
OVERVIEW OF THE DRAFT DVS REGULATION & COMPETING PROPOSALS FOR LIMIT VALUES

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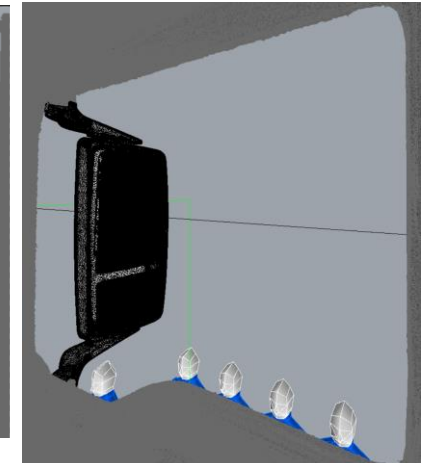
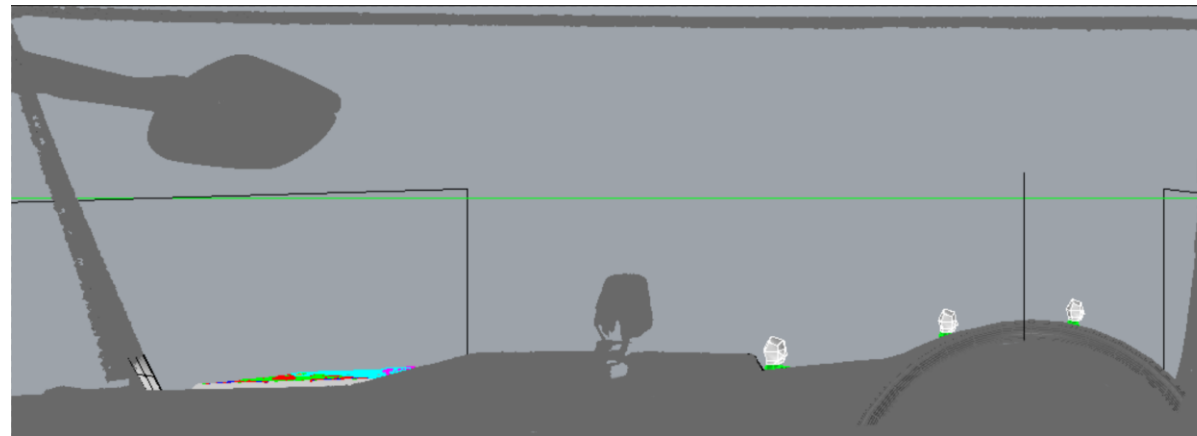
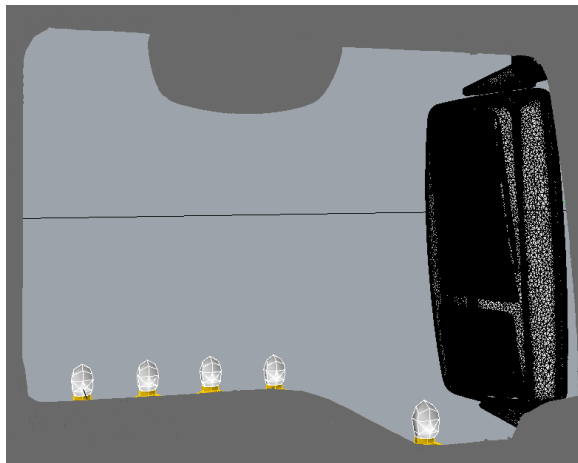
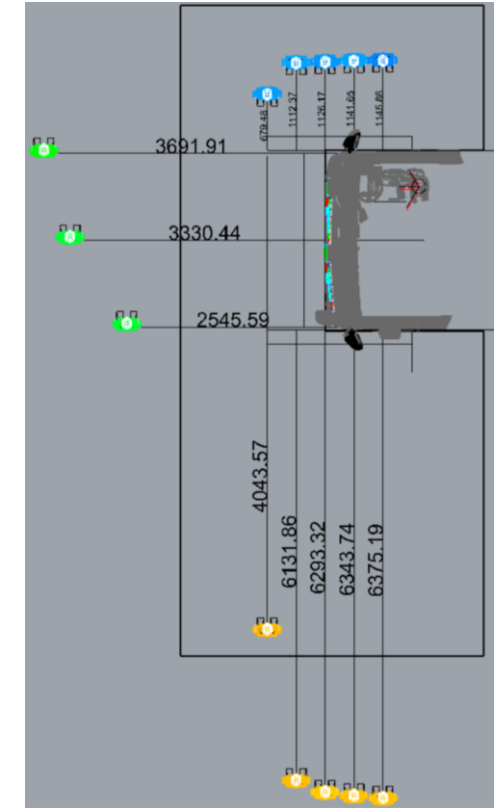
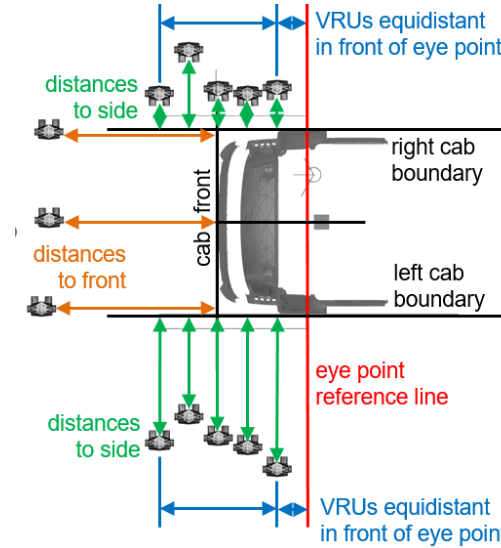


OBJECTIVES

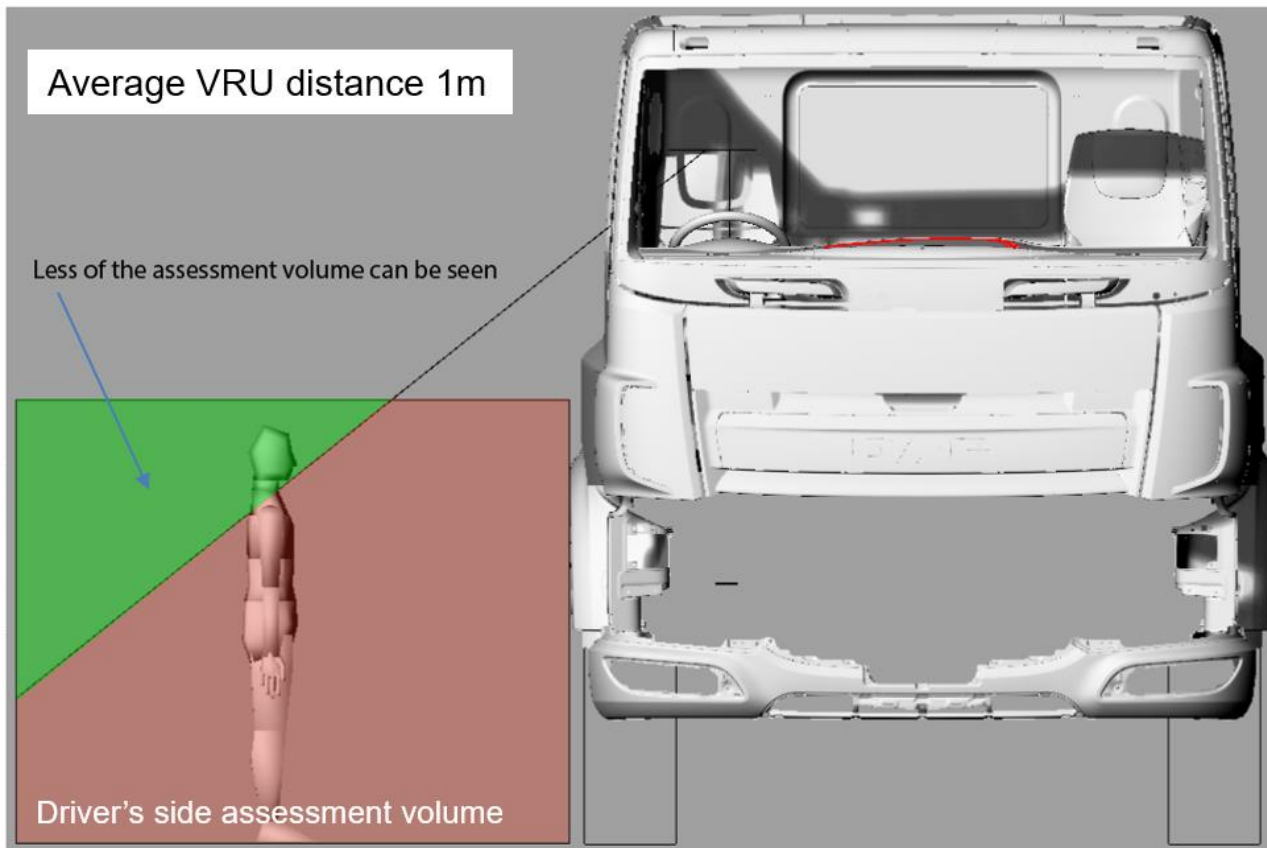
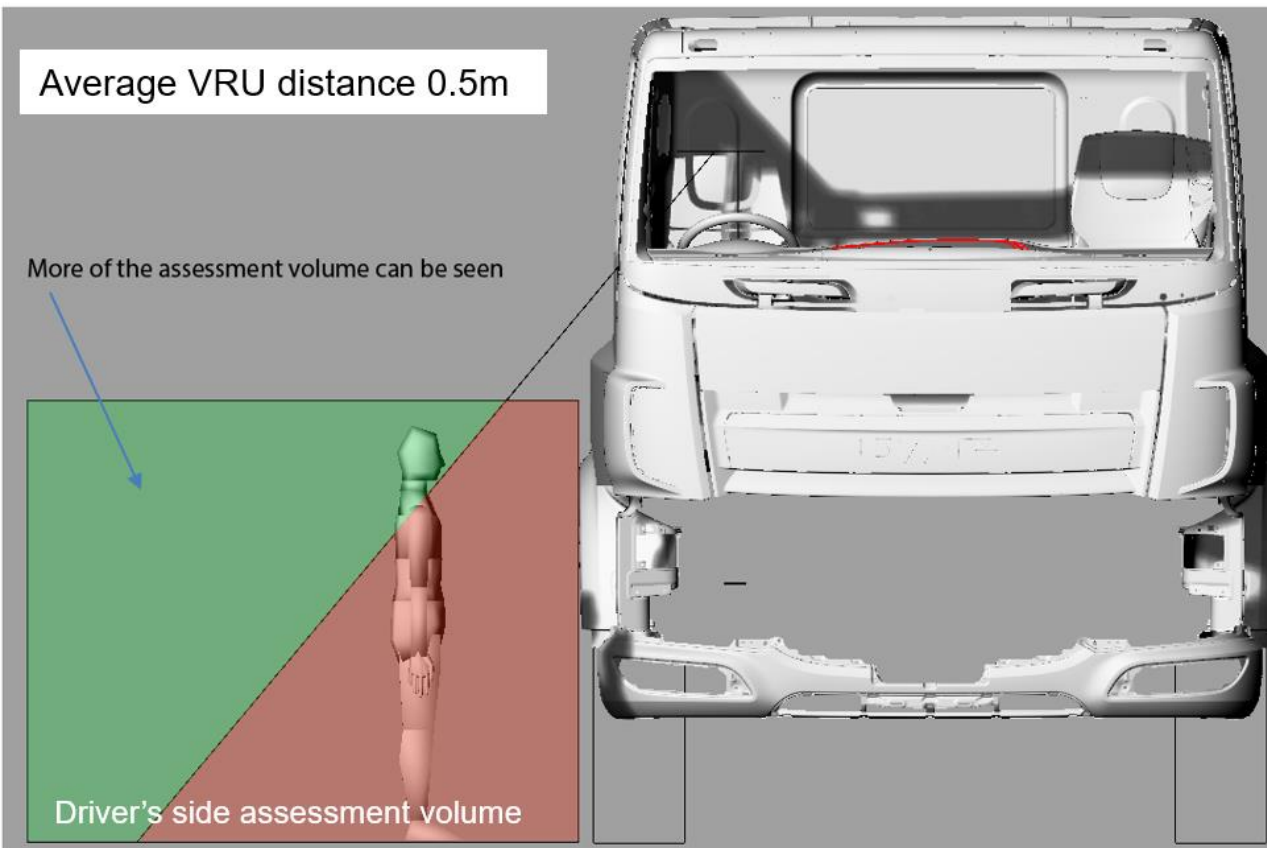
- Neutral overview of competing proposals for evaluation methods / limit values
 - ACEA/OICA
 - Japan
 - T&E
- Consideration of two phases

CONTEXT: VRU DISTANCE

- Volumetric scores are abstract
- VRU distance a simplistic illustration useful for assessing stringency of proposed limit values
- Average distance where VRU “just visible” from front, nearside, offside recorded, plus overall average of all 3 sides
- “just visible” currently based on being able to see head and neck but less could be considered



CONTEXT: VRU DISTANCE RELATIONSHIP TO VOLUME





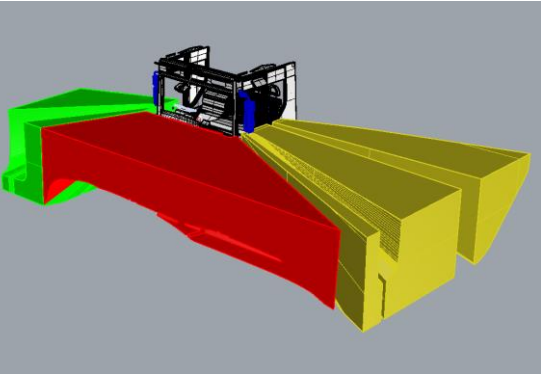
METHODOLOGICAL LIMITATION

- VRU distances to each side can be used to create an associated volume, either in each direction alone, or as a combined volume.
- However, where proposals have been made first in volume terms, it is only possible to calculate an average VRU distance to all sides together.
- Most proposals based on VRU distance defined by head and neck visibility. One is partly based on less than this (nominally half head)
- To provide comparable presentation for proposals made from different perspectives, all VRU distance illustrations are based on examples of real vehicles from the LDS sample, selecting those close to the proposed limit values (just pass or just fail) based on head and neck visibility.

CONTEXT: VARIABLES BETWEEN PROPOSALS

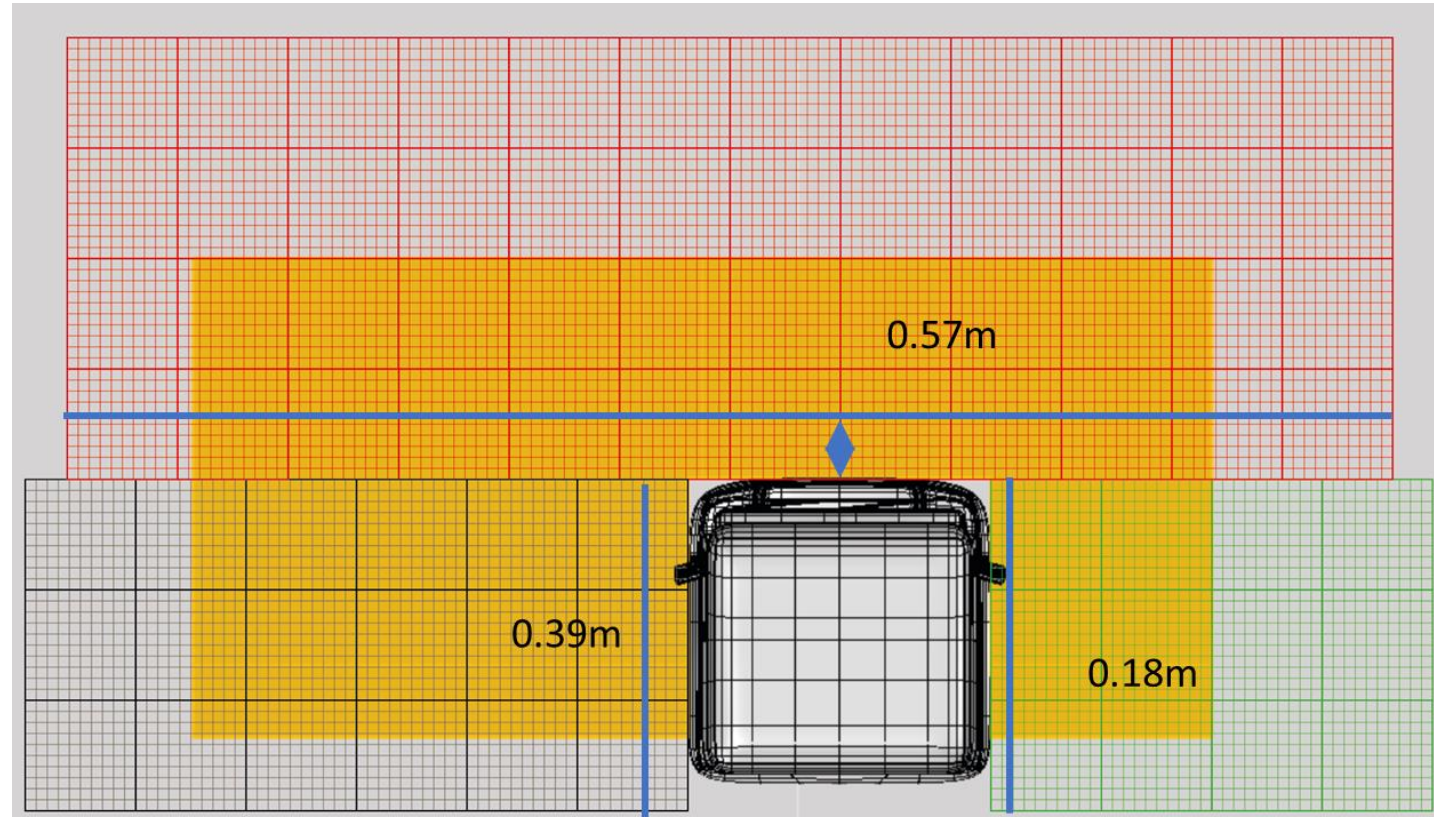
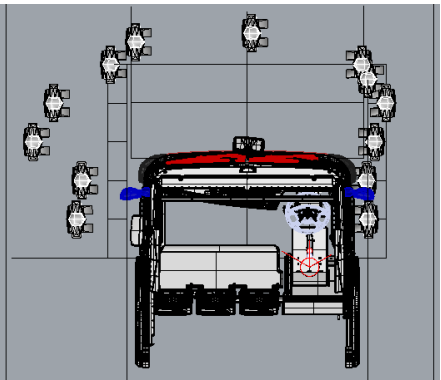
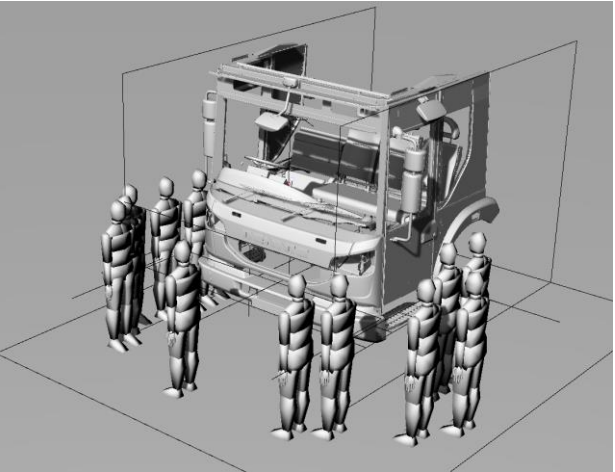
- Level of ambition / achievability: Limit values
- Application of limits to:
 - Whole assessment volume only
 - Separately to each side (nearside, front, offside)
 - Some hybrid of the two
- For separate/hybrid approaches only, definition of directions based on:
 - Zone defined on view through windscreen, nearside window etc – design dependent
 - Zone defined on geometry relative to vehicle only, visible through any window – design independent
- Consideration of alternative limit values
 - Permit manufacturer choice between very high direct vision alone or high direct vision plus active safety to pass regulation
 - Consider active safety equivalence in very limited circumstances only
 - Do not consider active safety in this regulation
- Variables are strongly inter-related: Higher ambition may be achievable if one or more other variables is more relaxed

CONTEXT: RANGE OF POSSIBILITY

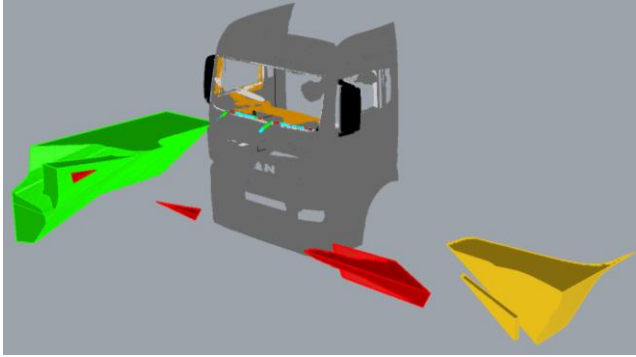


- Best case in LDS sample
- Volume: 22.4m³
- Individual VRU distance

- Average VRU Distance:
 - Nearside: 0.39m
 - Front: 0.57m
 - Offside: 0.02m
 - Average: 0.33m

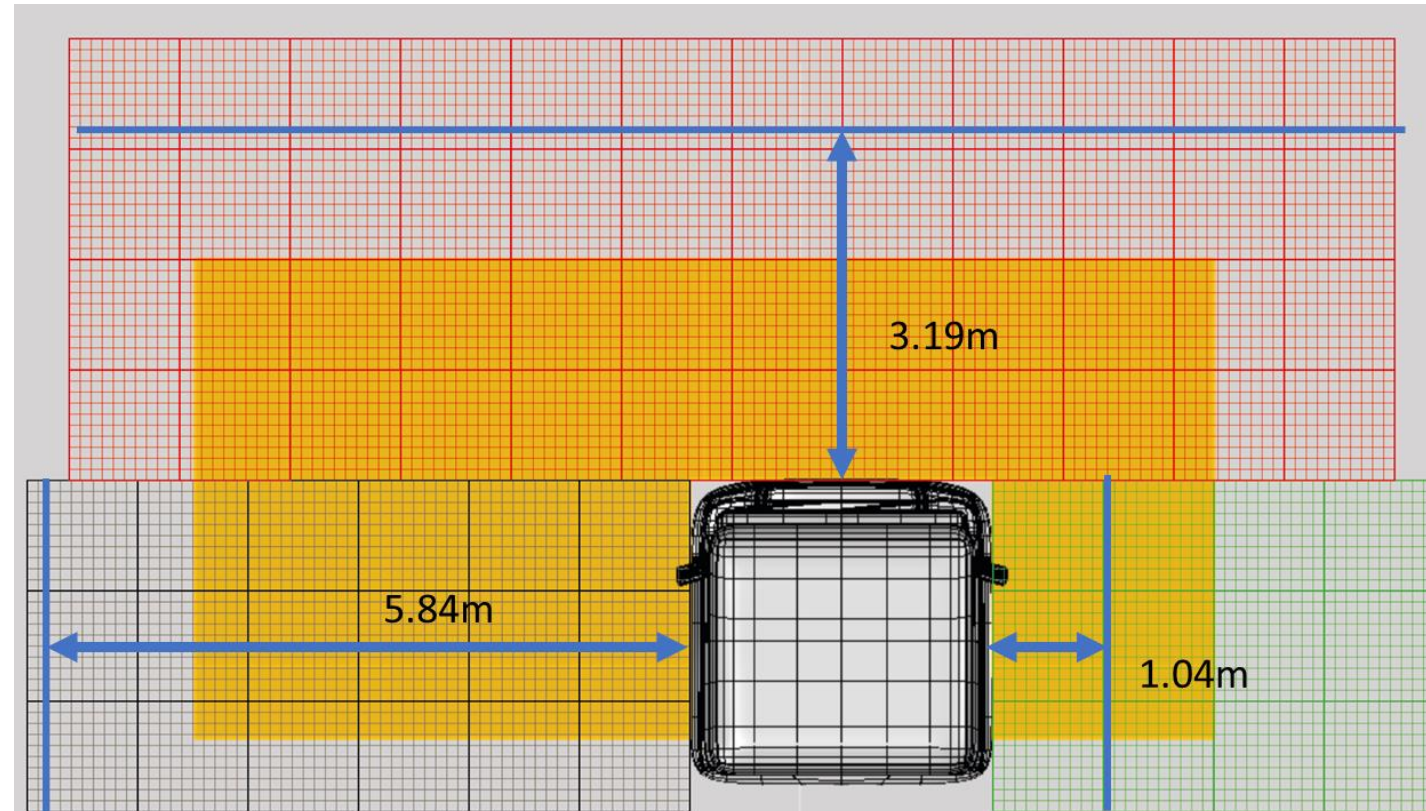
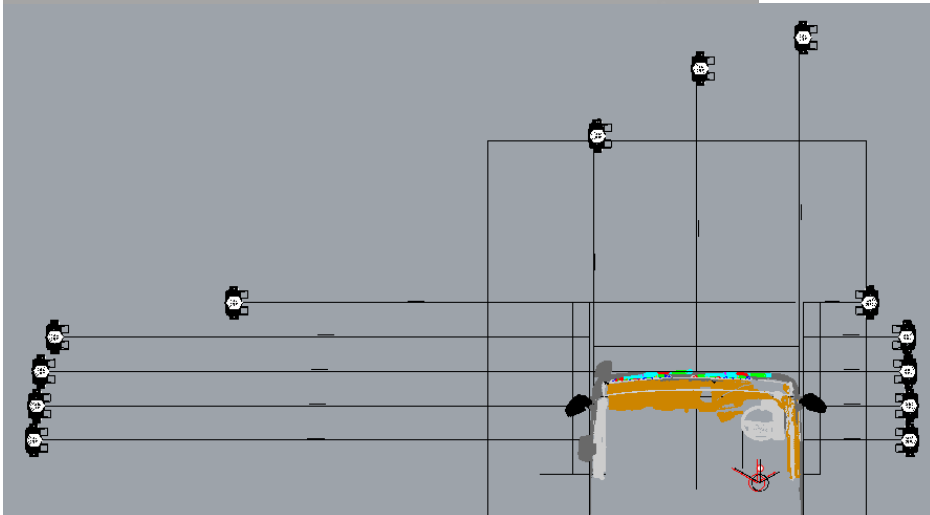
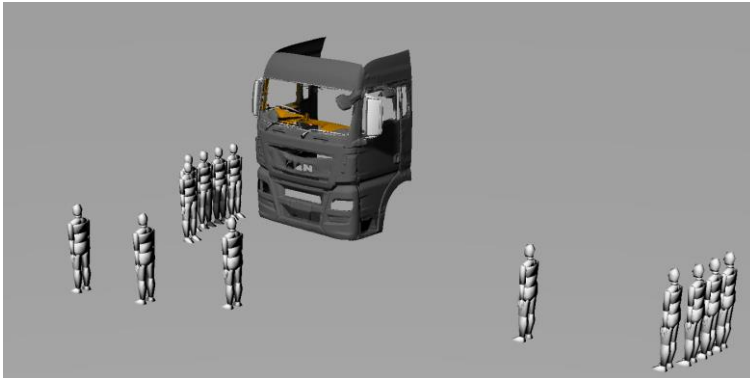


CONTEXT: RANGE OF POSSIBILITY



- Worst Case in LDS sample
- Volume: 2.5m³
- Individual VRU distance s

- Average VRU Distance:
 - Nearside 5.84m
 - Front: 3.19m
 - Offside: 1.04m
 - Average: 3.36m



T&E PROPOSAL

- Hybrid Approach - Vehicles must pass very ambitious level of direct vision when whole volume considered & less ambitious limit value applied separately to the front
- View to front based on earth fixed reference dimensions, not dependent on vehicle design – volume can be seen through any transparent area
- Note:
 - Volume estimated based on current vehicle data & VRU distance with less than whole head - aim to ensure VRU 'just visible' at 2m to front. Upper end of estimated range quoted here for simplicity
 - VRU distances actually quoted are for head and neck so comparable to other proposals
 - Actual details will need updating to match this intent

Whole Volume limits

Level	Volume (m3)	VRU Distance (m)			
		Pass	Front	Drv	Mean
1	11.2	-	-	-	1.6
2	[8.0 - 8.5]	-	-	-	2.03
3	[7.0 - 7.5]	-	-	-	2.18

Level	Front	
	Vol (m3)	Dist (m)
1	[1.0 - 1.3]	2.26 - 2.13
2	[1.0 - 1.3]	2.26 - 2.13
3	[1.0 - 1.3]	2.26 - 2.13

Limit applied to front

ACEA / OICA PROPOSAL

Level	Volume (m3)	VRU Distance (m)			
		Pass	Front	Drv	Mean
1	11.0	-	-	-	1.6
2	[8.0-8.5]	-	-	-	2.03
3	[7.0-7.5]	-	-	-	2.18

Level	Front	
	Vol (m3)	Dist (m)
1	[1.0 - 1.3]	2.26-2.13
2	[1.0 - 1.3]	2.26-2.13
3	[1.0 - 1.3]	2.26-2.13

Default limits combined zone
left, frontal zone right

Level	Volume (m3)	VRU Distance (m)			
		Pass	Front	Drv	Mean
1	8.5	-	-	-	2.03
2	7.0	-	-	-	2.23
3	6.0	-	-	-	2.41

Limits where default not achievable and assistance
systems required

- Apply very ambitious standard of Direct Vision to both whole volume and separate frontal zone (fixed by ground references not vehicle design)
- If this is not achievable apply less ambitious standard of direct vision to whole zone only but also require additional assistance systems

JAPAN PROPOSAL

- Hybrid Approach based on 'TF Compromise' presented at VRU Proxi 16
- Vehicles must pass ambitious level of direct vision when whole volume considered
- Vehicles must also pass less ambitious limit values applied separately in each direction,
- Views to each side are based on vehicle design – i.e. view through the front, nearside or offside windows
- Note: Average VRU distances (**mean of all directions**) don't always show expected change e.g. sum of volume to each side less than combined but mean VRU distance same – due to variability in design in each direction
- Japan also considering T&E approach

Whole Volume limits

Level	Volume (m3)	VRU Distance (m)			
		Pass	Front	Drv	Mean
1	10.0	-	-	-	1.79
2	8.0	-	-	-	2.10
3	7.0	-	-	-	2.23

Level	Passenger		Front		Driver		Mean
	Vol (m3)	Dist (m)	Vol (m3)	Dist (m)	Vol (m3)	Dist (m)	Dist (m)
1	3.4	3.14	1.8	1.90	2.8	0.92	1.98
2	3.0	3.32	1.6	2.00	2.5	0.98	2.09
3	2.6	3.5	1.4	2.10	2.1	1.05	2.21

Limits applied to each side

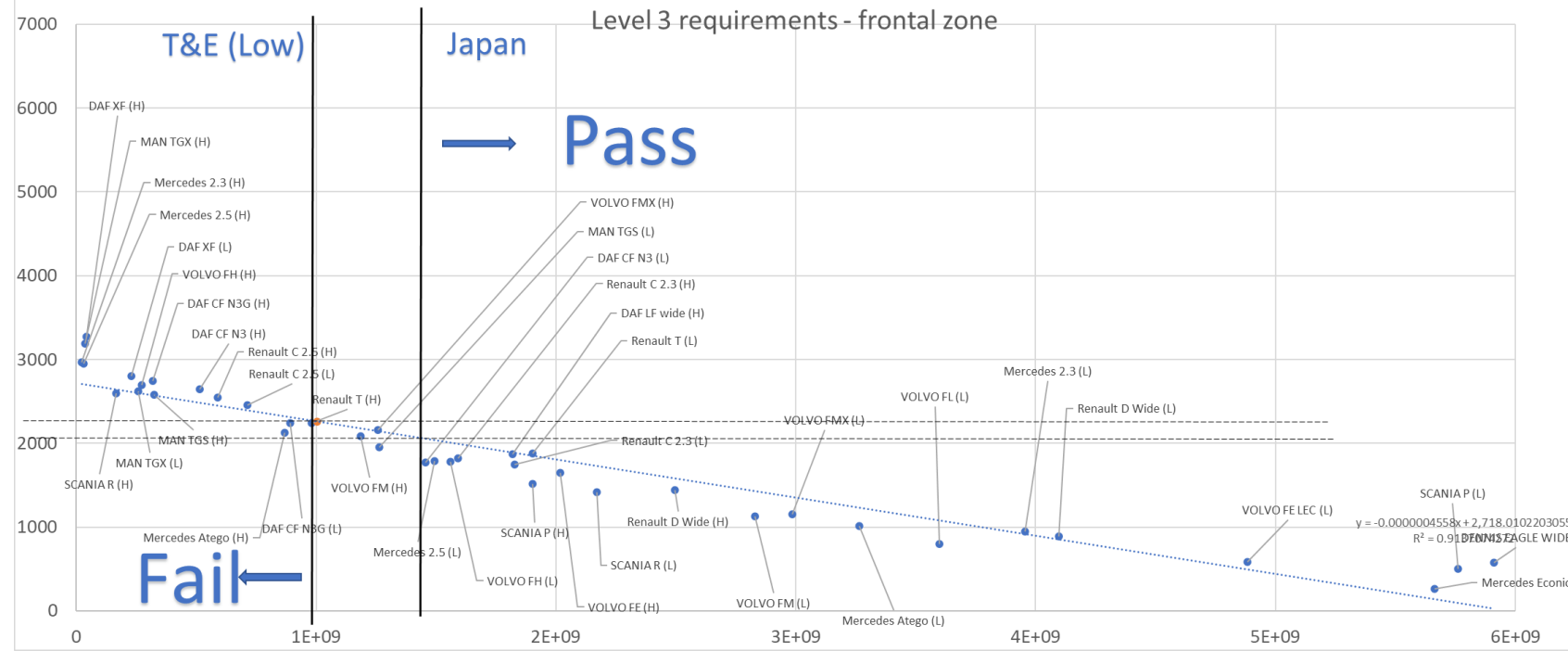
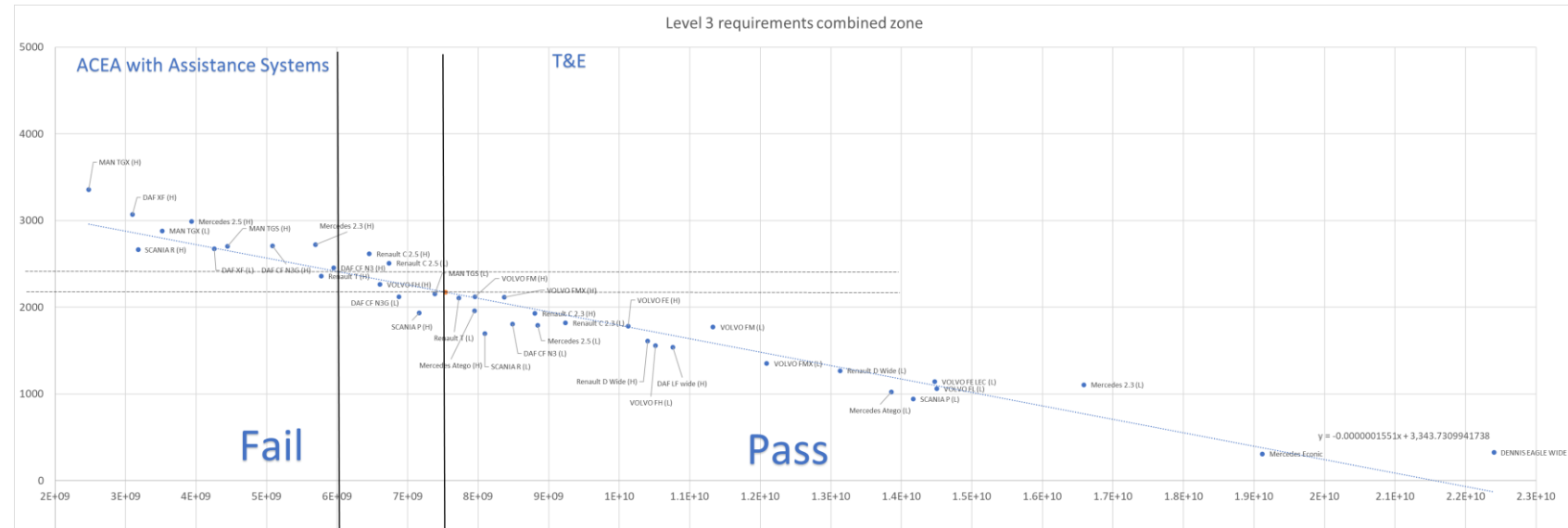


LEVEL 3 –VEHICLES THAT SELDOM ENTER URBAN AREAS

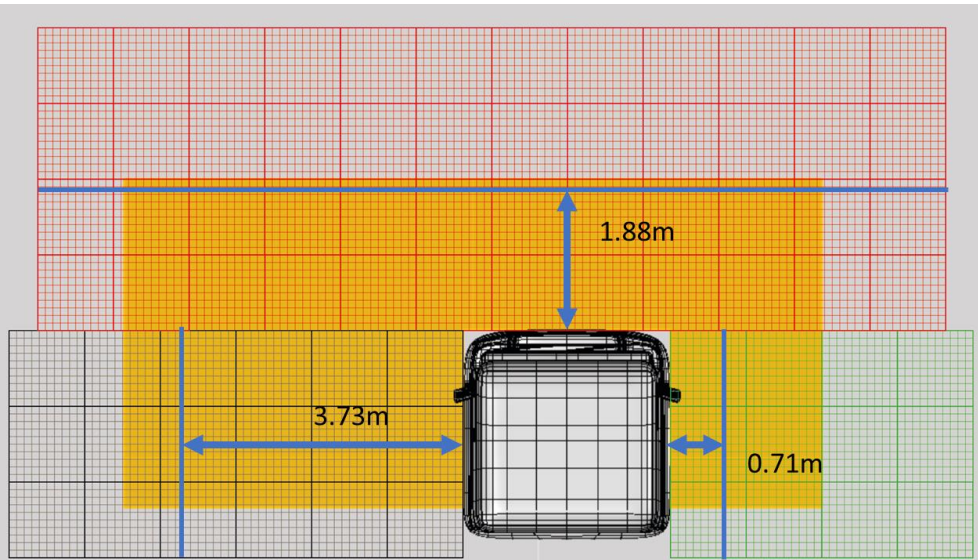


LEVEL 3 - OVERVIEW

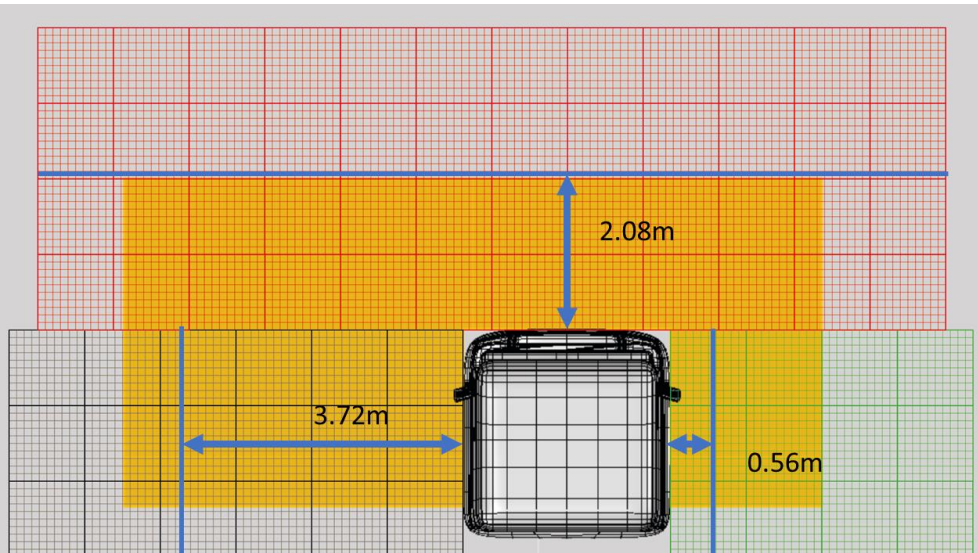
- Proposals forming boundaries shown
- Frontal limit as common part of hybrid proposals
- Combined 6m3 – 7.5m3
- Frontal 1m3 – 1.4m3



LEVEL 3 DETAILS: T&E PROPOSAL & ACEA/OICA WITHOUT ASSISTANCE SYSTEMS

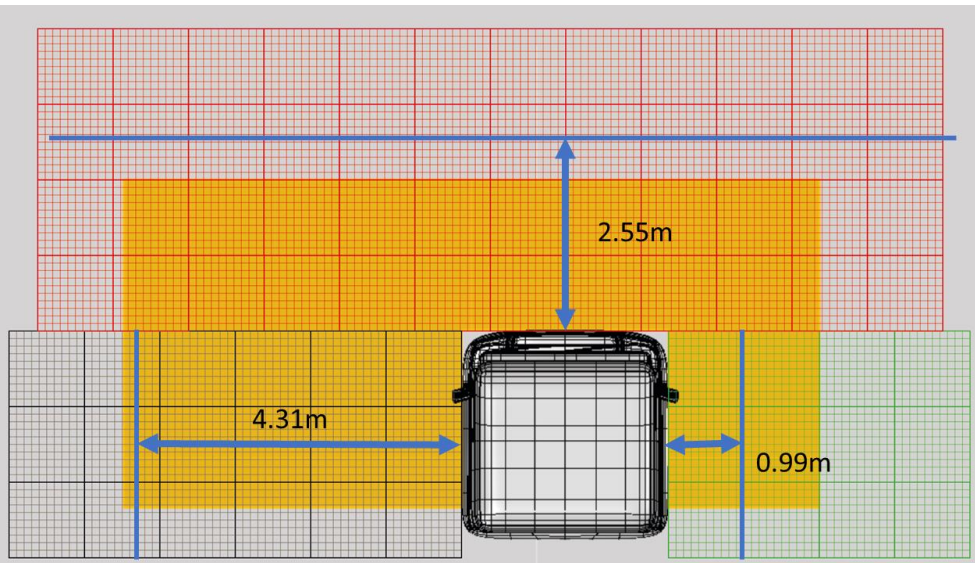


- LDS sample vehicle passing volume requirement by least margin
 - 7.73m³ combined (pass – 7 / 7.5)
 - 1.9m³ front (pass – 1 / 1.3)

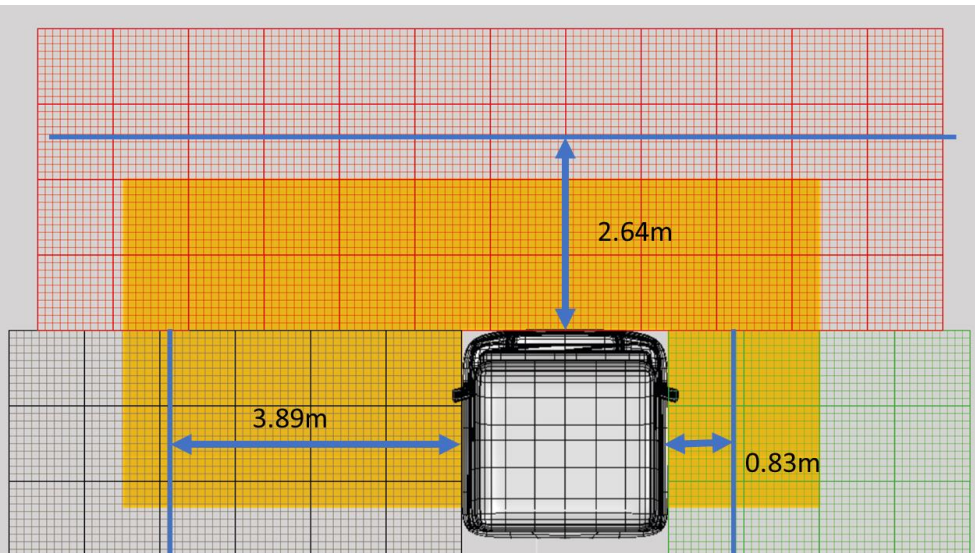


- LDS sample vehicle borderline pass/fail on volume depending on finalisation of values
 - 7.96m³ combined (pass – 7 / 7.5)
 - 1.18m³ front (? – 1 / 1.3)

LEVEL 3 DETAILS: ACEA / OICA PROPOSAL (DVS LIMIT WITH ASSISTANCE SYSTEMS)

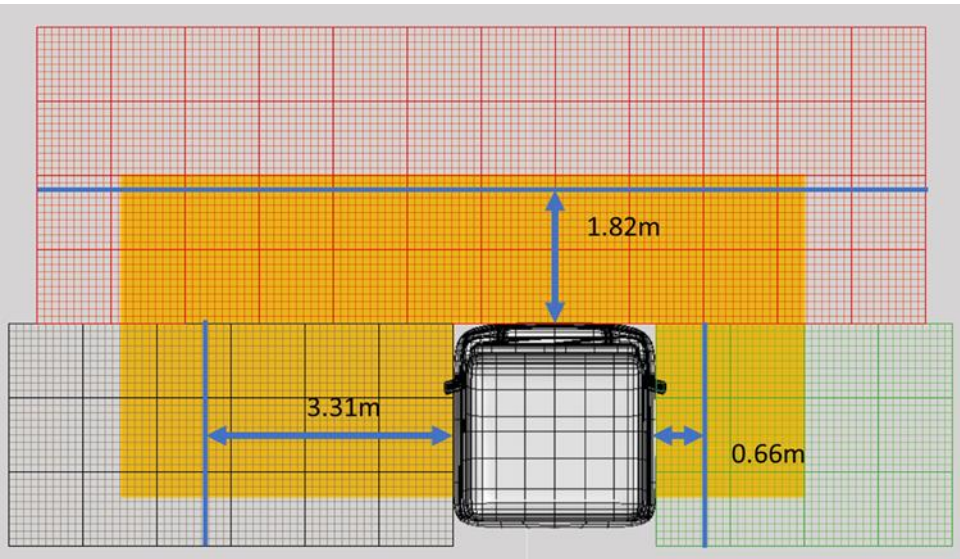


- LDS sample vehicle passing volume requirement by smallest margin with
 - 6.46m³ combined (pass – 6.0)



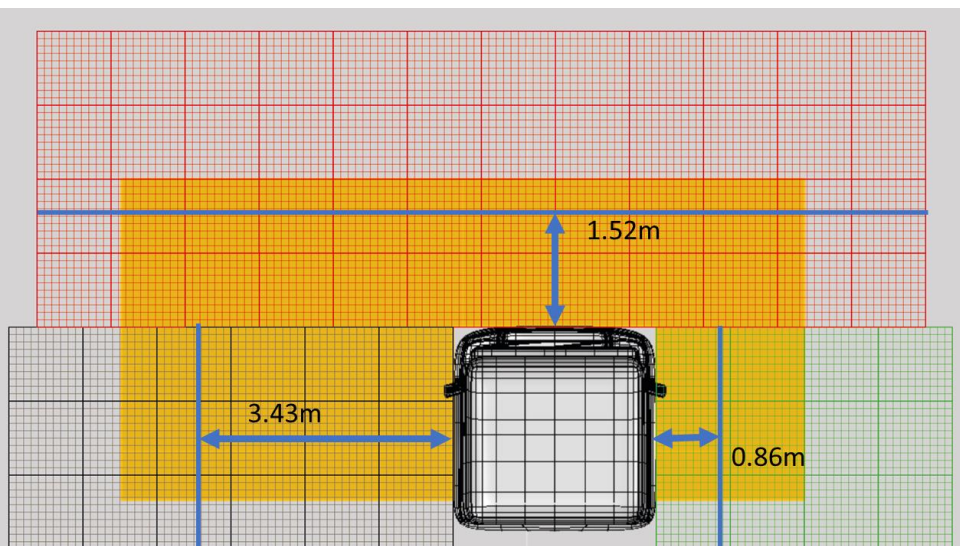
- LDS sample vehicle just fails volume requirement with
 - 5.95m³ combined (fail – 6.0)

LEVEL 3 DETAILS: JAPAN PROPOSAL



- LDS sample vehicle passing volume requirement by smallest margin with

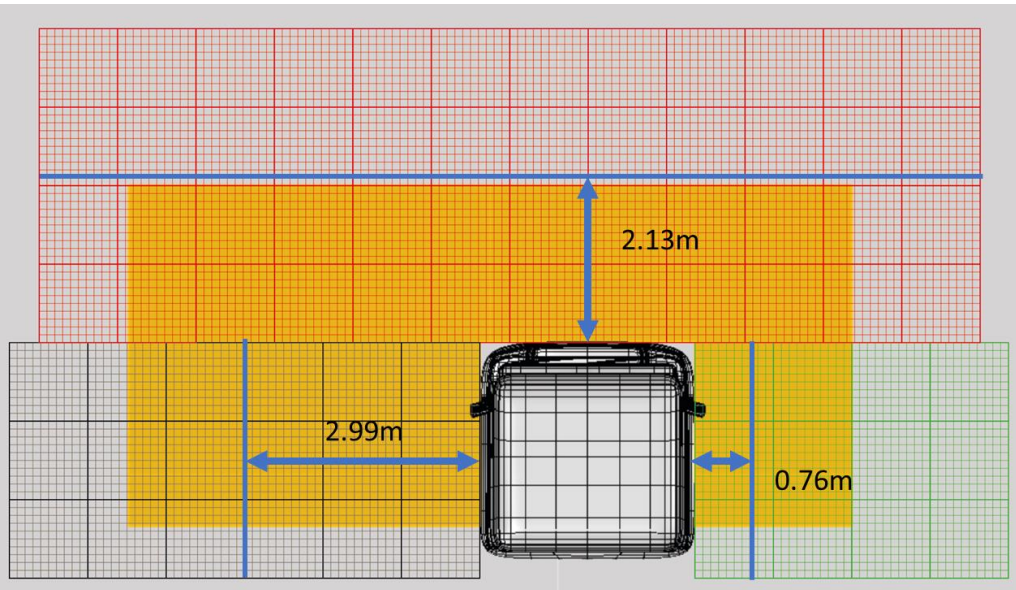
- 8.80m³ combined (pass – 7.0)
- 3.30m³ Nearside (pass – 2.6)
- 1.59m³ front (pass – 1.4)
- 3.92m³ Offside (pass – 2.1)



- LDS sample vehicle just failing volume requirement with

- 7.16m³ combined (pass – 7.0)
- 1.79m³ Nearside (fail – 2.6)
- 1.9m³ front (pass – 1.4)
- 3.47m³ Offside (pass – 2.1)

LEVEL 3 DETAILS: JAPAN PROPOSAL



- LDS sample vehicle just fails volume requirement with
 - 7.95m³ combined (pass – 7.0)
 - 2.87m³ Nearside (pass – 2.6)
 - 0.87m³ front (fail – 1.4)
 - 4.21m³ Offside (pass – 2.1)

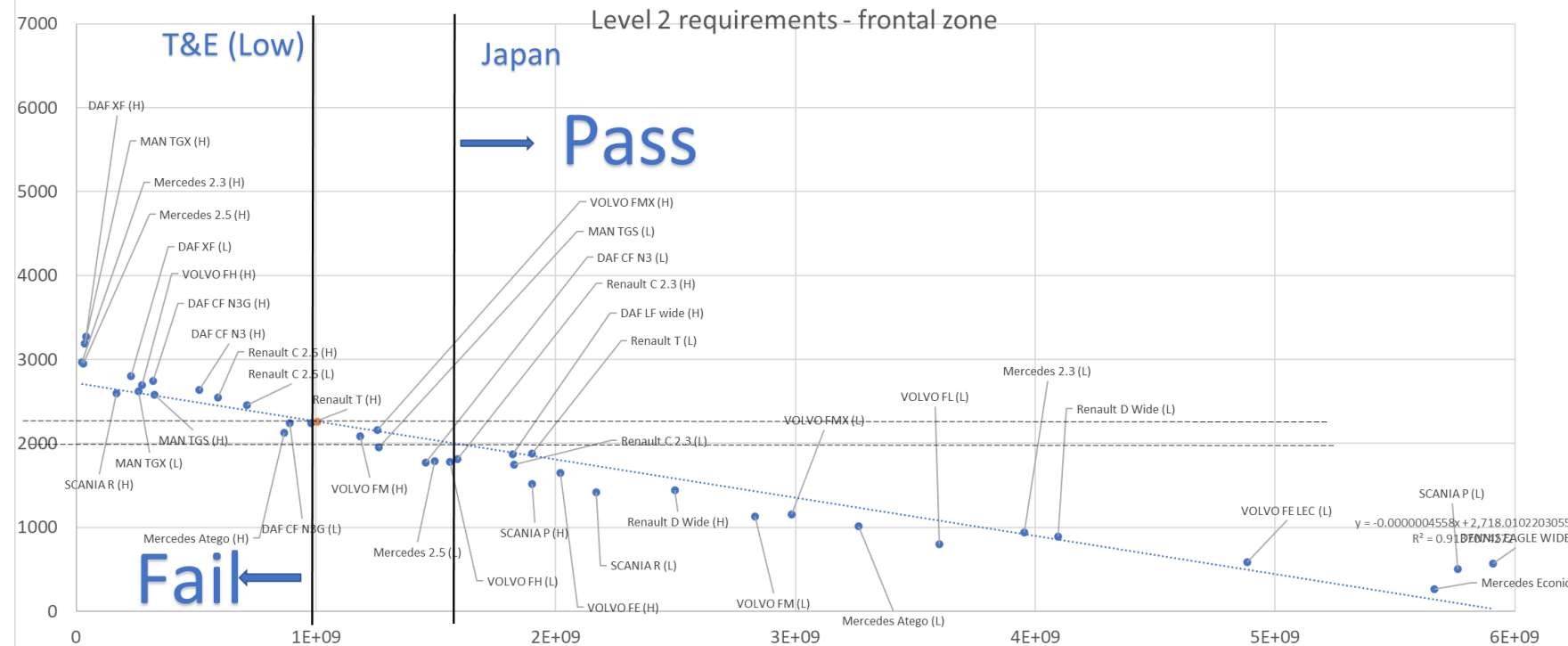
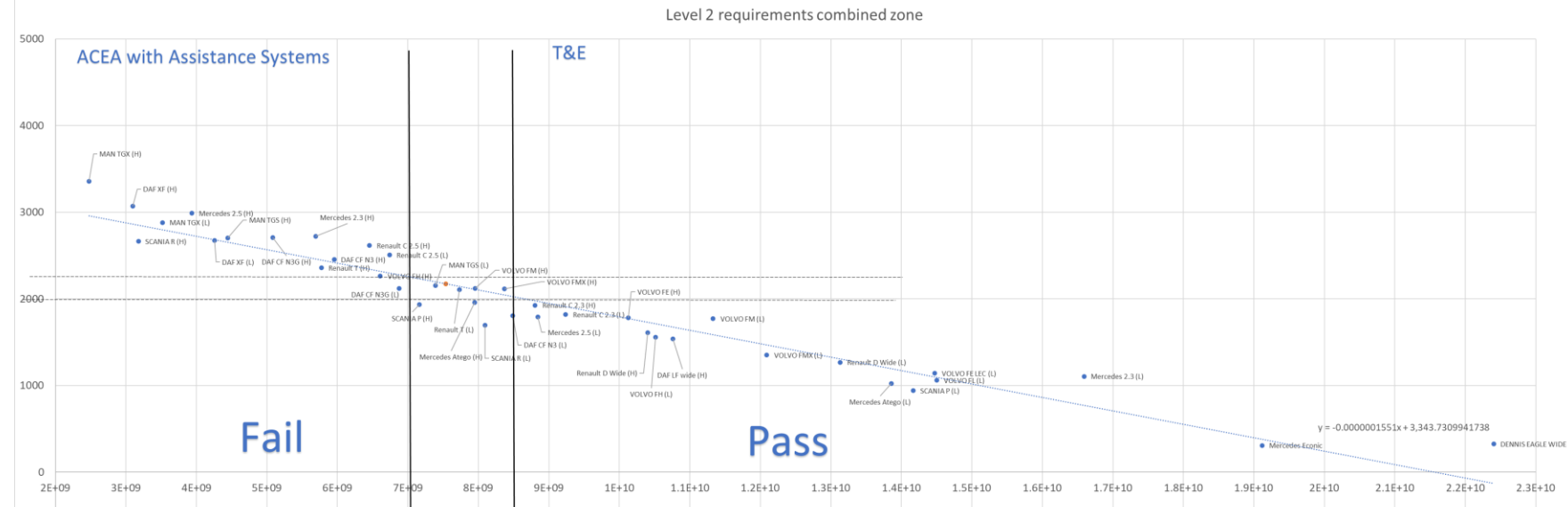


LEVEL 2 – OFF-ROAD VEHICLES

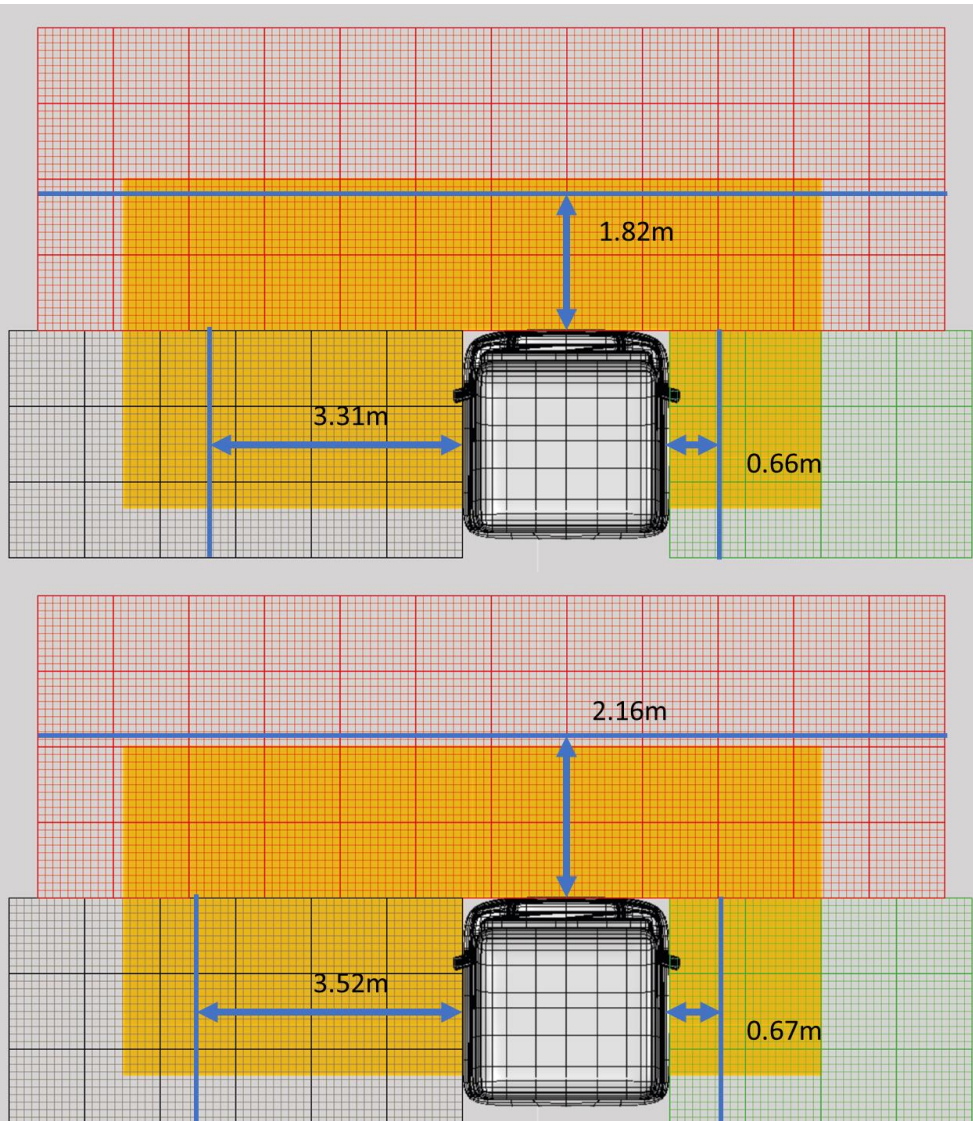


LEVEL 2 - OVERVIEW

- Proposals forming boundaries shown
- Frontal limit as common part of hybrid proposals
- Combined 7m3 – 8.5m3
- Frontal 1m3 – 1.6m3

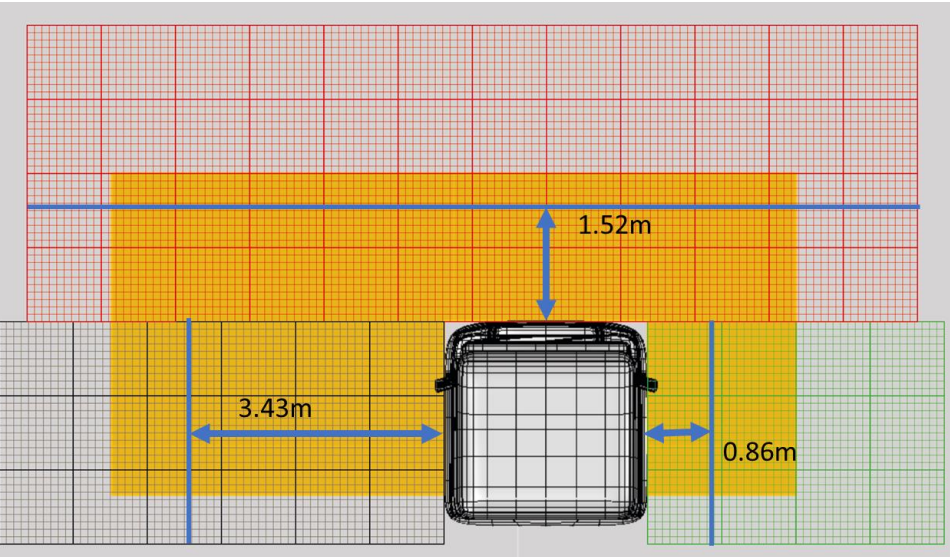


LEVEL 2 DETAILS: T&E PROPOSAL & ACEA/OICA WITHOUT ASSISTANCE SYSTEMS

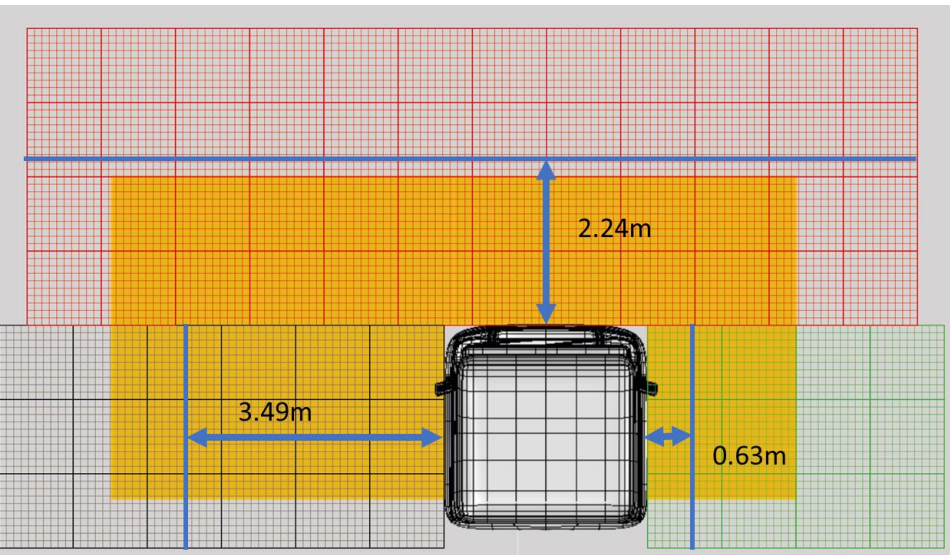


- LDS sample vehicle passing volume requirement (high) by smallest margin with
 - 8.8m³ combined (pass – 8 / 8.5)
 - 1.59m³ front (pass – 1 / 1.3)
- All LDS sample vehicles that pass 8.5 combined also pass front
- LDS sample vehicle borderline pass/fail on volume depending on finalisation of values
 - 8.37m³ combined (? – 8 / 8.5)
 - 1.26m³ front (? – 1 / 1.3)

LEVEL 2 DETAILS: ACEA / OICA PROPOSAL (DVS LIMIT WITH ASSISTANCE SYSTEMS)

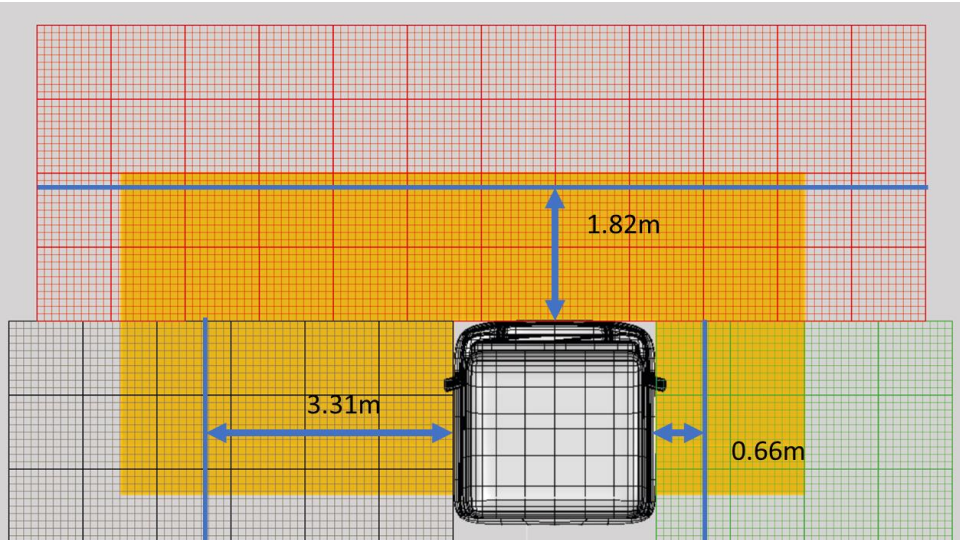
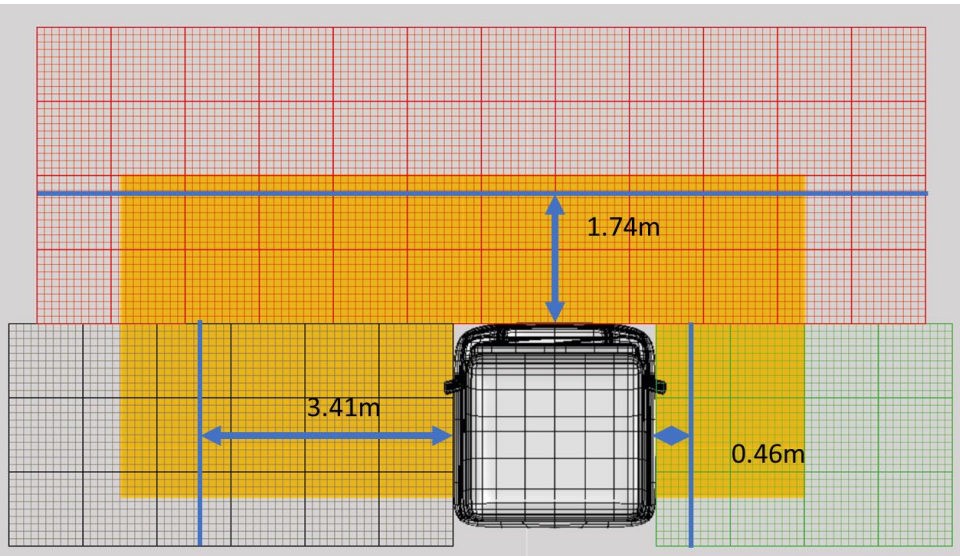


- LDS sample vehicle passing volume requirement by smallest margin with
 - 7.16m³ combined (pass – 7.0)



- LDS sample vehicle just fails volume requirement with
 - 6.87m³ combined (fail – 7.0)

LEVEL 2 DETAILS: JAPAN PROPOSAL



- LDS sample vehicle passing volume requirement by smallest margin with
 - 9.24m³ combined (pass – 8.0)
 - 3.41m³ Nearside (pass – 3.0)
 - 1.82m³ front (pass – 1.6)
 - 4.0m³ Offside (pass – 2.5)
- LDS sample vehicle just failing volume requirement with
 - 8.80m³ combined (pass – 8.0)
 - 3.30 Nearside (pass – 3.0)
 - 1.59 front (fail – 1.6)
 - 3.92 Offside (pass – 2.5)
- No vehicles in sample fail combined while passing to each side

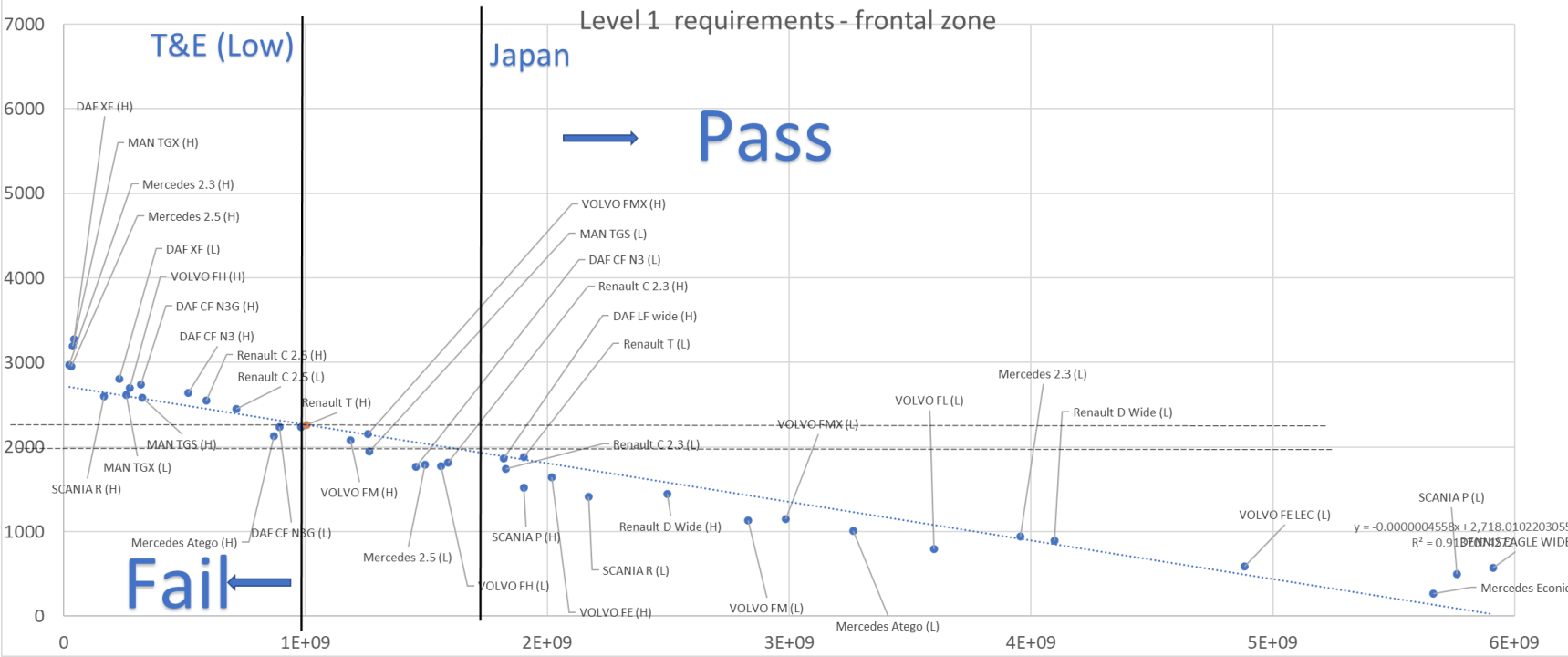
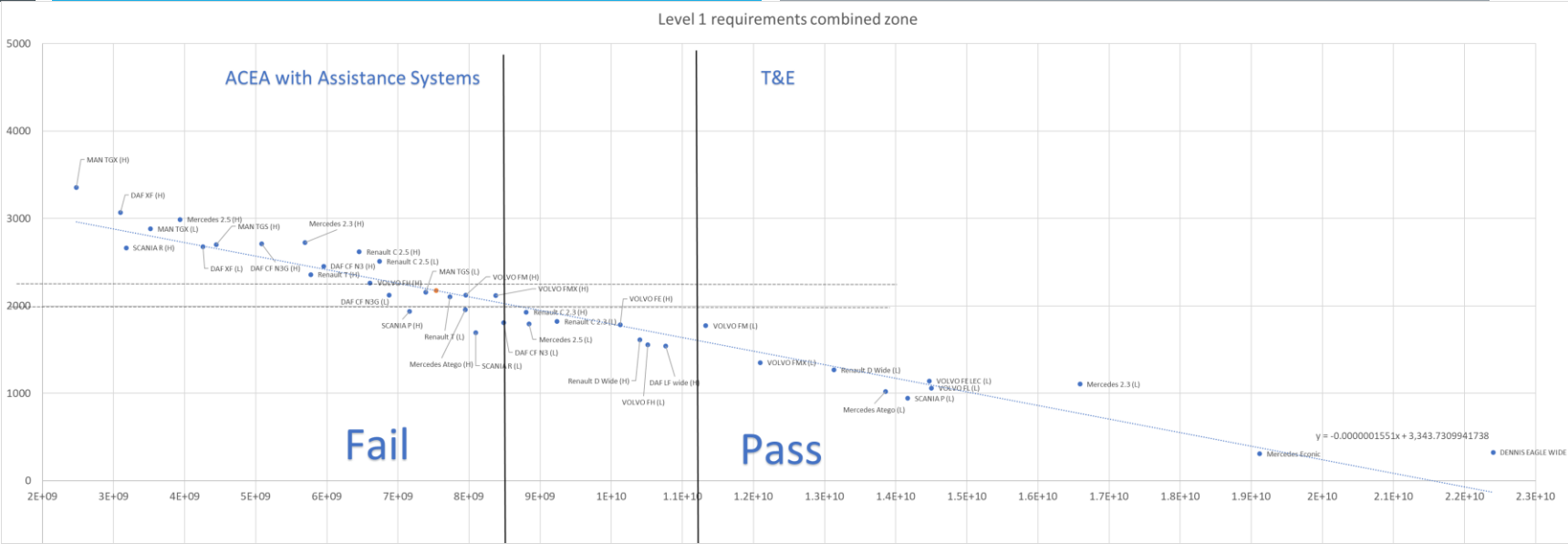


LEVEL 1 – VEHICLES OFTEN ENTERING URBAN AREAS

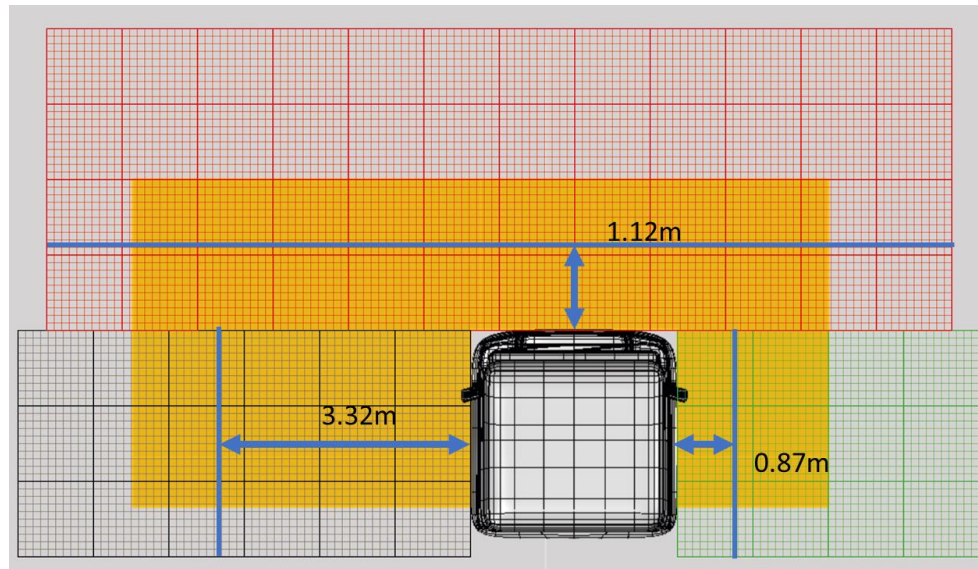


LEVEL 1 - OVERVIEW

- Proposals forming boundaries shown
- Frontal limit as common part of hybrid proposals
- Combined 8.5m3 – 11.2m3
- Frontal 1m3 – 1.8m3

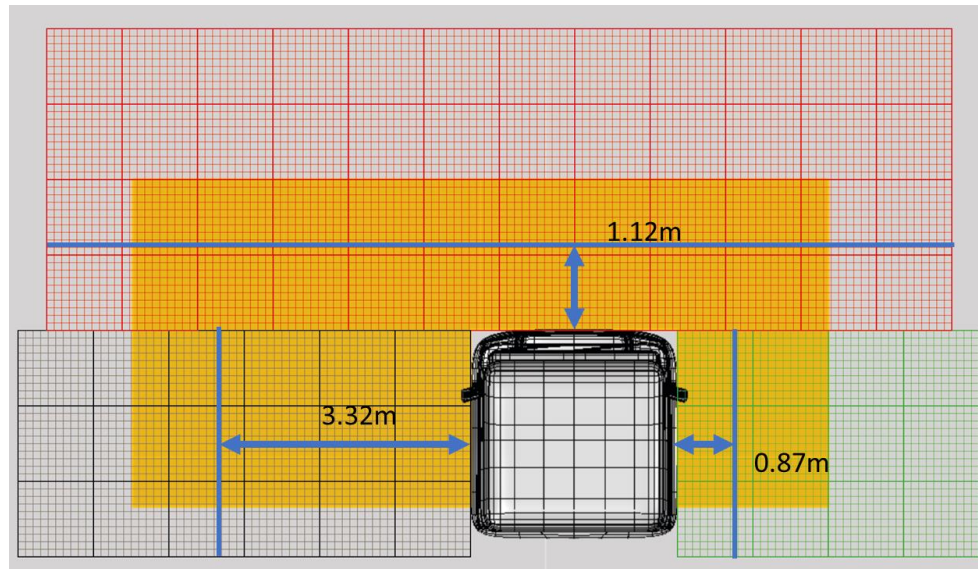


LEVEL 1 DETAILS - T&E PROPOSAL



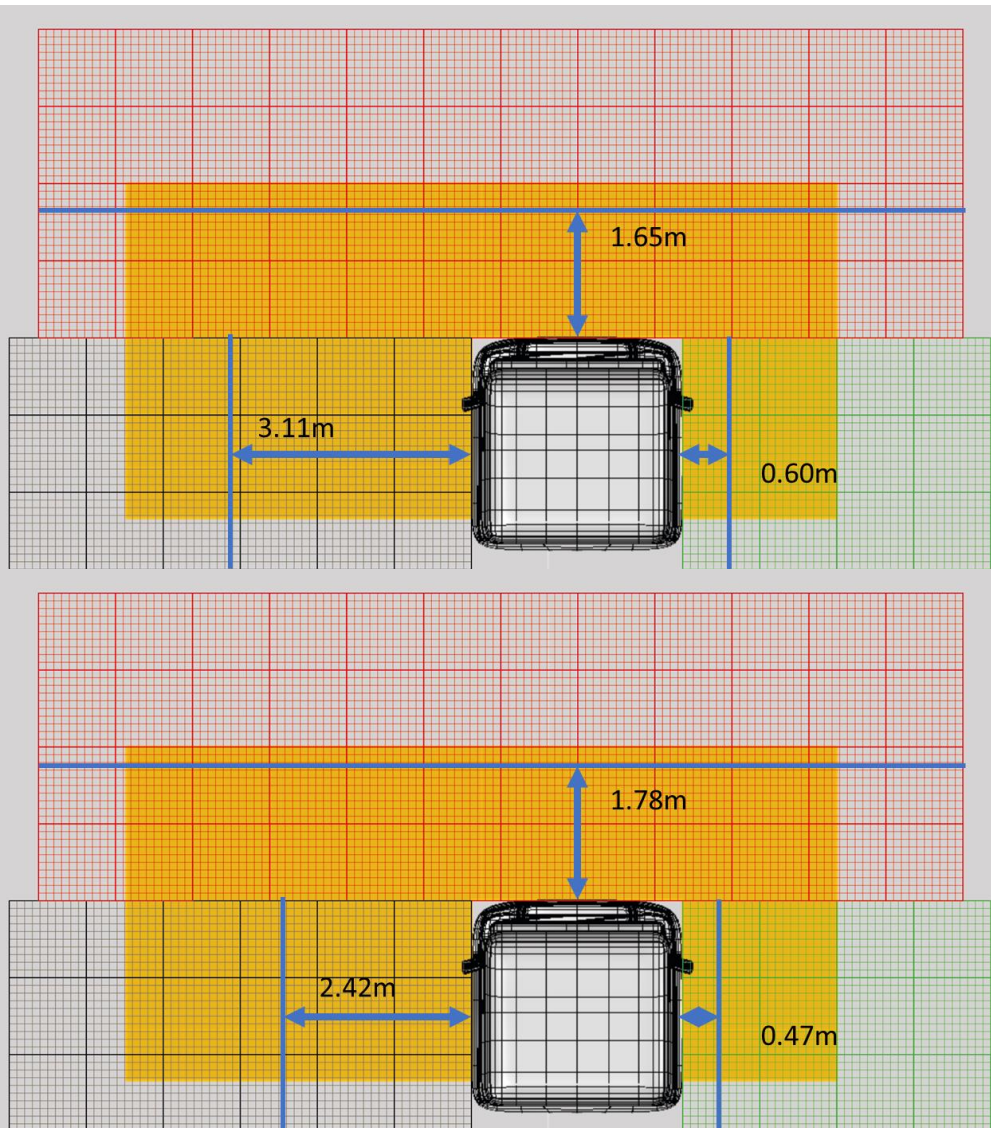
- LDS sample vehicle, closest that passes volume requirement with
 - 11.33m³ combined (pass - 11.2)
 - 2.83m³ front (pass - [1.0 - 1.3])
- All LDS sample vehicles that pass combined also pass front

LEVEL 1 DETAILS - ACEA / OICA PROPOSAL (DVS LIMIT WITHOUT ASSISTANCE SYSTEMS)



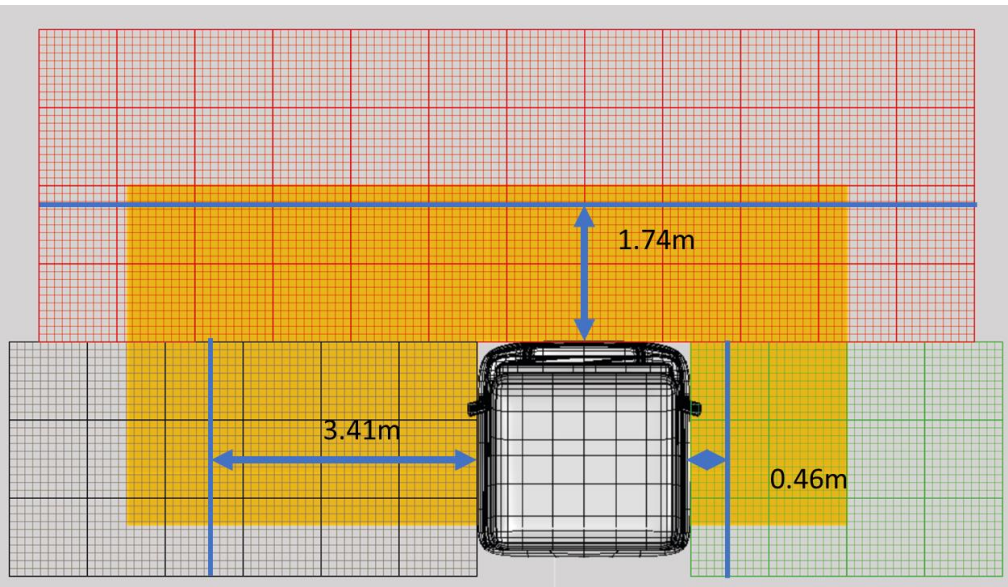
- LDS sample vehicle, closest that passes volume requirement with
 - 11.33m³ combined (pass - 11.0)
 - 2.83m³ front (pass - [1.0 - 1.3])
- All LDS sample vehicles that pass combined also pass front

LEVEL 1 DETAILS - JAPAN PROPOSAL



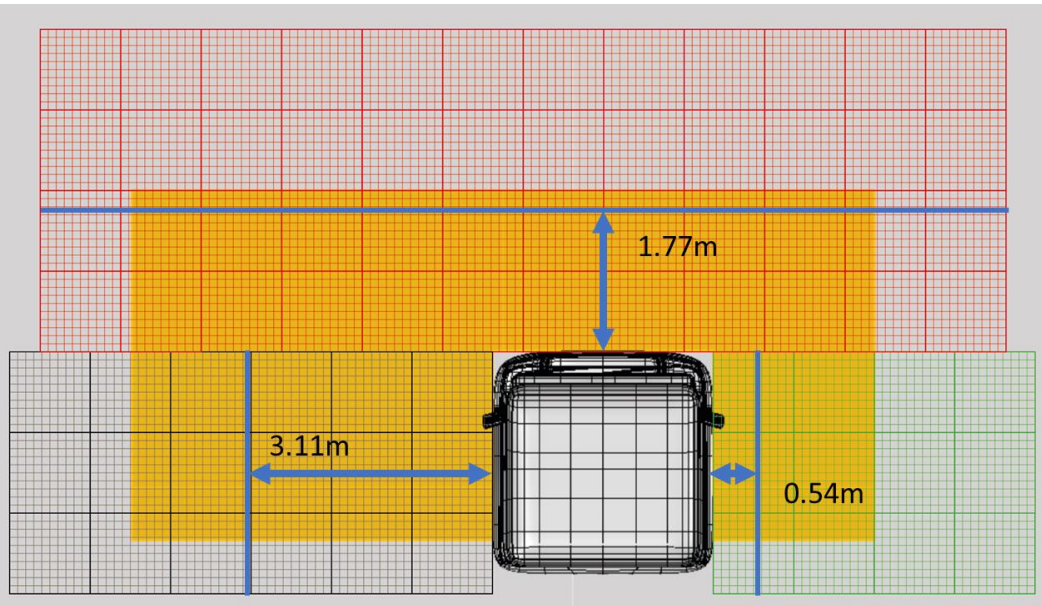
- LDS sample vehicle, closest that passes volume requirement with
 - 10.10m³ combined (pass – 10.0)
 - 3.76m³ Nearside (pass – 3.4)
 - 2.02m³ front (pass – 1.8)
 - 4.35m³ Offside (pass – 2.8)
- LDS sample vehicle just fails volume requirement with
 - 10.51m³ combined (pass – 10.0)
 - 3.63 Nearside (pass – 3.4)
 - 1.56 front (fail – 1.8)
 - 5.32 Offside (pass – 2.8)

LEVEL 1 DETAILS - JAPAN PROPOSAL



- LDS sample vehicle just fails volume requirement with
 - 9.24m³ combined (fail - 10.0)
 - 3.41m³ Nearside (pass - 3.4)
 - 1.83m³ front (pass - 1.8)
 - 4.00m³ Offside (pass - 2.8)

LEVEL 1 DETAILS - ACEA / OICA PROPOSAL (DVS LIMIT WITH ASSISTANCE SYSTEMS)



- LDS sample vehicle almost exactly at volume requirement but technically failing
 - 8.49m³ combined (fail – 8.5)
 - Included as the example because very close to pass mark



POTENTIAL FOR 2-PHASE APPROACH

- EC asked at last task force to consider whether there was merit in a 2 phase approach - aim
 - Complete a regulation now, based on very ambitious direct vision, without substitution for assistance systems, suitable for new types in the longer term
 - Provide certainty for 2026
 - Agree TOR now for a future amendment to allow some form of reduced standard or substitution for assistance systems for existing types in time for 2029.
 - Any exception should be for as small a number as possible, not for whole differentiation category, not one country only, not special purpose etc
- Industry to consider whether it helps



SUMMARY

- We have 3 firm proposals for method/limit values
- Visible volume is accurate and simple – the more volume the better
- VRU distance is more intuitive and is strongly correlated but has complexities and pitfalls, particularly when divided to each side
- In the context of the range of vehicle performance, the proposals span a relatively narrow range
- However, the small range is important, particularly in respect of
 - the extent to which complete blind spots between direct and indirect vision are eliminated, particularly for L3 vehicles that do sometimes enter cities and need to be “safe enough”
 - The commercial impact on the vehicle and wider freight & logistics industries and effects on other societal goals