# Vehicle Classification

**Statewide Toll Advisory Committee (STRAC) October 2023 Meeting Materials**
*Date Updated: October 22, 2023*

The purpose of this document is to build from the following documents that detailed Oregon's regulations, rules and policies, as well as the existing toll industry practices around vehicle classification systems for tolling - that we discussed at the July 2023 STRAC meeting - to provide feedback on the draft rules and approach to tolls and trucking.

## Why we plan to classify by shape rather than by axle?

It is almost universal practice in toll operations to charge higher rates for larger and heavier vehicles than for small and lighter vehicles, because the larger and heavier vehicles do the most damage to roads and bridges. However, weighing vehicles in a traditional toll environment is expensive, and traditional scales are not suitable for high-speed operations.

When tolls were collected in toll plazas, most toll operators used axle counts as a proxy to estimate weight. Axle-counting traditionally required in-pavement contact sensors for vehicles passing over at low speeds. With current non-stop all-electronic toll systems, toll operators most often have employed "smart loop" sensors. These have proven accurate in operations but come at a high price. Smart loops have a substantial cost to license and install, they may require special or replaced pavement, and they may require ongoing calibration and tuning.

As others launched new non-stop toll facilities, such as Toronto 407 ETR, Rhode Island DOT and the Dallas-Fort Worth region TXDOT TEXpress lanes, they also elected to avoid counting axles and to instead employ shape-based classification. We plan to do the same for I-205 Abernethy Bridge and RMPP. ODOT has agreed to provide the toll system and operations for the Interstate Bridge Replacement (IBR). As a result, ODOT is preparing procurements for all the facilities with shape-based classification.

## Proposed toll vehicle classification structure

The table on the following page presents the FHWA class, weights, weight categories, how length and height would correlate to them, and the recommended toll classification structure.

| FHWA Vehicle Class | | GVWR (lbs) | FHWA GVWR Category | Power Unit Height "H" | Overall Length "L" | | Recommended Toll Classes | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | **Description and Example Rate** | **As detected at toll zone** |
| 1 | Motorcycles | | Light Duty | < H limit | < L limit | | **Light** Rate = $Y$ | < H limit and < L limit |
| 2 | Passenger Cars | | | | | | | |
| | | 10,000 | | | | | | |
| 3 | Four tire, single unit | | | may exceed H limit | | | **Medium** Rate = up to 2 times $Y$ | exceed either H limit or L limit |
| | | 14,000 | | | may exceed L limit | | | |
| 4 | Buses | | | | | | | |
| | | 16,000 | Medium Duty | | | | | |
| 5 | Two axle, six tire, single unit | | | | | | | |
| | | 19,500 | | | | | | |
| 6 | Three axle, single unit | | | | | | | |
| | | 26,000 | | > H limit | | | | |
| 7 | Four or more axles, single unit | | | | | | **Heavy** Rate = up to 4 times $Y$ | exceed H limit and L limit |
| | | 33,000 | Heavy Duty | | > L limit | | | |
| 8 | Four or more axles, single unit | | | | | | | |
| 9 | 5-axle tractor semi-trailer | | | | | | | |
| 10+ | larger | | | | | | | |

# How does shape-based classification work?

Shape-based classification, also sometimes called volumetric classification, is based on measuring vehicle size.  Overhead sensors can measure the overall height of the power unit, and the combined length of the power unit and trailer.

Using H = 7.5' and L = 35' with images of a few typical vehicles as examples (first, a minivan, secondly a small SUV pulling a small boat, then a larger panel truck, a concrete mix truck, and then a tractor trailer). We believe the correlation of vehicle size to gross weight is no less precise that the count of axles, particularly when considering lighter vehicles and trailers. The charts below identify how this would be implemented.
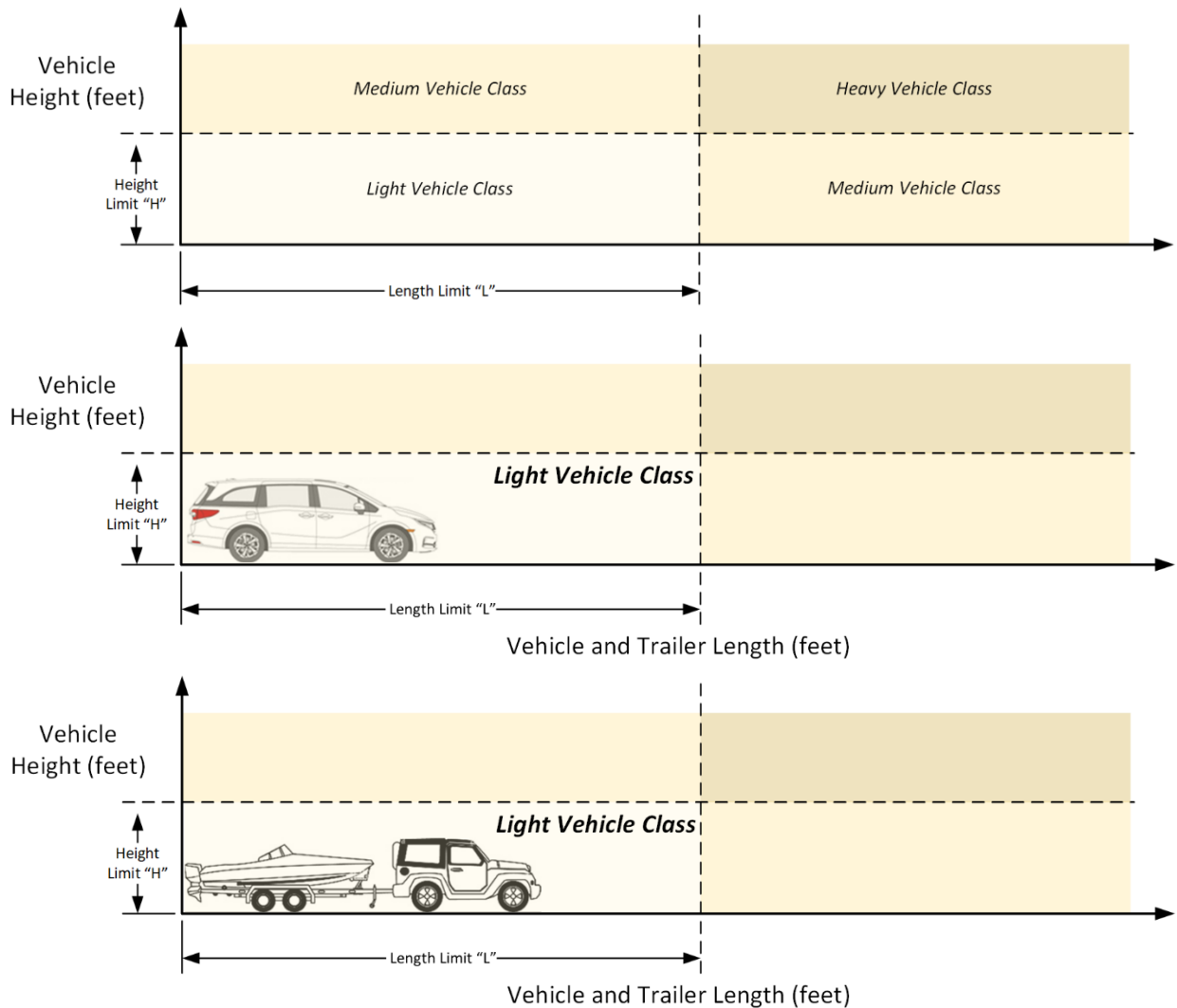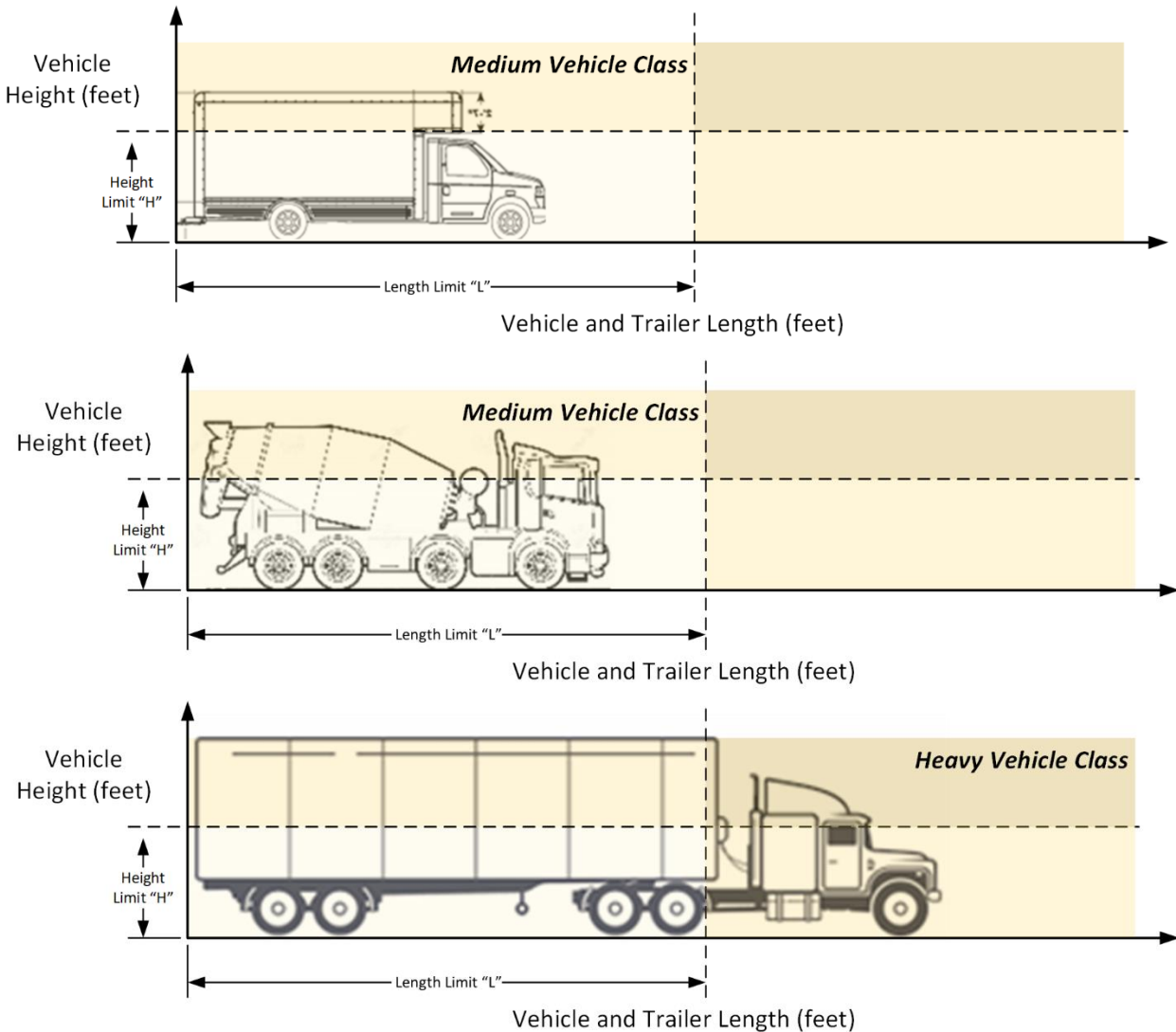
## Unique circumstances

### Bicycles and roof racks

The system should only include the permanent and/or significant part of a vehicle or its trailer in the dimension calculation. For example, a vehicle's flag post, a bicycle on the roof, a ladder leaning against a pickup's cabin typically will not be counted as part of a vehicle's height.  Some taller passenger vehicles such as large SUVs or vans) will have heights close to the H value.  Detected bicycles and roof racks might nominally exceed the H value and thus incur the higher toll rate.  We will work to address this circumstance out of concern for customer service and will verify with the systems integrator in 2024 how their technology will address this condition.

## Cars and Pickup Trucks with Trailers

The L value under consideration would allow any passenger vehicle or pickup truck to qualify as a Light Vehicle, even if pulling a short trailer.  However, if a heavy full-size pickup were detected pulling a 20+' livestock trailer, camper or boat, the total length would likely exceed the L value, and the Medium Vehicle toll would be incurred.

## Motorhomes

Most Class A motorhomes are tall enough to exceed the H value, but the average length is about 33 feet, and so would qualify as a Medium Vehicle.  When pulling an additional car, however, this would then also exceed the L value, and thus incur the Heavy Vehicle toll.

## Truck Tractors without Trailers (Bobtail)

Heavy tractor trailers with dimensions exceeding both the H and L values would normally be tolled at the Heavy Vehicle rate.  If a tractor drove past a toll point without a trailer, its length might be below the L value and the toll would be at the Medium Vehicle toll rate.