

Traffic Management Plan (TMP)



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- **Founder & CEO** – Road Safety School Ltd – UK (2025).
- Over **16 years of experience** in road projects.
- Contracting experience in roads & maintenance.
- **Chief Road Safety Engineer** – Eurogroup Engineering – MOT

Management Certifications

- **PMP** – Project Management Professional.
- **P3O** – Portfolio, Programme & Project Offices.
- **PMO-CP** – PMO Certified Practitioner.
- **MBA** – Master of Business Administration.
- **DBA (Candidate)** – Doctor of Business Administration.

Technical & Safety Certifications

- **iRAP** – International Road Assessment Program.
- **RSP1-SA** – Road Safety Professional.
- **RSA (Australia)** – Victoria & Queensland.
- **RSA-TL / RSATL** – IRF Global.
- **NEBOSH IG1 & IG2**.
- **Certified Defensive Driving Trainer**.
- Conducted **200+ accident investigations**.



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Courses by Elhadi Mohamed

1. Road Safety Auditor (RSA)
2. Road Safety Engineer (RSE)
3. Road Safety Professional (RSP1-SA)
4. Defensive Driving Skills (DDS)
5. Intelligent Transportation Systems (ITS)
6. Traffic Management Plan (TMP)
7. Saudi Road Safety Code (SHC)

Other Courses

- HSE – Occupational Health & Safety
- TIS – Traffic Impact Studies
- First Aid
- PBCs – Performance-Based Contracts

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1. Defensive Driving Skills (DDS)
2. Traffic Management Plan (TMP)
3. Road Safety Auditor (RSA)
4. Road Safety Professional (RSP)



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“What is ONE thing you expect to learn or be able to do better after completing this TMP course?”



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Topics

1. Fundamentals of Traffic Management Plans
2. Fundamentals of Work Area Safety
3. Designing Work Zones and Detours
4. Implementation and Continuous Improvement of TMPs
5. Case Studies in Detour-Related Incidents
6. Contractual Responsibilities
7. Smart Detours and Intelligent Traffic Solutions
8. Reference

redundancy

TRAFFIC MANAGEMENT PLAN (TMP) COURSE



- Fundamentals of Traffic Management Plans
- Fundamentals of Work Area Safety
- Designing Work Zones and Detours
- Implementation and Continuous Improvement of TMPs
- Case Studies in Detour-Related Incidents
- Contractual Responsibilities
- Smart Detours and Intelligent Traffic Solutions



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Diversions

Detours



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What is difference between detour and work zone ?

Work Zones

Detours

4.16. Temporary Road Surface (Detours)

4.16.1. General Considerations

Detours are temporary routes accommodating traffic around areas of prohibited or reduced access, such as construction sites. In general, detours are needed at highway and/or ramp sections where construction works require roadway closing. However, a potential decision for roadway closing is subject to additional parameters, such as construction time, availability of land for detour design, traffic volumes, and overall detour cost. Therefore, traffic detours require close coordination with the highway's competent authority whereby, special emphasis should be also placed on access requirements.



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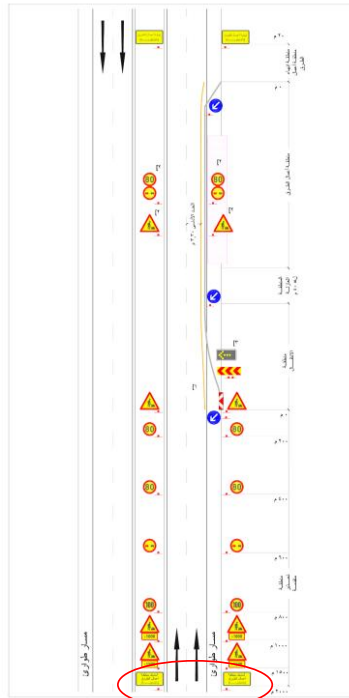
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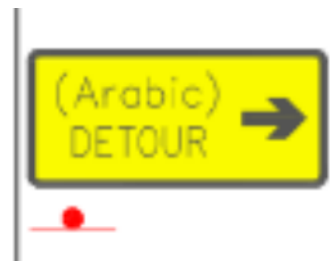
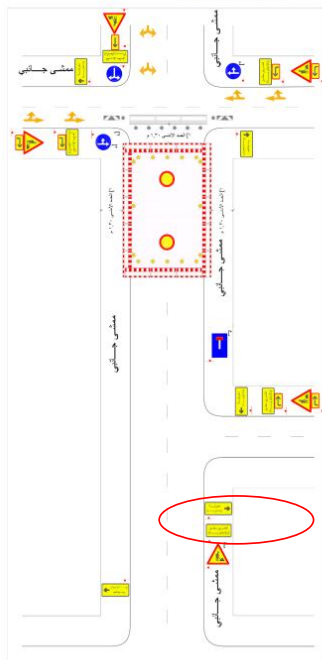
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SHC 305 Highway Facilities and Utilities Design - Work Zone Design



Aspect	TMP – Traffic Management Plan	TCP – Traffic Control Plan	Detours
Definition	Strategic plan for safe traffic flow during a project	Diagram of how traffic is controlled at a work zone	Temporary routes around closed roads
Purpose	Ensure safety, mobility & coordination	Guide field crews in setup	Maintain flow and safety during closures
Scope	Whole project area and duration	Specific site or phase	Only focuses on rerouting traffic
Components	Risk assessment, detours, TCPs, public notice	Signs, tapers, closures, flaggers	Signage, route design, re-entry point
Format	Written with maps and strategy	Schematic diagram or layout	Shown as route map or visual path
Relation	The main plan – includes TCP & detours	Subset of TMP – shows control setup	Subset of TMP – defines rerouting strategy



Detour vs Traffic Control Plan?



A temporary alternative route used to divert traffic away from a work zone or full road closure for smooth and safe traffic flow



An engineering document that details the organization of traffic around a work zone (signage, barriers, detours, temporary signals)



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Abbreviation

Full Term

Brief Description

TMP

Traffic Management Plan

High-level plan for managing road traffic

TCP

Traffic Control Plan

Site traffic layout plan

TTM

Temporary Traffic Management

Full system for managing traffic

MOT

Maintenance of Traffic

US term for traffic flow safety

TTC

Temporary Traffic Control

Temporary signs/devices control system

WZTM

Work Zone Traffic Management

Traffic handling in work zones

TDP

Traffic Diversion Plan

Rerouting plan for closures

LCMP

Lane Closure Management Plan

Plan for partial lane closures

TRCP

Temporary Road Closure Plan

Plan for full road closures

STMP

Site Traffic Management Plan

Manages internal construction traffic



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TRAFFIC
MANAGEMENT PLAN

Gradual change,
safer path.

ادْعُ إِلَى سَبِيلِ رَبِّكَ بِالْحُكْمَةِ وَالْمَوْعِظَةِ
الْحَسَنَةِ ۚ وَجَادِلْهُمْ بِالَّتِي هِيَ أَحْسَنُ
125 سورة النحل، آية

Change Management



Traffic Management Plan (TMP)



Definition:

A Traffic Management Plan (TMP) is a structured guide used to assess risks and hazards related to traffic within a workplace or site. It includes a template and procedures to ensure traffic safety and effective flow.



Purpose:

- To identify traffic-related hazards and risks.
- To summarize existing controls aimed at eliminating or reducing risks.
- To serve as a foundation for training all workers, contractors,.
- To apply to all types of vehicles on site, and personal vehicles.

TMP

TRAFFIC MANAGEMENT PLAN

Definition:

A guide for assessing and managing traffic risks and hazards.

Purpose:

To identify and reduce traffic-related hazards.



Aspect	Hazard Identification	Risk Assessment
Definition	The process of identifying potential sources of harm	The process of evaluating the likelihood × severity of each hazard
Key Question	What can go wrong?	How likely is it to happen, and how serious would it be?
Formula	—	Risk = Likelihood × Severity
Example 1	Pedestrian walkway crosses active forklift zone	Likelihood = High Severity = High → Risk Level = High
Example 2	Detour sign is small and non-reflective at night	Likelihood = Medium Severity = Medium → Risk Level = Medium
Output	A list of identified hazards	A prioritized list of risks (e.g., High, Medium, Low)



Traffic-management-guidance-plan-and-example-template_FINAL.pdf



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What are the three most important elements in TMP ?

1. TCP (Traffic Control Zone / Traffic Closure / Workzone plan / Detour plan)
2. TIS (Traffic Impact Study)
3. Risk Register



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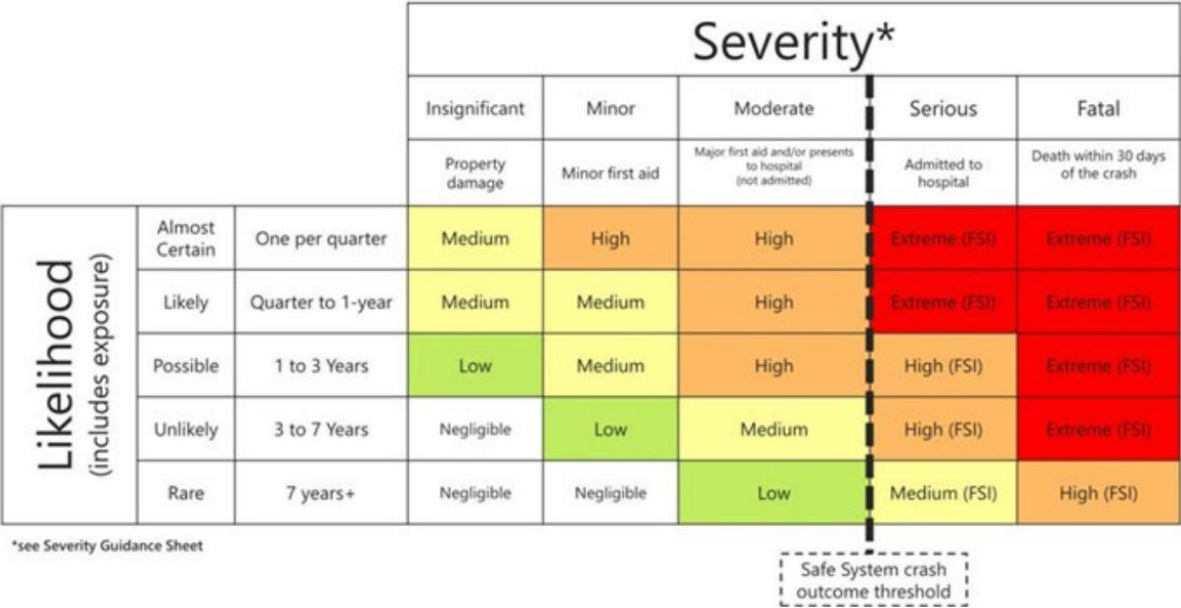


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Figure 10.2: Austroads RSA risk matrix



The corresponding priorities for mitigation are categorised as:

- Negligible – no action required
- Low – should be corrected or the risk reduced if the treatment cost is low
- Medium – should be corrected or the risk significantly reduced, if the treatment cost is moderate, but not high
- High – should be corrected or the risk significantly reduced, even if the treatment cost is high
- Extreme – must be corrected regardless of cost.





Key Hazards in Traffic Zones:

المخاطر الرئيسية في مناطق إدارة الحركة:



- Pedestrians near moving vehicles
- Falling loads during handling
- Rear-loading drop risks
- Poor visibility
- Over-speeding
- Equipment failure
- Untrained operators
- Improper use
- Vehicle tip-over
- Dropped objects
- Collisions
- Structural damage



- وجود مشاة قرب المركبات المتحركة
- سقوط الأحمال أثناء المناولة
- مخاطر السقوط عند التحميل الخلفي
- ضعف الرؤية
- السرعة الزائدة
- عطل في المعدات
- مشغولون غير مدربين
- استخدام غير آمن
- انقلاب المركبات
- سقوط الأجسام
- التصادمات
- أضرار بالمباني أو المعدات



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10 Hazards Related to Safety Devices in Detours:

10 مخاطر مرتبطة بأدوات السلامة في التحويلات:



1. Failure of lighting systems at night in the work zone
2. Poor retroreflectivity of signs and safety barrels
3. Plastic barriers displaced by strong winds
4. Traffic cones blown away by trucks or wind
5. Improper installation of warning signs
6. Use of undersized or non-compliant signs
7. Dust or mud covering signs, reducing visibility
8. Absence of early warning signs before the detour
9. Damaged or unstable warning lights at night
10. Lack of regular maintenance for safety equipment on site



1. انطفاء الإنارة الليلية في منطقة العمل
2. ضعف الانعكاسية في اللوحات والبراميل التحذيرية
3. سقوط أو تحرك الحواجز البلاستيكية بسبب الرياح
4. تحريك المخاريط المرورية (Cones) بفعل مرور الشاحنات أو الرياح
5. تثبيت غير سليم للوحات التحذيرية
6. استخدام لوحات صغيرة أو غير مطابقة للمواصفات
7. تراكم الغبار أو الطين على اللوحات مما يقلل وضوحها
8. غياب إشارات التحذير المبكر قبل التحويلة
9. تلف أو ضعف تثبيت الأضواء التحذيرية الليلية
10. غياب الصيانة الدورية لأدوات السلامة المستخدمة في الموقع



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1. Limited space for large vehicles
2. Barriers too close to the lane
3. Equipment near active traffic
4. Unprotected pedestrian crossing
5. Missing or weak guardrails
6. Scaffolding near traffic
7. Debris in roadside area
8. Poor night visibility
9. Unauthorized side entry
10. No emergency pull-off area



1. تقييد المساحة الجانبية لحركة المركبات الكبيرة
2. اقتراب الحواجز الخرسانية (نيوجيرسي) من المسار دون منطقة عازلة
3. وجود معدات ثقيلة قريبة من المسار النشط
4. عبور مشاة داخل حرم الطريق دون حماية
5. غياب أو ضعف الحواجز الواقية (Guardrails)
6. تواجد سقالات أو أبراج إنشائية قريبة من المركبات
7. تراكم مخلفات أو مواد إنشائية في الحرم
8. عدم وضوح حدود الحرم ليلاً (غياب الإضاءة أو العواكس)
9. دخول غير مصرح للمركبات أو الأشخاص من الطرق الجانبية
10. غياب مناطق الهروب أو الطوارئ للسائقين

1. Open potholes or uncovered gaps
2. Uneven asphalt surface levels
3. Accumulated sand or dust
4. Slippery surfaces (oil/water)
5. Edge erosion or collapse
6. Poorly fixed temporary covers
7. Faded or missing temporary markings
8. Scattered tools or construction materials
9. Uneven temporary pavement
10. Confusing or unclear road paint



1. حفر وفتحات مكشوفة
2. تفاوت في منسوب الأسفلت
3. تراكم رمال أو أتربة
4. أسطح زلقة (زيوت/مياه)
5. تآكل أو انهيار الحافة
6. تثبيت ضعيف للأغطية المؤقتة
7. طمس أو غياب العلامات المؤقتة
8. أدوات أو مواد متناثرة على الطريق
9. سطح غير مستو
10. دهانات مضللة أو غير واضحة



While preparing a **Traffic Management Plan (TMP)** for a residential tower construction project, and according to the **Austroads Guide to Traffic Management (AGTM)**, what is meant by the term "**traffic**" when mentioned without specifying its type?

- ☐ A) All road users including vehicles, pedestrians, bicycles, buses, etc.
- ☐ B) Vehicle movement only
- ☐ C) Public transportation movement only
- ☐ D) Truck and bus movement only
- ☐ E) Vehicle and pedestrian movement only

✓ **Correct Answer: A)** All road users including vehicles, pedestrians, bicycles, buses, etc.

According to the **Austroads Guide to Traffic Management (AGTM)**, the term "traffic" refers broadly to **all types of road users**, not just motor vehicles.

- Traffic: While the term 'traffic' may be closely identified with vehicle traffic, it can also refer to any mode of traffic that may be used within the road corridor. This includes vehicle, freight, pedestrian, bicycle, bus and tram traffic etc. Therefore, traffic has the same meaning as transport in the context of this part. Where traffic is mentioned on its own and without identification of its type, it should be viewed as capturing all modes. Where it is specifically identified (e.g. bicycle traffic) it should be viewed in this form.



As part of preparing a **Traffic Management Plan (TMP)** for an infrastructure project, both **Risk Identification** and **Risk Assessment** are included.

What is the correct difference between them?

- ☐ A) *Risk Identification* is used to place traffic signs, and *Risk Assessment* is used to determine the number of cones.
- ☒ B) *Risk Identification* is the process of identifying all potential hazard sources in the work zone, while *Risk Assessment* is the estimation of the likelihood and severity of each hazard to determine its risk level.
- ☐ C) *Risk Identification* means ranking risks from highest to lowest, and *Risk Assessment* means completely eliminating them.
- ☐ D) Both are only used to determine the types of signs to be placed.
- ☐ E) *Risk Assessment* is the process of identifying hazard sources, while *Risk Identification* is estimating the likelihood and severity of each hazard.

● Risk Identification

This is the process of spotting all **potential hazards** in the work zone — anything that could cause harm.

⚠ Risk Assessment

This step involves **evaluating** how likely each hazard is to occur... and how **severe** its impact could be. It helps determine the **level of risk** — so proper controls can be applied.



According to international best practices for traffic management within work zones, how can accidents in work areas be reduced?

- ☐ a) Pedestrians are allowed to move freely across the site as long as they wear safety gear
- ☐ b) Pedestrians are separated from vehicles wherever possible, with dedicated walkways assigned to them
- ☐ c) Site division is unnecessary as long as reflective barriers and warning signs are in place
- ☐ d) The site is divided into pedestrian zones, equipment zones, and shared zones
- ☐ e) Pedestrians are allowed to use internal routes as long as signage is provided

✓ (Correct answer: d)

9. Hazard: Pedestrians in same area as mobile plant / vehicles

9.1 Isolation

Wherever possible, pedestrians should be separated from vehicles and mobile plant. It is recommended your site is divided into the following zones:

- Pedestrian zones – walkways and work areas
- Restricted areas – These are mobile plant working areas plus all roadways for vehicle and mobile plant – they are termed “restricted areas” as pedestrian access is generally not permitted
- Shared zones – crossings over roadways and some work zones where there is both pedestrian access and mobile plant.



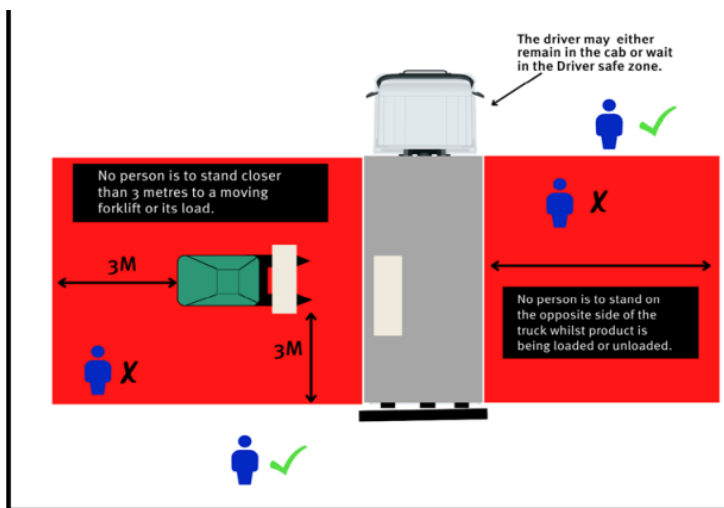
At a construction site where excavation and loading operations are performed using a loader and a truck, which of the following actions are *NOT considered safe practices* during loading and unloading operations?

✓ Select all that apply:

- ☐ a) It is acceptable for someone to stand behind the truck during unloading, as long as they maintain radio communication with the driver.
- ☐ b) No worker should stand within 3 meters of a forklift while it is moving or when the load is being handled.
- ☐ c) It is permitted to stand between the truck and the loader, provided the loader is fully stopped, handbrake engaged, and lift arms are resting on the ground.
- ☐ d) The driver should remain in the cabin or a designated safe zone during the loading process.
- ☐ e) Workers may walk behind a moving loader as long as warning signals are active.

✓ (Incorrect and unsafe answers: a, c, e)





Exclusion zone

While the truck driver is on the tarmac, the following rules **MUST** be observed at all times:

- ✓ The truck driver and forklift operator must always be visible (can make eye contact) to each other whilst loading and unloading.
- ✓ No person is to stand closer than 3 metres to a moving forklift or its load.
- ✓ No person is to stand on the opposite side of the truck whilst product is being loaded or unloaded from the truck.
- ✓ If a person is required to stand between a forklift and the truck tray, the forklift must be out of gear, handbrake applied, footbrake applied and tines lowered to the ground.

While preparing a Traffic Management Plan (TMP) for a construction site using mobile plant equipment, which strategies are most effective in reducing risks from poor visibility and blind spots?

✓ *Select all that apply:*

- ☐ a) Require reflective vests only for drivers and supervisors, excluding other workers
- ☐ b) Install convex mirrors at blind corners or hazardous intersections to enhance visibility
- ☐ c) Equip mobile equipment with flashing lights that activate automatically when the vehicle is in use
- ☐ d) Designate "Keep Clear" zones at loading points or hazardous areas and prohibit parking or storage in these zones
- ☐ e) Rely solely on rear-view cameras when reversing, with no need for a spotter

✓ **(Correct answers: b, c, d)**



convex mirrors



flashing lights



Keep Clear



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Plan (TMP), the Traffic Control Plan (TCP), and Detours?

- ☐ a) The Traffic Management Plan (TMP) is only used to identify detour routes, while detours control traffic equipment inside the work zone.
- ☐ b) The Traffic Control Plan (TCP) is the main plan covering the entire project, while the TMP focuses on detour routes and sign placement.
- ☐ c) The Traffic Management Plan (TMP) is the overall strategic plan that includes all planning elements; the Traffic Control Plan (TCP) deals with the details of placing control devices inside the work zone; detours are temporary routes used to redirect traffic away from closed areas.
- ☐ d) Detours are used to assess project risks, while the TMP is mainly for placing barriers and signs.
- ☐ e) All terms (TMP, TCP, Detours) are synonymous and used interchangeably with no clear difference.



(Correct Answer: c)



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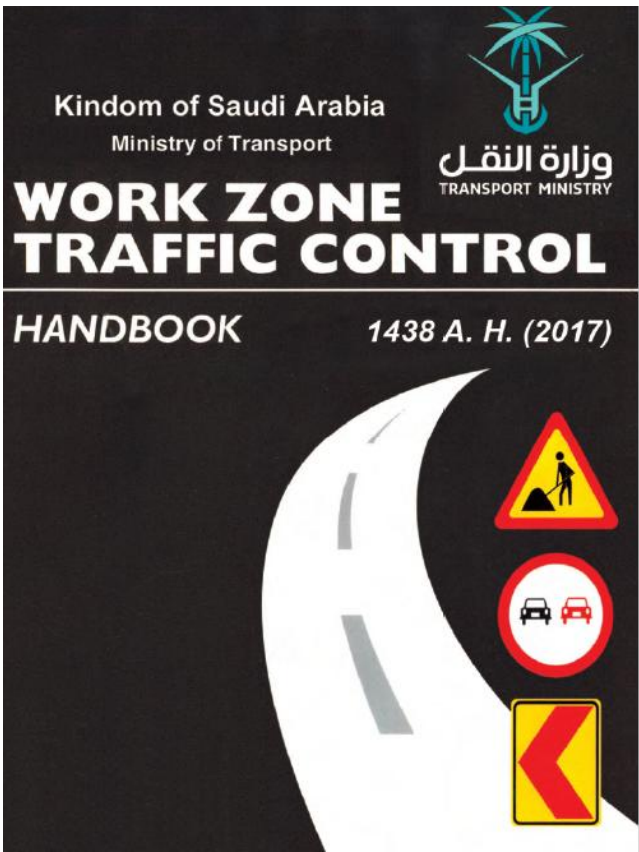
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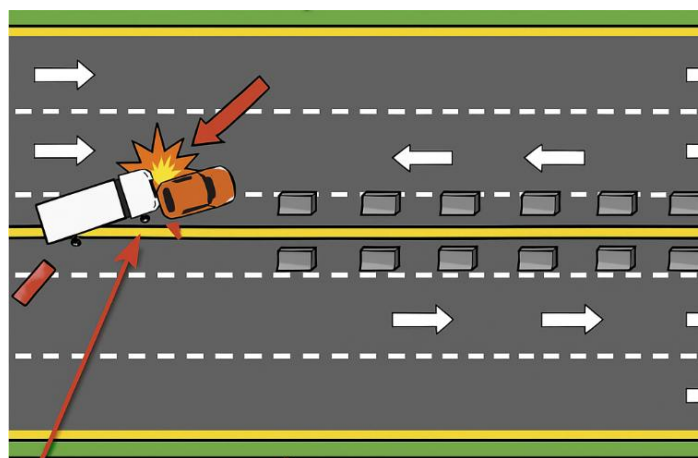
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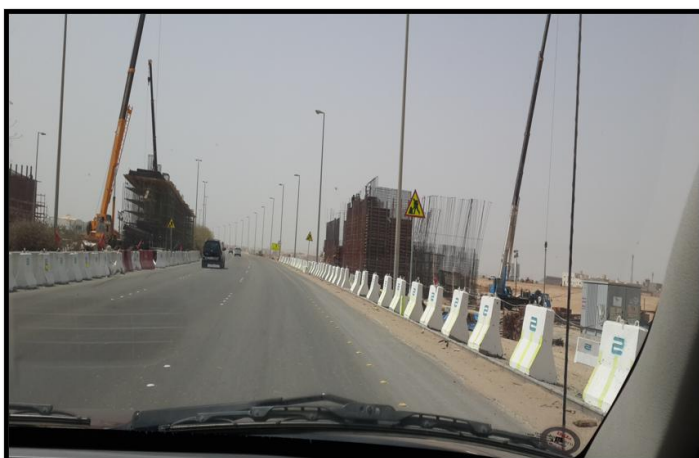
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4 fatalities





LOSSES

ECONOMIC LOSSES

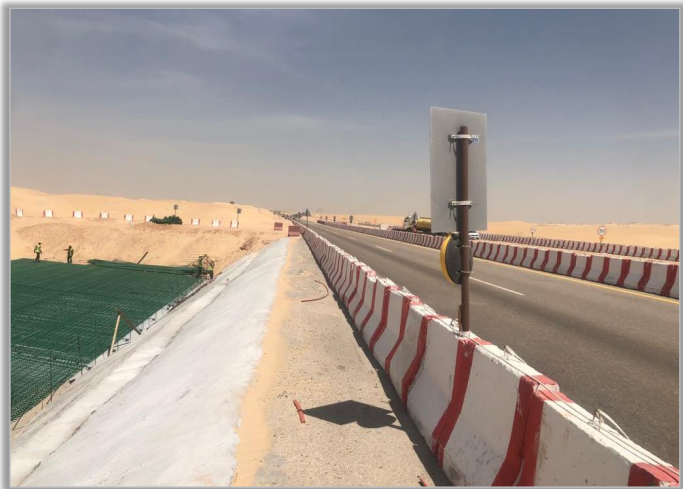
LOSS TYPE	PER UNIT COST (SAR)	TOTAL COST (SAR)
Single Fatality	5,127,171	20,508,684
Serious Injury	1,108,462	2,216,924
Minor Injury	60,929	15,076
Vehicle Damage (per unit)	7,538	-

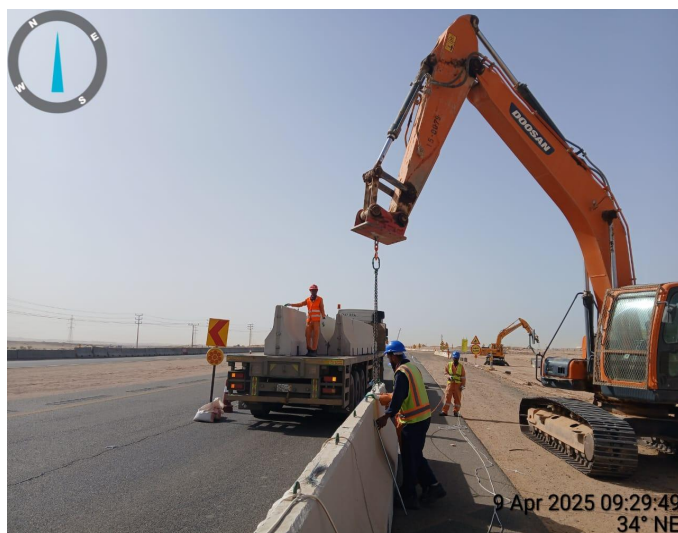
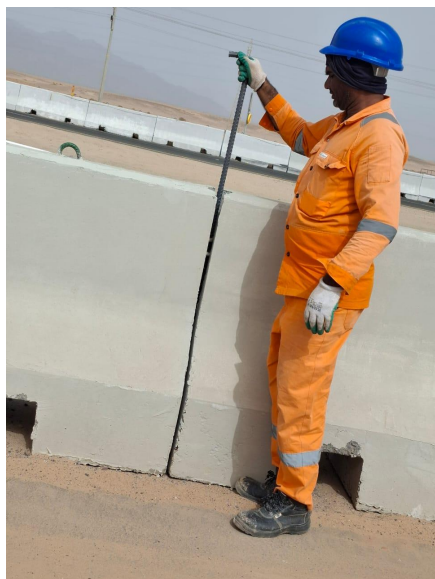
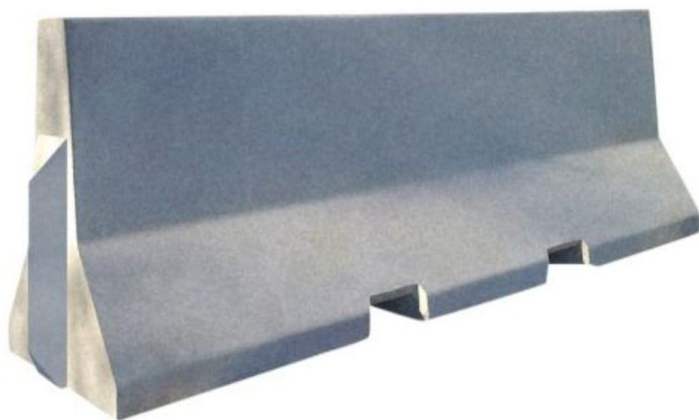
DIRECT LOSSES

5,971,262 SAR

INDIRECT LOSSES

16,771,722 SAR







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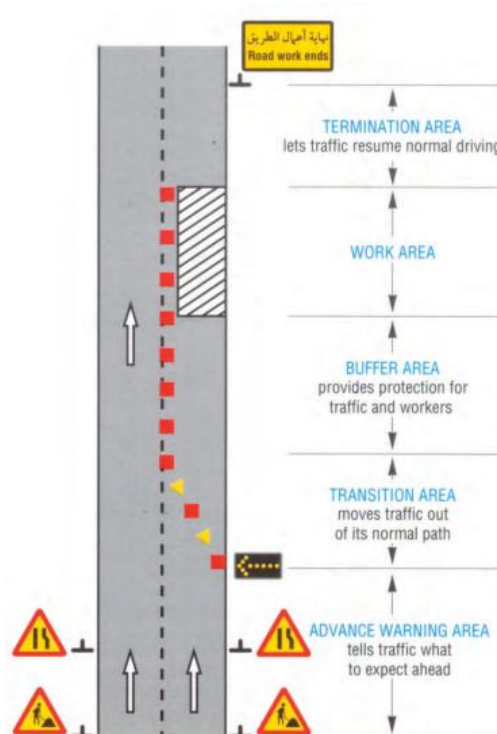
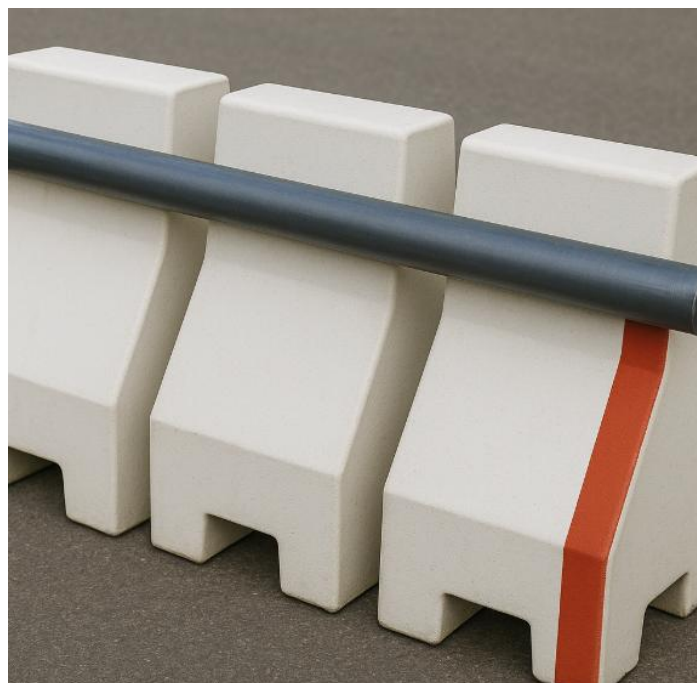
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“What is ONE thing you remember from our last session?”



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The Five Principles of Work Zone Traffic Management

مبادئ إدارة التحكم المروري



1. Prioritize Road Safety

Make traffic safety a fundamental element in every project.

1. اعتبار السلامة المرورية عنصرًا أساسيًا في كل مشروع.

2. Minimize Congestion and Disruption

Reduce delays and maintain smooth traffic flow as possible.

2. تقليل الازدحام ومنع إعاقة حركة المرور قدر الإمكان.

3. Provide Clear and Positive Guidance

Direct drivers with clear, visible, and understandable signs

3. توجيه سائقي المركبات بطريقة واضحة وإيجابية.

4. Conduct Routine Inspections

Regularly check and maintain traffic control devices

4. تنفيذ عمليات فحص دورية لعناصر التحكم المروري والتشغيل.

5. Maintain High Roadside Safety Standards

Continuously ensure safety along clear Zone

5. الحفاظ على مستوى عالٍ من السلامة على جانب الطريق باستمرار.



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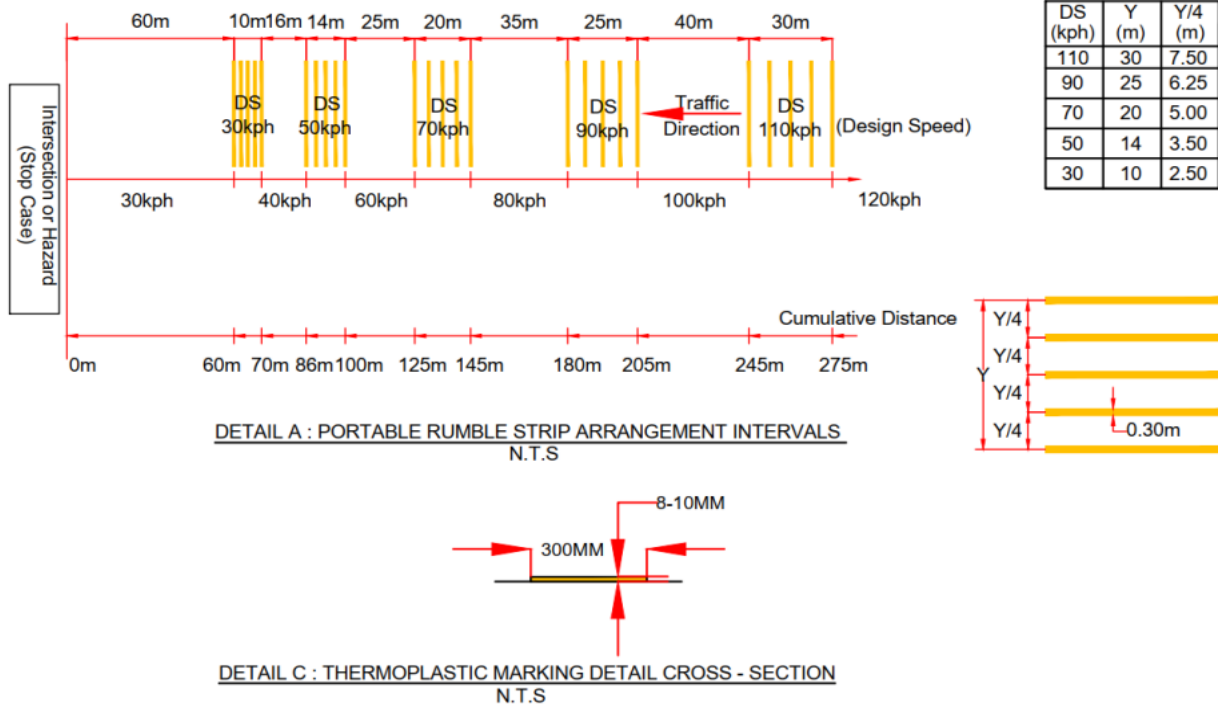


•► First: Early Warning Area

The importance of this area lies in alerting drivers to the changes in the road due to the work, and guiding them on what actions they need to take.

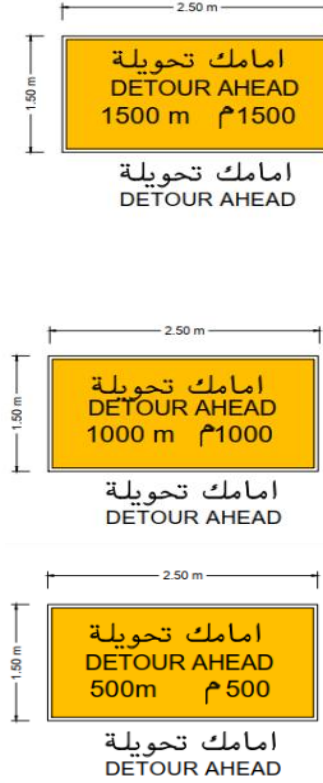
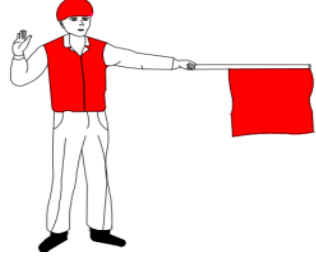
The early warning area consists of:

1. "Detour Ahead" signs (equipped with lighting and reflective elements for nighttime visibility)
2. Speed reduction signs for entry into the detour
3. Warning signs indicating roadworks or a change in road path
4. Rumble strips
5. Flag holder





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الطريق يضيق من اليمين
ROAD NARROW ON RIGHT
الحد الأقصى للسرعة
SPEED LIMIT



منطقة عمل
WORK AREA
الحد الأقصى للسرعة
SPEED LIMIT



منطقة عمل
WORK AREA
الحد الأقصى للسرعة
SPEED LIMIT



منطقة عمل
WORK AREA
الحد الأقصى للسرعة
SPEED LIMIT



الطريق يضيق من اليمين
ROAD NARROW ON RIGHT
الحد الأقصى للسرعة
SPEED LIMIT



منطقة عمل
WORK AREA
الحد الأقصى للسرعة
SPEED LIMIT



منطقة عمل
WORK AREA
الحد الأقصى للسرعة
SPEED LIMIT



منطقة عمل
WORK AREA
الحد الأقصى للسرعة
SPEED LIMIT



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1. Flaggers must be well trained and must be provided frequent relief during the flagging operation.
2. The flagger must wear a reflective safety vest and should be positioned at least 150 meters upstream of the work site.
3. Illumination must be provided when flaggers are operating during nighttime conditions.



"Provide a flag holder for detours on the asphalt surface."



- A. TO STOP TRAFFIC
- B. TRAFFIC PROCEED
- C. TO ALERT AND SLOW TRAFFIC





- A. TO STOP TRAFFIC
- B. TRAFFIC PROCEED
- C. TO ALERT AND SLOW TRAFFIC



- A. TO STOP TRAFFIC
- B. TRAFFIC PROCEED
- C. TO ALERT AND SLOW TRAFFIC





1) The first advance warning sign must meet the following criteria:

Distance to point where lane closure begins, or flagging position.

Divided Highway	1500 m.
Two Lane Highway	1000 m.

2) The spacing between advance warning signs must meet the following criteria.

Divided Highway	300 m.
Two Lane Highway	250 m.



► Second: Transition Area





► Second: Transition Area



This area is designated to divert traffic outside its natural

path

1. Illuminated arrow board
2. Place connected plastic New Jersey barriers in the transition area,
3. They must be continuous and function as a single unit.
4. Install warning signs (Chevron signs) at the transition area to help guide drivers.



Table 4-1 Taper Lengths (L) in Meters for Required Lateral Movement (SHC 602 (MUTCD))

Speed km/h	Distance in Meters Traffic has to be shifted Right (R) or Left (L)						
	1.5	2.5	2.75	3.0	3.25	3.5	3.65
30	9	15	16	17	19	20	22
35	11	20	22	24	26	28	30
40	15	26	28	31	34	36	39
45	20	33	36	39	42	46	49
50	24	40	44	48	52	56	60
55	29	49	54	48	63	68	73
60	35	58	64	70	75	81	87

Table showing the lengths of the
transition area based on lane width



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Table 4-1 Taper Lengths (L) in Meters for Required Lateral Movement (SHC 602 (MUTCD))

Speed km/h	Distance in Meters Traffic has to be shifted Right (R) or Left (L)						
	1.5	2.5	2.75	3.0	3.25	3.5	3.65
30	9	15	16	17	19	20	22
35	11	20	22	24	26	28	30
40	15	26	28	31	34	36	39
45	20	33	36	39	42	46	49
50	24	40	44	48	52	56	60
55	29	49	54	48	63	68	73
60	35	58	64	70	75	81	87
65	41	68	75	82	88	95	102
70	65	109	120	131	141	152	163
75	70	117	128	140	152	163	175
80	75	124	137	149	162	174	186
85	79	132	145	158	172	185	198
90	84	140	154	168	182	196	210
95	89	148	162	177	192	207	221
(100) exceptional	93	155	171	186	202	218	233



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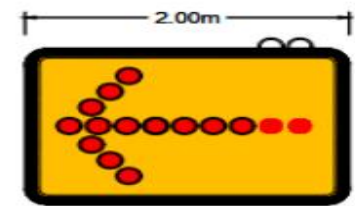
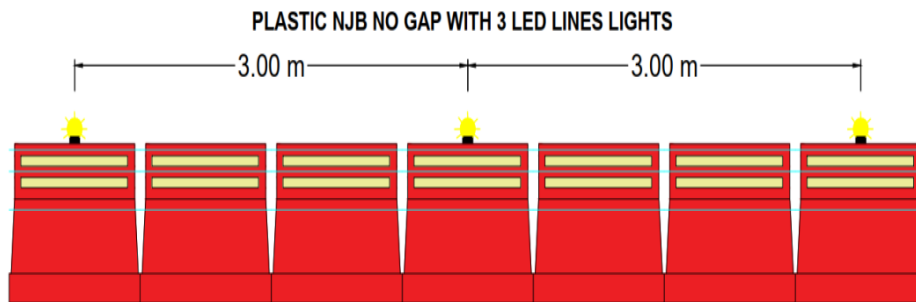


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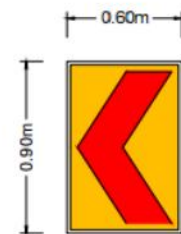


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سهم مضئ
FLASH ARROW



شيفرون
CHEVRON



• Chevron Sign

The Chevron sign should be used on curves and tapers to supplement other devices and provide additional emphasis and guidance for the motorist. Spacing shall be such that at least three Chevron signs are always visible to the motorist. Chevron signs shall be mounted on flexible supports.



Purpose:

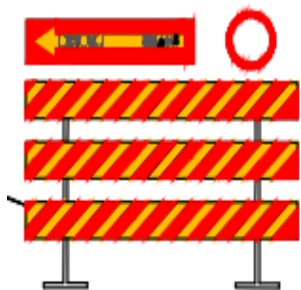
1. Provide buffer area to separates traffic from the work area,
2. providing space to assist drivers who have lost control of their vehicle and to protect workers on the road.

Key Guidelines:

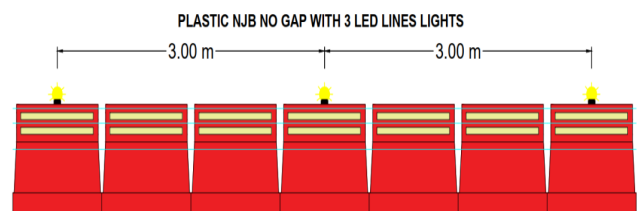
1. The buffer zone should not be less than **280 meters**
2. and should be established using **connected plastic barriers**.
3. A **crash attenuator (TMA) and truck** should be placed at the buffer zone to absorb potential collisions.

Compenents:

1. Connected barriers
2. Barricade
3. TMA (Truck Mounted Attenuator)



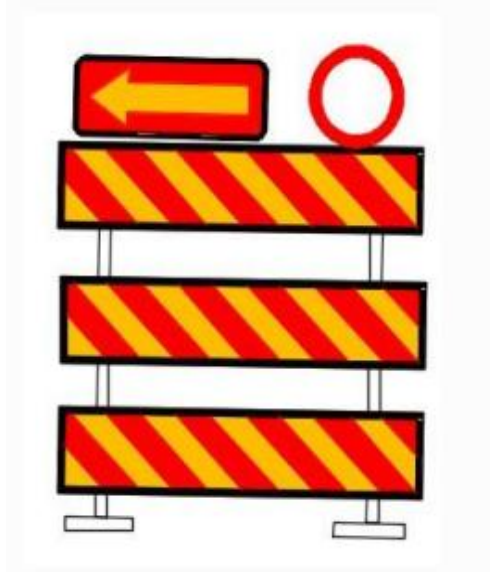
"An image showing the shape (barricade)"



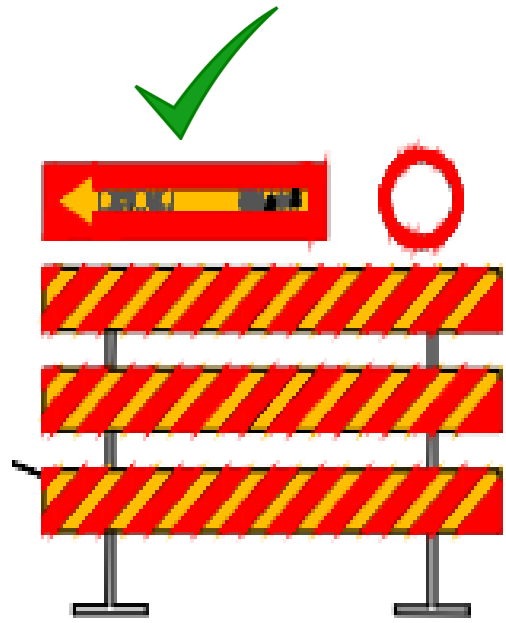
"An image showing a vehicle equipped with a crash attenuator (TMA)"



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A



B

BARRICADES TYPE II
WITH DETOUR ARROW
MOUNTED ON IT.



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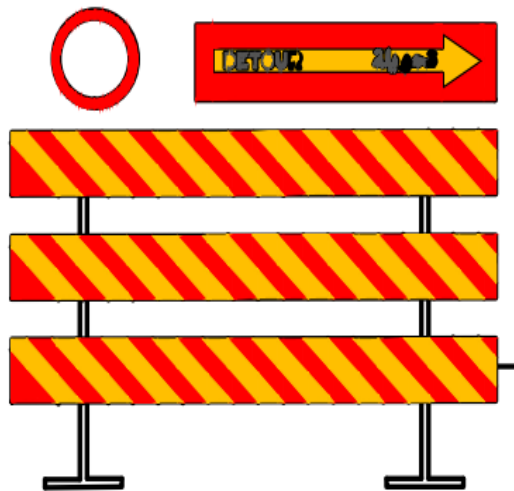
A



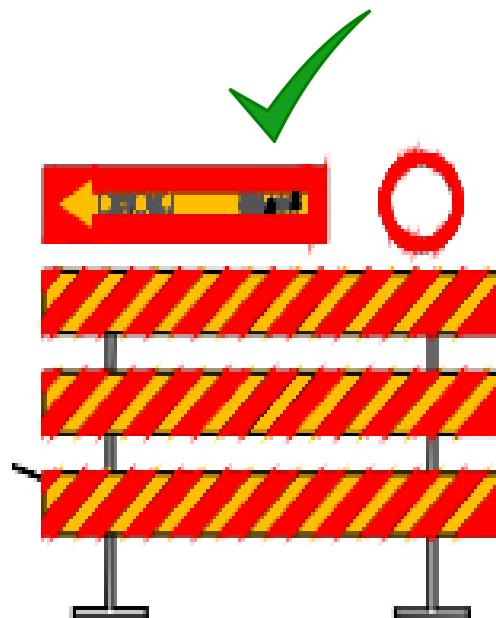
B



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A



B

Right ?



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A



B

ايهما الايمن ؟



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TMA Requirements :



- 1.The device must comply with international testing standards and specifications (such as NCHRP 350, KENI117, MASH16, and/or TLR3 - Test Level 3).
- 2.These devices must be generally designed to reduce collisions from vehicles weighing up to 2,000 kg at a speed of 110 km/h.
- 3.The truck on which the crash attenuator is mounted must be equipped with full control tools that allow complete operation of the attenuator and the arrow board from inside the vehicle cabin. These controls must be within easy reach of the truck driver.
- 4.The weight of the truck on which the crash attenuator is mounted must not be less than ten (10) tons.



T.M.A

Fourth: Work Area



Fourth: Work Area

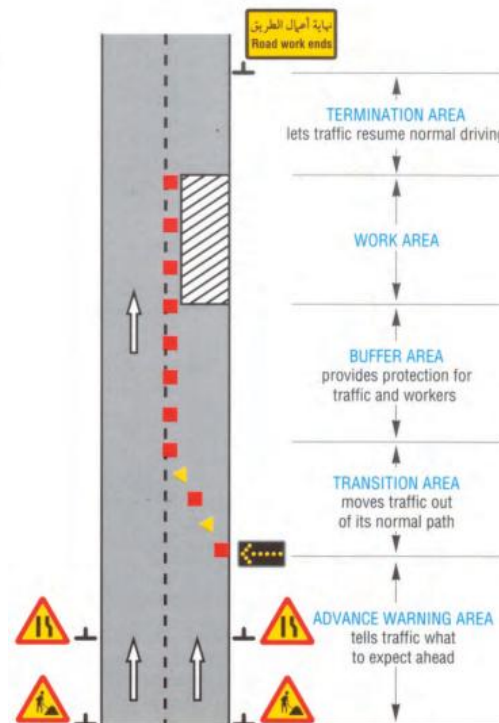


* Symbols used in typical application diagrams.



The area where the work is carried out.

1. It is usually preferred to protect this area with **connected concrete barriers**, especially in locations with **high slopes / Depths**.
2. **Warning signs** should be placed to indicate **ongoing roadworks and the speed limit within the work area**.



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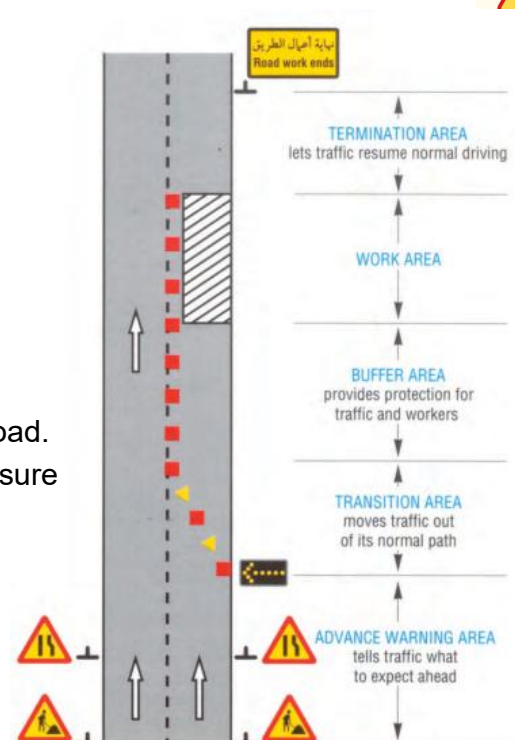
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Fourth: Work Area



1. On **divided highways**, it is **preferred** to use a **positive barrier** to separate traffic from the **Work Space**.
2. **Concrete portable crashworthy safety barriers** are an example of positive barriers.
3. These barriers:
 - **Prevent vehicles** from entering the work zone.
 - **Minimize injuries** to vehicle occupants.
4. A **positive barrier** should also be considered when there is a **significant elevation difference** between the work space and the road.
5. **Concrete barrier sections** must be **connected continuously** to ensure they act as a **single unit**.
6. The positive barrier must be **supplemented** with:
 - **Standard delineators**
 - **Channelizing devices**
 - Or **pavement markings**



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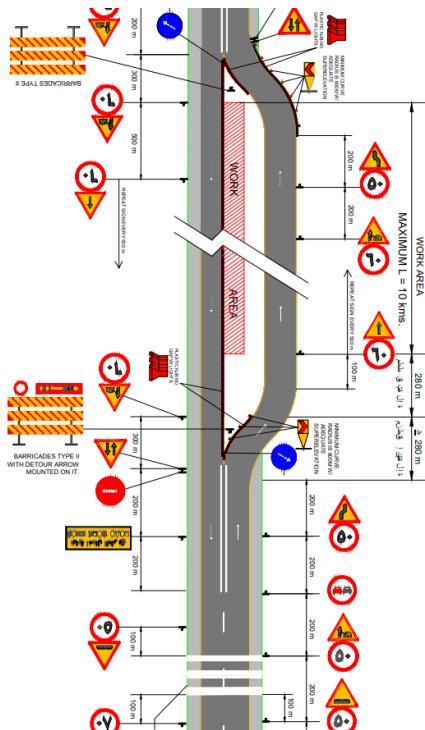
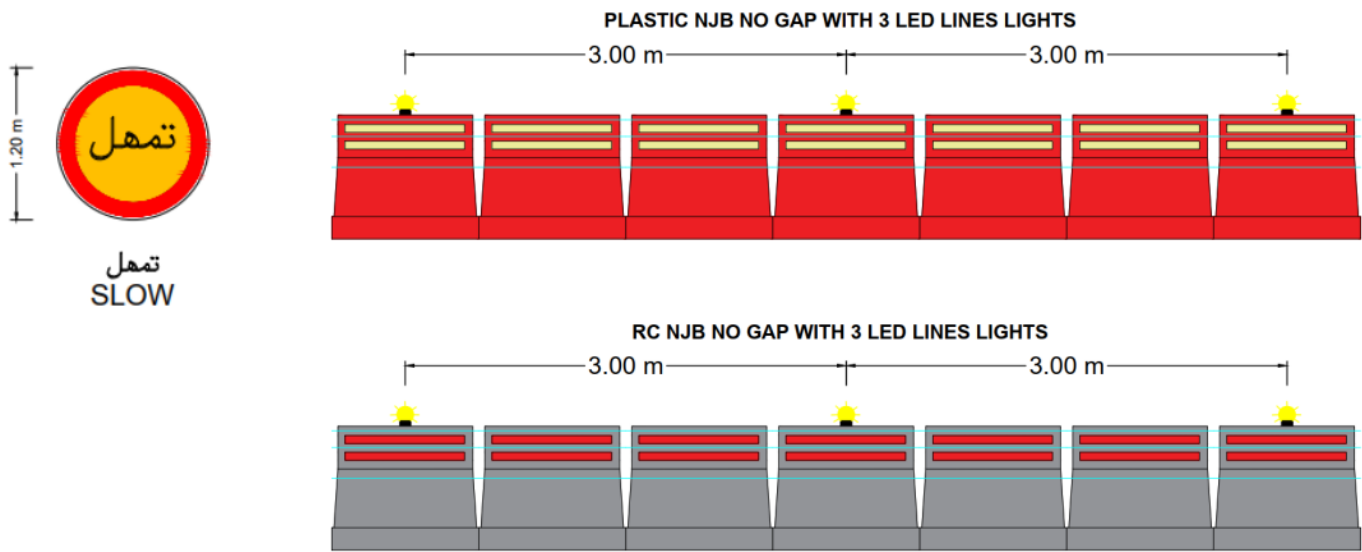


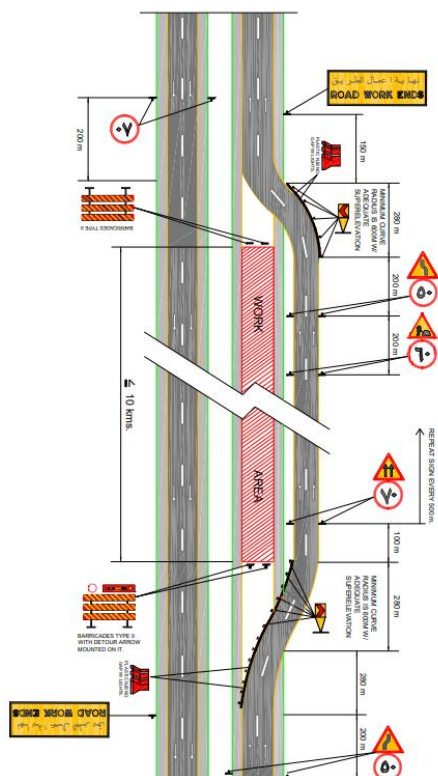
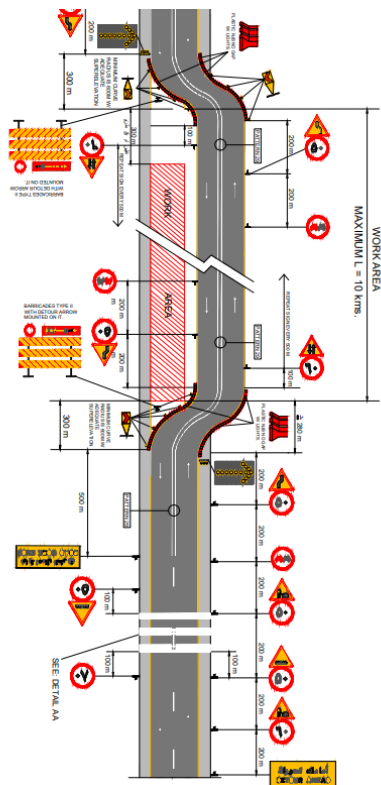
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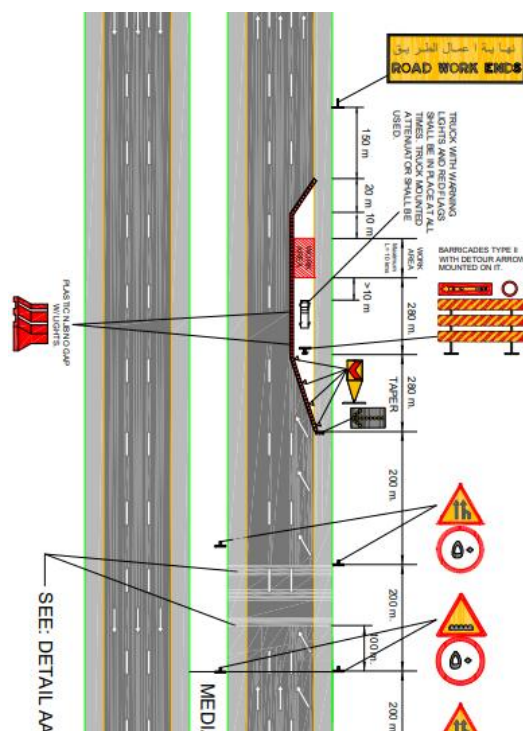




Fifth: End-of-Work Zone

Notes to consider in end-of-work zones:

1. The **downstream end** of the work site may require a **closure taper**.
2. Purpose: To **reduce the chance** of a vehicle from the opposite direction entering the work zone at **high speed**.
3. The **standard closure distance**, including the taper, is typically **50 meters** from the work site.
4. A **terminal taper** is not typically required on **divided roads**.



Steps for Detour Installation

1. Prepare a plan before starting detour works.
2. Ensure the availability of all detour materials and installation equipment.
3. Workers must be equipped with safety clothing including reflective vests and helmets.
4. Train workers on the importance of safety at the work site.
5. Coordinate with relevant authorities to regulate traffic.
6. Ensure equipment movement does not interfere with traffic flow.

Detour Removal Procedure

- Coordinate with the relevant authorities to manage traffic flow.
- Remove the detour uniformly, starting from the end of the detour.
- Clean the site of all debris and waste before reopening traffic.
- Remove all temporary road markings to avoid confusion for road users.



What is the issue ?



Early Warning Zone



What is the issue ?



Equipment operating on the asphalt surface without sufficient protection





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What is the issue ?



Equipment operating on the asphalt surface without sufficient protection



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What is the issue ?



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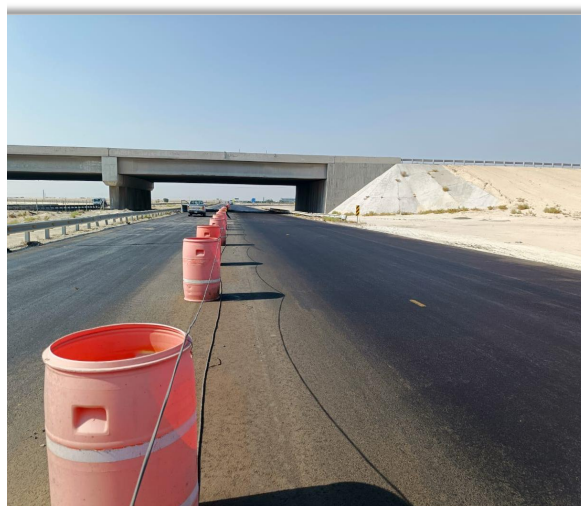
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What is the issue ?



What is the issue ?



Work area zone



Roadside safety requires constant attention during construction.

1. In order to accommodate disabled vehicles, or other emergency situations, it is desirable to provide a clear roadside recovery area that is as wide as practical.
2. All construction equipment, materials, and debris shall be stored more than five (5) meters from the edge of the travel lane. Preferably, a ten (10) meter clear space should be provided at divided highway work sites. R



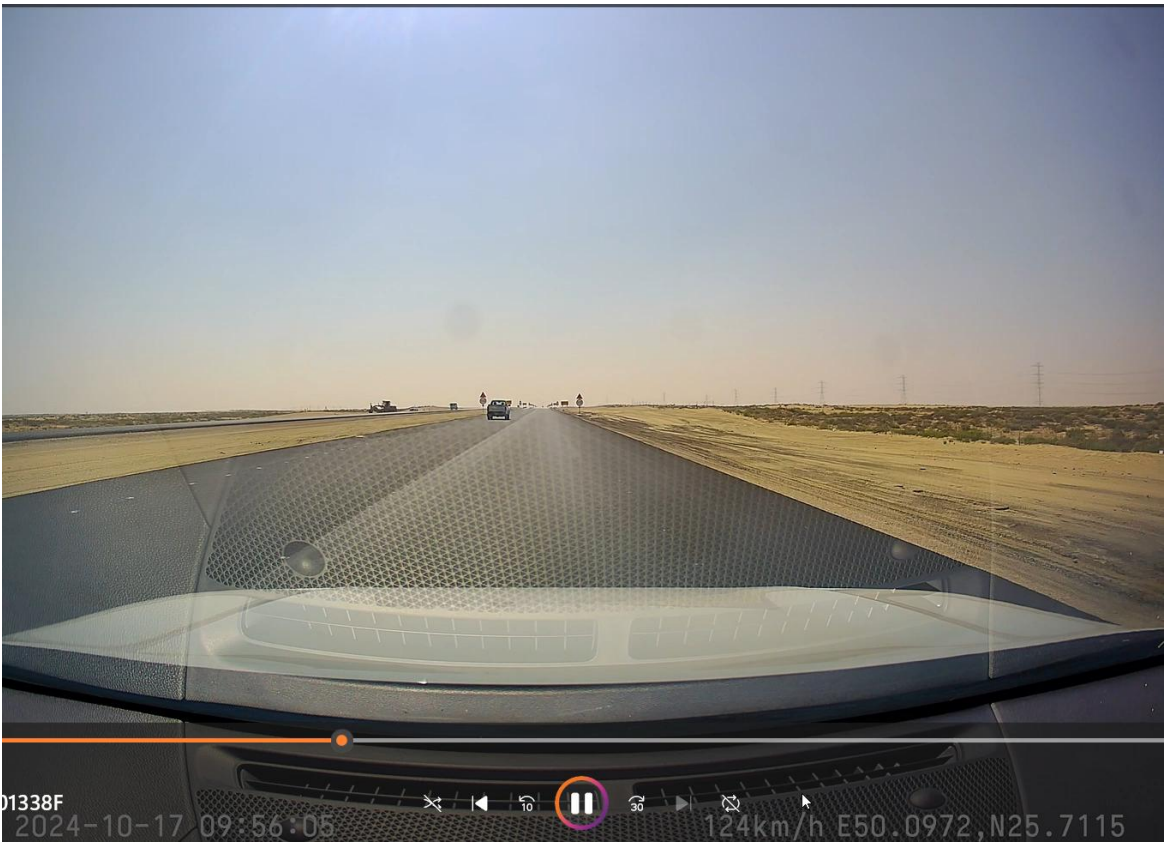
Standing equipment near the asphalt surface without proper protection.



Install a rear warning sign on all equipment



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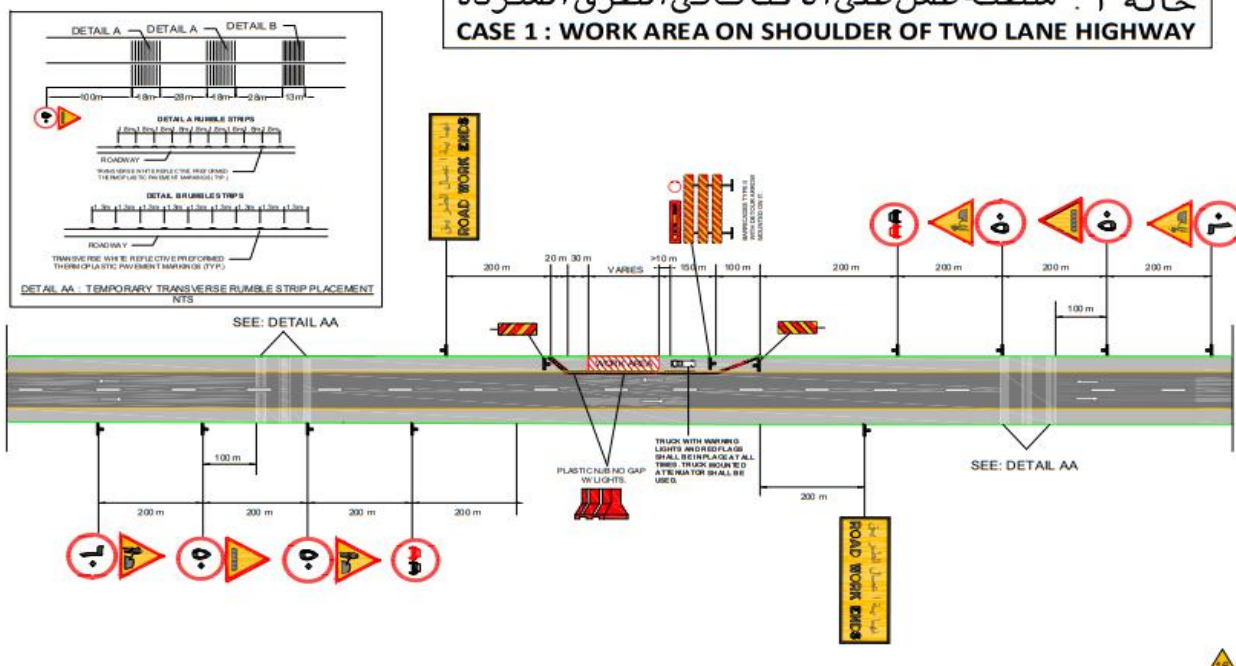
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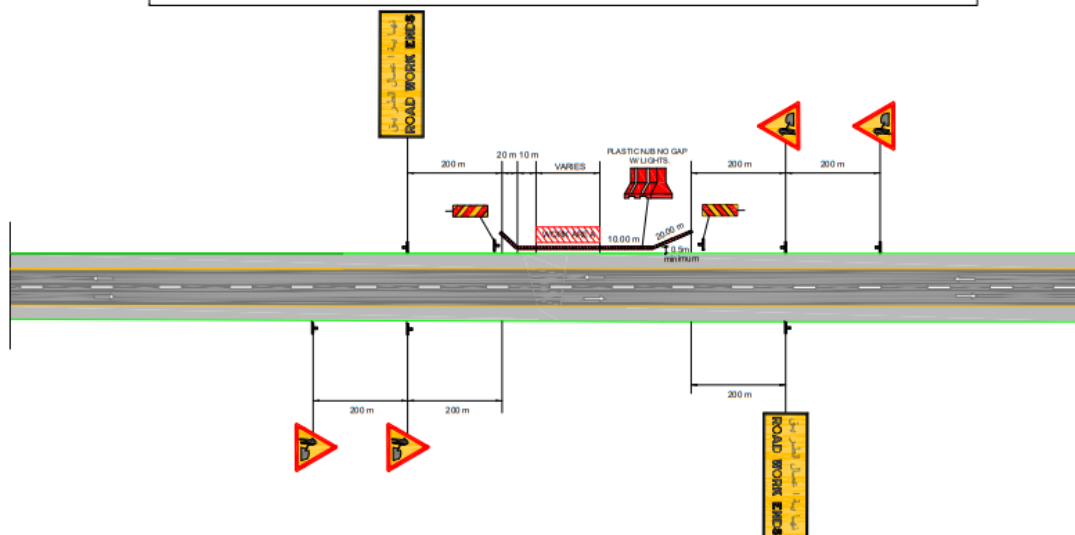
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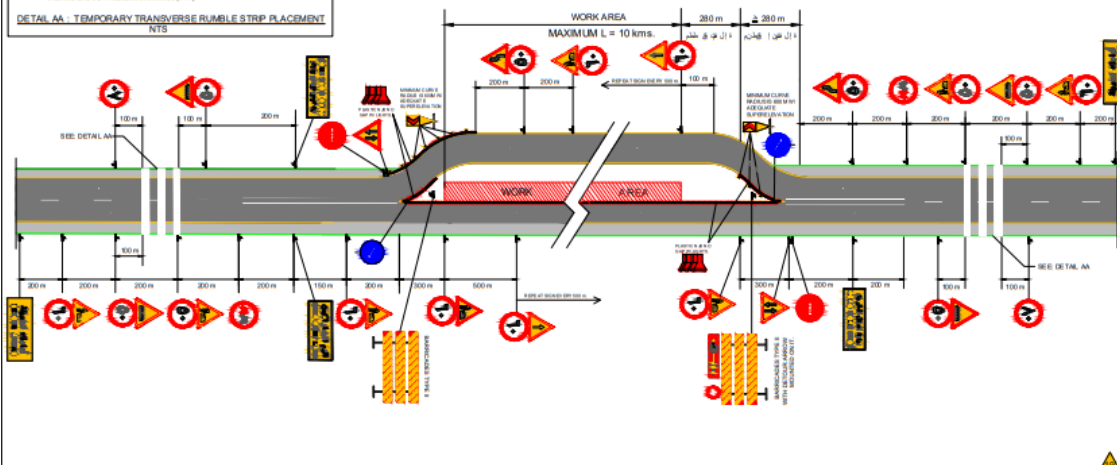
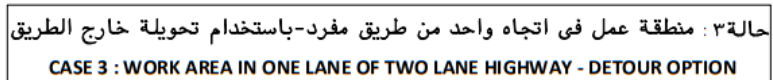
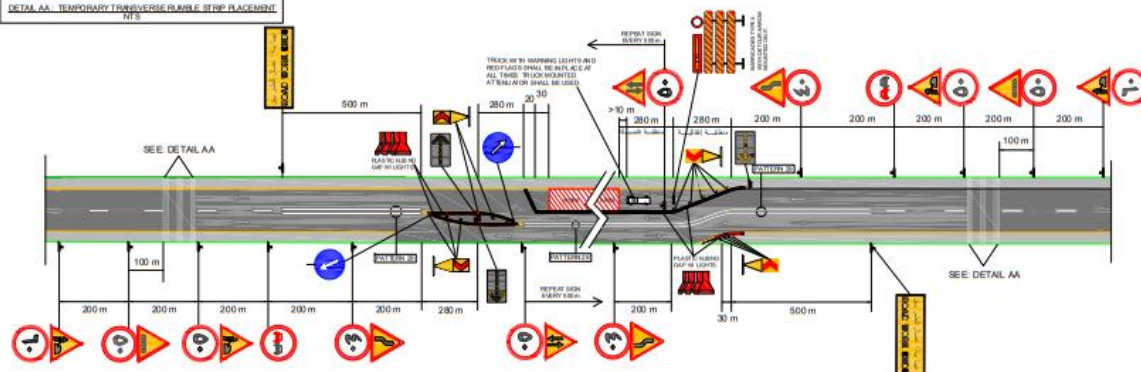


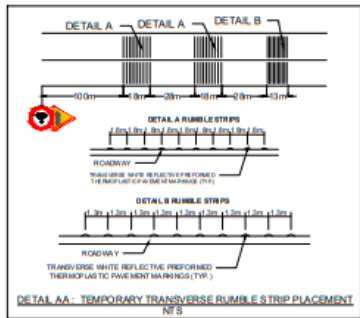
CASE 1: WORK AREA ON SHOULDER OF TWO LANE HIGHWAY



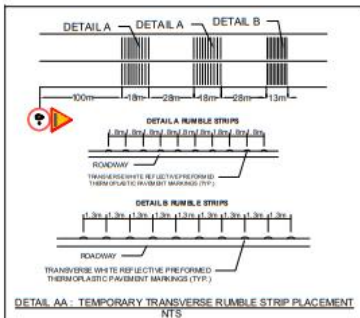
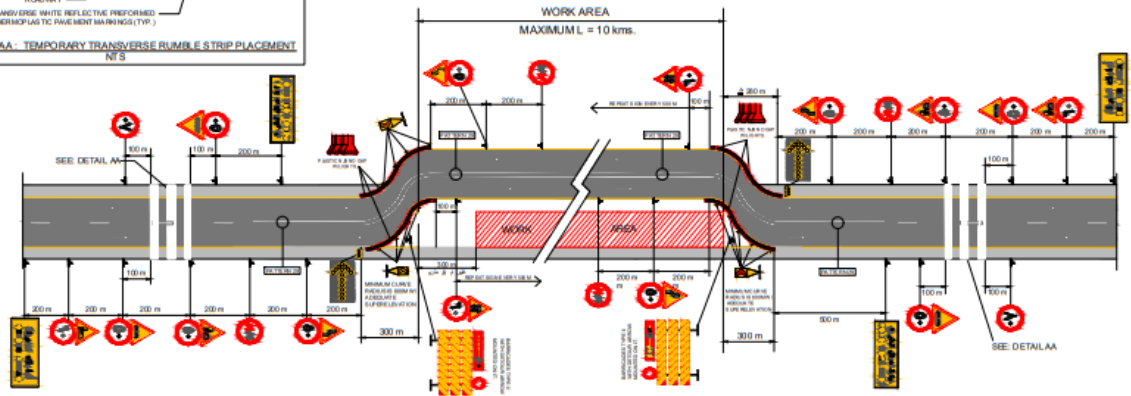
حالة ١١: منطقة عمل بجانب الاكتاف في الطرق المفردة



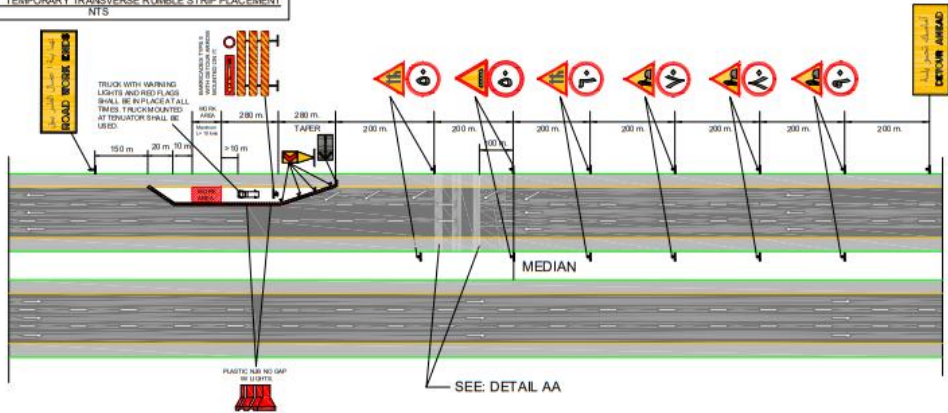




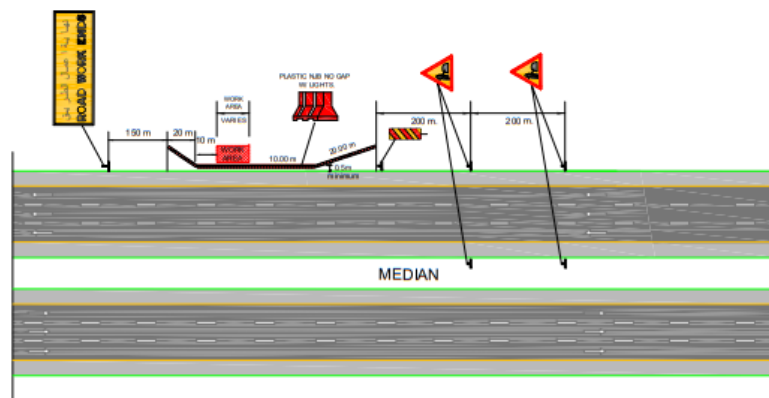
حالة ٤: منطقة عمل في كامل عرض الطريق من طريق مفرد استخدام تحويلية جانبية خارج الطريق لتحويل حركة المرور
CASE 4.) WORK AREA IN BOTH LANES OF TWO LANE HIGHWAY AND USE OF A TEMPORARY DETOUR.



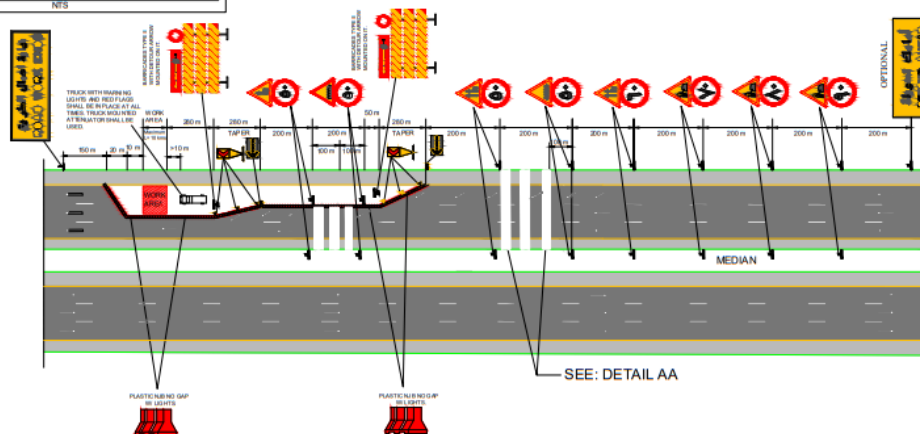
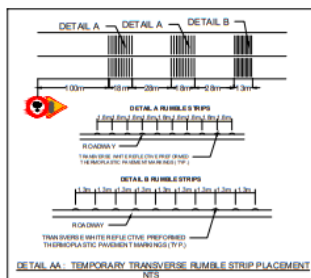
حالة ٥: منطقة عمل في مسار واحد من طريق سريع / مزدوج
CASE 5: WORK AREA IN ONE LANE OF DIVIDED HIGHWAY

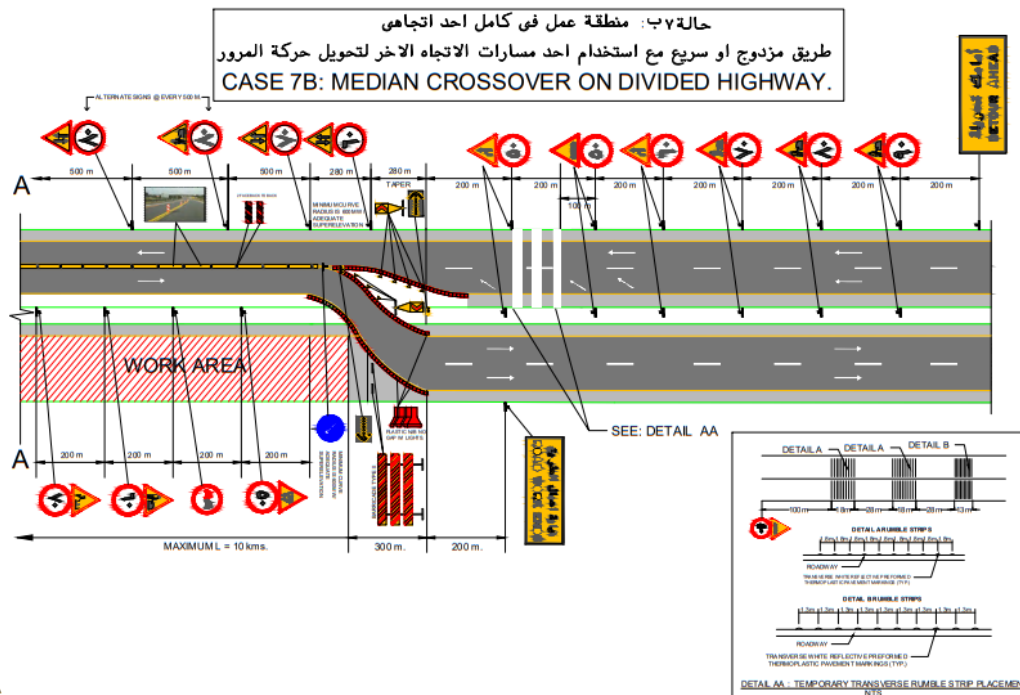
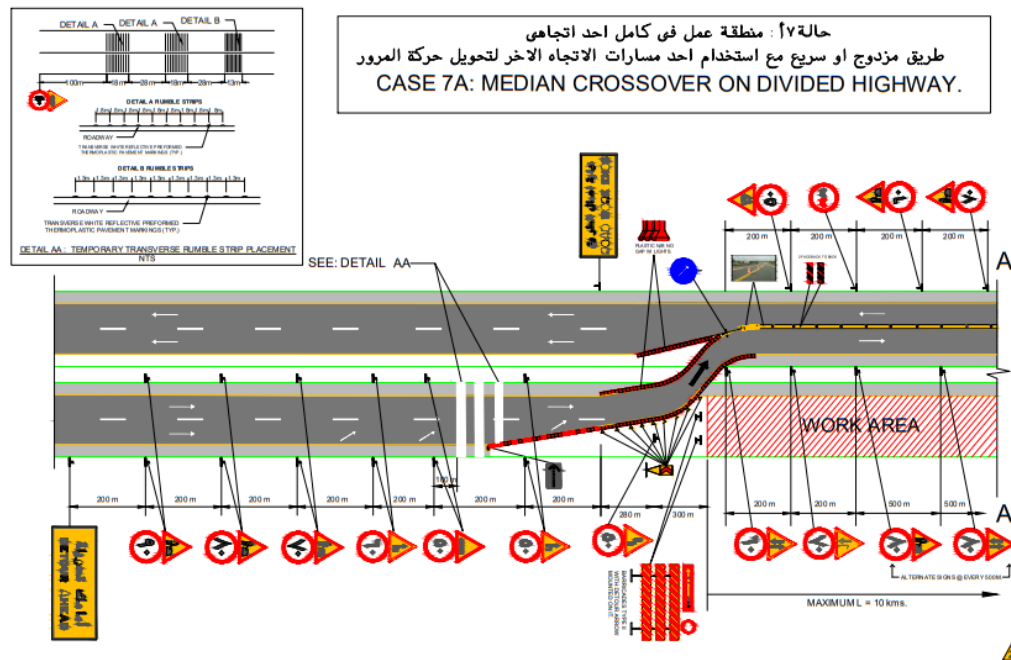


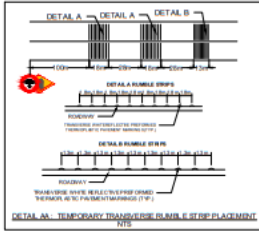
CASE 5A: WORK AREA OUTSIDE THE SHOULDER OF DIVIDED HIGHWAY.



CASE 6: WORK AREA IN TWO LANES OF DIVIDED HIGHWAY.

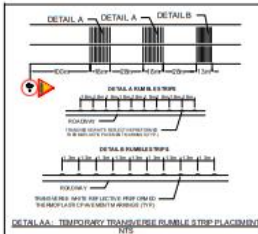
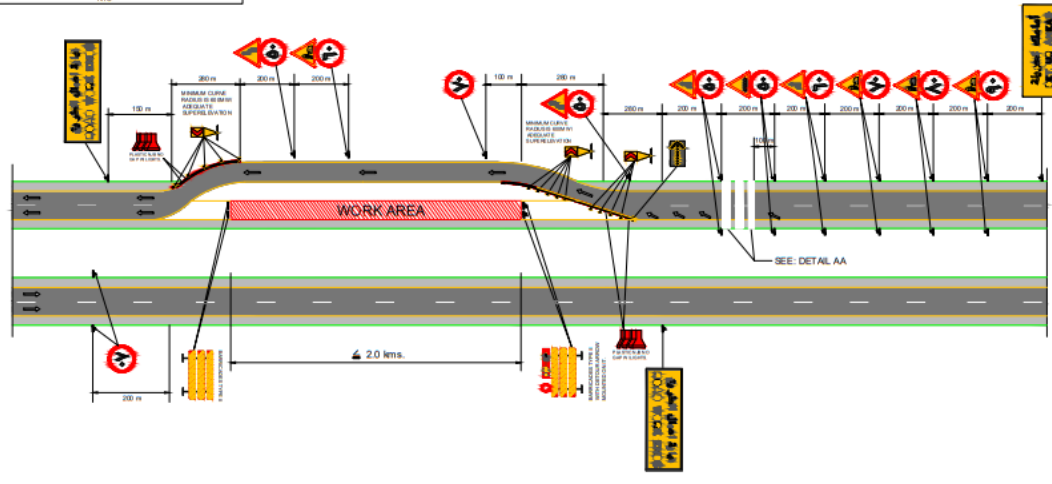






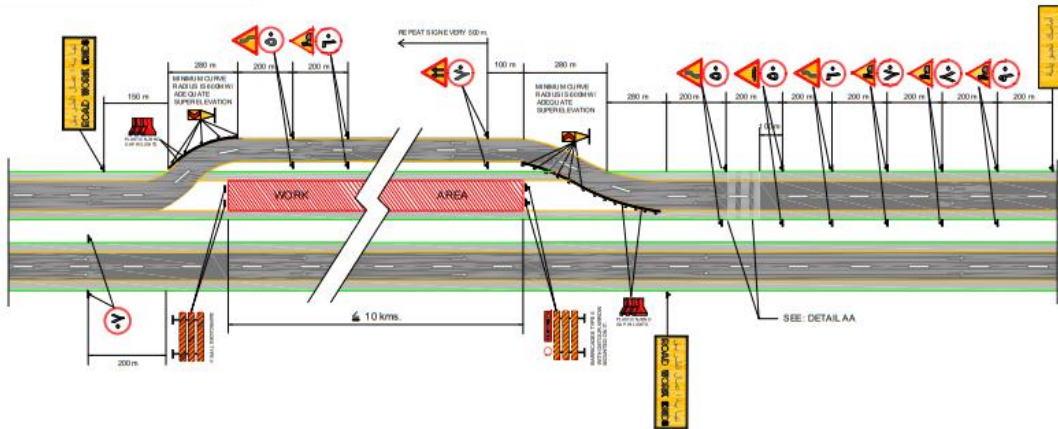
حالة ٨ : منطقة عمل في كامل احد اتجاهي طريق مزدوج
استخدام تحويلية جانبية بمسار واحد بطول ٢ كم او اقل - خارج الطريق لتحويل حركة المرور

CASE 8 : WORK AREA $\leq$ 2.0 kms. IN LT. OR RT. CARRIAGEWAY OF DIVIDED HIGHWAY - DETOUR OPTION.



حالة ٩ : منطقة عمل في كامل احد اتجاهي طريق مزدوج
استخدام تحويلية بمسارين جانبية خارج الطريق لتحويل حركة المرور

CASE 9: WORK AREA $\leq$ 10 kms. IN LT. OR RT. CARRIAGEWAY OF DIVIDED HIGHWAY - DETOUR OPTION.





“What is ONE thing you remember from our last session?”

“What is THE Number of Code for work Zones?”

No.	Thematic Category	Code	Title
1	Introduction	SHC 101	General
2	Planning and Preliminary Studies	SHC 201	Planning Process
3		SHC 202	Surveying and Mapping
4		SHC 203	Preliminary Studies
5	Design of Highways, Bridges and Tunnels	SHC 301	Highway Geometric Design
6		SHC 302	Highway Facilities and Utilities Design - Hydrology and Hydraulic Design
7		SHC 303	Highway Facilities and Utilities Design - Rest Areas, Truck Inspection Stations, Parking & Garage Facilities
8		SHC 304	Highway Facilities and Utilities Design - Passive Safety Systems Design
9		SHC 305	Highway Facilities and Utilities Design - Work Zone Design
10		SHC 306	Highway Facilities and Utilities Design - Public Utilities, Highway and Street Lighting, Control and Monitoring Devices
11		SHC 307	Highway Facilities and Utilities Design - Landscape Planting, Outdoor Advertising
12		SHC 308	Pavement Design
13		SHC 309	Material Specifications and Standardized Testing
14		SHC 310	Bridges and Tunnels Design
15	Construction of Highways, Bridges and Tunnels	SHC 401	Construction of Highways
16		SHC 402	Construction of Bridges and Tunnels
17		SHC 403	Construction of Highway Facilities
18	Highways, Bridges and Tunnels Maintenance and Management Systems	SHC 501	Pavement Maintenance Management Systems
19		SHC 502	Bridges and Tunnels Maintenance and Management Systems
20		SHC 503	Highway Facilities Maintenance and Management Systems
21	Traffic Engineering and Road Safety	SHC 601	Traffic Engineering
22		SHC 602	Manual on Uniform Traffic Control Devices
23		SHC 603	Road Safety
24	Environmental Aspects of Highways	SHC 701	Environmental Aspects of Highways
25	Autonomous Vehicles Requirements	SHC 801	Autonomous Vehicles Requirements



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1. Prioritize Road Safety

Make traffic safety a fundamental element in every project.

1. اعتبار السلامة المرورية عنصراً أساسياً في كل مشروع.

2. Minimize Congestion and Disruption

Reduce delays and maintain smooth traffic flow as possible.

2. تقليل الازدحام ومنع إعاقة حركة المرور قدر الإمكان.

3. Provide Clear and Positive Guidance

Direct drivers with clear, visible, and understandable signs

3. توجيه سائقي المركبات بطريقة واضحة وإيجابية.

4. Conduct Routine Inspections

Regularly check and maintain traffic control devices

4. تنفيذ عمليات فحص دورية لعناصر التحكم المروري والتشغيل.

5. Maintain High Roadside Safety Standards

Continuously ensure safety along clear Zone

5. الحفاظ على مستوى عالٍ من السلامة على جانب الطريق باستمرار.



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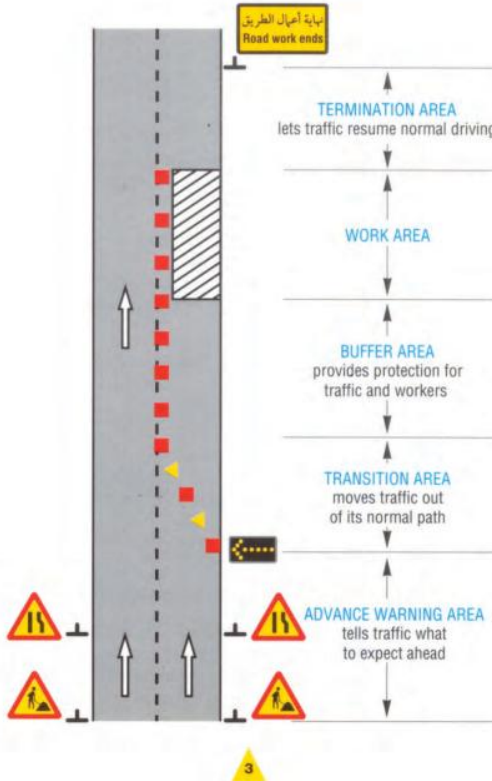
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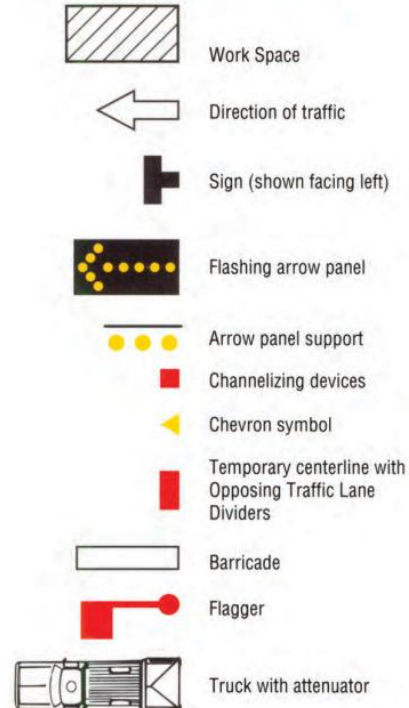
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• Symbols used in typical application diagrams.



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1. Chapter 1. Introduction - This chapter provides an overview of the chapters
2. Chapter 2. General Work Area Requirements/Fundamentals
3. Chapter 3. Temporary Traffic Signage
4. Chapter 4. Work Zone Principles
5. Chapter 5. Temporary Pavement Markings.
6. Chapter 6. Lighting Devices - This chapter describes the standard lighting and flashing devices that are deemed necessary for improving safety and traffic conditions in work areas, especially at night.
7. Chapter 7. Control of Traffic through Work Areas
8. Chapter 8. Selection and Use of Traffic Control Devices
9. Chapter 9. Typical Methods of Traffic Control through Work Areas



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1. Introduction
2. Work Zone Requirements / Basics
3. Traffic Signs
4. Work Zone Principles
5. Pavement Markings and Lines
6. Lighting Devices
7. Traffic Control Within Work Zones
8. Selection and Use of Traffic Control Devices
9. Typical Traffic Control Plans for Work Zones

1. المقدمة

2. متطلبات منطقة أعمال الطرق / الأساسيات

3. اللوحات الإرشادية

4. مبادئ منطقة أعمال الطرق

5. العلامات والخطوط الأرضية

6. أجهزة الإنارة

7. التحكم المروري داخل مناطق أعمال الطرق

8. اختيار واستخدام أجهزة التحكم المروري

9. الطرق النموذجية للتحكم المروري داخل مناطق أعمال الطرق



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Section (3): Signs

الباب (3): اللوحات

3.1 Sign Design

١-٣: تصميم اللوحات

3.2 Lighting and Reflectivity

٢-٣: الإضاءة والانعكاسية

3.3 Sign Placement

٣-٣: موقع تثبيت اللوحات

3.4 Sign Mounting

٤-٣: تركيب وتعليق اللوحات

3.5 Temporary Signs

٥-٣: اللوحات المؤقتة

Signing Standards

What are the minimum and maximum dimensions for standard sign sizes according to speed limits?

Table 4-11 Standard Sign Sizes in Work Zones (Public Works Authority, 2015)

Speed Limit (km/h)	Minimum Diameter / Height Circular / Triangular signs (mm)	Worded signs Aleph letter / x-height (mm)	Minimum forward visibility (m)
≤ 50	600	130 / 75	60
51 - 80	750	170 / 100	75
81 - 100	900	255 / 150	100



3.1. Design of Signs

١-٣ تصميم اللافتات:

Table 7-2 Standard Character Sizes in Work Zones Signs (Qatar WZTMG – Rev 1.2)

85 th Percentile Speed (km/h)	Advance Directional Guide Signs / Far Advanced Directional Guide Signs		Directional Guide Signs		Route Confirmation Guide Signs	
	Aleph- height (mm)	x-height (mm)	Aleph- height (mm)	x-height (mm)	Aleph- height (mm)	x-height (mm)
≤ 45	170	100	130	75	130	75
> 45 - 60	170	100	130	75	130	75
> 60 - 80	255	150	170	100	170	100
> 80 - 100	340	200	255	150	255	150
> 100	425	250	340	200	340	200

SHC 602

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Key Standards for Work Zone Signs (Highways/Streets)

1. Categories:

- Work zone signs are classified into:
 - Warning signs
 - Regulatory signs
 - Informative signs

2. Design Standards:

- Shapes must follow standard highway sign shapes.
- Colors:
 - Warning & regulatory signs: **black legend, yellow background, red border**
 - Informative signs: **black legend and border, yellow background**

3. Materials:

- Must be durable, lightweight, and weather-resistant
- Acceptable: **Aluminum, Aluminum Composite, Glass-Reinforced Plastic (GRP)**
- Not allowed: **Steel, Wood, Plywood, Cardboard, Flexible plastic**

4. Reflectivity & Visibility:

- Must be **clearly visible at night**
- Use **retroreflective sheeting** matching permanent sign standards

5. Mobility:

- Signs must be **easy to remove or cover** when not in use



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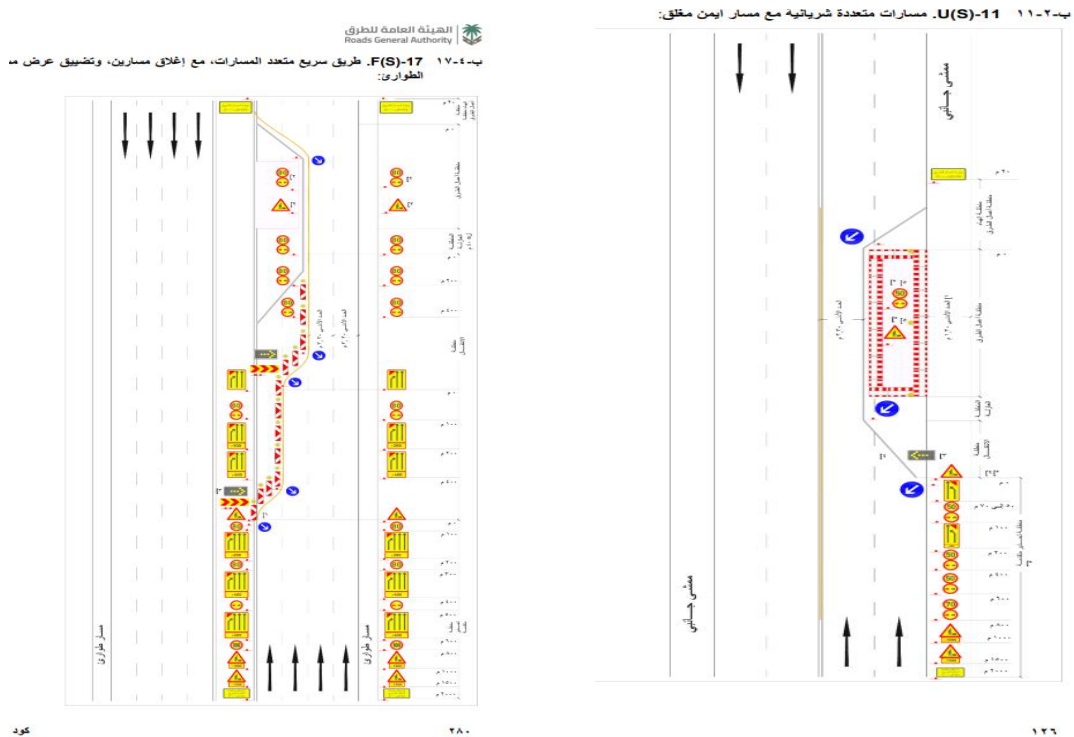
According to the Saudi Road Code, and while preparing a **Traffic Management Plan** for a **dual carriageway**, what is the correct procedure for placing **early warning signs** considering the road type (highway, urban, rural)?

- ☐ A) Early warning signs must be installed on all road types (highway, urban, rural) in both directions
- ☐ B) On highways: signs must be placed in both directions; on urban and rural roads: only in the direction of traffic flow
- ☐ C) Signs are only placed in both directions if one full direction is closed
- ☐ D) In urban roads: signs in one direction; in rural and highways: both directions
- ☐ E) Signs are placed in one direction only for all road types without distinction

☒ **Correct Answer: (B)**

✦ Based on the standard models in the Saudi Road Code:

- On **dual carriageway highways**, early warning signs must be installed in **both directions**
- On **urban and rural roads**, it is sufficient to install the signs in the **direction of traffic flow only**



- Signs must be placed for **maximum visibility** and driver reaction time.
- Default location: **right-hand side** of the road.
- For added emphasis (e.g., multi-lane highways): **duplicate signs** on both left and right sides.
- In work zones (e.g., lane/shoulder closures):
 - Signs may be placed on **portable supports** on the roadway itself.
 - If not passively safe, use **Vehicle Restraint Systems (VRS)** for protection.
- Signs may also be mounted on **barricades**.
- Minimum mounting height: **1.5 meters above pavement** for temporary signs.
 - **Higher mounting heights are recommended** when possible.

1. Fixed signs $\leq 1 \text{ m}^2$ → Mounted on **single post**
2. Fixed signs $> 1 \text{ m}^2$ → Mounted on **two posts**
3. **Portable supports** are suitable for **temporary use**
4. All mounts must be **impact-yielding** to reduce driver hazard

3.5. Mounting of Signs

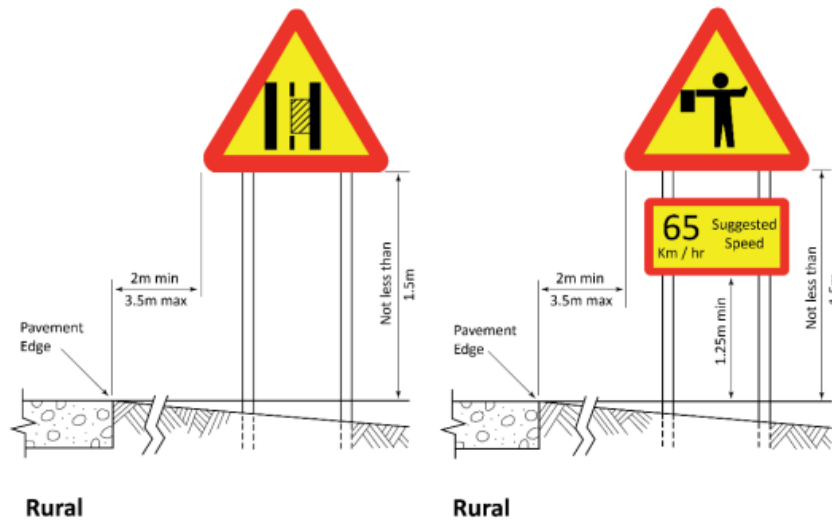


Figure 3-1 Height and Lateral Location of Signs – Typical Installation (Section 7.2.2 of SHC 602 (Manual of Uniform Traffic Control Devices))



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3.5. Mounting of Signs

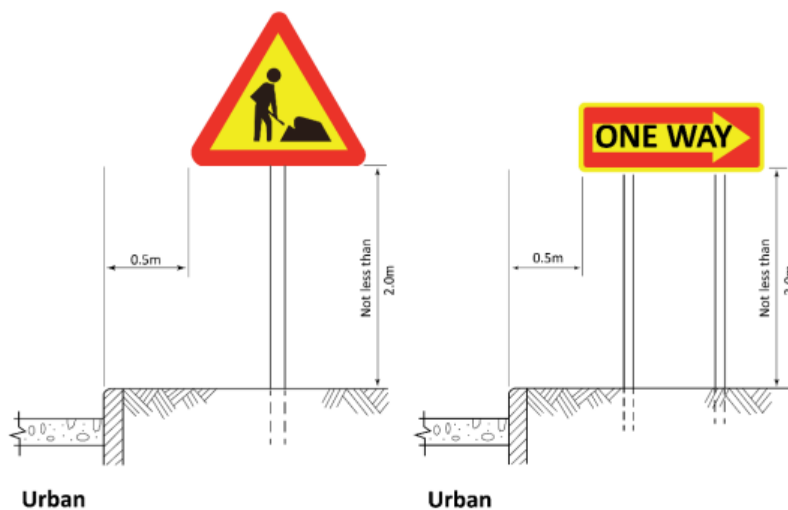


Figure 3-1 Height and Lateral Location of Signs – Typical Installation (Section 7.2.2 of SHC 602 (Manual of Uniform Traffic Control Devices))



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"At what sign size should a three-column layout be used on road signs?"

عدد الأعمدة حسب المساحة

الميل الجانبي					مساحة العامة (م ²)
١ : ٢	١ : ٣	١ : ٤	١ : ٥	١ : ٦	
٢٠٠ أي ييم	١٨٠ أي ييم	١٨٠ أي ييم	١٨٠ أي ييم	١٨٠ أي ييم	٥,٠ - ١,٥
٢٧٠ أي ييم	٢٤٠ أي ييم	٢٤٠ أي ييم	٢٤٠ أي ييم	٢٤٠ أي ييم	١٠,٠ - ٥,٠
٣٣٠ أي ييم	٣٠٠ أي ييم	٣٠٠ أي ييم	٣٠٠ أي ييم	٣٠٠ أي ييم	١٥,٠ - ١٠,٠
٣٦٠ أي ييم	٣٦٠ أي ييم	٣٣٠ أي ييم	٣٣٠ أي ييم	٣٣٠ أي ييم	٢٠,٠ - ١٥,٠
٤٠٠ أي ييم	٣٦٠ أي ييم	٣٦٠ أي ييم	٣٦٠ أي ييم	٣٣٠ أي ييم	٣٠,٠ - ٢٠,٠

Notes:

- No more than **five names and two symbols** should be written on the sign.
- **Minimum aluminum sheet thickness** used in guide signs:
 - 2 mm minimum
 - 3 mm maximum



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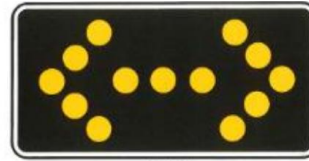
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لتحقيق أقصى قدر من التنقل بين أنواع مختلفة من مناطق أعمال الطرق، يُمكن تركيب لافتة كبيرة بشكل فعال على مركبة متركزة في مقدمة منطقة أعمال الطرق أو تتحرك على طولها. ويمكن تكون هذه مركبة أعمال الطرق نفسها أو موفرة صراحة لهذا الغرض. (انظر الشكل ٢-٣).



600x1200

الشكل (٢-٣) لوحة سهم يوضح مُعلّقة على مركبة (كود الطرق السعودي ٦٠٢) (الدليل الموحد لأجهزة التحكم المروري) (الدليل الموحد لأجهزة التحكم المروري).



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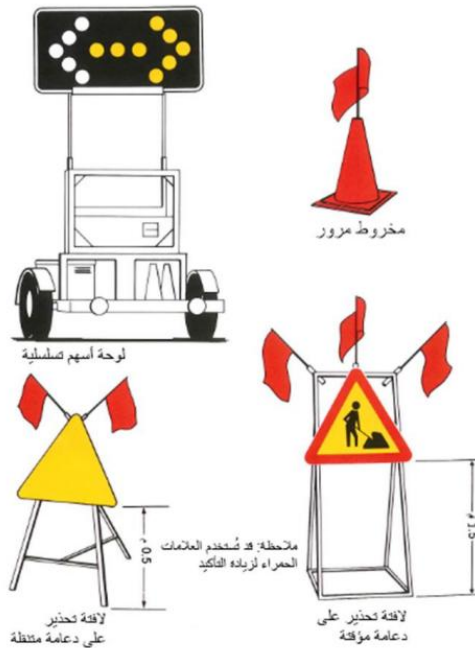
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٤-٣ تعليق اللافتات:

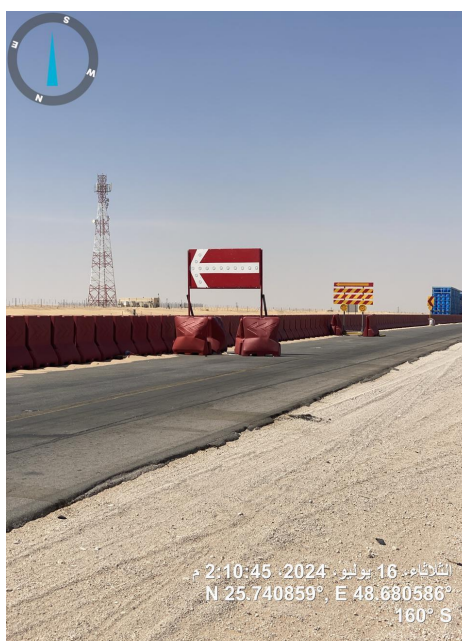


تعليق اللافتات:



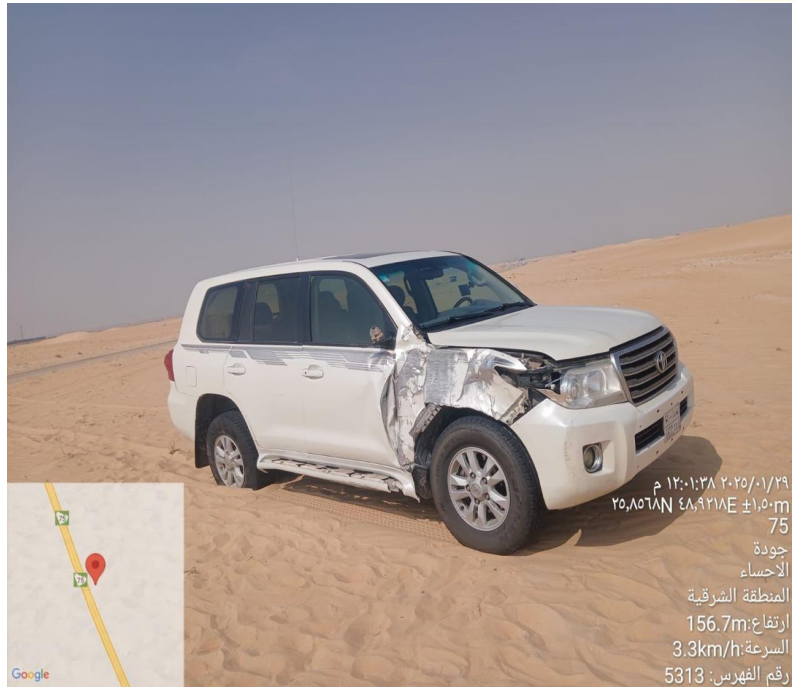
الشكل (٣-٣) طرق تعليق اللافتات بخلاف تركيبها على الأعمدة (كود الطرق السعودي ٦٠٢) (الدليل الموحد لأجهزة التحكم المروري) (الدليل الموحد لأجهزة التحكم المروري).

What is the problem ?



What is the problem ?





Question:

While implementing the Traffic Management Plan (TMP), if there are permanent signs that are not suitable for the temporary detour, what are the correct actions to take regarding them inside the road work zone?

Select all that apply:

- ☐ a) Remove them completely
- ☐ b) Cover them so they are not visible to drivers
- ☐ c) Cover them with red adhesive tape in an "X" shape
- ☐ d) Place them near the road without covering
- ☐ e) Turn them so they are not facing drivers (rotate them)

- ☒ a)
- ☒ b)
- ☒ c)
- ☒ e))



3.4. Covering / Removing Existing Signs

During the operation of traffic management, the permanent signs located within the temporary work zone and are not valid should be temporarily removed.

In practice this can be done by:

1. Removing them.
2. Covering them.
3. Rotating them so that they are not within the drivers' field of vision.
4. Placing adhesive tapes (red color) in a pattern [X].

3.6. Temporary Signs

1. • For Regulatory Signs
2. • For Warning Signs
3. • For Information Signs
4. • For Diagrammatic Information Signs

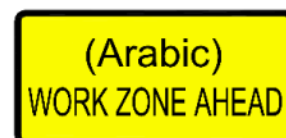
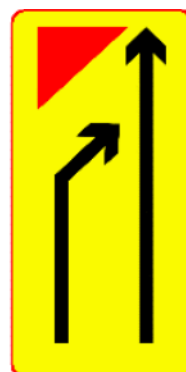




Table 3-1 Standard Sign Shapes

Standard Traffic Sign Shape	Function
	Reserved exclusively for Regulatory signs, including Mandatory (e.g., speed limit) and Prohibitory (e.g., no trucks, do not enter, no U- turn) signs
	Primarily used for specific Regulatory signs, including parking signs – also used for Attention and Information / Diagrammatic signs.
	Reserved exclusively for Advance Warning signs
	Primarily used for all Guide and Informative signs, comprising Direction, and General Information signs. Also used for One-Way signage and for Qualification Plates or Supplemental Plates below other sign shapes.



Table 3-1 Standard Sign Shapes

Standard Traffic Sign Shape	Function
	Reserved exclusively for Stop signs.
	Reserved exclusively for Yield signs.
	Reserved exclusively for Chevron Direction Signs / Route Information





You are driving on a road under traffic control, and one of the two signs (TR 9-1 or TR 9-2) appears ahead of you.

What is the difference in meaning between the two signs according to the Saudi Road Code?

Answer Choices:

- ☐ a) TR 9-1 means you have the right of way, and TR 9-2 means you must always stop
- ☐ b) TR 9-1 means oncoming vehicles have the right of way, and TR 9-2 means you have the right of way over oncoming vehicles
- ☐ c) TR 9-1 means one-way road, and TR 9-2 means two-way road
- ☐ d) TR 9-1 means traffic is stopped in both directions, and TR 9-2 means movement is allowed for all without priority
- ☐ e) Both signs have the same meaning, but TR 9-1 is temporary and used in road works, while TR 9-2 is a permanent sign





You are driving on a road under traffic control, and one of the two signs (TR 9-1 or TR 9-2) appears ahead of you. What is the difference in meaning between the two signs according to the Saudi Road Code?

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- ✓ ☒ b) TR 9-1 means oncoming vehicles have the right of way, and TR 9-2 means you have the right of way over oncoming vehicles
- ☐ c) TR 9-1 means one-way road, and TR 9-2 means two-way road
- ☐ d) TR 9-1 means traffic is stopped in both directions, and TR 9-2 means movement is allowed for all without priority
- ☐ e) Both signs have the same meaning, but TR 9-1 is temporary and used in road works, while TR 9-2 is a permanent sign

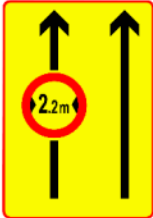
TR 9-1	
TR 9-2	



You see this sign while driving on a multi-lane road, showing two arrows with a width restriction on only one of them.

What is the correct meaning of this sign (TDI 17-1) according to the Saudi Road Code?

- ☐ a) Vehicles wider than 2.2 meters are prohibited in all lanes
- ☐ b) All vehicles are allowed regardless of their width
- ☒ c) Vehicles wider than 2.2 meters are prohibited in the **left lane only**
- ☐ d) Only vehicles narrower than 2.2 meters are allowed to use the right lane
- ☐ e) The maximum allowed vehicle **height** is 2.2 meters

TDI 17-1	
----------	---



Correct Answer:

c) Vehicles wider than 2.2 meters are prohibited in the left lane only



Appendix A - Temporary Signs

A.1. Table of Regulatory Signs

Sign	Name	Sign Number
	Stop	R 1-1
	Entry Prohibited	R 12-1
	Yield	TR 2-1
	Speed Limit	TR 3-1
	No Left Turn	TR 4-1L
	No Right Turn	TR 4-1R
	No U Turn	TR 4-2

Sign	Name	Sign Number
	Overtaking Prohibited	TR 8-1
	Overtaking by Trucks Prohibited	TR 8-2
	Priority for Oncoming Traffic	TR 9-1
	Priority Over Oncoming Traffic	TR 9-2
	Closed Both Directions	TR 12-1
	Restricted Clearance (Width)	TR 28-1
	Restricted Clearance (Height)	TR 29-1
	End All Prohibitions	TR 35-1
	End of Overtaking Prohibited	TR 35-2



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Appendix A - Temporary Signs

A.1. Table of Regulatory Signs

Sign	Name	Sign Number
	Mandatory Movement	R 5-6R
	Pass This Side (Left)	R 11-1
	Pass This Side (Right)	R 11-2
	Pass Either Side	R 11-3
	Mandatory Movement (Roundabout)	R 19-1
	Cycle Lane or Path	R 40-1
	Common Foot and Bike Path	R 44-1
	Separate Foot and Bike Path	R 44-2
	Pass This Side (Sign on Rear of vehicle)	TR 5-7

Sign	Name	Sign Number
	Mandatory Movement (Forward)	R 5-1
	Mandatory Movement	R 5-1L
	Mandatory Movement	R 5-1R
	Mandatory Movement (U Turn)	R 5-2
	Mandatory Movement	R 5-3
	Mandatory Movement	R 5-4
	Mandatory Movement (Left)	R 5-5L
	Mandatory Movement (Right)	R 5-5R
	Mandatory Movement	R 5-6L



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Appendix A - Temporary Signs

A.2. Table of Warning Signs

Sign	Name	Sign Number
	Left Curve	TW 1-1L
	Right Curve	TW 1-1R
	Sharp Curve	TW 1-2L
	Sharp Curve	TW 1-2R
	Reverse Curve L-R	TW 1-3L
	Reverse Curve R-L	TW 1-3R
	Dangerous Curves L-R	TW 1-4L
	Dangerous Curves R-L	TW 1-4R

Sign	Name	Sign Number
	Chevron Alignment (Left)	TW 2-1L
	Chevron Alignment (Right)	TW 2-1R
	Chevron board (variable numbers of chevrons and formats)	TW 2-2L
	Chevron board (variable numbers of chevrons and formats)	TW 2-2R
	Descent	TW 5-1
	Ascent	TW 5-2
	Road Narrows	TW 6-1
	Road Narrows-Keep Left	TW 6-2
	Road Narrows-Keep Right	TW 6-3

Appendix A - Temporary Signs

A.2. Table of Warning Signs

Sign	Name	Sign Number
	Slippery Road	TW 26-1
	Loose Gravel	TW 27-1
	Rough Road	TW 29-1
	Falling Rocks	TW 30-1
	Hump	TW 36-1
	Other hazard ahead	TW 37-1
	Merge	TW 41-1L
	Merge	TW 41-1R
	Side Road	TW 43-2L

Sign	Name	Sign Number
	Divided Road Ends	TW 9-1
	Divided Road Begins	TW 9-2
	Two-Way Traffic	TW 11-1
	Low Clearance	TW 12-1
	Stop Ahead	TW 16-1
	Yield Ahead	TW 17-1
	Signals Ahead	TW 19-1
	Signals Ahead	TW 19-2
	Dip	TW 23-1

Appendix A - Temporary Signs

A.2. Table of Warning Signs

Sign	Name	Sign Number
	Animal Crossing	TW 49-1
	Road Work	TW 50-1
	Lane Closed	TW 50-2
	Flagger Ahead	TW 50-3
	Left Arrow	TW 51-1
	Right Arrow	TW 51-2
	Double Arrow	TW 51-3
	Chevron board (various chevrons and formats available)	TW 52-1
	Electronic Arrow Board	TW 53-1

Sign	Name	Sign Number
	Side Road	TW 43-2R
	Cross Road	TW 43-6
	Traffic Rotary	TW 44-1
	Cyclists Crossing Ahead	TW 44-2
	U-turn Ahead	TW 45-1
	Pedestrian Crossing	TW 47-1
	Pedestrian Crossing	TW 47-2
	Children	TW 48-1
	Children Crossing	TW 48-2

Sign	Name	Sign Number
	Vehicle mounted "Pass to right or left" arrow sign	TW 54-1
	Road Work	TW 55-1
	Safety First	TW 56-1



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Appendix A - Temporary Signs

A.3. Table of Information Signs

Sign	Name	Sign Number
	Work Zone Ahead	TI 1-1
	End Road Work	TI 1-2
	Detour 2 km	TI 2-1
	Detour Ahead (It will be placed with sigs TDI 25-1, e.g., 500 m, 1,000 m, 1,500 m)	TI 2-2



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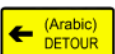


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Appendix A - Temporary Signs

A.3. Table of Information Signs

Sign	Name	Sign Number
	Detour (Arrow Ahead)	TI 8-1
	Detour (Arrow Right)	TI 8-2
	Detour (Arrow Left)	TI 8-3
	Construction Site Entrance - Exit	TI 9-1
	No Through Road	TI 10-1

Sign	Name	Sign Number
	Detour Arrow	TI 2-3
	Detour Arrow	TI 2-4
	On red stop here	TI 3-1
	Traveled way closed	TI 4-1
	Traffic control ahead	TI 5-1
	Pedestrian Detour	TI 6-1
	Pedestrian Detour	TI 6-2
	Cyclist Detour	TI 7-1
	Cyclist Detour	TI 7-2



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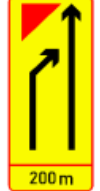


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Appendix A - Temporary Signs

A.4. Table of Diagrammatic Information Signs

Sign	Name	Sign Number
	Reduction in traffic lanes from the left	TDI 1-1L
	Reduction in traffic lanes from the left – including distance plate	TDI 1-1La



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Appendix A - Temporary Signs

A.4. Table of Diagrammatic Information Signs

Sign	Name	Sign Number
	Reduction in traffic lanes from the right	TDI 1-1R
	Reduction in traffic lanes from the right – including distance plate	TDI 1-1Ra
	Reduction in traffic lanes from the left	TDI 1-2L
	Reduction in traffic lanes from the left – including distance plate	TDI 1-2La
	Reduction in traffic lanes from the right	TDI 1-2R
	Reduction in traffic lanes from the right – including distance plate	TDI 1-2Ra
	Reduction in traffic lanes from the left	TDI 1-3L

Sign	Name	Sign Number
	Reduction in traffic lanes from the left – including distance plate	TDI 1-3La
	Reduction in traffic lanes from the right	TDI 1-4
	Reduction in traffic lanes from the right – including distance plate	TDI 1-4a
	One lane deviation to the left	TDI 2-1
	One lane deviation to the left – including distance plate	TDI 2-1a
	One lane deviation to the right	TDI 2-2
	One lane deviation to the right – including distance plate	TDI 2-2a



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Appendix A - Temporary Signs

A.4. Table of Diagrammatic Information Signs

Sign	Name	Sign Number
	Two lanes deviation to the left	TDI 3-1
	Two lanes deviation to the left – including distance plate	TDI 3-1a
	Two lanes deviation to the right	TDI 3-2
	Two lanes deviation to the right – including distance plate	TDI 3-2a
	Divert to emergency lane (number of arrows varies)	TDI 4-1
	Divert to emergency lane (number of arrows varies) – including distance plate	TDI 4-1a
	Rejoin main traveled way (number of arrows varies)	TDI 4-2

Sign	Name	Sign Number
	Rejoin main traveled way (number of arrows varies) – including distance plate	TDI 4-2a
	Right lane deviation to the right (number of arrows varies)	TDI 5-1
	Right lane deviation to the right (number of arrows varies) – including distance plate	TDI 5-1a
	Lanes deviation to the left (Number of arrows varies – may be reversed) Vehicles over mentioned width are not allowed in the left lane/lanes.	TDI 6-1
	Lanes deviation to the left (Number of arrows varies – may be reversed) Vehicles over mentioned width are not allowed in the left lane/lanes. Variant – including distance plate	TDI 6-1a
	Lanes deviation to the right (Number of arrows varies – may be reversed) Vehicles over mentioned width are not allowed in the left lane/lanes.	TDI 6-2
	Lanes deviation to the right (Number of arrows varies – may be reversed) Vehicles over mentioned width are not allowed in the left lane/lanes. Variant – including distance plate	TDI 6-2a



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Appendix A - Temporary Signs

A.4. Table of Diagrammatic Information Signs

Sign	Name	Sign Number
	Three lanes deviation to the left	TDI 7-1
	Three lanes deviation to the left – including distance plate	TDI 7-1a
	Three lanes deviation to the right	TDI 7-2
	Three lanes deviation to the right – including distance plate	TDI 7-2a
	Lanes deviation to the left (Number of arrows varies – may be reversed) Vehicles over mentioned width are not allowed in the left lane/lanes. Variant – including distance plate	TDI 8-1
	Lanes deviation to the left (Number of arrows varies – may be reversed) Vehicles over mentioned width are not allowed in the left lane/lanes. Variant – including distance plate	TDI 8-1a
	Lanes deviation to the right (Number of arrows varies – may be reversed) Vehicles over mentioned width are not allowed in the left lane/lanes. Variant – including distance plate	TDI 8-2

Sign	Name	Sign Number
	Lanes deviation to the right (Number of arrows varies – may be reversed) Vehicles over mentioned width are not allowed in the left lane/lanes. Variant – including distance plate	TDI 8-2a
	One lane deviation to the opposite traveled way	TDI 9-1
	One lane deviation to the opposite traveled way – including distance plate	TDI 9-1a
	One lane deviation to the opposite traveled way	TDI 9-2
	One lane deviation to the opposite traveled way – including distance plate	TDI 9-2a
	Two lanes deviation to the opposite traveled way	TDI 10-1
	Two lanes deviation to the opposite traveled way – including distance plate	TDI 10-1a



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Appendix A - Temporary Signs

A.4. Table of Diagrammatic Information Signs

Sign	Name	Sign Number
	Two lanes deviation to the opposite traveled way	TDI 10-2
	Two lanes deviation to the opposite traveled way – including distance plate	TDI 10-2a
	Two lanes deviation to the opposite traveled way Vehicles over mentioned width are not allowed in the left lane/lanes. Variant – including distance plate	TDI 11-1
	Two lanes deviation to the opposite traveled way Vehicles over mentioned width are not allowed in the left lane/lanes. Variant – including distance plate	TDI 11-1a
	Two lanes deviation to the opposite traveled way Vehicles over mentioned width are not allowed in the left lane/lanes. Variant – including distance plate	TDI 11-2
	Two lanes deviation to the opposite traveled way Vehicles over mentioned width are not allowed in the left lane/lanes. Variant – including distance plate	TDI 11-2a
	From straight-ahead moving traffic, lanes are splitting towards the left of the median. (Number of arrows varies – may be reversed) Vehicles over mentioned width are not allowed in the left lane/lanes. Variant – including distance plate	TDI 12-1

Sign	Name	Sign Number
	From straight-ahead moving traffic, lanes are splitting towards the left of the median. (Number of arrows varies – may be reversed) Vehicles over mentioned width are not allowed in the left lane/lanes. Variant – including distance plate	TDI 12-1a
	Lanes are splitting towards the left of the median, one or two lanes must crossover. (Number of arrows varies – may be reversed) Vehicles over mentioned width are not allowed in the left lane/lanes. Variant – including distance plate	TDI 13-1
	Lanes are splitting towards the left of the median, one or two lanes must crossover. (Number of arrows varies – may be reversed) Vehicles over mentioned width are not allowed in the left lane/lanes. Variant – including distance plate	TDI 13-1a
	Lanes are splitting towards the left of the median, one or two lanes must crossover. (Number of arrows varies – may be reversed) Vehicles over mentioned width are not allowed in the left lane/lanes. Variant – including distance plate	TDI 14-1
	Lanes are splitting towards the left of the median, one or two lanes must crossover. (Number of arrows varies – may be reversed) Vehicles over mentioned width are not allowed in the left lane/lanes. Variant – including distance plate	TDI 14-1a
	Three lanes deviation to the opposite traveled way	TDI 15-1
	Three lanes deviation to the opposite traveled way – including distance plate	TDI 15-1a



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Appendix A - Temporary Signs

A.4. Table of Diagrammatic Information Signs

Sign	Name	Sign Number
	Three lanes deviation to the opposite traveled way	TDI 15-2
	Three lanes deviation to the opposite traveled way - including distance plate	TDI 15-2a
	Three lanes deviation to the opposite traveled way. Vehicles over mentioned width are not allowed in the left lane/lanes.	TDI 16-1
	Three lanes deviation to the opposite traveled way. Vehicles over mentioned width are not allowed in the left lane/lanes. - including distance plate.	TDI 16-1a
	Three lanes deviation to the opposite traveled way. Vehicles over mentioned width are not allowed in the left lane/lanes.	TDI 16-2
	Three lanes deviation to the opposite traveled way. Vehicles over mentioned width are not allowed in the left lane/lanes. - including distance plate	TDI 16-2a
	Number of lanes (Number of arrows varies) Vehicles over mentioned width are not allowed in the specific lanes. Variant	TDI 17-1

Sign	Name	Sign Number
	Number of lanes (Number of arrows varies) Vehicles over mentioned width are not allowed in the specific lanes. Variant - including distance plate	TDI17-1a
	Number of lanes (Number of arrows varies) Vehicles over mentioned width are not allowed in the specific lanes. Variant	TDI 18-1
	Number of lanes (Number of arrows varies) Vehicles over mentioned width are not allowed in the specific lanes. Variant - including distance plate	TDI18-1a
	A short detour (left) of one direction.	TDI 19-1
	A short detour (left) of one direction - including distance plate	TDI 19-1a
	A short detour (right) of one direction.	TDI 20-1
	A short detour (right) of one direction - including distance plate	TDI 20-1a

PROVIDED UNDER THE PROVISIONS OF THE

Sign	Name	Sign Number
	A short detour of both directions.	TDI 21-1
	A short detour of both directions - including distance plate	TDI 21-1a
	A short detour of both directions.	TDI 22-1
	A short detour of both directions - including distance plate	TDI 22-1a
	Mobile Speed Limit Reduction in traffic lanes (Number of traffic lanes, direction, and lanes closed may be varied) (Sign on Rear of vehicle)	TDI 23-1 new
	Mobile Speed Limit Reduction in traffic lanes (Distance, number of traffic lanes, direction, and lanes closed may be varied) Variant - including distance plate (Sign on Rear of vehicle)	TDI 23-2 new



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TDI 9-2

One lane deviation to the opposite traveled way

TDI 2-2

One lane deviation to the right



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How Distance put on the informative sign ?



	Detour 2 km	TI 2-1
	Detour Ahead (It will be placed with sigs TDI 25-1, e.g., 500 m, 1,000 m, 1,500 m)	TI 2-2
	Distance ahead	TDI 25-1

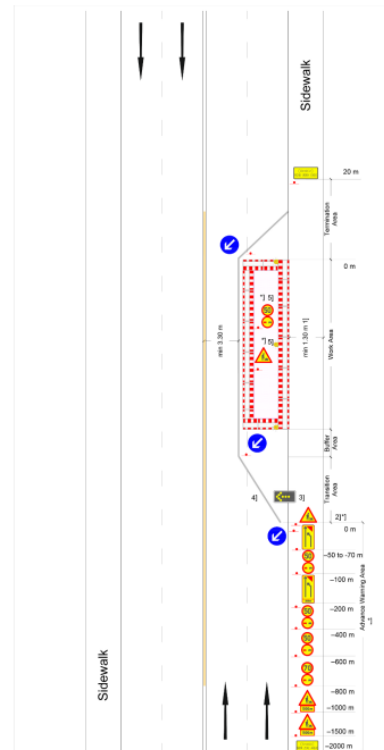


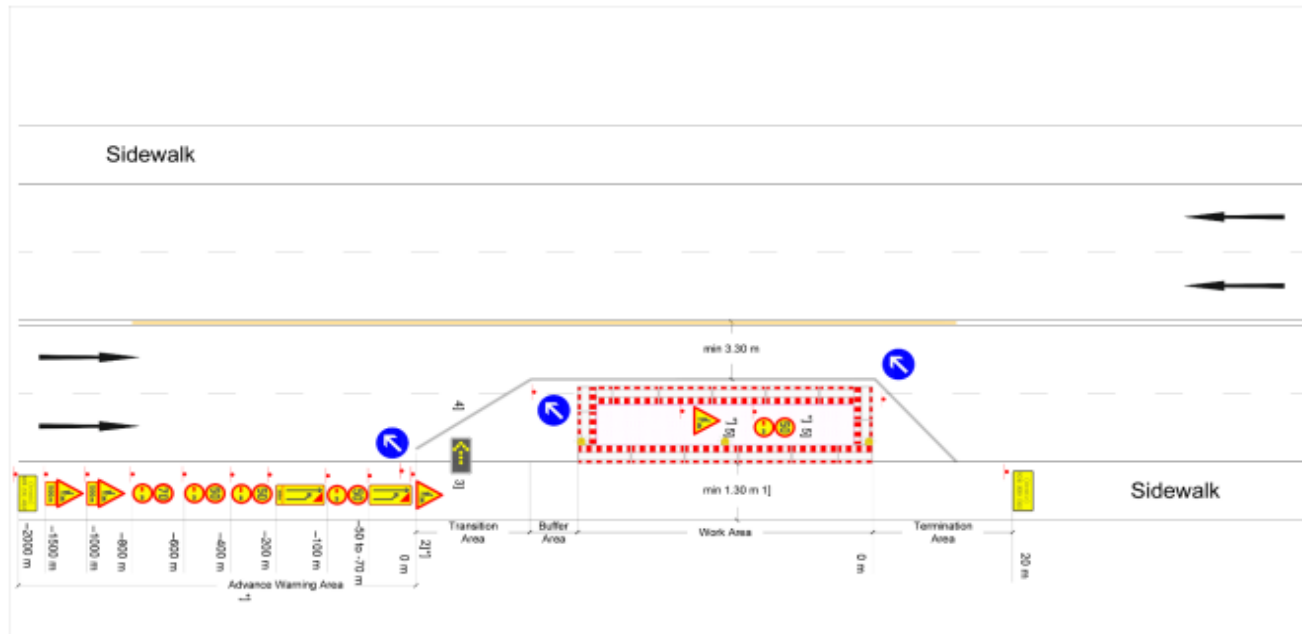
4-9 Advanced Warning Area:

- Signs:
- Beacons / Warning Lights:
- High-Level Warning Devices:
- Rumble Strips :
- Speed Reduction



B.2.11. U(S)-11. Multi-Lane Arterial with Right Lane Closed





B.2.11. U(S)-11. Multi-Lane Arterial with Right Lane Closed



9.4.2. Signing

Advance warning signs are intended to provide adequate time (and distance) for the driver to perceive and react to the condition ahead. The first advance warning sign must meet the following criteria:

Distance to the point where lane closure begins or flagging position.

- Divided Highway 2,000 m.
- Two Lane Highway 2,000 m.

The spacing between advance warning signs must meet the following criteria:

From 2,000 to 1,000 m in advance of the work zone;

- Divided Highway max 500 m.
- Two lane Highway max 500 m.

From 1,000 to 0 m in advance of the work zone;

- Divided Highway max 200 m.
- Two lane Highway max 200 m.



9.4.3. Flags / Warning Lights

1. Red flags attached to a sign attract attention during daytime operations
2. should be considered for application on the first advance warning sign.
3. Flashing warning lights add emphasis during nighttime operations.

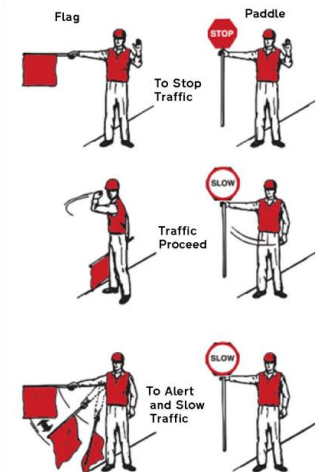


Figure 7-34 Use of Hand Signaling Devices by Flagger



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According to the Saudi Road Code, if the designated speed of a road is 120 km/h and a work zone with traffic control is established, what is the expected minimum speed usually driven by road users in this case?

- ☐ a) 100 km/h
- ☐ b) 95 km/h
- ☐ c) 85 km/h
- ☐ d) Drivers generally do not reduce speed significantly
- ☐ e) 60 km/h

☒ **Correct Answer: (c) 85 km/h**

✦ As stated in section (5-4-9) of the Saudi Road Code, experience shows that drivers tend not to reduce speed below 85 km/h on roads originally set at 120 km/h unless effective and clear speed control measures



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9.4.5. Speed Reduction

A basic principle of good temporary traffic control is that traffic movement should be inhibited as little as practical. Drivers will reduce their speed only if they clearly perceive a need to do so and reduced speed zoning should be avoided if possible (GCC, 2018; SHC 602 (MUTCD); Public Works Authority, 2015).

Experience shows that drivers will only slow to a certain level regardless of the presence of a speed control treatment. Typically, drivers will not reduce their speed by more than 35 km/h. For example, a driver travelling at 120 km/h. will usually not slow below 85 km/h.

Stationary traffic Police patrol cars are beneficial in controlling speed.



Which should come first: the flagger or the rumble strips with paint?



9.4.4. Rumble Strips

- 1. Rumble strips are used for tactile warning.
2. They are placed approximately 100 m in front of the mobile flashing warning sign in the right lane to be blocked or in the emergency lane (hard shoulder) at vertical angles to the direction of travel.
3. The dimensions of a rumble strip are 0.3 m x 0.23 m x 0.03 m.

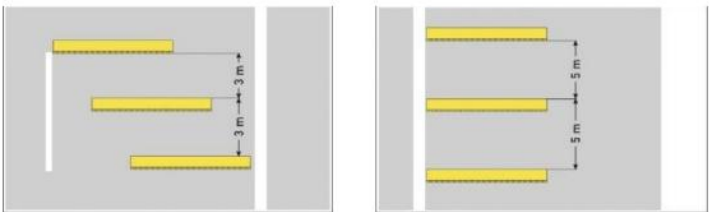
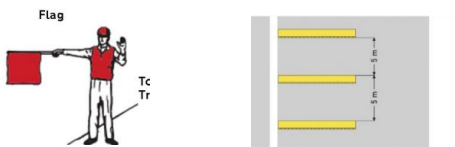


Figure 9-2 Arrangement of Rumble Strips on the Right Lane and on the Hard Shoulder/Emergency Lane (RSA, 2021)



According to the Saudi Road Code, what is the typical distance at which a flagger (flag bearer) station should be placed before the road work site in rural areas or at high speeds?

- ☐ a) 80 meters from the work site
- ☐ b) Not less than 100 meters from the end of the lane
- ☐ c) 150 meters from the work site or more if the speed exceeds 80 km/h
- ☐ d) Only 25 meters when an emergency vehicle is present
- ☐ e) Placed directly at the front edge of the work area in case of poor visibility



✓ **Correct Answer: (c)**

✚ The Saudi Road Code specifies that the typical distance for placing a flagger in rural areas or at high speeds is at least **150 meters**.

1.Rural Areas: Flagger station must be **150 m** before the work zone (or more if speed > 80 km/h).

2.Urban Areas: Distance may be **50–75 m** before the work zone.

3.Purpose: Allows flagger to warn workers of dangers like out-of-control vehicles.

4.Flagger Position:

- Stand on **shoulder** next to the controlled lane or in a **barricaded lane**.
- May stand on **opposite shoulder** if work area is short.
- Never stand in a live traffic lane.**

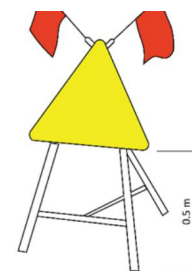
5.Flagger Alone: No other workers should be near the flagger.

6.Protection: Use **warning signs** and **flashing beacons** as needed.

7.Night Flagging: Station must be **well illuminated**.

7.3.7. High Level Warning Devices :

1. **Components:** Composed of **three or more red flags** on a **tall support**.
2. **Visibility:** Must be **taller than passenger vehicles** for visibility.
3. **Night Use:** Requires **Type B high-intensity flashing beacon** at the base.
4. **Optional Additions:** A **warning or regulatory sign** can be attached at proper height.
5. **Flag Size:** Flags must be **minimum 400 mm²** and **red** in color.
6. **Purpose:** Enhances visibility and advance warning for approaching traffic.



Warning Sign on Portable Support



Traffic Calming Devices in Road Work Zones



1. **Combined Red Light/Speed Cameras**
Used at intersections to detect vehicles that run red lights and exceed the speed limit simultaneously.
2. **Average Speed Cameras**
Measure the average speed of a vehicle between a defined start and end point within a work zone to check compliance with speed limits.
3. **Spot Speed Cameras**
Measure the instantaneous speed of a vehicle at a specific location, typically installed at the entry of a work zone to control speeding.
4. **Rumble Strips**
Installed on the road surface before entering work zones to alert drivers through vehicle vibrations.
5. **Radar Feedback Signs**
Display the vehicle's current speed directly to the driver, raising awareness to comply with the posted speed within the work zone.





5 Traffic Calming Devices in Work Zones

- 1  **Combined Red Light/Speed Cameras**
Detect vehicles running red lights and exceeding the speed limit at intersections.
- 2  **Average Speed Cameras**
Measure the average speed of a vehicle between the start and end of the work zone.
- 3  **Spot Speed Cameras**
Measure the speed of a vehicle at a specific location, such as the work zone entrance.
- 4  **Rumble Strips**
Alert drivers to reduce their speed through tactile vibrations.
- 5  **Radar Feedback Signs**
Display a vehicle's current speed to encourage compliance with the limit.



What is the ideal speed for the work zone ?

Table 9-1 Work Zone Maximum Speed Limit

Highway Category	Maximum Speed Limit (km/h)
Freeways/ Expressways	100
Other Rural Highways	80
Other Urban Highways	50





What is the ideal speed for the work zone ?



Table 4-10 Required Temporary Speed Limits (Public Works Authority, 2015)

Duration/Type of Works	Operating Speed Limit (km/h)	Temporary Speed Limit (km/h)
Mobile Works (any duration)	Any	Not normally appropriate / Subject to Risk assessment
Short-Term (< 15 min)	Any	Not normally appropriate / Subject to Risk assessment
Medium-Term (15 min - 8 h)	> 80	80
	≤ 80	50
Long-Term (> 8 h)	> 80	80
	≤ 80	50
	≥ 120	100
Use of Portable Traffic Signals, Stop, or Priority Yield	Any	50



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9.5. Transition Area (Taper)



What is the most important element in the transition area?

When designing traffic management, it is essential to ensure adequate visibility in the target area. If necessary, the length of isolation can be extended or additional measures can be used. The location should also be assessed for potential hazards and appropriate safety measures taken, including the use of channelizing devices. More details are available in the Saudi Road Code 201 (Part 10-2-8).



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▶ Tubular Markers

• علامات أنبوبية.

▶ Cones

• أقماع.

▶ Vertical Panels

• ألواح رأسية.

▶ Plastic Traffic drums

• براميل مرورية بلاستيكية.

2-5-9 Chevron Sign

2-5-9 لافتة شيفرون

3-5-9 Illuminated Arrow Warning Panels

3-5-9 ألواح أسهم تحذير مضيئة

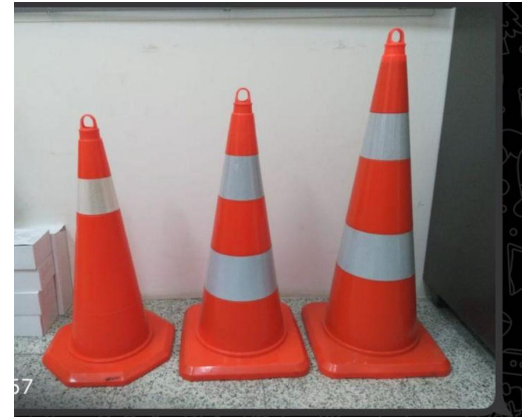
Cones

Table 4-6 Traffic Cones Sizes (RSA, 2021)

(a)  H = 450 mm	(b)  H = 750 mm	(c)  H = 1000 mm
---	--	---

Legend: H = height of traffic cone (mm). From left to right they are applicable at:

- Bicycle Lanes.
- All highways except Freeways.
- Freeways and Urban Streets in the vicinity of railways and tramways.





Channelizing Devices :

أجهزة التوجيه القنواطي: ١-٥-٩



علامات أنبوبية.

Tubular Markers



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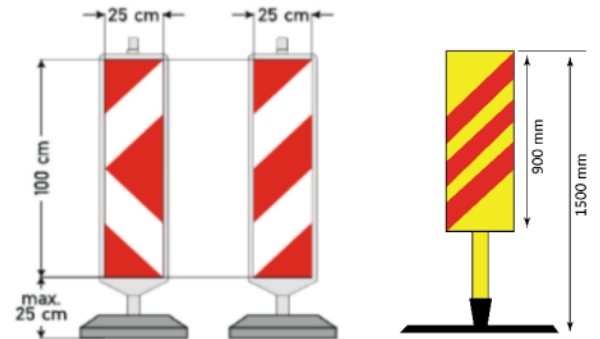
Channelizing Devices :

أجهزة التوجيه القنواطي:

١-٥-٩

ألواح رأسية.

Vertical Panels



الشكل (٢١-٤) ألواح رأسية (RSA, 2021).



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Channelizing Devices :

Plastic Traffic Drums

1. Minimum height: 800 mm; diameter: 500 mm.
2. Must have 2 red + 2 yellow reflective bands.
3. Band width: 100–200 mm; non-reflective max 50 mm.
4. Reflective bands must appear same day & night.
5. Do not weigh with rocks or concrete.
6. Max 250 mm sand allowed for stability.
7. Drums must have drain holes at the bottom.
8. Place warning signs if drums are on roadway.
9. Lights may be added at night.
10. Arrow signs can be mounted if needed.



Channelizing Devices :

2-5-9 Chevron Sign

لافتة شيفرون: ٢-٥-٩

chevron Sign – Key Points:

1. Used on curves and tapers for added guidance.
2. Supplements other traffic control devices.
3. Must provide clear emphasis to drivers.
4. At least 3 signs should be visible to motorists.
5. Signs must be spaced appropriately.
6. Should be mounted on flexible supports.



1. Used to supplement warning signs in high-speed or high-volume areas.
2. Ideal for lane closures and slow-moving operations.
3. Panel shows a flashing arrow or chevron using amber/yellow lights.
4. Must have a matte black background.
5. Must clearly show direction at required legibility distances.
6. Must display 4 modes: Left, Right, Both, Caution (no direction).
7. Panel features: 2 × 340mm LED corners + 25 × 200mm LED lights.
8. Flash rate: 60–90 flashes per minute.
9. Brightness: 2,000 lm (day) and 400–800 lm (night, max 800).
10. Usually mounted on trailers or trucks (min height: 2.1 m).
11. Vehicle-mounted panels must allow driver-controlled mode changes.

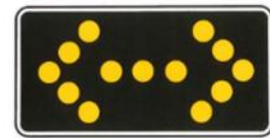
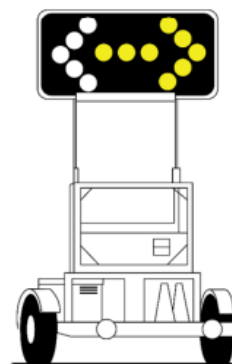


Figure 7-2 Vehicle Mounted Flashing Arrow Panel



Sequential Arrow Panel

illuminated warning arrow panel

As a road safety engineer reviewing a Traffic Control Plan (TCP) for a work site on a highway, you need to select the appropriate size of the illuminated warning arrow panel to guide traffic flow.

According to the Saudi Road Code 2022, what are the most suitable dimensions for this case?

Options:

- ☐ A) 750 × 1200 mm
- ☐ B) 1250 × 1500 mm
- ☒ C) 1200 × 2400 mm
- ☐ D) 1500 × 3000 mm
- ☐ E) There are no specific dimensions for warning arrow panels in the Saudi Road Code.

✓ Correct Answer: (C) 1200 × 2400 mm



•Type A:

- Use on local/collector streets
- Suitable for moderate traffic volume and low speed

•Type B:

- Use on arterial streets, highways, and expressways
- Also acceptable for local/collector streets when needed

•Type C:

- Use on busy expressways
- Best for high speed/volume or poor geometric conditions

Table 7-4 Warning Flashing Arrow Panels

Type	Minimum Size (mm)	Minimum Number of Panel Lamps	Minimum Legibility Distance (km)
A	600 x 1,200	12	0.80
B	750 x 1,350	13	1.25
C	1,200 x 2,400	15	1.50

$L = WS^2/155.4$ where the speed limit is less than 70 km/h.

$L = WS /1.61$ where the speed limit is 70 km/h or more.

Where L = total length of the taper section (m).

W = lateral distance traffic is to be moved (m).

S = speed limit or 85th percentile speed (km/h).

Table 4-1 Taper Lengths (L) in Meters for Required Lateral Movement (SHC 602 (MUTCD))

Speed km/h	Distance in Meters Traffic has to be shifted Right (R) or Left (L)						
	1.5	2.5	2.75	3.0	3.25	3.5	3.65
30	9	15	16	17	19	20	22
35	11	20	22	24	26	28	30
40	15	26	28	31	34	36	39
45	20	33	36	39	42	46	49
50	24	40	44	48	52	56	60
55	29	49	54	58	63	68	73
60	35	58	64	70	75	81	87
65	41	68	75	82	88	95	102
70	65	109	120	131	141	152	163
75	70	117	128	140	152	163	175
80	75	124	137	149	162	174	186
85	79	132	145	158	172	185	198
90	84	140	154	168	182	196	210
95	89	148	162	177	192	207	221
(100) exceptional	93	155	171	186	202	218	233



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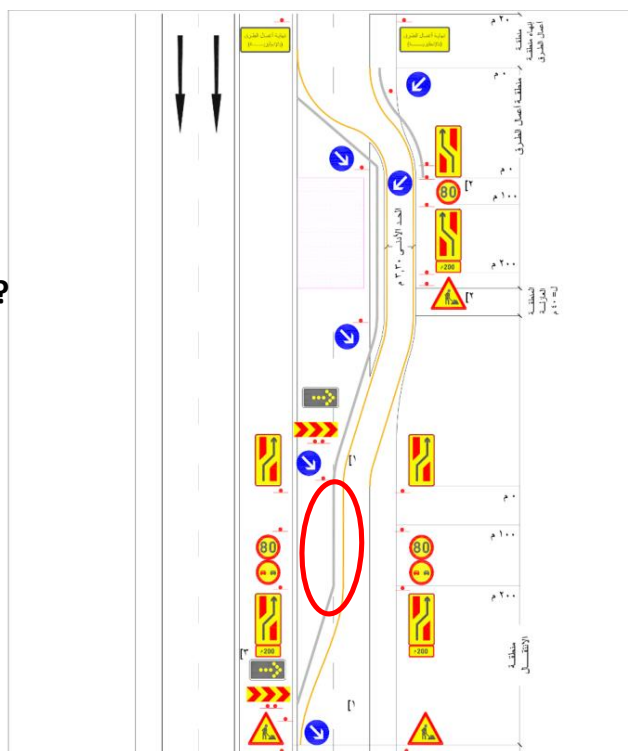
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What is the length of this line ?



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Road Safety in (SHC)



Table 4-2 Distance Between Tapers (Integrated Transport Center, 2018)

Permanent Posted Speed Limit (km/h) (S is equivalent to Permanent Posted Speed in m)	Distance between tapers (m)		
	Minimum 3S	Preferred 4S	Maximum 5S
40	120	160	200
60	180	240	300
80	240	320	400
100	300	400	500
120	360	480	600
140	420	560	700



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What is the main difference between Vertical Panels and Traffic Separators in terms of their use in traffic control according to the Saudi Road Code?

- ☐ A) Vertical panels are used for guidance in tight spaces, while traffic separators are used for separation in long-term detours.
- ☐ B) Traffic separators are permanently fixed, while vertical panels are only used for temporary night warnings.
- ☐ C) Traffic separators are used for actual lane separation, while vertical panels are for guidance in spatially constrained areas.
- ☐ D) Both devices serve the same function and can be used interchangeably in all cases.
- ☐ E) Vertical panels can be used as an alternative to traffic separators and are effective in channeled guidance zones within transition areas and in marking lateral hazard boundaries.

☒ **Correct Answer: (E)**

Vertical panels are flexible in installation and guidance, and are an effective alternative in transitional and narrow areas, as noted in the Saudi Road Code



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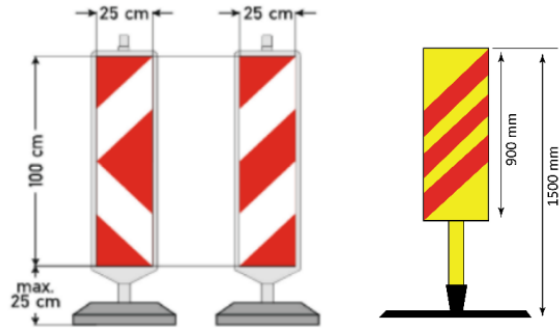
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الشكل (٢٢-٤) فاصل المرور (المصدر: TSS Traffic Safety Systems).

Figure 4-22 Traffic Separator (Source: TSS Traffic Safety Systems)



الشكل (٢١-٤) ألواح رأسية (RSA, 2021).

Figure 4-21 Vertical Panels (RSA, 2021)

Traffic Separators



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Lateral Barrier Offset (Shy Line)

الحاجز العرضي (خط التراجع):

In the context of designing temporary work zones on roads, what is the importance of the **barrier offset** in reducing collision risks and improving traffic safety?

- ☐ A) It allows for widening the road to accommodate additional traffic
- ☐ B) It reduces the likelihood of vehicles veering off and hitting the safety barrier
- ☐ C) It is only used to determine the placement of concrete barriers after the project is completed
- ☐ D) It increases vehicle speeds within the work zone



Correct Answer: (B)

It reduces the likelihood of vehicles veering off and hitting the safety barrier.

4-1 :The Lateral Safety Buffer can secure the adequate separation of traffic 22 SHC 305 from the construction area and at the same time allow the regular function of the safety barriers (working width).



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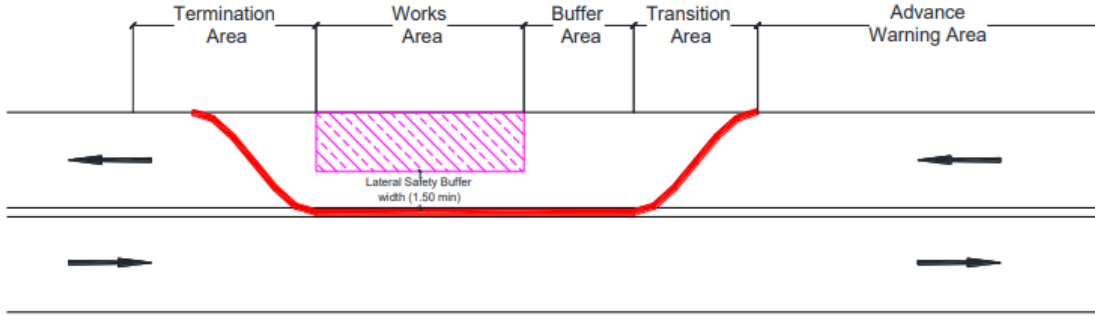


Figure 4-3 Typical Layout of Work Zones



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1. Only qualified workers are allowed in the area, with a safety buffer zone of at least 1.5 meters behind the barrier.
2. This width may be reduced if the speed does not exceed 50 km/h.
3. The buffer zone must not be used as a temporary passage.
4. Pedestrian buffer zones must have a separate and appropriate design.
5. Safety barriers are recommended to clearly define the buffer zone, depending on project type and speed limits.

1. يُسمح بدخول المنطقة فقط للعاملين المؤهلين، مع منطقة عزل خلف الحاجز لا تقل عن 1.5 متر.
2. يمكن تقليلها إذا كانت السرعة $50 \leq \text{كم/س}$.
3. يُمنع استخدام منطقة العزل كممر مؤقت.
4. منطقة المشاة تحتاج لتصميم مستقل.
5. يُنصح باستخدام حواجز السلامة حسب نوع المشروع والسرعة.



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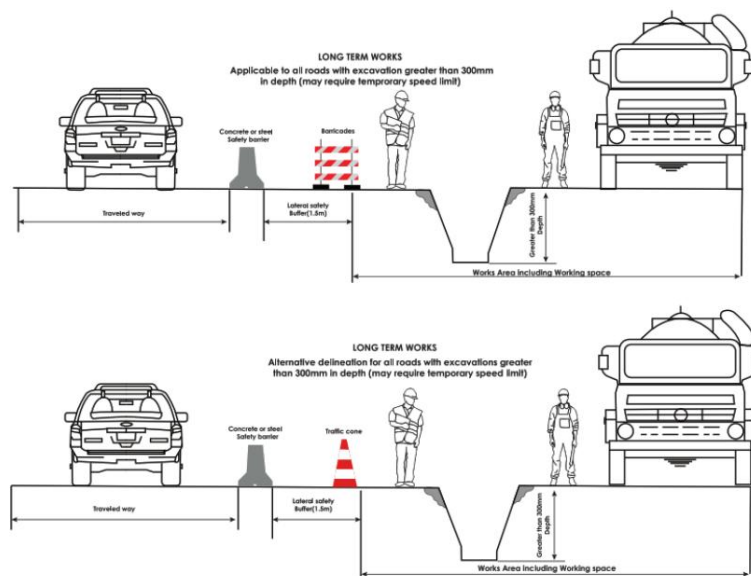


Figure 4-4 Long-Term Work Zone Lateral Safety Buffers for High-Speed Roads (> 50 km/h), (Public Works Authority, 2015; Source: Traffix Devices)



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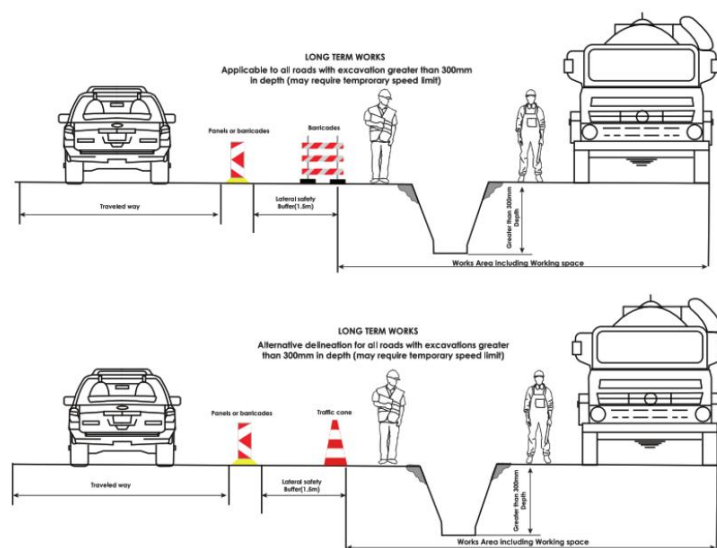


Figure 4-5 Long-Term Work Zone Lateral Safety Buffers for Low-Speed Roads ($\leq$ 50 km/h), (Public Works Authority, 2015; Source: Traffix Devices)



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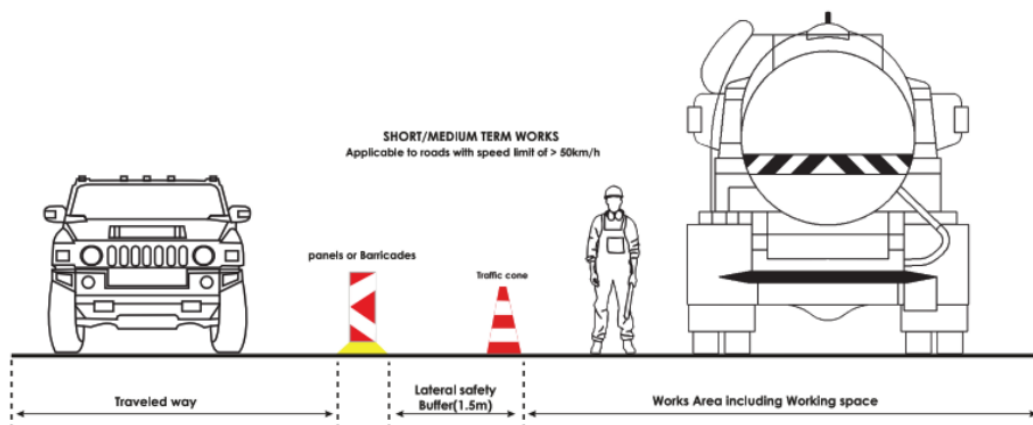


Figure 4-6 Short-Medium Term Work Zone Lateral Safety Buffers for High-Speed Roads (> 50 km/h), (Public Works Authority, 2015; Source: Traffix Devices)



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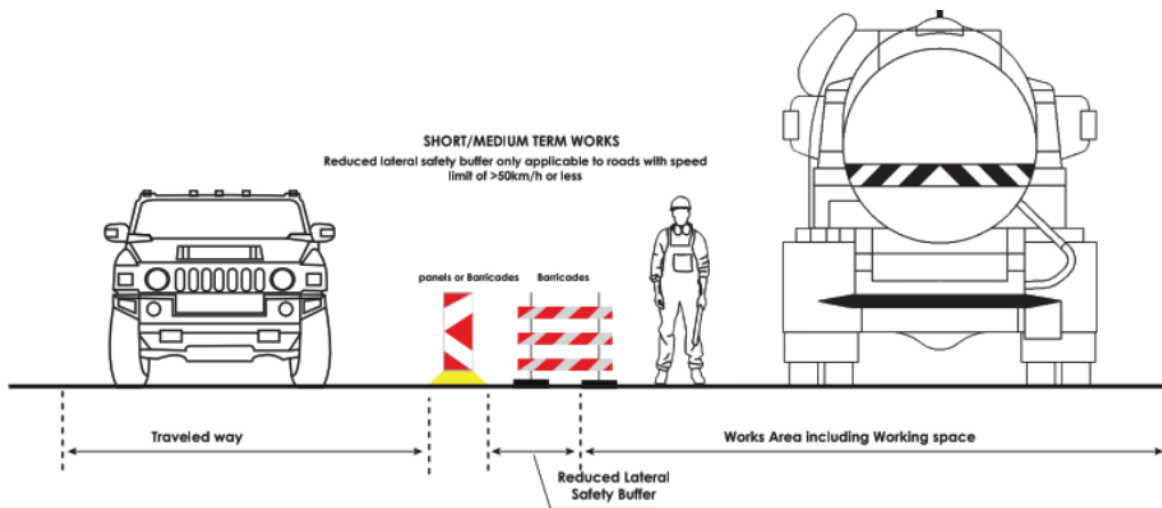


Figure 4-7 Short-Medium Term Work Zone Reduced Lateral Safety Buffers for Low-Speed Roads (≤ 50 km/h), (Public Works Authority, 2015; Source: Traffix Devices)



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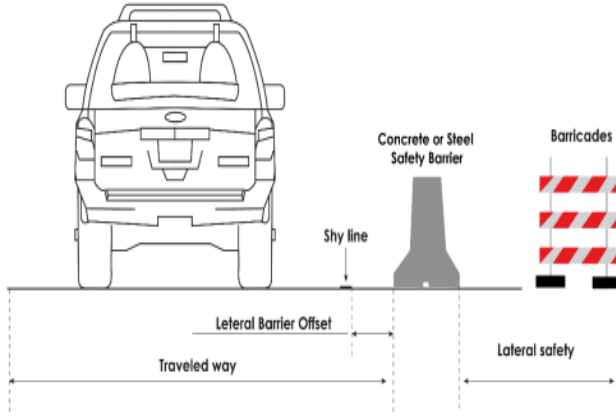


Figure 4-9 Lateral Barrier Offset (Shy Line), (Public Works Authority, 2015; Source: Traffix Devices)



Figure 4-8 Example Shy Lines adjacent to Concrete Safety Barriers



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Buffer Zone

المنطقة العازلة:

1. Ensures smooth traffic flow after the transition area and before entering the work zone.
2. Required when major lane shifts or adjustments are needed.
3. Must provide safe separation for vehicles and workers.
4. The parallel section of the buffer zone is used to calculate its length.
5. Minimum buffer zone length depends on approach speed (refer to Table 9-2).

1. تهدف إلى تأمين حركة مرور سلسة قبل دخول منطقة العمل.
2. تُستخدم عند الحاجة لتعديلات كبيرة في المسارات.
3. يجب أن تضمن سلامة المركبات والعاملين.
4. يُستخدم الجزء الموازي لحساب الطول المناسب حسب سرعة الطريق.
5. يوضح الجدول (9-2) الحد الأدنى لطول المنطقة العازلة



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Table 9-2 Buffer Area Distance (Integrated Transport Center, 2018)

Permanent Posted Speed Limit (km/h)	Preferred Distance to Work Area (m)	Absolute Minimum Distance to Work Area (m)
40	10	5
60	25	10
80	40	30
100	60	45
120	80	60
140	100	80



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work zone

منطقة أعمال الطرق



1. The work zone includes the road surface, equipment, materials, and storage areas.
2. Concrete or steel barriers are preferred to separate traffic from the work zone.
3. A positive barrier prevents vehicle intrusion and reduces injuries.
4. Barriers should be continuously connected without gaps.
5. The design depends on road elevation and facility type.
6. Barriers may include channelizing devices or curb markings.

1. تشمل منطقة أعمال الطرق سطح التنفيذ، والمعدات، والمواد، وأماكن التخزين.
2. يفضل استخدام حواجز خرسانية أو حديدية لفصل المرور عن منطقة العمل.
3. الحاجز الإيجابي يمنع اختراق المركبات ويقلل الإصابات.
4. يجب أن يكون الحاجز متصلاً بطريقة مستقرة بدون فجوات.
5. تصميم الحاجز يعتمد على منسوب الطريق ونوع المرفق.
6. يمكن أن يُدمج الحاجز مع معدات قنوية أو علامات رصيف.



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What is the correct sign repetition in work area for a 3 km detour in the Saudi Road Code?

Choices:

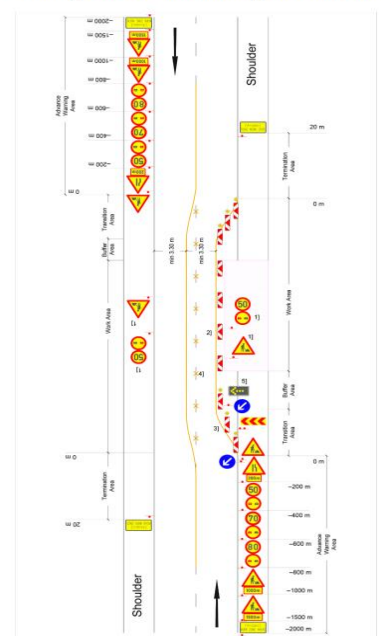
- ☐ A) Every 500 meters
- ☐ B) Every 1 km
- ☐ C) Every 200 meters
- ☐ D) Only once at midpoint
- ☐ E) Depends on road type and speed

Answer:

- ☒ A) Every 500 meters

1] If work area is longer than 1,000 m sign will be repeated every 500 m.

B.3.4. R(S)-4. Work Area with Narrowing both Lanes of Road



1. It is preferred to maintain the main road width when designing the detour.
2. A width of 3 meters may be used only if the Average Annual Daily Traffic (AADT) is less than 500, the speed is ≤ 70 km/h, and truck percentage is $\leq 10\%$.
3. If AADT exceeds 3,000 vehicles, the lane width must be 3.30 meters or more.
4. If AADT exceeds 5,000 vehicles, a width of 3.65 meters or more should be used.
5. A 3-meter width is not allowed on arterial roads or truck routes.

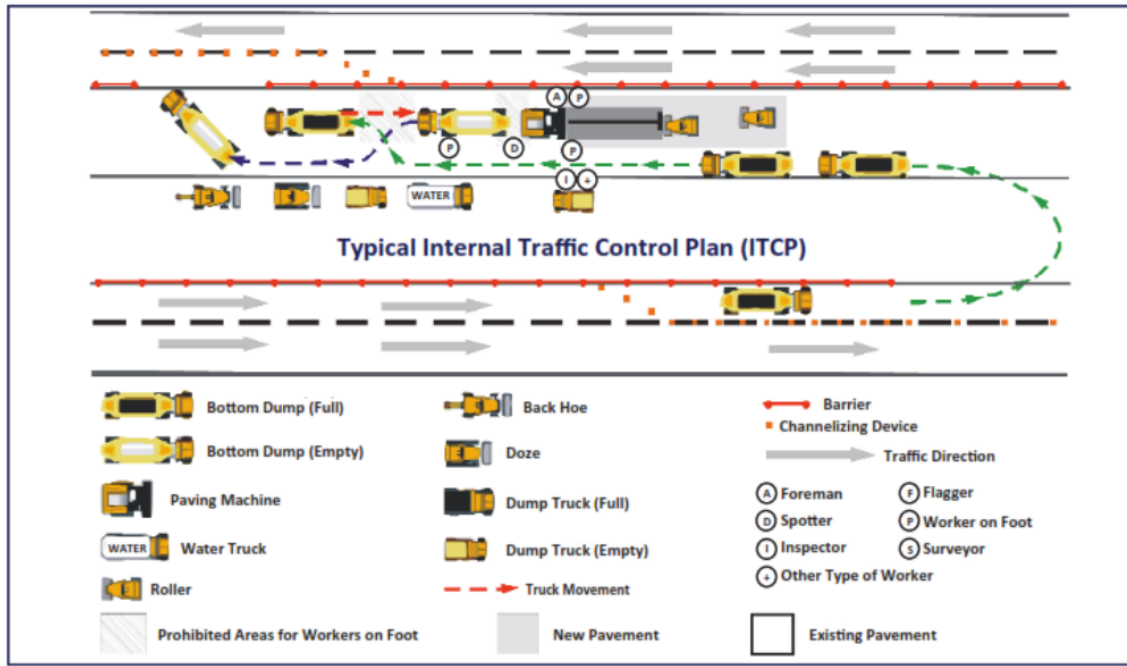


Figure 4-16 Typical Internal Traffic Control Plan (ITCP) (FHWA, 2007)



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End of Road Work Zone Area

منطقة إنهاء منطقة أعمال الطرق:

According to the Saudi Road Code, what is the typical length of the Exit Zone (used to return traffic to its normal path after temporary restrictions)?

Choices:

- ☐ A) 30 meters from end of closure
- ☐ B) At least 100 meters before return
- ☐ C) 50 meters after the work area
- ☐ D) Minimum 150 meters on divided roads only
- ☐ E) Depends on number of lanes after detour



Correct Answer: C) 50 meters after the work area



As per the Saudi Road Code, the Exit Zone typically extends 50 meters beyond the end of the work zone.



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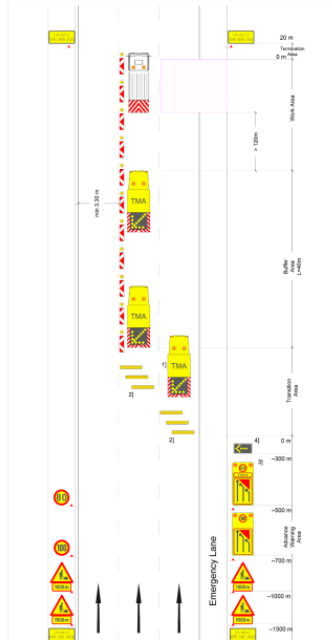


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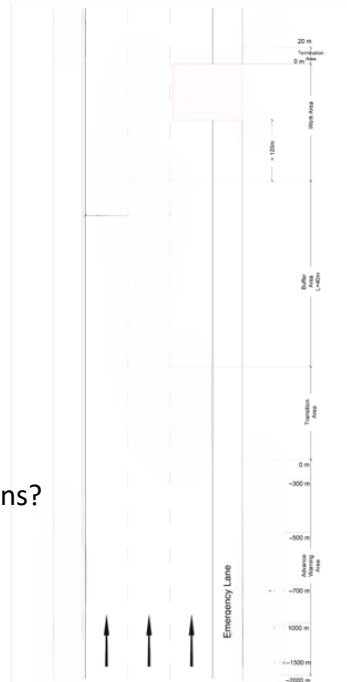




B.4.56. F(S-M)-14. Medium - Short Term Work Zone with Blocked Middle and Right Lane of Multi-Lane Freeway with Use of TMA (Night)



B.4.56. F(S-M)-14. Medium - Short Term Work Zone with Blocked Middle and Right Lane of Multi-Lane Freeway with Use of TMA (Night)



Early warning ?
TMA ?
Termination ?
N of signs of terminations?



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How many typical work zone layouts are included in the new Saudi Road Code compared to the old manual?

- ☐ a) Old manual: 12 layouts, New code: 98 layouts
- ☐ b) Old manual: 12 layouts, New code: 57 layouts
- ☐ c) Old manual: 10 layouts, New code: 60 layouts
- ☐ d) Old manual: 15 layouts, New code: 68 layouts
- ☐ e) Old manual: 12 layouts, New code: 125 layouts

✓ **Correct Answer: (e)**

(The old manual contained **12** layouts, while the new Saudi Road Code contains **125** layouts.)

Standard Typical for Temporary Traffic Management

•List of Standard Work Zone Plans for Urban Roads

List of Standard Work Zone Plans for Rural Roads

List of Standard Work Zone Plans for Highways

Total of **38**
34 Fixed
4 Mobile

Total of **30**
18 Fixed
12 Mobile

Total of **57**
42 Fixed
15 Mobile

Total of **125**
94 Fixed
31 Mobile

B.1. Symbols Used in Typical Work Zone Layouts

Description	Symbol
Temporary Sign	
Diagrammatic Information Signs	
Work Area	
Traffic Direction	
Signpost	
Crosswalk	
Road Marking Pictogram	
Traffic Signal	
Barricade. (Also, could be placed portable plastic safety barrier system, SASO-2980)	
Additional barricade that could be placed accordingly to the needs of work zone. (Also, could be placed portable plastic safety barrier system, SASO-2980)	
Hazard Identification Beacon	
Flashing Warning Light	

Description	Symbol
Temporary Marking	
Temporary Barrier (with adequate end treatment as specified in SHC 304)	
Panel	
Flashing Arrow Panel	
Sign with Special Signing (Warning Flashing Lights)	
Sh 2 Signal	
TMA	
Work Zone Vehicle	



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During roadwork on a multi-lane road, Signal Sh2 was placed at the beginning of the closure area. The aim is to alert drivers to stop or proceed with caution before entering the work zone.

الهدف هو تنبيه السائقين للتوقف أو في بداية منطقة الإغلاق Sh2 أثناء أعمال الطريق على طريق رئيسي متعدد المسارات، تم وضع إشارة المتابعة بحذر قبل دخول منطقة العمل.

? What is the main function of Signal Sh2 in this case?

في هذا السيناريو؟ Sh2 ما هو الدور الرئيسي لإشارة ؟

a) To guide trucks to the nearest detour.

لتوجيه الشاحنات إلى أقرب تحويلة.

b) To indicate a protective stop area before the hazard.

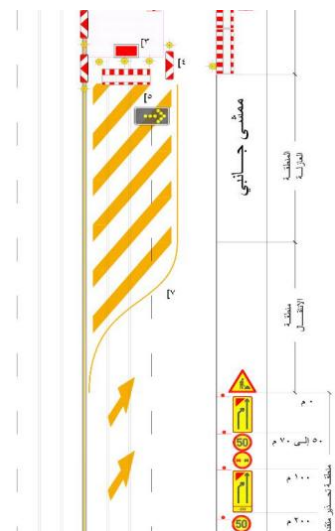
للدلالة على منطقة توقف وقائية قبل الخطر.

c) To measure road width for large vehicles.

لقياس عرض الطريق للمركبات الكبيرة.

d) To notify pedestrians to cross the road.

لإشعار المشاة بعبور الطريق.



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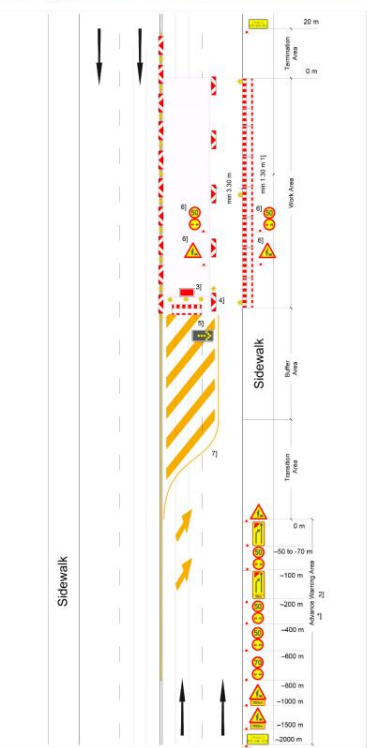




- Barricades with flashing warning lights. Signal Sh 2. (Meaning protective stop). Blocking area with yellow marking (Recommended length: > 50 m). The length of the buffer area is provided in the next table.

- متاريس بإضاءات تحذيرية وامضة. إشارة Sh 2. (يقصد بها توقف وقائي). منطقة إغلاق مع وضع علامات صفراء (الطول الموصى به: > 50 م). - يقدم طول المنطقة العازلة في الجدول التالي.

2.34. U(S)-34. Multi-Lane Arterial with Blocking the Railway Lane



B.2. List of Typical Work Zone Layouts of Urban Roads Specifications:

- U(S): Long-term work zone (static) for urban roads.
- U(S-M): Medium - Short term work zone (static or mobile) for urban roads.



Table B-2 Typical Work Zone Layouts of Urban Roads

Code Number	Description
U(S)-1	Narrowing lanes for work area in a two - way road with low traffic and speed.
U(S)-2	Alternative traffic for work area in a two - way road with low traffic and speed.
U(S)-3	Slight narrowing for work area in a two - way road.

U(S-M)-1	Medium - Short term work zone with narrowing lane.
U(S-M)-2	Medium - Short term work zone on roads with $V_e \leq 50$ km/h.
U(S-M)-3	Medium - Short term work zone on multi-lane arterial with blocking the railway lane.
U(S-M)-4	Medium - Short term work zone on roundabout.

•List of Standard Work Zone Plans for Urban Roads

Total of 38
34 Fixed
4 Mobile



List of Typical Work Zone Layouts of Rural Roads Specifications:

- R(S): Long-term work zone (static) for rural roads.
- R(S-M): Medium - Short term work zone (static or mobile) for rural roads.

Table B-3 Typical Work Zone Layouts of Rural Roads

Code Number	Description
R(S)-1	Work area out of shoulder.
R(S)-2	Work area on shoulder without narrowing the road.
R(S)-3	Work area on shoulder with narrowing the one lane of road.
R(S)-4	Work area with narrowing both lanes of road.
R(S)-5	Blocking one lane.

R(S-M)-1	Medium – Short term work zone on low traffic road (only daylight).
R(S-M)-2	Medium – Short term work zone with use of TMA.
R(S-M)-3	Medium – Short term work zone (only in daylight and good visibility).
R(S-M)-4	Medium – Short term work zone at shoulder (only in daylight and good visibility)
R(S-M)-5	Medium – Short term work zone at blocked lane with using traffic signals (only daylight).

List of Standard Work Zone Plans for Rural Roads

Total of **30**
18 Fixed
12 Mobile



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List of Typical Work Zone Layouts of Freeways Specifications:

- F(S): Long-term work zone (static) for urban roads.
- F(S-M): Medium - Short term work zone (static or mobile) for urban roads.

Table B-4 Typical Work Zone Layouts of Freeways

Code Number	Description
F(S)-1	Multi-lane freeway with left lane width narrowing.
F(S)-2	Multi-lane freeway with right lane width narrowing.
F(S)-3	Multi-lane freeway with two lane width narrowing.
F(S)-4	Multi-lane freeway with blocking left lane.
F(S)-5	Multi-lane freeway with blocking right lane.

Code Number	Description
F(S-M)-3	Medium - Short term work zone with blocked right lane of multi-lane freeway (only daylight).
F(S-M)-4	Medium - Short term work zone with blocked left and middle lanes of multi-lane freeway (only daylight).
F(S-M)-5	Medium - Short term work zone with blocked middle and right lane of multi-lane freeway (only daylight).
F(S-M)-6	Medium - Short term work zone with blocked emergency lane of multi-lane freeway with use of TMA (only daylight).

List of Standard Work Zone Plans for Highways

Total of **57**
42 Fixed
15 Mobile



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When can we put Signs of early warning in both sides ?



As a rule, signs shall be located on the right-hand side of the roadway.

Where special emphasis is necessary (e.g., three or more lanes on a dual highway), dual installations may be made

2] In case the median is wide enough, signs will be placed at both sides.

B.2.9. U(S)-9. Multi-Lane Arterial with Right Lane Closed (Emergency Lane)

B.2.10. U(S)-10. Multi-Lane Arterial with Left Lane Closed (Emergency Lane)

B.2.11. U(S)-11. Multi-Lane Arterial with Right Lane Closed

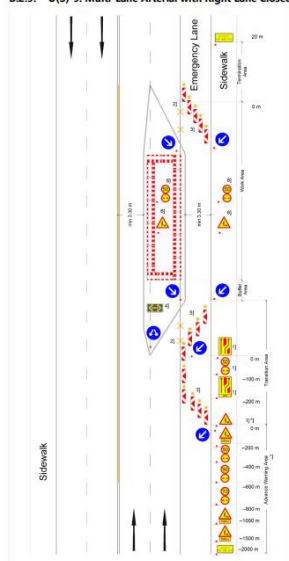
B.2.12. U(S)-12. Multi-Lane Arterial with Left Lane Closed

B.2.13. U(S)-13. Multi-Lane Arterial with Two-Lanes Closed

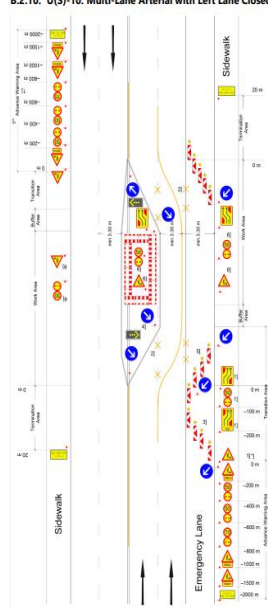
B.2.34. U(S)-34. Multi-Lane Arterial with Blocking the Railway Lane

When can we put Signs of early warning in both sides ?

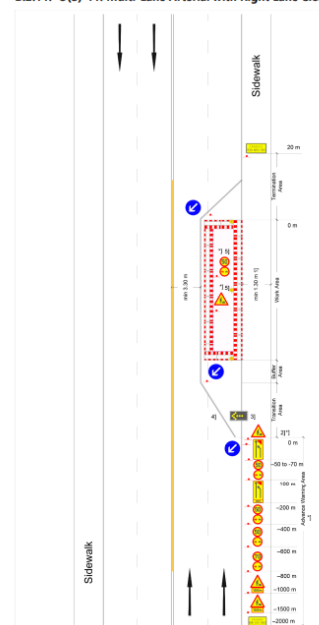
B.2.9. U(S)-9. Multi-Lane Arterial with Right Lane Closed (Emergency Lane)



B.2.10. U(S)-10. Multi-Lane Arterial with Left Lane Closed (Emergency Lane)



B.2.11. U(S)-11. Multi-Lane Arterial with Right Lane Closed

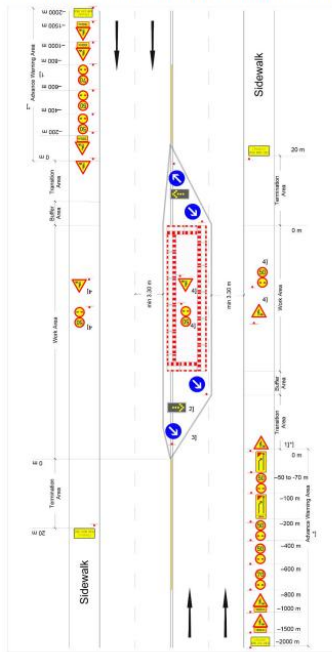




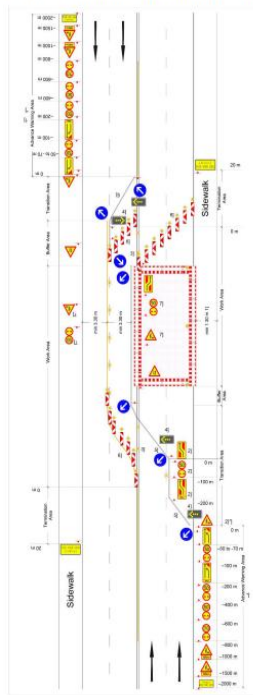
When can we put Signs of early warning in both sides ?



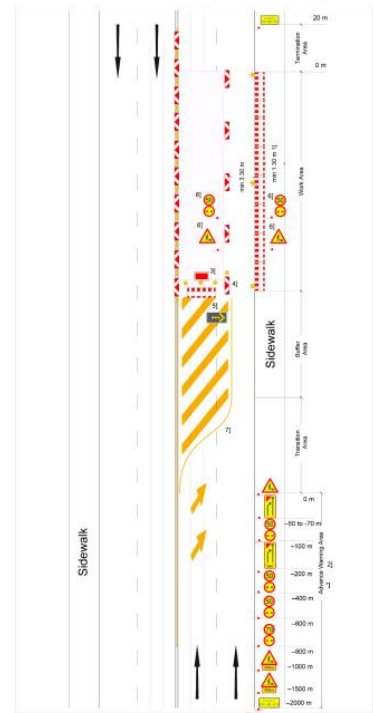
B.2.12. U(S)-12. Multi-Lane Arterial with Left Lane Closed



B.2.13. U(S)-13. Multi-Lane Arterial with Two-Lanes Closed



B.2.34. U(S)-34. Multi-Lane Arterial with Blocking the Railway Lane



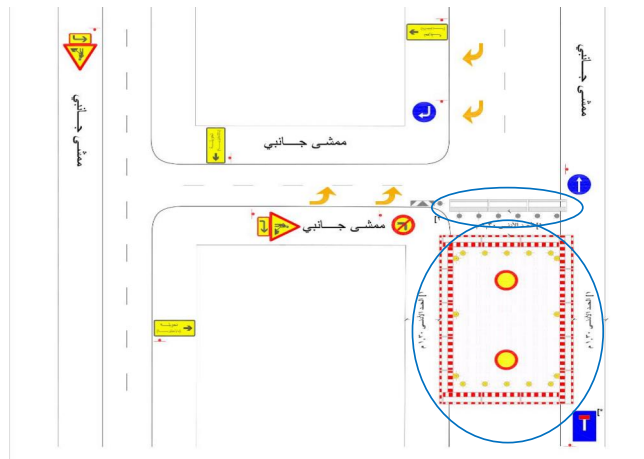
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Additional barricades may be installed as needed based on the specific requirements
Portable plastic safety barrier systems compliant with SASO-2980 may also be used.

Barricade. (Also, could be placed portable plastic safety barrier system, SASO-2980)



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Table 4-7 Traffic Control Decision Chart (Public Works Authority, 2015)



Speed Limit (km/h)	Two-way Traffic Flow		
	< 700 veh/h < 40 in 3 min	800 - 1,200 veh/h 40 - 60 in 3 min	> 1,200 veh/h > 60 in 3 min
≤ 50	Priority Signs 	Stop Sign 	Portable Signals
51 - 80	Stop Sign and Temporary Speed Limit 		
81 - 100	Portable Signals and Temporary Speed Limit 		



What is the maximum length of the work zone that allows the use of both a "STOP" sign and a portable traffic signal to control traffic, instead of a full road closure?

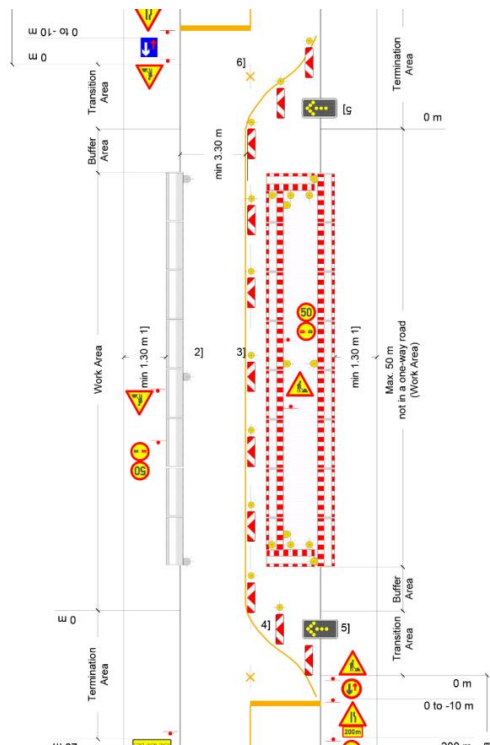
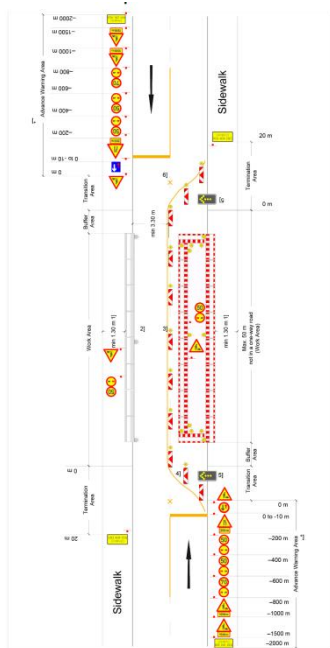
- ☐ A) STOP sign allowed up to 300 m, portable signal up to 150 m
- ☐ B) STOP sign allowed up to 100 m, portable signal up to 300 m
- ☐ C) STOP sign allowed up to 150 m, portable signal up to 500 m
- ☐ D) Both are allowed only if the work length does not exceed 75 m
- ☐ E) Neither is allowed unless an alternative detour exists

✓ **Correct Answer: (B)**

The traffic management with the use of a Stop sign (i.e., stop control) can be applied to works 100 m in length. The sign operators must have good visual and wireless communication and their coordination must be strong and effective. Portable traffic signals can be used when the works length is no bigger than 300 m. Finally, in cases when the road traffic is not covered by the above arrangements, the complete exclusion of the road with the creation of a deviation can be applied upon request.



B.2.2. U(S)-2. Alternative Traffic for Work Area in a Two - Way Road with Low Traffic and Speed



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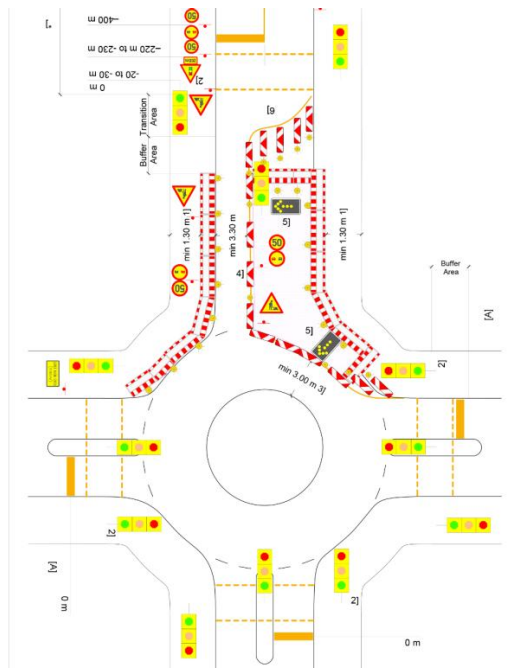
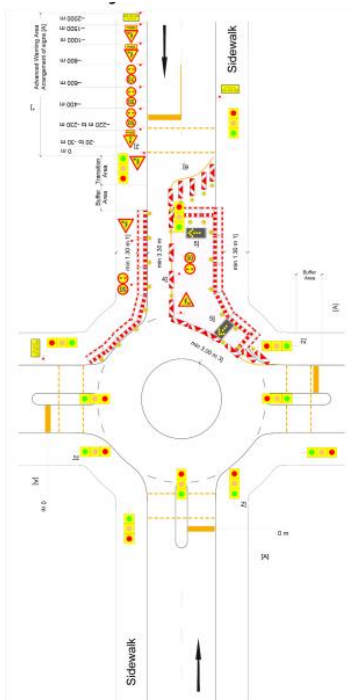
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B.2.19. U(S)-19. Blocking Lane at Roundabout and Adjustment Traffic Using Traffic Signals



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Break Time



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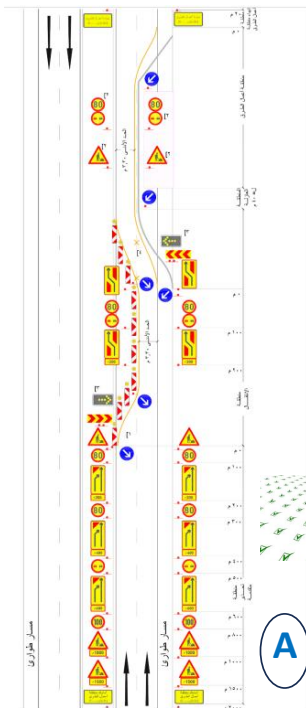
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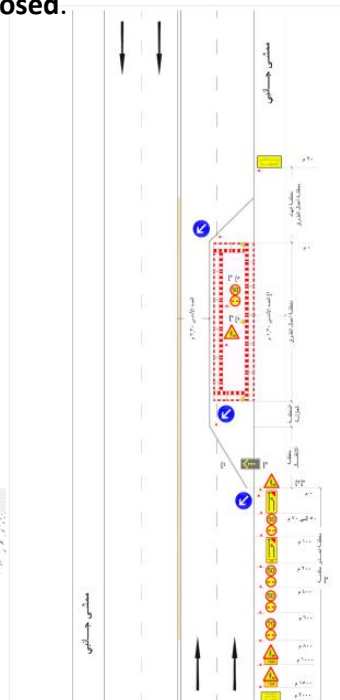
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B.4-5 (F(S)-5): High-speed multilane road with **right lane closure**.



B.10-2 (U(S)-11): Urban multilane road with **right lane closed**.



"What is the appropriate Traffic Control Plan (TCP)?
Free Highway right closure"

Any of them
with some
changes

C



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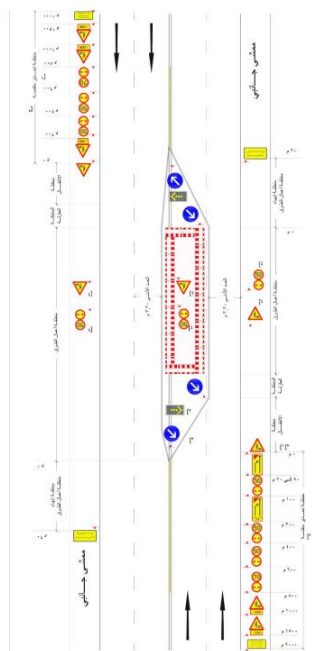
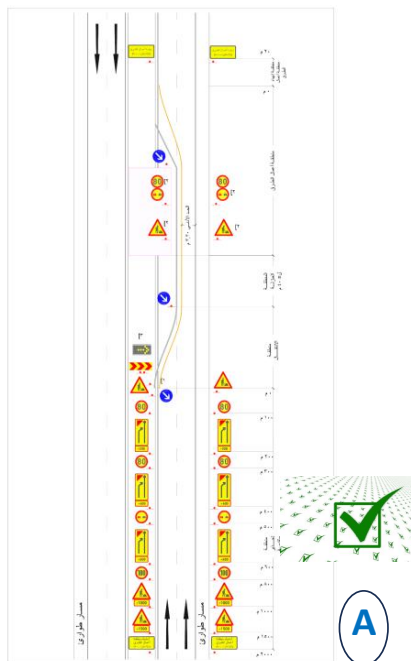


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"What is the appropriate Traffic Control Plan (TCP)? Free Highway left closure"



B

C

Any of them
with some
changes



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نصف قطر المنحنى:



Temporary Design Speed (km/h)	Minimum Curve Radius (m)
40	90
60	220
80	430
100	750

Table 4-9 Lane Widths by Speed (AASHTO, 2018)

Temporary Posted Speed Limit (km/h)	Minimum Lane Width (m)
< 50	3.0
50 - 80	3.3
> 80	3.3



1. Provide safe alternative pedestrian paths that are level, free of obstacles, and without hazardous slopes when the sidewalk or part of the road is closed.
2. The width of the alternative path should be at least 1.20 meters, and preferably increased to 1.50 meters or more as needed.
3. Provide side protection for pedestrians using barriers or separators to separate them from vehicle traffic when necessary.
4. Install lighting systems and warning signs where pedestrians cross hazardous or shared zones with vehicles.
5. Construct the temporary path outside the vehicle roadway when possible, or provide proper protection if necessary.



Pedestrian Safety in Detour Zones

- 1 Provide an alternate path on a flat, barrier-free surface 
- 2 Minimum width 1.2 m; 1.5 m or more preferred 
- 3 Separate pedestrians from traffic with barriers if needed 
- 4 Install lighting and warning signs in hazard areas 
- 5 Locate outside traffic lane, or install proper protection 
- 5 Locate outside traffic lane, or install proper protection 

Refer to Saudi Arabian Road Code No.305, Section 4-6

Pedestrian Safety in Detour Zones 319





Pedestrian Safety

سلامة المشاة:

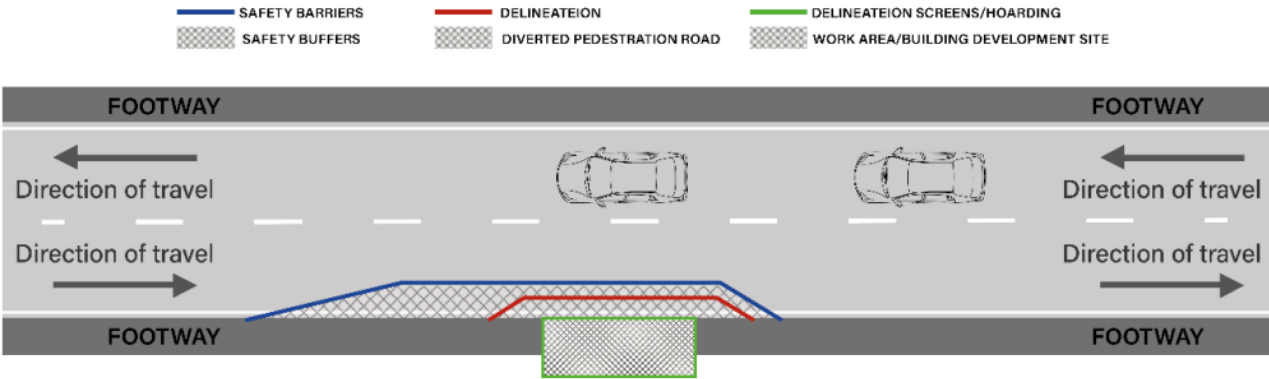


Figure 4-11 Footway Diversion into the Traveled Way (Based on Public Works Authority, 2015)



Pedestrian Safety

سلامة المشاة:

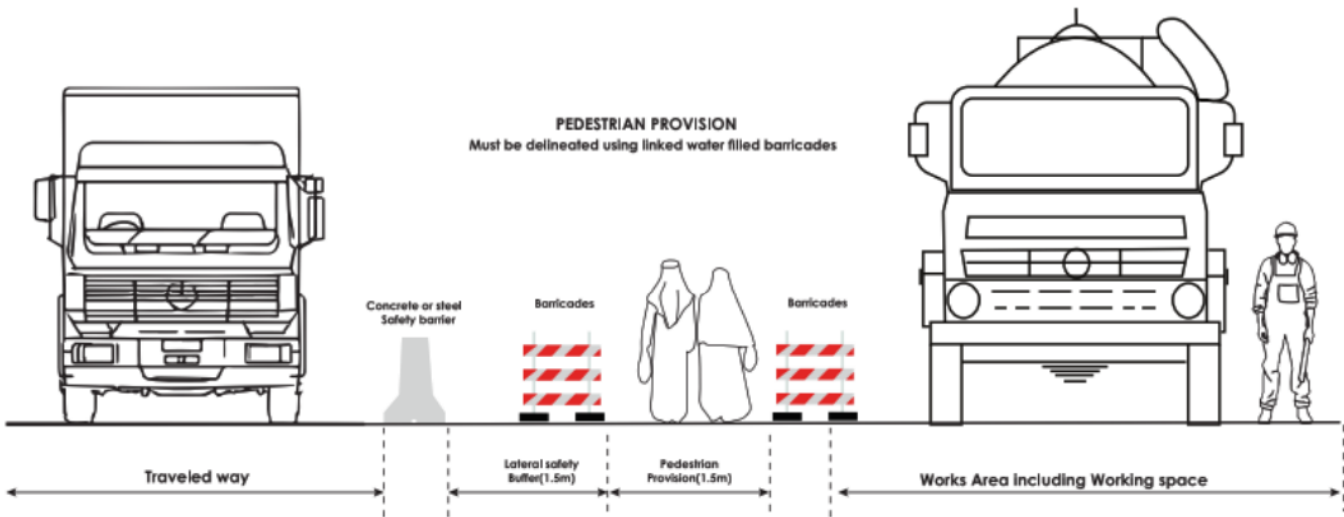


Figure 4-12 Pedestrian Provision (Based on Public Works Authority, 2015; Source: Traffix Devices)



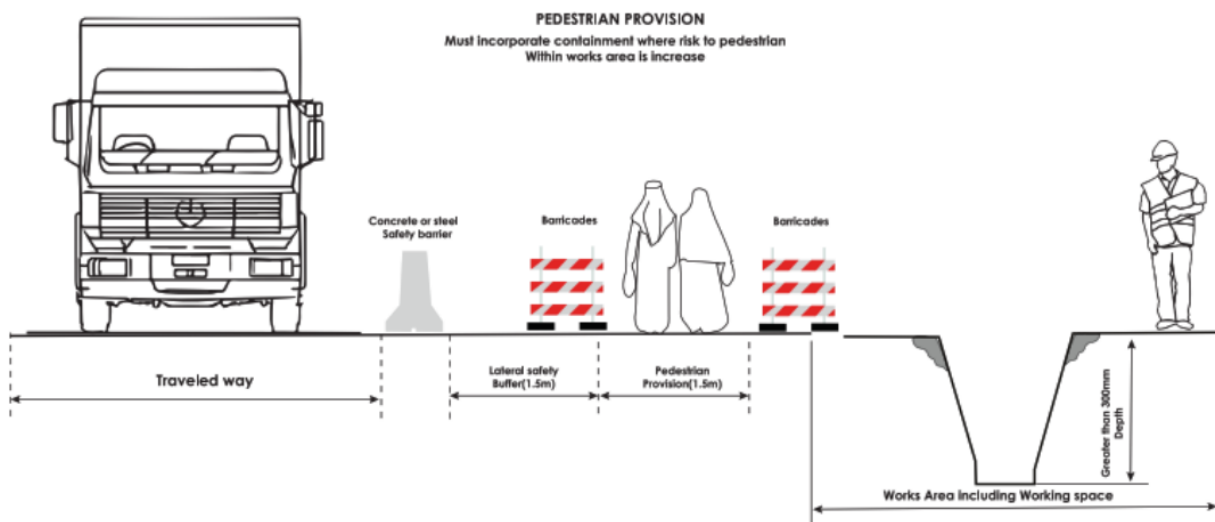


Figure 4-13 Pedestrian Provision (Increased Hazard), (Based on Public Works Authority, 2015; Source: Traffic Devices)



Figure 4-14 Pedestrian Protection around Construction Site incorporating Safety Barriers and Barricades (ARTBA, 2018; Source: Safe Site Facilities)

What is the problem ?



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Pedestrian Safety

سلامة المشاة:



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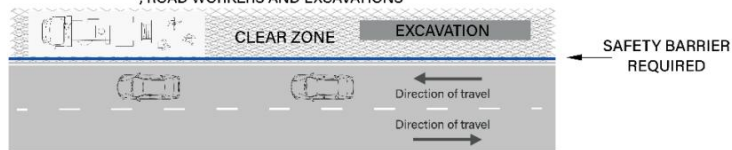
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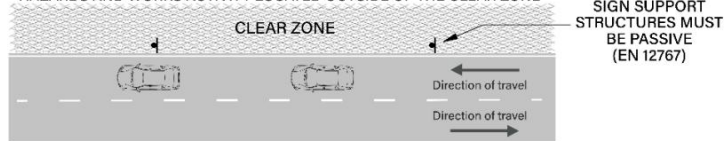
CLEAR ZONE OCCUPIED BY WORKS ACTIVITY INCLUDING ANY, OR ALL OF THE FOLLOWING - TRAFFIC SIGNS, EQUIPMENT, MATERIALS, WORKS VEHICLES, ROAD WORKERS AND EXCAVATIONS



WORK AREA
ALL WORKS ACTIVITY INCLUDING TRAFFIC SIGNS, EQUIPMENT, MATERIALS, WORKS VEHICLES, ROAD WORKERS AND EXCAVATIONS LOCATED OUTSIDE OF THE CLEAR ZONE



CLEAR ZONE ONLY OCCUPIED BY WORKS RELATED TRAFFIC SIGN STRUCTURES THAT ARE OF PASSIVE CONSTRUCTION. ALL OTHER NON-PASSIVE HAZARDS AND WORKS ACTIVITY LOCATED OUTSIDE OF THE CLEAR ZONE



What about work zone in free zone ?



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Table 4-5 Criteria of Road Safety Barrier Decision Chart (Public Works Authority, 2015; RSA, 2021; Source: Traffic Safety Zone, Traffic Safety Supply Company, Traffix Devices)

Permanent Speed Limit (km/h)	Work type – Delineation of Work Area and Working Space			
	Long - Term > 8 h	Medium - Term 15 min to 8 h	Short - Term < 15 min	Mobile
≤ 50				
				
51 - 80				
81 - 120				



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What about Distance between channelizing Devices ?

Table 4-4 Spacing of Channelizing Devices on Curves (SHC 602 (MUTCD))



Table 4-3 Spacing of Channelizing Devices in Tapers (SHC 602 (MUTCD))

Posted or 85 Percentile Speed Limit (km/h)	Spacing of Channelizing Devices (m)
30	6
40	8
50	9
60	11
70	13
80	15
90	17
(100) exceptional	19



Radius of Curve (m)	Spacing of Channelizing Devices (m)
25	7
50	10
75	12
100	15
125	18
150	20
175	21
200	22
250	25
300	27
400	33
500	36
Over 500	50



What about Distance between barriers ?



1. Use shorter spacing if drivers enter gaps between devices.
2. Observe drivers to check if taper and spacing are effective.
3. Applies to cones (750 mm), panels (250×1000 mm), and barricades.
4. For 500 mm cones, use **half** the standard spacing.
5. Portable barriers must be connected; spacing rules don't apply.

1. استخدم تباعدًا أقصر إذا دخل السائقون بين الأدوات التنظيمية.

2. راقب السائقين للتأكد من فعالية التدرج والتباعد.

3. تنطبق القواعد على الأقماع (ارتفاع 750 مم، الألواح 250×1000 مم)، والحواجز.

4. عند استخدام أقماع بارتفاع 500 مم، يجب تقليل التباعد إلى النصف.

5. يجب ربط الحواجز المحمولة ببعضها، ولا تنطبق عليها قواعد التباعد.





What is the positive barriers ?

- **Work Area** includes: work surface + space for workers, equipment, materials, and storage.
- All work activities take place **within this defined area**.
- On **divided highways**, it is preferred to use **positive barriers** to separate traffic from the work zone.
- **Examples**: concrete or steel **portable crashworthy safety barriers**.
- Positive barriers **prevent vehicle intrusion** and **reduce injury risk** to occupants.
- Barriers are recommended when there's a **significant elevation difference** between road and workspace.
- Larger than 300 mm
- Barrier sections must be **connected continuously** to function as one system.
- Positive barriers should be **supplemented** with delineators, channelizers, or pavement markings.

As a road safety engineer specializing in detours, which of the following signs is used to raise awareness about safety at the beginning of work zones according to the new Saudi Code?

- An octagonal red sign bearing the phrase "Safety First".
- A yellow triangular sign with a red border bearing the phrase "Safety First".
- A diamond-shaped yellow sign bearing the phrase "Safety First" with an additional square showing "Safety First".
- Other.

others



C



B



A

D





الشكل (١٢-٧) لافتة مسار مغلق (TW50-2).



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Road Safety Engineering



Temporary Channelization and Devices

٣-٧ أجهزة التوجيه المؤقتة:

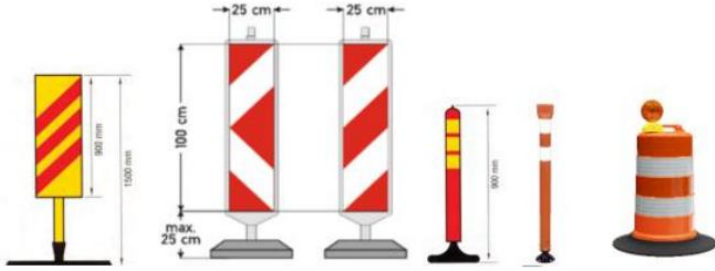
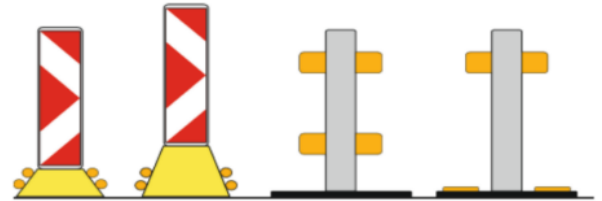
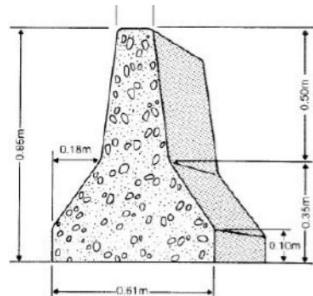


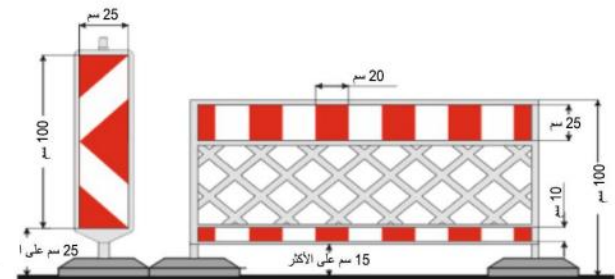
Figure 7-6 Delineation Equipment (RSA 21, Corporation "TRAFFIC SAFETY ZONE", Traffic Safety Supply Corporation)



الشكل (٥-٧) الحواجز المؤقتة (SASO-EN 1317).



الشكل (٢٥-٧) حاجز الأمان المتنقل.



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6.Lighting Devices



Figure 6-1 Warning Light (Source: Eastern Metal (Signs & Safety) Company)



Figure 6-2 Hazard Identification Beacon (Source: GT Towing Ltd)

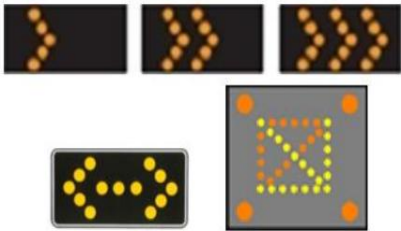


Figure 6-3 Flashing Warning Arrow Panels (Public Works Authority, 2015; FHWA, 2009)



Figure 6-4 Mobile Signage for Blocking Lanes (RSA, 2021)



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Figure 6-5 Electric Mobile Lighting (Source: UPRENT Lifting Equipment Rentals)



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6.1. Battery-Operated Warning and Delineation Lights

♦ Purpose:

Warning lights are among the most essential visual safety tools in work zones. They guide and alert drivers to road changes, especially at night or in low visibility.

♦ 1 Types of Lights:

- Type A: Low-intensity flashing light (intermittent)
- Type B: High-intensity flashing light (intermittent)
- Type C: Steady-on light (continuous)

♦ 2 Applications:

Used with barrels, barricades, reflectors, and warning signs to give a clear visual warning in work zones.

♦ 3 Operation Mechanism:

Automatically turn on at dusk and off at dawn. Designed to resist vandalism and damage.

♦ 4 Technical Specs:

Minimum lens diameter for all types is 150 mm to ensure visibility and effective lighting from sufficient distances.



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Table 7-3 Warning Lights

Characteristics	Type A Low Brightness	Type B High Brightness	Type C Steady Burn
Lens Directional faces	1 or 2	1	1 or 2
Flashing Rate per Minute	55 to 75	55 to 75	Do not flash
Flash Duration*	10 %	8 %	Do not flash
Minimum Effective Visibility	1,000 m (Night)	350 m (Sunny Day)	1,000 m (Night)
Minimum Lens Diameter	15 cm	15 cm	15 cm
Hours of Required Operation	Dusk to Dawn	All Times	Dusk to Dawn
*NOTE: Length of time instantaneous brightness is equal to or greater than effective brightness.			



- النوع (أ) عبارة عن وميض منخفض السطوع
- النوع (ب) عبارة عن وميض عالي السطوع.
- النوع (ج) يعطي ضوءاً ثابتاً.

Support:

15 Type A Low-Intensity Flashing warning lights are used to warn road users during nighttime hours that they are approaching or proceeding in a potentially hazardous area.

Option:

16 Type A warning lights may be mounted on channelizing devices.

Support:

17 Type B High-Intensity Flashing warning lights are used to warn road users during both daylight and nighttime hours that they are approaching a potentially hazardous area.

Option:

18 Type B warning lights are designed to operate 24 hours per day and may be mounted on advance warning signs or on independent supports.

19 Type C Steady-Burn warning lights and Type D 360-degree Steady-Burn warning lights may be used during nighttime hours to delineate the edge of the traveled way.

Guidance:

20 When used to delineate a curve, Type C and Type D 360-degree warning lights should only be used on devices on the outside of the curve, and not on the inside of the curve.

04 Warning lights shall comply with the provisions in Chapter 13 of the publication entitled, "Equipment and Materials Standards of the Institute of Transportation Engineers," 1998, Institute of Transportation Engineers.

05 When warning lights are used, they shall be mounted on signs or channelizing devices in a manner that, if hit by an errant vehicle, they will not be likely to penetrate the windshield.

Guidance:

06 The maximum spacing for warning lights should be identical to the channelizing device spacing requirements.

Support:

07 The light weight and portability of warning lights are advantages that make these devices useful as supplements to the retroreflectorization on signs and channelizing devices. The flashing lights are effective in attracting road users' attention.

Option:

08 Warning lights may be used in either a steady-burn or flashing mode.

Standard:

09 Warning lights shall flash when placed on channelizing devices used alone or in a cluster to warn of a condition.

10 Except for the sequential flashing warning lights discussed in Paragraph 12 of this Section, warning lights placed on channelizing devices used in a series to channelize road users shall be steady-burn.

11 Except for the sequential flashing warning lights that are described in Paragraph 12 of this Section, flashing warning lights shall not be used for delineation, as a series of flashers fails to identify the desired vehicle path.

12 If a series of sequential flashing warning lights is used on channelizing devices that form a merging taper, the successive flashing of the lights shall occur from the upstream end of the merging taper to the downstream end of the merging taper in order to identify the desired vehicle path. Each flashing warning light in the sequence shall be flashed at a rate of not less than 55 or more than 75 times per minute.

13 Type A Low-Intensity Flashing warning lights, Type C Steady-Burn warning lights, and Type D 360-degree Steady-Burn warning lights shall be maintained so as to be capable of being visible on a clear night from a distance of 3,000 feet. Type B High-Intensity Flashing warning lights shall be maintained so as to be capable of being visible on a sunny day when viewed without the sun directly on or behind the device from a distance of 1,000 feet.

14 Warning lights shall have a minimum mounting height of 30 inches to the bottom of the lens.



Hazard Identification Beacons

فان تحديد المخاطر:



- 1 Used only on warning signs, Jersey barriers, barrels, or temporary barriers within work zones.
- 2 The beacon must be circular, yellow, flashing, with a diameter of no less than 200 mm and a height of no less than 300 mm.
- 3 It must flash at a rate of no less than 50 flashes per minute, with the dark interval being at least half the flash duration.
- 6 It can be powered by an internal battery, electric generator, or external power source (110–220 volts).
- 7 May include a light sensor to activate automatically at night and turn off at dawn.
- 8 Typically mounted on top of signs, maintenance vehicles, or near excavation and temporary work sites.
- 9 Must be visible from all directions and provide clear visual warning to road users.
- 10 When installed at high elevation (e.g., on a truck or crane), it must comply with FHWA requirements regarding light intensity, positioning, and visibility.



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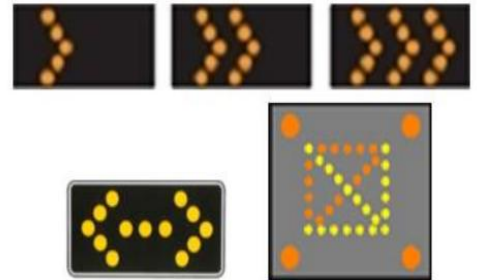
Flashing Warning Arrow Panels

لوحات أسهم التحذير الوامضة:



- 1 Directs drivers during lane narrowing or temporary detours.
- 2 Consists of an LED-lit arrow, mounted on a vehicle or fixed base.
- 3 Must be visible from a distance of at least 800 meters at night
- 4 Can be mounted on a vehicle, trailer, or fixed stand.
- 5 Displays 4 modes: steady left, steady right, flashing left, flashi
- 6 It is recommended to use LED lights with a diameter of no les: in amber color.

الهيئة العامة للطرق
Roads General Authority



الشكل (٦-٣) لوحات أسهم تحذيرية وامضة ((FHWA, 2009 ; Public Works Authority, 2015)).



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Floodlights

الأتوار الكاشفة



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1 Main Purpose: Enhance visibility in nighttime work zones (construction and maintenance), especially when there is an invisible hazard or a sudden change in road alignment.

2 Optimal Use: Installed on temporary poles or flagger stations, covering the work area without dazzling or distracting drivers.

3 Smart Distribution: Light must be directed toward the work surface, not toward traffic, to ensure visual safety without interfering with signs or traffic lanes.

4 Inspection Support: Used to inspect the quality of implementation, equipment safety, and worker protection, especially during barrier checks, excavations, or night digging.

5 High-Speed Traffic Conditions: Essential for high-speed or high-traffic roads to allow drivers early reaction to hazards.

6 Power Source: Operates via mobile generators or portable power units, especially in off-grid or temporary locations.

7 Technical Recommendation: Should not replace general lighting but serve as a temporary support element to ensure a clear and safe environment for equipment, drivers, and workers.



Figure 6-5 Electric Mobile Lighting (Source: UPRENT Lifting Equipment Rentals)



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Automated Flagger



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Figure 7-2 Automated Flagger (Source: SITE 20/20 Company, Canada)-Red Flag Color applies for KSA



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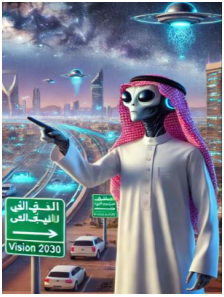




Is this mentioned in the code ?



Figure 6-1 Warning Light (Source: Eastern Metal (Signs & Safety) Company)



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Traffic Cones and Tubular Markers

الأقماع المرورية وعلامات أنبوبية:

✓ Requirements for Cones and Tubular Markers – Saudi Road Code:

- Made of flexible materials that withstand impacts without damaging the cone or the vehicle.
- Minimum cone height: 450 mm, with a square, stable base to prevent tipping.
- Larger and taller cones are used on high-speed roads for clearer guidance.
- Primary color: red, with a yellow reflective band at least 150 mm wide and no more than 75 mm from the top.
- Cones and markers must be regularly inspected to ensure they remain correctly positioned.



Figure 4-20 Traffic Cones and Tubular Markers (Source: Traffic Safety Zone)



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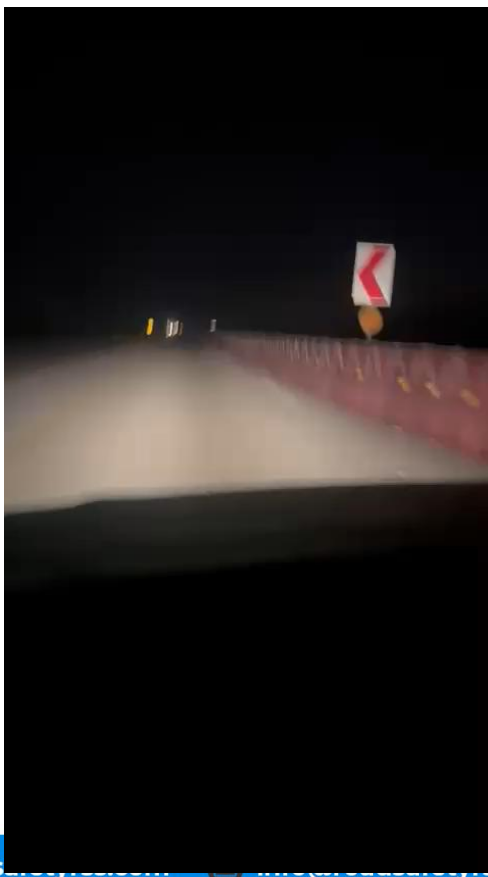


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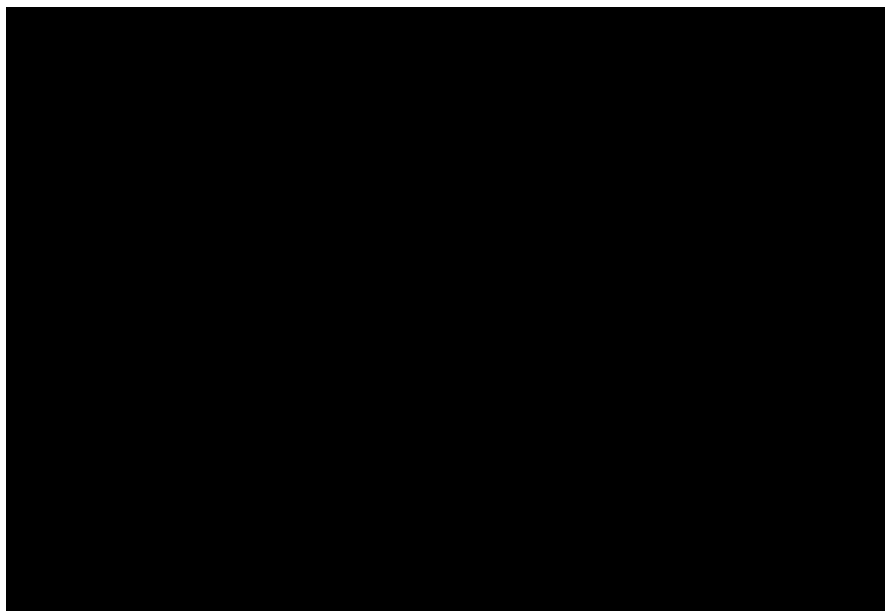
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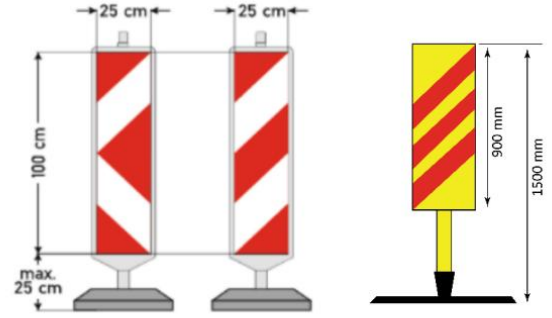
Vertical Panels

ألواح رأسية:



✓ Main Uses of Vertical Panels:

- ◆ Guiding traffic through narrow lanes or temporary detours.
- ◆ Warning of obstacles or sudden changes in the roadway alignment.
- ◆ Separating lanes or protecting the road edge (e.g., shoulder).
- ◆ Enhancing visual distinction in areas with limited visibility or tight spaces.



الشكل (٢١-٤) ألواح رأسية (RSA, 2021).

✂ Key Technical Specifications According to the Saudi Road Code:

- 1 Made with white warning stripes on a reflective red background.
- 2 Panel width is 25 cm and must be securely fixed to prevent tipping due to wind or traffic.
- 3 Mounted on a support or pole at a height of no less than 1.25 meters from the road surface.
- 4 Used on the shoulder or within the lane when side lanes are narrow.
- 5 Preferably equipped with reflective strips and warning lights to enhance nighttime visibility.



Traffic Separators

فواصل المرور:



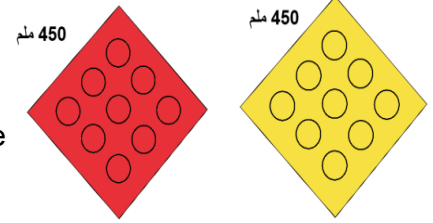
✂ Key Features and Uses of Traffic Separators:

- 1 Lane and Traffic Separation: Used to define traffic lanes and separate directions or individual lanes within the work zone.
- 2 Support for Vertical Panels: Vertical warning panels can be mounted on top of the separators to enhance visibility and safety.
- 3 Easy Installation and Removal: Their lightweight and flexible design makes them ideal for temporary applications in road projects.
- 4 Replaceable Options: Plastic New Jersey barriers can be used as an effective substitute in some scenarios.
- 5 Temporary and Efficient Organization: They help improve safety and ensure smooth traffic flow during



✓ Object Markers:

1. Used to identify obstacles within or beside the roadway.
2. When marking objects on the shoulder or curb, the distance must be ≤ 2.4 m from the edge or curb.
3. The installation height must ensure that the bottom of the marker is at least 1.2 m above ground level.
4. If the object is more than 2.4 m away, markers must still be mounted at a height of at least 1.2 m.
5. The mounting height can be adjusted depending on the nature of the object and local conditions.



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✓ Traffic Drum Requirements:

1. Drum height must be ≥ 800 mm, and diameter ≥ 500 mm.
2. Must include two reflective warning bands (Red/White or Orange/White).
3. Made of non-reflective material with consistent color visibility day and night.
4. Must not be filled with rocks or concrete; should include drainage holes for water.
5. It is allowed to install warning lights or traffic signs on the drum.



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Barricades

المتاريس:



Barricade Requirements (According to Saudi Road Code):

1. Made of wood, plastic, or lightweight metal.
2. Equipped with reflective stripes in clear colors (e.g., red/white or orange/white).
3. Must not be anchored with rocks or concrete; should be crash-safe.
4. Used for guiding or separating traffic or for full road closures.
5. When used for guidance, placed at an angle toward traffic flow.
6. Must not be placed parallel to traffic to avoid poor visibility.
7. In full closures, positioned across the road with a "ROAD CLOSED" sign.
8. Can be arranged progressively to reduce speed or redirect vehicles.
9. Should have fixed or flashing warning lights at night.
10. On highways, plastic barriers are preferred over traditional barricades.

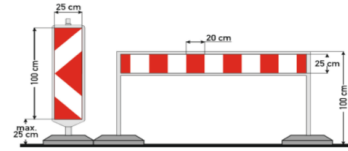


Figure 4-25 Type I of Barricades (RSA, 2021), (Portable Plastic Safety Barrier can also be Used (SASO-2980))

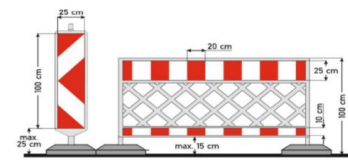


Figure 4-26 Type II of Barricades (RSA, 2021), (Portable Plastic Safety Barrier can also be Used (SASO-2980))

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Barricades

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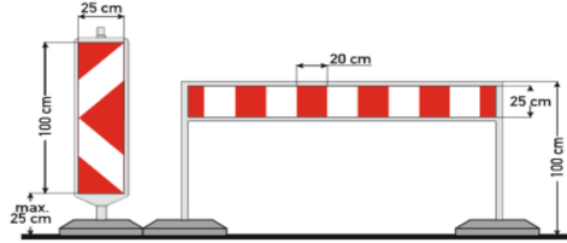


Figure 4-25 Type I of Barricades (RSA, 2021), (Portable Plastic Safety Barrier can also be Used (SASO-2980))

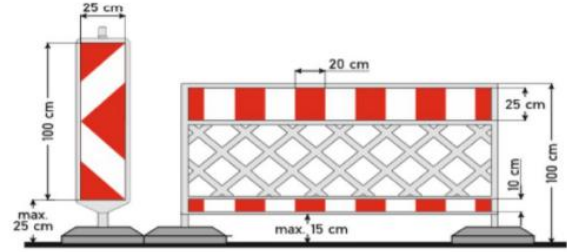


Figure 4-26 Type II of Barricades (RSA, 2021), (Portable Plastic Safety Barrier can also be Used (SASO-2980))



✓ Summary of Temporary Barrier Requirements:

1. Used to prevent vehicles from leaving the roadway or shoulder area.
2. Help guide traffic and separate different lanes and directions.
3. Designed to minimize injuries to drivers or workers in case of collision.
4. Preferred to be capable of redirecting vehicles with minimal damage.
5. Must be equipped with safety fencing (wire mesh) and continuous warning lights.
6. Plastic Jersey Barriers are acceptable and conform to the approved national standard (SASO 2980).

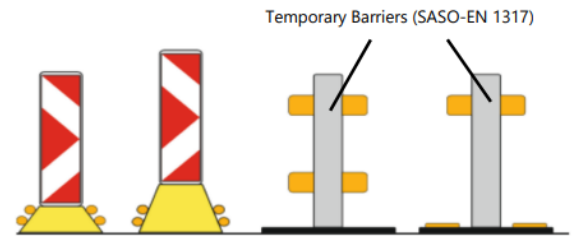


Figure 4-28 Temporary Barriers (SASO-EN 1317; RSA, 2021)





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1. Consist of three or more red flags mounted on a tall support.
2. Positioned above vehicle roofs to be visible from a sufficient distance.
3. A flashing warning light or another flag may also be mounted on the same support.
4. Used in situations requiring long-range visibility, especially at night.
5. The flag should be square, 40×40 mm in size, and red in color.



Figure 4-29 High Level Warning Device (Section 7.3.7 of SHC 602 (Manual of Uniform Traffic Control Devices))



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Temporary Pavement Markings

1. Pavement markings include paint
2. Plastic Delineators
3. Temporary Raised Reflective Pavement Markers

Pavement markings include paint,

الخطوط الأرضية الطلاء

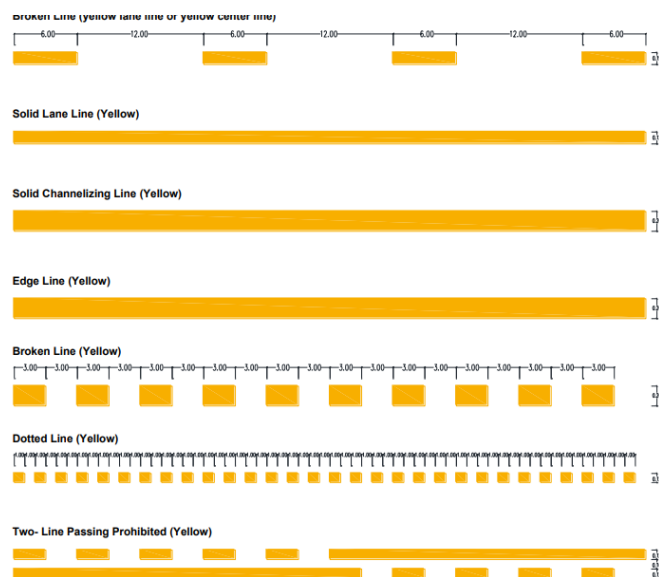


Figure 5-1 Typical Pavement Marking Lines and Patterns (Chapter 7 of SHC 602 (Manual of Uniform Traffic Control Devices))

Temporary Raised Reflective Pavement Markers

1. Used to improve nighttime visibility and lane guidance in poor weather conditions.
2. Feature reflective surfaces that return light toward the driver.
3. Installed directly on the road surface using strong adhesive or anchor bolts, depending on the type.
4. Made from durable materials like reinforced plastic, ceramic, or aluminum.
5. Available in different colors based on function (white for lanes, yellow for separation, red for restricted zones).
6. Some types produce vibration or noise when driven over to alert the driver.
7. Used on highways, detours, curves, and entry points.
8. Must withstand weather elements and heavy traffic without losing effectiveness.

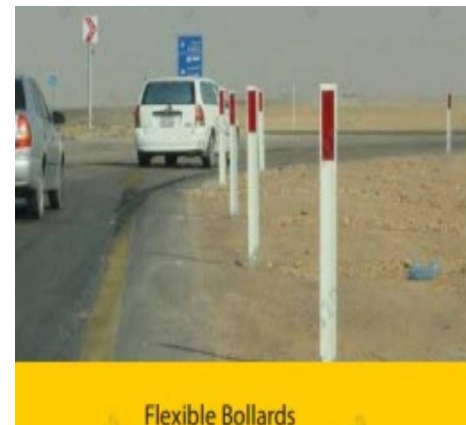


Figure 5-2 Temporary Raised Reflective Pavement Marke

Plastic Delineators

المحددات البلاستيكية:

1. Must be retro-reflective and visible up to 300 meters at night under normal conditions.
2. Minimum reflective area required is 0.01 m².
3. Mounted so the reflective element is approximately 1.2 meters above the pavement edge.
4. Placed 1 to 2 meters outside the berm or aligned with a guardrail.
5. Reflective color must be white.
6. Spacing must follow Table 4-3 and Table 4-4 of SHC 602.
7. Used in detours and curves to guide vehicles and show roadway alignment.
8. Not to be used alone or in groups as hazard warning devices.
9. Not suitable for areas with high hazards—use barricades or channelizing devices instead



Flexible Bollards



In a milling and paving project on a dual carriageway highway like the Dammam–Riyadh road, where traffic is reopened daily after work ends, what are the essential requirements for installing temporary road markings (temporary paint) according to the Saudi Road Code?

- ☐ A) Install temporary markings every 25 meters using regular paint with no additional requirements
- ☐ B) Place temporary side and center cat's eyes (15×15 cm) with gaps not exceeding 12 meters between segments
- ☐ C) Install temporary center and lane lines with a width of 150 mm and a minimum length of 3 meters, with gaps not exceeding 12 meters
- ☐ D) Install flexible side posts to indicate road boundaries only without any lane lines
- ☐ E) No need for temporary paint if the final asphalt layer has not been in place for more than 21 days

☒ **Correct Answer: (C)**

Temporary lines should be installed with a width of 150 mm, length of 3 m, and a maximum gap of 12 m between segments.

On resurfacing projects where traffic is maintained, temporary center and lane lines shall be installed prior to terminating the work each day. These temporary pavement markings shall consist, as a minimum, of a 3 m segment of line approximately 150 mm wide with 12 m gaps. It is recommended temporary marking tape or temporary raised pavement markers be used to provide these markings.



Plastic Delineators



Table 4-3 Spacing of Channelizing Devices in Tapers (SHC 602 (MUTCD))

Posted or 85 Percentile Speed Limit (km/h)	Spacing of Channelizing Devices (m)
30	6
40	8
50	9
60	11
70	13
80	15
90	17

Table 4-4 Spacing of Channelizing Devices on Curves (SHC 602 (MUTCD))

Radius of Curve (m)	Spacing of Channelizing Devices (m)
25	7
50	10
75	12
100	15
125	18
150	20
175	21
200	22
250	25
300	27
400	33
500	36
Over 500	50



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Object Markers

1. Object markers are used to mark obstructions within or near the road.
2. If the object is **within 2.4 m** from the shoulder or curb, the marker must be mounted **at least 1.2 m** above the nearest traffic lane.
3. If the object is **more than 2.4 m** from the shoulder or curb, the marker must be mounted **at least 1.2 m** above ground level.
4. Mounting height may vary depending on the nature of the object and **local conditions**.

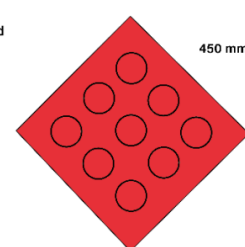
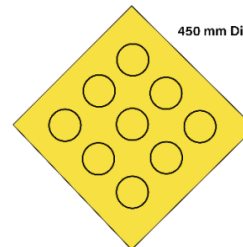


Figure 4-23 Object Markings (SHC 602 (Manual of Uniform Traffic Control Devices))



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1. Barricades are fixed or portable devices made of wood, metal, or plastic.
2. May have one or more horizontal rails.
3. Plastic safety barriers can be used as alternatives.
4. Must have red and white reflective stripes with a smooth, sealed surface.
5. Color must appear consistent day and night.
6. Supports should not be reflective but must be white or unpainted galvanized metal.
7. Both rails and supports should minimize damage and injury if struck by a vehicle.

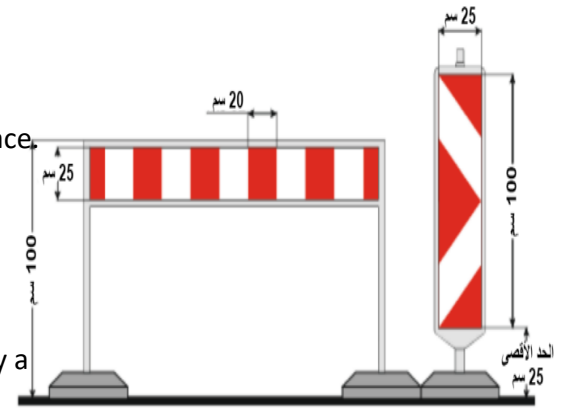


Figure 4-25 Type I of Barricades (RSA, 2021), (Portable Plastic Safety Barrier can also be Used (SASO-2980))

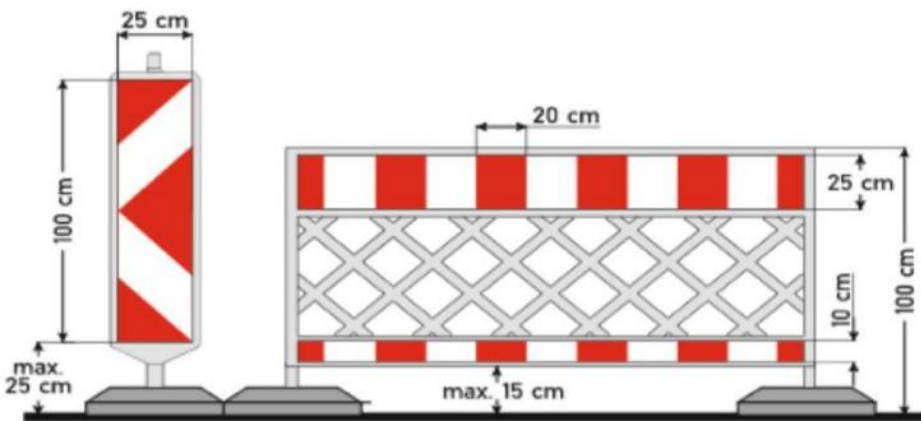


Figure 4-26 Type II of Barricades (RSA, 2021), (Portable Plastic Safety Barrier can also be Used (SASO-2980))

1. Flagmen should not be used except in emergency cases.
2. There is no need for steady flashing lights used on Type 1 or Type 2 barriers for daily operations.
3. At least two lights must be used at night during the setup phase before the work zone. The second light must be mounted above the first sign in the sequence.
4. The longitudinal dimensions may be adjusted slightly to suit field conditions.
5. When a side road intersects with the main road where the work is being carried out, additional traffic control devices must be installed as per the engineer's instructions.
6. At the end of daily work operations, all temporary signs related to the work must be removed or fully covered so they are no longer visible.

- Purpose:** Detours serve as temporary routes to redirect traffic around closed or restricted areas (e.g., construction zones).
- Typical Use:** Commonly required on highways or ramps where full road closures are necessary.
- Decision Factors:**
 - Construction duration
 - Availability of land for detour layout
 - Traffic volume
 - Cost of implementing the detour
- Authority Involvement:** Detour plans must be coordinated with the highway's competent authority.
- Access Considerations:** Special attention must be given to maintaining access for affected users.



According to the Saudi Road Code, what is the minimum required distance between the edge of the traffic lane and the storage location of equipment or materials on the roadside in work zones?

Choices:

- ☐ A) 20 meters on all highways and divided roads
- ☐ B) 10 meters from the edge of the lane
- ☐ C) 7 meters only on low-speed roads
- ☐ D) At least 5 meters, preferably 10 meters on divided roads
- ☐ E) No specific distance as long as warning signs are clear



Correct Answer: D



The Saudi Road Code specifies that construction equipment and debris must be stored at a **minimum distance of 5 meters** from the edge of the traffic lane, and **preferably 10 meters** on divided highways, to ensure road user safety and adequate emergency clearance.

9.10. Roadside Safety

Roadside safety requires constant attention during construction. In order to accommodate disabled vehicles, or other emergency situations, It is desirable to provide a clear roadside recovery area that is as wide as practical. All construction equipment materials and debris shall be stored more than 5 m from the edge of the travel lane. Preferably a 10 m clear space should be provided at divided highway work sites.





According to the Saudi Road Code, when conducting road works that require temporary traffic control or a detour, what is the maximum duration that conflicting permanent pavement markings are allowed to remain without removal?
Choices:

- ☐ A) Removal is not required if temporary signs are installed
- ☐ B) Must be removed immediately at the start of works
- ☐ C) Conflicting markings must be removed if the works exceed one week in the same location
- ☐ D) Markings are only removed during night work
- ☐ E) Conflicting markings may be temporarily covered without full removal



Correct Answer: C



If road works continue in the same location for more than one week, conflicting permanent pavement markings **must be permanently removed** to ensure clarity of temporary lanes and avoid misleading drivers.

9.9.1. Removal of Pavement Markings

When the work zone will be in place more than **one-week**, conflicting pavement markings must be removed.





According to the Saudi Road Code, what is the minimum geometric radius that must be adhered to when implementing a temporary detour curve for traffic in a work zone lasting more than one week?

Choices:

- ☐ A) 600 meters
- ☐ B) 400 meters
- ☐ C) 500 meters
- ☐ D) 700 meters
- ☐ E) Radius is determined only by the number of lanes

✓ **Correct Answer: A**

✚ The Saudi Road Code requires a **minimum radius of 600 meters** for long-term road detours, along with an appropriate superelevation rate to ensure vehicle safety while maneuvering through the work zone.

9.9.2. Radius of Curves

When the work zone will be in place more than **one week**, for highway detours minimum radius is 600 m. An adequate superelevation rate must be used in accordance with Section 4.6 of SHC 301 (Highway Geometric Design).



Top 10 TMA Work Zone Crashes Captured on Video

<https://www.youtube.com/watch?v=LQMFKS0EGK4>



Short term work zone without transition

<https://www.youtube.com/shorts/LxNMqCfYdq0>



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Why we should put TMA with the full width of lanes closed ?

<https://www.youtube.com/watch?v=O6GhZF7WrUw>



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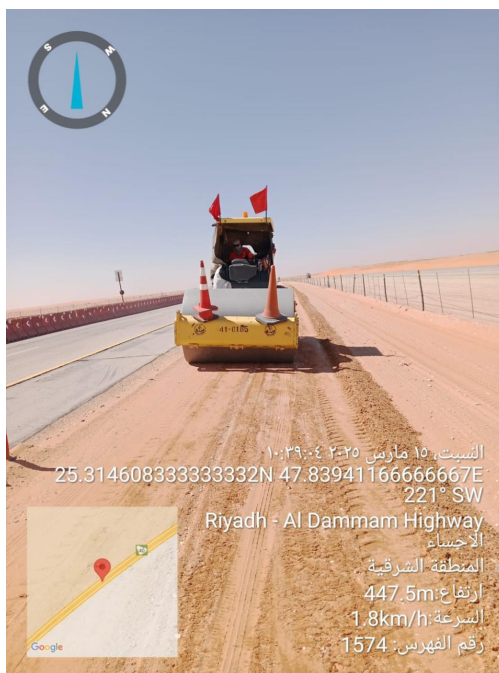
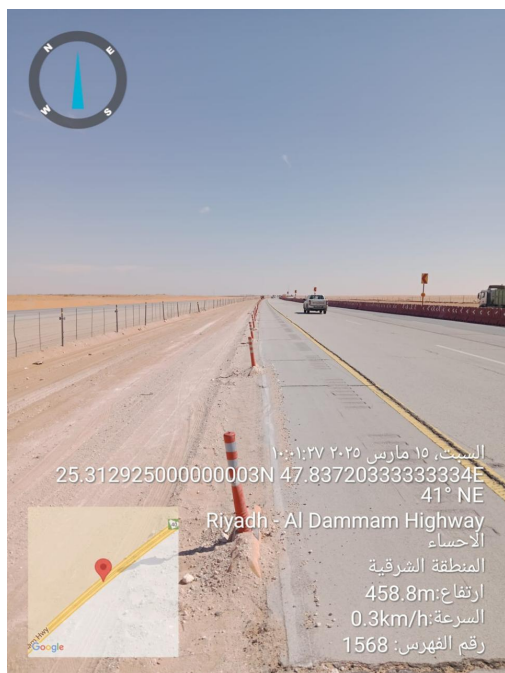
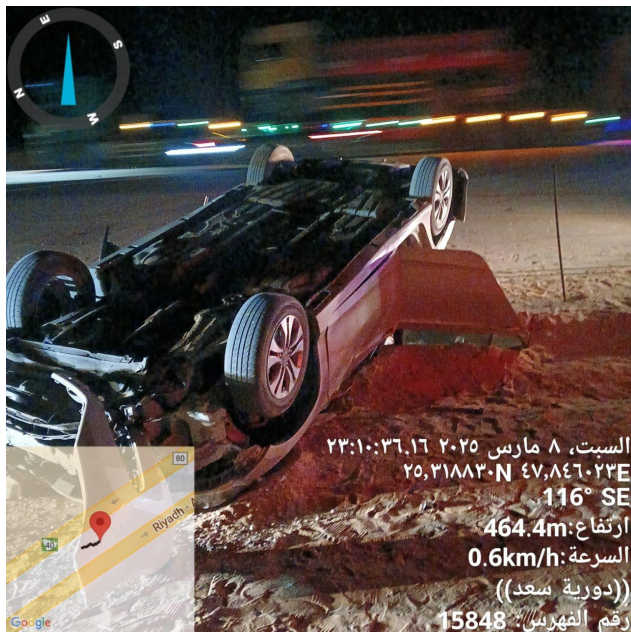


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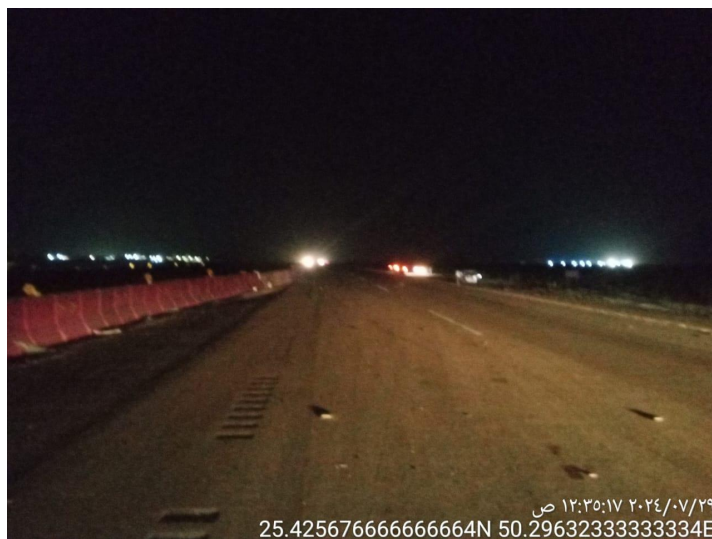
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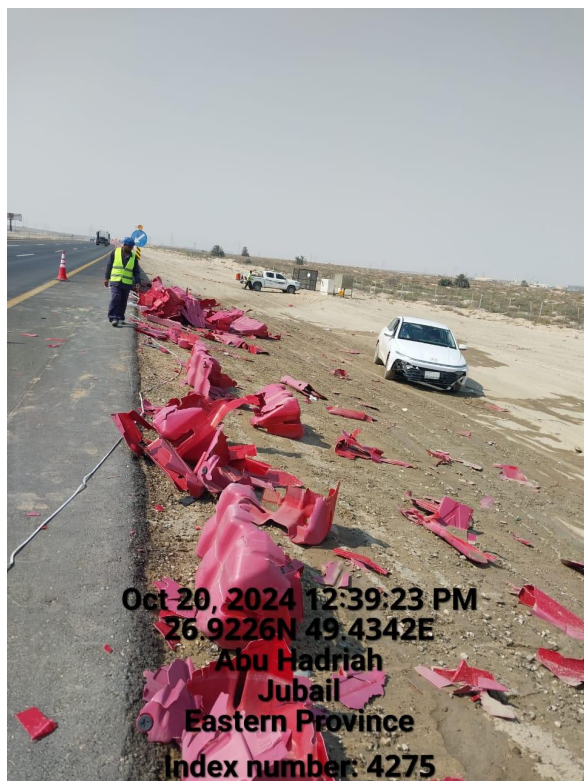


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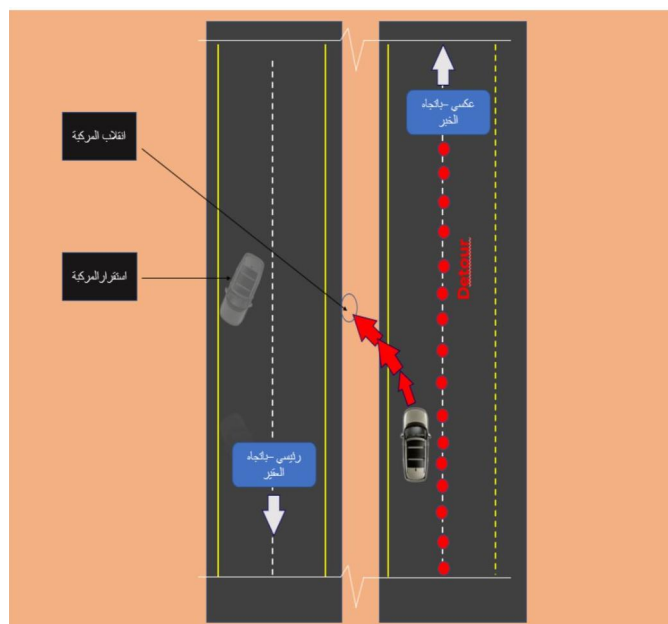
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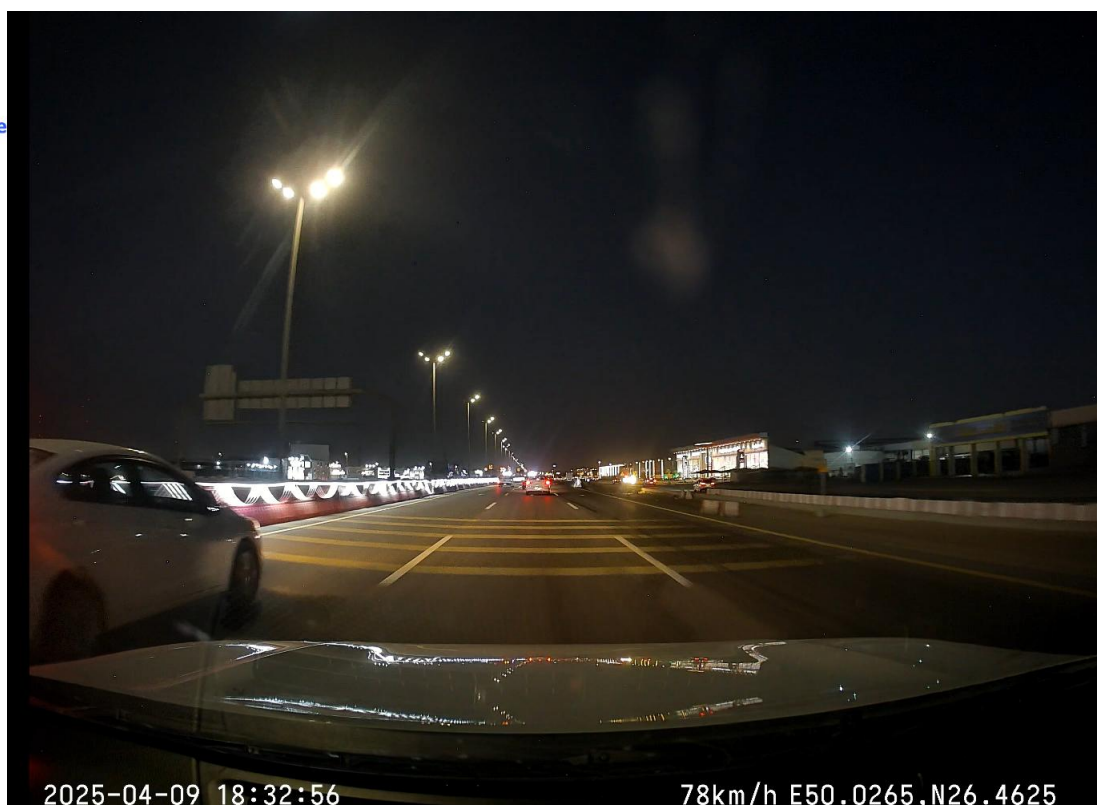
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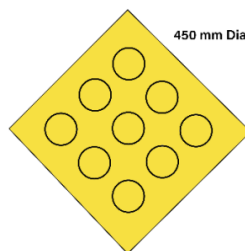


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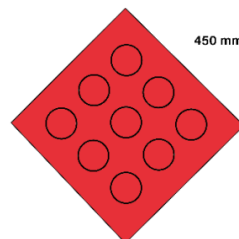


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450 mm Diamond



450 mm Diamond

Figure 4-23 Object Markings (SHC 602 (Manual of Uniform Traffic Control Devices))



Early Warning Area Crashes



	 Crash Type	Cause ?	✓ Solution
1	Rear-End Collision	Driver's delayed reaction or failure to notice warnings	Place clear advance warning signs with flashing lights / Rumble Strips
2	Sudden Lane Change Crash	Late visibility of warning leads to sudden lane change	Improve sign visibility and use directional arrows early
3	Collision with Sign Bases	Unsafe installation within the vehicle path and lack of protective barrier	Secure installation with base clearance or protective separator
4	Chain-Reaction Collision	Sudden stop of a vehicle without alerting others	Gradual speed reduction and encourage maintaining safe distances
5	Overtake Due to Asphalt Bump	Uneven or unmarked speed bumps or raised surfaces	Level the bumps and use clear advance warnings, reflective materials, and signage



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Transition Area Crashes



	 Crash Type	Cause ?	✓ Solution
1	Side-Swipe Collision	Sudden or unmarked lane change	Use clear directional arrows early and organize merging lanes
2	Lane Departure Crash	Poor transition lane design or unclear markings	Improve planned lanes using clear and reflective lines
3	Impact with Barriers	Lack of safe lane width or unexpected barriers	Use a safe lateral clearance and place barriers with enough buffer
4	Driver Confusion Crash	Unclear or inconsistent design and signage inside transition zone	Unify signage clearly and simplify traffic instructions in the area
5	Rear-End Collision	Sudden merge point with no clear alert	Early warning before merge area and reduce speed gradually



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Buffer Area Crashes

#	 Crash Type	Cause ?	✓ Solution
1	Impact with Equipment	Vehicle enters buffer zone due to insufficient distance or weak warning signs	Extend buffer zone length and use clear warning signs with reflectors
2	Worker Struck Crash	Vehicle crosses buffer zone boundaries and reaches worker area	Use protective barriers and clearly mark buffer zone with safe distance
3	Unintentional Entry Crash	Driver fails to recognize the buffer zone as a restricted area	Install clear signs and ground markings to prevent entry
4	Buffer Area Crash – Drifting into	Poor vehicle control or drowsiness causes drifting into buffer zone	Use rumble strips, audible markings, or edge reflectors to alert drivers
5	Collision with Temporary Barriers	Barriers placed too close to traffic lane without proper separation or visibility	Position barriers with safe clearance and secure them with reflectors for night visibility



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Work Area Crashes



#	 Crash Type	Cause ?	✓ Solution
1	Worker Struck Crash	Lack of proper separation between traffic and work zone	Use physical barriers and clearly define work lanes with warning signs
2	Equipment Impact Crash	Equipment working close to the lane without clear isolation or alert	Define equipment area with markings, reflectors, and warning lights
3	Side Impact from Drifting	Vehicle drifts off lane and hits equipment or workers inside work zone	Use side protection barriers and alert drivers with clear signage
4	Rollover from Shoulder Level Difference	Sudden elevation change or poor shoulder transition	Fill and level shoulders, and provide a safe buffer zone for movement
5	Drift/Rollover from Missing or Poor Pavement Markings	Missing or faded lane markings, especially at night or during rain	Repaint lanes with reflective materials and use clear temporary signs or reflectors
6	Impact at Equipment Access Points	Unprotected crossing between workers and vehicle paths	Define protected access points with warning signs, signals, or controllers



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#	 Crash Type	Cause ?	 Solution
1	Post-Merge Confusion Crash	Missing signs indicating end of the work zone and return to normal lanes	Use signs like "End of Work Zone" and "Return to Normal Route" clearly
2	Sudden Lane Shift Crash	End of diversion without clear tapering or merge area and unclear return to lanes	Provide a smooth taper and clear final merge area with directional arrows
3	Rear-End Collision	Sudden vehicle deceleration at merge end or disruption in traffic flow	Use early warning signs for lane change and promote vehicle spacing
4	Lane Departure Crash	Poor or missing lane markings after work zone	Repaint lines clearly using reflective paint and maintain guidance after the work zone
5	Collision with Temporary Devices	Temporary barriers or equipment not removed after work ends	Ensure all temporary devices are removed immediately and verify onsite



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What are the types of vehicles you need to take in your mind during preparation of TMP ?



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7. Types of traffic

Photograph	Description
	Forklift Mobile plant which can pick up, move and drop off goods
	Elevated work platforms Man cages, scissor lifts, cherry pickers and boom lifts
	Site vehicles SUV's and utes
	Tanker truck – liquid petroleum gas (LPG) Filling of LPG Tank for site forklifts and gas bottle cage self-unloaded



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7. Types of traffic

	Waste trucks Heavy rigid vehicles
	Delivery trucks (various) Delivering products to site such as materials, chemicals, etc unloaded by forklift.
	Courier van / ute / truck Unloaded by forklift or by hand
	Pedestrians



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What are the main components of TMP (Traffic Management Plan) ?



1. Introduction
2. Project Location
3. Project Description and Scope of Work
4. Sequential Steps for Traffic Diversion Plan (TDP) Approval
5. Objectives of a Traffic Management Plan
6. Base Conditions Assessment
7. Classification of Traffic Types
8. Hazard Identification & Risk Assessment
9. Construction Phases Description
10. Construction Phases Assessment
11. Conclusion & Summary
12. References & Further Resources
13. Appendices
14. Appendix A: Traffic Impact Study
15. Appendix B: Risk Register
16. Appendix C: Site Layouts & Diagrams



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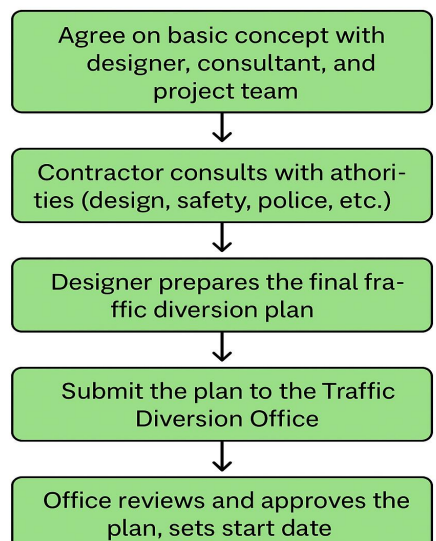


Sequential Steps for Traffic Diversion Plan (TDP) Approval

1. Agreement on the general concept of the traffic diversion plan between the designer, consultant, and project management.
2. The contractor coordinates with relevant authorities such as the Road Design Department, Road Safety, and the Ministry of Interior.
3. Final plan is prepared and developed by the designer based on the approved concept and received comments.
4. An official request is submitted to the Traffic Diversion Office for final approval.
5. The plan is reviewed by the office to ensure its compatibility with the site and scope of work, followed by approval and assignment of a start date.



TRAFFIC MANAGEMENT PLAN (TDP) APPROVAL STEPS



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Steps to Apply for a Road Work Zone Permit (Excavation or Detour) – Saudi Arabia



1. **Create a company account** on Balady platform
<https://balady.gov.sa>
2. **Submit excavation/detour permit request**
<https://balady.gov.sa/Services>
3. **Upload required files** (PDF layout, KMZ file)
4. **Draw route on the interactive map**
5. **Specify duration and project details**
6. **Coordinate with utility authorities:**
 - Electricity (SEC & Water (NWC): 8004411110 & Telecom
7. **Send files and follow up on NOCs (No Objection Certificate)**
8. **Pay fees via SADAD**
9. **Download and print the official permit**



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Highway Excavation Permit – Saudi Ministry of Transport (MOTLS)



1. Submit request on MOTLS portal
<https://mot.gov.sa/ar/e-services-details?contentId=70200>
2. Upload site plan (PDF), KMZ file, safety plan, and company credentials
3. Mark location and define work duration on the map
4. Coordinate with utility providers (SEC, NWC, Telecom)
5. Obtain NOCs from all relevant authorities
6. Get approval from Highway Security Command if work affects road surface
7. Pay permit fees via the instructed payment method
8. Download and print the official permit



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How to do Work Zone ?



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Stage 1: Planning – 10 Key Steps

- 1 Define the Scope of Work
- 2 Identify Affected Road Users
- 3 Conduct a Site Assessment

Visit the site to understand geometry, current signage, road conditions, surrounding land use, and access points.

- 4 Collect Traffic Data

Gather data on traffic volume, speed, direction, peak hours, and accident history.

- 5 Perform a Risk Assessment

Identify hazards (e.g., visibility issues, high-speed areas, access conflicts) and estimate severity and likelihood of crashes.

- 6 Determine Work Zone Alternatives

Explore options like:

- Working at night or off-peak hours
- Using shoulders or reversible lanes
- Minimizing full road closures

- 7 Evaluate the Need for Detours or Lane Shifts

Consider if traffic can be safely diverted, and identify alternate routes or temporary bypasses.

- 8 Coordinate with Stakeholders

Traffic police & Emergency services & Local businesses and residents & Utility companies

- 9 Estimate the Traffic Impact if required, to assess the effect on congestion and safety.

- 10 Set TMP Objectives and Scope



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- 1 Start from the Planning Stage** – Use the findings from the planning phase as your design foundation
- 2 Determine the Work Zone Area** – Mark the full extent of the work zone
- 3 Identify Entry and Exit Points for Equipment** – Design controlled, safe locations for machinery
- 4 Design the Buffer Area** – Set up protective zones between moving traffic and the work crew
- 5 Calculate Transition Area Lengths** – Use design speed and lane width to determine
- 6 Plan the Advance Warning Area** – Place early warning signs at appropriate distances
- 7 Select Proper Traffic Control Devices** – Choose cones, signs, barriers, and lights based on road type, traffic speed
- 8 Apply PDCA Strategy to Design** – Plan: set goals; Do: the design; Check: effectiveness; Act: improvements.
- 9 Accommodate Pedestrians and Cyclists** – Design safe pathways, crossings, or detours to protect non-motorized
- 10 Finalize and Review with Stakeholders** – Confirm the design meets all local standards and share with stakeholders for approval before execution.

- 1 Assign a Traffic Management Supervisor** – Designate a qualified person
- 2 Conduct a Pre-Installation Briefing** – Brief all staff and contractors on TCP details, roles, risks, and safety procedures
- 3 Install Advance Warning Devices** – Set up early warning signs and devices before approaching the actual work zone.
- 4 Deploy Channelizing Devices** – Place cones, barriers, and delineators according to the approved plan
- 5 Set the Buffer Area** – Establish a clear space between traffic and the work area to provide recovery for errant vehicles.
- 6 Define the Work Zone Area** – Mark construction area with clear boundaries to protect workers and guide traffic.
- 7 Set Up the Transition Area** – Ensure smooth lane shifts or tapers from moving traffic into the work
- 8 Check Driver Behavior** – Observe driver response to the setup (e.g., speed, confusion, violations) and adjust if needed.
- 9 Check Night Visibility and Lighting** – Verify that all warning lights, reflective devices, and illumination
- 10 Document the Installation** – Take photos and complete a checklist confirming full TMP compliance before allowing traffic.



Stage 4: Monitoring and Adjustment – 10 Key Steps



- 1 Conduct Regular Site Inspections** – Inspect the site daily to ensure all traffic control devices are present, visible,
- 2 Observe Traffic Operations** – Monitor driver behavior, traffic flow, and any signs of congestion
- 3 Check Worker and Public Safety** – Confirm barriers, PPE, and safe zones are in place and effective
- 4 Monitor Equipment and Material Placement** – Ensure construction equipment and materials are not blocking views
- 5 Evaluate Buffer and Transition Areas** – Re-check the effectiveness of buffer zones and transition tapers.
- 6 Gather Feedback from Field Personnel** – Listen to site workers and flaggers to learn about practical issues
- 7 Engage with Public and Stakeholders** – Collect input from residents, drivers, or emergency services
- 8 Apply PDCA Cycle (Plan-Do-Check-Act)**
- 9 Perform Nighttime Audits** – At night, inspect lighting, visibility of signs, and retroreflective
- 10 Document All Observations and Actions** – Keep accurate records of changes, issues, feedback, and actions taken



Stage 5: Removal and Closure – 10 Key Steps



- 1 Plan Termination Activities** – Define when and how the work zone will be deactivated safely.
- 2 Remove 'End of Work Zone' Signs** – Start by taking down the signs indicating the end of the zone.
- 3 Dismantle Equipment Access Areas** – Remove temporary entry/exit points for machinery.
- 4 Clear the Buffer Area** – Eliminate protection zones around the workspace.
- 5 Remove the Active Work Zone Area** – Clear all equipment, materials, and temporary markings.
- 6 Eliminate the Transition Area** – Smooth out the shift back to normal traffic lanes.
- 7 Take Down the Early Warning Area** – Remove advance warning signs and devices.
- 8 Clean and Restore the Site** – Sweep, inspect, and restore the road surface to its original state.
- 9 Document and Review** – Record the removal process and lessons learned for future projects.
- 10 Confirm Full Reopening** – Ensure traffic flow is fully restored and no residual hazards remain.





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Traffic management
guidance plan and
example template

WHSQ
Workplace Health and Safety Queensland
worksafe.qld.gov.au



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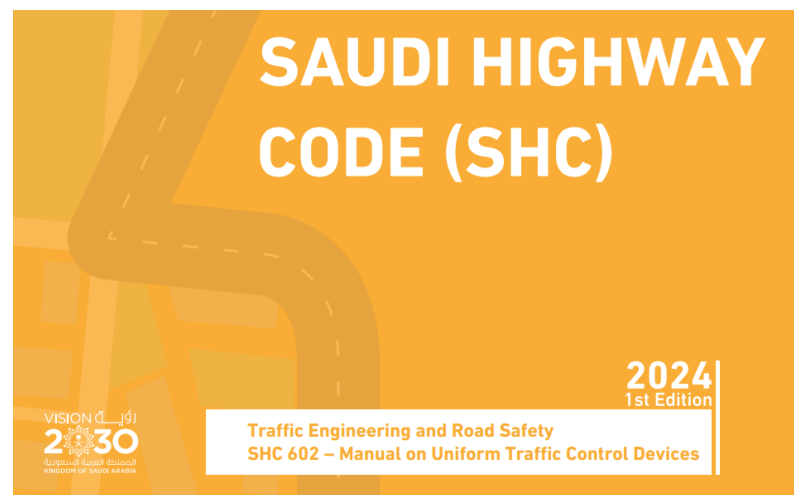
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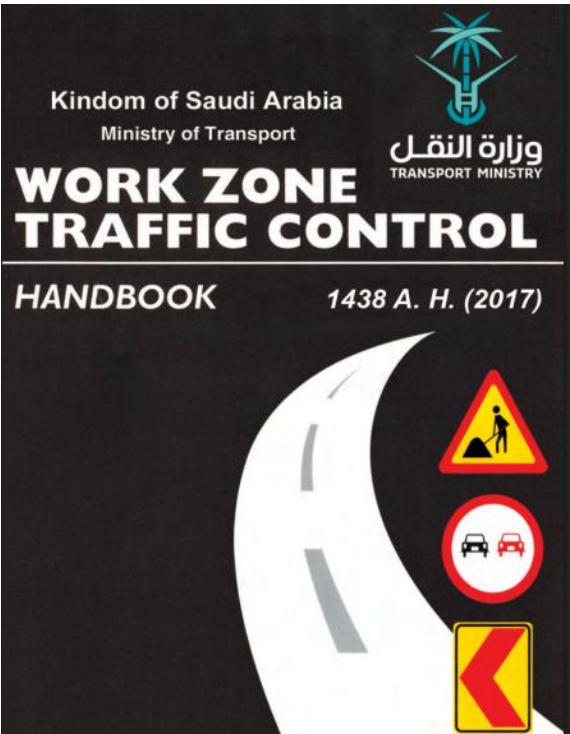
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GOVERNMENT OF THE DISTRICT OF COLUMBIA
District Department of Transportation

Public Space Regulation Division PSRD



GENERAL
TRAFFIC CONTROL PLAN (TCP) SUBMITTAL GUIDELINES

19TH Edition, February 14, 2018



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Traffic Control Inspection

Use this template when inspecting traffic control plans and safety precautions before commencing work each shift. Start the inspection by providing details of the project, speed limits and expected traffic conditions. Inspect the temporary traffic control safety measures including safety signs, channelizing devices, PPE worn and flagging. Next inspect the internal traffic control measures to ensure workers are safety separated from mobile construction equipment. Provide a final overall rating of the traffic control measures and any recommendations.

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<https://drive.google.com/file/d/179BOPcvmHkDwejr7SxmdH1-2vL5akCzb/view?usp=sharing>

OREGON DEPARTMENT OF TRANSPORTATION

TRAFFIC SIGNAL MANAGEMENT PLAN

APRIL 2020

Guide for Traffic Impact Studies) TIS)



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Construction Traffic Management Plan

INTEGRA
UNDERGROUND
GLENORE

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Construction Traffic Management Plan



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TRAFFIC MANAGEMENT PLAN

<https://drive.google.com/file/d/17YLpGWWd5Tr6iU1uYcBMPPmkCej4SE32/view?usp=sharing>

Romney Wind Energy Centre Project

Black & McDonald Project # 42030263



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Contents

1 Purpose	3
2 Scope	3
3 Work Areas and Traffic Flows	3
4 High Risk Areas, Activities and Interfaces	3
5 Safety Controls	3
5.1 Barriers	3
5.1.1 Hard Barriers	3
5.1.2 Soft Barriers	3
5.1.3 Bollards	3
5.2 Walkways	3
5.3 Exclusion Zones	3
5.4 Parking Areas	3
5.5 Visibility Aids	3
5.6 Warning Devices	4
5.7 Administrative Controls	4
5.7.1 Safe Operating Procedures	4
5.7.2 Training	4
5.7.3 Scheduling	4
5.7.4 Fatigue Management and Fitness for Work	4
5.7.5 Signage	4
5.7.6 Consultation and Communication	4
5.8 Maintenance and Fault Reporting	4
5.9 Personal Protective Equipment	4
6 Change Management and Review	4

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Thank you

4-12. Work Zone Implementation, Maintenance, and Clearance

1. Ensure all TTM equipment installation is done safely.
2. Use Medium–Short term TTM for installing/removing long-term TTM.
3. Follow Implementation and Clearance Plans for installing/removing TTM.
4. Implement TDPs progressively as TTM work advances.
5. Use TMA vehicles for long-term TTM, with an extra TMA for roads ≥ 120 km/h.
6. Conduct risk assessment and explore alternatives for safe TTM layouts.
7. Sign entrances and exits per SHC 602 based on vehicle type and speed.
8. Perform a visual check or drive-through before using the TTM site.
9. Confirm site compliance with TDP and clarity of signs for users and workers.



Description
Curriculum
Instructor
Evaluation

TMP
TRAFFIC
MANAGEMENT PLAN

The course includes

- Duration: 10 hours
- Enrolled: 30+ students
- Lessons: 5 lessons
- sections: 5 sections
- Tests: 5 tests
- Language: Arabic
- Notarized certificate

1000 SAR

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Course Content

Expand All

☐ First lecture
1 Topic | 1 Quiz
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☐ Second lecture
1 Topic | 1 Quiz
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☐ Third lecture
1 Topic | 1 Quiz
Expand

☐ Fourth lecture
1 Topic | 1 Quiz
Expand

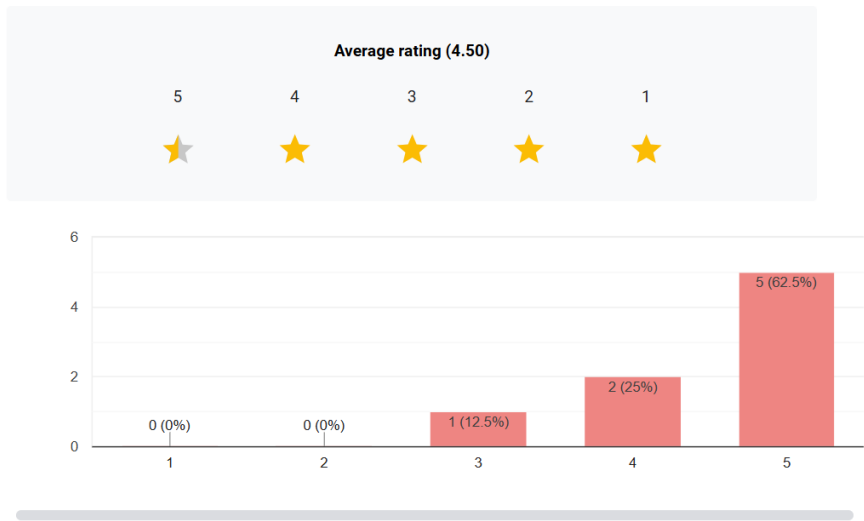
☐ Fifth lecture
1 Topic | 1 Quiz
Expand



نسخ الرسم البياني

"?Your evaluation of the Road Safety Society (RSS)"

8 ردود



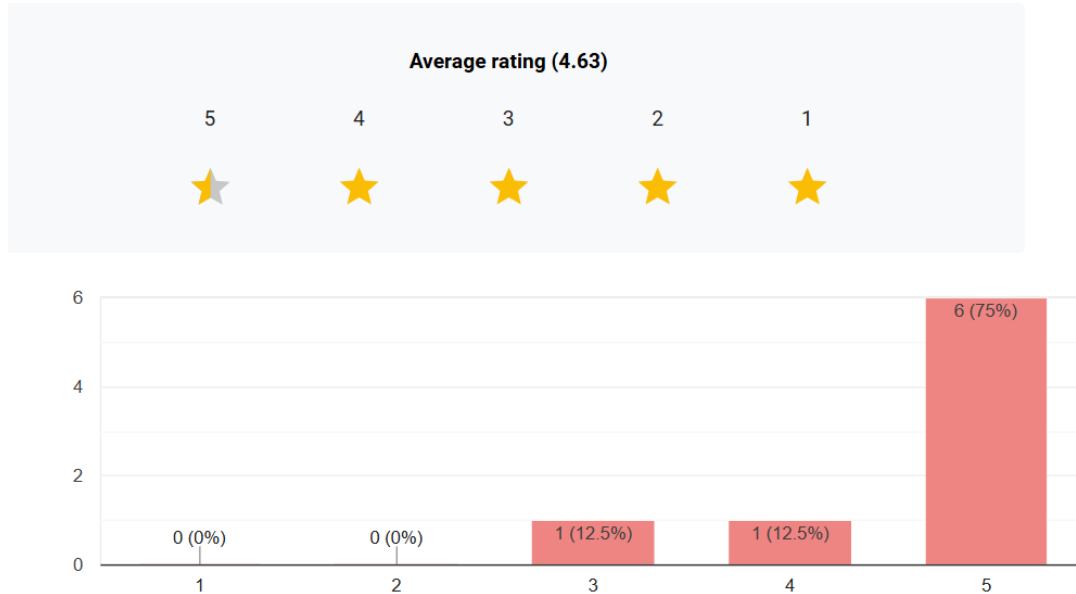


نسخ الرسم البياني

"What is your evaluation of the instructor"



8 ردود



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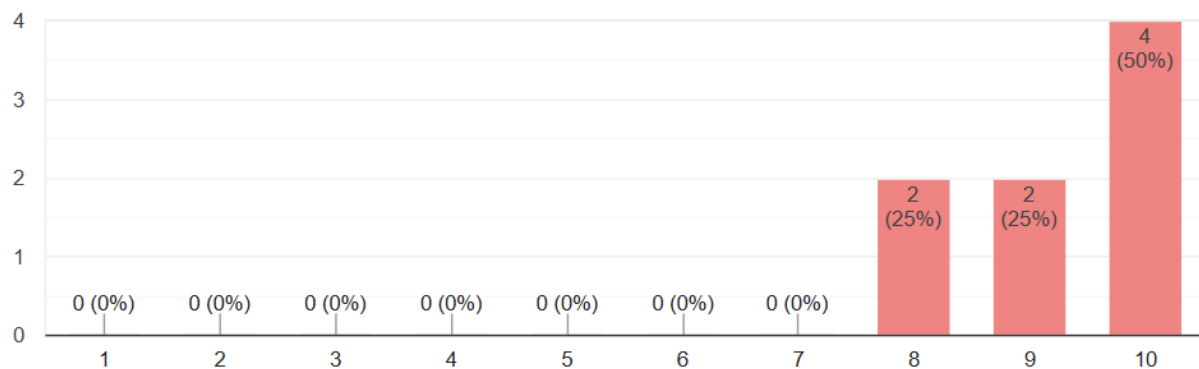


نسخ الرسم البياني

How likely are you to recommend Road Safety Society courses to a friend or "colleague? (1 = Not likely at all, 10 = Extremely likely)



8 ردود



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it is cover all the areas of traffic management plan

The instructor was very well informed, and the course tackled technical, managerial, as well as procedural aspects for Traffic Management for work zones

Detailed oriented

I really like how the instructor shares real life site experience and practical solutions to improve or reduce the likelihood of accident on the road. The training is delivered in understandable manner, and instructor is well knowledgeable on the different standards and best road safety practices that can be applied at worksite. Highly recommended instructor

Traffic very important for any personal work At safety

The way Eng. Elhadi presented the course with complete overview and required indepth knowledge about TMP

.The material is informative and full of valuable insights



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"?What did you like most about the course"

I really like how the instructor shares real life site experience and practical solutions to improve or reduce the likelihood of accident on the road. The training is delivered in understandable manner, and instructor is well knowledgeable on the different standards and best road safety practices that can be applied at .worksite. Highly recommended instructor

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