



Abu Dhabi EHSMS Regulatory Framework (AD EHSMS RF)

EHS Regulatory Instrument

Code of Practice

**EHS RI - CoP 33.0 – Working On, or
Adjacent to a Road**

Version 2.0

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With gratitude Abu Dhabi EHS Center acknowledges the great support provided by the Executive Council in facilitating the issuance of Abu Dhabi Emirate Environment, Health and Safety Management System (AD EHSMS) and its implementation at Emirate level.

The issuance of the system would not have been possible without the supervision, diligent efforts and productive recommendations of the AD EHS Center Board of Directors.

These documents (Regulatory Instruments) constitute the efforts of the Abu Dhabi EHS Center and the concerned Sector Regulatory Authorities who worked together to integrate all relevant regulatory requirements under *AD EHSMS RF*. The input, contribution and constructive views of all sectors is highly appreciated.

May these documents prove to be beneficial and helpful in system implementation and in expanding the knowledge in the EHS field.



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Preface

This Abu Dhabi EHS Regulatory Instrument was developed by the Building and Construction Sector Regulatory Authority as the primary Competent Authority for this topic to set the minimum mandatory requirements.

Every effort was made in developing this document so that it does not conflict with existing local or federal laws and regulations. In case of conflict, requirements of the existing local and federal laws and regulations shall prevail, and all concerned are obliged to bring the same to the attention of AD EHS Center for resolution.

This AD EHS Regulatory Instrument has been developed, reviewed and approved, following the process as described in *AD EHSMS Implementation Guideline: The Integration of EHS Requirements in the Emirate of Abu Dhabi*, by the following stakeholders:

- Abu Dhabi EHS Higher Committee;
- Abu Dhabi EHS Center;
- Environment Agency Abu Dhabi;
- Department of Municipal Affairs;
 - Abu Dhabi City Municipality;
 - Al Ain City Municipality;
 - Western Region Municipality;
- Department of Transport – Abu Dhabi;
- Abu Dhabi Water and Electricity Authority;
- Health Authority - Abu Dhabi;
- Higher Corporation for Specialized Economic Zones (ZonesCorp);
- Center for Waste Management – Abu Dhabi;
- Abu Dhabi Tourism Authority;
- Abu Dhabi Food Control Authority;
- Abu Dhabi Education Council;
- Regulation and Supervision Bureau; and
- Other Relevant Federal and Local Competent Authorities.

The AD EHSMS consists of the following hierarchy of documents:

- AD EHSMS RF Elements - Mandatory System Requirements

EHS Regulatory Instruments:

- Standards and Guideline Values - Mandatory EHS threshold and exposure levels
- Codes of Practice - Mandatory EHS technical requirements – subject specific
- Mechanisms - Mandatory system implementation processes and procedures

Guidelines:

- Technical Guidelines - Non-mandatory guidance on how to implement an EHS Regulatory Instrument
- AD EHSMS Guidance Documents - Non-mandatory guidance and interpretation of an *AD EHSMS RF* concept and/or principle

Further, this document is not intended to conflict with any contractual obligations in effect at the time of its issuance. However, all future contracts shall adhere to applicable requirements stated herein, and existing long term contracts shall be brought into compliance with its requirements as soon as reasonably practicable as stipulated by relevant subject authorities.

This document will be reviewed periodically as part of the continual improvement cycle.

1. Introduction

- (a) This Code of Practice (CoP) applies to all Employers within the Emirate of Abu Dhabi. This CoP is designed to incorporate requirements set by Abu Dhabi EHS Center and Sector Regulatory Authorities in the Emirate of Abu Dhabi.
- (b) This CoP establishes the requirements and standards so that the risks associated with road works, as applied to both new highway construction works and the reconstruction or resurfacing of existing highways, are assessed, that control measures are implemented in accordance with the hierarchy of controls and that control measures are taken to prevent injury, illness and disease to persons who might be exposed to risks arising from those activities.
- (c) The term "Road works" is the general term used in this CoP for activities of working on or adjacent to a road.
- (d) Road works includes the use of road surfacing materials containing cement, such as concrete and mortars and those containing bitumen, pitch or tar, such as hot rolled asphalt, cold asphalt, bituminous-macadam and tar macadam and also the use of bitumen and tars in cold or hot liquid and spray form.
- (e) Various ancillary works and materials are also covered, including the use of water-bound macadam and epoxy resins, the burning off and planning of existing bituminous road surfaces, the use of fuels such as diesel oil, petrol and liquefied petroleum gas, as well as many other maintenance activities such as patching, surface dressing, drainage works and trench reinstatements, carried out on roads and highways.
- (f) The term "Bituminous Material" used in this section refers to any material containing bitumen, tar or pitch as a binder and can also be considered to apply to bitumen or tar used in liquid form.

2. Training and Competency

- (a) Employers shall ensure that EHS training complies with the requirements of:
 - (i) *AD EHSMS RF – Element 05 – Training and Competency;*
 - (ii) *AD EHS RI – Mechanism 7.0 – AD EHS Professional Entity Registration;* and
 - (iii) *AD EHS RI – Mechanism 8.0 – AD EHS Practitioner Registration.*
- (b) Employers shall ensure employees required to implement the requirements of this CoP are trained in the use of relevant plant and equipment and understand the risks associated with working on or adjacent to roads and the control measures put in place by the employer.
- (c) Employers shall ensure that those involved in the planning and organisation of road works have received respective competence training which can be demonstrated in the safe systems of work and precautions to be adopted.
- (d) In addition, those operating any site plant or equipment shall have received training to a recognised standard in its safe operation and can understand the method statement and risk assessment to that particular activity.

- (e) Induction training to the workforce shall identify the precautions to be taken by individuals, including use of personal protective equipment and segregated traffic routes for pedestrians and vehicles.
- (f) Employers shall maintain a record of the required training that contains the following information:
 - (i) name and ID number;
 - (ii) Emirates ID number of the employee;
 - (iii) subject(s) of training;
 - (iv) dates(s) of training;
 - (v) training provider; and
 - (vi) person(s) providing the training.

3. Requirements

3.1 Roles and Responsibilities

3.1.1 Employers

- (a) Employers shall undertake their roles and responsibilities in accordance with the general requirements of *AD EHSMS RF – Element 01 – Roles, Responsibilities and Self-Regulation* Section 3.2.5.
- (b) Employers shall undertake their specific roles and responsibilities in accordance with the following:
 - (i) ensure the appropriate planning of road works in accordance with this CoP; and
 - (ii) development of a Traffic Control Plan for all works carried out on a road.

3.1.2 Employees

- (a) Employees shall undertake their roles and responsibilities in accordance with the general requirements of *AD EHSMS RF – Element 01 – Roles, Responsibilities and Self-Regulation* Section 3.2.7.
- (b) Employees shall undertake their specific roles and responsibilities in accordance with the following:
 - (i) following information provided by the employer regarding equipment use;
 - (ii) observing safe work practices and operating procedures prescribed by the employer;
 - (iii) shall use appropriate PPE, equipment or safety device provided for work by the employer in accordance with any training or instruction received; and
 - (iv) reporting any activity or defect which they believe is reasonably foreseeable to endanger their safety or another person.

3.2 Planning and Assessment

- (a) Employers shall ensure the following:
- (i) an assessment of the various risks is undertaken and systems of work are established which are safe to all parties involved or affected including the public;
 - (ii) that effective procedures and control measures are in place, which are implemented in order to manage activities safely and without risk to health;
 - (iii) that for the Building and Construction Sector the management of road works requirements are included in the Pre-Tender Environment, Health and Safety Plan in accordance with *AD EHS RI – CoP 53.0 – EHS Management During “Construction Work”*; and
 - (iv) that associated safe systems of work and site rules are included in the Environment, Health and Safety Construction Management Plan (EHS-CMP) in the case of the Building and Construction Sector in accordance with *AD EHS RI – CoP 53.0 – EHS Management During “Construction Work”*.
- (b) Employers shall ensure that planning and design is developed in accordance with the relevant Department of Transport (DoT) requirements, Municipality design manuals and instructions and the relevant No Objection Certificate (NOC) and Certificate of Completion (COC) are to be obtained.
- (c) When planning roadwork, employers shall consider if there are specific roadwork related risks such as:
- (i) pedestrian access and properties requiring vehicular access where these shall at all times be maintained;
 - (ii) if any underground services are present;
 - (iii) where work is planned which involves breaking up or opening any road or any sewer drain or tunnel under it; this shall be specified on the Notice of Intent and approval shall be given by all relevant authorities before commencing works;
 - (iv) any part of the road to be obstructed by plant or materials shall be appropriately signed and guarded, paying particular regard to the needs of the disabled;
 - (v) works shall be supervised by a supervisor having prescribed qualifications and there shall be on site at all times at least one trained operative having prescribed qualifications;
 - (vi) it is important that the workforce is given appropriate induction training before beginning road works; and
 - (vii) visitors shall be given appropriate instruction on relevant hazards before entering the works area and be accompanied at all times by a trained person.

3.3 Traffic Control Plans (TCP)

- (a) Employers shall ensure a Traffic Control Plan (TCP) is developed for all work performed within the public right-of-way and shall clearly depict the exact sequence of the construction operation(s), the construction to be performed, schedule of activities, and the travelled way that will be utilized by all movements of traffic during each phase of construction.

- (b) The TCP shall ensure that work zone activities level of risk has been assessed. All TCP devices and equipment (cone, signs, jersey barrier concrete or plastic, etc) shall address the safety of employees and equipment in the work zone. Use of concrete barrier shall be very specific to adjacent activities and in case of any change in TCP, work zone safety shall be evaluated again and approved.
- (c) Employers shall ensure a site traffic control assessment is conducted by road safety engineer to identify problems associated with traffic issues which shall consider:
 - (i) traffic conditions, such as major or minor road; high or low speed road; residential, commercial or rural location; peak-hour traffic flows;
 - (ii) road type and conditions (eg. divided, number of lanes, near or at an intersection);
 - (iii) road layout (uphill, downhill, work near a curve or a crest);
 - (iv) reasonably foreseeable weather conditions and visibility;
 - (v) time of the day (eg. lighting conditions, different traffic flows);
 - (vi) extent of the disruption caused by the work (eg. number of lanes to be closed, how many are left open, if the work involves closing the footpath, whether parking is affected); and
 - (vii) work zone activities along the running traffic shall be assessed according to method statements.
- (d) Employers shall ensure the TCP site layout and sequence of work shall:
 - (i) allow road traffic to be safely guided through, around or past the work area;
 - (ii) keep traffic delays and disruptions to a minimum; and
 - (iii) provide safe pedestrian access around or past the work site.

3.4 Major Roadwork Sites

- (a) On major roadwork sites, such as on highways, designers shall ensure that at least one safe method of construction is identified, covering the workforce, others involved in the project and members of the public.
- (b) Designers shall avoid difficult space limitations wherever reasonably practicable. Appropriate space is required for lateral and longitudinal safety zones, for the working area, for buffer zones and for efficient traffic management systems.
- (c) Employers shall provide safe type barriers for buffer and safety zones according to the running traffic speed (plastic or concrete barriers). In certain circumstances, where there is a high risk to employees from highway traffic the use of concrete barriers may be required.
- (d) Employers shall ensure that appropriate space is provided for:
 - (i) access for site transport;
 - 1) where reasonably practicable, well signed lead-in and lead-out coned off lanes shall be provided for site transport.
 - (ii) access for emergency services;

- 1) where reasonable practicable, a clear traffic lane shall be provided between the limits of the "working space" and the live traffic, for use by the emergency services;
 - 2) where a clear lane cannot be provided, the site access lane will need to be used by emergency services and, in the event of an incident blocking the running lanes, traffic police may require the site access lane to be used by general traffic; and
 - 3) where a site access lane cannot be provided, it will be necessary for an access through the works area to be available for use in an emergency.
- (iii) access across traffic lanes;
- 1) works personnel may need to get from one side of a traffic lane to the other. Where this is the case a risk assessment shall be prepared by the Entity to identify the safest means of crossing;
 - 2) where traffic volume is low and vehicle speeds are less than 80 km/h works personnel shall cross via designated crossing points; and
 - 3) busy and high speed traffic lanes shall never be crossed on foot and safe procedures shall be introduced, such as the provision of temporary bridges, or an approved route for authorized vehicles to follow.

3.5 Roadwork Hazards and Controls

3.5.1 General

- (a) Employers shall ensure safe systems of work are established that include:
- (i) vehicles and plant shall be equipped with two high intensity rear reversing lamps that are automatically switched on when reversing, plus an automatic audible reversing alarm to warn operatives of the danger from a reversing vehicle;
 - (ii) reversing maneuvers are directed by a banksman located towards the rear of the vehicle but within sight of the driver;
 - (iii) in order to enable works to proceed smoothly on heavily used roads, consideration is given, where reasonable practicable, to:
 - 1) working during light traffic flows only;
 - 2) working at night; and
 - 3) working at weekends.
 - (iv) when works are being carried out on a road open to traffic, two-way working of traffic flows shall be maintained whenever reasonably practicable;
 - (v) minimum widths recommended are 2.75 meters for one-way working and 5.5 meters for two-way working; The DoT "*Work Zone Traffic Management Requirements*" shall be complied with;
 - (vi) approve speed limits for the work area shall be appropriately posted (km/h);
 - (vii) control measure shall be implemented to maintain both site safety and security outside working hours in order to reduce the risk of incidents to the public; and
 - (viii) vehicles and plant shall be secure and immobilised when not in use.

3.5.2 Burns and Fire Risks

- (a) Employers shall ensure safe systems of work are established that shall include:
- (i) control measures for bituminous materials that are supplied and used in hot form. This includes hot rolled asphalt which is supplied at a temperature in the region of 135°C and liquid bitumen for surface dressing at 150°C, for which burns can easily occur;
 - (ii) control measures for machinery and hand tools used to lay hot bituminous materials or to heat existing road surfaces;
 - (iii) control measures to prevent the overheating of bitumen or tar boilers and the control measures implemented to control the fire risks associated with fuels such as diesel and LPG; and
 - (iv) control measures for skin contact with LPG which can give cold burns, and cement, when wet, in the form of concrete or mortar which can cause serious burns.

3.5.3 Carcinogenic Nature of Pitch, Tar and Mineral Oils

- (a) Employers shall ensure safe systems of work are established that include:
- (i) control measures where operatives who use pitch, tar or mineral oils, especially over a long period of time can develop a skin cancer in the form of cancerous warts. The danger arises where any of these materials are in frequent contact with the skin;
 - (ii) control measures that will be taken to screen for such conditions which may occur on the face, neck, hands, arms or scrotum that can often be cured by early treatment; and
 - (iii) control measures where further hazards from prolonged and constant contact with these same materials and the contraction of dermatitis.

3.5.4 Vehicle and Plant Incidents

- (a) Employers shall ensure that safe systems of work are developed to minimise the risks associated with vehicles and plant that include:
- (i) the risks when vehicles or plant are moving or working alongside pedestrians including members of the public on any road works site. Hazards under this heading fall into two general categories:
 - 1) the traffic incident type where a pedestrian is run over by plant or a vehicle; and
 - 2) the machinery/operative type of incident where injury is caused by the operation of the plant, vehicle or machinery such as in the case of being struck by the bucket of an excavator.
- (b) To control these risks employers shall provide a clear segregation area where reasonably practicable or provide a banksman where this is not the case. The preferred option shall be to provide dummy flagger instead of an employee.

3.5.5 Incidents Involving Members of the Public

- (a) Employers shall ensure safe systems of work are established that include:
- (i) control measures, as road works present an additional risk to road users, over and above the ever present traffic incident risk. This shall include road works that are well signed, as the sudden appearance of roadmen and plant in the road in front of moving traffic can lead to sudden avoidance action by drivers leading to an incident; and
 - (ii) control measures which include the provision of a complete system of advance warning signs, together with an appropriate traffic control system.

3.5.6 Eye Hazards

- (a) Employers shall ensure safe systems of work are established that include:
- (i) the specific eye hazards associated with the use of hot bitumen and epoxy resins; and
 - (ii) control measures which are in accordance with *AD EHS RI – CoP 2.0 – Personal Protective Equipment*.

3.5.7 Falls

- (a) Employers shall ensure safe systems of work are established that include:
- (i) control measures required to manage specific work at height risks associated with road works;
 - (ii) control measures required to manage the specific risk of falling from moving vehicles or plant; and
 - (iii) control measures which are in accordance with *AD EHS RI – CoP 23.0 – Work at Heights*.

3.5.8 Noise Hazards

- (a) Employers shall ensure safe systems of work are established that include:
- (i) control measures where excessively noisy plant or other equipment is used whereby permanent damage to hearing can occur;
 - (ii) control measures for the reduction of noise at source and the provision and use of hearing protection. However, employers shall consider that, if hearing protection is worn when working close to fast moving traffic, the risk of a traffic incident is increased; and
 - (iii) control measures which are in accordance with *AD EHS RI – CoP 3.0 – Occupational Noise and 3.1 Vibration*.

3.5.9 Hazards from Overhead and Underground Services

- (a) Employers shall ensure safe systems of work are established that include:
- (i) control measures required where the presence of underground electricity cables and other services exist, particularly on existing roads;

- (ii) the location and identification of all underground and overhead mains and cables which shall be established before works on site commence;
- (iii) control measures covering attention to electricity cables, both underground and overhead and also to gas mains, water mains and telecoms;
- (iv) control measures required to verify the location of any given service main before commencing excavation works in the locality; and
- (v) control measures which are in accordance with *AD EHS RI – CoP 39.0 – Overhead and Underground Services*.

3.5.10 Hazards from Dusts, Fumes and Smoke

- (a) Employers shall ensure safe systems of work are established that include:
 - (i) control measures required for various dusts on roadwork sites including dust containing pitch which is carcinogenic, cement dust which can cause lung scarring, burns and dermatitis and Silica dust which can cause silicosis; and
 - (ii) the assessment and monitoring of any dust, fume or smoke conditions as fumes and smoke from hot bituminous materials can cause discomfort, nausea and may lead to cancer.

3.5.11 Personal Hygiene

- (a) Employers shall ensure safe systems of work are established that include:
 - (i) transportable washing and toilet facilities which are provided on all sites to enable operatives to wash off bituminous materials, cement or oils from the skin, especially before eating or using toilet facilities;
 - (ii) the provision of appropriate welfare facilities;
 - (iii) the arrangements for clean overalls for all employees involved with using solvents, bituminous materials and epoxy resin; and
 - (iv) ensure compliance with *AD EHS RI – CoP 8.0 – General Workplace Amenities*.

3.5.12 Protective Clothing and Equipment

- (a) Employers shall ensure all operatives handling bituminous materials or concrete, and all others working on roadwork sites shall at all times wear the following in accordance with *AD EHS RI – CoP 2.0 – Personal Protective Equipment*:
 - (i) Safety helmets:
 - 1) conspicuously colored to make the wearer more visible to vehicle and plant operators. All site personnel shall wear a safety helmet at all times.
 - (ii) Safety boots:
 - 1) with steel toecaps and with stout heat resisting soles.
 - (iii) High visibility clothing:
 - 1) essential to ensure that operatives are easily visible to all vehicle and plant drivers and to passing traffic.
 - (iv) General covering/clothing:

- 1) cover exposed parts of the body in order to prevent contamination of the skin with bituminous materials or concrete or cement;
 - 2) if clothing becomes impregnated with any bituminous material or concrete or cement, it ceases to protect and may even cause the effects which it is intended to prevent as oils, bituminous materials and cement work their way through clothing on to the skin; and
 - 3) all overalls, gloves shall be regularly cleaned to remove any contamination. In bad cases of saturation with bituminous material or cement, the only remedy is disposal and replacement.
- (v) Gloves:
- 1) able to protect the wearer against heat, oil, tars, bitumen and concrete.
- (vi) Eye protection:
- 1) for such operations as cutting out, grinding, spraying bitumen or tar. Eye protection shall include provision of eye wash facility to wash eyes in case of dust, chemical or foreign body enters the eyes.
- (vii) Hearing protection:
- 1) noise from various sources can often be reduced by the provision of baffles or screens. Noise from internal combustion engines can be reduced by the provision of silencers or replacement of defective ones.
- (viii) Dust masks and breathing apparatus:
- 1) where working in confined sites such as a narrow road between tall buildings or in tunnels or underpasses; and
 - 2) if breathing apparatus is required, appropriate selection and training is required.

3.5.13 Fuels

- (a) Employers shall ensure safe systems of work are established that include:
- (i) correctly storing fuels and limiting storage amounts wherever reasonably practicable;
 - (ii) implementation of a strict no smoking policy for all persons involved with roadwork;
 - (iii) taking measures to ensure leaks of any fuel are stopped quickly and effectively; and
 - (iv) keeping spill kits at convenient locations to deal with fuel spills.

3.5.14 Fire Extinguishers

- (a) Employers shall ensure safe systems of work are established that include:
- (i) providing appropriate fire extinguishers conveniently located throughout the area where roadwork is being carried out;
 - (ii) provision for all fuel storage areas with firefighting points;
 - (iii) maintaining fire extinguishers in all vehicles and plant used where road works are being carried out; and

- (iv) control measures shall be in accordance with *AD EHS RI – CoP 7.0 – Fire Prevention, Planning and Control*.

3.5.15 Pedestrian & Warning Barriers

- (a) Employers shall ensure safe systems of work are established that include:
 - (i) control measures to prevent persons or plant from falling into any excavation and the control measures required where the public are involved, which will mean the fixing of continuous rigid barriers to mark any temporary footway and to protect pedestrians from traffic, excavations and plant; and
 - (ii) control measures shall be in accordance with *AD EHS RI – CoP 22.0 – Barricading of Hazards*.

3.6 Traffic Diversions

3.6.1 General

- (a) Employers shall ensure that traffic diversions comply with any special requirements of the Traffic Police Department and “*Work Zone Traffic Management Requirements*” (DoT) or Abu Dhabi Municipality. In particular:
 - (i) it is essential and mandatory for the protection of operatives and the general public that appropriate signs are displayed giving road users advance warning of road works;
 - (ii) the sizes and positioning of signs and cones are dependent on the type of the road and the relevant speed limits;
 - (iii) if it is necessary to hold down signs and cones because of wind problems, only sandbags shall be used. Hard heavy objects shall not be used as, if hit by a moving vehicle, they could become lethal missiles dangerous to persons or other vehicles nearby;
 - (iv) warning signs shall be set so that their lower edge is at least 300mm clear of the ground;
 - (v) signs shall be clearly visible to approaching drivers by both day and night, and in all weather conditions; and
 - (vi) if there is not appropriate lighting available to appropriately illuminate the sign at night, then reflective signs shall be used.

3.6.2 Safety Zones

- (a) Employers shall ensure safe systems of work are established that include:
 - (i) a safety zone, marked by cones and lamps which shall be provided where reasonably practicable to protect operatives from the traffic and to protect traffic from the road works;
 - (ii) on any roadwork site, a space which shall be provided around the works for the storage of spoil, tools, plant and equipment and to allow the safe movement and operation of plant;
 - (iii) plant which must not be allowed to encroach onto the safety zone, nor must operatives be allowed to enter it other than to maintain the cones or safety signs;
 - (iv) A safety zone which comprises:

- 1) a lead-in taper of cones, which will vary with the speed limit and width of the works;
 - 2) a sideways clearance between the working space and moving traffic, which shall be at least 0.6 meters on roads with speeds up to 80 km/h and at least 1.2 meters on roads with speeds of 80 km/h and over;
 - 3) an exit taper which is always at 45 degrees to the curbside or road edge; and
 - 4) a traffic barrier, facing oncoming traffic, positioned within the coned-off area to show the width of the works site.
- (v) for roads with a speed limit of 80 km/h or more, an additional traffic barrier at the end of the lead-in taper.

3.6.3 Working Space

- (a) Employers shall ensure appropriate working space to ensure that the movement and operation of plant (eg. swinging of jibs and excavator arms) is clear of passing traffic and is not encroaching into the safety zone, or adjacent footway.

3.6.4 Buffer Zones

- (a) Employers shall ensure safe systems of work are established that include:
- (i) on heavily used high-speed roads such as highways and other principal roads, control measures which are developed to provide buffer zones, to segregate opposing traffic flows;
 - (ii) the width of such buffer zones which shall preferably be a full lane width of 3.65 meters, but shall be at least 1 meter. A full lane width has the added advantage of providing a separate unused lane for access and emergency vehicles if breakdown or incident occurs; and
 - (iii) barriers which are used to delineate buffer zones. The ideal types in this case are traffic cones, cats eye bollards or simple red and white colored plastic pendant markers, all of which are relatively harmless if hit by a vehicle.

3.6.5 Traffic Barriers

- (a) Employers shall ensure safe systems of work are established that include:
- (i) traffic barriers that are constructed and shall be continuous concrete traffic protection devices (barriers) that comply with NCHRP-350(TL3), used to indicate the road works and to segregate the traffic from the works; and
 - (ii) their design shall not cause a further hazard if hit by a moving vehicle, and they shall be of a conspicuous color and kept clean.

3.6.6 Cones

- (a) Employers shall ensure safe systems of work are established that include:
- (i) a line of traffic cones shall be positioned at a taper and shall guide traffic past the works, at a distance ahead of the works as indicated in Table 1 under the row 'Minimum Number of Cones';

- (ii) the maximum spacing distance of cones in longitudinal lengths of coning shall be no more than 9 meters, but no less than 2 cones shall be used in any length between tapers; and
- (iii) generally lead-in tapers used with traffic control measures, and all exit tapers, shall be approximately 45° to the curb line with cones spaced 1.2 m apart.

3.6.7 Advance Signage

- (a) Employers shall ensure safe systems of work are established that include;
 - (i) 'Road Works Ahead' signs which shall be placed in advance of the road works and shall be the first signs to be seen by the driver;
 - (ii) signs which shall be placed in accordance with the specifications laid out in Table 1;
 - (iii) 'Road Narrows Ahead' signs which shall be placed midway between the 'Road Works Ahead' signs and the beginning of the taper of traffic cones;
 - (iv) 'Keep Right' or 'Keep Left' signs which shall be placed at the beginning and end of the lead in taper of cones; and
 - (v) on roads with speed limits of 80km/h or more, all "Ahead" signs which shall have the distance to the works in meters printed on them.

3.6.8 Lamps

- (a) Employers shall ensure safe systems of work are established that include;
 - (i) provision of road danger lamps for use at night, in poor daytime visibility and in bad weather;
 - (ii) road danger lamps shall not be higher than 1.2 meters above the road (flashing lamps 120 to 150 flashes per minute);
 - (iii) lamps can be used on any road with or without street lighting; and
 - (iv) lamps are only to be used if all of the following are satisfied:
 - 1) the road speed limit shall be under 60 km/h;
 - 2) the road danger lamp shall be within 50 meters of a street lamp;
 - 3) the street shall be illuminated; and
 - 4) the lamps are steady.

3.6.9 Pedestrians

- (a) Employers shall ensure safe systems of work are established that include:
 - (i) works on footways which shall leave at least 1.5 meters unobstructed width for temporary pedestrian ways. Where this is not reasonably practicable, an alternative safe route for pedestrians shall be provided;
 - (ii) rigid barriers which shall be used to mark any temporary footway and to protect pedestrians from traffic, excavations, plant and materials. Road danger lamps shall be placed at the ends of the barriers at night. Hand rails shall be between 1.0 meter and 1.2 meters above ground level; and

- (iii) temporary footway if in the carriageway, and signing will be necessary for both pedestrians and drivers. The provision of curb ramps or raised footways may also be necessary to help blind, elderly or disabled persons, or for those with prams or wheelchairs.

Type of road	Minimum siting distance (D) of first sign in advance of works (metres) (Note 1)	Minimum clear visibility to first sign (metres)	Minimum size of signs (mm)	Minimum height of cones (mm) (Note 2)	Details of lead-in cone tapers							
					Width of hazard (metres)							
					1	2	3	4	5	6	7	
Single carriageway road, restricted to 40km/h or less	20 to 45	60	600	450	Length of taper (T) in metres	13	26	39	52	65	78	91
					Min. No. of cones	4	4	6	7	9	10	12
					Min. No. of lamps at night	3	3	5	6	8	9	11
Single carriageway road, restricted of speeds 41km/h to 60km/h inclusive	45 to 110	60	750	450	Length of taper (T) in metres	20	40	60	80	100	120	140
					Min. No. of cones	4	6	8	10	13	15	17
					Min. No. of lamps at night	3	5	7	9	12	14	16
All-purpose dual carriageway road, restricted to 40km/h or less	110 to 275	60	750	450	Length of taper (T) in metres	25	50	75	100	125	150	175
					Min. No. of cones	4	7	10	13	15	18	21
					Min. No. of lamps at night	3	6	9	12	14	17	20
Single carriageway road, with speed limit 80km/h or more	275 to 450	75	750	450	Length of taper (T) in metres	25	50	75	100	125	150	175
					Min. No. of cones	4	7	10	13	15	18	21
					Min. No. of lamps at night	3	6	9	12	14	17	20
All-purpose dual carriageway road, with speed limit 80km/h or more	725 to 1600	105	1200	750	Length of taper (T) in metres	32	64	96	128	160	192	224
					Min. No. of cones	5	9	12	16	19	23	26
					Min. No. of lamps at night	4	8	11	15	18	22	25

Table 1: Positioning of Signs and Cones

Note 1: Minimum and normal maximum distance of the first sign (D) is given to allow a range wherein the sign can be placed in a convenient position, bearing in mind available space and visibility for drivers.

Note 2: It may be appropriate to use the next larger size of cone in lead-in tapers (eg. 750mm cones) in tapers where 450mm cones are indicated and 1 meter high cones where 750mm cones are shown.

3.7 Night Work

- (a) Employers shall ensure safe systems of work are established for night work that include:
- (i) all vehicles and plant which shall be equipped with two high intensity rear fog lamps that are automatically switched on when the vehicle is placed in reverse;

- (ii) works carried out at night which shall always be floodlit, taking care not to effect the vision of oncoming traffic;
- (iii) for lane closures where necessary flashing arrow signs are used to signify lane closures;
- (iv) the work site to be fully lit by floodlighting. Where it is not practical to floodlight the whole work site consider floodlighting the Traffic Controllers and the Stop/Slow signs;
- (v) the works supervisor who shall check floodlighting to ensure it does not adversely affect road users or adjacent dwellings or businesses;
- (vi) control measures for pavement markings as line marking is generally not clearly visible, therefore employers shall use raised reflective pavement markers (stick and stomps). Retro-reflective cones can also provide the continuity to guide motorists through the work site effectively;
- (vii) control measures needed to achieve standard spacing's, particularly on winding rural roads; and
- (viii) advance signs are required and other matters to consider are:
 - 1) yellow is better than red at night;
 - 2) externally lit signs are preferred to unlit retro-reflective signs;
 - 3) messages on signs shall be brief and clear;
 - 4) use standard signs in standard sizes for ease of storage and installation; and
 - 5) keep accurate records of the locations and types of signs displayed.

4. References

- *AD EHSMS RF – Element 01 – Roles, Responsibilities and Self-Regulation*
- *AD EHSMS RF – Element 02 – Risk Management*
- *AD EHS RI – CoP 2.0 – Personal Protective Equipment*
- *AD EHS RI – CoP 3.0 – Occupational Noise*
- *AD EHS RI – CoP 3.1 – Vibration*
- *AD EHS RI – CoP 7.0 – Fire Prevention, Planning and Control*
- *AD EHS RI – CoP 8.0 – General Workplace Amenities*
- *AD EHS RI – CoP 22.0 – Barricading of Hazards*
- *AD EHS RI – CoP 23.0 – Work at Heights*
- *AD EHS RI – CoP 39.0 – Overhead and Underground Services*
- *Abu Dhabi Department of Transport – Work Zone Traffic Management Requirements*

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