

Construction Industry Council

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Publication No. 3

Guidelines on

Safety of Site Vehicles and Mobile Plant

Purpose

This publication provides guidelines to contractors and subcontractors in direct control of any construction works (duty holder) on measures for enhancing the safety of site vehicles and mobile plant.

Introduction

2. The increase of accidents caused by site vehicles and mobile plant in recent years has given rise to concerns of the community.

3. As such, duty holders are encouraged to adopt the holistic approach recommended in this publication to prevent accidents caused by site vehicles and mobile plant. However this publication only sets out the relevant good practices for reference by industry stakeholders. For the avoidance of doubt, adoption of these practices alone may not necessarily be sufficient for complying with the relevant statutory provisions on site safety including any obligations to undertake risk assessment and provide safe systems of work.

Safety Measures

4. The following measures may be adopted for enhancing the safety of operation of site vehicles and mobile plant –

- (a) risk assessment;
- (b) design of site layout;
- (c) installation of reversing video device (RVD);
- (d) installation of other reversing safety devices;

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- (e) safe working procedures; and
 - (f) training of site personnel.

(A) Risk assessment

5. Duty holders are encouraged to conduct risk assessments to identify any risks resulting from site vehicles and mobile plant, assess their likelihood and possible consequences. Such assessment should take into account all relevant circumstances including –

- (a) locations of ingress and egress points for vehicles;
- (b) layout of traffic routes on the site;
- (c) movements of site vehicles and mobile plant in works areas and loading/unloading areas; and
- (d) movement of workers and other personnel within the site.

6. Appropriate measures should be taken to deal with the hazards identified in the above process giving due consideration to their likelihood and possible consequences. These measures include –

- (a) elimination of the risk (such as obviating the need for reversing by providing drive-through circulation routes); or
- (b) where the risks could not be eliminated, mitigate them at source with engineering controls or minimize the risks by providing suitable safe systems of work. For instance, where reversing cannot be avoided, reversing vehicles or plant should be guided by a banksman or equipped with RVD.

(B) Design of site layout

7. Duty holders should properly design site layout and traffic circulation routes making reference to the guidelines in the following paragraphs and other relevant statutory provision.

8. Minimizing movements - Movements of vehicles and plant on construction sites should be minimized through appropriate measures including –

- (a) controlling entry of vehicles into site through gates and barriers;
- (b) providing parking spaces away from works areas; and
- (c) locating loading and unloading areas on the periphery of construction sites.

9. Safety of pedestrians – Appropriate facilities should be provided to facilitate safe movement of personnel within the site including –

- (a) providing pedestrian-only routes;
- (b) providing clear demarcation of pedestrian routes by barrier;
- (c) providing grade-separated pedestrian crossing points;
- (d) providing at-grade pedestrian crossing points with facilities (such as traffic light signals) for controlling pedestrian and traffic flows; and
- (e) wearing of high-visibility safety vests.

10. Reversing movements

- (a) reversing movements should be minimized by providing, where possible, drive-through circulation routes;
- (b) where reversing is unavoidable, turning heads should be provided and banksmen should be deployed to guide reversing vehicles and plant where necessary; and
- (c) steps should be taken to ensure that banksmen wear high-visibility safety vests and use walkie-talkie or similar equipment for effective communication.

11. Speed limits

- (a) speed limits should be imposed on traffic routes through erecting speed limit signs; and
- (b) road humps or other similar devices should be provided to prevent speeding.

(C) Installation of RVD

12. Duty holders are encouraged to install RVD to provide drivers and operators with rear-side views on a monitor in the driving cabinet through a closed circuit television (CCTV) camera mounted on the rear of vehicles and plant.

13. Annex A sets out the findings on the assessment of the need and suitability for installation of RVD on site vehicles and mobile plant commonly used on local construction sites which may be summarized as follows –

- (a) 12 types of vehicles/plant for which installation is not recommended for various reasons such as vibration which could affect the functioning of RVD;
- (b) 27 types of vehicles/plant for which installation is recommended. Out of these –
 - (i) 16 types of vehicles/plant which are licensed to operate on public roads are covered by the guidelines published by Transport Department on RVD and are not therefore covered by this publication; and
 - (ii) 11 types of vehicles/plant which are used on construction sites only and are therefore covered by this publication.

14. The guidelines for installation of RVD on the types of vehicles and plant referred to in paragraph 13(b)(ii) above are included at Annex B.

(D) Other reversing safety devices

15. RVD may be complemented by other reversing safety devices including –

- (a) cross view mirror;
- (b) parking sensor; and
- (c) reversing alarm and warning light.

(E) Safe working procedures

16. Duty holders should formulate safe working procedures in relation to the operation of site vehicles and mobile plant on the basis of the guidelines at Annex C.

(F) Training of site personnel

17. Apart from basic training, duty holders should also provide the following types of training specific to site vehicles and mobile plant –

- (a) job-specific induction and refresher training to drivers and operators for safe operation of vehicles and plant;
- (b) courses on safe operation for managers and supervisors;
- (c) briefing for drivers, operators and workers on the traffic routes and rules on site; and
- (d) job-specific training for banksmen covering safety rules and instructions on site traffic and communication system.

Annex A

Assessment of Need and Suitability for Installing RVD on Common Site Vehicles and Mobile Plant

Site Vehicle and Mobile Plant		Installation of RVD	Remarks
1 Excavation, site formation and roadworks			
1.1	Bulldozer	Recommended	
1.2	Excavator, tracked		
1.3	Excavator, wheeled		
1.4	Loader, wheeled		
1.5	Loader, tracked		
1.6	Grader		
1.7	Scraper		
1.8	Tractor		
1.9	Road planer		
1.10	Road miller		
1.11	Dump truck, gross vehicle weight > 38 tonne	Recommended	The guidelines at Annex B do not apply to this type of vehicle/plant since they are also used on public roads and are therefore covered by the guidelines published by Transport Department for RVD.
1.12	Dump truck, 5.5 tonne < gross vehicle weight \leq 38 tonne		
1.13	Breaker, excavator mounted (pneumatic)	Not recommended	Excessive vibration generated by rock/concrete breaking may cause frequent malfunctioning of RVD
1.14	Breaker, excavator mounted (hydraulic)		
1.15	Rock drill, crawler mounted (pneumatic)		
1.16	Rock drill, crawler mounted (hydraulic)		
1.17	Dump truck with grab, 5.5 tonne < gross vehicle weight \leq 38 toone		
1.18	Asphalt paver	Not recommended	Installation of RVD is not practical
1.19	Road roller	Not recommended	Lack of enclosed control cabin
1.20	Roller, vibratory	Not recommended	Ditto
1.21	Locomotive (run on track)	Not recommended	There should be measures to prevent workers from getting into the railway line when the plant is in operation.

Site Vehicle and Mobile Plant		Installation of RVD	Remarks
1.22	Ballast regulating machine (run on track)	Not recommended	Ditto
2. Piling Works			
2.1	Crane, mobile	Recommended	
3. Concreting			
3.1	Concrete lorry mixer	Recommended	The guidelines at Annex B do not apply to this type of vehicle/plant since they are also used on public roads and are therefore covered by the guidelines published by Transport Department for RVD.
3.2	Concrete pump, lorry mounted		
4. Lifting / Transportation			
4.1	Lorry	Recommended	The guidelines at Annex B do not apply to this type of vehicle/plant since they are also used on public roads and are therefore covered by the guidelines published by Transport Department for RVD.
4.2	Lorry, gross vehicle weight > 38 tonne		
4.3	Lorry, 5.5 tonne < gross vehicle weight \leq 38 tonne		
4.4	Crane, mobile (diesel)		
4.5	Light goods vehicle, gross vehicle weight \leq 5.5 tonne		
4.6	Lorry, with crane/ grab, gross vehicle weight > 38 tonne		
4.7	Lorry, with crane/ grab, 5.5 tonne < gross vehicle weight \leq 38 tonne		
4.8	Pick up truck		
5. Others			
5.1	Water truck	Recommended	The guidelines at Annex B do not apply to this type of vehicle/plant since they are also used on public roads and are therefore covered by the guidelines published by Transport Department for RVD.
5.2	Road sweeper		
5.3	Pressure tanker		
5.4	Tipper		
5.5	Forklift truck	Not recommended	Lack of enclosed control cabin.
5.6	Dumper		

Annex B

Installation of RVD

Purpose

This Annex provides guidance on the installation of RVD on site vehicles and mobile plant.

Scope

2. The guidance given in this Annex applies to the following types of vehicles and mobile plant –
 - (a) Bulldozer
 - (b) Excavator, tracked
 - (c) Excavator, wheeled
 - (d) Loader, wheeled
 - (e) Loader, tracked
 - (f) Grader
 - (g) Scraper
 - (h) Tractor
 - (i) Road planer
 - (j) Road miller
 - (k) Crane, mobile, wheeled & tracked

Typical RVD

3. A typical RVD consists of –
 - a wide angle camera of effective horizontal angle of vision not less than 120° and effective vertical angle of vision not less than 70°.

- A monitor with diagonal size not less than 130 mm.

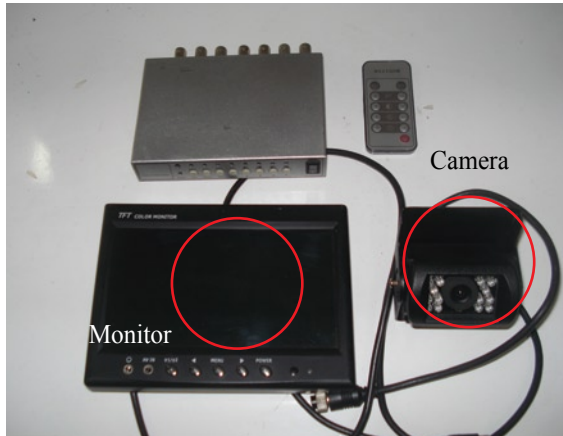


Figure 1 – Typical RVD



Figure 2 – Typical Image Displayed on Monitor

Requirements for RVD

4. RVD should provide drivers/operators with the following minimum visibility envelop –
 - longitudinal coverage – 3.2 m from rearmost of the vehicle/plant;

- lateral coverage – overall width of vehicle/plant plus 0.5 m on each side;
- height of object detected – any object 0.3 m above ground in the visibility envelop

5. The recommended visibility envelop is illustrated in the following figure.

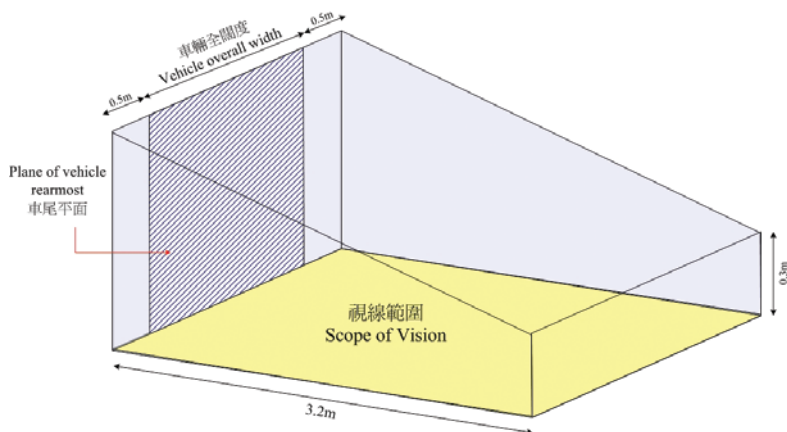


Figure 3 – Visibility Envelop

(Source: "A Guide for the installation of Devices to Assist Reversing of Goods Vehicles" published by Transport Department)

6. Cameras should be water and dust proof. Infrared cameras should be used in order to capture images under low illumination.

7. The image captured by the camera should be displayed automatically on the monitor upon engaging the backward gear.

Guidance on Installation

(A) Camera

8. The camera should be installed at a height not less than 1.5 m as shown in Figure 4. Otherwise more than one camera may be required to achieve the required visibility.



Figure 4 – Camera setup for excavator

9. Appropriate mounting frame should be provided for installing and protecting the camera as shown in Figure 5.



Figure 5 – Mounting Frame for Camera

(B) Monitor

10. The monitor should be installed in operator's cabin at visible locations but should not obstruct vision of normal operation as illustrated in Figure 6.



Figure 6 – Position for Monitor

(C) Wiring

11. All wiring and conduits should be adequately protected from chafing and short-circuit.

Safe Working Procedures

Purpose

This Annex sets out the safe working procedures for operating site vehicles and mobile plant.

Procedures

2. Authorization of drivers and operators
 - (a) only authorized drivers and operators with proper training and qualification should be allowed to operate site vehicles and mobile plant; and
 - (b) the list of authorized drivers and operators should be affixed to vehicles and plant where possible.

3. Preparation for starting work
 - (a) drivers and operators should conduct pre-use check in accordance with prescribed procedures to ensure fitness of vehicles and plant for use; and
 - (b) if RVD is installed, drivers and operators should also ascertain that it is in reasonably good working conditions, in particular the legibility of the image on the monitor.

4. Vehicles and plant in operation
 - (a) drivers and operator should check around before starting any vehicles and plant;
 - (b) when vehicles and plant are traveling, drivers and operators should –
 - (i) look in the direction of travel particularly in reversing;
 - (ii) keep to designated vehicle routes;

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- (iii) drive at safe speeds; and
 - (iv) follow directions indicated on traffic signs and made by signalers;
 - (c) in performing loading/unloading operations, drivers and operators should –
 - (i) load and unload on level ground with the parking brake applied and outriggers fully extended (where applicable); and
 - (ii) where this is not possible, choke the rear wheels and turn the front wheels towards the kerb (when facing downhill) or away from the kerb (when facing uphill) and engage the first gear and stay at the wheels.
5. End of working day – At the end of the working day, drivers and operators should –
- (a) park the vehicles and plant in designated parking space which is reasonably level and sufficiently remote from edges of excavations, pits, spoil heaps and sea fronts where possible; and
 - (b) where appropriate retract the jib, or lower the arm or bucket onto the ground.