

India's comments/Suggestions on Low Powered Vehicle Cycle designed by Heinz Steven

**Z A Mujawar
WLTP/DHC meeting on 29th March
2012 at Ispra, Italy.**

Proposal for Vehicle Classes by Heinz Steven

- **Class 1: $\text{pmr} < [21] \text{ kW/t}$,**
 - ✓ $v_{\text{max}} < [70] \text{ km/h}$, low speed part with highly reduced accelerations,
 - ✓ $v_{\text{max}} \geq [70] \text{ km/h}$, low and medium speed parts with highly reduced accelerations.

- **Class 2: $[21] \text{ kW/t} \leq \text{pmr} < [35] \text{ kW/t}$,**
 - ✓ $v_{\text{max}} < [90] \text{ km/h}$, low and medium speed parts with reduced accelerations,
 - ✓ $v_{\text{max}} \geq [90] \text{ km/h}$, low, medium and high speed parts with reduced accelerations.

- **Class 3: $\text{pmr} \geq [35] \text{ kW/t}$,**
 - ✓ $v_{\text{max}} < [135] \text{ km/h}$, low, medium and high speed parts of WLTC V4,
 - ✓ $v_{\text{max}} \geq [135] \text{ km/h}$, all parts (L,M,H & Ex H of WLTC V4)

India's Concerns on Low Powered Vehicle Cycle

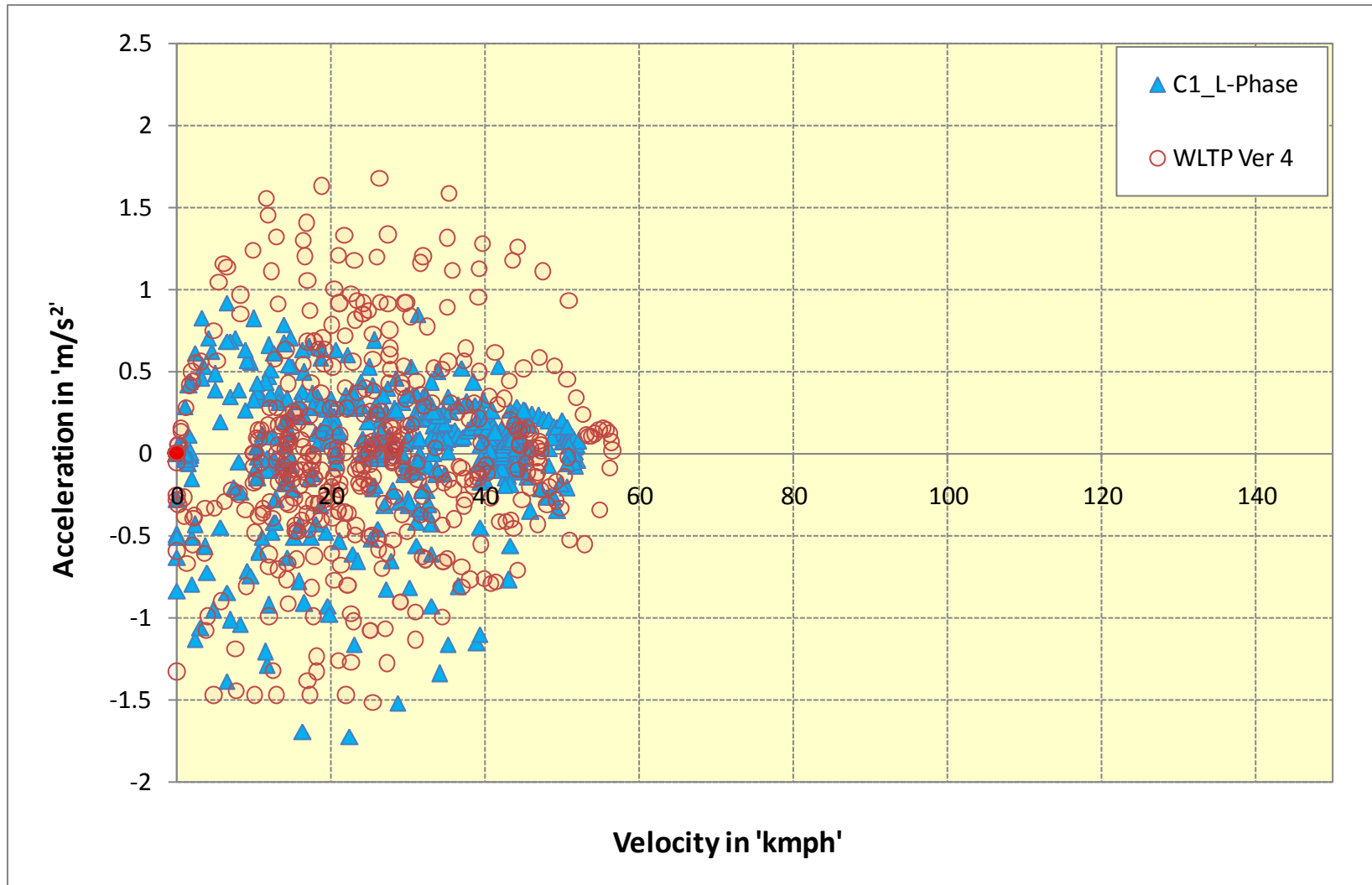
- The Low Powered Vehicle Cycle Class 1 proposed by Mr. Heinz Steven needs to be modified for better driveability on chassis dynamometer and moderated in the deceleration portions to avoid excessively aggressive braking.
- **Modification 1** is shown in Slide No.7 in which the Short Trip “A” is interchanged with Short Trip “B” marked in Slide No.6.
- Modification 1 in Slide No.7 also show the idling portions interchanged at the later part of the Cycle.
- Also the maximum speed of the last Short Trip needs to be reduced from 52 km/h to 45 km/h. This would allow the vehicles with max. speed of 55 to 60 km/h to go through the Cycle without opening full throttle.

India's Concerns on Low Powered Vehicle Cycle

- **Modification 2** in Slide No.8 shows the need for moderating the deceleration in the last Short Trip to avoid excessively aggressive braking.
- For Class 2 Low, Middle and High phases the deceleration needs to be reduce to lower than WLTC Ver 4. See Slide No. 10, 11 and 12.
- The drive cycle for Class 2 also needs to have gradual speed increase. This can be achieved by interchanging the first & the last short trips in low speed phase as shown in Slide No. 10.
- **Modification 3** Our earlier tests indicate that the vehicle does not get fully warmed up after middle speed phase. Hence, in order to get more realistic conditions, the third phase needs to be added for all class-1 & class-2 vehicles. This can be achieved by repeating the phases. Further inputs can be given after conducting LPVC Validation 1.

Low Powered Vehicle Cycle

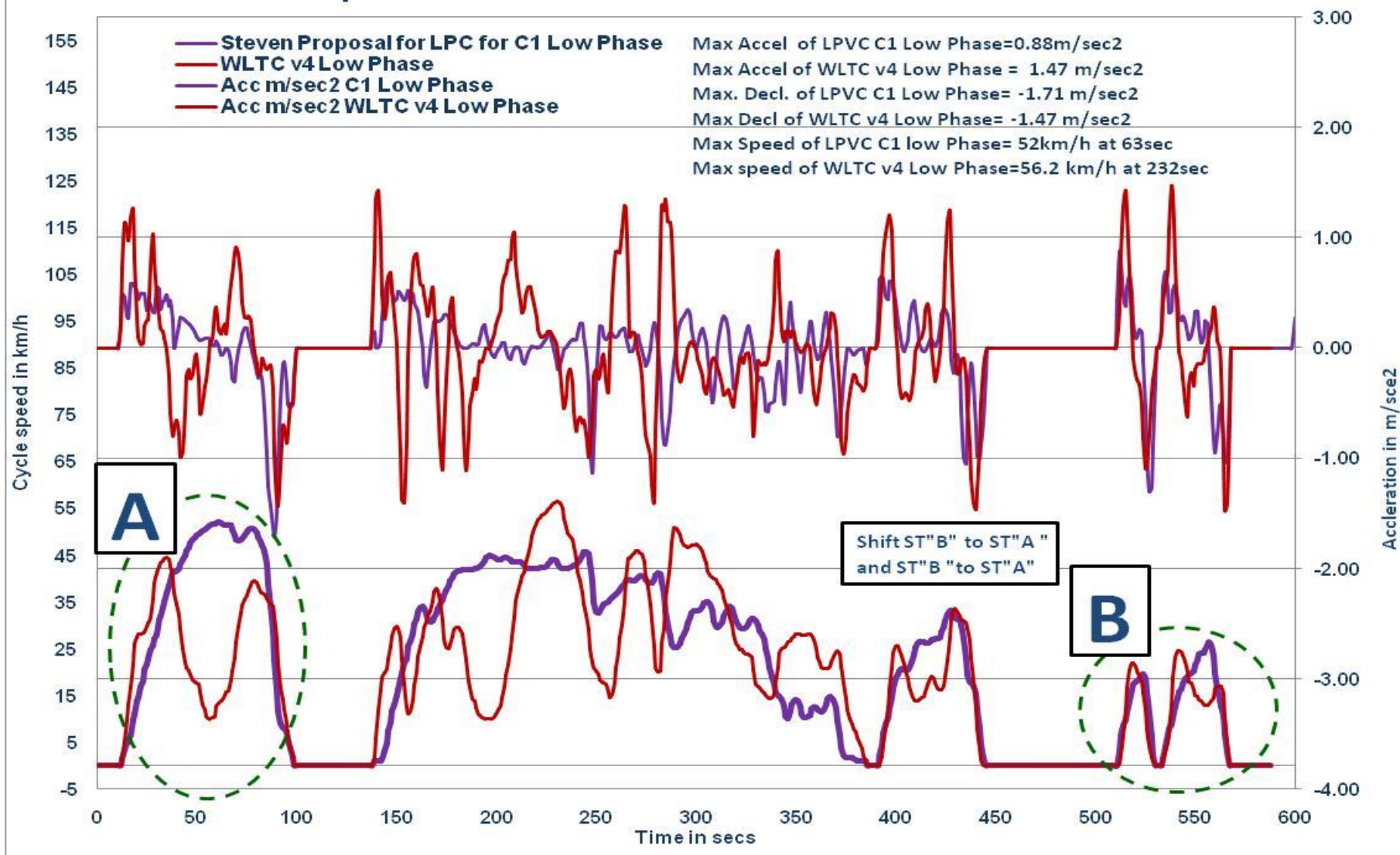
Acceleration/Deceleration: Class 1_Low Phase



- In C1_L-Phase, the deceleration is greater than in WLTP V4 cycle. These deceleration points are hard to follow on the dyno and need to be moderated to avoid excessively aggressive braking.

Low Powered Vehicle Cycle

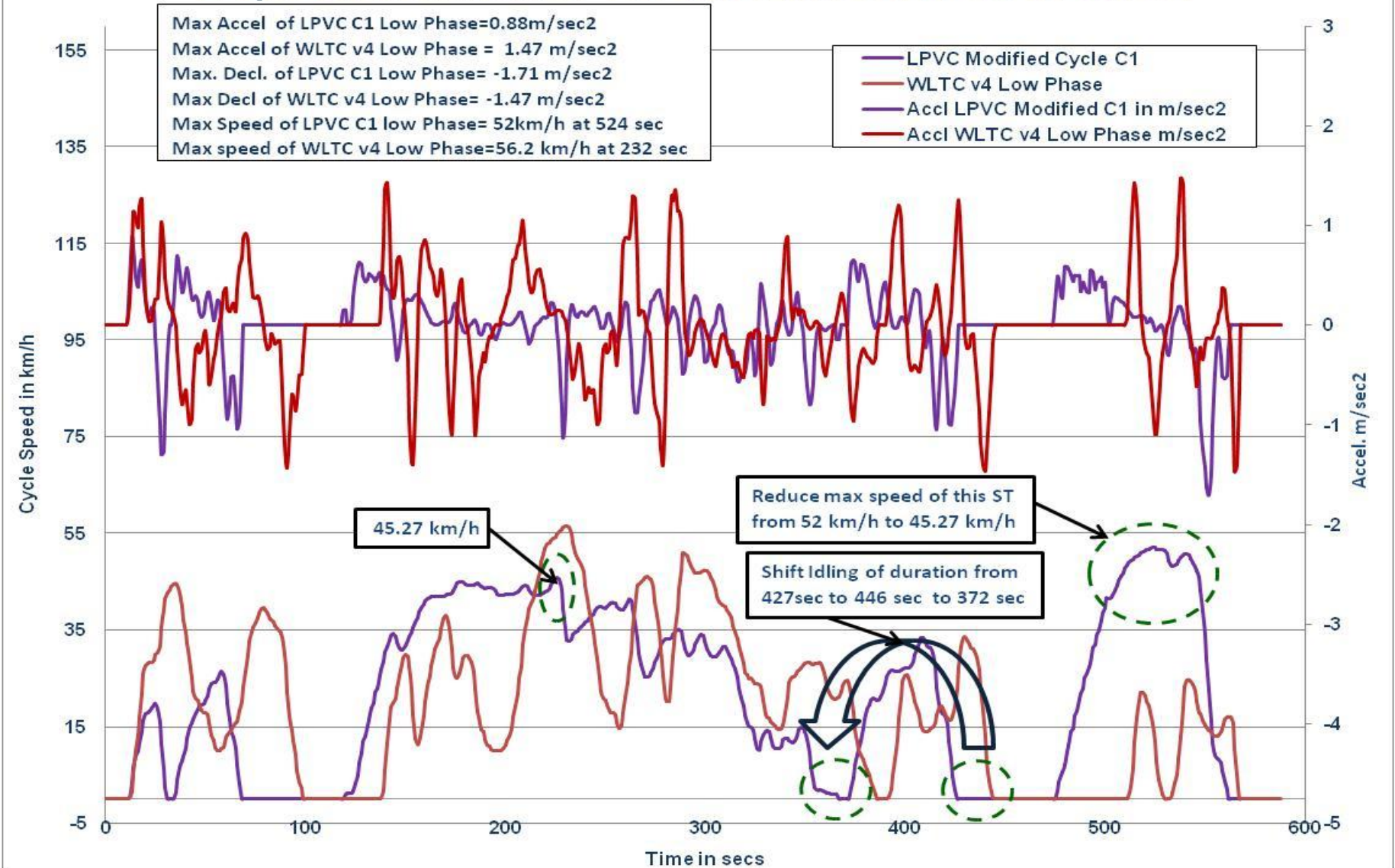
Steven Proposal for LPVC for C1 LOW Phase Vs WLTC v4 LOW Phase



The Short Trip "A" is interchanged with Short Trip "B"

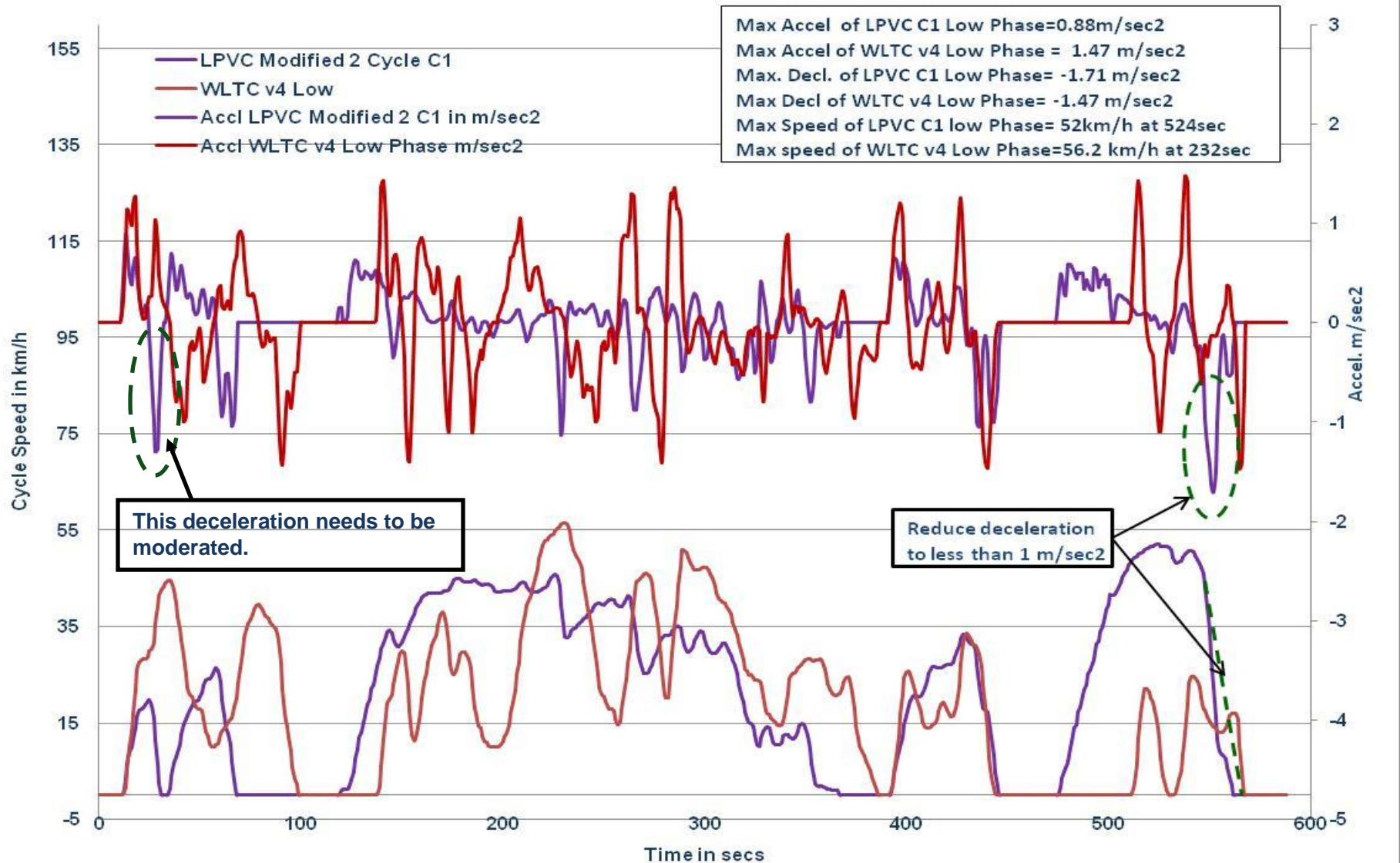
Low Powered Vehicle Cycle

Proposed Modification 1 of Low Phase of LPVC of Class 1



Low Powered Vehicle Cycle

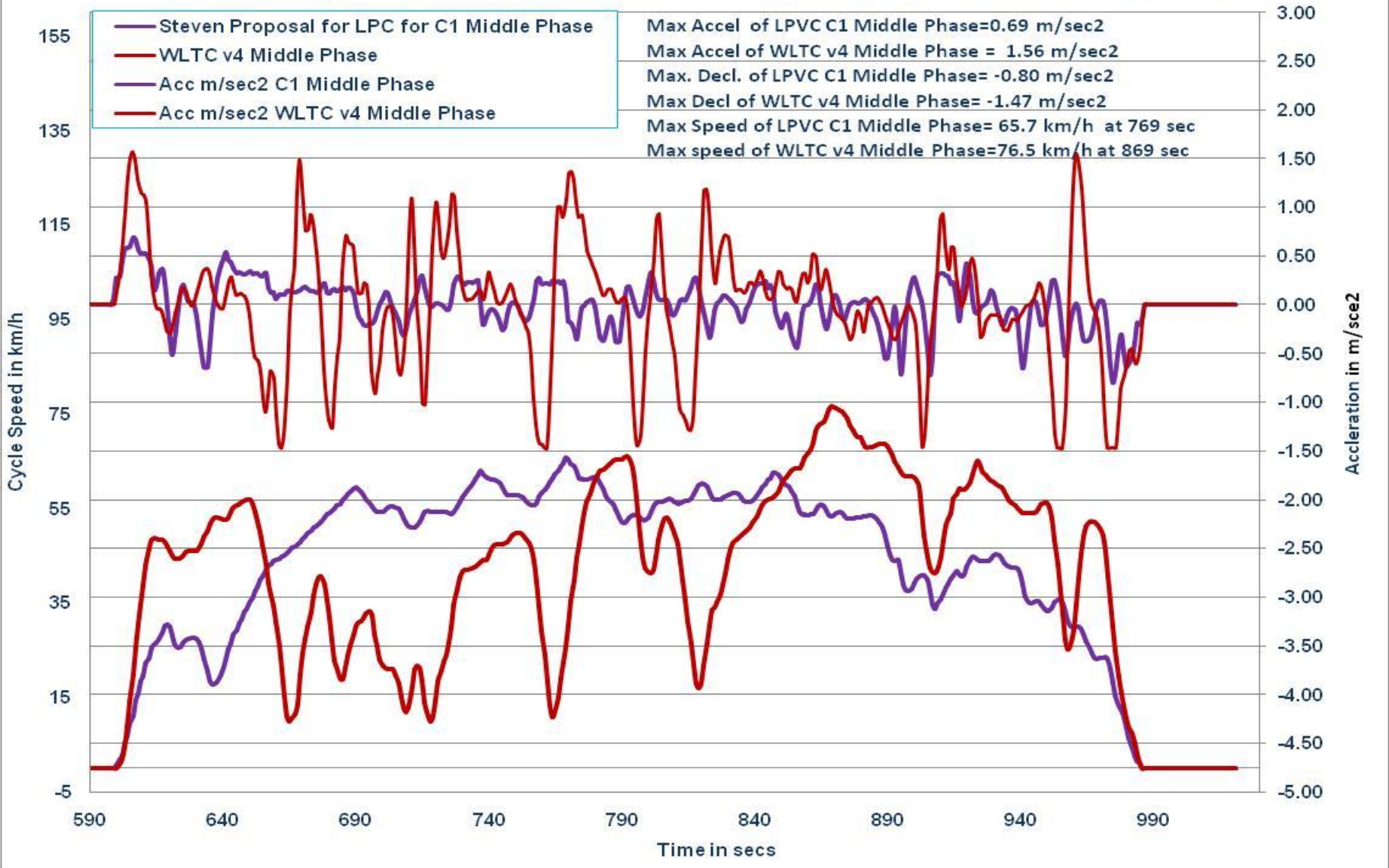
Proposed Modification 2 of Low Phase of LPVC of Class 1



Moderate the deceleration in the last Short Trip reduce excessive braking.

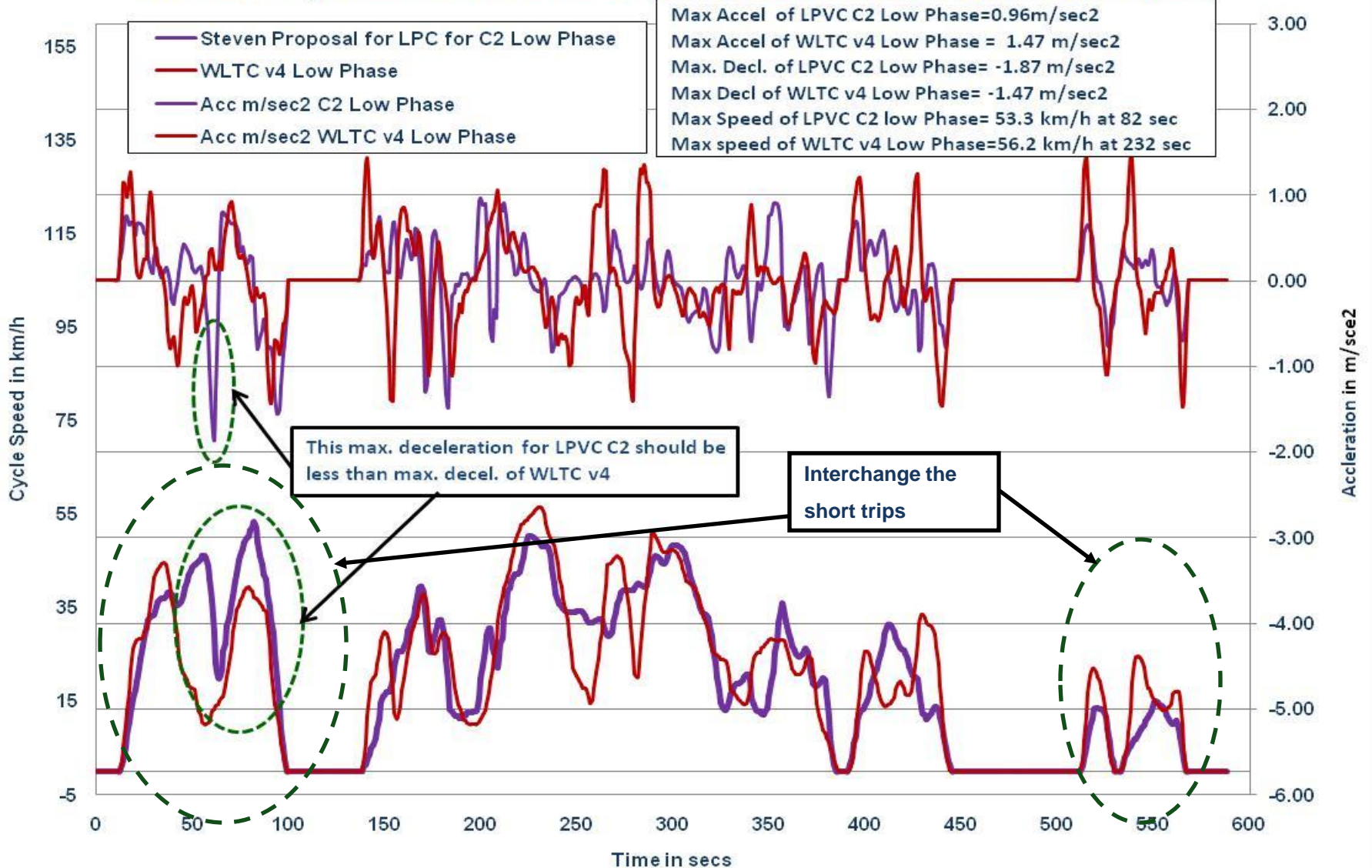
Low Powered Vehicle Cycle

Steven Proposal for LPVC for C1 Middle Phase Vs WLTC v4 Middle Phase



Low Powered Vehicle Cycle

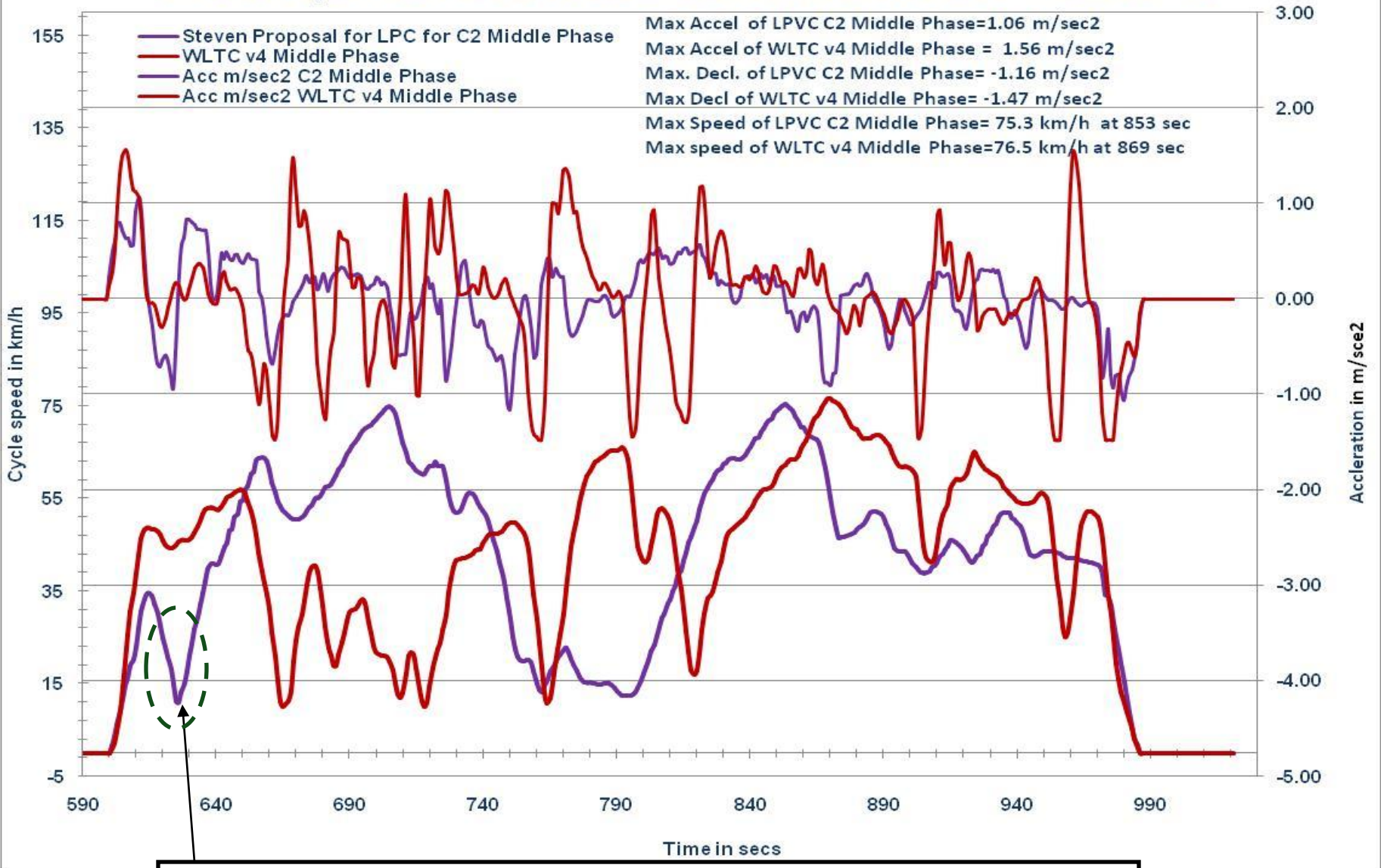
Steven Proposal for LPVC for C2 Low Phase Vs WLTC v4 Low Phase



**Reduce the max deceleration for LPVC to lower than WLTC Ver 4.
The first & the last short trip needs to be interchanged.**

Low Powered Vehicle Cycle

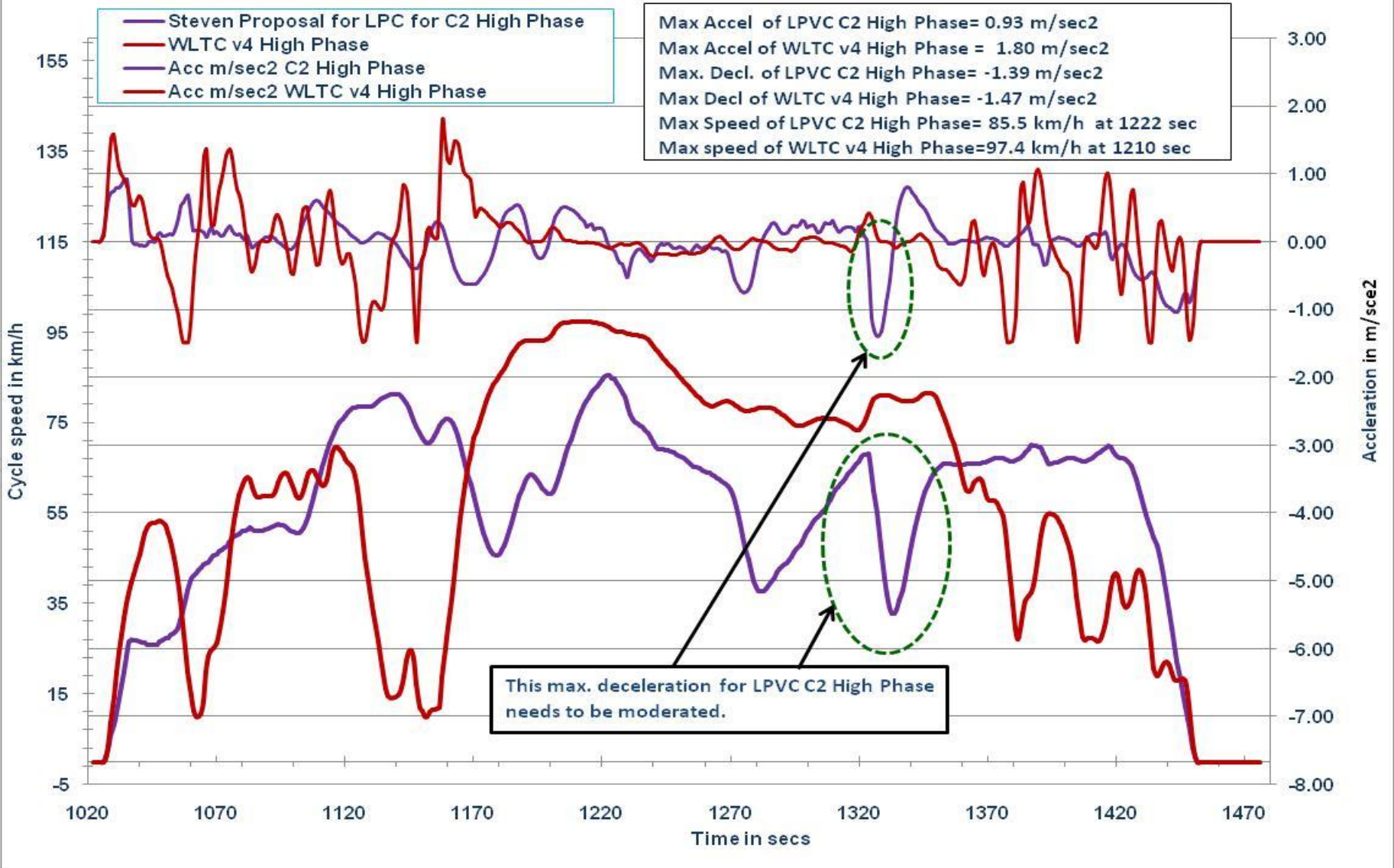
Steven Proposal for LPVC for C2 Middle Phase Vs WLTC v4 Middle Phase



**This deceleration & acceleration needs to be moderated.
A steady speed step also needs to be provided.**

Low Powered Vehicle Cycle

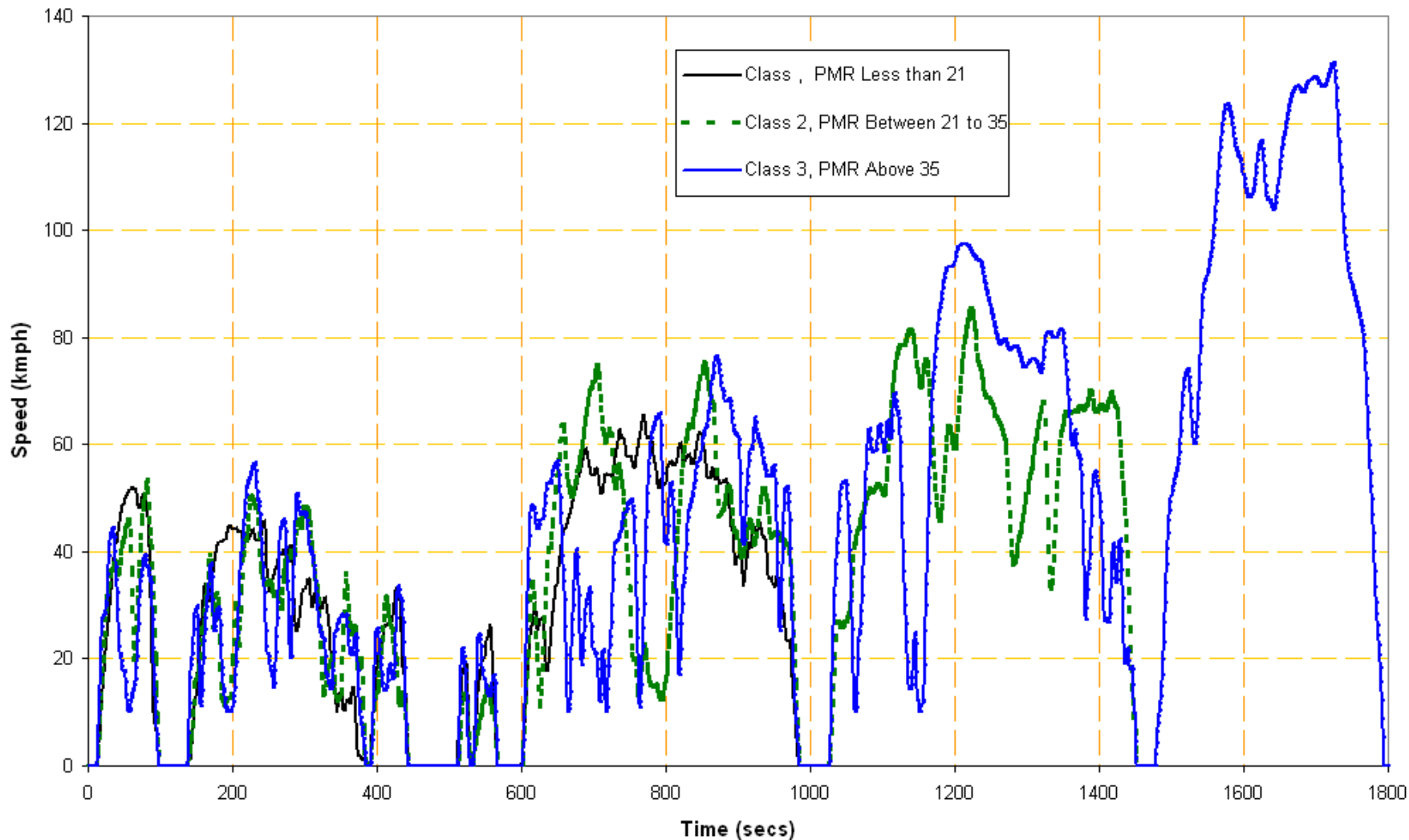
Steven Proposal for LPVC for C2 High Phase Vs WLTC v4 High Phase



Reduce the max deceleration for LPVC Class 2 High phase.



WLTP Cycle for Different Class of Vehicles



India's Concerns on Low Powered Vehicle Cycle

- Further comments from India will be given after Steven Gear Shift for LPVC is studied and Validation test are conducted on Low Powered Vehicles.
- WLTP group is requested to consider the modifications suggested on the low powered vehicle cycle before going to start validation due to availability of resources and time constraints.
- For Low Powered Vehicles the GTR test mass should not be increased from that of current reference mass.

Thank You