionality and enabling a higher level of real time compliance based upon local municipal regulations.

References:

The Dawn of Computer Vision in Micromobility
https://zagdaily.com/opinion/the-dawn-of-computer-vision-in-micromobility/

Using AI to Solve the Problems of Shared Micromobility
https://alexnesic88.medium.com/using-ai-to-solve-the-problems-of-shared-micromobility-3986137a3bc5

Parking Compliance - Unleashing the Potential of Shared Micromobility
https://alexnesic88.medium.com/parking-compliance-unleashing-the-potential-of-shared-micromobility-d979b1e3c950