

Your Ref: TP/IP/15115/2020  
Our Ref : CI/TPD20005590/P

10<sup>th</sup> September 2020

**General Investigation Team**

Traffic Police Department  
Singapore Police Force  
10 Ubi Avenue 3  
Singapore 408865

**MECHANICAL INSPECTION REPORT OF MOTOR LORRY XD 1936M**

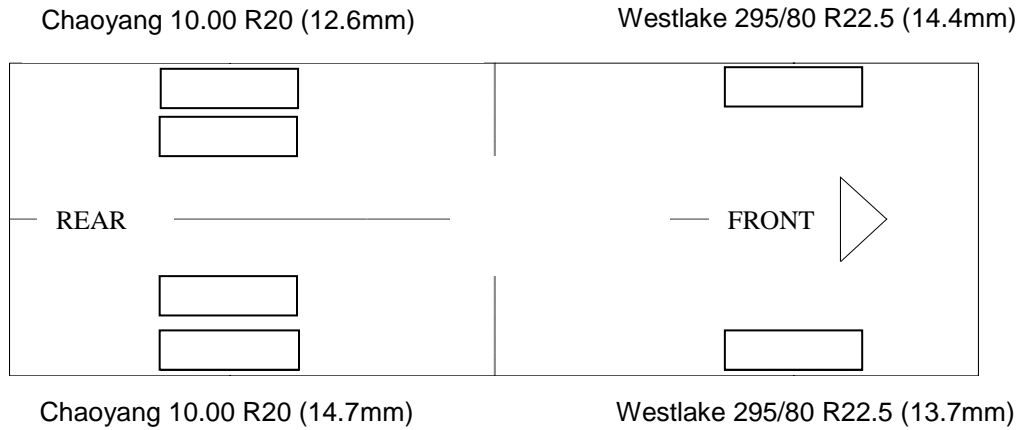
1. I refer to your request on 28<sup>th</sup> April 2020 to conduct a physical inspection of a Motor Lorry bearing registration number XD 1936M (herein referred to as "**Motor Lorry**"), which was involved in a road traffic accident on 19<sup>th</sup> March 2020
2. The objective of this inspection is to determine if there was any possible mechanical failure to the Motor Lorry that may have contributed to the accident.
3. Following the request, I had carried out a physical inspection of the Motor Lorry on 7<sup>th</sup> July 2020 at the premises of Traffic Police vehicle pound, 517 Airport Road Singapore 539942. I now set out below my observations and comments with respect to this inspection.

**General Condition**

4. The mileage of the Motor Lorry at the time of my inspection was 420,388km.
5. The Motor Lorry was observed to have sustained damage at its left hydraulic arm of the crane system as a result of the accident.

**Tyres and Wheel Rims**

6. The 6 tyres of the Motor Lorry was observed to be in serviceable condition; sufficiently inflated for vehicular operation. I did not find any tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the 6 tyres. The tyre brand, tyre size and remaining tread depth of the 6 tyres of the Motor Lorry were recorded as follows:-



7. The 6 tyres were observed to be wrapped around standard steel wheel rims that were found to be without any damage. See photo 1 – 14 below.



**Photo 1** shows a general view of the instrument cluster of the Motor Lorry at the time of my inspection. The mileage of the Motor Lorry was 420,388km



**Photo 2** shows a general view of the Motor Lorry's frontal portion at the time of my inspection. The Motor Lorry was observed to be intact and unaffected by the accident.



**Photo 3** shows a general view of the left body of the Motor Lorry at the time of my inspection. The Motor Lorry was observed to be intact and unaffected by the accident.





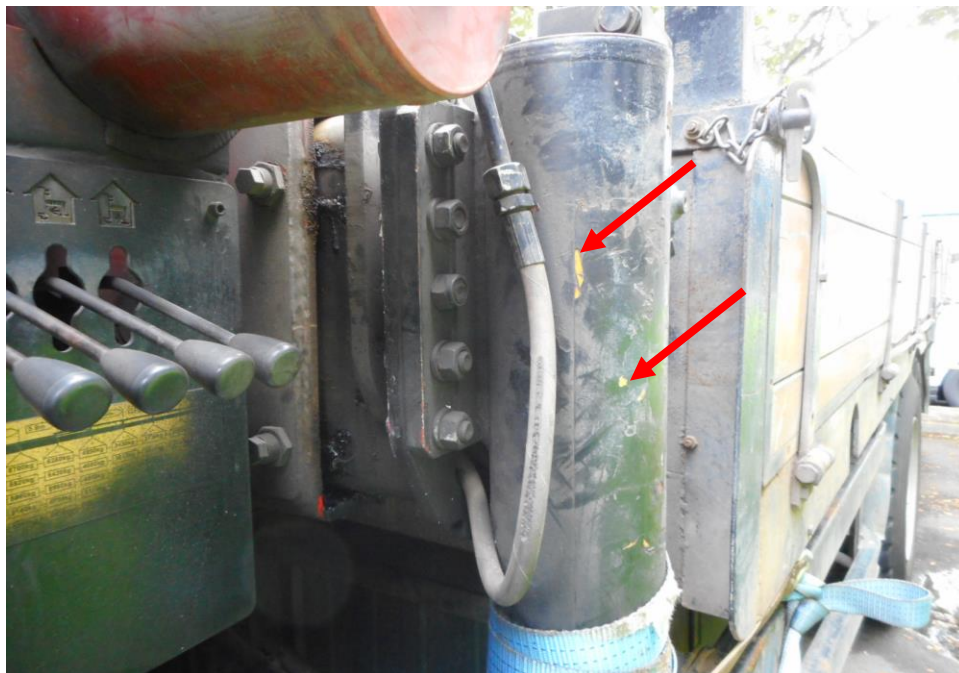
**Photo 4** shows a general view of the right body of the Motor Lorry at the time of my inspection. The Motor Lorry was observed to be intact and unaffected by the accident.



**Photo 5** shows a general view of the rear body of the Motor Lorry at the time of my inspection. The Motor Lorry was observed to be intact and unaffected by the accident.

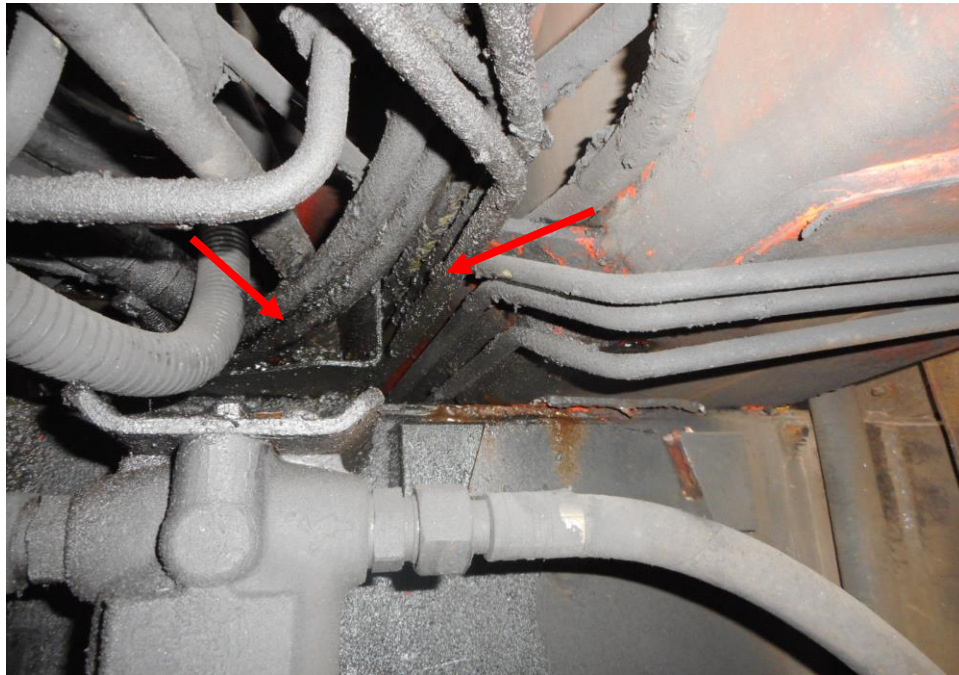


**Photo 6** shows a general view of the left hydraulic arm of the Motor Lorry at the time of my inspection. The left hydraulic arm was observed to be damaged as a result of the accident, it was strapped in by ropes as the hydraulic arm will extend out of place when not strapped in.



**Photo 7** shows a general view of the left hydraulic arm of the Motor Lorry at the time of my inspection. The left hydraulic arm (arrowed) was observed to be damaged as a result of the accident.

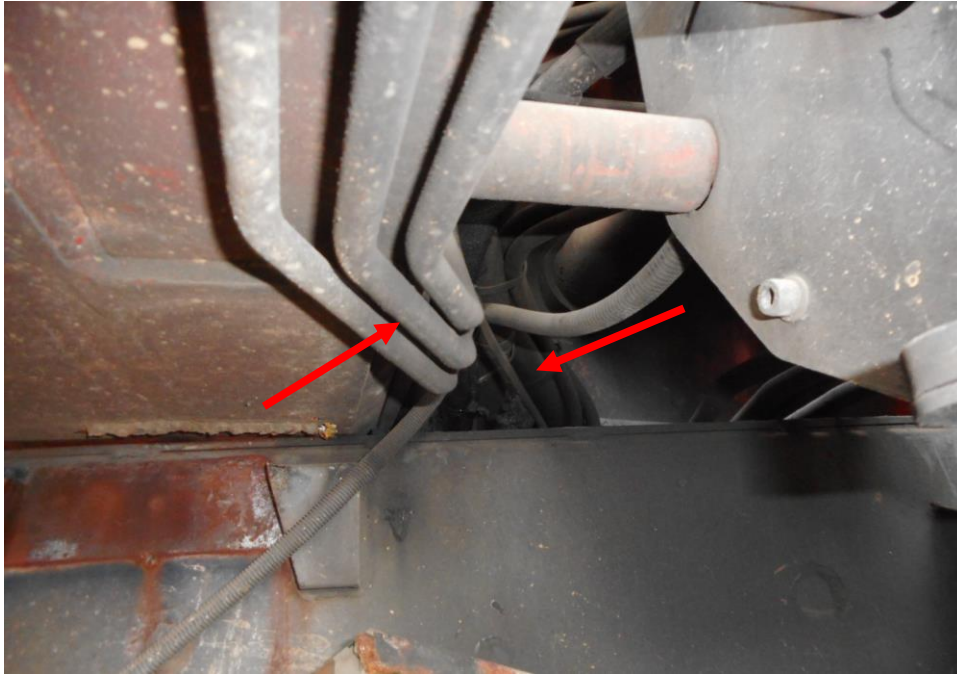




**Photo 8** shows the close up view of the hydraulic pipes (arrowed) of the left hydraulic arm of the Motor Lorry, I observe leakage of hydraulic fluid at the time of my inspection of the Motor Lorry. Upon closer inspection, the fluid stain on the piping's was found to be an old fluid stain as it had accumulated dust & grime over time. This fluid leakage has likely the cause the loss of control pressure to the left hydraulic arm system & causing it to extend outwards at the material time of accident.



**Photo 9** shows a general view of the right hydraulic arm of the Motor Lorry at the time of my inspection. The right hydraulic arm was observed to be intact and undamaged by the accident.



**Photo 10** shows the close up view of the hydraulic pipes (arrowed) of the right hydraulic arm of the Motor Lorry. I did not observe any leakage of hydraulic fluid at the time of my inspection. Hence the right hydraulic arm system of the Motor Lorry was likely to be in serviceable condition at the material time of accident.



**Photo 11** shows the condition of the front right tyre of the Motor Lorry, which was observed to be in serviceable condition with remaining tread depth of approximately 13.7mm. The tyre, which was wrapped around standard steel wheel rim, was also observed to be sufficiently inflated for vehicular operation. There was no tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the 6 tyres that were fitted on the Motor Lorry.





**Photo 12** shows the condition of the rear right tyres of the Motor Lorry, which was observed to be in serviceable condition with remaining, tread depth of approximately 14.7mm. The tyres, which were wrapped around standard steel wheel rim, were also observed to be sufficiently inflated for vehicular operation. There was also no damage found on all 6 steel wheel rims of the Motor Lorry.



**Photo 13** the condition of the rear left tyres of the Motor Lorry, which was observed to be in serviceable condition with remaining, tread depth of approximately 12.6mm. The tyres, which were wrapped around standard steel wheel rim, were also observed to be sufficiently inflated for vehicular operation. There was also no damage found on all 6 steel wheel rims of the Motor Lorry.





**Photo 14** shows the condition of the front left tyre of the Motor Lorry, which were observed to be in serviceable condition with remaining, tread depth of approximately 14.4mm. There was also no tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the 6 tyres that were fitted on the Motor Lorry.

### **Engine Compartment & Operating Fluids**

8. Upon examination of the Motor Lorry's engine compartment, I had observed all the parts and components inside the engine compartment to be intact and unaffected by the accident. The air brake cylinder, engine oil and engine coolant were all found to be of sufficient level for operating purposes. Visually, there was also no contamination found to these fluids.
9. Further examination of the engine compartment revealed, there was no sign(s) or indication(s) of fresh fluid leakage and/or fluid stain within the engine compartment of the Motor Lorry.
10. My subsequent checks on the underside of the Motor Lorry also revealed no fluid stain. Visually, the various undercarriage components of the Motor Lorry were all observed to be intact and without any visible damage. See photo 15 – 20 below.



**Photo 15** shows a general view of the Motor Lorry's engine compartment, which was accessed by lifting the front cabin of the Motor Lorry. The various parts and components inside the engine compartment were unaffected by the accident. There was also no sign(s) or indication(s) of fresh fluid leakage and/or fluid stain within the engine compartment



**Photo 16** shows the air in the air brake cylinders of the Motor Lorry at the time of my inspection. The air in the cylinder was observed to be of sufficient level & serviceable at the time of the accident.

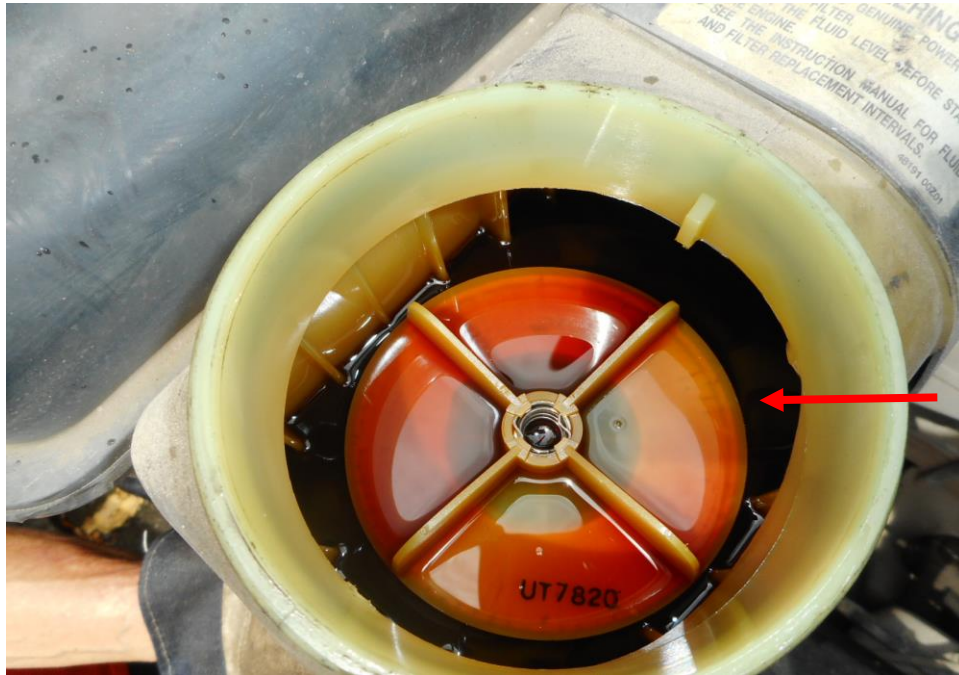


**Photo 17** shows the engine coolant reservoir of the Motor Lorry at the time of my inspection. The engine coolant was observed to be of sufficient level (arrowed) and without any visible contamination.



**Photo 18** shows the engine oil dip stick of the Motor Lorry at the time of my inspection. The engine oil was observed to be of sufficient level (arrowed) and without any visible contamination.





**Photo 19** shows the power steering fluid reservoir of the Motor Lorry at the time of my inspection. The power steering fluid (arrowed) was observed to be of sufficient level and without any visible contamination.



**Photo 20** shows the undercarriage of the Motor Lorry, at the area where the engine housing and transmission housing are located. I did not observe any leakage or fluid stain on the underside of the Motor Lorry.

## Steering System & Braking System

11. Static brake tests conducted on the Motor Lorry revealed no abnormality. The air brake booster had responded well to the various tests conducted. There was also no abnormal movement of the brake pedal when it was depressed. In general, the static brake tests had suggested that there was no internal leakage of pressure/vacuum in the braking system of the Motor Lorry. The braking system of the Motor Lorry was likely to be in serviceable condition at the material time. This was also taking into consideration that the air brake was of sufficient level, and also that there was no sign(s) of air leakage along the brake hoses, brake pipes and air cylinders.
12. Static test on the steering system of the Motor Lorry also revealed no abnormality to the steering system. I did not experience any abnormal free play and/or other resistance when turning the steering wheel left and right to full lock positions. My visual examination of the various steering components which had included the rack and pinion, tie rods, tie rod ends and ball joints had revealed that these components were all generally in good condition. See photo 21 - 29 below.



**Photo 21** shows the various undercarriage components at the front right wheel of the Motor Lorry, in particular the steering tie rod end (arrowed). The various steering components were all found to be intact, suggesting that the steering system of the Motor Lorry was likely to be in serviceable condition at the material time of accident. There was also no sign of fluid stain(s) observed on the various undercarriage components.



**Photo 22** shows the various undercarriage components at the front left wheel of the Motor Lorry, in particular the steering tie rod end (arrowed). The various Undercarriage components of the Motor Lorry were all found to be intact without any visible damage. There was also no sign of fluid stain(s) observed on the various undercarriage components.



**Photo 23** shows the steering box component (arrowed) at the undercarriage of the Motor Lorry was found to be intact without any visible damage. There was also no sign of fluid stain(s) observed on the various undercarriage components.





**Photo 24** shows the brake pipe (arrowed) at the rear right wheel of the Motor Lorry. I did not observe any leakage of brake fluid at the time of my inspection of the Motor Lorry. My static tests of the Motor Lorry's braking system, along with my visual examination of the various mechanical components in the braking system, had indicated that there was no internal leakage of pressure/vacuum. Hence the braking system of the Motor Lorry was likely to be in serviceable condition at the material time of accident.



**Photo 25** shows the brake pipe (arrowed) at the rear left wheel of the Motor Lorry. I did not observe any leakage of brake fluid at the time of my inspection of the Motor Lorry. My static tests of the Motor Lorry's braking system, along with my visual examination of the various mechanical components in the braking system had indicated that there was no internal leakage of pressure/vacuum. Hence the braking system of the Motor Lorry was likely to be in serviceable condition at the material time of accident.



**Photo 26** shows the air brake cylinders (arrowed) at the undercarriage of the Motor Lorry. I did not observe any leakage of air brake fluid at the time of my inspection of the Motor Lorry. My static tests of the Motor Lorry's braking system, along with my visual examination of the various mechanical components in the braking system had indicated that there was no internal leakage of pressure/vacuum. Hence the braking system of the Motor Lorry was likely to be in serviceable condition at the material time of accident.



**Photo 27** shows the brake hose/pipe (arrowed) at the front right wheel of the Motor Lorry. I did not observe any leakage of brake fluid at the time of my inspection of the Motor Lorry. My static tests of the Motor Lorry's braking system, along with my visual examination of the various mechanical components in the braking system had indicated that there was no internal leakage of pressure/vacuum. Hence the braking system of the Motor Lorry was likely to be in serviceable condition at the material time of accident.





**Photo 28** shows the brake hose/pipe (arrowed) at the front left wheel of the Motor Lorry. I did not observe any leakage of brake fluid at the time of my inspection of the Motor Lorry. My static tests of the Motor Lorry's braking system, along with my visual examination of the various mechanical components in the braking system had indicated that there was no internal leakage of pressure/vacuum. Hence the braking system of the Motor Lorry was likely to be in serviceable condition at the material time of accident.



**Photo 29** shows the front right wheel of the Motor Lorry turned to its full left. During my steering system test, I did not experience any abnormal free play and/or resistance when I had turned the steering wheel towards full left and full right. This would suggest that the steering system of the Motor Lorry was likely to be in serviceable condition at the material time of accident.



**Electronic Safety / Warning Indicators**

13. Motor Lorry's automatic self-test of the functionality of its electronic operating systems was not conducted as there was no electronic safety systems installed.

**Operational Behaviour of the Motor Lorry**

14. A short operational test of the Motor Lorry, to primarily determine whether there was any abnormality to its various operating systems like its engine system, its transmission system, steering system and braking system was subsequently carried out. The test was conducted by driving the Motor Lorry forward, stopping, before reversing and coming to a stop again.
15. During the operational test, the various transmission gears of the Motor Lorry were able to be engaged without any difficulty by stepping on the clutch pedal and manually shifting the gear lever. There were no abnormal sounds heard and/or abnormal behaviour of the Motor Lorry's engine system. It was able to move forward and backward normally. The braking system was also found to be in working condition as the Motor Lorry was able to slow down and come to a complete stop upon depressing of the brake pedal. Refer to photo 2 & 29

**Others**

16. For this particular case, we visually inspected both hydraulic arms on the Motor Lorry. We observed old hydraulic fluid stain on the left hydraulic arm pipes as compared to its right hydraulic arm. To our understanding the hydraulic fluid in the hydraulic arm system is used to control the extension and retracting of the hydraulic arms, however the leakage of hydraulic fluid to the left hydraulic would have caused a loss of control pressure to the system & resulted in an uncontrolled extension of the left hydraulic arm when the Motor Lorry was making a left turn which had resulted to the accident. Refer to photo 8 & 10.
17. A latest MOM equipment inspection certification of both the hydraulic arms was provided to us. The equipment had been certified and passed its inspection for 1 year from 2<sup>nd</sup> January 2020 to 1<sup>st</sup> January 2021. See below.

51 UBI AVE 1, #01-25 PAYA UBI INDUSTRIAL PARK, SINGAPORE 408933 TEL : (065) 62563561 FAX : (065) 67414108

FORM B

MINISTRY OF MANPOWER, SINGAPORE  
WORKPLACE SAFETY AND HEALTH ACT 2006  
WORKPLACE SAFETY AND HEALTH (REGISTRATION AND OTHER  
SERVICES FEES AND FORMS) REGULATIONS  
CERTIFICATE OF TEST/THOROUGH VISUAL EXAMINATION  
OF LIFTING EQUIPMENT (LE)\*

LE Registration No. : LM083722E  
UEN of Owner. : 198802660D  
Workplace No. :

Owner of Lifting Equipment	Factory Occupier and Location of Lifting Equipment
HG METAL MANUFACTURING LIMITED 28 JALAN BUROH SINGAPORE 619484	At various locations


Particulars of Lifting Equipment		
Type and Description of Lifting Equipment	633 Lorry Loader - Combination of Telescopic Boom & Articulating Arm Type	Classification Code : 633
Brand Name	: PALFINGER PK42502C	Distinctive No. ** : 100071303
Country of Origin	: AUSTRIA	Date of Manufacture : 2007
Source of Power	: Diesel Engine	First Registration Date : 26/10/2007
Max. Safe Working Load	: 8800 kg	Max. Boom Length/Span : 12.00 m
Owners' Reference/Vehicle Registration No.	: XD1936M	Length of Fly Jib/Extension :

Particulars of Last Load Test						
Date of Load Test	: 02/01/2020			Max Test Load : 11000 kg		
	(1)	(2)	(3)	(4)	(5)	(6)
Radius (m) :	4.4	12.0				
Test Load (kg) :	11000	3850				
Safe Working Load (kg) :	8800	3080				

Comments/Observations
Height audio warning system is fitted, in good working condition and not altered/deactivated.

I certify that on 02/01/2020 the lifting equipment described in this certificate was examined thoroughly by me, as far as its construction permits, and this is a true report of my examinations.

I further certify that the lifting equipment complies in all respects with the requirements pertaining to lifting equipment as stipulated in the Workplace Safety and Health (General Provisions) Regulations, and all other regulations made thereunder and is safe for use.

Expiry Date of Certificate	Date of Print of Certificate	Authorised Examiner's Name	Signature of Authorised Examiner
01/01/2021	02/01/2020	QUEK SEOW MENG H/P: 9620 4906	

\* Lifting Equipment means Lifting Gear, Lifting Appliance, Lifting Machine, Lift and Hoist as defined under the Workplace Safety and Health (General Provisions) Regulations.

\*\* Distinctive Number refers to the Identification Number/Serial Number assigned to the equipment by the manufacturer..



## Conclusion

18. From my physical inspection of the Motor Lorry, it appears that its engine system, steering system, braking system and transmission system were all in serviceable condition. I did not find any evidence(s) to suggest that there was possible mechanical failure to the Motor Lorry that may have caused and/or contributed to the accident. This is also taking into consideration that the operational test of the Motor Lorry, which I had conducted, did not produce any sign(s) or symptom(s) to suggest that there was any abnormality to its various operating systems.
19. In our opinion, the likely cause to the extension of the left hydraulic is of wear & tear nature to the hydraulic piping materials that had caused the leakage of hydraulic fluids which had resulted in the uncontrolled extension of the left hydraulic arm when the Motor Lorry was making a right turn resulting to the accident.
20. The 6 tyres fitted on the Motor Lorry were also found to be in serviceable condition. I did not find any tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the Motor Lorry 6 tyres. The 6 tyres of the Motor Lorry were also observed to be sufficiently inflated for vehicular operation with remaining tread depth of approximately 12.6mm – 14.7 mm.



**Sherwin Beh**

*Technical Investigator*



**Ang Bryan Tani**

*AMSOE, AMIRTE, AFF SAE, M.MATAI, AFF.Inst.AEA*

*Senior Technical Investigator*

*Technical Investigation & Reconstructionist (SAE-A)*

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