Table I: Overview of ODD Attributes (section 2.1) and the Chosen $ODD1$ and $ODD2$ (section 4.2)

ODD Attributes	Attributes	Sub- Attributes	Sub-Attributes	Sub-Attributes	Capability	
					ODD1	ODD2
Scenery	Zones	Geo-Fenced Areas	-	-	×	×
		Traffic Management		-	×	×
		School Zones		-	×	×
		Region or Counties	Urban roads	-	✓	×
			Rural roads	-	×	✓
			Suburban roads	-	×	✓
		Interference		-	×	×
	Derivable Area	Road Type	Radial Roads	-	✓	×
			Distributor Roads	-	✓	×
			Minor Roads	-	✓	✓
			Slip Roads	-	✓	✓
			Parking Roads	-	✓	×
			Shared Space	-	✓	×
			Motorways	Active Management	✓	×
				No Active Management	✓	×
		Geometry	Horizontal Plane	**Curves**	✓	✓
				Straight	✓	✓
			Longitudinal Plane	Down slope	✓	×
				Level Plane	✓	×
				Up slope	✓	×
			Transverse Plane	divided	✓	×
				Un divided	✓	×
				Divided	✓	×
				Pavements	✓	×
				Barriers on edges	✓	×
				Types of lanes together	✓	×
		Lane Specification	Lane Dimension		✓	×
			Lane Markings		✓	×
			Number of Lanes		2-3	2
			Direction of Lane	**Right-hand traffic**	✓	✓
			Direction of Lane	Left-hand traffic	×	×
			Lane Type	Bus Lane	×	×
				Traffic Lane	✓	✓
				Cycle Lane	×	×
				Tram Lane	×	×
				Emergency Lane	×	×
				Other special purpose Lane	×	×
		Road Signs	Information Signs	Uniform	✓	×
				Variable	✓	×
			Regulatory Signs	Uniform	✓	×
				Variable	✓	×
			Warning Signs	Uniform	✓	×
				Variable	✓	×
		Roadway Edge	Line Markers	-	✓	×
			No Edge	-	✓	×
			Shoulder (paved or grass)	-	✓	×
			Shoulder (grass)	-	✓	×
			Solid Barriers	-	✓	✓
			Temporary Line Markers	-	×	×
		Road Surface	road surface type	Loose	✓	×
				Segmented	✓	×
				Uniform	✓	✓
			Road Surface Features	Cracks	✓	×
				Potholes	✓	×
				Ruts	✓	×
				Swells	✓	×
			Induced road surface conditions	Icy	×	×
				Flooded roadways	×	×
				Mirage	×	×
				Snow	✓	×
				Standing water	×	×
				Wet road	✓	×
				Surface contamination	×	×
	Junction	Intersection	Grade separated	-	✓	×
			Staggered	-	✓	×
			Y-Junction	-	✓	×
			T-Junction		✓	×
			Crossroads	**Signalized Crossroads**	✓	✓
				Non-Signalized Crossroads	×	×
		Roundabouts	Compact	Signalized	✓	×
				Non-Signalized	×	×
			Double	Signalized	✓	×
				Non-Signalized	×	×
			Large	Signalized	✓	×
				Non-Signalized	×	×

Continued on next page

Table I: Overview of ODD Attributes (section 2.1) and the Chosen $ODD1$ and $ODD2$ (section 4.2) (continued)

ODD Attributes	Attributes	Sub- Attributes	Sub- Attributes	Sub-Attributes	Capability	
					ODD1	ODD2
Scenery			Mini	Signalized	✓	×
				Non-Signalized	×	×
			Normal	Signalized	✓	×
				Non-Signalized	×	×
	Special Structures	Automatic Access Control			×	×
		Bridges			✓	×
		Pedestrian Crossing			✓	✓
		Rail Crossing			×	×
		Tunnels			×	×
		Toll plaza			×	×
	Fixed Road Structures	Buildings			×	×
		Street lights			✓	×
		Street Furniture	Bus stop		✓	×
			Street Camera		×	×
		Vegetation			×	×
	Temporary Road Structures	Construction Site Detours			×	×
		Refuse Collection			×	×
		Road Works			×	×
		Road Signage			✓	×
Environmental Conditions	Weather	Rainfall	Rainfall Type	Convective rainfall	×	×
				Dynamic Rainfall	✓	×
				Orographic Rainfall	×	×
		Wind			×	×
		Snowfall			×	×
	Particulates	Marine			✓	×
		Sand & Dust			×	×
		Smoke & Pollution			×	×
		Volcanic ash			×	×
		ice crystal			×	×
	Illumination	Day	Sun Position	**Sun behind**	✓	✓
				Sun in front	✓	✓
				Sun to the left	✓	✓
				Sun to the right	✓	✓
		Low light	Low ambient		×	×
			Night		✓	×
		cloudiness			✓	✓
		Artificial Illumination	Street Lighting		×	×
			Vehicle Lighting		×	×
	Connectivity	Communication	V2V		✓	×
			V2I		×	×
		Positioning	Galileo		×	×
			GPS		×	×
			GLONASS		×	×
Dynamic Elements	Subject Vehicle	Max Allowable Speed			40-60km/hr	20-40km/hr
		Density of Agents			Mod	low
		Volume of Traffic			Mod	less
		Flow rate			Mod	slow
		Presence of special vehicle			×	×
	Traffic	Agent Type	**Animal**		✓	✓
			Human		✓	✓
			Vehicle		✓	✓

(Mod = Moderate, * The intersection of both ODDs is shown in Yellow.)

Comparison $ODD1$ vs. $ODD2$

Table 1 shows the ODD attributes along with their sub-attributes and a comparison between both ODDs by indicating the attributes available in each ODD with a tick. The columns from 1-5 show the attributes and sub-attributes of ODD, and the column 'Capability' having sub-columns named 'ODD1' and 'ODD2' shows whether each ODD has the listed conditions or not. For example, under the "Scenery", attributes are 'Zones'. Further within 'Zones',sub-attributes include 'Geo-Fenced Areas', 'Traffic Management', 'School Zones', 'Regions or Counties', and 'Interference'. These sub-attributes indicate the environments in which the ego vehicle is designed to operate. For example, under Regions or Counties,' the $ODD1$ can operate on urban highways, while the $ODD2$ is restricted to rural and suburban roads.

Unlike $ODD1$, $ODD2$ is restricted to straight and curved roads and cannot handle lane changes, U-

turns, or segmented surfaces such as cobblestones. $ODD2$ can only detect pedestrian road signs, while $ODD1$ can recognize all road signs, lane markers, and barriers. Additionally, $ODD2$ cannot operate in wet conditions, darkness, or detect traffic light status, whereas $ODD1$ supports wet surfaces and more complex environments. Despite these differences, both $ODD1$ and $ODD2$ have intersecting ODD elements, such as daylight conditions, curved roads, and straight roads. These shared elements represent the intersection of the two ODDs. Overall, $ODD1$ offers a wider operational scope than $ODD2$.