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RIPC INFRASTRUCTURE CODE

A Comprehensive Guide for Planning, Coordination, Execution,
and Monitoring of Infrastructure Works in the Riyadh Region

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ripc.gov.sa

info@ripc.gov.sa

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



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GLOSSARY

Definitions

A

Adjustment

The required modification to an existing utility facility to eliminate a conflict with a proposed highway/structure element on an active project where the utility facility will generally be retained in the same location.

Advanced Traffic Management

A variety of strategies to more efficiently manage traffic on existing facilities, including managed lanes and ITS systems.

Advisory Speed

A recommended speed for all vehicles operating on a section of highway and based on the highway design, operating characteristics and conditions.

Annual Average Daily Traffic (AADT)

Annual average daily traffic is the total volume of traffic observed on a point or segment of a highway in both directions over a period of one year divided by the number of days in a year.

Arterial

A signalized street that primarily serves through traffic and provides access to abutting properties.

As-Built Plans

Plans that show the state of the road or bridge at the end of construction; usually prepared by the Contractor or Resident Engineer.

Asphalt Concrete

Also referred to as asphalt or blacktop, is a composite mixture that consists of aggregate and asphalt binder. It is the most commonly used surface material for the construction of roads, highways, airports, parking lots, and other types of pavements.

Asphalt Overlay

A paving course applied to an existing asphalt surface to repair any created cracking or potholing, while still not being damaged enough to need replacement.

Asphalt Pavement

A structure consisting of one or more prepared courses of asphalt mix atop one or more supporting courses of unbound, modified, or treated subgrade, subbase or base materials.

Asphalt Surface Treatment

An application of asphalt material followed by a layer of mineral aggregate. Multiple applications of asphalt material and mineral aggregate may be used.

Audit Report

The formal report produced by the Audit Team describing the road safety deficiencies identified by the team and the recommended solutions to these deficiencies - also "RSA report".

B

Backdrawing

Pulling a cable or pipe through a duct using a smaller diameter wire or cable or cranes.

Banksmen

Site operatives trained to direct vehicle movement on or around site. Vehicles that are directed are typically large, such as trucks

Base Course

The layer of material immediately beneath the surface or intermediate course.

Bentonite

Bentonite is a clay-based material used in drilling mud to lubricate and cool the cutting tools (drill bit), to remove cuttings, to stabilize the borehole walls, and to help prevent blowouts (by maintaining a sufficient hydraulic pressure in the well).

Binder Layer

The lower layer of the surface, consisting of a plant mix of graded aggregate and bituminous material.

Bond

A surety bond posted to ensure proper and complete construction and/or repair of a facility and the affected rights-of-way pursuant to a permit.

Buffer Zone

There are two types of buffer zones, the safety buffer zone and the lateral safety buffer zone. Both provide an unoccupied space between workers (typically within the Work Area) and the traffic. Buffer zones are essential to temporary traffic control and ensuring safety of site personal.

C**California Bearing Ratio (CBR)**

A measurement that is defined as the ratio of the load required to force a calibrated piston into a soil specimen and the load required to penetrate a mass of high-quality crushed stone with the same piston. It primarily expresses the support of a crushed stone base or subgrade soil.

Carriageway

That portion of a road or bridge devoted particularly to the use of vehicles, inclusive of shoulders and auxiliary lanes.

Centerline

The defined and surveyed line shown on the plans from which the highway construction is controlled.

Competent Individual

Someone with the necessary education, training, and experience to safely and effectively perform engineering tasks within their area of expertise.

Confined Space Entry Permit

A permit issued by a Contractor indicating that safety risks have been identified, understood assessed and mitigated before work can commence in a confined space where there is a restricted means of access. The person issuing the permit must be sufficiently trained and competent and all those carrying out work under the permit must be fully briefed and understand the process and safe system of work to be followed.

Contraflow System

A traffic management strategy that enables the safe flow of vehicles in the opposite direction to what it normally would be. This is typically both directions of traffic using a single carriageway of a dual carriageway road (e.g. an expressway).

Cover (Depth)

Vertical distance, from the top of pipe or pipe's protective coating, casing, duct, cable, etc. to some specified surface such as pavement, ditches, or shoulders.

Cross-Section

A perpendicular intersection of the roadway at right angles to the Centerline of the roadway, including the elements of the road such as vertical and horizontal dimensions, lanes, shoulders, pavement structure, etc.

D**Depression**

A distress type in asphalt pavement is defined as small, localized pavement surface areas with slightly lower elevation than the adjacent paved area that occur due to poor unbound layers and subgrade.

Dewatering System

A system used to remove groundwater from an excavation.

Directional Drilling

Directional drilling is the practice of drilling non-vertical bores to accommodate utility installation.

Diversion Route

A set of approved routes to follow in case of closure of a road.

E**Easement**

A right, other than the acquisition of title, acquired to use or control property for a designated purpose.

Environmental Impact Study

A study to identify, assess, and mitigate the environmental impacts of the construction, operation, maintenance, upgrade, or removal of any Activity on any Environmental Aspect and their inclusion in parallel with economic, social and security considerations.

Expressway

A high-speed divided main road designed for through traffic, featuring limited access points and exits, with overpasses or underpasses at major intersections.

F**Footway Boards**

Temporary assets that allow pedestrians and users of micro mobility to traverse excavations.

Freeway

A divided highway with complete access control, featuring at least two lanes in each direction.

GLOSSARY

H

Hazardous Material

Biological, chemical, or physical substances that can be in the form of solids, liquids or gases that can be harmful to people, animals, or the environment.

Health and Safety (H&S) Management Plan

A suite of documents outlining the Contractor's approach to keeping people safe. It may include details of how the Contractor will ensure competence, and how risk management, governance, incident reporting, and continuous improvement.

Health, Safety, and Environment (HSE)

As it relates to RIPC projects, includes protecting the safety and wellbeing of workers and citizens, as well as the preservation of flora, fauna, and wildlife in the country.

H&S Management System

A comprehensive framework for managing safety in an organization, encompassing policies, procedures, and practices.

Heavy Axle

An axle designed for wheels with tyres having a bead seat diameter exceeding 406.4 millimeters (16 inches), or an axle equipped with more than two wheels regardless of tyre size, excluding axles of motorcycles, motor tricycles, or motor cars.

Heavy Vehicle

Motor vehicle with at least one heavy axle and/or any vehicle which is principally designed or adapted for the conveyance of persons exceeding sixteen (16) in number.

Highway Edge Line

The lateral boundary of the traffic space which coincides with the paved edge line.

I

Infrastructure

Fixed and/or permanent structures, such as roadway or railroad tracks etc.

IP Rating

Internationally recognised ratings that grade the resistance of an enclosure against the intrusion of dust or liquids.

J

Jersey Barrier

Modular concrete or plastic barrier used to separate lanes of traffic. Jersey barriers are commonly used to reroute traffic and protect pedestrians and workers during highway construction.

K

Kerb Ramps

Primarily for the use of pedestrians and users of micro mobility when the existing footway or cycle lane has been closed off and rerouted due to site works.

L

Local Street/Road

Roads which provide access to abutting property and consist of low average traffic volume and short average trip lengths.

Longitudinal Joint

A joint normally placed between traffic lanes to control longitude.

M

Manhole

Also referred to as inspection chamber, is an opening in an underground system used to carry out inspection, maintenance, repair, and tests on utilities.

Micro Tunneling

A tunnel construction technique used to construct utility tunnels from approximately 0.5–4m in diameter. Because of the small diameter, it is not possible to have an operator driving the tunnelling machine, so it is remotely operated.

Mounting Height

The vertical distance between the road surface and the Center of an apparent light source (luminaire) or underside of traffic sign.

P**Patching**

A method of asphalt pavement treatment that includes saw cutting outside the distress area, removing the old or damaged asphalt and cleaning, applying tack coat, and backfilling with hot asphalt, followed by suitable methods of compaction.

Pedestrian

Any person traveling on foot - whether walking, running, or using mobility aids such as wheelchairs.

Permit

A document issued by a Center pursuant to the provisions of an Executive Regulation, before start of an activity permitting a Service Entity/Contractor to start the activity.

Personal Protective Equipment (PPE)

Protective clothing that includes helmets, goggles, gloves or other garments and equipment that are designed to limit the risk of death, injury or infection to the wearer.

Pipe Jacking

A trenchless method of installing pipes for utility works using hydraulic jacks and a navigation system.

Project Information Board

Sign(s) strategically located around the Site Area that indicate details of the excavation work being conducted along with the QR link to the associated excavation permit.

Public Realm

Publicly accessible spaces such as streets, parks, plazas, sidewalks, and places that are open to everyone, regardless of their economic or social conditions.

Public Rights of Way

A right by which the public can pass along linear routes over land at all times.

Q**Quality**

As it relates to RIPC projects, includes materials,

workmanship, performance, functionality, and sustainability.

R**Reception Pits**

A receiving pit is an excavated pit, located at the exit of the cutterhead or casing, which is the destination point for a thrust jacking operation. The receiving pit is used to remove the equipment and spoil.

Regulatory Sign

A sign that gives notice to road users of traffic laws or regulations.

Residential Area

An area in which the dominant land use is residential development, but where small businesses may be included.

Resurfacing

A maintenance technique that involves the placing of one or more new layers of material on an existing surface instead of replacing the entire pavement structure to extend its service life.

Risk Assessment

Definition of a schedule, known as a Risk Register, that quantifies risks based on quantitative analysis of likelihood against impact, then prescribes mitigation measures to reduce the Risk Score.

Riyadh Region Municipality

A municipal body responsible for overseeing city services and the maintenance of facilities within Riyadh and the Riyadh Governorate. Established in 1937, it operates under the Ministry of Municipal Affairs and Housing.

Road Contractor

A Road Contractor is responsible for the construction, repair, maintenance, and reinstatement of roadways. Their primary duties include tasks such as paving, resurfacing, and ensuring the structural integrity of roads.

Road Cross-Section

Used to illustrate the configuration of the road at right angles to the Centerline, showing the width, depth and descriptions of the pavement section.

GLOSSARY

Road Defect

Cracks, deterioration, or disintegration in the road normally caused by repeated traffic loading, thermal expansion/contraction, poor drainage, or movement across underlying layers.

Road Plates

Temporary steel assets used to cover excavations such that vehicles may continue using the road.

Road Trench

In context of inspecting utilities infrastructure (trial hole).

Road User

Pedestrians, drivers, and users of micro mobility devices.

Road Width

Clear space between kerbs or barriers.

S

Safety Barrier

Continuous vehicle restraint system installed alongside, or on the median area of a highway.

Service Entity

An organization responsible for providing and maintaining essential services such as water, electricity, transportation, and telecommunications to support the infrastructure's operation and functionality.

Service Level Agreement

A contract that defines the expected level of performance to be provided over a specific period. It outlines the responsibilities of the service provider, the performance metrics to be used, and the consequences if the agreed-upon service levels are not met.

Sheet Piling

Interlocking steel sheets that can be used as shoring for an excavation in soft ground and tight spaces.

Shoring

The process of temporarily supporting an excavation with appropriately designed and installed props to prevent collapse.

Shoulder

The portion of the roadway continuous with the traveled way for accommodation of stopped vehicles, for emergency use, and for lateral support of base and surface courses.

Site Induction

A safety briefing provided to all visitors and first-time attendees of site.

Sub-base Course

The unbound or treated aggregate or granular material that is placed on the subgrade as a foundation for the base course.

Surface Course

The top layer of a roadway or pavement, providing a smooth, durable, and skid-resistant surface for vehicles.

T

Thrust Boring/HDD

Trenchless methods for installing underground utilities infrastructure. Thrust boring is typically undertaken in high traffic areas and HDD techniques in restricted areas. These terms are often used interchangeably, albeit they are different in practice.

Traffic Management Plan

A stakeholder-coordinated suite of documents related to the safe and efficient planning, implementation, and decommissioning of a traffic diversion scheme.

Traffic Study

The assessment of traffic conditions patterns and behaviors within a specific area. A Traffic Study involves the collation and analysis of data to understand vehicle flows, pedestrian movement as well as movement of other modes of transport on road networks.

U**Utilities Contractor**

A Utilities Contractor is responsible for installing and maintaining underground utilities, such as water, electricity, and telecommunications. In addition to these tasks, they also handle all associated road works, including excavation, trenching, and the restoration of road surfaces affected by utility installations

V**Vehicle Operator**

A driver of a Work Vehicle, or another individual licensed to operate and conduct regular maintenance and checks of Heavy Vehicles.

W**Well Pointing**

A grouped system of small diameter wells installed at a pre-determined depth and appropriate spacing around an excavation to lower the water table

Work Area

An area inside the Site Area where construction, operation, or maintenance works are being undertaken.

Works Execution Plan (WEP)

A suite of documents describing how the project will be delivered. It will include reference to timescales, costs, procurement, quality and resources.

Work Party

Competent Contractor personnel tasked with carrying out the work.

Work Vehicle

A vehicle that is used at the Site Area. May include cars but may also include Heavy Vehicles (e.g. Excavators).

GLOSSARY

Acronyms

Acronym	Definition
AADT	Average Annual Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
ATC	Automatic Traffic Counter
CBR	California Bearing Ratio
CIBSE	Chartered Institution of Building Services Engineers
GPR	Ground Penetrating Radar
CST	Communications, Space & Technology Commission
DCN	District Cooling Network
DCS	District Cooling System
ERP	Emergency Response Plan
FOC	Fibre Optic Cables
GACA	General Authority for Civil Aviation
GIS	Geographic Information System
GPR	Ground Penetrating Radar
HDD	Horizontal Directional Drilling
HGV	Heavy Goods Vehicle
HIRA	Hazard Identification and Risk Assessment
HS	High Security
HSE	Health, Safety, and Environment
HV	High Voltage Power Lines
H&S	Health and Safety
IICP	Integrated Infrastructure Coordination Plan
IP	Ingress Protection
JWOG	Joint Operations Working Group
LED	Light-Emitting Diode
LV	Low Voltage Power Lines
MASH	Manual for Assessing Safety Hardware
MDS	Material Data Sheets
MEWA	Ministry of Environment, Water and Agriculture
MOF	Ministry of Finance
MOMAH	Ministry of Municipal and Rural Affairs
MOTLS	The Ministry of Transport and Logistics Services
MV	Medium Voltage Power Lines
NDD	Non-destructive Digging
NWC	National Water Company

Acronym	Definition
O&M	Operations & Maintenance
OCS	Occupational Health and Safety
PCMS	Portable Changeable Message Signs
PIB	Project Information Board
PPE	Personal Protective Equipment
QA/QC	Quality Assurance / Quality Control
RA	Risk Assessment
RAMS	Risk Assessments and Method Statements
RCRC	Royal Commission for Riyadh City
RGA	Roads General Authority
RoHS	Restriction of Hazardous Substances
ROW	Right-of-Way
RSA	Road Safety Audit
RTA	Road Traffic Authority
RTMG	Riyadh Traffic Management Guidelines
SAAC	Saudi Accreditation Center
SCA	Saudi Contractors Authority
SCE	Saudi Council of Engineers
SEC	Saudi Electricity Company
SHC	Saudi Highway Code
SIO	Saudi Irrigation Organization
SLA	Service Level Agreement
STC	Saudi Telecom Company
SUE	Subsurface Utility Engineering
SWCC	Saline Water Conversion Cooperation
TMA	Truck Mounted Attenuator
TMP	Traffic Management Plan
TSE	Treated Sewerage Effluent
TTC	Temporary Traffic Control
TTCP	Temporary Traffic Control Plan
UAS	Unmanned Aircraft Systems
VRS	Vehicle Restraint System
WEP	Works Execution Plan
WMP	Waste Management Plan
WTTCO	Water Transmission Technology Company



1.1 FREQUENTLY ASKED QUESTIONS

1.2 OVERARCHING APPROACH

1.3 ROAD CATEGORIES

1.4 HOW TO USE THIS MANUAL

01.

INTRODUCTION & USER GUIDANCE



The Riyadh Infrastructure Projects Center (“RIPC” – a.k.a. “the Center”) was established under the Council of Ministers’ Resolution No. (902) dated 30/12/1444H with the primary aim of enhancing infrastructure planning and coordination in the region.

Riyadh’s infrastructure planning currently encounters challenges due to a reactive approach, lack of centralized control, and fragmented planning. These factors can lead to disruptions, reduced quality, and inefficiencies. To address these issues, RIPC has developed this Infrastructure Code Manual – ‘The Manual’.

The Manual is a comprehensive guide for coordination, planning, execution, and monitoring of public realm infrastructure works in the Riyadh Region.

The Manual is built upon “The Overarching Approach” – a principle-based guidance that helps structure decision-making, influence collaborative implementation, and drive downstream regulation. Alignment is achieved by reference to The Goal and the Infrastructure Lifecycle, and by highlighting, within relevant sections, specific Guiding Principles, Action Areas, and Violation Categories.

Whilst The Overarching Approach highlights ‘what’ Stakeholders should focus on; The Manual sets out in detail precisely ‘how’ conformance can be achieved. The Manual clarifies the work processes and procedures, as well as roles and responsibilities.

The Manual is a regulatory instrument to be deployed by RIPC and is issued for use by all Stakeholders. This includes Service Entities, their Contractors and Consultants, as well as other Government Entities – who all have a role to play in achieving our common goal:

RESILIENT & CO-ORDINATED PUBLIC REALM INFRASTRUCTURE



The figure below illustrates a detailed day visual of a typical work site, highlighting essential elements and examples from this Code Manual, complete with corresponding chapter references.

1 PPE
Chapter 2 - Section 2.2.1.1



2 Advance Warning Signs
Chapter 2 - Section 2.2.3





امامك منطقة عمل
WORK ZONE AHEAD

نهاية منطقة العمل
WORK ZONE END

3 Temporary Safety Barriers
Chapter 2 - Section 2.2.2



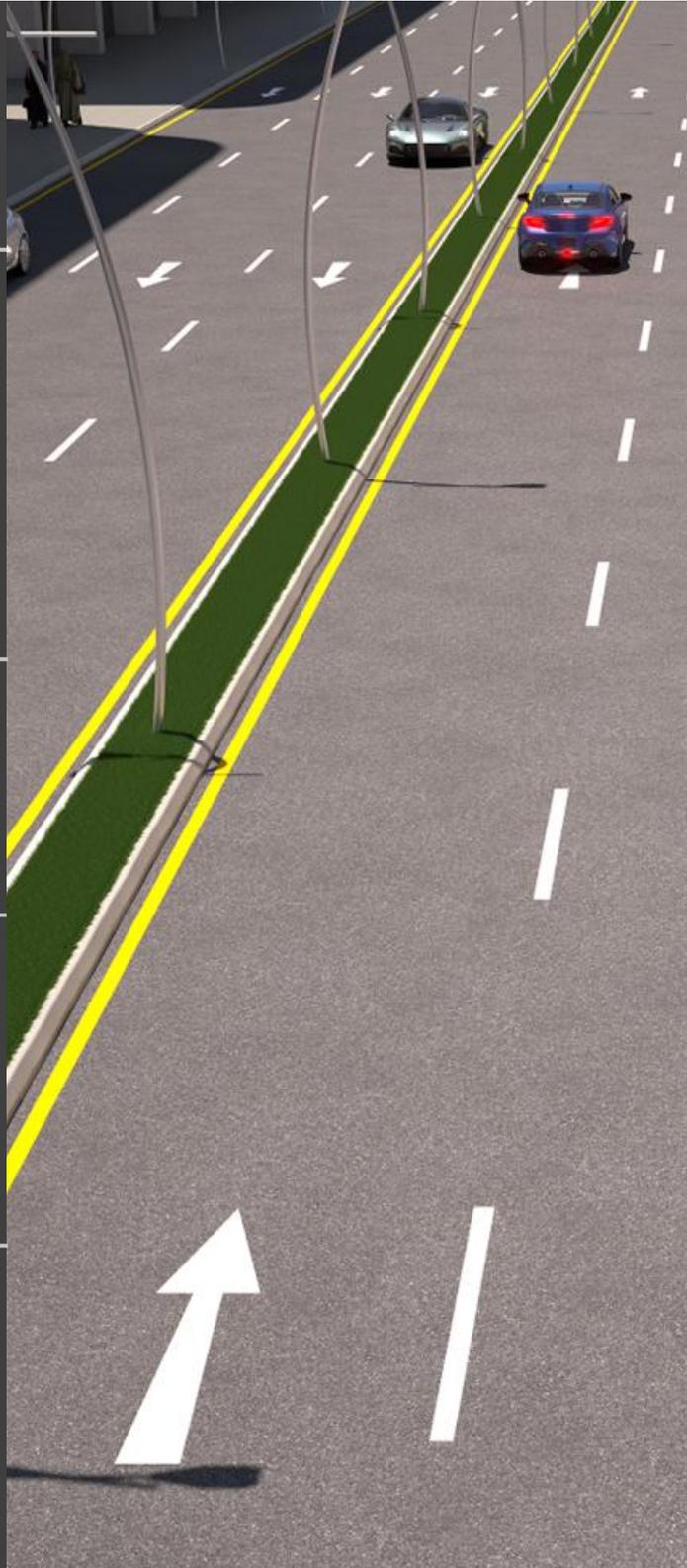

4 Access And Communication Protocols
Chapter 2 - Section 2.2.4



5 Traffic Signage & Temporary Pavement Marking
Chapter 2 - Section 2.1.3.4



Temporary road markings alert road users to the presence of an existing work zone, reducing confusion and accidents.



FOR ILLUSTRATIVE PURPOSE

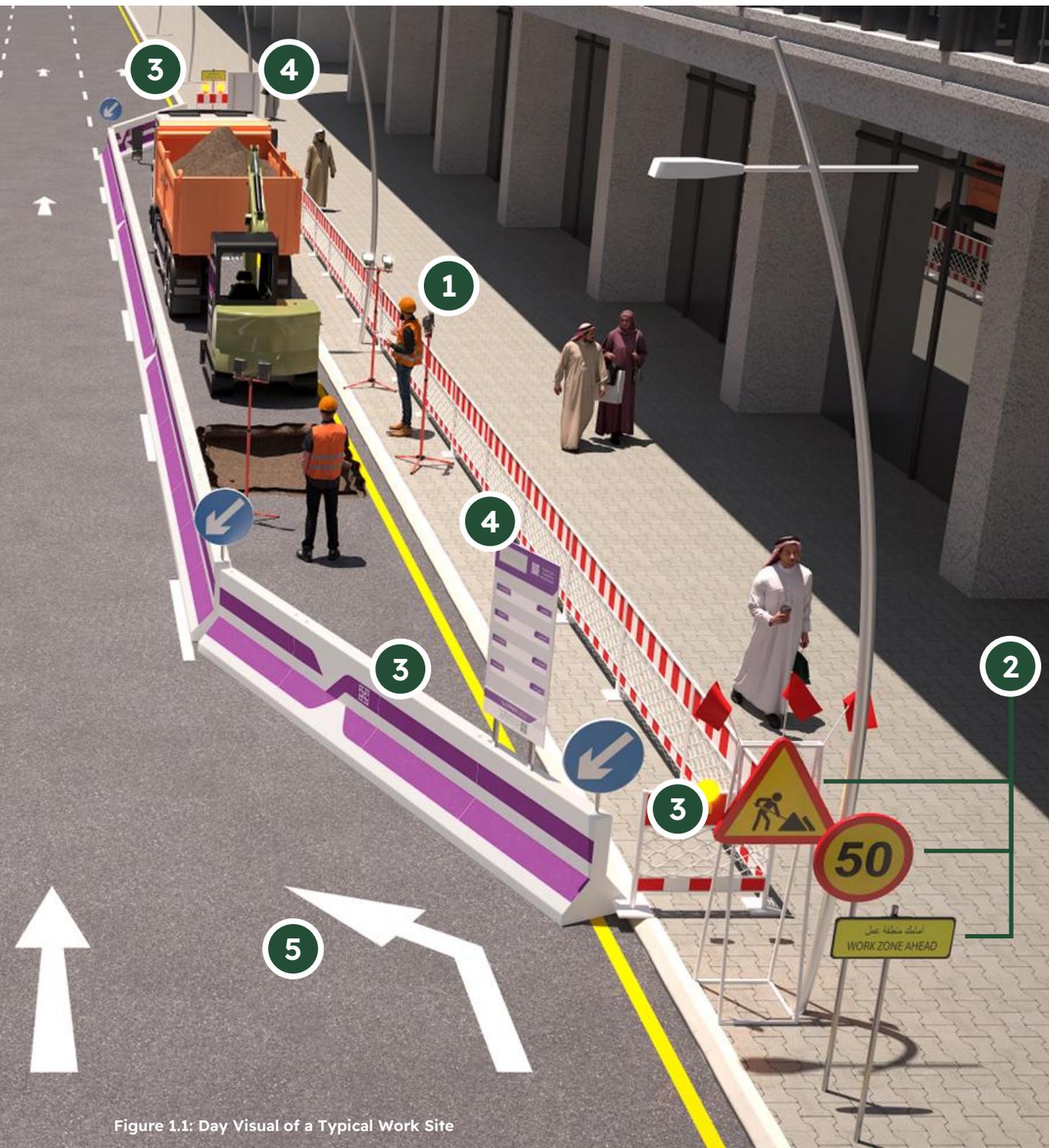


Figure 1.1: Day Visual of a Typical Work Site



The figure below illustrates a detailed night visual of a typical work site, highlighting essential elements and examples from this Code Manual, complete with corresponding chapter references.

- 1 PPE**
Chapter 2 - Section 2.2.1.1


- 2 Advance Warning Signs**
Chapter 2 - Section 2.2.3



امامك منطقة عمل
WORK ZONE AHEAD

نهاية منطقة العمل
WORK ZONE END
- 3 Temporary Safety Barriers**
Chapter 2 - Section 2.2.2


- 4 Access And Communication Protocols**
Chapter 2 - Section 2.2.4


- 5 Traffic Signage & Temporary Pavement Marking**
Chapter 2 - Section 2.1.3.4



Temporary road markings alert road users to the presence of an existing work zone, reducing confusion and accidents.



FOR ILLUSTRATIVE PURPOSE

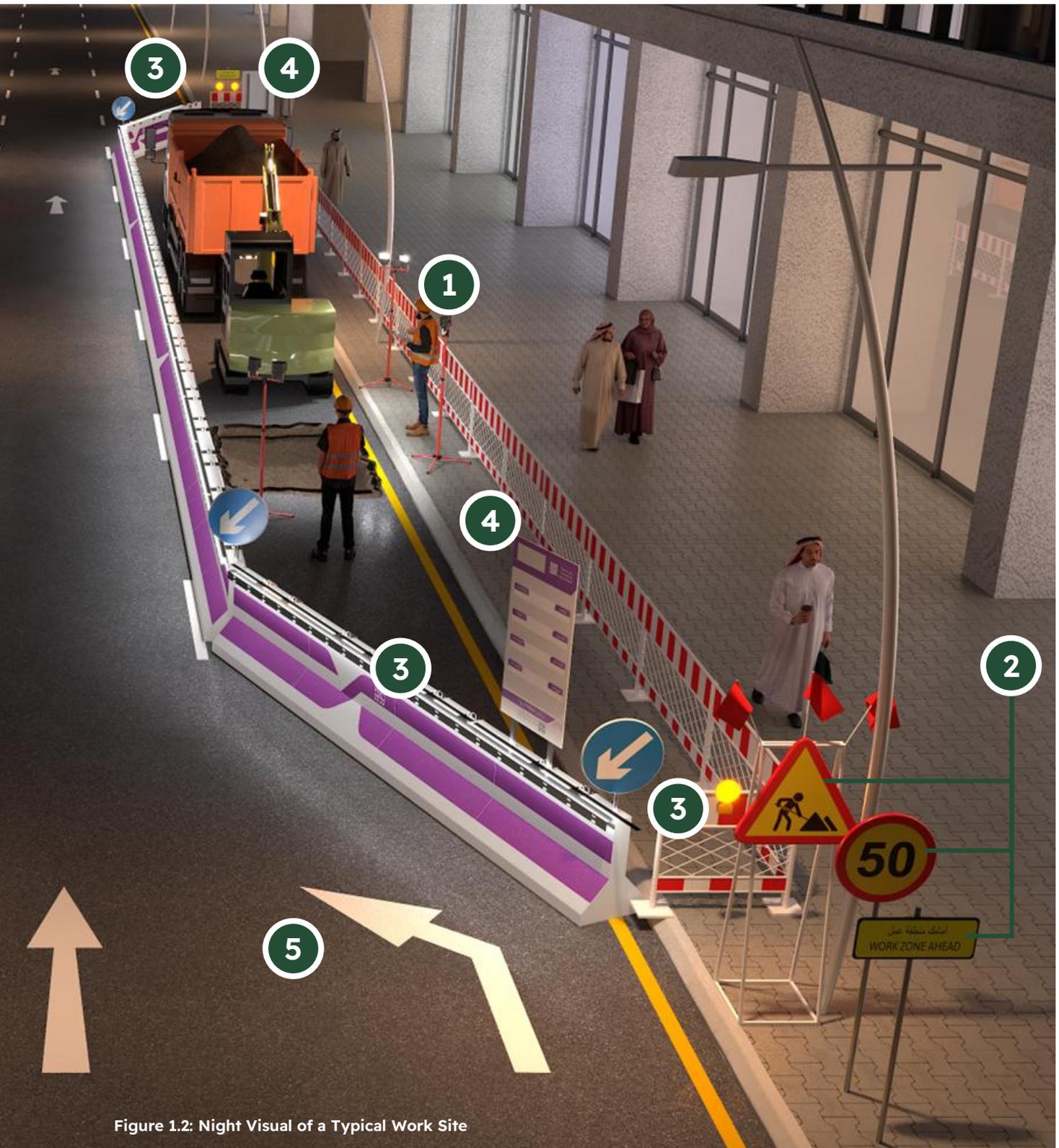


Figure 1.2: Night Visual of a Typical Work Site



1.1 FREQUENTLY ASKED QUESTIONS

1. WHAT IS THE ROLE OF RIPC?

RIPC has a mandate to regulate and supervise public realm infrastructure projects in the Riyadh Region. Its role also includes enforcement of regulations and collaborating with all Stakeholders toward the common goal of resilient & coordinated public realm infrastructure.

2. WHY DO WE NEED THIS MANUAL?

The Manual serves as a regulatory mechanism designed to enhance the quality, consistency, and coordination of public realm infrastructure throughout the Infrastructure Project Lifecycle.

3. WHO SHOULD FOLLOW THIS MANUAL?

The Manual is issued for use in Riyadh Region by all Stakeholders. This includes RIPC, Service Entities, their Contractors and Consultants, as well as other Government Entities – all have a role to play in achieving our common goal.

4. WHAT IS THE GEOGRAPHICAL SCOPE OF THIS MANUAL?

The Manual is applicable to the entire Riyadh Region (~400,000 km²), all cities and towns therein and all stretches of Freeways/Expressways that connect towns and cities.



1.2 OVERARCHING APPROACH

The Overarching Approach (right) is a principle-based guidance that helps structure decision-making, influence collaborative implementation, and drive downstream regulation.

Whilst The Overarching Approach highlights 'what' Stakeholders should focus on, associated regulations such as The Manual set out in detail precisely 'how' conformance can be achieved.

Therefore, in The Manual, we find clarity regarding work processes and procedures, as well as roles and responsibilities.

The Manual is built around this Overarching Approach. This is proven by reference to The Goal and the Infrastructure Lifecycle, and by highlighting, within relevant sections, specific Guiding Principles, Action Areas, and Violation Categories.

This Section includes the Overarching Approach as follows:

- Guiding Principles
- Violation Categories
- Action Areas and their Performance Indicators
- Stakeholder Interaction Model
- Infrastructure Project Lifecycle

Subsequent chapters make regular mention of the above components, and they have been described herein for ready reference.

The Manual provides a framework process for planning the activity of setting up a safe working area within the Public Realm and thereafter guiding the contractors in the requirements for the establishment and maintenance of that safe working area. The Manual specifically addresses how these safe working areas interface and impact with the Public and is not intended to provide technical guidance and regulation on the installation, commissioning, and reinstatement requirements for each Service Entity.

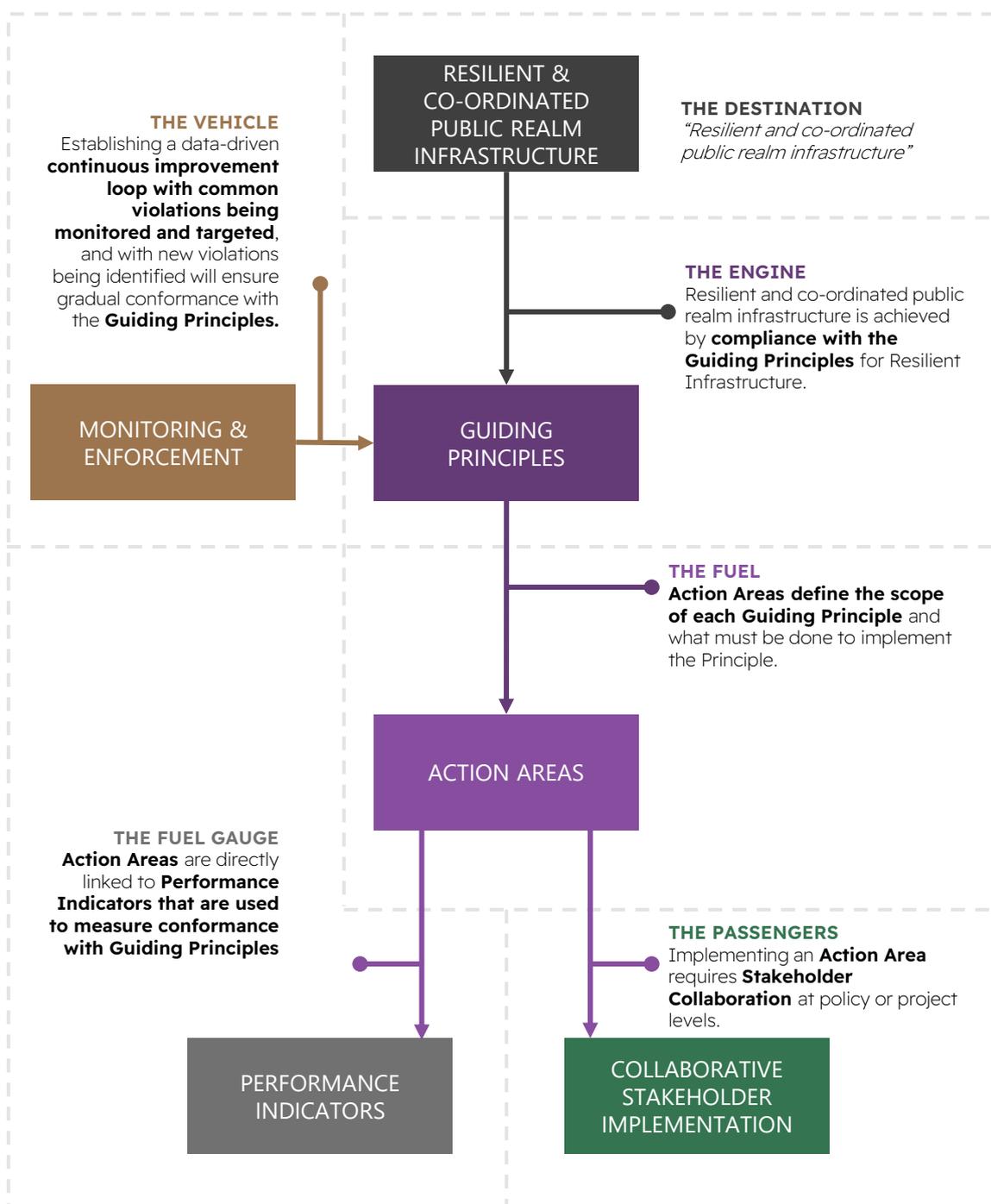


Figure 1.2.1: The Overarching Approach



1.2 OVERARCHING APPROACH

Guiding Principles

Maintain organized worksites, manage resources efficiently, and leverage innovative technologies to enhance project efficiency.



P1.
Safe, Compliant & Controlled

Prioritize the safety of workers and the public, ensure compliance with all legal, regulatory, and technical standards, and maintain consistent quality throughout the project lifecycle.

P2.
Effectively Managed & Continuously Improved



P3.
Clearly Communicated & Actively Engaged

Foster clear and effective communication with Stakeholders, ensuring accessible and timely information, and engage communities to address concerns and gather feedback.

P4. Technologically Advanced & Data-driven

Leverage innovative technologies and practices to enhance the efficiency, sustainability, and resilience of infrastructure projects. Ensure that data capture and analytics are maximised to support informed decision-making.



Ensure minimal disruption to the community and maintain accessibility for all, prioritizing the needs and concerns of residents and businesses.

P6. Community-Centric & Accessible



P5. Environmentally Sustainable

Implement sustainable practices to protect and enhance the environment, ensuring that projects contribute positively to ecological health and sustainability.





1.2 OVERARCHING APPROACH

Guiding Principles

 **P1. Safe, Compliant & Controlled**

 **P2. Effectively Managed & Continuously Improved**

 **P3. Clearly Communicated & Actively Engaged**

 **P4. Technologically Advanced & Data-driven**

 **P5. Environmentally Sustainable**

 **P6. Community-Centric & Accessible**

P1.

Safe, Compliant & Controlled

Prioritize the safety of workers and the public, ensure compliance with all legal, regulatory, and technical standards, and maintain consistent quality throughout the project lifecycle.

ACTION AREAS:

P1.1. Safety Compliance:

Ensure adherence to safety standards to protect workers and the public.

P1.2. Legal Compliance:

Adhere to legal frameworks to ensure project accountability and transparency.

P1.3. Quality Assurance:

Implement strict quality control measures to ensure high standards of infrastructure.

P1.4. Laboratory Assurance:

Ensure accuracy and reliability of laboratory testing and results.

P1.5. Traffic and Parking Control:

Manage traffic flow and parking to minimize disruptions and ensure safety.

P2.

Effectively Managed & Continuously Improved

Maintain organized worksites, manage resources efficiently, and leverage innovative technologies to enhance project efficiency.

ACTION AREAS:

P2.1. Project Management:

Incorporate robust project management methodologies for efficient execution.

P2.2. Worksite Management:

Maintain organized and clean worksites.

P2.3. Digital Tools for Management:

Leverage digital tools and innovative technologies for efficient management.

P2.4. Continuous Learning and Improvement:

Emphasize infrastructure resilience through continuous learning that inform system improvements.

P2.5. System Resilience:

Ensure continuous adaptation and improvement based on new information and conditions.

P3.**Clearly Communicated and Actively Engaged**

Foster clear and effective communication with Stakeholders, ensuring accessible and timely information, and engage communities to address concerns and gather feedback.

ACTION AREAS:**P3.1. Clear and Transparent Communication:**

Provide clear, accessible information to workers and the public.

P3.2. Stakeholder Engagement:

Foster collaboration and communication among all project Stakeholders and the public.

P4.**Technologically Advanced & Data-driven**

Leverage innovative technologies and practices to enhance the efficiency, sustainability, and resilience of infrastructure projects. Ensure that data capture and analytics are maximised to support informed decision-making.

ACTION AREAS:**P4.1. Advanced Technologies:**

Integrate advanced technologies into infrastructure planning, design and construction.

P4.2. Data Capture and Monitoring Methods:

Leverage data capture and monitoring methods for efficient planning and management.

P5.**Environmentally Sustainable**

Implement sustainable practices to protect and enhance the environment, ensuring that projects contribute positively to ecological health and sustainability.

ACTION AREAS:**P5.1. Environmental Protection:**

Protect the environment and minimize the project's carbon footprint.

P5.2. Sustainable Resources:

Use sustainable and local resources in infrastructure projects.

P5.3. Ecosystem Consideration:

Consider broader ecological impacts and benefits.

P5.4. Natural Disasters and Risk Management:

Integrate disaster risk management into infrastructure planning and implementation..

P6.**Community-Centric and Accessible**

Ensure minimal disruption to the community and maintain accessibility for all, prioritizing the needs and concerns of residents and businesses.

ACTION AREAS:**P6.1. Public Accessibility:**

Provide alternative transportation options and ensure accessibility for all, fostering social inclusion.

P6.2. Community Benefits:

Maximize the health, economic and social benefits of infrastructure projects for local communities.

P6.3. International Standards and Fair Labor:

Align with global standards and ensure fair labour in infrastructure projects in concordance with Saudi Labor Law.



1.2 OVERARCHING APPROACH

Violation Categories



V1. Barriers and Safety Compliance Issues



V2. Permit and Regulation Compliance Violations



V3. Infrastructure and Roads Issues



V4. Worksite Management and Cleanliness Violations



V5. Traffic and Parking Control



V6. Boards and Information Violations



V7. Environmental Violations



V8. Community and Public Accessibility Violations

V1.

Barriers and Safety Compliance Violations

Covers various safety issues at Work Sites, including inadequate safety measures, improper barrier management, and excavation safety concerns. It also covers exposed electrical hazards, insufficient health and safety compliance documentation, and emergency preparedness.

V1.1. Inadequate Worksite Safety Measures

1. Failure to meet the minimum lighting requirements according to the Center’s code.
2. Storing hazardous materials without proper containment.
3. Failure to secure the excavation site with temporary barriers.
4. Failure to install ground fencing.
5. Failure of the approved consulting office to comply with the Center’s excavation procedures and requirements.
6. Workers’ failure to comply with safety measures, the safety of neighbouring facilities and installations, and the protection of services.
7. Failure of the LED warning lights to operate along the entire boundary of the infrastructure project.
8. Failure to comply with the installation of LED lighting according to the approved manual.
9. Failure to comply with the color temperature specification for warning LED lighting according to the approved manual.

V1.2. Inadequate Barrier Management

10. Failure to maintain ground fencing or informational and warning signs at the work area (for each site).
11. Leaving temporary barriers after the completion of work.
12. Using temporary barriers that are dilapidated, damaged, unpainted, or non-uniform.
13. Failure to arrange temporary barriers in an orderly and continuous manner.
14. Failure to standardize the type or size of temporary barriers.
15. Failure to comply with the requirements for the locations and methods of installing temporary barriers.
16. Leaving the ground fencing in place after the work is completed.
17. Leaving temporary barriers on sidewalks and adjacent lands outside the excavation path.
18. Failure of the Contractor to place the Service Entity’s logo, along with the Contractor’s logo and name, on the temporary barriers.

V1.3. Lack of Excavation Safety Considerations

19. Failure to secure cross sections, reinforce and support the sides of the excavation according to the required specifications.
20. Not extracting water from the bottom of excavations as per soil examination report.
21. Absence of covers for inspection openings, valves, or stormwater traps, or failure to maintain their covers.
22. Not filling in excavations and restoring the site after work.

V1.4. Exposed Electrical Hazards

23. Electrical transformers with exposed cables in the streets.
24. The presence of a falling or fallen lantern, or the presence of exposed lighting wires and extensions.

V1.5. Health and Safety Compliance Documentation

25. Not maintaining records of regular safety inspections
26. Failure to update the Risk Register.
27. Not maintaining an updated log of worksite incidents, accidents, and near misses.
28. Not maintaining records of emergency evacuation drills.
29. Not maintaining records of emergency vehicle access plans to work site and its surrounding areas.

V1.6. Emergency Preparedness

30. Failure to equip the equipment with a fire extinguisher.
31. Not maintaining clear emergency exit paths free of obstructions.
32. Blocking emergency exits in the vicinity of the work site.
33. Absence of a first aid kit at the work site during works.

V2.**Permit and Regulation Compliance Violations**

Involves working without proper permits, violating permit terms, and failing to renew permits. This includes unauthorized street blocking, misuse of excavation permits, trespassing, exceeding project boundaries, lack of supervision, and improper placement of temporary facilities.

V2.1. Permit Violation

34. Working on-site without a license.
35. Closing streets without a permit from traffic authorities (Muroor).
36. Using an excavation permit in violation of its content
37. Using an emergency excavation permit for non-

emergency excavation.

38. Trespassing on public or private property and resources during work.
39. Lack of commitment by the approved consulting office to supervise and control work.
40. Placing temporary toilets outside the work area without a permit.
41. Exceeding the total length of infrastructure projects beyond the permit.
42. Failure to renew the excavation license.
43. Working at a site not specified in the license.
44. Failure to complete the license closure procedures on the platform.
45. Storage outside the permitted work area.
46. Delaying the issuance of required test results for infrastructure projects.
47. any violation of the regulations and requirements for infrastructure project works that does not have a specific penalty.

V2.2 Approved Suppliers

48. Carrying out infrastructure projects through an unqualified Contractor.
49. Failure to provide an accredited consulting office for infrastructure projects.
50. Failure to obtain Saudi Accreditation Center approval within the specified regulatory period.
51. Heavy Vehicles at Site that have not been certified by the Heavy Equipment Regulatory Center.



1.2 OVERARCHING APPROACH

Violation Categories



V1. Barriers and Safety Compliance Issues



V2. Permit and Regulation Compliance Violations



V3. Infrastructure and Roads Issues



V4. Worksite Management and Cleanliness Violations



V5. Traffic and Parking Control



V6. Boards and Information Violations



V7. Environmental Violations



V8. Community and Public Accessibility Violations

V3.

Infrastructure and Roads Quality Violations

Includes non-compliance with technical standards, improper asphalt and road surface work, street damage, damage to sidewalks and public property and inadequate inspections and documentation.

V3.1. Technical Standards Compliance

- 52. Using excavation materials not certified by the Saudi Standards, Metrology, and Quality Organization (SASO).
- 53. Using non-compliant materials for temporary road markings.
- 54. Asphalt layer sinking, unevenness, or flaking after work completion during the license guarantee period.
- 55. Failure to apply approved technical standards for asphalt work on developed streets.

V3.2. Asphalting Violations

- 56. Irregular edges of the cuts for asphalt layers and stone base.
- 57. Using backfill materials that do not meet the approved specifications according to the results of the accredited laboratory.
- 58. Not using the spreader during asphalt work.
- 59. Not using (RC2) or (MC1) during re-asphaltting
- 60. Adding asphalt over the sidewalk to modify the path.
- 61. Adding asphalt over manholes.
- 62. Leaving the worksite unpaved after removing temporary barriers.

V3.3. Street and Services Damage

- 63. Failure to comply with the excavation location and/or the dimensions and requirements specified in the Service Routes Guide (updated road section).
- 64. Damaging asphalt and paved streets with equipment and machinery.
- 65. Pumping water into flood traps or unauthorized places.
- 66. Cutting subsidiary extensions for services.
- 67. Cutting main service lines and ducts.

V3.4. Sidewalk and Public Property Damage

- 68. Damaging lighting poles or overhead line poles.
- 69. Failure to restore the sidewalk to its original condition.
- 70. Damaging distribution panels.
- 71. Damaging any public or private property by any means during infrastructure works.

V3.5. Inspections and Documentation

- 72. Not conducting required inspections and testing of materials using SAAC-certified laboratories.
- 73. The certified consulting office's failure to submit models and reports to the Center during work phases on the platform.
- 74. Failure to calibrate measurement devices used in quality tests for infrastructure projects.
- 75. Failure of the service provider's representative, Contractor, Consultant, or laboratory to visit the Center after official notification within 3 working days.

76. The certified consulting office's failure to monitor and report on visual pollution elements during excavation phases.

V4.

Worksite Management and General Cleanliness Violations

Include lack of worksite cleanliness, and improper cement mixing.

V4.1. Lack of Worksite Cleanliness

77. Failure to maintain general cleanliness at the work site during work.
78. Disposing of excavation waste outside the excavation perimeter during excavation work.
79. Failure to clean the worksite after the completion of work (general cleanliness).

V4.2. Improper Cement Mixing

80. Mixing cement on asphalt and street pavements without adequate protection to the pavement surfacing.

V5.

Traffic and Parking Control Violations

Includes failures in replacing traffic signs and paints after project completion, and inadequate traffic and parking control, such as not placing warning lights on traffic diversions.

V5.1. Traffic Signs Violations

81. Failure to place instructional signs or reflective warning signals at the work area.
82. Not replacing traffic signs and paints after project completion.
83. Tampering with road signs, reflectors, or traffic signs.

V5.2. Inadequate Traffic and Parking Control

84. Not following the approved Traffic Management Plan.
85. Blocking designated cycle lanes without proper detours.
86. Blocking access to emergency lanes with parked machinery or vehicles.

V6.

Boards and Information Violations

Include inadequate information board (e.g., Missing logos, names, regulatory data).

V6.1. Inadequate Information Board

87. Absence of a project information board.
88. Absence of a copy of the excavation permit at the work site on the project board.

89. Failure to comply with the approved measurements for the project information board.
90. Failure to include all required information on the project information board according to the Center's code.

V7.

Environmental Violations

Includes all violations related to natural assets, wildlife and resources, or their supporting infrastructure.

V7.1. Trees and Environmental Damage

91. Removing grass and trees, damaging tree protection, tampering with public gardens, or damaging irrigation networks.

V7.2. Inadequate Environmental Management

92. Failure to remove debris resulting from excavation work after completing the work around the excavation site.
93. Allowing infrastructure works to emit excessive dust that is visible to the human eye beyond site boundaries and is disruptive to residents or road users.
94. Unauthorized burning of waste materials on-site.
95. Flooding the road with any type of water resulting from excavation work, causing disruption to the movement of beneficiaries and vehicles.

V8.

Community and Public Accessibility Violations

Include obstructing pedestrian accessibility (e.g., Lack of crossings, blocked sidewalks) and obstructing access to residences and amenities.

V8.1. Obstructed Pedestrian Accessibility

96. Not placing pedestrian crossings every 100 meters or less.
97. Obstructing pedestrians on sidewalks.
98. Entirely blocking access for residents to enter their homes and/or failing to provide alternative routes.
99. Not maintaining clear access routes to local businesses during infrastructure works, supported by signage.
100. Not maintaining clear access routes to critical social interface such as hospitals, schools, mosques, etc.
101. Blocking access to public amenities, such as bus stops, benches or public restrooms, without alternatives.



1.2 OVERARCHING APPROACH

Action Areas and their Performance Indicators

P1	P1.1. Safety Compliance
	P1.2. Legal Compliance
	P1.3. Quality Assurance
	P1.4. Laboratory Assurance
	P1.5. Traffic and Parking Control
P2	P2.1. Project Management
	P2.2. Worksite Management
	P2.3. Digital Tools and Technology
	P2.4. Continuous Learning and Improvement
	P2.5. System Resilience
P3	P3.1. Clear and Transparent Communication
	P3.2. Stakeholder Engagement
P4	P4.1. Advanced Technologies
	P4.2. Data Capture and Monitoring Methods
P5	P5.1. Environmental Protection
	P5.2. Sustainable Resources
	P5.3. Ecosystem Integration
	P5.4. Natural Disasters and Risk Management
P6	P6.1. Public Accessibility
	P6.2. Community Benefits
	P6.3. International Standards and Fair Labor

P1.1.

Safety Compliance Performance Indicators

Ensure adherence to safety standards to protect workers and the public.

- **PI1.1.1.** Percentage of projects with zero lost-time injuries
- **PI1.1.2.** Safety training completion rate
- **PI1.1.3.** Number of corrective actions arising from safety audits per project
- **PI1.1.4.** Percentage of major risks mitigated through risk assessment per project

P1.2.

Legal Compliance Performance Indicators

Adhere to legal frameworks to ensure project accountability and transparency.

- **PI1.2.1.** Number of legal non-compliance incidents (e.g, permit non-compliance)
- **PI1.2.2.** Licensing Process Clarity Score
- **PI1.2.3.** Percentage of Legal Compliance Issues Resolved
- **PI1.2.4.** Number of Grievances Resolved
- **PI1.2.5.** Average Time to Resolve Grievances

P1.3.

Quality Assurance Performance Indicators

Implement strict quality control measures to ensure high standards of infrastructure.

- **PI1.3.1.** Percentage of projects passing quality audits with no major issues
- **PI1.3.2.** Frequency of Inspections
- **PI1.3.3.** Number of complaints regarding infrastructure and roads quality
- **PI1.3.4.** Inspection Pass Rate

P1.4.

Laboratory Assurance Performance Indicators

Ensure accuracy and reliability of laboratory testing and results.

- **PI1.4.1.** Number of Approved Laboratories
- **PI1.4.2.** Percentage of Laboratories Passing Audits

P1.5.**Traffic and Parking Control Performance Indicators**

Manage traffic flow and parking to minimize disruptions

- **PI1.5.1.** Number of traffic control-related complaints per project
- **PI1.5.2.** Percentage of project without traffic violations
- **PI1.5.3.** Number of Coordination Meetings with Local Traffic Authorities

P2.1.**Project Management Performance Indicators**

Incorporate robust project management methodologies for efficient execution.

- **PI2.1.1.** Project management training participation rate
- **PI2.1.2.** Percentage of planning decisions made based on critical services mapping
- **PI2.1.3.** Average project planning time based on time to issue all required permits per project
- **PI2.1.4.** Resource utilization efficiency rate based on resource management plans

P2.2.**Worksite Management Performance Indicators**

Maintain organized and clean worksites.

- **PI2.2.1.** Number of site inspections conducted per project
- **PI2.2.2.** Percentage of projects without worksite and cleanliness violation
- **PI2.2.3.** Number of worksites-related complaints
- **PI2.2.4.** Percentage of project without Barriers and Safety violations
- **PI2.2.5.** Number of violations regarding laydown areas per project

P2.3.**Digital Tools and Technology Performance Indicators**

Leverage digital tools and innovative technologies for efficient management.

- **PI2.3.1.** Management Efficiency Improvement Rate due to Work-site Monitoring System
- **PI2.3.2.** Work-site Monitoring System Utilization Rate

P2.4.**Continuous Learning and Improvement Performance Indicators**

Emphasize infrastructure resilience through continuous learning that inform system improvements.

- **PI2.4.1.** Investment in Training, Learning and Development
- **PI2.4.2.** Improvement in Performance Indicator Metrics
- **PI2.4.3.** Accuracy of Demand Forecasts

P2.5.**System Resilience Performance Indicators**

Ensure continuous adaptation and improvement based on new information and conditions.

- **PI2.5.1.** Percentage of Infrastructure Passing Stress Tests



1.2 OVERARCHING APPROACH

Action Areas and their Performance Indicators

P1	P1.1. Safety Compliance
	P1.2. Legal Compliance
	P1.3. Quality Assurance
	P1.4. Laboratory Assurance
	P1.5. Traffic and Parking Control
P2	P2.1. Project Management
	P2.2. Worksite Management
	P2.3. Digital Tools and Technology
	P2.4. Continuous Learning and Improvement
	P2.5. System Resilience
P3	P3.1. Clear and Transparent Communication
	P3.2. Stakeholder Engagement
P4	P4.1. Advanced Technologies
	P4.2. Data Capture and Monitoring Methods
P5	P5.1. Environmental Protection
	P5.2. Sustainable Resources
	P5.3. Ecosystem Integration
	P5.4. Natural Disasters and Risk Management
P6	P6.1. Public Accessibility
	P6.2. Community Benefits
	P6.3. International Standards and Fair Labor

P3.1.

Clear and Transparent Communication Performance Indicators

Provide clear, accessible information to workers and the public.

- **PI3.1.1.** Stakeholder satisfaction score on communication and regulations clarity
- **PI3.1.2.** Number of violations regarding information signage
- **PI3.1.3.** Number of transparency-related complaints per year (e.g. Complaints about being ill informed)
- **PI3.1.4.** Public and private utilization rate of information access points
- **PI3.1.5.** Frequency of real-time Stakeholder updates

P3.2.

Stakeholder Engagement Performance Indicators

Foster collaboration and communication among all project Stakeholders and the public.

- **PI3.2.1.** Reach rate of communication channels
- **PI3.2.2.** Number of public and private access points established
- **PI3.2.3.** Percentage of relevant Stakeholders involved in project planning and execution
- **PI3.2.4.** Stakeholders' engagement rate with updates (e.g. Feedback, approval, rejection, ..etc)
- **PI3.2.5.** Average response time to Stakeholder concerns and feedback
- **PI3.2.6.** Stakeholder satisfaction with cases resolution
- **PI3.2.7.** Community participation rate (e.g. Public consultation)
- **PI3.2.8.** Community satisfaction score
- **PI3.2.9.** Small businesses and shops satisfaction score

P4.1.

Advanced Technologies Performance Indicators

Integrate advanced technologies into infrastructure planning, design and construction.

- **PI4.1.1.** Efficiency improvement from modern methods
- **PI4.1.2.** Number of near miss events (e.g. Major issues avoided due to early detection by technology)
- **PI4.1.3.** Investment in research & development for technological advancements and innovation

P4.2.**Data Capture and Monitoring Methods Performance Indicators**

Leverage Data Capture and Monitoring Methods for efficient planning and management.

- **PI4.2.1.** Percentage of data coverage of Riyadh infrastructure
- **PI4.2.2.** Data accuracy rate
- **PI4.2.3.** Data collection rate (number of project contributing data input/total number of projects)
- **PI4.2.4.** Decision-making improvement rate from data analytics

P5.1.**Environmental Protection Performance Indicators**

Protect the environment and minimize the project's carbon footprint.

- **PI5.1.1.** Number of environmental incidents reported
- **PI5.1.2.** Percentage reduction in pollution levels (e.g. Project carbon footprint)
- **PI5.1.3.** Percentage of waste diverted from landfill
- **PI5.1.4.** Number of violations regarding waste disposal practices
- **PI5.1.5.** Percentage of major environmental risks mitigated through environmental monitoring and reporting
- **PI5.1.6.** Percentage of projects using pollution control measures

P5.2.**Sustainable Resources Performance Indicators**

Use sustainable and local resources in infrastructure projects.

- **PI5.2.1.** Percentage of materials that are locally sourced and sustainable
- **PI5.2.2.** Percentage of projects using lower-carbon alternatives
- **PI5.2.3.** Reduction in fossil fuel usage

P5.3. Ecosystem Integration Performance Indicators

Consider broader ecological impacts and benefits.

- **PI5.3.1.** Number of environmental violations
- **PI5.3.2.** Ecosystem data utilization rate

P5.4.**Natural Disasters and Risk Management Performance Indicators**

Integrate disaster risk management into infrastructure planning and implementation.

- **PI5.4.1.** Number of infrastructure failure caused by natural disasters
- **PI5.4.2.** Risk reduction from mitigation measures
- **PI5.4.3.** Number of emergency excavations conducted

P6.1.**Public Accessibility Performance Indicators**

Provide alternative transportation options and ensure accessibility for all, fostering social inclusion.

- **PI6.1.1.** Percentage reduction in traffic congestion due to alternative routes
- **PI6.1.2.** Number of violations relevant to public accessibility

P6.2.**Community Benefits Performance Indicators**

Maximize the health and social benefits of infrastructure projects for local communities.

- **P6.2.1.** Service interruption rate
- **P6.2.2.** Beneficiary satisfaction score on services
- **P6.2.3.** Number of complaints about infrastructure works disruptions
- **P6.2.4.** Response time to disruption complaints
- **P6.2.5.** Percentage of contracts awarded to local businesses

P6.3.**International Standards and Fair Labor Performance Indicators**

Align with global standards and respect human rights in infrastructure projects.

- **P6.3.1.** Gender diversity in workforce
- **P6.3.2.** Number of labour related violations or complaints

1.2 OVERARCHING APPROACH

Stakeholder Interaction Model

The Overarching Approach describes how Stakeholders should work together throughout the project lifecycle. The Stakeholder Interaction Model (below) represents all the elements of Stakeholder coordination that are necessary for The Overarching Approach to achieve its goal of resilient & co-ordinated public realm infrastructure for the Riyadh Region.

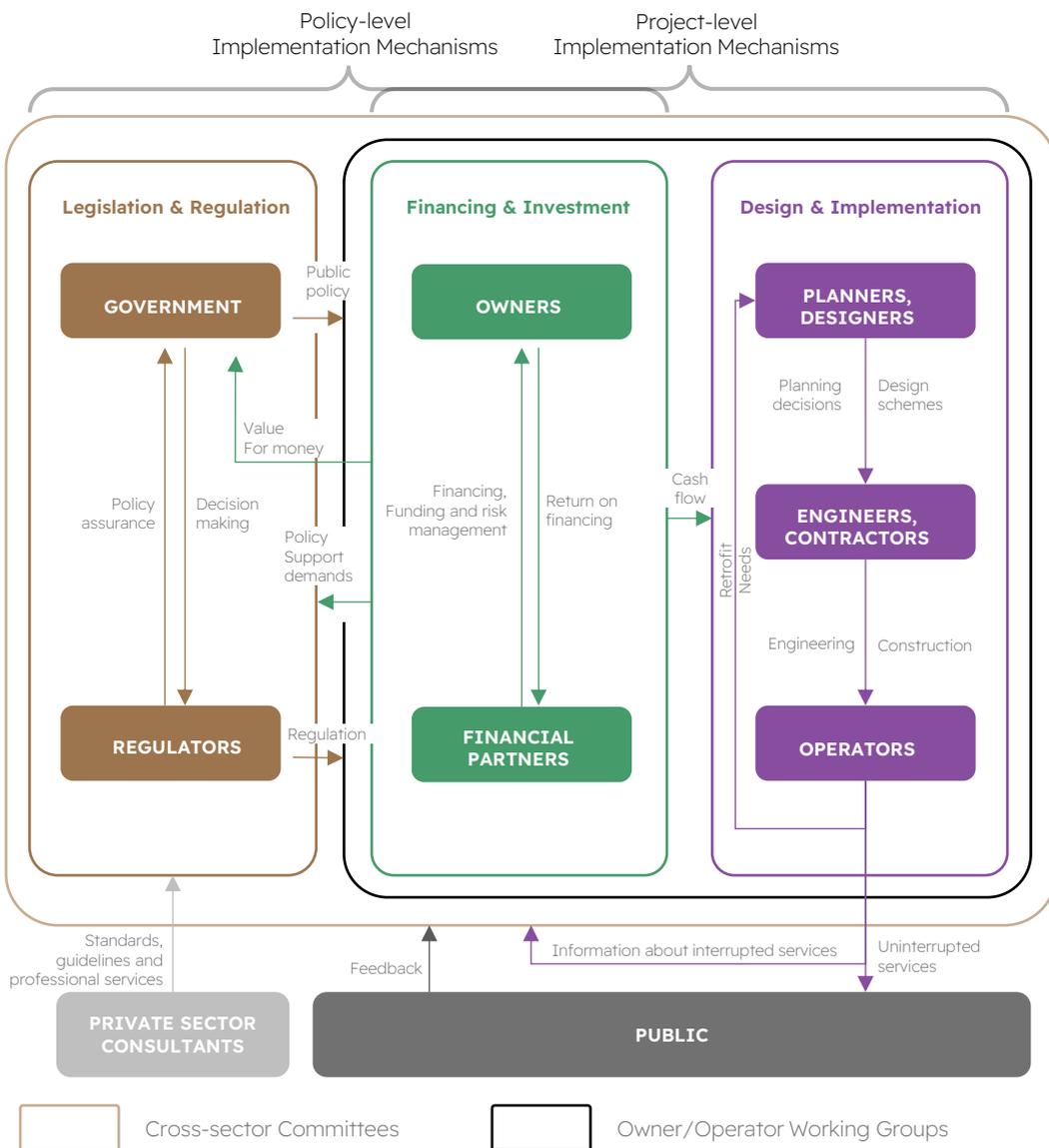


Figure 1.2.2: The Stakeholder Interaction Model

Stakeholders are grouped into 3 categories:

- 1. Legislation & Regulation:** Those responsible for setting legislation and regulating against it
- 2. Financing & Investment:** At present, infrastructure project owners are typically Service Entities that are funded by the Ministry of Finance (MOF)
- 3. Design & Implementation:** Service Entities deliver some functions in-house and are supported by Design Consultants and Contractors.

Infrastructure Project Lifecycle

The Manual is built around RIPC's infrastructure project lifecycle. It has eight stages (right). All Stakeholders should structure projects around this process.

The early stages of the infrastructure project lifecycle (Stages 1 – 2) present the most significant opportunity to influence final outcomes and impacts.

As infrastructure projects move through design stages (Stage 3 – 5), then construction stages (Stage 6 – 7), the potential for suitably mitigating risks and delivering the best solutions decreases.

There are no specified 'stage gates' set out as part of the infrastructure project lifecycle. Instead, each entity should define its own internal triggers and thresholds against which to measure stage completion.

Each Stakeholder shall consider and take ownership of that which is under their charge during each stage of the process. Guidance related to those responsibilities are set out within Chapter 3 of this document, but each Stakeholder knows best their own operations and should supplement the guidance set out herein with the outcomes of their own analysis.

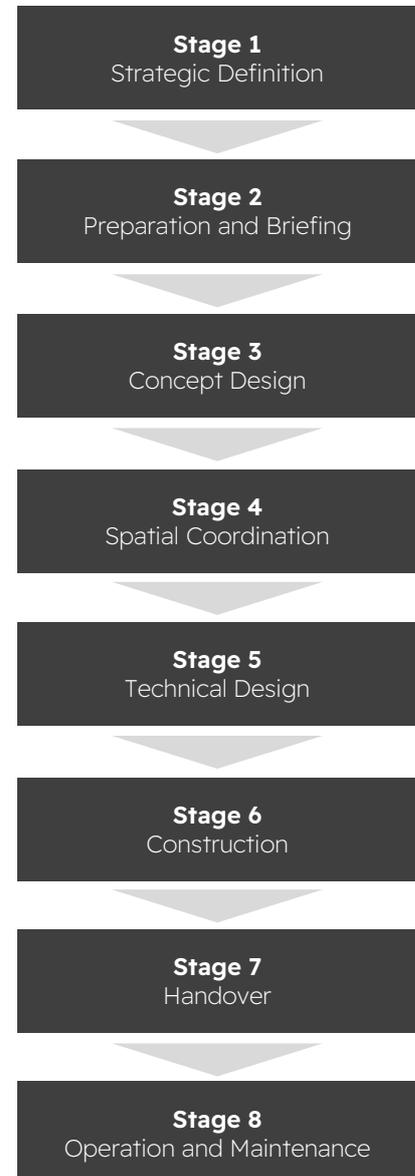


Figure 1.2.3: Infrastructure Project Lifecycle Stages



1.3 ROAD CATEGORIES

Road Categories shall be considered by the RIPC when determining the Project Category. The Road Categories specified within The Manual shall align with those established in the Saudi Highway Code, SHC 301 – Highway Geometric Design (1st Edition, 2023), as detailed below.

Whilst highways and streets are classified broadly into one of five highway categories, they are further classified into **rural** and **urban** areas, by means of technical parameters (measurable) and subjective considerations (non-measurable).



Figure 1.3.1: Road Categories (SHC 301)

The table below has been adapted from SHC 301 and highlights key aspects of Road Categories that are considered when determining the Project Category.

Aspects	Freeways	Expressway	Arterials	Collectors	Locals
Land Access	Full control of access-no direct land access	Limited control of access-no direct land access	Land access secondary consideration		Land access primary consideration
AADT	Over 20,000	Over 20,000	5,000 - 30,000	1,000 - 12,000	100 - 1,000 (up to 5,000 in certain cases)
Traffic Flow Characteristics	Free flow	Free flow	Uninterrupted flow except at Intersections	Interrupted flow	Interrupted flow
Design Speed	80 - 100 km/h	70 - 90 km/h	50 - 80 km/h	30 - 50 km/h	30 - 40 km/h
Vehicle Type	All types with > 60 km/h; heavy trucks average 20 - 40 %	All types; heavy trucks average 20 - 40 %	All types; up to 40 % trucks	All types; up to 30 % heavy trucks	Predominantly passenger cars & light to medium trucks with occasional heavy trucks
Connects to	Expressways Freeways	Expressways Freeways Arterials	Collectors Arterials Locals Expressways	Locals Arterials	Arterials Collectors Locals
Private and Commercial Approaches	Not permitted	Not permitted	None or limited	Permitted	Permitted

Table 1.3.1: Road Categories (SHC 301)



1.4 HOW TO USE THIS MANUAL

Quick Start Guide

TOPIC	RIPC	Service Entities	Contractor	Laboratory	Consultant
CHAPTER 2 PROJECT LIFE CYCLE					
2.1 PROJECT PLANNING					
2.1.1 PERMITTING	X	X	X		X
2.1.2 WORK EXECUTION PLAN AND RISK MANAGEMENT		X	X		X
2.1.3 TRAFFIC CONTROL	X	X	X		X
2.1.4 HEALTH & SAFETY MANAGEMENT	X	X	X	X	X
2.1.5 ENVIRONMENTAL MANAGEMENT		X	X		X
2.1.6 WASTE MANAGEMENT		X	X		X
2.1.7 QUALITY ASSURANCE & CONTROL	X	X	X	X	X
2.1.8 EMERGENCY MANAGEMENT	X	X	X		
2.1.9 COMMUNITY OUTREACH & ACCESSIBILITY		X	X		
2.1.10 PROTECTING ASSETS & MINIMIZING DISRUPTION		X	X		
2.2 SPATIAL PLANNING					
2.2.1 SITE SAFETY		X	X		X
2.2.2 BARRIERS AND WARNING MEASURES	X	X	X		
2.2.3 WORK ZONE MANAGEMENT		X	X		X
2.2.4 ACCESS AND COMMUNICATION ELEMENTS		X	X		X
2.3 PROJECT EXECUTION					
2.3.1 SITE PREPARATION AND MANAGEMENT		X	X		X
2.3.2 EXCAVATION TYPES AND GUIDELINES		X	X		X
2.3.3 REINSTATEMENT WORKS		X	X	X	X
2.4 PROJECT INSPECTION & COMPLIANCE					
2.4.1 INSPECTIONS AND VIOLATIONS	X	X	X	X	X
2.4.2 APPEALS AND COMPLAINTS	X	X	X		
2.5 PROJECT CLOSURE					
2.5.1 PROJECT CLOSURE	X	X	X	X	X
2.6 GENERAL CONSIDERATIONS					
2.6.1 LEVERAGING TECHNOLOGY	X	X	X	X	
2.6.2 MAXIMIZING DATA CAPTURE	X	X	X		X

Table 1.4.1: Responsibility Matrix

Summary of Stakeholder's Roles and Responsibilities

Stakeholders shall:

1. Fulfil specific responsibilities outlined in The Manual.
2. Provide RIPC with Plans, Standards, Processes, Procedures, and GIS locations of infrastructure assets.
3. Protect other Stakeholders' assets when undertaking work.
4. Act in good faith in all interactions, even during disputes, and resolve issues promptly.
5. Cooperate, collaborate, and engage constructively through open communication.
6. Maintain both formal and informal communications with other Stakeholders.

PROJECT STAGE	RIPC	Service Entities	Contractor	Laboratory	Consultant
Stage 1: Strategic Definition	<ul style="list-style-type: none"> Request and consolidate infrastructure project plans from Service Entities. Analyze upcoming projects to develop a comprehensive schedule, as per the IIPM. Circulate the consolidated IICP with relevant authorities. 	<ul style="list-style-type: none"> Collaborate with RIPC in the development (and consolidation) of the Integrated Infrastructure Coordination Plan (IICP). 	<ul style="list-style-type: none"> Prepare Works Execution Plans (WEP), Traffic Management Plans (TMP) and necessary documentation (as per Chapter 2, Section 2.1.2). 		
Stage 2: Preparation & Briefing					
Stage 3: Concept Design					
Stage 4: Spatial Coordination	<ul style="list-style-type: none"> Coordinate new project plans with service agencies. Approve excavation permits. 	<ul style="list-style-type: none"> Coordinate with the General Directorate of Traffic (if necessary) as well as any other party as per RIPC internal coordination cycle. 	<ul style="list-style-type: none"> Request permits via the digital portal and pay excavation fees. Make any necessary adjustments to WEPs and TMPs. Prepare HSE plans and RAMS. 		
Stage 5: Technical Design	<ul style="list-style-type: none"> Refer works penalty objections to the Grievance Committee. Adapt the digital portal to meet business needs. Conduct field visits, monitor violations, and notify Contractors of required corrections. 	<ul style="list-style-type: none"> Engage required Consultants, Contractors, and safety officers. 	<ul style="list-style-type: none"> Notify public in advance of the works. Prepare the work area and commence works. Execute infrastructure works (utilities extension, backfilling, reinstatement, etc.). Comply with Traffic Management Plans, restore sites, and settle fines if applicable. 	<ul style="list-style-type: none"> Ensure material samples and tests are completed and coordinated with the Contractor and Consultant. 	<ul style="list-style-type: none"> Supervise excavation and reinstatement work, upload photos, videos, and control reports for compliance. Ensure Contractor adherence to RIPC standards and procedures.
Stage 6: Construction					
Stage 7: Handover	<ul style="list-style-type: none"> Approve completion and clearance certificates. Monitor works during the Warranty Period. 	<ul style="list-style-type: none"> Submit site vacate requests. Notify when the Contractor Completion Certificate is issued. 	<ul style="list-style-type: none"> Complete any required remedial work within the Warranty Period. Submit requests to vacate the site post-Warranty Period. Testing Laboratories Responsibilities. 	<ul style="list-style-type: none"> Issue completion certificate to Service Entity (including sample testing results as per project requirements). 	<ul style="list-style-type: none"> Submit records to the Service Entity.
Stage 8: Operation & Maintenance					

Table 1.4.2: Stakeholder responsibilities across the Infrastructure Project Lifecycle



1.4 HOW TO USE THIS MANUAL

Overview

The Manual is split into 4 Chapters, each has sections and sub-sections.

Introductory Chapter: The purpose of Chapter 1 is to introduce The Manual, including reference to the Overarching Approach and the infrastructure project lifecycle.

Action Chapter: Chapter 2 guides Stakeholders through the infrastructure project lifecycle by highlighting requirements within each of the relevant stages.

Supporting Chapters:

Chapter 3 articulates how the Code Manual will be updated. It also offers useful information regarding regulatory compliance and deviation management as part of the Legal Framework.

Chapter 4 features useful templates, processes, procedures and checklists that will ensure consistency of quality and approach among Service Entities, their Consultants and Contractors.

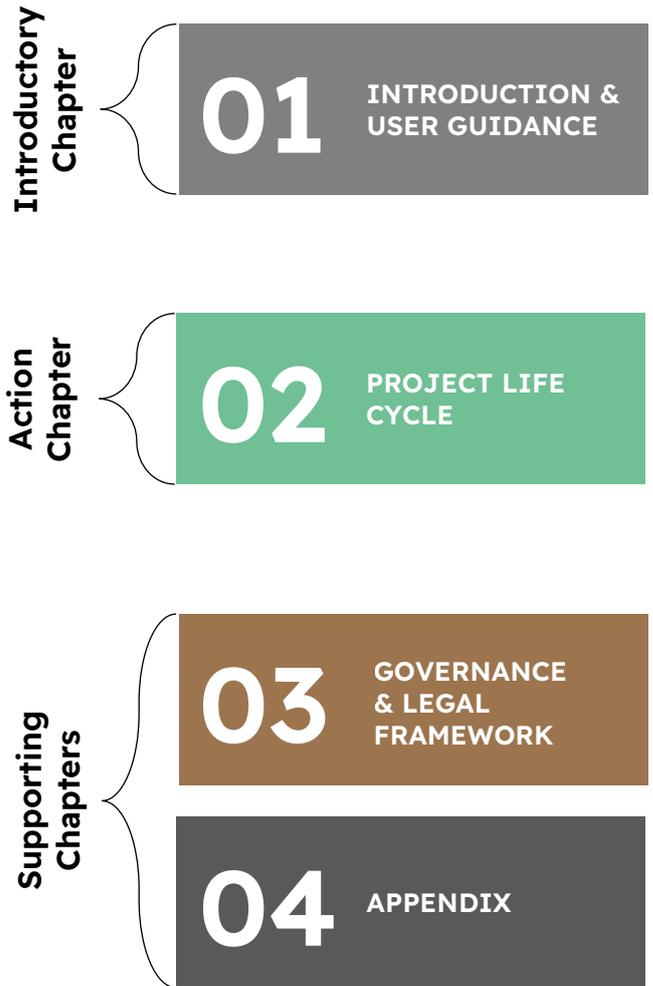


Figure 1.4.1: Chapter Types

General Rules on Interpreting The Manual

All Stakeholders must interpret this Manual as follows:

1. Where The Manual specifies that the Stakeholders shall 'review' or 'agree' on requirements, the review and its outcome are to be recorded in writing (e.g. through formal approval and signatory or meeting minutes).
2. A reference to any Law or Regulation includes all subsequent Laws and Regulations and includes relevant Laws and Regulations in amendment of, or substitution for, the same.
3. A reference to any Standard or other document includes reference to that document as amended, supplemented or replaced from time to time.
4. If The Manual conflicts with any legislative provision issued by higher legislative authority, the legislative provision will prevail.
5. This Manual replaces and supersedes any voluntary code of practice covering delivery of public realm infrastructure projects in the Riyadh Region.
6. This Manual is not retrospective. It will have legal force on the date stipulated when approved by RIPC. It does not apply to projects launched before the approval date.
7. Where Stakeholders agree terms and conditions between themselves that vary from this Manual, they must still comply with all legislative requirements.
8. This Manual does not indemnify any party from any liability that they may incur when carrying out works in accordance with this Manual.
9. If there is conflict between the wording of any provision of this Manual and any illustration, table or graphic within it, the provision as written takes precedence over the illustration or graphic, unless the contrary is explicitly stated.

Linguistic Hierarchy

To ensure conformance with the Overarching Approach, legal compliance with laws and regulations, compliance with standards, and avoidance of violations as set out in "Licensing Compliance and Controls for Infrastructure Projects in the Riyadh Region", four tiers of linguistic classification have been used throughout this Manual and in describing its requirements. The four tiers are as follows:

Shall: This is a mandatory instruction where Compliance is essential, and failure to adhere to it will lead to immediate halting of the work. For example, "Excavation sites shall be inspected daily for safety compliance to prevent any work stoppages due to non-compliance".

Should: This is a mandatory instruction and best practice, failure to follow it could result in delays in the work. For example, "Workers should wear protective gear at all times to avoid potential work stoppages due to safety violations".

Consider: Such requirements align with the purpose of The Manual and are good practice. The Stakeholder would need justification for not conforming to such requirements.

Advise: These requirements often represent best practice intended to raise the quality and consistency of approach through Service Entities, their Consultants, and Contractors.

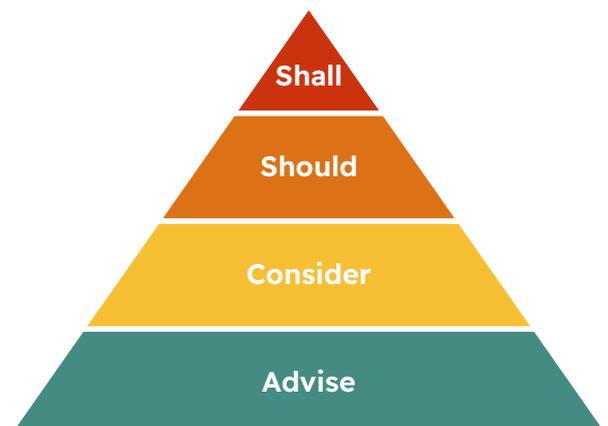


Figure 1.4.2: Linguistic Hierarchy



1.4 HOW TO USE THIS MANUAL

Structure of The Manual

Action Chapters feature code cards that sets out requirements in an easy-to-follow structure which denotes whether the requirement is mandatory or not, based on the linguistic mechanism used.

The structure of the cards is outlined below, highlighting the main headings general and content.

Code Statement: The overarching statement that best describes the code.

Rationale: The reason why the code statement is important.

Context: A quick review of the current situation and how RIPC will work with Stakeholders to fix it.

Positive Impacts: How implementation of the code will impact different spheres of our lives.

Key Requirements: Mandatory or optional requirements based on the linguistic mechanism.

Main Outcomes: A description of the benefits that are expected to be seen from implementation of The Manual.

Key References: External Local and International references that help Stakeholders in understanding the requirements.

03

3.1.3 TRAFFIC CONTROL

3.1.3.1 Traffic Diversion Planning (TDP)

Code Statement: Develop Traffic Diversion Plans to manage traffic flow and ensure safety during construction..

1 RATIONALE

Effective traffic diversion ensures safe navigation around work zones, reduces congestion, and complies with traffic management regulations, safeguarding both workers and road users.

3 CONTEXT

A Traffic Diversion Plan (TDP) outlines the methods to manage traffic flow during construction activities, ensuring safety for both workers and road users.

4 POSITIVE IMPACTS

Health & Safety

Quality of Life & Well-being

Public Perception

Accessibility & Movement

Economy & Business

Infra & Public Space

Environmental

Shall	Should
REQUIREMENTS	
<ul style="list-style-type: none"> • Prepare a Traffic Diversion Plan (TDP) by a qualified individual, with their details included on the TDP, including the following details: <ul style="list-style-type: none"> ▫ TDPs must clearly show existing site details and proposed Temporary Traffic Control (TTC) devices. ▫ Existing permanent traffic control devices around the site must be clearly shown. ▫ Proposed dates, times of occupancy, and extent of TTC setup. ▫ Impact on traffic flow, including road closures, lane closures, and speed reductions. ▫ Ensure the TDP is displayed clearly on-site at all times. • TTC must be prepared and implemented according to MoMRAH guidelines/MUTCD, including necessary diversions. • Adhere to standards set forth in SHC 305 for all traffic control devices. • The Contractor is responsible for managing HSE aspects on site. 	<ul style="list-style-type: none"> • TDPs and traffic control devices implemented on site shall comply with relevant guidelines and standards. • Provide alternative pedestrian paths when work sites occupy sidewalks, ensuring continuity of pedestrian movement. • Permit Conditions: <ul style="list-style-type: none"> ▫ On-site representative must contact RIPC before and after road/lane closures or adjustments. ▫ A copy of the TDP and Excavation Permit must be displayed on site at all times. ▫ RIPC must be informed of any changes to the on-site contact or TDP. ▫ RIPC may request postponement of activities in cases of heavy traffic or emergencies.
MAIN OUTCOMES	
<ul style="list-style-type: none"> • A clear understanding of traffic flows and the impact that the work will have on road users. 	
KEY REFERENCES	
<ul style="list-style-type: none"> • SHC 305 	

PROJECT PLANNING

Applicable Chapters, Forms and Templates: References, forms, and templates that help Stakeholders in understanding the requirements, within The Manual.

- Applicable Chapters, Forms and Templates**
- TDP guidance/template

PROJECT LIFECYCLE			
Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE	
	P1. Safe, Compliant & Controlled

SUCCESS MEASUREMENT	
P1.5. Traffic and Parking Control	<ul style="list-style-type: none"> • P11.5.1. Number of traffic control-related complaints per project • P11.5.3. Number of coordination meetings with local traffic authorities

LINKED VIOLATION	
	V5. Traffic and Parking Control Violations
	V6. Signage and Information Violations

9

Consider

Advise

REQUIREMENTS

- Adjust TDP details in real-time based on traffic conditions, with provisions for emergency changes if required by RIPC.
- Keep RIPC informed of any changes to the TDP.
- Details for Approval:
 - On-site contact
 - Individual who prepared the plan
 - Type of works
 - Proposed location of works (work zone)
 - Proposed extent of TTC setup
 - Proposed dates and times of occupancy
 - Details of proposed impact on traffic flow (e.g., road closure, lane closure, speed reduction, counterflow)

MAIN OUTCOMES

KEY STAKEHOLDERS

- CONTRACTOR
- RIYADH AMANAH
- RIPC

10

Infrastructure Project Lifecycle Stages: What stages of the project will primarily be affected by these requirements.

11

Guiding Principles: How this code statement aligns with the Guiding Principles of the Overarching Approach.

12

Success Measurement Examples: Suggested ways in which Stakeholders can check their success (non-exhaustive).

13

Linked Violations: What violation categories should be checked within the Overarching Approach to ensure conformance.

8

Key Stakeholders: Main entities that are affected by the chapter outcomes.



2.1 PROJECT PLANNING

2.2 SPATIAL PLANNING

2.3 PROJECT EXECUTION

2.4 PROJECT INSPECTION & COMPLIANCE

2.5 PROJECT CLOSURE

2.6 GENERAL CONSIDERATIONS

02.

PROJECT LIFE CYCLE



- 2.1 PROJECT PLANNING
- 2.2 SPATIAL PLANNING
- 2.3 PROJECT EXECUTION
- 2.4 PROJECT INSPECTION & COMPLIANCE
- 2.5 PROJECT CLOSURE
- 2.6 GENERAL CONSIDERATIONS

Chapter 2 guides all Stakeholders in the planning, execution, and closure of infrastructure projects.

Albeit there are no ‘stages’ set by RIPC, when mapped against the Infrastructure Lifecycle Process (first introduced in Chapter 1), the sections of Chapter 2 align as follows:

- Planning: Stages 1 – 4
- Execution: Stages 5 – 6
- Closure: Stages 7 – 8

The Chapter begins by describing key system components that ensure the smooth operation of various networks.

Stakeholders are reminded that the guidance set out herein is considered comprehensive and linked to the Overarching Approach. However, each Stakeholder entity knows best their own operations and should supplement the guidance set out herein with their own detailed processes and procedures that are project and entity-specific.

Stage 1
Strategic Definition

Stage 2
Preparation and Briefing

Stage 3
Concept Design

Stage 4
Spatial Coordination

Stage 5
Technical Design

Stage 6
Construction

Stage 7
Handover

Stage 8
Operation and Maintenance

2.1

PROJECT PLANNING

2.1

PROJECT PLANNING

2.1.1 PERMITTING

2.1.1.1 Permitting Requirements

2.1.1.2 Supplementary Material



2.1.1 PERMITTING

2.1.1.1 Permitting Requirements

Code Statement: Implement a clear and robust permitting process, supported by documentation and driven by data, to ensure that all planned works are approved in advance, with provisions for managing emergency and unplanned works efficiently.

A clear and robust permitting process is necessary to maintain control over infrastructure projects, prevent unauthorized or unsafe work, and ensure that all projects are consistent with strategic objectives. Setting strict governance around permits, supported by documentation, will minimise errors, facilitate coordination between Stakeholders and ensure that projects are executed efficiently and effectively.

Typically, permitting for public realm infrastructure works has traditionally lacked due process and sufficient data to make informed decisions. The ratio of emergency permits to normal permits was also far from what would be expected from a mature sector. Now, RIPC has established a robust, data-driven, process supported by documentation that will enable evidenced-based decisions to be made regarding permit approvals.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
REQUIREMENTS	
<ul style="list-style-type: none"> • Provide RIPC with Infrastructure Project Plans within specified timeframes and in compliance with RIPC Data and Information Standard. • Collaborate with RIPC in the development (& consolidation) of the Integrated Infrastructure Coordination Plan (IICP), resolving time and/or space clashes and working around moratoriums. • Secure individual project Excavation Permits or Emergency Excavation Permits, as needed, before starting work. • Not exceed permit validity for all Road Categories. • Permit Extension/Modification: Must apply for an extension if the civil works exceed planned schedules, with fees doubling for half the duration of the original permit. Request shall be granted at the discretion of RIPC. • Feature a QR Code of the latest valid permit at the site for inspection purposes. If there is no permit on display, or if the permit displayed is out of date (even if the Service Entity has secured a new permit) then the Contractor will face a penalty. 	<ul style="list-style-type: none"> • Include in the permit application details such as project description, timing and scheduling, scope of work, past and future earthworks, and management proposals (traffic management, environmental considerations, work execution plan, etc.). • Submit data as requested by RIPC in agreed-upon timeframes and comply with RIPC Data Information Standard (refer to Integrated Infrastructure Planning Methodology). • Provide data for three-year plans within the timeframes stated by RIPC. • Identify any changes from the published IICP and submit change requests where necessary. • Work with RIPC’s Joint Operations Working Group (JWOG) in consideration of contractual, safety, and constructability matters relating to on-site works.
MAIN OUTCOMES	
<ul style="list-style-type: none"> • Comprehensive and accurate data supporting the permitting process. 	

KEY REFERENCES

- Control, Compliance and Licensing Controls for Infrastructure Projects in Riyadh – RIPC
- RIPC Integrated Infrastructure Planning Methodology
- RIPC Data Information Standard

Applicable Chapters, Forms and Templates

- [Chapter 2.6.2.1 Maximizing Data Capture](#)
- [Chapter 2.1.1.2 Supplementary Material](#)

PROJECT LIFECYCLE

Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE



P1. Safe, Compliant & Controlled



P2. Effectively Managed & Continuously Improved



P4. Technologically Advanced & Data-driven

SUCCESS MEASUREMENT

P2.1. Project Management

- PI2.1.2. Percentage of planning decisions made based on critical services mapping.
- PI1.2.2. Licensing Process Clarity Score.
- PI2.1.4. Resource utilization efficiency rate based on resource management plans.

Additional Performance Indicators

- Permit Approval Rate: Percentage of permits approved without need for revisions.
- Permit Processing Time: Average time taken to process and issue permits.

LINKED VIOLATION



V2. Permit and Regulation Compliance Violations

Consider

Advise

REQUIREMENTS

- Adhere to RIPC generated automated reminders for permit deadlines and submit required documentation to reduce delays and ensure compliance.
- Provide accurate works location details within the WEP and permit application, specifying the exact location and extent of works.
- Liaise with RIPC, Service Entities, Riyadh Municipality, and Mega Projects (e.g., Green Riyadh, Sports Boulevard) to coordinate collective works under a 'dig once' approach to minimize repeated disruptions.
- Regularly audit data quality and document completeness to minimize the risk of permit delays, rejections, and violations.

MAIN OUTCOMES

- Improved coordination and information flow among stakeholders.

KEY STAKEHOLDERS

- CONTRACTOR
- RIPC
- SERVICE ENTITTY
- CONSULTANT



2.1.1 PERMITTING

2.1.1.2 Supplementary Material

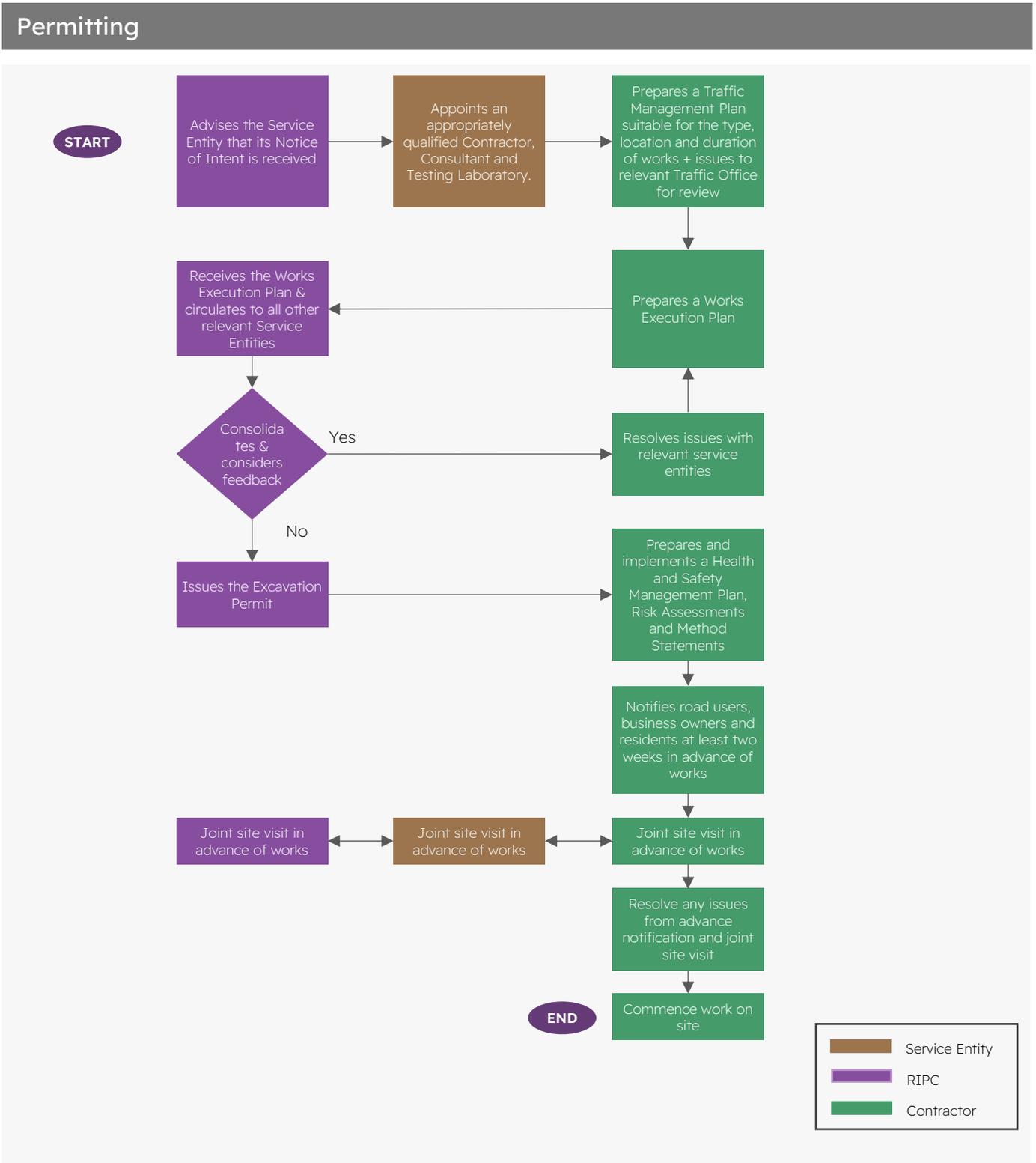


Figure 2.1.1.2.1: Permit Application Process

Permitting	
Road Category	Service Entity to Submit Permit Application in Advance of Proposed Start Date
Freeway, Expressway or Arterial	8 weeks
Collector	6 weeks
Local or Residential	4 weeks

Table 2.1.1.2.1: Permitting Timescales



2.1.1 PERMITTING

2.1.1.2 Supplementary Material

Permitting

Ascertaining an Emergency Permit

- In certain circumstances Emergency and Unplanned work will need to be undertaken by Service Entities outside of the approved Infrastructure Project Plans.
- Emergencies typically refer to unexpected events that require immediate action to protect public safety, health, and welfare.
- Service Entities should submit an Emergency Permit application within 24 hours of the event. This will be dealt with as a priority by RIPC.
- To expedite matters, Service Entities and RIPC should agree specimen Traffic Management Plans and Work Executions Plans in advance on an annual basis. These shall cover each category of road. In addition, Service Entities should have standing resources in place to deal with typical types of emergencies that occur.
- Emergency Permits will be granted based on self-assessment.
- The following steps will be followed to manage emergencies:
 1. Service Entities will be required to indicate which criteria the emergency aligns with (reference table below).
 2. The permit will be approved subject to the relevant criteria that has been identified.
 3. Upon completion of the emergency works, Service Entities are required to submit a completion report.
 4. RIPC will conduct inspections to validate if the works require an emergency permit, with fines issued for non-compliance.

Impact Criteria	Vulnerability Criteria
Safety Impact	Time Sensitivity
Disruption to Services	Lack of Alternatives
Damage to Infrastructure	History Precedent
Environmental Impact	
Financial/Economical Impact	

Table 2.1.1.2.2: Impact & Vulnerability Criteria for Emergency Permits

Permitting

WHAT TO LOOK OUT FOR

RIPC

- Has the IICP been published?
- Has the Permit been issued?
- Has a joint site visit been carried out?

Service Entity

- Has an appropriately qualified Contractor, Consultant, Testing Laboratory (and Service Entity Contractor) been appointed?
- Has the Permit Fee been paid to RIPC?
- Has a joint site visit been carried out?

Contractor

- Has a suitable Traffic Management Plan been prepared and submitted to the Traffic Office? Have any issues been resolved?
- Has a Works Execution Plan been prepared and submitted to RIPC? Have any issues been resolved?
- Has a Health and Safety Management Plan, Risk Assessments and Method Statements been prepared?
- Have road users, business owners and local residents been notified at least two weeks and two days in advance of works?
- Has a joint site visit been carried out?
- Have any issues from notification and site visit been addressed?

Traffic Office

- Has the Traffic Management Plan been reviewed and approved within three working days?

2.1

PROJECT PLANNING

2.1.2 WORK EXECUTION PLAN AND RISK MANAGEMENT

- 2.1.2.1 Work Execution Plan (WEP)
- 2.1.2.2 Risk Management by Road Type and Location
- 2.1.2.3 Site-Specific Risk Assessments
- 2.1.2.4 Key Risks and Hazards in Utility Works
- 2.1.2.5 Subsurface Utilities Risk Assessments
- 2.1.2.6 Critical Infrastructure Guidelines
- 2.1.2.7 Supplementary Material



2.1.2 WORK EXECUTION PLAN AND RISK MANAGEMENT

2.1.2.1 Work Execution Plan (WEP)

Code Statement: Develop a Work Execution Plan that outlines safety, methodology, and compliance procedures for specific tasks.

RATIONALE

A comprehensive WEP ensures that all project elements are planned, risks are mitigated, and responsibilities are clearly defined, aligning with safety and compliance standards.

CONTEXT

The Work Execution Plan (WEP) is a detailed document that outlines the methodology and procedures for completing specific tasks onsite, ensuring work is performed safely and efficiently. Depending on the project’s nature and scale, the WEP can be a single document or a package of documents.

POSITIVE IMPACTS

Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall

REQUIREMENTS

- Prepare a Work Execution Plan (WEP) that includes the following elements :
- Project Information: Official name of the project, Detailed location of the work, Name of Client or principal Contractor.
 - Scope of Work: Detailed description of the tasks to be performed, clearly defined objectives and expected outcomes of the work.
 - Work Sequence: Step-by-step instructions on how the work will be carried out and estimated timeline for completion of the project.
 - Hazard Identification and Risk Assessment: Outline specific measures to control or mitigate risks, including (but not limited to):
 - List of required PPE for all workers.
 - Placement and type of safety signage within the work area, on plant, and pedestrian barriers.
 - Emergency procedures to be followed.
 - Temporary Traffic Control Plan (TTCP): Detailed traffic management procedures specific to the work zone.
 - Environmental Management: Take measures to protect the environment and manage incidents.
 - Roles and Responsibilities: List of key personnel / Organization Chart with defined roles and responsibilities.
 - Tools and Equipment: Detailed list of tools and equipment to be used, and procedures for inspection and maintenance of tools.
 - Communication Plan: Methods for internal team communication and stakeholder engagement, including public and emergency services.
 - Review and Approval: Process details for WEP review, including required signatures of preparers, reviewers, and approvers. RIPC is solely responsible for monitoring and reviewing the WEP to facilitate stakeholder management and will not approve this information from a site safety point of view. This is the responsibility of the Contractor.

MAIN OUTCOMES

- Broad consideration for all elements of project delivery, ahead of the execution phase.

KEY REFERENCES

- SHC 305

Applicable Chapters, Forms and Templates

- [Chapter 2.1.4 Health Safety Management](#)
- [Chapter 2.1.5 Environmental Management](#)
- [Chapter 1.4 How to use this Manual](#)
- [Chapter 2.1.2.7 Supplementary Material](#)

PROJECT LIFECYCLE

Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE



P1. Safe, Compliant & Controlled

SUCCESS MEASUREMENT

P1.1. Safety Compliance	<ul style="list-style-type: none"> • PI1.1.1. Percentage of projects with zero lost-time injuries
1.2. Legal Compliance	<ul style="list-style-type: none"> • PI1.2.1. Number of legal non-compliance incidents
P1.3. Quality Assurance	<ul style="list-style-type: none"> • PI1.3.1. Percentage of projects passing quality audits with no major issues
P1.5. Traffic and Parking Control	<ul style="list-style-type: none"> • PI1.5.1. Number of traffic control-related complaints per project

LINKED VIOLATION



V1. Barriers and Safety Compliance Violations



V2. Permit and Regulation Compliance Violations

Should

Consider

Advise

REQUIREMENTS

- | | | |
|--|--|--|
| <ul style="list-style-type: none"> • Categorize work types and align WEP details accordingly: <ul style="list-style-type: none"> • Mobile Works: Continuously moving work; vehicles should not remain in one location for more than 15 minutes. • Medium – Short Term Works: Require occupancy of part/all of the roadway for a limited number of hours, usually for work in the daylight of a calendar day. • Emergency Works: Unplanned work requiring immediate action (e.g., burst pipes). • Note: Examples of Medium-Short Term Works include (but are not limited to): maintenance work, repair of safety barriers, topographical/geotechnical surveys, etc. | <p>Adjust the WEP format based on project needs, opting for a single document or a suite of documents as suitable.</p> | <ul style="list-style-type: none"> • Ensure comprehensive coverage of all required elements in the WEP, including specific utility work requirements. |
|--|--|--|

MAIN OUTCOMES

- High standards of safety, preventing accidents and ensuring smooth works operations.

KEY STAKEHOLDERS

- CONTRACTOR
- SERVICE ENTITY



2.1.2 WORK EXECUTION PLAN AND RISK MANAGEMENT

2.1.2.2 Risk Management by Road Type and Location

Code Statement: Evaluate and mitigate risks associated with different road types and locations in work zone planning.

RATIONALE

Identifying and addressing risks specific to road categories ensures the protection of workers and road users, enhancing safety and compliance across diverse work sites.

CONTEXT

Each road category has distinct characteristics influencing risk levels and requiring specific traffic control measures. Understanding these risks ensures appropriate safety measures for workers and the public.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall
REQUIREMENTS
<ul style="list-style-type: none"> • Account for relevant risks in planning documents (e.g. Traffic Management Plan, Work Execution Plan, Temporary Traffic Control Plan) tailored to the road category. • Implement required traffic control measures based on the risk level of each road category: <ul style="list-style-type: none"> ▫ High Risk - Freeways/Expressways ▫ High Risk - Major Arterials > 20,000 vpd ▫ Moderate Risk - Minor Arterials ≤ 20,000 vpd ▫ Moderate Risk - Collector ▫ Low Risk - Local Roads ▫ Low Risk - Dead-End Streets • Refer to the table titled “Risk Levels Attributed to Road Categories” in the supplementary materials for further guidance. • Enhance control measures in areas with high pedestrian or vehicle activity, using variable message signs, temporary signals, and enhanced signage where necessary.
MAIN OUTCOMES
<ul style="list-style-type: none"> • Full appreciation of hazards associated with road type and minimised risks at the planning stage.

KEY REFERENCES

- SHC 301

Applicable Chapters, Forms and Templates

- [Chapter 1.3 Road Categories](#)
- [Chapter 2.1.2.7 Supplementary Material](#)

PROJECT LIFECYCLE

Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE



P1. Safe, Compliant & Controlled



P5. Environmentally Sustainable

SUCCESS MEASUREMENT

P1.1. **Safety Compliance**

- PI1.1.4. Percentage of major risks mitigated through risk assessment per project

P1.5. **Traffic and Parking Control**

- PI1.5.2. Percentage of project without traffic violations

P5.1. **Environmental Protection**

- PI5.1.1. Number of environmental incidents reported

LINKED VIOLATION



V1. Barriers and Safety Compliance Violations



V5. Traffic and Parking Control Violations

Should

Consider

Advise

REQUIREMENTS

- | | | |
|---|--|---|
| <ul style="list-style-type: none"> • Ensure day-to-day compliance with approved plans. | <ul style="list-style-type: none"> • Additional control measures based on specific site conditions, such as enhanced barriers or modified traffic patterns to suit local needs. | <ul style="list-style-type: none"> • Ensure ongoing assessment and adjustment of traffic control measures to maintain safety and compliance. Regular checks should verify proper implementation of all control measures. |
|---|--|---|

MAIN OUTCOMES

KEY STAKEHOLDERS

- CONTRACTOR
- SERVICE ENTITIY



2.1.2 WORK EXECUTION PLAN AND RISK MANAGEMENT

2.1.2.3 Site-Specific Risk Assessments

Code Statement: Identify and assess specific site-related risks to ensure tailored safety measures.

RATIONALE

Customizing risk assessments to specific sites improves safety and operational efficiency, reducing the likelihood of incidents by addressing unique hazards proactively.

CONTEXT

Additional risks beyond general road categories must be considered for each Work Site, requiring customized risk assessments and traffic control strategies. Special considerations are needed for zones with unique characteristics such as schools, commercial areas, intersections, and tourist sites, which have higher pedestrian traffic and specific operational risks. Plans shall be tailored to specific local conditions to ensure the safety of both workers and the public at temporary Work Sites.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall

REQUIREMENTS

- Conduct site-specific risk assessments for each Work Site, considering specific factors such as street typology and zone, traffic volume, speed, visibility, and vulnerable users.
- Ensure compliance with local standards (e.g. SHC 305), and confirm plans are developed by qualified personnel.
- Implement road closures and traffic diversions wherever possible; if not feasible, reduce speeds to 40 km/h or below, significantly minimizes the impact of existing hazards for road users, pedestrians, and workers.
- Use proper safety buffers, barriers, and appropriate signage as per local regulations to mitigate risks at each specific location.

Special Site Considerations:

- School Zones: Implement enhanced signage, crossing guards, and speed reductions during school hours. Barriers must separate pedestrians from traffic.
- Commercial Zones: Clearly delineate pedestrian pathways, use pedestrian barriers, and provide temporary loading zones.
- Intersections and Interchanges: Set up temporary traffic signals, flaggers, and clear detour routes. Use advanced warning signs and markings for complex traffic patterns.
- Areas around major mosques: Install pedestrian crossings with guards or signals and establish clear signage.

Risks and site considerations featured herein are non-exhaustive. There are many situations which may result in development of unique risks on each site. The planning of works by the Contractor shall be supplemented by site visits.

MAIN OUTCOMES

- Full appreciation of hazards associated with the specific site, and minimised risks at the planning stage.

KEY REFERENCES

- SHC 305

PROJECT LIFECYCLE			
Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE	
	P2. Effectively Managed & Continuously Improved

SUCCESS MEASUREMENT	
P2.2. Worksite Management	<ul style="list-style-type: none"> PI2.2.1. Number of site inspections conducted per project PI2.2.2. Percentage of projects without worksite and cleanliness violation

LINKED VIOLATION

	V1. Barriers and Safety Compliance Violations
---	---

	V4. Worksite Management and Cleanliness Violations
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Applicable Chapters, Forms and Templates

- [Chapter 2.1.2.7 Supplementary Material](#)

Should	Consider	Advise
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REQUIREMENTS

<ul style="list-style-type: none"> The timing, duration, Work Zone set-up, and methodology of the works should also be considered in the Contractor’s risk assessment when preparing a TTCP. Engage the public early with clear communication about upcoming changes in traffic control, using public notices, signage, and direct community engagement techniques. Continuously supervise the site and monitor the effectiveness of traffic control measures and adjust as necessary. 	<ul style="list-style-type: none"> Adapt the timing, setup, and methods of work based on ongoing site conditions, environmental factors, and feedback from real-time assessments. 	<ul style="list-style-type: none"> Continuously monitor and adjust traffic control measures based on real-time observations, ensuring immediate responses to unexpected hazards or inefficiencies.
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MAIN OUTCOMES

- Safe and efficient works planning through continuous engagement.

KEY STAKEHOLDERS

- CONTRACTOR
- SERVICE ENTTIY



2.1.2 WORK EXECUTION PLAN AND RISK MANAGEMENT

2.1.2.4 Key Risks and Hazards in Utility Works

Code Statement: Address key hazards through proactive risk assessment and control measures.

RATIONALE

Highlighting and mitigating key risks within the WEP ensures that all potential hazards are managed systematically, safeguarding workers and the public from preventable incidents.

CONTEXT

There are several key hazards and risks commonly associated with implementing utility works within roads. A hazard is defined as something that has the potential to harm. A risk is the likelihood of a hazard causing harm. Key hazards and risks associated with utility works within roads include live traffic, subsurface utilities, overhead wires, moving plant, trenches, slips, trips, falls, confined spaces, noise, vibration, dust, and environmental damage. Mitigation measures are essential for reducing these risks.

POSITIVE IMPACTS

Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall
REQUIREMENTS
<ul style="list-style-type: none"> • Include all key risks in the Work Execution Plan (WEP). If risks are not adequately addressed, the WEP will be considered insufficient. • Identify and mitigate the following hazards: <ul style="list-style-type: none"> ▫ Live Traffic: Implement Temporary Traffic Control Plans (TTCP). ▫ Subsurface Utilities: Conduct Utility Location Enquiry with Asset Owners and RIPC, perform utility location surveys before excavation, use Non-Destructive Digging (NDD) techniques within 0.3m of subsurface utilities, where clashes may occur, or where impact arising from loss of service is high. ▫ Overhead Lines: Identify and mark overhead lines, establish safe working distances and provide training on working near overhead lines. ▫ Moving Plant: Set up designated plant movement paths, install reversing alarms and cameras on vehicles, and create exclusion zones behind all vehicles. ▫ Trenches: Install shoring or shielding systems, conduct regular inspections of trench stability, and provide proper access control and barriers. ▫ Slips, Trips and Falls: Ensure proper site lighting, keep work areas clean, provide proper footwear ▫ Confined Spaces: Conduct risk assessments and implement confined space entry procedures, use gas detectors and ventilation systems, provide training and establish emergency rescue plans. ▫ Noise and Vibration: Issue hearing protection for site-based staff and visitors, implement noise control measures. ▫ Dust: Use dust suppression methods, e.g., water sprays, and provide respiratory protection. ▫ Environmental Damage: Use erosion control measures and store hazardous materials correctly. • Additional hazards on site will be addressed in the Contractor’s Work Execution Plan. The Contractor is responsible for identifying and mitigating all risks. Suggested measures are not minimum requirements.
MAIN OUTCOMES
<ul style="list-style-type: none"> • Full appreciation of hazards associated with specific utility types, and minimised risks at the planning stage.

KEY REFERENCES

- ASCE 38-22

PROJECT LIFECYCLE			
Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE	
	P1. Safe, Compliant & Controlled
SUCCESS MEASUREMENT	
P1.1. Safety Compliance	<ul style="list-style-type: none"> PI1.1.3. Number of corrective actions arising from safety audits per project
P1.4. Laboratory Assurance	<ul style="list-style-type: none"> PI1.4.2. Percentage of Laboratories Passing Audits
LINKED VIOLATION	
	V1. Barriers and Safety Compliance Violations
	V3. Infrastructure and Roads Quality Violations

Applicable Chapters, Forms and Templates

- [Chapter 2.1.1 Permitting](#)
- [Chapter 2.1.2.7 Supplementary Material](#)

Should	Consider	Advise
--------	----------	--------

REQUIREMENTS

- | | | |
|--|---|---|
| <ul style="list-style-type: none"> • WEP and Risk Assessments should be professionally prepared, well presented, and compliant with safety guidelines. • WEP should be prepared and coordinated with relevant stakeholders, with necessary approvals in place. • Due to the uniqueness of each site, other specific risks may be present and shall be addressed by the Contractor in their WEP. • Conduct regular site inspections to verify risk control measures are in place and effective. • Adjust mitigation measures based on site-specific conditions and emerging risks identified during ongoing operations. • Incorporate non-destructive geophysical methods to enhance utility detection accuracy. • Consult with relevant service entities to ensure compliance with relevant backfilling and compaction requirements | <ul style="list-style-type: none"> • Use advanced technologies like ground-penetrating radar for more accurate utility detection before excavation works. • Consider specific risks that could have an impact on nearby communities, e.g. gas leaks and risk of contaminated water as a result of flooding. | <ul style="list-style-type: none"> • Review all risk mitigation measures continuously to ensure they meet the site-specific hazards identified in the WEP. |
|--|---|---|

MAIN OUTCOMES

- Thorough risk identification and mitigation.

KEY STAKEHOLDERS

- CONTRACTOR
- SERVICE ENTITTY



2.1.2 WORK EXECUTION PLAN AND RISK MANAGEMENT

2.1.2.5 Subsurface Utilities Risk Assessments

Code Statement: Ensure safety and accuracy through comprehensive assessments of subsurface utilities.

RATIONALE

Striking subsurface utilities can result in severe safety hazards, leading to injuries, project delays, costly repairs, and service interruptions. Therefore, employing Subsurface Utility Engineering (SUE) practices is crucial to accurately identify and map these utilities, mitigating risks and ensuring safer, more efficient project execution, as well as ensuring compliance with technical standards and legal requirements.

CONTEXT

Subsurface utilities like water, sewer pipes, and electrical cables are critical yet concealed, posing significant safety risks during excavation. The complexity and density of underground networks, combined with often outdated or incomplete records, make accurate location and mapping challenging. Employing Subsurface Utility Engineering (SUE) practices ensures accurate identification and risk mitigation.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
REQUIREMENTS	
<ul style="list-style-type: none"> • Use Subsurface Utility Engineering (SUE) practices to identify and map utilities, adhering to ASCE 38-22 standards. Refer to the table titled “Quality Levels for Utility Detection” in the supplementary materials for detailed guidance. <ul style="list-style-type: none"> ▫ Conduct a Quality Level B (QL-B) survey for the proposed excavation area prior to commencing any destructive excavation to locate subsurface utilities. ▫ Conduct a Quality Level A (QL-A) survey to confirm the location of utilities identified during the QL-B survey that are within 0.5m of any proposed excavation or where existing utilities may conflict with new works. ▫ Utilize Non-Destructive Digging (NDD) techniques when excavating near subsurface utilities, ensuring compliance with buffer distances defined by the Contractor’s Work Methodologies, Risk Assessments, Utility Company guidelines, and RIPC’s minimum requirement that NDD techniques must be used within 0.3m of all known utilities. 	<ul style="list-style-type: none"> • Incorporate non-destructive geophysical methods like ground-penetrating radar (GPR) and electromagnetic locators to enhance utility detection accuracy. • Ensure the Work Zone is safe and that the utility data is accurate to avoid potential hazards. • Inform Service Entities responsible for any adjacent services about the excavation works that will be executed next to their assets.
MAIN OUTCOMES	
<ul style="list-style-type: none"> • Work Zone is safe • Verifying that existing utility and services data is accurate enough to avoid potential hazards. 	

KEY REFERENCES

- ASCE 38-22 ‘Standard Guideline to Investigating and Documenting Existing Utilities’

PROJECT LIFECYCLE

Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE



P4. Technologically Advanced & Data-driven

SUCCESS MEASUREMENT

P1.3. **Quality Assurance**
P4.2. **Data Capture & Monitoring Methods**

- PI1.3.1. Percentage of projects passing quality audits with no major issues
- PI4.2.2. Data accuracy rate

LINKED VIOLATION



V2. Permit and Regulation Compliance Violations



V3. Infrastructure and Roads Quality Violations

Applicable Chapters, Forms and Templates

- [Chapter 2.2.3.1 Transition Zone Management](#)
- [Chapter 2.2.3.2 Safety Buffer Zone Requirements](#)
- [Chapter 2.2.3.3 Lateral Buffer Zone Specifications](#)
- [Chapter 2.1.2.7 Supplementary Material](#)

Consider

Advise

REQUIREMENTS

- Use direct exposure techniques, such as vacuum excavation or hand digging, to physically expose utilities when closer proximity is unavoidable.

MAIN OUTCOMES

KEY STAKEHOLDERS

- CONTRACTOR



2.1.2 WORK EXECUTION PLAN AND RISK MANAGEMENT

2.1.2.6 Critical Infrastructure Guidelines

Code Statement: Ensure proper coordination and execution when working adjacent to Critical Infrastructure.

RATIONALE

Emphasizing the guidelines for operating around critical infrastructure within the WEP helps ensure that these assets are systematically managed. This protects both workers and the public from avoidable incidents, while also preventing disruptions that could affect public, key stakeholders, and businesses.

CONTEXT

Critical infrastructure assets are vital for meeting the social and business demands of both local and national economies. The requirements are applicable for Infrastructure works adjacent to critical subsurface utilities and, in some cases, overhead transmission lines too. While these assets may have severe consequences if they fail, the likelihood of such failures is not always high. By pinpointing these critical assets, authorities and organizations can focus and enhance their prevention of failure and investigative efforts, maintenance strategies, and financial planning in the most essential areas.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
REQUIREMENTS	
<ul style="list-style-type: none"> Conduct site specific assessments for each work site and location and identify critical assets (assets linked to airports, metro stations, hospitals, banks, VIPs etc.,) based on their classification by utility types. Conduct a risk assessment before excavation to identify hazards. Survey for subsurface utilities and use careful excavation and backfilling to avoid damaging infrastructure. Collaborate with asset owners and service providers, ensuring due diligence for special work planning and implementation requirements to obtain necessary approvals. Develop special work, mitigation, and emergency plans to ensure network resilience. Monitor the site as per mitigation measures. Ensure emergency planning is feasible and display emergency contact numbers. For streets with "special engineering needs" (e.g., bridges, retaining walls, isolated structures, culverts, metro stations), seek necessary approvals from relevant authorities. 	<ul style="list-style-type: none"> Engage the public early with clear communication about upcoming changes in traffic control, using public notices, signage, and direct community engagement techniques. Coordinate with other utility providers to prevent disruptions to essential services (e.g., water, telecoms, electricity), requiring detailed planning and communication with multiple stakeholders. Include in the permit application details like project description, timing and scheduling, scope of work, past and future earthworks, specific standards and checklists, and management proposals (traffic management, environmental considerations, work execution plan, etc.) Develop emergency and immediate response plans to efficiently handle capacity issues and outages during work execution, ensuring compliance with pre-defined and agreed-upon SLAs. Create appropriate mitigation measures for working in proximity to critical infrastructure assets.
MAIN OUTCOMES	
Plans are in place for key stakeholders to manage disruptions from accidental loss or unplanned outages of critical assets.	

KEY REFERENCES

- RIPC Critical Infrastructure Guidelines
- Code of practice for the co-ordination of street and road works
- Safety at Street Works and Road Works – A Code of Practice

Applicable Chapters, Forms and Templates

- [Chapter 2.1.2.1 Work Execution Plan \(WEP\)](#)
- [Chapter 2.2.1 Site Safety](#)
- [Chapter 2.2.4.2 Project Information Boards](#)
- [Chapter 2.1.2.7 Supplementary Material](#)

PROJECT LIFECYCLE

Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
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PRINCIPLE



P1. Safe, Compliant & Controlled



P2. Effectively Managed & Continuously Improved



P4. Technologically Advanced & Data-driven

SUCCESS MEASUREMENT

P2.1. Project Management

- PI2.1.2. Percentage of planning decisions made based on critical services mapping.

LINKED VIOLATION



V2. Permit and Regulation Compliance Violations



V3. Infrastructure and Roads Quality Violations

Consider

Advise

REQUIREMENTS

- | | |
|---|--|
| <ul style="list-style-type: none"> • Using non-invasive excavation techniques such as vacuum excavation to minimize the risk of damaging underground utilities. • Scheduling excavation work, where possible and permissible during relevant off-peak hours to reduce the impact on the city's infrastructure. • Consulting with experts in underground utilities to ensure safe excavation practices. | <ul style="list-style-type: none"> • Stay clear of marked utility lines and follow safety protocols strictly as detailed in code card 2.2.1. • Use of non-disruptive detection equipment to locate underground utilities accurately before excavation. • Establish and ensure continuous communication between contractors, utility companies, and relevant impacted stakeholders. Share progress reports, project stages, and long-term support needs with RIPC as required. |
|---|--|

MAIN OUTCOMES

Robust public relations strategy to ensure transparent and timely communication with relevant stakeholders

KEY STAKEHOLDERS

- | | |
|---|--|
| <ul style="list-style-type: none"> • CONTRACTOR • SERVICE ENTITY • CONSULTANT/LABORATORY | <ul style="list-style-type: none"> • PUBLIC • GOVERNMENTAL AUTHORITIES |
|---|--|



2.1.2 WORK EXECUTION PLAN AND RISK MANAGEMENT

2.1.2.7 Supplementary Material

Work Execution Plan (WEP)

Summary of the key elements within the Work Execution Plan (WEP):

Item	Details to be Included
Project Information	<ul style="list-style-type: none"> The official name of the project. Detailed location where the work will be performed. The name of the Client or principal Contractor overseeing the project.
Scope of Work	<ul style="list-style-type: none"> A detailed description of the work to be performed. Clear objectives and expected outcomes of the work.
Work Sequence	<ul style="list-style-type: none"> Detailed step-by-step instructions on how the work will be carried out. Estimated timeline for the completion of the project.
Risk Assessment	<ul style="list-style-type: none"> Identification of potential hazards associated with the work. Assessment of the risks associated with each identified hazard. Specific measures to control or mitigate the identified risks. Personal Protective Equipment (PPE) - list of required PPE for all workers. Details on the placement and type of safety signage to be used (this includes within the work area, on plant, on pedestrian barriers, etc.). Procedures to be followed in case of an emergency.
Temporary Traffic Control Plan (TTCP)	<ul style="list-style-type: none"> Discussed further in Section 2.1.3.2.
Environmental Management	<ul style="list-style-type: none"> Discussed in Section 2.1.5 of this Code Manual. Measures to protect the environment. Procedures for managing environmental incidents. May be included within Risk Assessment.
Roles and Responsibilities	<ul style="list-style-type: none"> List of key personnel involved in the project, along with their respective roles and responsibilities.
Tools and Equipment	<ul style="list-style-type: none"> Detailed list of tools and equipment to be used to complete the work (and how they will be stored within the Work Area). Provide evidence of any permits or agreements received from Riyadh Amanah for storage of any tools/equipment, machinery and material away from the Work Area. Procedures for the inspection and maintenance of tools and equipment.
Communication Plan	<ul style="list-style-type: none"> Methods for communicating between team members. Methods for communicating with stakeholders, including the public and emergency services.
Review and Approval	<ul style="list-style-type: none"> Details of the process for reviewing the WEP. Signatures of the personnel responsible for preparing, reviewing, and approving the WEP.

Table 2.1.2.7.1: Key Elements of Work Execution Plan



WHAT TO LOOK OUT FOR

Contractor

- Has a Work Execution Plan been prepared?
- Does it cover all necessary topics?

Storage of Hazardous Material

Item	Method to be Used
1	Ensure that a plan/diagram is available on site displaying the storage area.
2	Choose a flat, stable area that is easily accessible for delivery vehicles – avoiding placing materials in high-traffic areas to prevent accidents.
3	Ensure there is adequate space for all materials to be stored without overcrowding.
4	Organize materials by type and size for easy access and identification.
5	Use tarps, covers, or other methods to protect materials from adverse weather conditions and heat.
6	Implement safety barriers and signage to keep unauthorized personnel away from storage areas.
7	Maintain a clear inventory system to track materials and prevent loss or over-ordering.
8	Regularly inspect stored materials for damage or deterioration and keep relevant inspection report record.
9	Store flammable materials in designated areas away from ignition sources, ensuring that fire extinguishers and emergency exits are clearly marked and accessible.
10	Use appropriate certified equipment for moving heavy or bulky materials.
11	Train workers on safe handling practices to minimize injuries.
12	Keep records of materials received, stored, and used including Safety Data Sheets (SDS) which should be available in hardcopy at first aid points.

Table 2.1.2.7.2: Method for storage of hazardous material



2.1.2 WORK EXECUTION PLAN AND RISK MANAGEMENT

2.1.2.7 Supplementary Material

Risk Management by Road Type and Location

Risk Levels Attributed to Road Categories:

Risk Level	Road Category	General Characteristics	General Risks	Typical Temporary Traffic Control Measures
High	Freeways and Expressways	High-speed traffic, multiple lanes, limited access points. Separated carriageways.	High-speed collisions, limited time for drivers to react to changes, high traffic volume.	Concrete barriers, advance warning signs, reduced speed zones, dedicated exit and entry points for Work Zones.
High	Major Arterial (> 20,000 vpd)	High traffic volume, multiple lanes, higher speed limits.	Frequent intersections, heavy commercial vehicle traffic, complex traffic patterns.	Lane closures with advance warning, flagging operations, variable message signs, temporary traffic signals.
Moderate	Minor Arterial (≤ 20,000 vpd)	Moderate traffic volume, fewer lanes than major arterials, significant commuter traffic.	Moderate speed limits, heavy vehicle traffic, multiple access points.	Lane reductions, flaggers, pedestrian detours, portable barriers.
Moderate	Collector	Connect local streets to arterial roads, moderate traffic volume, residential and commercial access.	Moderate speed limits, mixed traffic types (pedestrians, cyclists, vehicles).	Temporary lane closures, pedestrian pathways, signage, cones and barriers.
Low	Local	Low traffic volume, residential areas, low speed limits.	Pedestrian and cyclist activity, frequent driveway access, parked vehicles.	Simple lane closures, signage, pedestrian detours, minimal barriers.
Low	Dead-End Streets	Very low traffic volume, primarily residential, limited through traffic.	Pedestrian activity, children playing, parked vehicles.	Minimal traffic control needed, signage, cones. Road Closure (resident access only).

Table 2.1.2.7.3: Risk Levels Attributed to Road Categories

WHAT TO LOOK OUT FOR

Contractor

- Have risks associated with road categories been taken into consideration?
- Have risks associated with special sites been taken into consideration?

Site-Specific Risk Assessments

Special Site Considerations	General Characteristics	General Risks	Typical Temporary Traffic Control Measures
School Zones	High pedestrian activity, (especially children), lower speed limits during school hours.	High pedestrian volume, unpredictable pedestrian movements.	Enhanced signage, crossing guards, speed reduction.
Commercial Zones	High pedestrian and vehicle activity, loading zones, frequent deliveries.	Mixed-use traffic, high turnover of vehicles, potential for distracted pedestrians. High density of pedestrians, frequent crossings, complex traffic patterns.	Clear pedestrian pathways, pedestrian barriers, dedicated pedestrian detours, temporary loading zones, advanced warning signs.
Intersections and Interchanges	High complexity, frequent vehicle turning movements, pedestrian crossings.	Increased potential for collisions, confusion for drivers, pedestrian conflicts.	Temporary traffic signals, flaggers, clear detour routes, pedestrian crossings with dedicated signals.
Public transport (metro and bus stations)	Busy locations with pedestrian footfall.	Increased potential for collisions, especially during peak hours on major routes.	Clear pedestrian pathways, barriers, detours and temporary loading zones.
Tourist Areas	High pedestrian volume, frequent stopping of tour buses, seasonal traffic variations.	Unfamiliar drivers, high pedestrian activity, sudden stops.	Informative signage in multiple languages, designated tour bus stops, pedestrian guides.
Industrial Areas	Commercial vehicle traffic, industrial equipment, shift changes.	Interaction between trucks and passenger vehicles, potential hazardous material transport.	Clear signage for large vehicle, designated truck routes, coordination with industrial operators.
Mosque Areas	High pedestrian traffic during prayer times. Increased traffic congestion before and after prayers.	Risk of pedestrian accidents, particularly during peak prayer times. Traffic congestion. Potential for illegal parking.	Pedestrian crossings with signals or guards. Clear signage and barriers to separate pedestrian and vehicle traffic. Parking restrictions or designated parking areas.
Cut-through traffic	Local streets that become alternative routes for avoiding congestion on main roads or collector routes, typically during peak hours.	High traffic volumes during peak hours, potential for speeding especially during night works, increased noise, and safety hazards for residents and pedestrians.	Early warning signs on connecting routes to discourage through traffic, temporary speed bumps or rumble strips, reduced speed limits.

Table 2.1.2.7.4: Special Site Considerations



2.1.2 WORK EXECUTION PLAN AND RISK MANAGEMENT

2.1.2.7 Supplementary Material

Key Risks and Hazards in Utility Works

Hazards and Possible Mitigants in Construction Sites:

Hazard	Possible Mitigants
Live Traffic	<ul style="list-style-type: none"> Implement Temporary Traffic Control Plans (TTCP)
Sub Surface Utilities	<ul style="list-style-type: none"> Utility Location Enquiry with Asset Owners and RIPC Conduct utility location surveys before excavation Use non-destructive digging techniques such as vacuum excavation when working close to utilities or to positively confirm utility location prior to works Locate works/trenches to prevent clashes
Overhead Wires	<ul style="list-style-type: none"> Identify and mark the location of overhead lines Use safe work procedures when working near overhead lines Provide workers with training on the dangers of overhead lines Ensure machinery operates at a safe distance from overhead lines
Moving Plant	<ul style="list-style-type: none"> Implement site lighting to improve visibility Use banksmen to assist with vehicle movements Install reversing alarms and cameras on vehicles Create designated plant movement paths Install flashing beacons on all site vehicles Create an exclusion zone behind all vehicles/
Trenches	<ul style="list-style-type: none"> Install trench shoring or shielding systems Ensure proper sloping and benching of trench walls Conduct regular inspections of trench stability (in conjunction with weather conditions) Provide worker training on trench safety Secure the site with barriers and signage around open trenches to prevent falls by the public and road users.
Slips, Trips, and Falls	<ul style="list-style-type: none"> Ensure proper site lighting Keep work areas clean and free of obstructions Use non-slip surfaces and provide proper footwear
Confined Space	<ul style="list-style-type: none"> Conduct confined space risk assessments Implement confined space entry procedures, including permits Use gas detectors and ensure adequate ventilation Provide proper training and emergency rescue plans
Noise and Vibration	<ul style="list-style-type: none"> Workers to use hearing protection Implement noise and vibration control measures such as dampening Schedule noisy activities to minimise impact on public.
Dust	<ul style="list-style-type: none"> Workers to use safety goggles/protective eyewear Provide respiratory protection for workers Use dust suppression methods such as water sprays or enclosures to protect public and road users Regularly clean work areas to reduce dust buildup
Environmental Damage	<ul style="list-style-type: none"> Use a wet vacuum to prevent cement slurry from entering storm water drains Implement erosion and sediment control measures Properly store and dispose of waste and hazardous materials Conduct site specific environmental impact assessments
Other specific hazards may be present on site which shall be addressed in the Contractor's Work Execution Plan.	

Table 2.1.2.7.5: Hazards and Possible Mitigants in Construction Sites

Key Risks and Hazards in Utility Works

Note: RIPC does not approve WEP or Risk Assessments. When a Risk Assessment is submitted with the Excavation Permit application, it is viewed by RIPC to determine if the Contractor has addressed the common risks encountered on Service Entity sites.

Further Information on Common Risks:

Overhead Wires

Contractors should consider the following for each work site:

1. Identify if there are any overhead wires on-site.
2. Establish safe working distances based on risk.
3. Install warning signs where required.
4. Restrict use of high-reach equipment where required.
5. Train workers on overhead wire safety, with relevant training records and proof of work authorization.
6. Ensure the location of overhead lines on site are communicated to all workers.
7. Have plans and procedures in place for emergencies.

Moving Plant

Working with moving plant and machinery on construction sites poses significant safety risks. To minimize these risks, it is essential to implement effective control measures that ensure the safety of both workers and the public.

Contractors should consider the following controls to manage this risk on site:

1. Establish clear zones for plant operation and movement (part of TMP/TTCP).
2. Set up barriers and signage to keep unauthorized personnel out of plant areas (part of TMP/TTCP).
3. Equip machinery with high-visibility markings and lights. Flashing beacons are recommended for all moving plant.
4. Use audible reversing alarms on all mobile plant.
5. Designate secure parking areas for plant when not in use.
6. Ensure all operators are properly trained and certified.
7. Assign spotters to guide plant operators and ensure safe movements, especially in tight areas.

Trenches

The Contractor should put in place systems to manage risks associated with trenches. This could include:

1. Edge barriers
2. Safe means of access including control of entry
3. De-watering
4. Shoring

WHAT TO LOOK OUT FOR

Contractor

- Have key hazards and risks been identified and mitigated?
- Have the common risks of subsurface utilities, overhead wires, moving plant, and trenches been mitigated?

RIPC

- Has the Contractor mitigated key hazards and risks in their WEP?



2.1.2 WORK EXECUTION PLAN AND RISK MANAGEMENT

2.1.2.7 Supplementary Material

Subsurface Utilities Risk Assessments

Quality Levels for Utility Detection and Mapping (ASCE 38-22):

Quality Level	Description and Method (ASCE 38-22)
QL-D	Based on existing records and maps, offering the lowest accuracy. This level relies solely on the collection of available utility records, maps, and other historical documentation without any physical verification.
QL-C	Combines existing records with surface feature verification, providing a moderate level of accuracy. It integrates existing records with visual inspections of surface features such as manholes, valve boxes, and utility markings.
QL-B	Utilizes non-destructive geophysical methods to detect and map sub surface utilities. It employs advanced geophysical techniques like ground-penetrating radar (GPR) and electromagnetic (EM) locators to detect utilities.
QL-A	Involves direct exposure of utilities through non-destructive methods like vacuum excavation or hand digging to physically expose and measure utilities.

Table 2.1.2.7.6: Quality Levels for Utility Detection and Mapping

Advanced Survey Methods for Detecting Infrastructure Assets

Technique	Description	Benefits
Ground-penetrating radar	Used for detecting underground assets and services, such as pipes and foundations.	<ul style="list-style-type: none"> Provides accurate information about the location and depth of underground service assets.
Laser scanning	Used to create accurate 3D models of infrastructure assets.	<ul style="list-style-type: none"> Assists in evaluating designs and necessary modifications.
3D Scanning	Can be used to document the current condition of infrastructure.	<ul style="list-style-type: none"> Useful in inspection and auditing processes.
Seismic survey	Can be used to assess the stability of soil and foundations under facilities.	<ul style="list-style-type: none"> Helps in designing appropriate foundations.
X-Ray Surveys	Used for surveying underground utilities, especially those embedded within concrete structures.	<ul style="list-style-type: none"> Precise identification and mapping of services
Thermography	Uses infrared cameras to detect and visualize heat patterns.	<ul style="list-style-type: none"> Useful in identifying active utility lines that emit heat

Table 2.1.2.7.7: Survey Methods

Subsurface Utilities Risk Assessments

Associated Utilities Risks by Road Category: The following table visualizes the potential impact of network disruption caused by infrastructure works, based on different road categories.

Risk Range					
Infrastructure Assets \ Road Categories	Expressways (Freeways)	Arterials	Collectors	Locals	
Water	TSE	x	Disruption in Supply from STP	Disruption in Looped Network	Disruption in Tertiary networks supplying assets
	Sewage	x	Disruption in Discharge into the STP	Disruption in Discharge into lifting stations	Disruption in house connection to local network
	Potable	Disruption in Supply on a city level	Disruption in Supply on a neighborhood level	Disruption in Looped Network	Disruption in house connection to local network
	Storm	Disruption in Interstate Traffic	Disruption in City Traffic	Disruption in City Traffic	Flood risk damaging residential and commercial assets
Energy	Extra High Voltage	Disruption in Supply to Bulk Supply Points	x	x	X
	High Voltage	Disruption in Supply to Primary Substation	Disruption in Supply to Primary Substation	Tight corridors and proximity to other utilities	X
	Medium Voltage	x	Disruption in Looped Network and supply of Distribution Substation	Disruption in Looped Network and supply of Distribution Substation	Tight corridors and proximity to other utilities
	Low Voltage	x	Disruption in Road Lighting and Asset Connection	Disruption in Road Lighting and Asset Connection	Disruption in house connection to local network
Telecom	ICT	x	Disruption in connection to PoP	Disruption in connection to Data Centers	Disruption in connection to assets
	Security	x	Disruption in surveillance of main roads	Disruption in surveillance of secondary roads	Disruption in surveillance of neighborhood roads

Table 2.1.2.7.8: Risk Heatmap Against Potential Network Disruptions

In summary:

Water (Potable, Sewage, TSE): Disruptions can lead to significant public health and safety concerns, especially on major road networks.

Energy (HV, MV, LV): Disruptions in High Voltage (HV) lines are extremely hazardous and can cause widespread outages. Lower Voltage (LV) disruptions are less severe, but still impactful.

Telecom (ICT, Security): Disruptions can affect communication and security systems, critical on all types of roads but with varying impact and severity.

Some instances are left blank as not all utilities sub-types feature in every locality (e.g., Extra High Voltage 380kV cables do not typically exist within residential streets and would therefore not be found in a 'Local' road).

Note: The above table is non-exhaustive. It should be used by relevant Stakeholders to inform their project-specific risk management activities throughout the project lifecycle.

2.1

PROJECT PLANNING

2.1.3 TRAFFIC CONTROL

- 2.1.3.1 Traffic Management Planning (TMP)
- 2.1.3.2 Temporary Traffic Control Planning
- 2.1.3.3 Work Zone and Area Management
- 2.1.3.4 Traffic Signage Requirements
- 2.1.3.5 Traffic Control Device Selection and Placement: Cones,
Barricades, Barriers
- 2.1.3.6 Temporary Alignments
- 2.1.3.7 Supplementary Material

2.1.3 TRAFFIC CONTROL

2.1.3.1 Traffic Management Plan (TMP)

Code Statement: Develop Traffic Management Plans to manage traffic flow and ensure safety during construction.

RATIONALE

Effective temporary traffic management generally ensures safe navigation around work zones, mitigates operational impacts, and complies with traffic management regulations, safeguarding both workers and road users.

CONTEXT

A Traffic Management Plan (TMP) summarizes the planned staging strategy, traffic analysis results, expected impacts, and proposed mitigation measures. The TMP outlines the methods to manage traffic flow during construction activities, ensuring safety for both workers and road users.

POSITIVE IMPACTS



Health & Safety



Quality of Life & Well-being



Public Perception



Accessibility & Movement



Economy & Business



Infra & Public Space



Environmental

Shall	Should
REQUIREMENTS	
<ul style="list-style-type: none"> • Prepare a Traffic Management Plan (TMP) by a qualified individual. The TMP shall include the following details: <ul style="list-style-type: none"> ▫ A Temporary Traffic Control Plan (TTCP) that must clearly show existing site details and proposed Temporary Traffic Control (TTC) devices and their placement. <ul style="list-style-type: none"> • Existing permanent traffic control devices around the site must be clearly shown, particularly elements such as signing and striping, that are not applicable during construction. • TTCP must be prepared and implemented according to RTMG Version 1 guidelines, including necessary diversions. • Proposed dates, times of occupancy, and extent of TTC setup. • Impact on traffic flow including road closures, lane closures, and speed reductions. • Temporary pedestrian accessible route plan when work sites occupy sidewalks, ensuring continuity of pedestrian movement. • Ensure the TMP is available on-site at all times. • TMPs and traffic control devices implemented on site shall comply with relevant guidelines and standards set forth in RTMG Version 1. 	<ul style="list-style-type: none"> • TMP should include the following additional details: <ul style="list-style-type: none"> ▫ Consideration of stakeholders’ needs during the decision-making process. ▫ Public information and outreach strategies. ▫ List of holidays, local events, or seasonal restrictions that may impact construction staging. ▫ Mitigation strategies, including demand management strategies, accelerated construction strategies, and traffic operations strategies such as optimizing signal timing. ▫ Incident management strategies. • Permit Conditions: <ul style="list-style-type: none"> ▫ On-site representative must contact RIPC before and after road/lane closures or adjustments. ▫ A copy of the TMP and Excavation Permit must be available on site at all times. ▫ RIPC must be informed of any changes to the on-site contact or TMP. ▫ RIPC may request postponement of activities in cases of unforeseen, severe traffic impacts or emergencies.
MAIN OUTCOMES	
<ul style="list-style-type: none"> • A clear understanding of traffic flows and the impact that the work will have on road users. 	

KEY REFERENCES

- RTMG Version 1

PROJECT LIFECYCLE

Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE



P1. Safe, Compliant & Controlled

SUCCESS MEASUREMENT

P1.5.
Traffic and Parking Control

- PI1.5.1. Number of traffic control-related complaints per project
- PI1.5.3. Number of coordination meetings with local traffic authorities

LINKED VIOLATION



V5. Traffic and Parking Control Violations



V6. Boards and Information Violations

Applicable Chapters, Forms and Templates

- [Chapter 2.1.3.7 Supplementary Material](#)
- [Chapter 2.1.8.2 Supplementary Material](#)

Consider

Advise

REQUIREMENTS

- | | |
|--|--|
| <ul style="list-style-type: none"> • Adjust TMP details in real-time based on traffic conditions, with provisions for emergency changes if required by RIPC. • Details for Approval: <ul style="list-style-type: none"> ▫ On-site contact ▫ Individual who prepared the plan ▫ Type of works ▫ Proposed location of works (work zone) ▫ Proposed extent of TTC setup ▫ Proposed dates and times of occupancy ▫ Details of proposed impact on traffic flow (e.g., road closure, lane closure, speed reduction, counterflow, etc.) • Note: RIPC does NOT approve TMPs. When a TMP is submitted with the Excavation Permit application, it is viewed by RIPC and the Traffic Office of the Amanah as a document containing information about the impacts on traffic flow only and is not evaluated from the viewpoint of risk assessment. • The Contractor shall be responsible for risk management on their site. However, RIPC shall reject plans that are unprofessionally prepared or poorly presented or have clear breaches from TTC guidelines. | <ul style="list-style-type: none"> • Keep RIPC informed of any changes or accidents due to the TMP. |
|--|--|

MAIN OUTCOMES

KEY STAKEHOLDERS

- | | |
|---|--|
| <ul style="list-style-type: none"> • CONTRACTOR • RIYADH AMANAH | <ul style="list-style-type: none"> • RIPC |
|---|--|



2.1.3 TRAFFIC CONTROL

2.1.3.2 Temporary Traffic Control Planning

Code Statement: Implement temporary traffic control measures to protect workers and road users.

RATIONALE

Proper design and implementation of Temporary Traffic Control (TTC) measures provide continuity of movement contributing to safe and effective mobility of road users through or around work zones while protecting the traveling public, construction workers and equipment, and responders to any traffic incidents.

CONTEXT

Temporary Traffic Control (TTC) measures guide road users through or around construction activities, protecting workers and road users. A properly designed and implemented Temporary Traffic Control Plan (TTCP) provides enhanced safety, efficient traffic flow, and access to essential areas. TTCPs detail movement paths for road users and delineate the traffic area and work area with the use of a variety of traffic control devices. The Temporary Traffic Control Plan (TTCP) must be prepared by a qualified individual using the relevant standards for the characteristics of the roadway.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall
REQUIREMENTS
<ul style="list-style-type: none"> • Design and implement Temporary Traffic Control (TTC) measures according to the guidelines in RTMG Version 1. • Ensure TTC plans guide road users efficiently through the work zone, protect road users and workers by managing risks related to live traffic, pedestrian access, and vehicle interaction. • A TTCP shall ensure safe and efficient traffic management by adhering to the following TTC objectives: <ul style="list-style-type: none"> ▫ Clear Communication: Provide advance warnings about Work Zones and traffic pattern changes. Clearly delineate travel paths and separation of the work zone. ▫ Consistent Implementation: Manage road user expectation and experience by consistent application of design guidelines and implementation. ▫ Infrastructure Protection: Manage vehicle movement to ensure efficient operation and access to essential services. ▫ Worker Safety: Protect workers from risks posed by road users. ▫ Road User Safety: Safeguard all road users including drivers, cyclists, and pedestrians from construction hazards. ▫ Efficient Traffic Flow: Minimize delays and congestion. ▫ Access Maintenance: Maintain access to residential and business areas, minimize disruptions as much as possible. ▫ Regulatory Compliance: Ensure traffic control measures meet local and national standards. ▫ Environmental Impact: Reduce emissions and noise pollution from traffic delays. • A TTCP shall detail work control zone layout including Advance Warning Zone, Transition Zone, Buffer Zone, Work Area, and Termination Zone. • A TTCP shall specify Traffic Control Devices and Pedestrian Access Provisions. • A TTCP shall be prepared by a qualified individual and includes details and qualifications of the preparer.
MAIN OUTCOMES
<ul style="list-style-type: none"> • Implementation of TTC measures that minimise disruption to the public whilst ensuring site safety and work efficiency.

KEY REFERENCES

- RTMG Version 1
- SHC 305 and 602
- Traffic Control at Work Sites Technical Manual, 2022, version 6.1, Transport for NSW

PROJECT LIFECYCLE			
Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE	
	P1. Safe, Compliant & Controlled
SUCCESS MEASUREMENT	
P1.1. Safety Compliance	<ul style="list-style-type: none"> PI1.1.4. Percentage of major risks mitigated through risk assessment per project
P1.5. Traffic and Parking Control	<ul style="list-style-type: none"> PI1.5.2. Percentage of projects without traffic violations
LINKED VIOLATION	
	V1. Barriers and Safety Compliance Violations
	V5. Traffic and Parking Control Violations

Applicable Chapters, Forms and Templates

- [Chapter 2.1.2 Work Execution Plan and Risk Management](#)
- [Chapter 2.1.3.6 Supplementary Material](#)

Should	Consider	Advise
REQUIREMENTS		
<ul style="list-style-type: none"> • Follow the Risk Control Hierarchy for TMP setups: Eliminate, Substitute, Isolate, Engineer, Training & Admin, and PPE (refer to "Risk Control Hierarchy" in Section 2.1.3.7). • Address the following risks in the TMP if applicable (this is related to hazards and risks addressed earlier in this section): <ul style="list-style-type: none"> ▫ Proximity to live traffic ▫ Interaction with pedestrian and active travel routes ▫ Speed and volume of traffic ▫ Type of traffic ▫ Noise levels ▫ Heavy weather and other delays to project timelines 	<ul style="list-style-type: none"> • Use appropriate physical barriers for the roadway characteristics that enhance worker and road user safety. These may include concrete barrier, plastic barrier, Truck Mounted Attenuators (TMAs), or lighting that alerts drivers to the work zone. 	<ul style="list-style-type: none"> • Regularly inspect TTC setups to ensure they meet relevant standards and safety objectives. Adjust setups as required based on real-time conditions.
MAIN OUTCOMES		

KEY STAKEHOLDERS

- CONTRACTOR



2.1.3 TRAFFIC CONTROL

2.1.3.3 Work Zone and Area Management

Code Statement: Design and manage work zones to ensure clear separation between live traffic and work areas.

Clearly defined work zones protect workers by separating them from traffic, enhancing operational safety and efficiency, and ensuring that the project complies with safety regulations.

The Work Control Zone includes the Work Area and the surrounding area where temporary traffic control devices are deployed to manage and redirect the flow of traffic and pedestrians away from the Work Zone. This zone ensures that the works area is separated from live traffic, thereby ensuring the safety of both workers and the traveling public.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
REQUIREMENTS	
Work Control Zone	
<ul style="list-style-type: none"> Ensure that the Work Control Zone complies with RTMG Version 1 guidelines regarding temporary traffic control. Contractor must set up and maintain Work Control Zone, including the: <ul style="list-style-type: none"> Work Area, Advance Warning Area, Transition Zone, Safety Buffer Zone, Lateral Buffer Zone, Termination Area (end of Work Zone). 	<ul style="list-style-type: none"> Ensure all workers are situated within the Work Area at all times (except those that are managing traffic). Ensure all materials, equipment, and consumables are neatly arranged and inaccessible to the public. Several factors need to be considered by the Contractor when determining the parameters of a required Work Area: <ul style="list-style-type: none"> Nature of the works Space requirements (including plant and equipment space) Laydown areas Zone of Influence Safety considerations Logistical needs Material and plant stored within the Work Area should be clearly labelled with Contractor/Service Entity logos for ease of identification.
Work Area	
<ul style="list-style-type: none"> The Contractor must set up and maintain a suitable Work Area within the Work Control Zone designated for excavation, maintenance, or utility works activities, ensuring efficiency and safety. The Work Area should be designed based on specific work needs (e.g., trenching, paving, utility installations, etc.) with adequate space and safety measures, as detailed in the figure titled “Elements of a Work Control Zone” in the Supplementary Material. Obtain permission from Riyadh Amanah for laydown area, material stockpiling, and waste storage & coordinate with RIPC accordingly. Provide details of permits and agreements with the Amanah in the WEP. Allocate Laydown Areas for the storage of material and supplies within the Work Area (and as per Supplementary Material). 	
MAIN OUTCOMES	
<ul style="list-style-type: none"> Work Zones and Areas that are measured, clearly demarcated, and effectively managed. 	

KEY REFERENCES

- RTMG Version 1

Applicable Chapters, Forms and Templates

- [2.1.2 Work Execution Plan and Risk Management](#)
- [Chapter 2.1.3.6 Supplementary Material](#)

PROJECT LIFECYCLE

Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
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PRINCIPLE



P1. Safe, Compliant & Controlled



P2. Effectively Managed & Continuously Improved

SUCCESS MEASUREMENT

P1.1. **Safety Compliance**

- PI1.3.1. Percentage of projects passing quality audits with no major issues

1.2. **Legal Compliance**

- PI2.2.3. Number of worksite-related complaints

LINKED VIOLATION



V1. Barriers and Safety Compliance Violations



V8. Community and Public Accessibility Violations

Consider

Advise

REQUIREMENTS

- Designate entry/exit points for construction vehicles.
- Ensure proper emergency access to the Work Area and plan for entry and exit points that minimize disruption to traffic flow.
- Avoid obstruction of traffic or pedestrian pathways.
- Determine the amount of space needed for machinery and vehicles within the Work Control Zone.
- Material and plant may be temporarily stored adjacent to the proposed Work Area whilst the site (Work Control Zone) is being set up, or site equipment/plant is being relocated. Close coordination with RIPC is required in this instance.
- Continuously monitor and maintain the Work Control Zone and Work Area to ensure they remain properly installed and effective.

MAIN OUTCOMES

KEY STAKEHOLDERS

- CONTRACTOR
- RIPC
- RIYADH AMANAH

2.1.3 TRAFFIC CONTROL

2.1.3.4 Traffic Signage and Temporary Pavement Marking Requirements

Code Statement: Ensure proper placement and visibility of traffic signs to guide road users maintain safely around work zones.

RATIONALE

Appropriately placed advance warning signs and pavement markings alert road users to an upcoming work zone. Clear and consistent use of warning signs and pavement markings improve road user awareness and standardize road user expectation through work zones, reducing confusion and accidents.

CONTEXT

Properly designed and placed traffic signs and pavement markings are essential for alerting road users to changes in existing travel patterns and guiding road users around construction zones, ensuring their safety and compliance with TTC setups.

POSITIVE IMPACTS



Health & Safety



Quality of Life & Well-being



Public Perception



Accessibility & Movement



Economy & Business



Infra & Public Space



Environmental

Shall

REQUIREMENTS

- Ensure all temporary traffic control signs meet RTMG Version 1:
 - General Placement:**
 - Signs must be positioned for maximum visibility and effectiveness, with placement adapted to the roadway characteristics.
 - Signs must be positioned to allow motorists adequate time to respond to the changes in road conditions.
 - Use standard signs on single lane roadways under 70 km/h.
 - Use dramatic signs on multi-lane roadways between 50 km/h and 70 km/h, and all roadways over 70 km/h.
 - Advance warning signs must have yellow background with a black border and black legend and wording.
 - Within Work Areas:**
 - If there are shoulder and lane closures, it is often necessary and/or desirable to erect signs on portable supports placed on the permanent roadway itself (protected with an adequate VRS if not passively safe).
 - It is permissible to mount appropriate signs on barricades/barriers.
 - Signs mounted on barricades or temporary supports may be mounted at lower heights, but the bottom of the sign shall be no less than 1.5m above the pavement elevation. However, mounting heights of 2m or more are desirable.
 - Advance Notice Distance:**
 - Minimum advance notice distances and sign sizes are specified based on design speed. Higher speed facilities require increased sign spacing for earlier warning of the work control zone.
 - Freeways and Expressways have increased sign spacing due to higher operating speeds and number of road users.
- Ensure all temporary pavement markings meet RTMG Version 1:
 - Install temporary pavement markings of the same pattern and color as required for permanent pavement markings. The absence of permanent pavement markings does not relieve the requirement for temporary pavement markings.
- Place Portable Changeable Message Signs (PCMS) prior to the last alternative route access so road users can consider avoiding the project site if they choose.

MAIN OUTCOMES

- Traffic signage that is clear and conforming, improving safety and reducing uncertainty for road users.

KEY REFERENCES

- RTMG Version 1
- SHC 305 and 602

PROJECT LIFECYCLE			
Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE	
	P1. Safe, Compliant & Controlled
SUCCESS MEASUREMENT	
P1.1. Safety Compliance	<ul style="list-style-type: none"> PI1.1.1. Percentage of projects with zero lost-time injuries
P1.5. Traffic and Parking Control	<ul style="list-style-type: none"> PI1.5.2. Percentage of projects without traffic violations
LINKED VIOLATION	
	V5. Traffic and Parking Control Violations

Applicable Chapters, Forms and Templates

- [Chapter 2.2.2 Barriers and Warning Measures](#)
- [Chapter 2.1.3.7 Supplementary Material](#)

Should	Consider	Advise
--------	----------	--------

REQUIREMENTS

- | | | |
|--|--|--|
| <ul style="list-style-type: none"> • During traffic management operations, invalid permanent signs in a work control zone should be temporarily removed to avoid driver confusion. This can be done by removing, covering, or rotating the signs 90 degrees. Using adhesive tape in an X pattern is not suitable for covering signs. • Evaluate the combined effect of all signs and devices to ensure they communicate the required actions clearly and consistently to drivers. • Mounting signs on fixed supports typically involves a single post, but those over 1m² require two posts. Portable supports are ideal for temporary conditions, and all installations must breakaway or yield upon impact to minimize hazards to motorists. • Remove all permanent pavement markings in conflict with temporary pavement markings. Applying black paint or tape over permanent pavement markings is not considered an appropriate means of removal. • Refresh temporary pavement markings as needed to maintain visibility, especially on projects longer than 12 months in duration. | <ul style="list-style-type: none"> • For maximum mobility on certain types of work area operations, a large sign may be effectively mounted on a vehicle stationed in advance of the work or moving along with it. • This may be the working vehicle itself or a vehicle provided expressly for this purpose (Shadow Vehicle). • Materials for temporary pavement markings may differ from permanent ones to facilitate their removal after project completion. • Simulated pavement markings, installations using temporary reflective pavement markers, are acceptable for installations of 14 days or less. • Delineating lane lines for single lane configurations with cones or tubular markers is acceptable for installations of 3 days or less. | <ul style="list-style-type: none"> • Inspect the positioning and visibility of all signs regularly to ensure compliance and optimal guidance for road users. Adjust sign installations as required based on real-time conditions. • Regularly inspect the condition and visibility of temporary pavement markings for the duration of the project. |
|--|--|--|

MAIN OUTCOMES

- Conservation of ways for different types of road users, limiting uncertainty and minimising risk.

KEY STAKEHOLDERS

- CONTRACTOR



2.1.3 TRAFFIC CONTROL

2.1.3.5 Traffic Control Device Selection and Placement: Cones, Barricades, Barriers, Barrier End Protection

Code Statement: Use traffic control devices such as cones, barricades, and barriers to enhance safety around work zones.

RATIONALE

Effective use of traffic control devices provides clear guidance around work areas, keeps traffic orderly, and minimizes the risk of accidents, supporting safe and compliant project execution.

CONTEXT

Traffic control devices, including delineation devices, temporary pavement markings, signs, and signals are used to guide and separate traffic from construction zones - enhancing overall safety. Delineation of Temporary Channelizing Device (TCD) refers to any object or material used to guide and channelize vehicles and pedestrians, such as cones, drums, barricades, and barriers, indicating the alignment of the roadway or path.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall

REQUIREMENTS

- Deploy traffic control devices according to RTMG Version 1, ensuring proper use of cones, tubular markers, vertical panels, and barricades:
 - **Traffic Cones and Tubular Markers:** Deploy cones and markers with a minimum height of 450mm, made of impact-resistant material with a square base wide enough to prevent overturning from passing vehicles' air rush. They must be reflectorized, predominantly red, and kept clean for visibility. Use weighted bases for stability without damaging vehicles if struck. Tubular markers must be attached to the roadway and inspected frequently to prevent overturning. Refer to Section 2.1.3.7 for additional requirements.
 - **Drums:** Use plastic drums of a minimum height of 800mm and a minimum diameter of 500mm. Drums are not permitted to be weighted with rocks, concrete, asphalt, sand, or any other substance to the extent they become hazardous to motorists if struck. Drums are not an appropriate method of barrier end protection. Refer to Section 2.1.3.7 for additional information.
 - **Vertical Panels:** Use vertical panels with reflectorized red stripes on a yellow background, measuring at least 300mm in width and 900mm in height. These panels are used for traffic separation and delineation.
 - **Traffic Separators:** Traffic separators are used to divide lanes and can support vertical panels for better delineation.
 - **Barricades:** Barricades, whether fixed or portable, should be made from wood, light metal, or plastic, with one or more horizontal members. The entire red and white area must be reflectorized with a smooth, sealed outer surface, maintaining the same color day and night. Barricades must yield upon impact to minimize harm to vehicles and occupants.
 - **Barricade Rails:** Barricade rails should be flat, with supporting members designed to hold the rails in the required position. The supports must withstand normal storms and the wind from passing vehicles.
 - **Concrete Barriers:** Temporary concrete barriers are designed to redirect impacting vehicles. Install concrete barriers to protect road users from roadside hazards when the result of impacting the roadside hazard will be greater than the result of impacting the temporary concrete barrier. Provide temporary concrete barrier that has been successfully crash tested according to Manual for Assessing Safety Hardware (US MASH, 2016), NCHRP 350 (NCHRP, 1993), or SASO EN 12767.
 - **Barrier End Protection:** Protect road users from all vertical exposed barrier ends. Sloped ends are allowed on roadway 50 km/h and under. Speeds over 50 km/h shall have successfully crash tested crash cushions (impact attenuation) for the given design speed. After a crash involving the crash cushion, barrier end protection shall be restored as soon as practical.

MAIN OUTCOMES

- Traffic Control Devices that are prescribed based on applicable local standards.

KEY REFERENCES

- RTMG Version 1.
- SHC 305 and 602

PROJECT LIFECYCLE			
Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE	
	P1. Safe, Compliant & Controlled
SUCCESS MEASUREMENT	
P1.1. Safety Compliance	<ul style="list-style-type: none"> PI1.1.1. Percentage of projects with zero lost-time injuries
P1.3. Quality Assurance	<ul style="list-style-type: none"> PI1.3.4. Inspection pass rate
LINKED VIOLATION	
	V1. Barriers and Safety Compliance Violations

Applicable Chapters, Forms and Templates

- [Chapter 2.1.3 Traffic Control](#)
- [Chapter 2.2.1 Site Safety](#)
- [Chapter 2.2.2 Barriers and Warning Measures](#)
- [Chapter 2.1.3.7 Supplementary Material](#)

Should	Consider	Advise
--------	----------	--------

REQUIREMENTS

- | | | |
|---|--|--|
| <ul style="list-style-type: none"> • Keep devices in new or like new condition. Clean and regularly check for position, visibility, and cleanliness. • Replace worn or damaged devices as needed. • Barricade supports should be non-reflectORIZED and either white or unpainted galvanized iron/aluminium. • For barricade rails, both the reflectORIZED rails and supporting structure should be constructed to ensure minimal damage to vehicles and harm to occupants if hit. | <ul style="list-style-type: none"> • Deploy additional traffic separators to delineate lanes or separate traffic as needed, especially in high-speed zones. • Adjust longitudinal dimensions of control setups slightly to suit field conditions without compromising safety. • Traffic cones can be stacked on top of each other for added weight, if required. • Warning or delineation lights may be placed on drums. • Vertical panels can include warning lights at night. | <ul style="list-style-type: none"> • Regularly check all traffic control devices for correct positioning and cleanliness, ensuring devices remain functional and visible at all times. • Inspect and adjust traffic control devices daily to confirm they remain positioned correctly and effectively guide traffic through the work area. |
|---|--|--|

MAIN OUTCOMES

KEY STAKEHOLDERS

- CONTRACTOR
- RIPC



2.1.3 TRAFFIC CONTROL

2.1.3.6 Temporary Alignments

Code Statement: Design and set out suitable temporary alignments to safely redirect traffic around infrastructure works.

RATIONALE

Effective temporary alignments, including merging lanes and lane shifts, mitigate operational impacts and ensures safe navigation around work control zones.

CONTEXT

Properly designed and spaced lane merges and shifts, in conjunction with advance warning signs, are used to guide traffic around work control zones, provide efficient traffic flow and enhance overall safety for road users and workers.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall
REQUIREMENTS
<ul style="list-style-type: none"> • Deploy lane merging and lane shifts according to RTMG Version 1: <ul style="list-style-type: none"> ▫ Design temporary alignments according to the permanent (pre-construction) posted speed limit. ▫ Lane merges are used to reduce the number of travel lanes by 1 at a time. If multiple lane reductions are needed to accommodate the work control zone, provide the required settling zone between subsequent tapers. ▫ Lane merges and shifts are separate movements and do not occur over the same distance. Implement lane merges and shifts in sequence.
MAIN OUTCOMES
<ul style="list-style-type: none"> • Redirect traffic safely and effectively around work control zones.

KEY REFERENCES

- RTMG Version 1.
- SHC 305 and 602

PROJECT LIFECYCLE			
Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE	
	P1. Safe, Compliant & Controlled
SUCCESS MEASUREMENT	
P1.1. Safety Compliance	<ul style="list-style-type: none"> PI1.1.1. Percentage of projects with zero lost-time injuries
P1.3. Quality Assurance	<ul style="list-style-type: none"> PI1.3.4. Inspection pass rate
LINKED VIOLATION	
	V1. Barriers and Safety Compliance Violations

Applicable Chapters, Forms and Templates

- [Chapter 2.1.3 Traffic Control](#)
- [Chapter 2.1.3.7 Supplementary Material](#)

Should	Consider	Advise
REQUIREMENTS		
<ul style="list-style-type: none"> The number of receiving lanes should be equal to or greater than the number of feeding lanes. Reduce the number of feeding lanes as required. 	<ul style="list-style-type: none"> Perform work on one side of the roadway at a time in constrained areas. 	<ul style="list-style-type: none"> Regularly check all traffic control devices for temporary alignments for correct positioning and cleanliness, ensuring devices always remain functional and visible at all times.
MAIN OUTCOMES		

KEY STAKEHOLDERS

- CONTRACTOR
- RIPC



2.1.3 TRAFFIC CONTROL

2.1.3.7 Supplementary Material

Traffic Management Plan (TMP)

The following table outlines the contents to be included in a Traffic Management Plan (TMP).

Document Name	Document Description	Required data	Format type	Drawing Scale	Degree of importance
Scheme Title	A table featuring key project information	<ul style="list-style-type: none"> Name of the project, Contractor , owner, start and end date of the works, name of the Municipality, neighborhood and street 	AutoCAD Scheme	N/A	Binding for all types of business except emergencies
General Site Plan	Site plan showing the location of the works and the diverted traffic	<ul style="list-style-type: none"> Clear aerial photo Work site and traffic directions for each stage of the implementation plan and a diagram of the diversion The start and end date of the works and the number of stages of the diversion 	AutoCAD Scheme with coordinates WSG84	1:10000	Binding for all types of business except emergency
Horizontal Projection Chart	Detail of the general site plan	<ul style="list-style-type: none"> Detail illustrating the work area, locations of Temporary Traffic Control devices, details for implementing diversions, widths of road paths and necessary setbacks Locations of cross-sections Type of traffic control devices (type of barriers) Existing traffic control devices and their treatment (covering - removal) Details of any cancelled traffic movements Entry/exit points - accessibility for adjacent activities 	AutoCAD chart with coordinates WSG84	1:1000	Binding for all types of works except emergency
Typical Cross Sections Chart	Cross section details	<ul style="list-style-type: none"> Horizontal offset dimensions Dimensions of pedestrian paths Dimensions of vehicle paths Type of traffic control devices 	AutoCAD Chart	1:10000	Binding for all types of works for excavations deeper than 0.3m (except for emergencies)
Details	Details of all Temporary Traffic Control devices	<ul style="list-style-type: none"> Dimensions & colors Reinforcement Source (producing factories) 	AutoCAD Chart	N/A	Not binding for short- and medium-term works
Action Plan Report	Plan details	<ul style="list-style-type: none"> Site furnishing plan Site emergency & evacuation plan Start and end date of works Loading and unloading plans Routine inspection and control plan Potential stakeholders and communication plan Risk analysis & mitigation plans 	Document	N/A	Not binding for short- and medium-term works
Table of Quantities	A table containing a description of the items used in the diversion and their quantities	<ul style="list-style-type: none"> Number of traffic signs Number of concrete barriers 	Document	N/A	Binding for all types of works except emergency

Table 2.1.3.7.1: Traffic Management Plan Content

Traffic Management Plan (TMP)

WHAT TO LOOK OUT FOR

TMP – Contractor

- Does TMP meet minimum requirements and address all relevant issues and standards?
- Has the TMP been prepared by a suitably qualified person?
- Is the TMP displayed on site?
- Are RIPC kept informed of any changes?

TMP – RIPC

- Rejected any TMPs that are not suitable?



2.1.3 TRAFFIC CONTROL

2.1.3.7 Supplementary Material

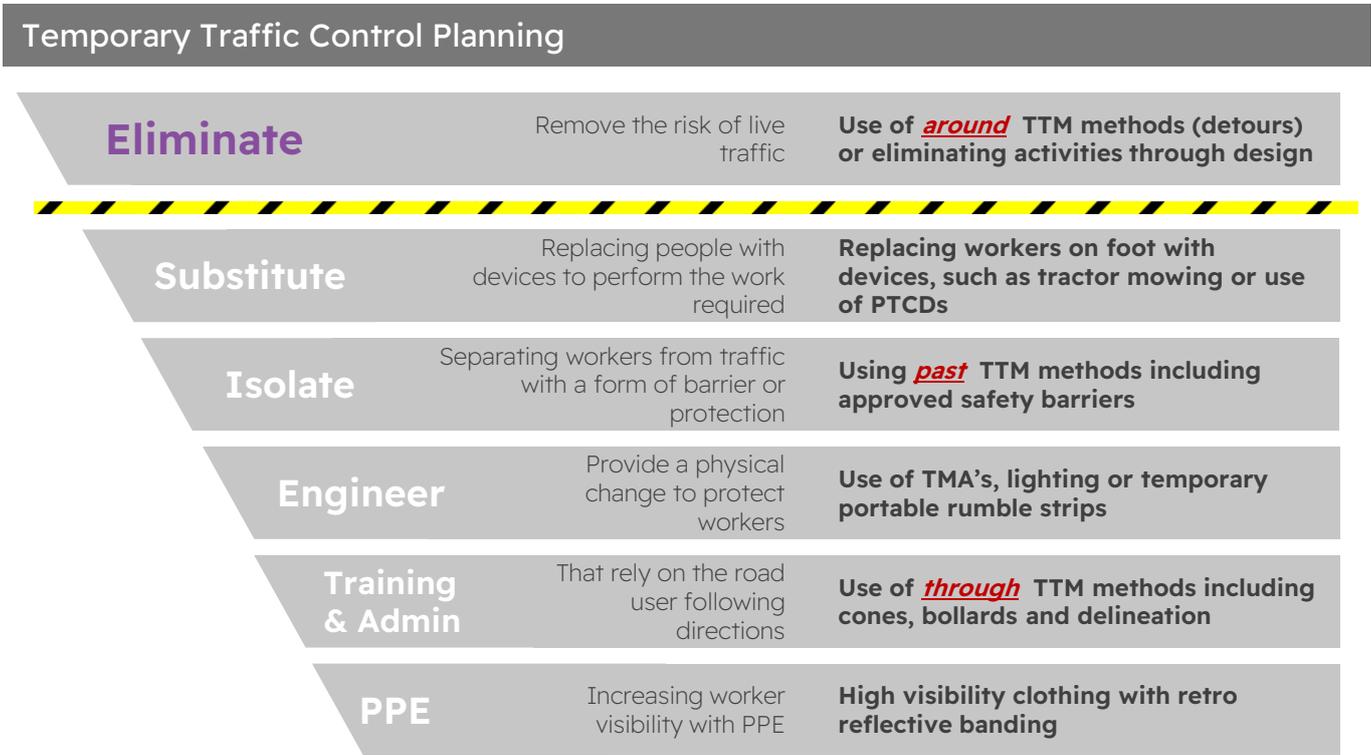


Figure 2.1.3.7.1: Risk Control Hierarchy (Traffic Control at Work Sites Technical Manual, Transport for NSW)

Temporary Traffic Control Planning

Temporary Traffic Control Plan

Contents	What is in the plan?
How objectives will be achieved	<p>This includes:</p> <ul style="list-style-type: none"> • Safety of workers • Safety of road users • Efficient traffic flow, including appropriate speed limits • Clear communications • Compliance with Regulations • Minimise environmental impact • Protection of access to critical infrastructure • Managing the movement of vehicles • Maintain residential and business access where possible
Work Control Zone details	<p>This includes layouts covering the entire Work Control Zone, showing appropriate signs, traffic control devices, hoardings, temporary markings, raised reflective markings, plastic delineators, lighting, beacons, flashing warning panels, signals, safety barriers etc that will be used in the:</p> <ul style="list-style-type: none"> • Advance Warning Zone • Transition Zone • Buffer Zone (longitudinal and lateral) • Work Area, including laydown and welfare facilities • Termination Zone • Details of Pedestrian and micro mobility access, including kerb ramps and footway boards • Internal traffic control plan, if required, for major or long-term projects
Preparation by a suitably qualified person	Details of the person who prepared the plan and their appropriate qualifications.

Table 2.1.3.7.2: Temporary Traffic Control Plan



WHAT TO LOOK OUT FOR

Temporary Traffic Control Planning – Contractor

- Have the key objectives for TTC been considered?
- Are SHC guidelines being followed?



2.1.3 TRAFFIC CONTROL

2.1.3.7 Supplementary Material

Work Control Zone and Area Management

Several factors need to be considered by the Contractor when determining the parameters of a required Work Area:

1. Nature of the Works

The specific tasks to be performed, for example; trenching, paving, or utility installations. Each type of work has different requirements for space and safety measures. Consideration should also be given to the staging of the works.

2. Space Requirements

- a) Plant and Equipment: Determine the amount of space needed for machinery and vehicles. This includes space for moving and operating equipment such as excavators, bulldozers, and cranes.
- b) Set Down of Materials (Laydown Areas): Allocate areas for the storage of materials and supplies. Ensure that materials are stored in a way that is accessible to workers and does not obstruct traffic or pedestrian pathways. Laydown areas should be indicated in site plans and are considered work areas and material lay down shall not occur in Advanced Warning Zone, Transition Zone, or Buffer Zones. Should there not be a suitable location and/or enough space for a laydown area, the Contractor should collaborate with Riyadh Amanah to assign land as a laydown area away from the work site.
- c) Zone of Influence: Consider the area influenced by the specific work being done. For example, a 3 meter deep trench would affect a larger surrounding area due to potential ground instability and safety risks (This is discussed further in Project Execution). This influenced zone should be included in the work area to ensure comprehensive safety measures.

3. Safety Considerations

Ensure that the work area is clearly separated from live traffic and pedestrian paths to prevent accidents. Ensure that the Work Control Zone complies with SHC 305 guidelines regarding temporary traffic control.

Note: A minimum clearances of workers to traffic is required (lateral buffer zone).

4. Logistical Needs

Identify and plan for entry and exit points for construction vehicles and deliveries. These should be located to minimize disruption to traffic flow and ensure the safety of workers. Ensure that emergency vehicles can access the work area if needed.

WHAT TO LOOK OUT FOR

Work Control Zone- Contractor

- Is it properly designed, installed and maintained?

Work Area - Contractor

Work Control Zone and Area Management

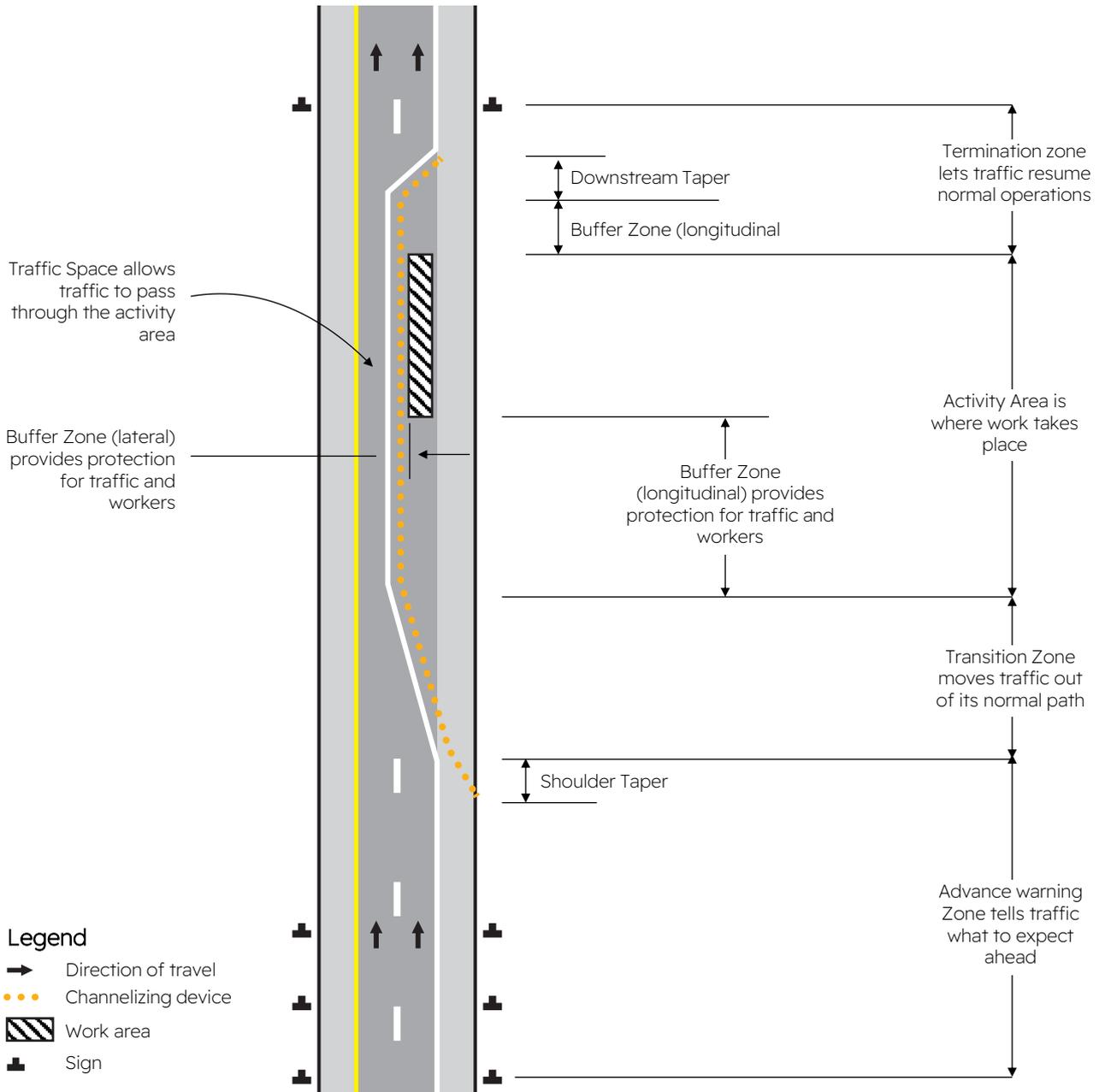


Figure 2.1.3.7.2: Elements of a Work Control Zone



2.1.3 TRAFFIC CONTROL

2.1.3.7 Supplementary Material

Temporary Traffic Control Plan Template

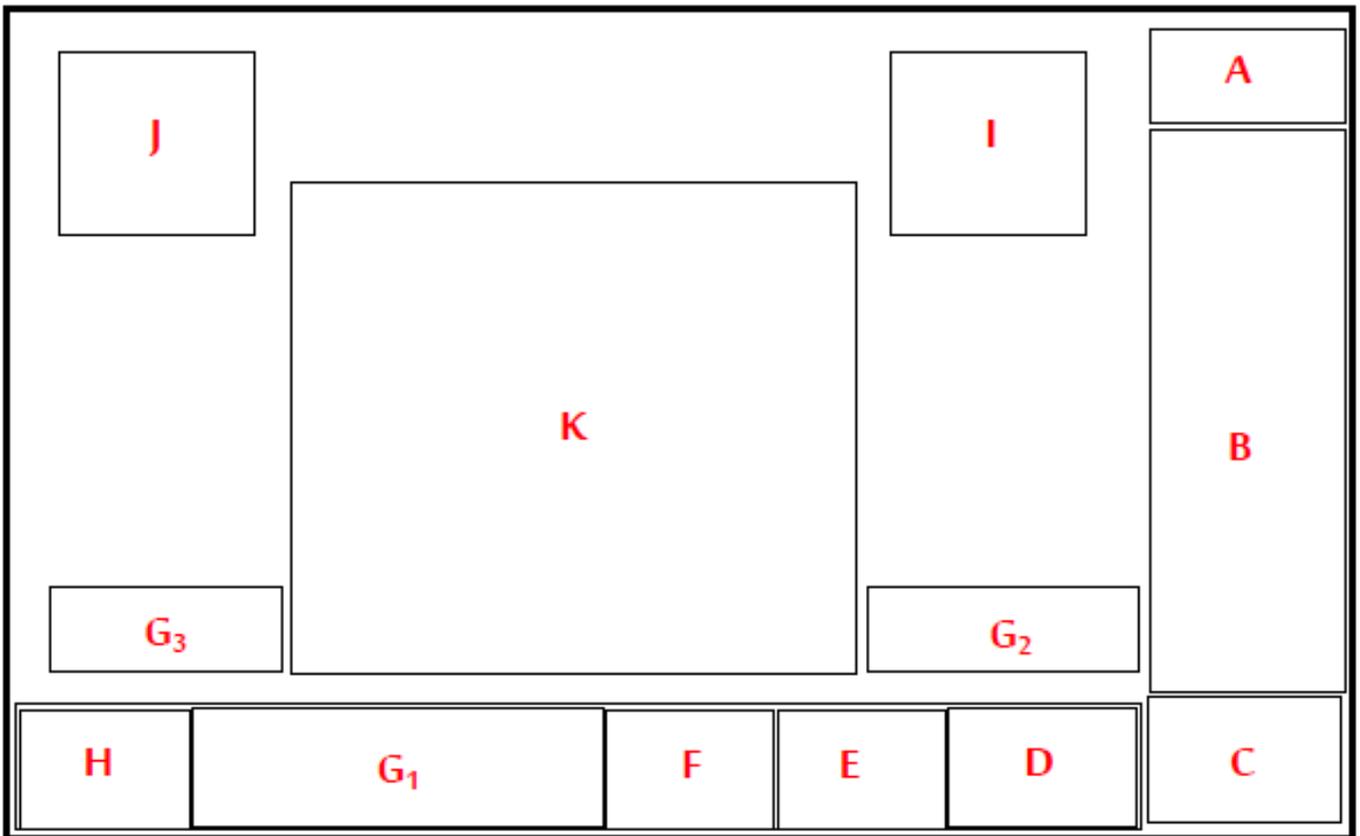


Figure 2.1.3.7.3: Temporary Traffic Control Plan Template and Components

Temporary Traffic Control Plan Template

Symbol	Definition
A	Logo and name of the ministry and municipality.
B	Scope of work/identification of stakeholders/Contractor /notes to be considered during implementation, including Governing design standards (such as: the minimum distance between warning categories according to table (No...) included in the guide (...)) / Procedures to be followed (such as: the necessity of installing warning lights/....) Exceptions (such as: it is permissible The supervising engineer may allow the Contractor to....).
C	Basic information (project name/project number/Contractor /Consultant/owning entity/start and end date Business/Name (Municipality/District/Street)
D	The name of the traffic approval specialist and the traffic stamp approving the plan.
E	Basic information of the template (north arrow/scale/symbols/legend/etc.
F	Suspension data (total/partial closure) (Closing time: throughout the day/from one hour.. to the hour..)
G _{1,2,3}	Legend to show items (number and description of traffic control means).
H	Names and positions of auditors and reviewers in the municipality and initial approval stamp.
I	General location of the infrastructure work zone.
J	The relationship of the infrastructure work zone to the surrounding area.
K	Proposed plan for temporary traffic diversion.

Table 2.1.3.7.3: Temporary Traffic Control Plan Components

2.1.3 TRAFFIC CONTROL

2.1.3.7 Supplementary Material

Traffic Signage Requirements			
Permanent Pre-Construction Speed Limit (km/h)	Standard Sign Size "W" (mm)	Dramatic Sign Size (mm)	Required Min. Clear Visibility* (m)
40	600	900 (W) x 1,200 (H)	60
60	750	1,200 (W) x 1,600 (H)	60
80	Use Dramatic	1,200 (W) x 1,600 (H)	75
100	Use Dramatic	1,800 (W) x 2,400 (H)	100
>100	Use Dramatic	2,250 (W) x 3,000 (H)	120

Table 2.1.3.7.4: Sign Size Criteria

*Slender obstructions such as traffic signal posts and lamp columns may be ignored.

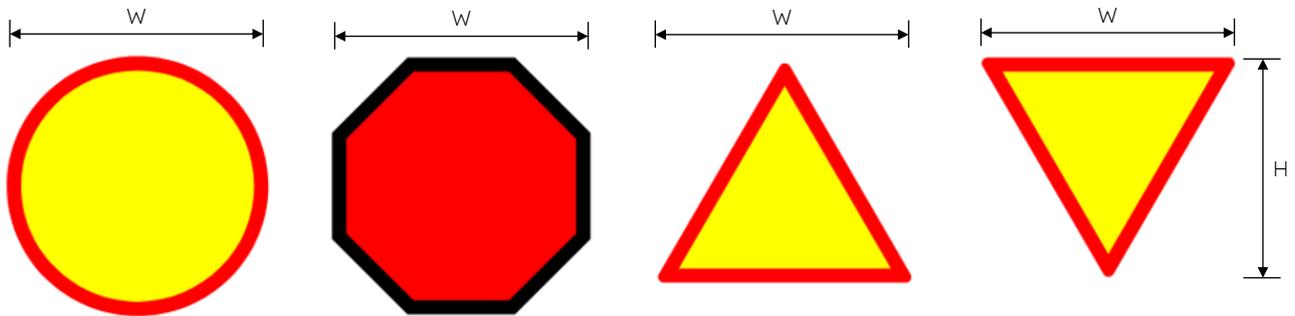


Figure 2.1.3.7.4: Standard Signs

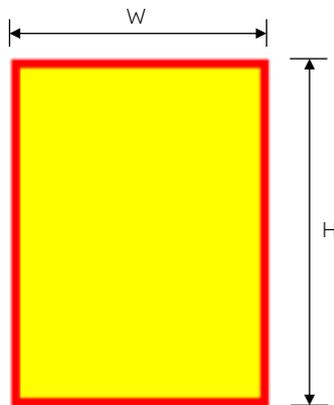


Figure 2.1.3.7.5: Dramatic Signs

Note: See Section 3 of SHC 305 and Section 2 of SHC 602 for additional traffic sign requirements.

Traffic Control Device Selection and Placement: Cones, Barricades, Barriers

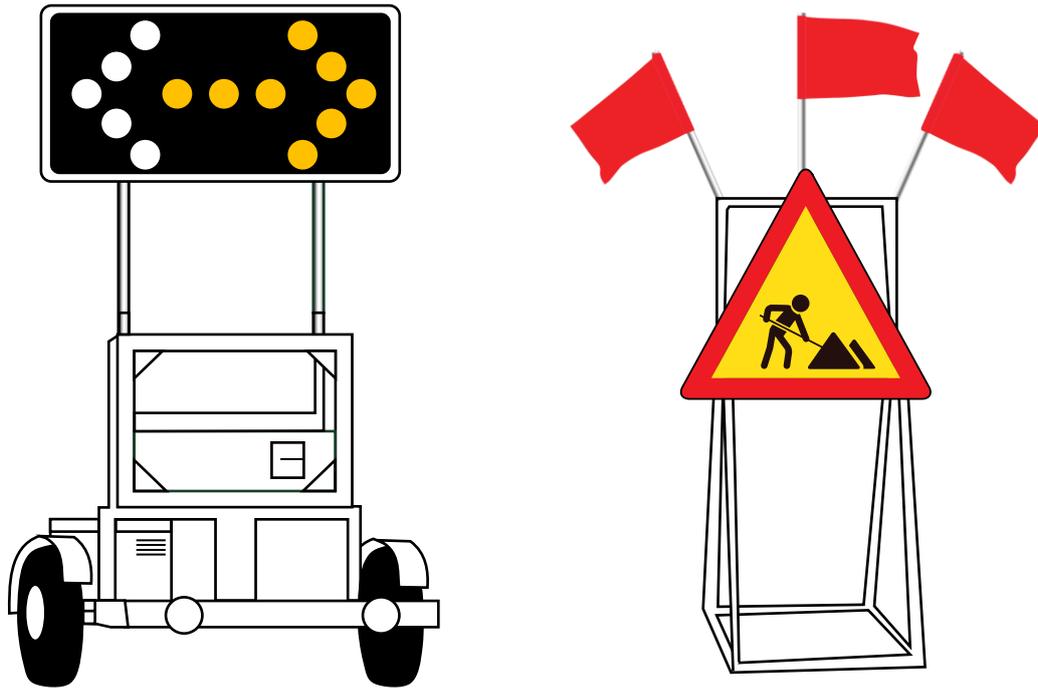


Figure 2.1.3.7.6: Methods of Mounting Signs other than on Posts for shorter term works (SHC 602)

Note: Red flags are added for extra emphasis. They are not required but are good practice for emergency sites.

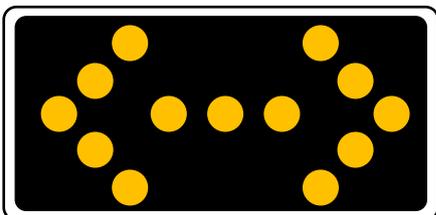


Figure 2.1.3.7.7: Vehicle Mounted Flashing Arrow Board/Panel (SHC 602)

WHAT TO LOOK OUT FOR

Traffic Control – Contractor

- Are all temporary traffic control signs as per RTMG Version 1 and SHC 305?
- Are existing signs covered or removed?
- Are signs mounted correctly?

2.1.3 TRAFFIC CONTROL

2.1.3.7 Supplementary Material

Temporary Signs Installation

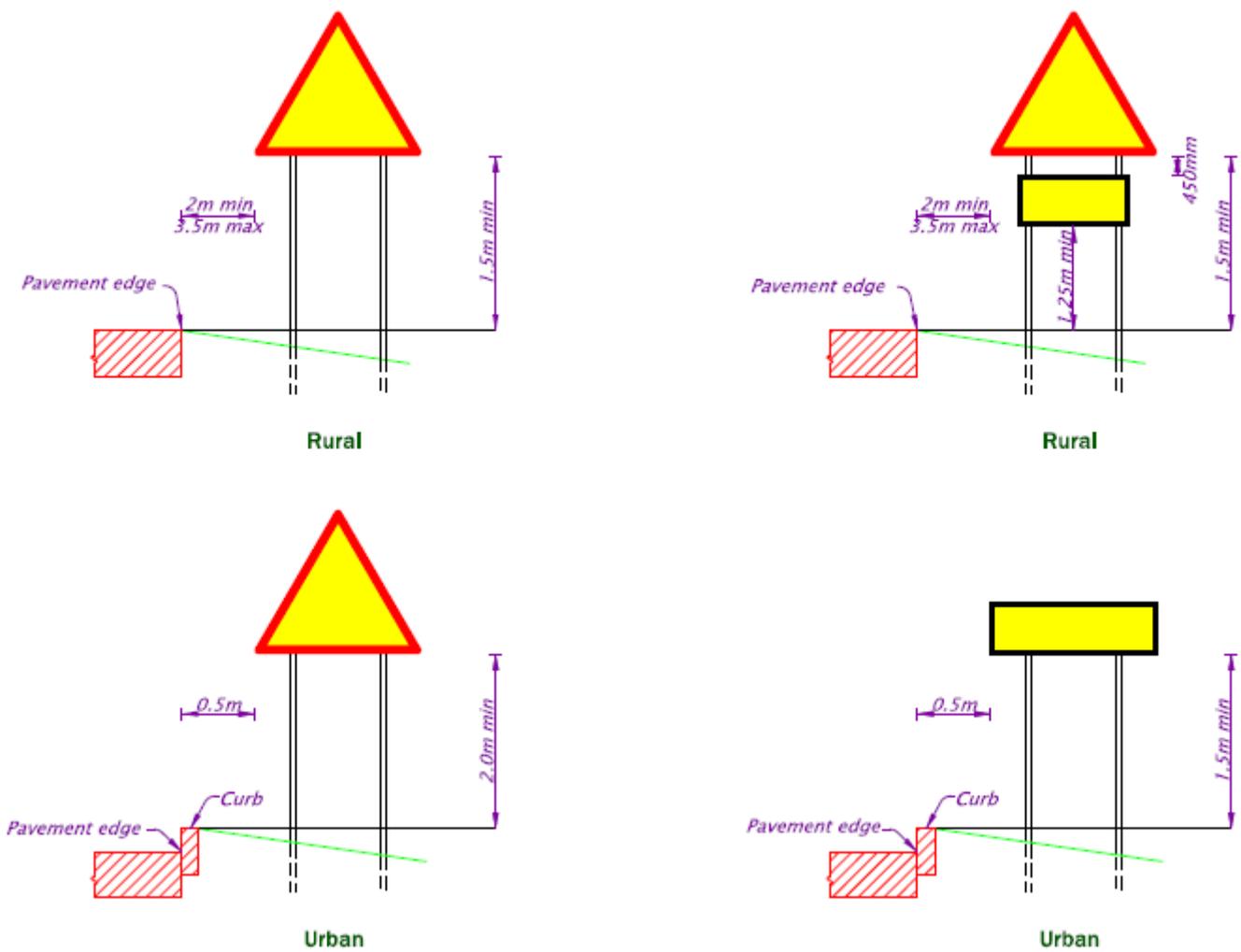


Figure 2.1.3.7.8: Ground Mounted Temporary Installations

Temporary Signs Installation

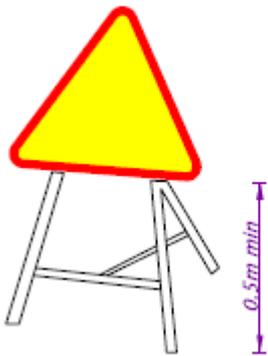


Figure 2.1.3.7.9: Portable Sign Support

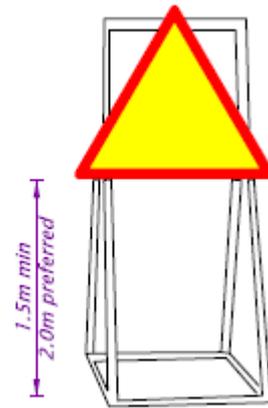


Figure 2.1.3.7.10: Temporary Sign Support

2.1.3 TRAFFIC CONTROL

2.1.3.7 Supplementary Material

Common Warning Signs



Reverse Curve L-R
TW 1-3L



Reverse Curve R-L
TW 1-3R



Signals Ahead
TW 19-1



Stop Ahead
TW 16-1



Flagger Ahead
TW 50-3



Road Work
TW 50-1



Road Narrows -
Keep Right
TW 6-3



Road Narrows -
Keep Left
TW 6-2



Road Narrows
TW 6-1



Lane Closed
TW 50-2



Rough Road
TW 29-1



Merge
TW41-1R



No Left Turn
TR 4-1L



No Right Turn
TR 4-1R



Overtaking
Prohibited
TR 8-1



أمامك منطقة عمل
WORK ZONE AHEAD

Work Zone Ahead
TI 1-1



نهاية منطقة العمل
ROAD WORK ENDS

End Road Work
TI 1-2



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

Figure 2.1.3.7.11: Standard Signs Examples

Common Warning Signs

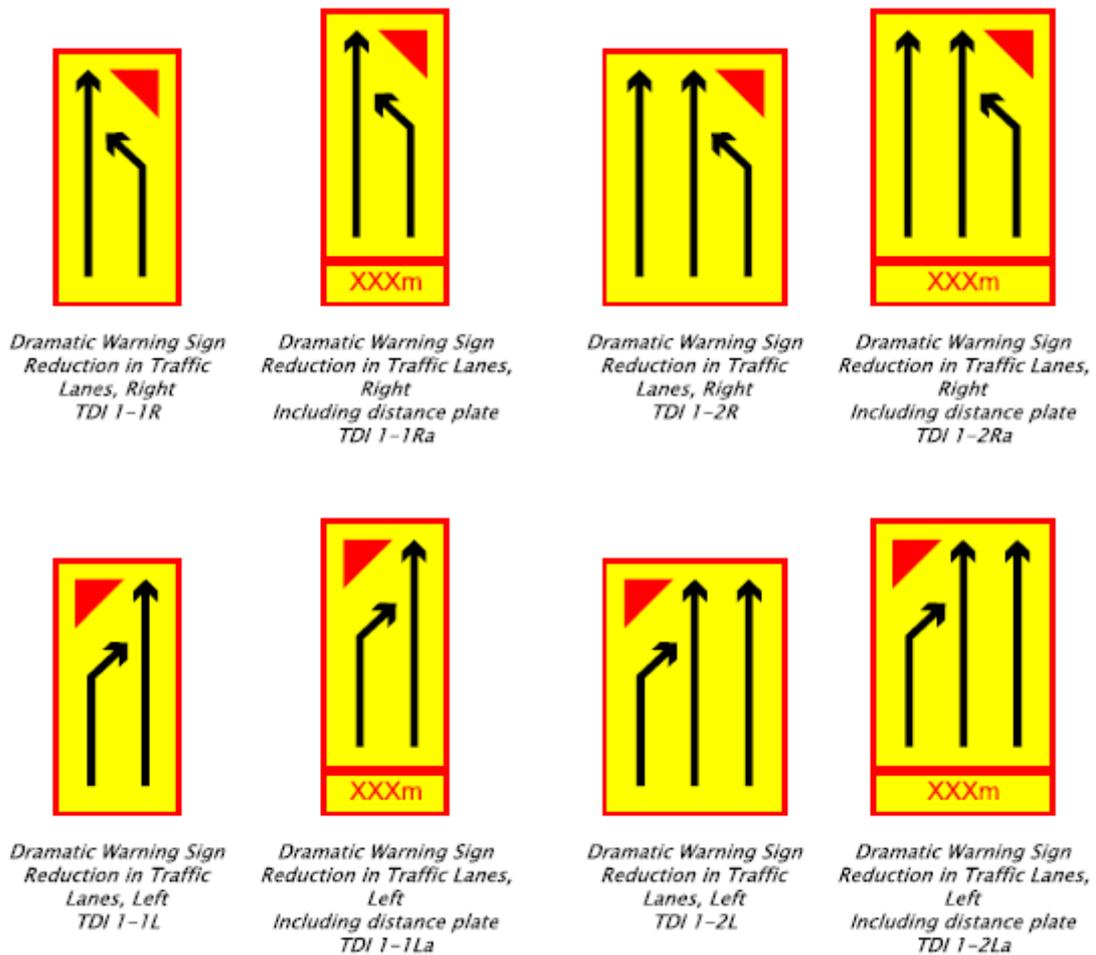


Figure 2.1.3.7.12: Dramatic Signs Examples

Note:

1. See Section 3 of SHC 602 for additional sign requirements.
2. Use standard signs on single lane roadways under 70km/h.
3. Use dramatic signs on multi-lane roadways between 50 and 70km/h, and all roadways over 70km/h.
4. See Table D-1 in SHC 602 for additional work zone signs.

2.1.3 TRAFFIC CONTROL

2.1.3.7 Supplementary Material

Traffic Control Device Selection and Placement: Cones, Barricades, Barriers

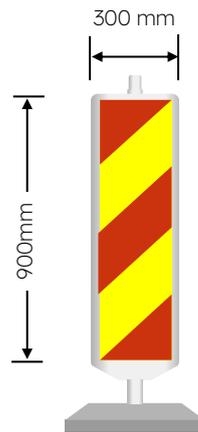


Figure 2.1.3.7.13: Vertical Panel (SHC 602)

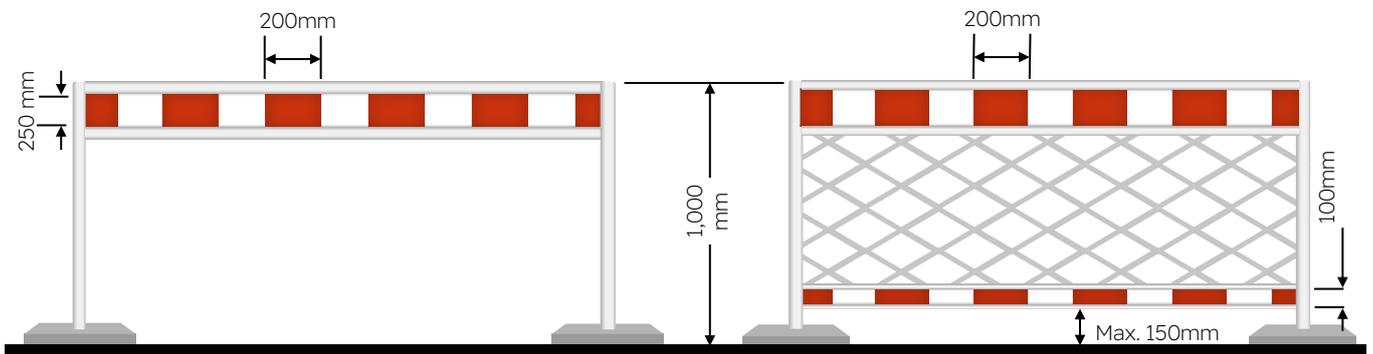


Figure 2.1.3.7.14: Types of Barricades (SHC 602)

Traffic Control Device Selection and Placement: Cones, Barricades, Barriers

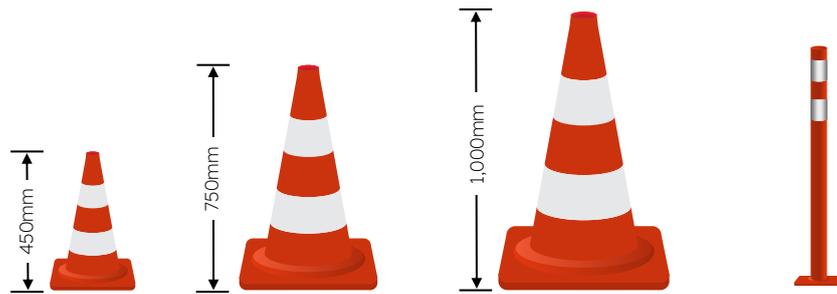


Figure 2.1.3.7.15: Traffic Cones and Tubular Markers (SHC 602)

Note: Cones should have a yellow reflectorized band at least 150mm wide, placed no more than 75mm from the top. 450mm height cones are used to delineate bicycle lanes. 750mm height cones and tubular markers are used on all roadways except Freeways. 1,000mm height cones and tubular markers are used on freeways and urban streets in the vicinity of railways and tramways.

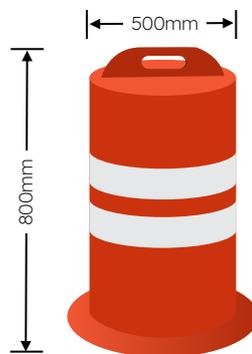


Figure 2.1.3.7.16: Plastic Drum (SHC 602)

Note: Markings on each drum must consist of two horizontal reflecting yellow and two red bands which completely encircle the drum. Each band shall be between 100 and 200mm. A maximum non-reflectORIZED band of 50mm is permitted between the yellow and red stripes.

WHAT TO LOOK OUT FOR

Traffic Control Devices – Contractor

- Are all traffic control devices, including signs, signals, speed bumps, markings, and delineation devices to the standards in SHC 305?
- Are traffic control devices kept clean and regularly checked for position and cleanliness?

2.1

PROJECT PLANNING

2.1.4 HEALTH & SAFETY MANAGEMENT

2.1.4.1 Health & Safety Management Requirements

2.1.4.2 Supplementary Material



2.1.4 HEALTH & SAFETY MANAGEMENT

2.1.4.1 Health & Safety Management Requirements

Code Statement: Implement comprehensive health and safety protocols across all project stages to prevent injuries, protect public safety, and ensure compliance with legal standards.

RATIONALE

Ensuring the health and safety of workers and the public is an integral part of successful infrastructure project delivery. By systematically identifying and managing risks related to Health and Safety, projects can reduce accidents and promote a safe work environment.

CONTEXT

The onus for keeping people safe has typically been on Service Entities, their Contractors and Consultants. Added weight from Government Entities such as RIPC, and National Council of Occupational Safety & Health (NCoSH), will help to inculcate a culture of Health and Safety on every project.

POSITIVE IMPACTS

Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
KEY REQUIREMENTS	
<ul style="list-style-type: none"> Prevent personal injuries and ill-health across all project stages. Ensure H&S measures are risk-based and project-tailored. Implement a hierarchy of controls: elimination, substitution, engineering controls, administrative controls, and Personal Protective Equipment (PPE). Conduct regular safety inspections to ensure compliance with safety standards. Conduct risk assessments for any open excavation to determine if works pose a risk to individuals, whether authorised or not, entering the site, and proposed mitigation measures. Risk assessment must consider stockpiling of materials near the excavation and vehicle traffic within the trench's zone of influence. Road plates must be fit for purpose depending on the arrangement of the excavation and road speed. Plates must resist displacement induced by traffic loading. 	<ul style="list-style-type: none"> Conduct Hazard Identification and Risk Assessment (HIRA) for all projects at the start and continually update the Risk Register throughout the project lifecycle. Select Laydown Areas that minimize security risks and implement effective equipment storage protocols. Use alternatives to slate-type Road Plates and implement suitable traffic control measures as to the Traffic Management Plan. Ensure Road Plates are secured to prevent movement. Use adequate barriers based on guidance in this Manual. Conduct excavations based on guidance in this Manual and ensure time allowance for dewatering. Plan diversions and heavy vehicle routes to minimize disruptions to the public. Plates can be fixed with bolts or steel pins. Fixings should be at all corners of the plate as a minimum.
MAIN OUTCOMES	
<ul style="list-style-type: none"> Safe working environments for workers and the public, minimizing health risks. 	<ul style="list-style-type: none"> Comprehensive risk assessments informing effective mitigation measures. Reduction in accidents and occupational illnesses.

KEY REFERENCES

- | | |
|---|--|
| <ul style="list-style-type: none"> National Policy for Occupational Safety and Health ISO 45001:2018 Employer Compliance Guide to Occupational Safety and Health Policies Occupational Safety and Health Inspection Mechanism | <ul style="list-style-type: none"> National Road Safety Center (NRSC) Training Program for Road Engineers Guidelines for the Prevention of the Effects of Work in Hot Places The Ministerial Decision Regarding the Ban of Work Under the Sun |
|---|--|

Applicable Chapters, Forms and Templates
 • [Chapter 2.1.4.2 Supplementary Material](#)

PROJECT LIFECYCLE			
Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE	
	P1. Safe, Compliant & Controlled
SUCCESS MEASUREMENT	
P1.1. Safety Compliance	<ul style="list-style-type: none"> PI1.1.1. Percentage of projects with zero lost-time injuries. PI1.1.4. Percentage of major risks mitigated through risk assessment per project.
LINKED VIOLATION	
	V1. Barriers and Safety Compliance Issues

Consider

Advise

KEY REQUIREMENTS

- | | |
|---|---|
| <ul style="list-style-type: none"> • Appointing a full time H&S Officer, with relevant qualifications and certifications, to be based at site empowered to manage all activities that keep workers, road users, and residents safe. • Toolbox talks delivered regularly by site-based staff to highlight prevailing and commonly occurring H&S-related issues. • Effective means of communication shall be established for the reporting of H&S concerns at site. • Consider the use of road plates with non-slip coating to prevent skidding and improve safety in wet conditions. • Road plates must be fit for purpose depending on the arrangement of the excavation and road speed. Plates must resist displacement induced by traffic loading. • Appoint a site safety specialist in accordance with requirements set out by the relevant Service Entity. | <ul style="list-style-type: none"> • Centralising site-related H&S documentation into one unified location that is accessible to all. • Appointment of Safety Champions, first aiders and formulation of Safety Committees featuring representation from Service Entity, Contractor, and Consultant. • Establish an Occupational Health and Safety Management System (OHSMS) aligned with ISO 45001:2018. • Road plates can be surface mounted or recessed depending on the type and duration of the work (& excavation). • Road plates to have lifting points attached to ensure these can be both placed and removed without risk to operatives. |
|---|---|

MAIN OUTCOMES

- | | |
|---|---|
| <ul style="list-style-type: none"> • Improved worker safety and compliance with national OHS standard. | <ul style="list-style-type: none"> • Early identification and mitigation of potential risks. • Adaptation of risk management strategies as projects progress. |
|---|---|

KEY STAKEHOLDERS

- CONTRACTOR
- CONSULTANT



2.1.4 HEALTH & SAFETY MANAGEMENT

2.1.4.2 Supplementary Material

Preparation Guidance for HSE Plans

The Health, Safety and Environment (HSE) Plan shall be developed during the planning phase of a project and is to be reviewed at regular intervals throughout the project lifecycle to ensure that it is maintained and remains fit for purpose.

This document outlines the general requirements and elements of the HSE Plan. It serves to provide guidance to Contractors to prepare a HSE plan.

Elements of the HSE Plan

The essential components of a HSE Plan are:

1. Project description.
2. Project HSE structure and system.
3. Risk Assessment and Risk Register.
4. Project induction and HSE training.
5. Safe work practices and procedures.
6. Workplace HSE inspections.
7. HSE consultation & communication.
8. Emergency Procedures.
9. Incident recording and investigation.
10. HSE performance monitoring.

Project Description

A brief description of the scope of work associated with the project should be documented.

The description should be sufficiently detailed to provide those unfamiliar with the project an overview of the type of work being carried out and by whom, including subcontractors, Consultants, etc.

Key elements include a:

- Summary of major activities and types of work to be performed.
- List of tasks or specialist procedures that may require detailed HSE work procedures and training.

- List of project areas requiring special consideration from a HSE perspective, for example:
 - Public Access.
 - Traffic Management.
 - Work restrictions (work times, confined spaces, etc.).
 - Exposure to hazards (noise, dust, elevated heights, etc.).

Project HSE Structure and System

The HSE Plan should be established around existing HSE management systems (ISO 45001, 14001, etc.) and associated procedures and controls. Reference should be made to existing procedures and documentation in the HSE Plan.

The Contractor should outline the management structure, responsibilities, standards and control systems applicable to the project to ensure HSE requirements are adequately addressed.

The following information should be included:

- Company HSE policy, to be displayed at worksites.
- An outline of the project HSE organisation and structure. i.e. names and/or positions of those with specific HSE responsibilities.
- A summary of HSE roles and responsibilities of contractor staff involved in the project.

Risk Assessment & Risk Register

The Risk Assessment is an integral component of the HSE Plan and must include:

- Hazard identification associated with project tasks, for example:
 - Pedestrian vehicle interfaces.
 - Excavations.
 - Heights.
 - Heavy Vehicles.
 - Noise.
- Assess likelihood of hazard occurrence.
- Assign Risk Level (i.e., Hazard Impact x Likelihood of Occurrence).
- Assign appropriate risk control measure.
- Consider emergency scenarios.
- Establish a review process to take place at each stage of the project lifecycle.

Worksite Induction & Safety Training

Contractors are to ensure that workers have the required skills and competencies to perform the work. This requires that an effective training regime be established for workers, ensuring that they have appropriately skilled employees.

The following information should be provided:

- An outline of project induction process for workers and visitors to the site.
- Attendance Register of personnel who have satisfactorily completed the induction.
- Details of employee HSE training which has (or will) be provided relevant to project requirements.

Safe Work Practices and Procedures

Based on the Risk Assessment and determined mitigation controls, relevant safe work practices and procedures should be developed to mitigate risk. Where possible, existing HSE company procedures should be used. However, project-specific safe work procedures may need to be developed dependent on project-specific Risk Assessment.

The following information should be provided:

- A list and copies of safe work procedures relevant to the project.
- A list and copies of project-specific safe work procedures.
- Detail site operations that will be subject to permit-to-work systems.
- Provide details of employees and/or subcontractors issued with copies of safe work procedures and instructions.
- Safe work procedures and instructions should be recorded on Safe Work Procedure/Instruction Register.

Worksite HSE Inspections

HSE inspections help ensure that HSE protocols are being adhered to and help identify new hazards. The HSE Plan should outline the method and frequency of worksite inspections, including (but not limited to) the following:

- Checklists.
- Frequency of inspections.
- Roles, responsibilities, and contact details as it relates to HSE.
- Mechanism for identifying and reporting issues, and actioning findings.



2.1.4 HEALTH & SAFETY MANAGEMENT

2.1.4.2 Supplementary Material

HSE Consultation & Communication

Consultation with employees and the public, stakeholder etc. provides an important mechanism whereby HSE issues can be dealt with in a manner that promotes ownership and prompt resolution.

Emergency Procedures

Hazards may be identified that warrant development into an emergency planning scenario (e.g. emergency return to service, emergency system shut down, flood, fire, excavation collapse, etc). Such scenarios should be identified and developed, then addressed through emergency protocols that are published and practiced.

Examples of key points are:

- Register of emergency equipment (i.e. first aid equipment, fire extinguishers, etc.) and a diagram indicating the locations.

- Register of qualified First Aiders and their contact details.
- Process showing necessary actions in case of an emergency.

Incident Reporting and Investigation

All incidents associated with the project involving personal injury, medical treatment, or property damage should be recorded and investigated. The HSE Plan should include:

- Details of incident reporting and investigation procedures.

- Details of how incidents shall be notified to the Service Entity.
- Details of how incident statistics are to be compiled and shared.

HSE Performance Monitoring

Metrics for monitoring HSE performance shall include:

- Number of accidents (i.e., those that resulted in corrective actions such as medical care or environmental clean-up).

- Number of near misses (i.e., those that were observed and reported before an accident occurred).
- Number of man-hours without an accident.

Guide to Risk Matrix and Risk Tolerance Levels

The Risk Register that is linked to the HSE Plan should follow a 5x5 Risk Assessment Matrix (as shown on the right), featuring risk dimensions, impact (from least [A] to most [E]) and likelihood (from Rare to Almost certain) that will be adopted to assess risks. It will also define the risk matrix categories (red, amber, yellow, green) that will be used to prioritize risk management interventions.

Within each risk category, a scoring mechanism will be adopted to enable prioritization within each category.

Note: the numbers are assigned for prioritization purposes only. They are not derived from any numerical calculation.

RISK MATRIX						
5	10	15	20	25	Almost certain	Likelihood
4	9	14	19	24	Likely	
3	8	13	18	23	Possible	
2	7	12	17	22	Unlikely	
1	6	11	16	21	Rare	
A	B	C	D	E	Impact	

Table 2.1.4.2.1: Risk Matrix

A Risk Management Plan that sits alongside the Risk Register will define how priorities will be established based on defined risk categories. As illustrated in the example below, it will define the level of risk management intervention that will be required for risks in different priority categories.

	Level of Risk Exposure			
	Red Priority 1	Amber Priority 2	Yellow Priority 3	Green Priority 4
Risk Tolerance	Risks that significantly exceed the risk tolerance threshold	Risks that exceed the risk tolerance threshold	Risks that lie on the risk tolerability threshold	Risks that are below the risk tolerability threshold
Risk Response	Require urgent and immediate attention	Require proactive management	Require active monitoring	Do not require active management

Table 2.1.4.2.2: Levels of Risk Exposure



2.1.4 HEALTH & SAFETY MANAGEMENT

2.1.4.2 Supplementary Material

Heavy Vehicle and Plant Checklist

Checks Points		Vehicle/Plant License No. or Identification:														Remarks		
		Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat		Sun	
1	Operator competent?																	
2	Front & rear lights working?																	
3	Front and back indicators working?																	
4	Reverse lights / alarm working?																	
5	Windscreen undamaged?																	
6	Windscreen wipers working sufficiently?																	
7	Horn in working order?																	
8	Tyres undamaged and inflated. Correctly?																	
9	Fire extinguisher in cabin?																	
10	Any visible damage on the body of the Vehicle?																	
11	Is the cabin clean?																	
12	Are the windows clean?																	
13	The view for the driver/operator unobstructed?																	
14	Is the vehicle serviced regularly?																	
15	Oil, water & brake fluid filled to Max levels?																	
16	Engine clean?																	
17	Any signs of fluid, oil, water, fuel leaks?																	
18	License current?																	
18	Excessive noise?																	
19	Condition of exhaust emissions?																	
20	Last time emissions levels checked?																	
Dates:																		
Inspector Initials:																		

Table 2.1.4.2.3: Heavy Vehicle and Plant Checklist

2.1

PROJECT PLANNING

2.1.5 ENVIRONMENTAL MANAGEMENT

2.1.5.1 Environmental Management

2.1.5.2 Supplementary Material

2.1.5.1 ENVIRONMENTAL MANAGEMENT

Code Statement: Implement sustainable practices, especially those that improve air quality, protect flora and fauna, and minimise noise, such that the impact of infrastructure projects on people and planet is mitigated.

RATIONALE

Protecting the environment whilst delivering infrastructure projects is the responsibility of all Stakeholders. By minimizing use of resources, preventing pollution, and implementing effective dust control measures, projects can mitigate their negative environmental impact.

CONTEXT

Through use of heavy vehicles, equipment and resources, infrastructure projects have significant environmental footprints. With RIPC's focus on environmental protection alongside entities such as the NCEC and MWAN, consumption of resources and implementation of environmental protection measures will help to ensure compliance with environmental regulations and to support a culture that prioritises protection of the planet.

POSITIVE IMPACTS



Health & Safety



Quality of Life & Well-being



Public Perception



Accessibility & Movement



Economy & Business



Infra & Public Space



Environmental

Shall	Should
KEY REQUIREMENTS	
<ul style="list-style-type: none"> Minimize land use through carefully planned Work Zones. Implement erosion control measures such as applying tarpaulin and re-planting. Comply with environmental regulations from NCEC. Prepare an Environmental Management Plan, supported by processes and procedures. Ensure that all Heavy Vehicles and associated plant are certified by the Equipment Regulatory Center under SASO. Implement dust control measures, such as using water sprays, plastic sheeting, or temporary walls to separate the Work Site from other areas. Ensure all lighting is RoHS compliant and that electrical and electronic products used in lighting installations do not contain Lead, Mercury, Hexavalent Chromium, Cadmium, polybrominated biphenyls (PBDE), polybrominated diphenyl ethers (PBB) above the legal threshold. 	<ul style="list-style-type: none"> Conduct Environmental and Social Impact Assessments (ESIA) as per NCEC guidance. Establish protocols for air, water, and soil pollution control. Retrofit Heavy Vehicles with noise suppressors. Regularly clean the construction site to minimize dust accumulation and spread. Conduct noise assessments to ensure construction activities, plant, and machinery do not exceed allowable noise levels (e.g. 50dB during daytime and 40dB at night-time in residential areas). Particular attention should be given to these maximum noise levels in residential areas. Adhere to noise limits during daytime (07:00 to 20:00) and night-time hours (20:00 to 07:00). Note that in residential areas, the permissible working hours are (07:00 to 18:00) and weekends (07:00 to 13:00). No works are allowed outside these hours for residential areas, except in exceptional cases, which require written approval from RIPC.
MAIN OUTCOMES	
<ul style="list-style-type: none"> Reduced environmental impact and preservation of natural resources. Post-construction restoration. 	<ul style="list-style-type: none"> Compliance with environmental regulations and minimization of adverse environmental impacts. Reduced dust emissions and better air quality.

KEY REFERENCES

- The Environment Law, enacted by Royal Decree No. M/165 on 19/11/1441H (2020)
- Executive Regulations for Noise issued by the Ministry of Environment, Water, and Agriculture
- SHC 701
- ISO 14001:2015

PROJECT LIFECYCLE

Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
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PRINCIPLE



P5. Environmentally Sustainable

SUCCESS MEASUREMENT

P5.1. **Environmental Protection**

- PI5.1.1. Number of environmental incidents reported.
- PI5.1.2. Percentage reduction in pollution levels (e.g., project carbon footprint).
- PI5.1.6. Percentage of projects using pollution control measures.

LINKED VIOLATION



V7. Environmental Violations

Applicable Chapters, Forms and Templates

- [Chapter 2.2.1 Site Safety](#)
- [Chapter 2.2.2 Barriers & Warning Measures](#)
- [Chapter 2.3.2 Excavation Types & Guidelines](#)
- [Chapter 2.4.1 Inspections and Violations](#)
- [Chapter 2.1.5.2 Supplementary Material](#)

Consider

Advise

KEY REQUIREMENTS

- | | |
|---|--|
| <ul style="list-style-type: none"> • Ensure that areas affected by erosion are monitored and stabilized after construction to prevent long-term environmental. • Plan high-noise activities during daylight hours to minimize disturbance to the surrounding community. Refer to Section 2.2.1.2 Noise Management for requirements relating to noise levels. • Fit equipment with noise suppression devices. | <ul style="list-style-type: none"> • Establish an Environmental Management System (EMS) aligned with ISO 14001:2015. • Remove inefficient and under-performing Heavy Vehicles and equipment from the site. |
|---|--|

MAIN OUTCOMES

- Minimized impact on works and on the public (i.e. residents and road users).

KEY STAKEHOLDERS

- | | |
|--|--|
| <ul style="list-style-type: none"> • MEWA • CONTRACTOR | <ul style="list-style-type: none"> • CONSULTANT • NCEC |
|--|--|



2.1.5.2 SUPPLEMENTARY MATERIAL

Environnemental Management Plan Template

The Environmental Management Plan (EMP) shall be developed during the planning phase of a project and is to be reviewed at regular intervals throughout the project lifecycle to ensure that it is maintained and remains fit for purpose.

The general requirements and elements of the EMP have been outlined below. It serves to provide guidance to Contractors to prepare an EMP.

Elements

The minimum elements that make up an EMP include:

1. Project description.
2. Project HSE structure and system.
3. Aspects and Impacts assessment and Risk Register.
4. Project induction and HSE training.
5. Environmental work practices and procedures.
6. Workplace Environmental inspections.
7. Environmental consultation & communication.
8. Emergency Procedures.
9. Incident recording and investigation.
10. HSE performance monitoring.

Project Description

A brief description of the scope of work associated with the project should be documented.

The description should be sufficiently detailed to provide persons unfamiliar with the project an overview of the type of work being carried out and by whom, including subcontractors, Consultants, etc.

The scope of work should include as a minimum requirement the following details:

- o Summary of activities and types of work to be performed, that may have an adverse impact on the environment.
- o Environmental and Social Impact Assessment (ESIA), when deemed necessary.
- o List of tasks that may impact on the environment

Provide high-level considerations for the following:

- o **Minimizing Land Use** – minimization of the footprint on land, making use of existing infrastructure where possible.
- o **Pollution Prevention** - establishing site protocols/procedures to minimize air, water, and soil pollution during construction.

- o **Erosion and Dust Control** - implementing erosion, dust and sediment control measures to protect soil and water quality during construction. Considering the use of techniques such as utilizing plastic sheeting/tarps to separate the construction zone from other spaces, suppression water sprays and re-vegetation to stabilize disturbed areas.
- o **Noise** - ensure effective work planning – high noise activities should be planned during daylight hours. Ensure vehicles and other plant have the required noise suppressors/silencers as per Section 2.2.1.2.
- o **Waste Management** – ensure a suitable waste management plan is established for the site.
- o **Environmental Protection Measures** - implement measures to protect local wildlife and vegetation.
- o **Post-construction Restoration** – ensure planning for the restoration of disturbed areas after project completion, including habitat restoration and landscaping.
- o The above considerations shall be included the Environment Aspects and Impacts Assessment.

Project EMP and System

The project's EMP should be established in alignment to the ISO 45001:2018 requirements. Respective legal requirements and international best practices should form the basis of the EMP.

The Contractor should outline the management structure, responsibilities, standards and control systems applicable to the project to ensure Environmental requirements are adequately addressed.

The following information should be included:

- Company HSE policy is to be displayed.
- An outline of the project HSE organisation and structure. i.e. names and / or positions of those with specific environmental responsibilities.
- Summary of HSE roles and responsibilities of Contractor staff involved in the project, particularly for environment management.

Aspects and Impacts Assessments & Risk Register

The identification and assessment of environmental Aspects and Impacts is an integral part of the EMP and should include:

- Identification of possible environment aspects that may have a consequence on the environment associated with the project's tasks and activities.
- Assess / analyse the level of impact / risk.
- (ISO 14001 defines an aspect as an "element of an organization's activities or products or services that interacts or can interact with the environment" and an impact as a "change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects.")
- Establish appropriate impact control measures.
- Establish a review process which should include at each project lifecycle stage.
- Include considerations for public interface.
- Consider credible emergency scenarios, such as accidental fires, spillages / leaks of chemicals, fuels, oils, planning for all types of spills, minor, large and major, etc.
- Results of the Risk Assessment are to be recorded in an Environment Risk Register.

Project Induction and HSE Training

Contractors are to ensure that workers have the required environment knowledge, skills and competencies to perform the work required. This requires that an effective training regime be established for workers, ensuring that they have appropriately skilled employees.

The following information should be provided:

- An outline of project environmental issues, aspects and impacts in the induction process for workers and visitors to the site.
- Details of employee HSE training which has or will be provided relevant to the Project requirements.

Environmentally Sound Practices and Procedures

Based on the Aspects and Impacts Assessment and determined mitigation controls, relevant environmental practices and procedures should be developed to mitigate high-risk activities / tasks. Where possible, existing HSE company procedures should be used. However, Project specific procedures may need to be developed on the basis of particular Project aspects and impacts.

The following information should be provided:

- A list and copies of company environmental procedures or instructions relevant to the project.
- A list and copies of project specific environmental procedures and/or work instructions.
- Detail site operations that will be subject to permit to work systems.
- Provide details of subcontractors issued with copies of environmental procedures and instructions.
- Environmental procedures and instructions should be recorded on Safe Work Procedure/Instruction Register.

Workplace Environmental Inspections

HSE inspections play an important in ensuring HSE protocols are being adhered to and also identifies new aspects and impacts. The EMP should outline the procedures and methods by which project workplaces will be environmentally inspected on a regular basis.

The following information should be provided for:

- Details of how workplace environment inspections will be undertaken during the project, considering:
 - Environment checklists to be used.
 - Frequency of inspections.
 - Team members.
 - Actioning of inspection findings - Close out reports.
 - Details of impact reporting procedures for the project.
 - Details of specific activities or areas targeted for inspection i.e. plant, hazardous materials, waste control, pollution, etc.



2.1.5.2 SUPPLEMENTARY MATERIAL

Environmental Consultation

Consultation with employees and the public, stakeholders, etc. provides an important mechanism whereby HSE, particularly environmental issues, can be dealt with in a manner that promotes ownership and prompts resolution.

Emergency Procedures

There is the potential for a range of emergency situations to occur both on-site and off-site in relation to infrastructure works. These situations need to be identified and specific emergency protocols including response plans developed and made known.

The following should be considered:

- Process for hazardous materials movement, storage and usage.
- Hazardous materials spillage and clean-up requirements.

- Dust controls.
- Noise controls.
- Local Authorities should be notified of potential emergencies that occur on site.
- Regular drills in dealing with emergency situations are held and recorded in a log.
- Ensure visitors are inducted before entering the site and informed on possible emergency situations and their required action.

Incident Recording and Investigation

All environmental incidents are to be reported, recorded and investigated, when deemed necessary.

The following details should be included in an incident investigation process:

- Incident reporting and investigation process requirements.
- The notification/reporting of incidents.
- Considerations for conducting the investigation.

Environment Performance Monitoring

The monitoring of environment performance shall include at a minimum:

- Incidents and accidents.
- Near Misses.
- KPIS and objectives.
- Dust and noise.
- Waste management.

Health, Safety, and Environmental Management Plan Template

The Health, Safety and Environment (HSE) Plan shall be developed during the planning phase of a project and is to be reviewed at regular intervals throughout the project lifecycle to ensure that it is maintained and remains fit for purpose.

The general requirements and elements of the HSE Plan are outlined below. It serves to provide guidance to Contractors in the preparation of a HSE plan.

Elements

The minimum elements that make up an HSE Plan include:

1. Project description.
2. Project HSE structure and system.
3. Risk assessment and Risk Register.
4. Project induction and HSE training.
5. Safe work practices and procedures.
6. Workplace HSE inspections.
7. HSE consultation & communication.
8. Emergency Procedures.
9. Incident recording and investigation.
10. HSE performance monitoring.

Project Description

A brief description of the scope of work associated with the project should be documented. The description should be sufficiently detailed to provide persons unfamiliar with the project an overview of the type of work being carried out and by whom, including subcontractors, Consultants etc.

The scope of work should include as a minimum requirement the following details:

- Summary of major activities and types of work to be performed.
- List of tasks or specialist procedures that may require

detailed HSE work procedures and training.

- List areas of project requiring special consideration from a HSE perspective, for example:
 - Presence of public.
 - Traffic management.
 - Work restrictions (work times, confined spaces).
 - Exposure to hazards (noise, dust, elevated heights).

Project HSE Structure and System

The project's HSE Plan should be established around existing HSE management systems (ISO 45001, 14001 etc.) and associated procedures and controls. Reference should be made to existing procedures and documentation in the HSE Plan.

The Contractor should outline the management structure, responsibilities, standards and control systems applicable to the project to ensure HSE requirements are adequately addressed.

The following information should be included:

- Company HSE policy, to be displayed at worksites.
- An outline of the project HSE organisation and structure. i.e. names and/or positions of those with specific HSE responsibilities.
- Summary of HSE roles and responsibilities of Contractor staff involved in the project.

Risk Assessment & Risk Register

The Risk Assessment is an integral part of the HSE Plan and must include:

- Hazard Identification and Risk Assessment (HIRA) associated with project tasks and activities.
- Include considerations for public and motorists' interface and traffic management.
- Consider credible emergency scenarios.
- Determine the level of risk.
- Establish appropriate risk control measure.
- Establish a review process which should include at each project lifecycle stage.
- Results to be in a Risk Register.
- Position and/or name of senior individual who will liaise with the Client and RIPC on HSE matters.



2.1.5.2 SUPPLEMENTARY MATERIAL

Project Induction and Safety Training

Contractors are to ensure that workers have the required skills and competencies to perform the work required. This requires that an effective training regime be established for workers, ensuring that they have appropriately skilled employees.

The following information should be provided:

- An outline of project induction process for workers and visitors to the site
- Attendance Register of personnel who have satisfactorily completed the project induction.
- Details of employee HSE training which has or will be provided relevant to the project requirements.

Safe Work Practices and Procedures

Based on the Risk Assessment and determined mitigation controls, relevant safe work practices and procedures should be developed to mitigate high-risk activities/tasks. Where possible, existing HSE company procedures should be used. However, project specific safe work procedures may need to be developed on the basis of particular project hazards.

The following information should be provided:

- Provide a list and copies of company safe work procedures or instructions relevant to the project.

- Provide a list and copies of project specific safe work procedures or instructions.
- Detail site operations that will be subject to permit to work systems.
- Provide details of employees and / or subcontractors issued with copies of safe work procedures and instructions.
- Safe work procedures and instructions should be recorded on Safe Work Procedure/Instruction Register.

Workplace HSE Inspections

HSE inspections play an important in ensuring HSE protocols are being adhered to and also identifies new hazards and risks. The HSE Plan should outline the procedures and methods by which project workplaces will be inspected on a regular basis.

The following information should be provided for:

- Details of how workplace HSE inspections will be undertaken during the project, considering:
- Checklists to be used.

- Frequency of inspections.
- Team members.
- Actioning of inspection findings.
- Details of hazard reporting procedures for the project, including hazard report forms.
- Details of specific activities or areas targeted for inspection i.e. plant, hazardous materials, electrical safety.

Health and Safety Consultation

Consultation with employees and the public, stakeholder, etc. provides an important mechanism whereby HSE issues can be dealt with in a manner that promotes ownership and prompt resolution.

Emergency Procedures

There is the potential for a range of emergency situations to occur both on-site and off-site in relation to infrastructure project works. These situations need to be identified and specific emergency protocols including response plans developed and made known.

The following information should be documented:

- Overall emergency plan and structure for the project.
- Register of emergency equipment and locations i.e. first aid equipment, fire extinguishers.
- Register of current qualified First Aiders.
- Arrangements/co-ordination with worksite visitors in the event of an emergency.

Incident Recording and Investigation

All incidents associated with the project involving personal injury, medical treatment or property damage should be recorded and investigated.

The following should be documented:

- Details of incident reporting and investigation system

and procedures.

- Details of how incidents shall be notified to the Client .
- Details of how incident statistics are to be compiled and distributed.

HSE performance monitoring

The monitoring of occupational health and safety includes at a minimum:

- HSE Incidents and accidents.
- HSE Near Misses.

- KPIS and objectives.
- Dust and noise.
- Waste management.

2.1

PROJECT PLANNING

2.1.6 WASTE MANAGEMENT

2.1.6.1 Waste Management

2.1.6.2 Supplementary Material

2.1.6.1 WASTE MANAGEMENT

Code Statement: Implement the Waste Hierarchy on projects. Use a Waste Management Plan (WMP) to govern all waste-related activities (i.e. handling, segregation, and disposal of waste) to minimize the visual distortion caused by waste, associated cleanliness issues, and environmental impacts.

RATIONALE

Effective waste management is crucial for minimizing environmental impact and ensuring compliance with regulations. By planning for waste generation, storage, and disposal, project Stakeholders can manage waste responsibly and sustainably.

CONTEXT

Excavated materials represent the highest volume of waste associated with Infrastructure Projects. RIPC prioritises effective waste management and supports MWAN in delivering its mandate as the National Center for Waste Management.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
KEY REQUIREMENTS	
<ul style="list-style-type: none"> Establish a Waste Management Plan (WMP) that identifies the types and quantities of waste expected, methods for on-site storage, and disposal practices. Segregate waste at the source to facilitate recycling and legal disposal. Comply with Waste Management regulations from MWAN. 	<ul style="list-style-type: none"> Use designated waste containers that are clearly labelled and appropriate for the type of waste (e.g., hazardous waste, recyclables). Establish waste storage areas and regularly monitor and maintain them to prevent leaks, spills, and contamination. Regularly update the WMP to reflect changes in project activities and waste generation. Focus on recycling resources and reusing products to reduce waste. Conserve natural resources and materials to promote sustainability. Ensure financial sustainability and adhere to proper disposal methods to support a circular economy. Remove or reduce risk of contamination to water courses and sources.
MAIN OUTCOMES	
<ul style="list-style-type: none"> Proper handling, storage, and disposal of waste to minimize environmental impact and ensure regulatory compliance. 	

KEY REFERENCES

- | | |
|---|--|
| <ul style="list-style-type: none"> The Implementing Regulations of the Waste Management Law issued by Ministerial Resolution No.332291/1/1443 dated 18/10/1443 (19 May 2019) | <ul style="list-style-type: none"> SHC 701 The Waste Management Law Violation Classification Table |
|---|--|

PROJECT LIFECYCLE

Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE



P5. Environmentally Sustainable

SUCCESS MEASUREMENT

P5.1. **Environmental Protection**

- PI5.1.3. Percentage of waste diverted from landfill.
- PI5.1.4. Number of violations regarding waste disposal practices.

LINKED VIOLATION



V7. Environmental Violations

Applicable Chapters, Forms and Templates

- [Chapter 2.4.1 Inspections and Violations](#)
- [Chapter 2.1.6.2 Supplementary Material](#)

Consider

Advise

KEY REQUIREMENTS

- Implement training programs for workers to ensure waste handling and disposal practices are followed.
- Identifying Waste Off-takers as part of implementing a circular economy associated with waste.

MAIN OUTCOMES

- Effective waste segregation and disposal that supports environmental protection and sustainability goals.

KEY STAKEHOLDERS

- MEWA
- CONTRACTOR
- CONSULTANT



2.1.6.2 SUPPLEMENTARY MATERIAL

Waste Management Plan Template

Elements

The minimum elements that make up a Waste Management Plan (WMP) include:

1. Project description.
2. Project HSE structure and system.
3. Waste Register.
4. Project induction and HSE training.
5. Planning.
6. Inspections.
7. Waste Consultation.
8. HSE performance monitoring.

Project Description

A brief description of the scope of work associated with the project should be documented. The description should be sufficiently detailed to provide persons unfamiliar with the project an overview of the type of work being carried out and by whom, including subcontractors, Consultants etc.

The scope of work should include as a minimum requirement the following details: *Waste Management* – ensure a waste management plan is established for the project which is to include:

- Identifying the types of wastes.
- Quantifying of wastes.
- Methods of storage; and
- Methods of disposal, including recycle, re-use considerations etc.

Project WMP Structure and System

The project's WMP should be established in alignment to the ISO 45001:2018 requirements. Respective legal requirements and international best practices should form the basis of the WMP.

The Contractor should outline the management structure, responsibilities, standards and control systems applicable to the project to ensure Waste Management requirements are adequately addressed. The following information should be included:

- Company Waste Management policy, included in the HS policy.
- An outline of the project HSE organisation and structure. i.e. names and / or positions of those with specific HSE responsibilities.
- Summary of HSE roles and responsibilities of Contractor staff involved in the project, particularly for Waste Management.

Waste Register

The Waste Register is an integral part of the WMP Plan and must include:

- Types.
- Quantities.
- Storage.
- Hazard Rating.
- Control Measures.
- Responsible Persons for each type of waste.

Project Induction and HSE Training

Contractors are to ensure that workers have the required skills and competencies to perform the work required. This requires that an effective training regime be established for workers, ensuring that they have appropriately skilled employees.

The following information should be provided:

- An outline of waste control measures must be included in the induction process for workers and visitors to the site.
- An outline of the project HSE organisation and structure. i.e. names and/or positions of those with specific waste management responsibilities.
- Summary of WM roles and responsibilities of Contractor staff involved in the project.

Waste Risk Assessment Planning

The potential waste generated by the project is evaluated with a primary focus on its environmental impact. Also, waste spills, particularly for hazardous materials, are to be factored into the RA. All waste recorded on the water register should be considered. Based on the results of the Waste RA, controls are to be established to eliminate, or when this is not possible, mitigate the effects of waste release on site.

The waste management planning should include the considerations of legal requirements and international best practices. Sound waste management planning considerations shall include:

- How to deal with specific wastes in a safe and responsible manner.
- Waste segregation.
- Maximum amounts that can be stored on site.
- Determination of waste disposal contractors including approved waste sites.
- Documentation required to prove safe disposal, especially for hazardous wastes.
- Possible reactions when certain waste mix / mingle due to spillage(s).
- Safe work instructions on the handling of hazardous wastes.
- Ensuring that Material Data Sheets (MDS) are available for type of types of waste on the site.
- MDS prescribe considerations for:
 - Health and safety effects of exposure.
 - First aid treatment to be applied.
 - Spills clean-up protocols..
 - Ensure that copies of MDS are kept in the first aid room, to assist first aiders to administer suitable first aid when required.

The following information should be maintained on site:

- Specific instructions for waste handling.
- Waste inventory.
- Waste Management Risk Register if separate from the HSE one.
- Detail site operations that will be subject to permit to work systems.

Workplace Waste Management Inspections

HSE inspections play an important in ensuring respective, particularly WM protocols are being adhered to. The WMP should outline the procedures and methods by which project workplaces will be inspected on a regular basis.

The following information should be provided for:

- Details of how workplace HSE inspections will be undertaken during the project, including:
 - Waste Management Checklists to be used.
 - Frequency of inspections.
 - Team members.
 - Actioning of inspection findings – Close out reports.
 - Waste disposal Manifests.

Waste Consultation

Consultation with employees and the public, stakeholder etc. provides an important mechanism whereby HSE, including waste management, issues can be dealt with in a manner that promotes ownership and prompt resolution.

Monitoring and Document Control

Considerations for the monitoring of WM should include:

- Incidents and accidents.
- Near Misses.
- Waste disposal manifests.
- KPIS and objectives.

2.1

PROJECT PLANNING

2.1.7 QUALITY ASSURANCE & CONTROL

2.1.7.1 Quality Assurance & Control

2.1.7.2 Supplementary Material

2.1.7.1 QUALITY ASSURANCE & CONTROL

Code Statement: Ensure compliance and quality control through rigorous checks and balances, regular inspections, and built-in acceptance criteria underpinned by accurate documented evidence. Implement performance clauses and testing thresholds that guarantee completed infrastructure work is free from defects and limits claims and disputes.

RATIONALE

Public realm infrastructure projects require excellent design, brilliant implementation, and smooth handover to help ensure that installed systems and services are fit-for-purpose. Meticulous record keeping, documenting, and reporting is, therefore, essential. Such documentation ensures standards compliance, transparency, and clarity on accountability. It includes a Quality Control Plan, supported by processes and procedures, inspection reports with acceptance criteria, and test reports with clear thresholds.

CONTEXT

This Code Manual empowers everyone involved with delivery of public realm infrastructure works in the Riyadh Region with a duty of care to the residents of Riyadh. Through its monitoring and enforcement capability, RIPC will collaborate with Service Entities, Consultants, and Contractors to ensure that no shortcuts are made, and that everyone strives for delivery excellence. RIPC supports the work of SASO and its subsidiaries such as the Saudi Accreditation Center (SAAC) to govern and certify laboratories – a key component of the drive toward quality-assured, resilient infrastructure for the Riyadh Region.

POSITIVE IMPACTS

Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
KEY REQUIREMENTS	
<ul style="list-style-type: none"> Develop and implement a comprehensive Quality Control Plan that is tailored to the project and used to guide all parties through quality assurance at each project stage. Establish clear work acceptance criteria based on RIPC, Service Entity and local requirements. Implement a rigorous acceptance process before handover to ensure that the work meets all specifications and that any defects are addressed promptly. Set testing thresholds use laboratories that are SAAC-certified. Provide warranties for materials and workmanship for a duration after handover that is mutually agreed with Stakeholders, dependent on the project. 	<ul style="list-style-type: none"> Conduct regular inspections and testing of materials as well as testing of ancillaries and tools from 3rd party. Use materials that are SASO-certified. Establish processes for managing non-conformance that are escalatory in nature and aimed at addressing and rectifying issues promptly. Use digital dashboards such as Excel or PowerBI, for progress tracking, highlighting risks and opportunities. Maintain thorough documentation of all project-related activities, including inspection reports supported by ample photographic evidence. Establish an organized filing system for easy reference and audit purposes. Service Entities, Contractors, and Consultants: implement a 'self-check' inspection regime that includes regular progress reports and risk management updates to be shared with all Stakeholders.
MAIN OUTCOMES	
<ul style="list-style-type: none"> High-quality infrastructure projects that meet all regulatory and Client expectations. 	<ul style="list-style-type: none"> Verified quality of work before project handover and protection against defects. Reduced grievances, claims, and disputes.

KEY REFERENCES

- Saudi Accreditation Center
- ISO 9001:2015
- SHC 401
- SHC 403

Applicable Chapters, Forms and Templates

- [Chapter 2.4.1 Inspections and Violations](#)
- [Chapter 2.1.7.2 Supplementary Material](#)

PROJECT LIFECYCLE

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PRINCIPLE



P1. Safe, Compliant & Controlled



P2. Effectively Managed & Continuously Improved

SUCCESS MEASUREMENT

1.2.
Legal Compliance

- PI1.2.3. Percentage of legal compliance issues resolved.

P1.3.
Quality Assurance

- PI1.3.1. Percentage of projects passing quality audits with no major issues.
- PI1.3.2. Frequency of inspections.
- PI1.3.3. Number of complaints regarding infrastructure and roads quality.
- PI1.3.4. Inspection pass rate.

LINKED VIOLATION



V3. Infrastructure and Roads Issues



V4. Worksite Management and Cleanliness Violations

Consider

Advise

KEY REQUIREMENTS

- | | |
|--|--|
| <ul style="list-style-type: none"> • Align with ISO 9001:2015 requirements for Quality Management. • Update the Quality Control Plan and associated documentation to reflect any changes in project conditions, standards, or regulatory requirements. • Ensure that all documentation is readily available in digital format for audits and inspections. | <ul style="list-style-type: none"> • Link quality control measures explicitly to each project lifecycle stage. • Incorporate detailed review stages before final inspections to catch and address potential issues early. • Follow a structured process for documenting findings and reporting critical safety issues immediately. • Establish periods for site personnel to rectify issues before penalties are applied to maintain project continuity. |
|--|--|

MAIN OUTCOMES

- | | |
|---|--|
| <ul style="list-style-type: none"> • Comprehensive records that ensure accountability and transparency throughout the project lifecycle. | <ul style="list-style-type: none"> • A gated approach to project delivery, backed by evidence of quality assurance. |
|---|--|

KEY STAKEHOLDERS

- | | |
|--|--|
| <ul style="list-style-type: none"> • CONTRACTOR • CONSULTANT | <ul style="list-style-type: none"> • SERVICE ENTITY |
|--|--|



2.1.7.2 SUPPLEMENTARY MATERIAL

Quality Control Plan Template

Quality Control Plan

The Quality Control Plan (QCP) shall be developed during the planning phase of a project and is to be reviewed at regular intervals throughout the project lifecycle to ensure that it is maintained and remains fit for purpose.

It is important to maintain sound quality control standards in infrastructure projects and to ensure that these are constantly applied and monitored. Each project has its own unique characteristics, strategic importance and various complexities. Therefore, quality control requirements shall be considered by the respective project team during each project lifecycle stage. This document outlines the requirements and elements of the QCP. It serves to provide guidance to Contractors to prepare a QCP.

Elements

The minimum elements that make up an QCP include:

1. Project description
2. Project Quality Assurance (QA) structure and system
3. Risk Management
4. Project induction and QMS training
5. QA practices and procedures
6. Workplace QA / QM inspections
7. Penalties & violations
8. QC / QM consultation & communication
9. Work Acceptance Criteria
10. Guaranties and Warranties
11. QA / QM performance monitoring.

Project Description

A brief description of the scope of work associated with the project should be documented. The description should be sufficiently detailed to provide persons unfamiliar with the project, it must also include an overview of the type of work being carried out and by whom, including subcontractors, Consultants etc. The scope of work should include as a minimum requirement the following details:

- Summary of all major project milestones.
- Summary of major activities work to be performed.
- List of tasks or specialist procedures that may be required, including considerations for Quality Assurance processes / procedures and training.
- List areas of project requiring special consideration from a QA / QC perspective, including:
 - Quality control and monitoring;
 - Specifications and standards;
 - Material inspections and quality testing; and
 - Laboratories.

Project QA Structure and System

The QCP should be established around existing QA management systems requirements of the ISO 9001:2015 Standard. Respective references should be made as and when required.

The Contractor should outline the management structure, responsibilities, standards and control systems applicable to the project to ensure QA requirements are adequately addressed. The following information should be included:

- Quality Control Procedures / processes, considering:
 - Detailed procedures / processes for inspection, testing, and verification of materials, workmanship, and installations;
 - Definition of acceptance criteria and tolerances; and
 - Process for handling non-conformances and corrective actions.
- Supplier & Subcontractor Management:
 - Process for evaluating and selecting qualified suppliers subcontractors and laboratories;
 - Monitoring and control of their performance; and
 - Ensuring compliance with project quality requirements.
- Documentation & Record Keeping, considering system for maintaining accurate and complete project records, including:
 - Inspection and test reports;
 - Non-conformance reports and corrective action logs;
 - As-built drawings and specifications; and
 - Project close-out documentation.
- Quality Assurance Activities, considering:
 - Internal and external audits to ensure compliance with the PQP and QMS.
 - Process for management review of quality performance;
 - Continuous improvement initiatives.
- Personnel Qualifications & Training:
 - Identification of key personnel and their qualifications;
 - Plan for training and certification of personnel involved in quality-related activities; and
 - Competency assessment and ongoing development.

Risk Management

Risk Management is an integral part of the QC Plan. Respective actions and activities which are to be conducted on the site, which may have a high risk of impacting on quality must be identified and assessed. Quality risk assessments shall include for:

- Identification and assessment of potential risks to project quality.
- Development of mitigation and contingency plans.
- Regular review and updating of risk registers.
- Continuously identifying potential risks that could impact project progress, or quality considerations.
- Developing and implementing controls / strategies to mitigate identified risks.
- Consider for contingency planning when required.
- Customer / Client Complaints.
- Risk results to be captured in a Risk Register.

Project Induction and QMS Training

Contractors are to ensure that workers have the required skills and competencies to perform the work required. This requires that an effective training regime be established for workers, which must include:

- Ensuring personnel attain, or have the required qualifications
- Identification of key personnel and their qualifications;
- Plan for training and certification of personnel involved in quality-related activities; and
- Competency assessment and ongoing development.

Quality Control Processes / Procedures

Based on Risk management according to the project specification and determined mitigation controls, relevant QA practices and procedures should be developed to mitigate high-risk activities / tasks. Where possible, existing QM company procedures should be used. However, project specific QM procedures will need to be developed on the basis of particular project hazards.

The following information should be provided:

- A list and copies of company QA / QM procedures or instructions relevant to the project.
- A list and copies of project specific QA / QM procedures or instructions.
- Detail site operations that will be subject to stringent QC protocols.

Workplace QC / QA Inspections

1. QA / QM Consultation

Ensure that a communication protocol is established to keep stakeholders informed about acceptance processes, guarantees, and warranty provisions.

2. Work Acceptance Criteria

Establish clear acceptance criteria based on project specifications, standards, and regulatory requirements.

Work acceptance and guarantees are important components of infrastructure projects. It is important that a systematic approach for inspections and documentation throughout the project lifecycle is established to verify compliance with acceptance criteria.

3. Guaranties and Warranties

The Contractor is to provide performance guarantees that stipulate the infrastructure will meet specified performance levels for a defined period.

Also, it is recommended to establish a defects liability period during which the Contractor is responsible for repairing or rectifying any defects that arise after project completion.

Clearly define the duration of warranties for materials and workmanship, which typically ranges from one to several years, depending on the type of infrastructure.

4. QA / QM performance monitoring

Arrange for, and conduct, regular inspections of the construction site to monitor progress, compliance with designs, and adherence to safety protocols. Perform periodic quality audits to assess the effectiveness of quality control processes and identify areas for improvement

2.1

PROJECT PLANNING

2.1.8 EMERGENCY MANAGEMENT

2.1.8.1 Emergency Management

2.1.8.2 Supplementary Material



2.1.8.1 EMERGENCY MANAGEMENT

Code Statement: Protect lives, property, systems, and the environment by ensuring that all parties involved in the delivery of public realm infrastructure projects are prepared and practiced for every conceivable emergency scenario.

RATIONALE

Emergency Management doesn't prevent a crisis from occurring, but it ensures that all parties are prepared when it does. Emergency scenarios may include fires, natural disasters, or road traffic accidents. By preparing for various emergency scenarios, Stakeholders can protect lives, property, systems, and the environment, minimize damage and ensure a swift, an organized response and full recovery to normal operating conditions. Fulfilling this component of The Manual involves developing and implementing comprehensive Emergency Management Plans based on scenarios derived through risk analysis and supported by processes and procedures.

CONTEXT

Response to emergencies will no longer be reactive in nature. In fact, Stakeholders will now collaborate to proactively identify, plan and prepare for emergency scenarios. The Emergency Management Committee may involve representatives from MOI, MEWA, the Traffic Office, the Service Entity, Consultants, and Contractors. All working together, to ensure the optimum response during a crisis.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
KEY REQUIREMENTS	
<ul style="list-style-type: none"> Highlight site access/egress points for workers and vehicles. Prepare, disseminate and practice evacuation procedures among Site Personnel. Accommodate individuals with disabilities. Ensure that all Emergency Management Plans comply with national standards and regulations. 	<ul style="list-style-type: none"> Collaborate with local entities (e.g. civil, defence, etc.) to establish Emergency Management Plans, then tailor those to each project, as applicable. Conduct Hazard Identification and Risk Assessment (HIRA) this through the lens of Emergency Management (i.e. hazards pertaining to fire and life safety, utilities system failure, flood, natural disaster, etc.). Implement mitigation measures associated with HIRA and develop Emergency Plans to proactively mitigate residual risks. Equip the site with suitable Fire Safety Equipment, promote awareness and training among Site Personnel. Conduct regular drills to familiarize workers and site visitors with evacuation procedures.
MAIN OUTCOMES	
<ul style="list-style-type: none"> Enhanced emergency preparedness and efficient evacuation processes. 	<ul style="list-style-type: none"> Minimized fire risks and improved emergency response capabilities.

KEY REFERENCES

- MOI
- ISO 22320:2018
- EXPRO NMA&FM, Volume 14

Applicable Chapters, Forms and Templates

- [Chapter 2.1.1 Permitting](#)
- [Chapter 2.1.8.2 Supplementary Material](#)

PROJECT LIFECYCLE

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PRINCIPLE



P1. Safe, Compliant & Controlled



P2. Effectively Managed & Continuously Improved

SUCCESS MEASUREMENT

P1.1.
Safety Compliance

- PI1.1.2. Safety training completion rate.
- PI1.1.3. Number of corrective actions arising from safety audits per project.
- PI1.1.4. Percentage of major risks mitigated through risk assessment per project.

1.2.
Legal Compliance

- PI1.2.3. Percentage of Legal Compliance Issues Resolved.

LINKED VIOLATION



V3. Infrastructure and Roads Issues



V4. Worksite Management and Cleanliness Violations

Consider

Advise

KEY REQUIREMENTS

- Incorporate the use of fire-resistant materials and construction techniques.
- Coordinate with local emergency services to ensure a unified response in case of an emergency.
- Ensure clear and accessible emergency exits and routes, with well-marked assembly areas.
- Establish an Emergency Management Committee involving key Stakeholders, dependent on the nature of the project.

MAIN OUTCOMES

- Efficient and safe evacuation of all individuals during an emergency.

KEY STAKEHOLDERS

- MOI
- CONTRACTOR
- CONSULTANT
- SERVICE ENTIY



2.1.8.2 SUPPLEMENTARY MATERIAL

Emergency Management Plan Template

Emergency Response Plan

The Emergency Response Plan (ERP) shall be developed during the planning phase of a project and is to be reviewed at regular intervals throughout the project lifecycle to ensure that it is maintained and remains fit for purpose. This document outlines the general requirements and elements of the ERP. It serves to provide guidance to Contractor s to prepare an ERP.

Elements

The minimum elements that make up an ERP include:

1. Project credible emergency scenarios
2. ERP Roles & Responsibilities
3. Raising the alarm
4. Determine the severity of the emergency - can the emergency be handled by ERT?
5. Emergency services
6. Call to evacuate
7. Muster point(s)
8. Roll call
9. Minimize losses
10. All clear

Project Credible Emergency Scenarios

List all possible emergency scenarios which the project could face. These should be fed from the Risk Assessment Process.

Emergencies should include, for example:

- Fire
- Excavation collapse
- Fall from height
- Medical

ERP Roles & Responsibilities

The Emergency Response Team (ERT) should be established, and each member's roles and responsibility must be clearly defined. Team members should include:

- ERT Lead
- Evacuation warden(s)
- ERT members
- First aider(s) / nurse etc.

Raising the Alarm

Consider the easiest, most effective way to raise the alarm in case an emergency arises.

Determine the Severity of the Emergency

The ERT Lead is to evaluate the respective emergency and determine whether the local ERT can deal with the situation, or whether external support is required (emergency services etc.)..

Emergency Services

When the emergency cannot be handled solely by the site ERT, then emergency services must be contacted to help normalize the situation.

It is important to have a prepared list of emergency services contact details, which should include:

- Nearest hospital
- Ambulance
- Fire brigade
- Police etc.

Evacuation

Once it has been determined that additional emergency support is required, a general evacuation should be called. An evacuation diagram should be prepared indicating exit routes and muster points.

Muster Point(s)

Muster / emergency gathering point(s) must be identified. Means and routes of egress should be clearly marked on the evacuation diagram. Evacuation wardens should be designated for each area on the site.

Roll Call

Once the evacuation has taken place, a roll call should be held to ensure that all personnel and visitors have been accounted for.

Minimize Losses

Once it has been ascertained that all personnel are safe, the site / project manager together with the ERT lead could establish a team to enter the site to secure certain equipment / areas in order to minimize losses etc.

All Clear

Once the emergency situation has been effectively dealt with. The ERT Lead should inform the site manager that the “All Clear” can be sound and that all may return to the site and continue with normal activities.

2.1

PROJECT PLANNING

2.1.9 COMMUNITY OUTREACH & ACCESSIBILITY

2.1.9.1 Community Outreach & Accessibility

2.1.9.2 Supplementary Material



2.1.9.1 COMMUNITY OUTREACH & ACCESSIBILITY

Code Statement: Engage communities to gather feedback, set expectations, and address concerns. Plan work with road users and residents in mind; ensure their safety and minimize disruption. Ensure pedestrian and micro-mobility pathways are accessible, enhancing inclusivity and community access.

RATIONALE

Public realm infrastructure works should serve, not hinder, the public. Ensuring accessibility for pedestrians and micro-mobility users is vital for creating inclusive infrastructure. Consideration for the public begins during early stages of the project lifecycle. Resident Notices, and Traffic Management Plans are intended to build trust, ensure safety, and minimize disruption during infrastructure projects. New platforms and supporting mechanisms will be established to gather valuable feedback, address concerns, and proactively support continuous improvement.

CONTEXT

Public realm infrastructure projects have been known for the nuisance and visual disruption that they cause; impacting resident access and traffic flow. Through implementation of this Manual, RIPC will ensure that residents are actively engaged in the projects that impact their daily activities and that visitors are aware of the beneficial outcomes that these projects will bring. Service Entities and RIPC will collaborate to garner public support; engaging with local communities and other Stakeholders to ensure all parties are kept informed, their expectations are suitably set, and that their concerns are addressed.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
KEY REQUIREMENTS	
<ul style="list-style-type: none"> Develop a Traffic Management Plan to ensure safe and smooth movement of vehicles, pedestrians, and micro-mobility users around the construction site. Plan Heavy Vehicle Routes carefully to avoid disruption and protect the road surface. Establish communication protocols to keep Stakeholders and the public informed regarding project progress, risks, and potential impacts throughout the project lifecycle. Engage with the community regularly during the project to address concerns and gather feedback. 	<ul style="list-style-type: none"> Ensure pathways are accessible and clearly signed for pedestrians, wheelchair users, and micro-mobility devices – nobody should ever have to walk into oncoming traffic. Design safe crossings and intersections with clear wayfinding signage and adequate lighting. Schedule regular updates and meetings with Stakeholders, especially during critical phases of the project.
MAIN OUTCOMES	
<ul style="list-style-type: none"> Minimized traffic congestion and enhanced safety for both pedestrians and motorists. 	<ul style="list-style-type: none"> Strong relationships with stakeholders and a well-informed community that supports the project.

KEY REFERENCES

- | | |
|---|---|
| <ul style="list-style-type: none"> KSA Building Codes: Design Specifications for Persons with Disabilities King Salman Centre for Disability Research, Marine Transportation Guidelines, 2012 King Salman Centre for Disability Research, Built Environment Guidelines, 2010 | <ul style="list-style-type: none"> King Salman Centre for Disability Research, Destinations and Places of Accommodation Authority for the Care of People with Disabilities, A Simplified Guide to Comprehensive Standards for Facilities Rights for Persons with Disabilities (gov.sa) |
|---|---|

Applicable Chapters, Forms and Templates

- [Chapter 2.2.4 Access and Communication Management](#)
- [Chapter 2.6.1 Leveraging Technology](#)
- [Chapter 2.1.9.2 Supplementary Material](#)
- [2.2.3.6 Pedestrian Walkways and Paths Management](#)
- [2.2.4.2 Project Information Boards \(PIBs\)](#)

PROJECT LIFECYCLE

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PRINCIPLE

	P1. Safe, Compliant & Controlled
	P3. Clearly Communicated & Actively Engaged
	P6. Community-Centric & Accessible

SUCCESS MEASUREMENT

P1.5. Traffic and Parking Control	<ul style="list-style-type: none"> • PI1.5.1. Number of traffic control-related complaints per project.
P3.1. Clear and Transparent Communication	<ul style="list-style-type: none"> • PI3.1.1. Stakeholder satisfaction score on communication and regulations clarity.
P3.2. Stakeholder Engagement	<ul style="list-style-type: none"> • PI3.2.1. Reach rate of communication channels.
P6.1. Public Accessibility	<ul style="list-style-type: none"> • PI6.1.1. Percentage reduction in traffic congestion due to alternative routes. • PI6.1.2. Number of violations relevant to public accessibility.

LINKED VIOLATION

	V5. Traffic and Parking Control
	V6. Boards and Information Violations
	V8. Community and Public Accessibility Violations

Consider

Advise

KEY REQUIREMENTS

- | | |
|--|--|
| <ul style="list-style-type: none"> • Provide clear signage for drivers and real-time updates to guide drivers and pedestrians. • Establish a schedule for regular meetings with the community to provide updates and gather feedback, especially during key phases of the project. • Actively incorporate feedback from stakeholders into project planning and execution to improve outcomes and foster positive relationships. | <ul style="list-style-type: none"> • Integrate pathways with public transportation and provide amenities like rest areas and charging stations for micro-mobility devices. • Conduct surveys and engage stakeholders to identify and address accessibility challenges. |
|--|--|

MAIN OUTCOMES

- | | |
|--|--|
| <ul style="list-style-type: none"> • Inclusive infrastructure that promotes safety and accessibility for all users. | <ul style="list-style-type: none"> • Safe and accessible infrastructure that accommodates all users, promoting inclusivity. |
|--|--|

KEY STAKEHOLDERS

- | | |
|--|---|
| <ul style="list-style-type: none"> • RIPC • CONTRACTOR | <ul style="list-style-type: none"> • CONSULTANT • SERVICE ENTITIY |
|--|---|



2.1.9.2 SUPPLEMENTARY MATERIAL

Traffic Management Plan Template					
Document Name	Document Description	Required data	Format type	Drawing Scale	Degree of importance
Title scheme	A table featuring key project information	Name of the project, Contractor , owner, start and end date of the works, name of the Municipality, neighbourhood and street	AutoCAD Scheme	Not applicable	Binding for all types of business except emergencies
General Site Plan	Site plan showing the location of the works and the diverted traffic	Structural plan of the Municipality / Municipality - clear aerial photo - work site and traffic directions for each stage of the implementation plan and a diagram of the diversion - the start and end date of the works and the number of stages of the diversion	Autocad Scheme with coordinates WSG84	1:10000	Binding for all types of business except emergency
Horizontal Projection Chart	Detail of the general site plan	Detail of the work area, locations of temporary traffic control devices, details for implementing diversions, widths of road paths and necessary setbacks - locations of cross-sections - type of traffic control devices (type of barriers) - existing traffic control devices and their treatment (covering - removal) - details of any cancelled traffic movements - entry/exit points - accessibility for adjacent activities	AutoCAD chart with coordinates WSG84	1:1000	Binding for all types of works except emergency
Typical Cross Sections Chart	Cross section details	Horizontal offset dimensions - Dimensions of pedestrian paths - Dimensions of vehicle paths - Type of traffic control devices	AutoCAD Chart	1:10000	Binding for all types of works for excavations deeper than 30cm except for emergencies
Details	Details of all temporary traffic control devices	Dimensions - Reinforcement - Source (producing factories) - Colors	AutoCAD Chart	Not applicable	Not binding for short and medium term works
Action Plan Report	Plan details	Site furnishing plan - Site evacuation plan - Emergency plan - Start and end date of works - Loading and unloading plans - Routine inspection and control plan - Potential stakeholders and communication plan - Risk analysis - Mitigation plans	Word	Not applicable	Not binding for short and medium term works
Table of quantities	A table containing a description of the items used in the diversion and their quantities	Number of traffic signs - Number of concrete barriers	Excel	Not applicable	Binding for all types of works except emergency

Table 2.1.9.2.1: Traffic Management Plan Template

Temporary Traffic Control Plan (TTCP) Template

Plan	
Contents	<ul style="list-style-type: none"> • Insert required contents here.
Scope of Work	<ul style="list-style-type: none"> • A detailed description of the work to be performed. • Clear objectives and expected outcomes of the work.
Work Sequence	<ul style="list-style-type: none"> • Detailed step-by-step instructions on how the work will be carried out. • Estimated timeline for the completion of the project.
Risk Assessment	<ul style="list-style-type: none"> • Identification of potential hazards associated with the work. • Assessment of the risks associated with each identified hazard. • Specific measures to control or mitigate the identified risks. • Personal Protective Equipment (PPE) - list of required PPE for all workers and visitors. • Details on the placement and type of safety signage to be used (this includes within the work area, on plant, on pedestrian barriers, etc.). • Procedures to be followed in case of an emergency.
Temporary Traffic Control Plan (TTCP)	<ul style="list-style-type: none"> • As outlined in requirements for TTCP.
Emergency Response Plan	<ul style="list-style-type: none"> • As outlined in requirements for ERP.
Health, Safety & Environment Plan (HSEP)	<ul style="list-style-type: none"> • As outlined in requirements for HSEP.
Quality Control Plan (QCP)	<ul style="list-style-type: none"> • As outlined in requirements for QCP.
Waste Management Plan (WMP)	<ul style="list-style-type: none"> • As outlined in requirements for WMP.
Roles and Responsibilities	<ul style="list-style-type: none"> • List of key personnel involved in the project, along with their organization chart, respective roles and responsibilities.
Tools and Equipment	<ul style="list-style-type: none"> • Detailed list of tools and equipment to be used to complete the work. • Procedures for the inspection and maintenance of tools and equipment.
Communication Plan	<ul style="list-style-type: none"> • Methods for communicating between team members. • Methods for communicating with stakeholders, including the public and emergency services.
Checklists	<ul style="list-style-type: none"> • Marked up checklists as an Appendix or in main Plan, as appropriate.

Table 2.1.9.2.2: Temporary Traffic Control Plan (TTCP) Template



2.1.9.2 SUPPLEMENTARY MATERIAL

Works Notification Letter Template

A template is provided below for a Works Notification Letter, to be issued 2 weeks in advance of any infrastructure works. Reference should be made to the requirements set out in this Manual to inform the planning of works.

[Organization Logo]



مركز مشاريع البنية
التحتية بمنطقة الرياض
Riyadh Infrastructure Projects Center

Date: **[Insert Date]**

Dear Residents of **[Neighborhood Name/Street Name]**,

We hope this message finds you well. We are writing to inform you about upcoming infrastructure works in your area.

Description of Works: The planned works will take place in the **[Neighborhood Name/Street Name/Location Description]** area. These works are essential for [briefly describe the purpose, e.g., upgrading the water supply system, road maintenance, etc. and attach works general arrangement drawing].

Dates of Works: The works are scheduled to commence on **[Start Date]** and are expected to be completed by **[End Date]**.

Important Request: To ensure the safety and efficiency of the works, we kindly request all residents to keep the area clear of any vehicles during this period. This will help our team to carry out the necessary tasks without any hindrance.

We apologize for any inconvenience this may cause and thank you in advance for your cooperation. Should you have any questions or require further information, please do not hesitate to contact us at **[Contact Information]**.

Thank you for your understanding and support.

Sincerely,

[Name]
[Position]
[Contact Information]
[Organization]

2.1

PROJECT PLANNING

2.1.10 PROTECTING ASSETS & MINIMIZING DISRUPTION

2.1.10.1 Protecting Assets & Minimizing Disruption



2.1.10.1 PROTECTING ASSETS & MINIMIZING DISRUPTION

Code Statement: Coordinate with utility providers to identify and protect existing infrastructure assets and prevent service disruptions during construction activities. Plan and coordinate construction activities around those assets to minimize disruption to the community.

RATIONALE

Minimizing disruption and visual distortion during infrastructure projects is important for maintaining public support. By collaborating to identify buried services, then carefully plan and coordinate activities, Stakeholders can reduce the negative impact on local communities, maintain service levels, and protect existing infrastructure.

CONTEXT

Damage to existing utilities and disruption to people’s lives are hallmarks of infrastructure projects. No longer, RIPC will lead the charge in ensuring effective planning and communication to minimize damage and disruption, and garner public goodwill.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
KEY REQUIREMENTS	
<ul style="list-style-type: none"> Conduct desktop and site pre-construction surveys to identify and map existing utilities using Geographic Information Systems (GIS). Collaborate with Stakeholders to establish and implement a Protection Plan for Existing Infrastructure, articulating the measures that will be taken during construction to preserve existing utility routes. Avoid breaking into whatever paths that homeowners choose to install outside of their properties. In the case that breaking such pathways cannot be avoided, then the Contractor should re-instate the path as it was before. In the event that the materials cannot be preserved, the homeowner should be requested to sign a waiver relieving the Contractor of the obligation to reinstate with the same materials. Developers and homeowners: for new builds, establish a cavity such that utilities can be connected to the property without damaging paths around the property. 	<ul style="list-style-type: none"> Include an Emergency Plan in the event of accidental damage to existing buried services, along with supplementary processes and procedures (e.g. Emergency Return to Service Procedure) Clearly identify utility routes, including those discovered through surveys. After construction activities are completed, and before handover, conduct thorough inspections to ensure that all utilities remain undamaged and fully operational. Conduct Hazard Identification and Risk Assessment (HIRA) through the lens of disruption (i.e. loss of service, resident property damage, etc.).
MAIN OUTCOMES	
<ul style="list-style-type: none"> Protection of existing utility networks with no or minimal service disruptions. 	<ul style="list-style-type: none"> Protection of existing utilities with minimal service interruptions and no damage during construction.

KEY REFERENCES

Applicable Chapters, Forms and Templates

- **Chapter 2.3.1 Site Preparation and Management**

PROJECT LIFECYCLE

Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE

	P1. Safe, Compliant & Controlled
	P3. Clearly Communicated & Actively Engaged
	P4. Technologically Advanced & Data-driven
	P6. Community-Centric & Accessible

SUCCESS MEASUREMENT

1.2. Legal Compliance	<ul style="list-style-type: none"> • PI1.2.1. Number of legal non-compliance incidents (e.g., permit non-compliance).
P6.1. Public Accessibility	<ul style="list-style-type: none"> • PI6.1.2. Number of violations relevant to public accessibility.
P6.2. Community Benefits	<ul style="list-style-type: none"> • PI6.2.1. Service interruption rate.

LINKED VIOLATION

	V1. Barriers and Safety Compliance Issues
	V2. Permit and Regulation Compliance Violations
	V3. Infrastructure and Roads Issues
	V4. Worksite Management and Cleanliness Violations
	V5. Traffic and Parking Control
	V6. Boards and Information Violations

Consider

Advise

KEY REQUIREMENTS

- Schedule construction during off-peak hours and avoid major holidays or events.
- Establish project-level coordination meetings between RIPC, Service Entities, Consultants, and Contractors, particularly during stages 4 to 8.
- Where necessary, coordinate with Service Entities to relocate utilities avoid service interruptions and minimize impacts.
- Employ hoarding around the project site for long-term and/or special projects.

MAIN OUTCOMES

- Smooth project execution with minimal disruption to the community and existing services.
- Reduced visual distortion from breaking into walkways
- Improved project timelines through use of existing cavities

KEY STAKEHOLDERS

- CONTRACTOR
- SERVICE ENTITTY

2.2

SPATIAL PLANNING



2.2.1 SITE SAFETY

2.2.2 BARRIERS AND WARNING MEASURES

2.2.3 WORK ZONE MANAGEMENT

2.2.4 ACCESS AND COMMUNICATION PROTOCOLS

2.2

SPATIAL PLANNING

2.2.1 SITE SAFETY

2.2.1.1 Personal Protective Equipment (PPE)

2.2.1.2 Noise Management

2.2.1.3 Lighting - General

2.2.1.4 Lighting - Handheld and Portable Floodlights

2.2.1.5 Lighting - Pole Mounted Floodlights

2.2.1.6 Supplementary Material



2.2.1 SITE SAFETY

2.2.1.1 Personal Protective Equipment (PPE)

Code Statement: Ensure site safety through proper use of PPE.

RATIONALE

Implementing robust safety protocols, including the use of Personal Protective Equipment (PPE) reduces injury risks and ensures compliance with regulatory standards, fostering a safe and productive worksite.

CONTEXT

Site safety involves ensuring that all workers are equipped with appropriate PPE according to regulatory standards.

POSITIVE IMPACTS



Health & Safety



Quality of Life & Well-being



Public Perception



Accessibility & Movement



Economy & Business



Infra & Public Space



Environmental

Shall

REQUIREMENTS

- Ensure all site-based staff and visitors wear appropriate PPE, conforming to standards set by “Safety at Street Works and Road Works: A Code of Practice 2013”, within the site area (i.e., both inside and outside of the works area).
Required PPE includes:
 - High visibility jackets/vests.
 - High visibility trousers.
 - Hard hats.
 - Safety boots.
 - Any other special required PPE based on the nature of work and best practice safety procedures
- The following PPE should be available at all times and utilised when necessary (depending on site activity and RAMS):
 - Eye protection/safety goggles.
 - Ear defenders.
 - Safety gloves.
- PPE shall be fastened and maintained in a clean and useable condition.
- Contractors delivering projects in the Riyadh Region shall conform to a standard work uniform.
- All PPE should be in compliance with SASO safety standards for the KSA region.
- High visibility vests and trousers should consist of a minimum of two reflective strips.

MAIN OUTCOMES

- Prevent and reduce risk of injuries and accidents
- Consistent and professional appearance
- Enhanced safety
- Increased compliance
- Reduces man-hour downtime, increasing productivity

KEY REFERENCES

- Safety at Street Works and Road Works: A Code of Practice 2013
- SASO ‘Technical Regulation for Personal Protective Equipment and Clothing’

PROJECT LIFECYCLE			
Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE	
	P1. Safe, Compliant & Controlled
SUCCESS MEASUREMENT	
P1.1. Safety Compliance	<ul style="list-style-type: none"> PI1.1.2. Safety training completion rate PI1.1.1. Percentage of projects with zero lost-time injuries
P1.5. Traffic and Parking Control	<ul style="list-style-type: none"> PI1.5.2. Percentage of projects without traffic violations
LINKED VIOLATION	
	V1. Barriers and Safety Compliance Violations

Applicable Chapters, Forms and Templates

- [Chapter 2.1.4 Health & Safety Management](#)
- [Chapter 2.2.1.6 Supplementary Material](#)

Should	Consider	Advise
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REQUIREMENTS

- Ensure all site personnel are informed about appropriate PPE usage, with regular checks on the condition and correct use of all PPE items.
- PPE shown in Supplementary Material is suggested basic minimum requirements for use on work sites. The actual PPE requirements for a project should be determined through Risk Assessment.
- For long-term projects, all site-based staff should have their name and designated role displayed for ease of identification.
- Prohibit the use of personal headphones to ensure worker safety.

MAIN OUTCOMES

- Improved worker confidence
- Positive safety culture
- Enhanced labor morale

KEY STAKEHOLDERS

- CONTRACTOR



2.2.1 SITE SAFETY

2.2.1.2 Noise Management

Code Statement: Ensure site safety through proper noise management.

RATIONALE

Implementing robust safety protocols, including site noise management, ensures compliance with regulatory standards, fostering a safe and productive worksite.

CONTEXT

Site safety involves the management of noise according to regulatory standards. Noise is measured in Decibel A (dBA), a measurement unit of noise intensity as perceived by the human ear, using an audio filter (Filter-A), and the average noise level over time (LAeq, T). Residential areas, categorized by density (low, medium, high), have specific noise limits that must be adhered to during daytime and nighttime hours. Construction work; including drilling, building, demolishing, and repairing activities, must comply with these noise limits to ensure site safety and minimize disruption.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
--------------	---------------

KEY REQUIREMENTS

- | | |
|--|---|
| <ul style="list-style-type: none"> • Ensure noise levels comply with the Executive Regulations for Noise issued by the Ministry of Environment, Water, and Agriculture, using Sound Level Meters in vicinity of the work area. • Adhere to noise limits during daytime (07:00 to 20:00) and night-time hours (20:00 to 07:00). • Note that in residential areas, the permissible working hours are (07:00 to 18:00) and weekends (07:00 to 13:00). No works are allowed outside these hours for residential areas, except in exceptional cases, which require written approval from RIPC. • Refer to table “Permissible Noise Limits” for detailed guidelines. • For short construction activities durations, adjustments can be made to temporarily increase the permissible noise limits: <ul style="list-style-type: none"> ◦ Up to 2.5hrs: 10 dB increase. ◦ From 2.5 to 8hrs: 5dB increase. ◦ Over 8hrs: 0dB increase. • Monitor noise levels regularly and adjust work methods to minimize noise exposure. | <ul style="list-style-type: none"> • If noise limits are exceeded, approval and a temporary noise permit from the Ministry of Environment, Water, and Agriculture is required. • Comply with conditions and requirements specified in the relevant noise permits. • Contractors must monitor noise levels during the work. |
|--|---|

MAIN OUTCOMES

- Minimized disturbances to nearby residents and businesses, enhancing their quality of life.
- Protect workers and the public from potential hearing damage and stress-related health issues.

KEY REFERENCES

- Executive Regulations for Noise issued by the Ministry of Environment, Water, and Agriculture (MEWA)
- SHC 701

Area	Daytime L _{Aeq} , T(dB)	Night-time L _{Aeq} , T(dB)
Low-density residential areas, tourist attractions, parks, surroundings of hospitals, schools, elder care Centers, and nurseries.	50	40
Medium-density residential areas	55	45
High-density residential and mixed-use areas	60	50
Roadsides (main roadsides and highways)	70	65
Industrial Zones	70	65

Table 2.2.1.2.1: Permissible Noise Limits
(Executive Regulation For Noise, MEWA)

Applicable Chapters, Forms and Templates

- [Chapter 2.1.4 Health & Safety Management](#)
- [Chapter 2.2.1.6 Supplementary Material](#)

PROJECT LIFECYCLE

Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE



P1. Safe, Compliant & Controlled

SUCCESS MEASUREMENT

P1.1. Safety Compliance

- PI1.1.2. Safety training completion rate
- PI1.1.1. Percentage of projects with zero lost-time injuries

P1.5. Traffic and Parking Control

- PI1.5.2. Percentage of projects without traffic violations

LINKED VIOLATION



V1. Barriers and Safety Compliance Violations

Consider

- Use noise control measures, such as dampening techniques, and adjust work schedules to reduce noise during sensitive times.

Note: Residential Area Densities as Per MEWA Executive Regulations:

- **Low-density:** 4 to 8 units per 10,000 m² or 1,000 to 3,999 persons per km².
- **Medium-density:** 9 to 14 units per 10,000 m² or 4,000 to 6,999 persons per km².
- **High-density:** 15 to 20 units per 10,000 m² or 7,000 to 9,999 persons per km².

Advise

KEY REQUIREMENTS

- Regularly monitor noise levels using approved methods, according to the Executive Regulation for Noise under the Environmental Law.
 - **Measurement Conditions:** Conduct measurements under specific conditions, including time of day, weather, and location.
 - **Time of Day:** Take measurements at different times to capture noise variations.
 - **Weather Conditions:** Avoid extreme weather; ensure accuracy by measuring under appropriate conditions.
 - **Location:** Choose representative locations that reflect typical noise levels.
 - **Measurement Duration:** Measure over sufficient periods, typically several minutes, for accurate representation.
 - **Calibration:** Calibrate sound level meters before and after measurements.
 - **Equipment Standards:** Use calibrated sound level meters meeting international standards.
 - **Data Recording:** Record detailed information, including date, time, location, weather, and noise levels.
- Switch off machinery when not in operation.

MAIN OUTCOMES

- Adjusting work methods and schedules to manage noise levels ensures smoother project execution without interruptions due to noise complaints or regulatory breaches.

KEY STAKEHOLDERS

- CONTRACTOR



2.2.1 SITE SAFETY

2.2.1.3 Lighting – General

Code Statement: Ensure site safety through adequate and compliant lighting.

RATIONALE

Implementing robust safety protocols, including the use of site lighting, reduces risk of injuries and ensures compliance with regulatory standards, fostering a safe and productive worksite.

CONTEXT

Site safety involves ensuring that the site is properly lit, according to regulatory standards. The specifications for Work Area lighting vary based on the type of task and the size of the area. Using luminaires such as flood lights, portable light towers, and balloon lighting can significantly reduce risks for road workers in low-light conditions, particularly during excavations. Additionally, placing warning lights such as beacons and arrow boards around the work control zone helps direct road users away from the site.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
KEY REQUIREMENTS	
<ul style="list-style-type: none"> All site lighting installations must comply with relevant standards and be rated for outdoor use with a minimum IP65 ingress protection rating. All electrical cabling must be safely managed to prevent hazards such as trips, slips, and electrocution. Cabling must not cross access roads or pathways, and loose cabling must be minimized. Lighting materials must adhere to SASO RoHS regulations and Saudi Arabia’s Waste Management Law as per Section 2.1.6.1. Minimum technical conditions detailed in the supplementary materials to be fulfilled. Design lighting to avoid glare impacting residences or businesses. Ensure night-time lighting does not interfere with contraflow or other traffic-related lighting systems. 	<ul style="list-style-type: none"> Lighting Levels: <ul style="list-style-type: none"> The required lighting levels are influenced by various factors, including the level of detail needed, the age of the workers, and the speed and accuracy required. These specifications are outlined in the CIBSE Code for Lighting. Lighting should meet the “Recommended Illuminance Levels” table requirements for various activities (see Supplementary Material), with higher levels for high-risk or detailed tasks. Luminaires should be tested for performance characteristics, including power consumption, luminous output, spectrum, color, and efficiency. Luminaires must comply with safety and photometric data standards, including EN 60598-1, EN 60598-2-5, and EN 62471:2009 for photobiological safety. A comprehensive warranty of at least 3 years should be provided for lighting, covering the entire luminaire, LED module, and driver.
MAIN OUTCOMES	
<ul style="list-style-type: none"> Reduced risk of injuries and accidents by providing adequate site lighting. 	

KEY REFERENCES

- CIBSE Code for Lighting (2022)
- EN 60598-1, EN 60598-2-5, and EN 62471:2009
- SASO RoHS regulations

PROJECT LIFECYCLE			
Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE	
	P1. Safe, Compliant & Controlled

SUCCESS MEASUREMENT	
P1.1. Safety Compliance	<ul style="list-style-type: none"> PI1.1.2. Safety training completion rate PI1.1.1. Percentage of projects with zero lost-time injuries
P1.5. Traffic and Parking Control	<ul style="list-style-type: none"> PI1.5.2. Percentage of projects without traffic violations

LINKED VIOLATION	
	V1. Barriers and Safety Compliance Violations

Applicable Chapters, Forms and Templates

- [Chapter 2.1.4 Health & Safety Management](#)
- [Chapter 2.1.5 Environmental Management](#)
- [Chapter 2.1.6 Waste Management](#)
- [Chapter 2.2.2 Barriers and Warning Measures](#)
- [Chapter 2.2.1.6 Supplementary Material](#)

Consider	Advise
----------	--------

KEY REQUIREMENTS

- | | |
|--|---|
| <ul style="list-style-type: none"> • Provide additional illumination for precision activities to enhance safety and accuracy. • Choose lighting equipment rated for temperatures expected in the operational environment to ensure reliability. • Consider the type of floodlights to be used on work sites - the characteristics of which depend on their intensity and mounting height. • The different types whose characteristics are indicated in the following sections are: <ul style="list-style-type: none"> ▫ Handheld and portable floodlights. ▫ Floodlights on supports up to 6m high. | <ul style="list-style-type: none"> • Conform to all technical specifications in the supplementary materials. • Manufacturers are advised to provide data sheets, diagrams, and test reports to verify compliance with requirements: |
|--|---|

MAIN OUTCOMES

- Elevate site safety and efficiency of works execution.

KEY STAKEHOLDERS

- CONTRACTOR



2.2.1 SITE SAFETY

2.2.1.4 Lighting - Handheld and Portable Floodlights

Code Statement: Ensure site safety and efficiency through the proper use of handheld and portable floodlights.

RATIONALE

Implementing the use of handheld and portable floodlights enhances visibility and safety on construction sites, ensuring that work can be carried out efficiently and safely.

CONTEXT

Site lighting should be in place when works are carried out to ensure that all areas are adequately illuminated using portable floodlights. These floodlights are designed to be placed on stable surfaces and directed as needed to provide optimal lighting conditions, reducing the risk of accidents and improving overall work efficiency.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
KEY REQUIREMENTS	
<ul style="list-style-type: none"> Handheld and portable floodlights shall be suitable for outdoor use. The beam of light may be directed in a vertical direction. Supports of the headlamp bracket should be in contact with the ground. Floodlights should be fitted with a handle for easy handling and movability. Handheld and portable floodlights should comply with CE & SASO safety standards. In terms of light source, floodlights shall be of LED type, with a color temperature of 3,000K. 	<ul style="list-style-type: none"> Floodlights should be used at least at two points at an angle of 60° to the illuminated point. Chassis made of die-cast aluminium finished in a color to be defined, with synthetic material protection (polyurethane, PVC or polychloroprene) in the parts most exposed to knocks. The projector chassis is supported by a structure that allows it to be placed separately from the floor and oriented towards the area to be illuminated. It should be equipped with an ergonomic grip. A glass impact protection grille may be required to protect the glass from damage on site. Floodlights should have a minimum protection rating of IP65.
MAIN OUTCOMES	
<ul style="list-style-type: none"> Reduced risk of injuries and accidents by providing adequate site lighting. 	

KEY REFERENCES

- CE marking - EU requirements
- SASO safety standards

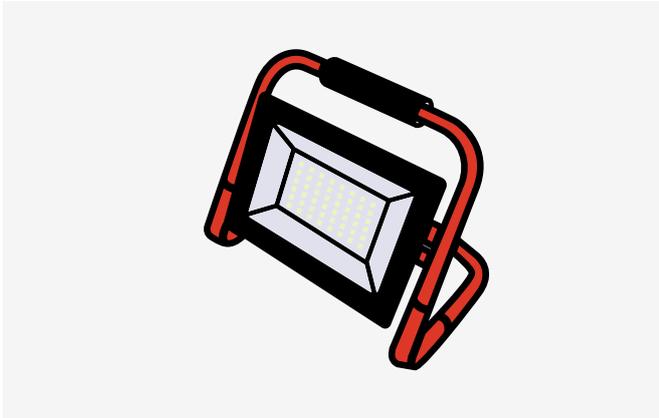


Figure 2.2.1.4.1: LED Flood Light (handheld and portable)

Applicable Chapters, Forms and Templates

- [Chapter 2.1.4 Health & Safety Management](#)
- [Chapter 2.2.2 Barriers and Warning Measures](#)
- [Chapter 2.2.1.6 Supplementary Material](#)

PROJECT LIFECYCLE			
Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE	
	P1. Safe, Compliant & Controlled
SUCCESS MEASUREMENT	
P1.1. Safety Compliance	<ul style="list-style-type: none"> • PI1.1.1. Percentage of projects with zero lost-time injuries
LINKED VIOLATION	
	V1. Barriers and Safety Compliance Violations

Consider

Advise

KEY REQUIREMENTS

- | | |
|---|--|
| <ul style="list-style-type: none"> • Handheld and portable floodlights may be battery operated. • Operating temperature between -20°C to +50°C. | <ul style="list-style-type: none"> • Ensure portable floodlights are securely positioned and regularly checked to maintain optimal visibility and safety during infrastructure works. |
|---|--|

MAIN OUTCOMES

- Elevate site safety and efficiency of works execution.

KEY STAKEHOLDERS

- CONTRACTOR



2.2.1 SITE SAFETY

2.2.1.5 Lighting – Pole Mounted Floodlights

Code Statement: Ensure site safety and efficiency through the proper use of floodlights mounted on poles.

RATIONALE

Implementing the use of floodlights on 6m poles enhances visibility and safety on construction sites, ensuring that work can be carried out efficiently and safely in outdoor environments.

CONTEXT

Construction site lighting ensures all areas are well-lit with floodlights mounted on poles. These floodlights are strategically placed to provide optimal lighting, reducing risk of accidents and enhancing work efficiency.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
KEY REQUIREMENTS	
<ul style="list-style-type: none"> To avoid hard shadows and ensure thorough illuminance of the works, at least two floodlights (or groups of floodlights) shall be placed at two points at an angle of 60° to the illuminated point. Floodlights shall be suitable for outdoor operation. Light Source: <ul style="list-style-type: none"> LED type light source. Color temperature of 3,000K. Luminous flux between 15,000lm and 30,000lm. Floodlights should comply with CE & SASO safety standards. 	<ul style="list-style-type: none"> These type of floodlights shall be used for the illumination of small areas and vertical planes of larger dimensions than the portable equipment. Chassis: <ul style="list-style-type: none"> Chassis made of die-cast aluminium. Support that allows its free orientation both vertically and on its axis. The support can be anchored on a mobile or fixed structure and in vertical, horizontal and inclined planes. Driver incorporated inside the chassis. Tempered safety glass. Impact protection grille may be required.
MAIN OUTCOMES	
<ul style="list-style-type: none"> Reduced risk of injuries and accidents by providing adequate site lighting. 	

KEY REFERENCES

- CE marking - EU requirements
- SASO safety standards

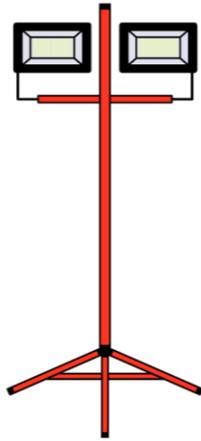


Figure 2.2.1.5.1: Typical portable floodlight



Figure 2.2.1.5.2: Typical pole mounted floodlights

Applicable Chapters, Forms and Templates

- [Chapter 2.1.4 Health & Safety Management](#)
- [Chapter 2.2.2 Barriers and Warning Measures](#)
- [Chapter 2.2.1.6 Supplementary Material](#)

PROJECT LIFECYCLE			
Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE	
	P1. Safe, Compliant & Controlled

SUCCESS MEASUREMENT	
P1.1. Safety Compliance	<ul style="list-style-type: none"> • PI1.1.2. Safety training completion rate • PI1.1.1. Percentage of projects with zero lost-time injuries
P1.5. Traffic and Parking Control	<ul style="list-style-type: none"> • PI1.5.2. Percentage of projects without traffic violations

LINKED VIOLATION	
	V1. Barriers and Safety Compliance Violations

Consider	Advise
-----------------	---------------

KEY REQUIREMENTS

- | | |
|--|---|
| <ul style="list-style-type: none"> • In order to avoid the emission of light into the sky in sensitive locations or areas of protection, the use of asymmetric beam floodlights is recommended. This precaution should always be considered when trespass light can be created in residential spaces. • Other Technical Characteristics: <ul style="list-style-type: none"> ▫ Minimum protection rate IP65. ▫ Operating temperature: -20°C to +50°C. ▫ Power consumption: 120 - 250W max. | <ul style="list-style-type: none"> • These floodlights may be fixed or on mobile structures at a height. The mobile structures may be electrically powered from diesel generators, mains electricity or lithium batteries and use several floodlights. |
|--|---|

MAIN OUTCOMES

- Elevate site safety and efficiency of works execution.

KEY STAKEHOLDERS

- CONTRACTOR

2.2.1 SITE SAFETY

2.2.1.6 Supplementary Material

PPE



Figure 2.2.1.6.1: Standard Issue PPE

WHAT TO LOOK OUT FOR

PPE – Contractor

- Is specified PPE in line with standards and risk assessment?
- Are all site personnel and visitors wearing PPE with the contractor's name/logo printed?
- Is PPE fastened and maintained in a clean and useable condition?

Noise Management

WHAT TO LOOK OUT FOR

Contractor

- Does the Work Method Statement identify all noise-generating activities?
- Have noise control measures been implemented for each identified activity?
- Are noise levels regularly monitored to ensure compliance with permissible limits?
- Is ear protection (e.g., earplugs or earmuffs) available to all site personnel?
- Are all noise-generating activities conducted in accordance with the Executive Regulations for Noise?
- Are approvals or permits in place for any activities that exceed permissible noise limits?
- Have all site personnel been informed about noise hazards and control measures?
- Are regular noise assessments conducted to review the effectiveness of noise controls?

General Site Lighting Levels

Activity	Typical location / types of work	Eav (Avg. illuminance Lux)	Emin (Min. illuminance lux)
Movement of people, machines and vehicles	Lorry park, corridors, circulation routes	20	5
Movement of people, machines and vehicles in hazardous areas; rough work not requiring any perception of detail	Construction site clearance, excavation and soil work, loading bays...	50	20
Work requiring limited perception of detail (*)	Civil works, concrete works...	100	50
Work requiring perception of detail (*)	Sheet metal works, electrical works,...	200	100

Lighting levels in the table provide recommended illuminance for safety purposes.
 (*) Average and minimum values requested in the horizontal and vertical planes.

Table 2.2.1.6.1: Recommended Illuminance Levels



2.2.1 SITE SAFETY

2.2.1.6 Supplementary Material

General Site Lighting - Quality Assurance Control

General Technical Conditions

Manufacturer to comply with and provide Data Sheets, plans, diagrams, test results for compliance and other relevant documents for all the following aspects:

Housing:

- Material: Pressure die-cast aluminium housing LM6 (EN-AC-44100).
- Documentation and Certification: Aluminium alloy certificate from the foundry.
- Design: Separate compartments for optical and control gear components.
- Fixation: Designed to be fixed both horizontally and vertically.
- Surface: Flat and smooth to prevent dirt accumulation and ensure proper dissipation.
- Thermal Management: Independent control compartments and LEDs to extend luminaire lifespan.

LED Source Specs:

- Color Temperature: 3,000K.
- LED Efficiency: $\geq 140\text{lm/W}$ at 350mA and 25°C.
- Luminaire Efficiency: $> 120\text{lm/W}$ at 350mA and 25°C.
- Color rendering index (CRI): > 60 .
- Estimated Life: L80B10 at 50,000 hours (TM-21 based on LM-80 data).
- Documentation: Laboratory measurements using EN 13032-4 regulations, LLMF graph based on LM-80 data and TM-21 calculations.

Electric Specifications:

- Driver Operation: 210 - 240 VAC, 50-60Hz.
- Temperature Range: 0°C to +50°C, certified by a third-party lab.
- Power Efficiency: $>90\%$.
- Driver Container Temperature: -10°C to 75°C.
- Power Factor: >0.9 at maximum load.
- Driver Output Current: 350mA - 1000mA.
- Surge Protection: Internal protection $\geq 4\text{kW}$.
- Total Harmonic Distortion: $<20\%$.
- External Surge Protection: Up to 10 kV, per IEC 61547 and IEC 61643.
- Electrical Safety: IEC Class I or II on request; Class III for battery-powered projectors.
- Documentation: Relevant documentation and tests about the drivers to be installed in the luminaire.

Mechanical Specifications:

- Wind Resistance: Withstands 150km/h.
- Compartments: Separate optical and control gear, both IP66.
- Impact Resistance: $\geq \text{IK 08}$, per IEC 62262, verified by a third party.
- Exterior Paint: ISO 9227-NSS, class S or higher after 2500 hours (ASTM D3359-78/ISO 4628-2/ISO 4628-4).
- Tilt Adjustment: -45° to +45°.

Other Specifications:

- FHS: $< 2\%$.
- Photometric Distributions: Narrow, Medium, or Wide.
- Warranty: 3 years for LED luminaire.
- Certifications: SASO and CE.



WHAT TO LOOK OUT FOR

Lighting – Contractor

- Is illumination in accordance with standards and guidance for the type of activity?
- Is light being spilled out of the site?
- Are local residences and business shielded from glare?
- Are appropriate safety measures in place for electrical lighting?
- Are luminaires placed correctly to reduce glare on workers?

Report of tests or certificates on the luminaire and its components

In order to verify the quality of the materials, the results of tests carried out on its luminaires may be requested from the manufacturer. The manufacturer shall submit at least the test reports listed below. In case of doubt, a SASO accredited laboratory may be asked to carry out the test.

Security Requirements:

EN 60598-1: General requirements and tests.
 EN 60598-2-5: Particular requirements for floodlights.
 EN 62471:2009: Photo-biological safety.
 Degree of tightness certificate per EN 60598.

Electromagnetic Compatibility:

EN 61000-3-2: Limits for harmonic current emissions.
 EN 61000-3-3: Voltage variations, fluctuations, and flicker limits.
 EN 55015: Radio disturbance characteristics.
 EN 61547: EMC immunity requirements.

Luminaire Components:

EN 62031: LED modules safety specifications.
 EN 61347-2-13: Requirements for LED control gear.
 EN 62384: Performance requirements for LED control gear.
 IEC EN 62471: Photo Biological Safety test.
 RoHS compliance for LED floodlights.

Guarantees:

Minimum Warranty: 3 years for the entire set (luminaire, LED module, driver, and components).

Total Luminaire Failure: Defined as no light emission due to driver or LED module failure, or reduced luminosity below L80B10 expectations.

Power System Failure: Drivers must operate without characteristic alterations during the warranty period.

Mechanical Defects: Coverage for material, workmanship, or manufacturing defects.

Luminous Flux Reduction: Luminaire must maintain specified luminous flux (L80B10).

Usage Coverage: 4,200 hours/year or 15,000 hours total operation.

Handheld and Portable Floodlights

Further technical details:

- Luminous Flux:
 - Low Power: between 1,500 to 2,500lm.
 - Medium Power: between 3,500 and 7,500lm.
 - High Power: >7,500lm.
 - Beam Angle: 120°.
- Protection Rate: Minimum IP65.
- Power Consumption:
 - Low Power: 20 - 40W.
 - Medium Power: 40 - 70W.
 - High Power: >100W.
- Operating Temperature: -20°C to +50°C.
- Battery Option:
 - Estimated Power: 20W, 1,600lm.
 - Battery Data: Li-ion, 5V, 5,000mAh.
 - Battery Life: > 2 hours at full power.
 - Self-resetting fuse protection in battery version.

2.2

SPATIAL PLANNING

2.2.2 BARRIERS AND WARNING MEASURES

- 2.2.2.1 Channelizing Devices and Barrier Placement
- 2.2.2.2 Temporary Safety Barriers Installation
- 2.2.2.3 Battery-Operated Warning Lights
- 2.2.2.4 Hazard Identification Beacon
- 2.2.2.5 Flashing Warning Arrow Panels
- 2.2.2.6 Hand Signalling Devices and Paddles
- 2.2.2.7 Traffic Control Signals
- 2.2.2.8 Advance Warning Area Setup
- 2.2.2.9 Supplementary Material

2.2.2 BARRIERS AND WARNING MEASURES

2.2.2.1 Channelizing Devices and Barrier Placement

Code Statement: Properly space and maintain channelizing devices and barriers to guide traffic safely.

RATIONALE

Adequately managed channelizing devices enhance safety by clearly directing traffic, preventing confusion, and reducing the risk of collisions near construction activities.

CONTEXT

Proper spacing and use of channelizing devices and barriers are essential for safely guiding traffic through transition zones.

POSITIVE IMPACTS



Health & Safety



Quality of Life & Well-being



Public Perception



Accessibility & Movement



Economy & Business



Infra & Public Space



Environmental

Shall

REQUIREMENTS

Spacing of Channelizing Devices in Tapers

- The Contractor shall set out channelizing devices in accordance with SHC 305 and RTMG Version 1.
- The spacing on the edges of tapers should give motorists the impression of a continuous guiding line. The maximum spacing of channelizing devices within a taper is provided in the "Spacing of Channelizing Devices Based on Speed Limits" table.
- This does not apply to portable barriers or barricades, which should be connected. Shorter spacing may be needed if drivers are moving between the devices.

Barriers

- Use barriers in accordance with SHC 305 to channelize traffic, separate two-way traffic on adjacent lanes, and protect roadside objects or personnel and site working team. Refer to the chapter on Lateral Buffer Zone for details on Safety Barriers.
- Install barriers to prevent vehicles from leaving the roadway, ensuring redirection with minimal injury or damage.
- Concrete barriers branding to be implemented as per requirements set out supplementary material.

Hoardings

- Use hoardings, when appropriate, in accordance with SHC 305 to protect drivers and pedestrians from work areas, especially from construction works, deep excavations, and hazardous materials.
- Use hoardings around the entire work area as requested by RIPC, possibly extending to lateral buffer zones. Hoardings shall be installed where the work zone is greater than or equal to 300m and shall include RIPC and Service Entity logos placed at the bottom left & right corners of each panel. Refer to hoarding criteria table 2.2.2.9.11.
- Site hoarding set-up (including lighting) should be coordinated and agreed with RIPC prior to installation.
- For other works, attach a green mesh safety net to barriers.

MAIN OUTCOMES

- Traffic Control Devices that are deployed safely and effectively.

KEY REFERENCES

- SHC 305
- SHC 602
- RTMG Version 1

Speed Limit (km/h)	Spacing of Channelizing Devices (m)
< 50	3
50 - 70	6
> 70	12

Table 2.2.2.1.1: Spacing of Channelizing Devices Based on Speed Limits

Applicable Chapters, Forms and Templates

- [Chapter 2.1.3 Traffic Control](#)
- [Chapter 2.2.3 Work Zone Management](#)
- [Chapter 2.2.3.3 Lateral Buffer Zone Specifications](#)
- [Chapter 2.2.2.9 Supplementary Material](#)

PROJECT LIFECYCLE			
Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE	
	P1. Safe, Compliant & Controlled
	P2. Effectively Managed & Continuously Improved
SUCCESS MEASUREMENT	
P1.1. Safety Compliance	<ul style="list-style-type: none"> • PI1.1.3. Number of corrective actions arising from safety audits per project
P2.2. Worksite Management	<ul style="list-style-type: none"> • PI2.2.4. Percentage of projects without barriers and safety violations
LINKED VIOLATION	
	V1. Barriers and Safety Compliance Violations

Should	Consider	Advise
--------	----------	--------

REQUIREMENTS

- | | | |
|--|---|--|
| <ul style="list-style-type: none"> • Ensure barriers and hoardings are properly maintained and installed securely to prevent damage or collapse. • Ensure hoardings are 2-3 meters high, made of environmentally friendly materials, and do not disturb the area. • Use posts or other devices to ensure stability. • Maintain hoardings and propose them to the relevant authorities. • Equip barricades or barriers used at night with steady burning lights that are tidy and secure to avoid visual distortion. The color grade is measured as 3000 – 4000 Kelvin. • Lighting accessories to be implemented as per supplementary material. | <ul style="list-style-type: none"> • Use green mesh safety nets on all other works to provide visibility and safety for both workers and the public. • Ensure hoarding does not restrict visibility to the Project Information Board (PIB). No hoarding should be placed where there is a PIB erected. • Note: Refer to the approved designs for barriers, hoarding, and signage as described in this document. New projects and entities with a special branding are encouraged to consult and coordinate with RIPC to ensure consistency and compliance with the overarching infrastructure guidelines. | <ul style="list-style-type: none"> • Inspect barriers, hoardings, and channelizing devices regularly to confirm they meet placement, stability, and visibility standards. |
|--|---|--|

MAIN OUTCOMES

- Protect drivers and pedestrians from work areas.

KEY STAKEHOLDERS

- CONTRACTOR
- RIPC



2.2.2 BARRIERS AND WARNING MEASURES

2.2.2.2 Temporary Safety Barriers Installation

Code Statement: Use temporary safety barriers to protect work zones and guide traffic safely.

RATIONALE

Safety barriers act as a physical deterrent, shielding work areas from oncoming traffic and ensuring a controlled and safe environment around construction sites.

CONTEXT

Temporary safety barriers are critical for protecting motorists and work zones, reducing the severity of crashes, and guiding traffic safely. These barriers must meet specific standards to ensure effectiveness and safety.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
REQUIREMENTS	
<ul style="list-style-type: none"> Set up temporary safety barriers according to SHC 305 standards. Ensure barriers' tested dynamic deflection suits the lateral buffer zone. All barriers must be MASH-tested (Manual for Assessing Safety Hardware). Install barriers considering traffic speed and lateral buffer distance, following the supplier's or manufacturer's recommendations, including proper linking or filling with water or sand. Unfilled plastic barriers can serve as delineation or channelization devices/barricades. Follow the table in the supplementary materials titled "Minimum Temporary Traffic Controls for Re-asphalting Works & Non-Long-term Utility Works" for guidance on selecting safety buffer delineation and barrier types. Ensure all safety barriers comply with SHC 305 and suit the traffic speed and lateral buffer zone. Conduct a risk assessment for each site and implement specific risk mitigation measures to protect workers and the public from any open excavations. 	<ul style="list-style-type: none"> The start of a portable barrier section is a serious hazard unless precautions are taken to prevent the unguarded vertical face from being hit by vehicles. Where practicable, flare out the leading end of portable barriers from the edge of the roadway and fit with a sloping terminal section, or install a crash cushion at the beginning of a portable barrier. Use safety barriers along the lateral buffer zone adjacent to the work area; barriers are not required in taper zones or to separate the work area from pedestrians. Use worker symbolic signs and all required regulatory and warning signs when workers are present and visible. Safety barrier figures are included in supplementary materials. For long-term projects with open excavations deeper than 0.3m and wider than 0.1m, use the temporary barrier types listed in the table titled "Minimum Temporary Barrier Types for Long Term Works Adjacent to Open Excavations", regardless of the lateral buffer distance. This table specifies the appropriate barriers to ensure safety around open excavations. If the table titled "Minimum Temporary Traffic Controls for Re-asphalting Works & Non-Long-term Utility Works" recommends a higher-level temporary barrier, it should be used. This second table provides guidance on selecting traffic controls based on various site conditions to enhance safety.
MAIN OUTCOMES	
<ul style="list-style-type: none"> Protect workers and the public from hazards. 	<ul style="list-style-type: none"> Use appropriate barriers based on site-specific factors.

KEY REFERENCES

- | | |
|--|---|
| <ul style="list-style-type: none"> MASH (Manual for Assessing Safety Hardware) SASO EN 12767 | <ul style="list-style-type: none"> NCHRP 350 (NCHRP, 1992). SHC 305 |
|--|---|

Applicable Chapters, Forms and Templates

- [Chapter 2.1.3 Traffic Control](#)
- [Chapter 2.2.3 Work Zone Management](#)
- [Chapter 2.2.3.3 Lateral Buffer Zone Specifications](#)
- [2.2.3.6 Pedestrian Walkways and Paths Management](#)
- [Chapter 2.2.2.9 Supplementary Material](#)

PROJECT LIFECYCLE			
Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE	
	P1. Safe, Compliant & Controlled
SUCCESS MEASUREMENT	
P1.1. Safety Compliance	<ul style="list-style-type: none"> • PI1.1.1. Percentage of projects with zero lost-time injuries
P1.3. Quality Assurance	<ul style="list-style-type: none"> • PI1.3.1. Percentage of projects passing quality audits with no major issues
LINKED VIOLATION	
	V1. Barriers and Safety Compliance Violations

Consider	Advise
-----------------	---------------

REQUIREMENTS

- | | |
|--|---|
| <ul style="list-style-type: none"> • When deploying temporary safety barriers near trenches, integrate the zone of influence of the trench into the shoring design for comprehensive safety. • Use the safety barrier as a standard barrier or channelization device, and as a base for additional structures like fencing or hoarding, ensuring it meets SHC 305 requirements. • Ensure every non-frangible/rigid obstacle in the Work Area within the Clear Zone is addressed as a hazard, while flexible or frangible obstacles are not considered dangerous. • Certify traffic control devices as frangible or deformable according to crash test standards SASO EN 12767, US MASH (2016), or NCHRP 350 (1992). • Site-specific risk assessment must be conducted for all sites. • In some situations a Plastic Safety Barrier may be suitable for sites with a speed greater than 50km/hr where there is a suitable lateral buffer zone which can be provided. • Concrete jersey barriers can be equipped with reflective markings, glare shields, and lighting to enhance nighttime visibility and overall traffic management safety, durability, and efficiency, as detailed in the supplementary materials. | <ul style="list-style-type: none"> • Ensure the correct type of barrier is specified for the site conditions. • Verify barriers are correctly installed and maintained to meet the safety standards. <p>Note:
MASH (Manual for Assessing Safety Hardware) is a standardized evaluation process developed by the American Association of State Highway and Transportation Officials (AASHTO) to assess the safety performance of roadside safety hardware, including barriers, crash cushions, and guardrails. MASH testing ensures these devices effectively protect motorists and mitigate crash severity. It evaluates the maximum dynamic deflection of barriers at various traffic speeds to ensure their effectiveness.</p> |
|--|---|

MAIN OUTCOMES

- Follow standards and conduct risk assessments.

KEY STAKEHOLDERS

- CONTRACTORS
- CONSULTANTS



2.2.2 BARRIERS AND WARNING MEASURES

2.2.2.3 Battery-Operated Warning Lights

Code Statement: Install battery-operated warning lights to enhance visibility in low-light conditions..

RATIONALE

Warning lights improve night-time work zone safety, reducing the risk of accidents by ensuring traffic control devices remain visible under all conditions.

CONTEXT

Battery-operated warning and delineation lights provide essential visibility and guidance at night and in low-light conditions, enhancing the safety of work zones.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall

REQUIREMENTS

- The Contractor shall install and maintain battery-operated warning lights according to SHC 305 standards, ensuring:
 - These portable, battery-operated lights have a plastic lens that emits a yellow light. They are used with warning signs, barricades, drums, reflecting panels, or other devices. See the first light type of warning beacons in the figure “Warning Beacons”.
 Comparison of Light Characteristics for Types A, B, and C:
 - Type A (low brightness flasher): Used on barricades and drums, vertical reflecting panels, and supports for advance warning signs, operational from dusk to dawn. Intended to call attention to the device and warn drivers of hazardous areas. Should not be used for delineation purposes.
 - Type B (high brightness flasher): Used with advance warning signs on the approach to a work area, operational day and night. Can be used with barricades, signs, and other supports in extremely hazardous conditions.
 - Type C (steady burn): Used to supplement reflective panels and longitudinal barricades to delineate vehicle paths through work zones.
 - When mounted on barricades or safety barriers, the bottom of the lens should be approximately 1m above the ground. Minimum Specifications:
 - Lens diameter: 150mm.
 - Flash rate: 55 to 75 flashes per minute for Type A and B.
 - Visibility: Type A – 1,000m (night), Type B – 350m (sunny day), Type C – 100m (night)
 - Refer to table “Comparison of Light Characteristics for Types A, B, and C” in the supplementary materials for further details.

MAIN OUTCOMES

- Warning lights that are consistent, ergonomically and aesthetically specified.

KEY REFERENCES

- SHC 305

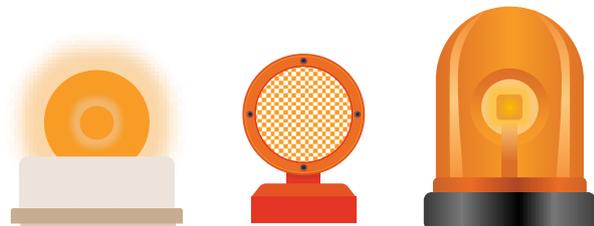


Figure 2.2.2.1: Warning Beacons (SHC 602)

Applicable Chapters, Forms and Templates

- [Chapter 2.1.3 Traffic Control](#)
- [Chapter 2.2.1.3 Lighting - General](#)
- [Chapter 2.2.2.9 Supplementary Material](#)

PROJECT LIFECYCLE			
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PRINCIPLE	
	P1. Safe, Compliant & Controlled
SUCCESS MEASUREMENT	
P1.1. Safety Compliance	<ul style="list-style-type: none"> • PI1.1.1. Percentage of projects with zero lost-time injuries
P1.5. Traffic and Parking Control	<ul style="list-style-type: none"> • PI1.5.1. Number of traffic control-related complaints per project
LINKED VIOLATION	
	V1. Barriers and Safety Compliance Violations

Should	Consider	Advise
--------	----------	--------

REQUIREMENTS

- | | | |
|--|--|---|
| <ul style="list-style-type: none"> • Attach lights with vandal-resistant fasteners to barricades or barriers, ensuring stability and correct alignment. | <ul style="list-style-type: none"> • Type A and C lights should automatically turn off during daylight hours. | <ul style="list-style-type: none"> • Inspect and maintain all warning lights to ensure correct operation and compliance with safety standards. |
|--|--|---|

MAIN OUTCOMES

KEY STAKEHOLDERS

- CONTRACTORS
- CONSULTANTS

2.2.2 BARRIERS AND WARNING MEASURES

2.2.2.4 Hazard Identification Beacon

Code Statement: Use Hazard Identification Beacons to provide clear, visible warnings of potential hazards in work zones, enhancing safety and guiding motorists effectively.

Hazard Identification Beacons enhance safety in work zones by providing clear, visible warnings to motorists about potential hazards. Their flashing yellow light draws attention, ensuring drivers are aware of changes in road conditions or construction activities. The beacons' specifications, including lens size, flash rate, and brightness, maximize visibility and effectiveness. By supplementing Warning or Regulatory signs, these beacons help maintain orderly traffic flow and reduce accident risks. Their versatile placement and power options, including trailer-mounted units, make them adaptable to various work site conditions.

A Hazard Identification Beacon is a traffic signal with a flashing yellow light, used to supplement Warning or Regulatory signs. It operates whenever a hazard exists and can be placed on cones, barricades, temporary barriers, TMA, and Work Zone vehicles. The beacon can be a single or dual flashing unit, typically powered by a 110 V or 220 V source, or a portable generator.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall
REQUIREMENTS
<ul style="list-style-type: none"> The Contractor shall install and maintain hazard identification beacons in accordance with SHC 305 and the following guidelines: A Hazard Identification Beacon is a traffic signal with a flashing yellow light, used to supplement Warning or Regulatory signs. Refer to “warning beacons” figure. The beacon operates whenever the hazard exists and can be placed on cones, barricades, temporary barriers, TMA, and Work Zone vehicles. <p>Specifications:</p> <ul style="list-style-type: none"> Yellow lens with a visible diameter of at least 200mm, preferably 300mm. Mounted above the sign with a clearance of 300-400mm. Flashes 50-80 times per minute, with an illuminated period of 1/2 to 2/3 of the cycle. Lamp rating: 600 lumens for smaller lens, 1,750 lumens for larger lens.
MAIN OUTCOMES
<ul style="list-style-type: none"> Prevent accidents by clearly signalling hazards to road users and workers. Smooth traffic flow and minimized disruptions.

KEY REFERENCES

- SHC 305
- SHC 602



Figure 2.2.2.1: Warning Beacons (SHC 602)

Applicable Chapters, Forms and Templates

- [Chapter 2.2.1.3 Lighting - General](#)
- [Chapter 2.2.2.9 Supplementary Material](#)

PROJECT LIFECYCLE			
Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
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PRINCIPLE	
	P1. Safe, Compliant & Controlled
SUCCESS MEASUREMENT	
P1.1. Safety Compliance	<ul style="list-style-type: none"> • PI1.1.1. Percentage of projects with zero lost-time injuries
P1.5. Traffic and Parking Control	<ul style="list-style-type: none"> • PI1.5.1. Number of traffic control-related complaints per project
LINKED VIOLATION	
	V1. Barriers and Safety Compliance Violations

Should	Consider	Advise
REQUIREMENTS		
<ul style="list-style-type: none"> • Can consist of one or two flashing units, placed above and below the sign, or aligned horizontally if the sign is wider than it is tall. • Typically a single section of a traffic control signal head, operating from a 110 V or 220 V power source. Can be connected to mains power or a portable generator. • May also be a self-contained unit on a trailer, operated from batteries or a generator, with racks for holding Warning and Regulatory signs. 	<ul style="list-style-type: none"> • Trailer-mounted Hazard Identification Beacons are useful for advance warnings at Work Sites on all highway classes. • They can be towed slowly along highways to warn of moving maintenance operations. The signs and flashing lights may be mounted lower than usual, provided they are visible to approaching traffic. • The lens size, color, light distribution, brightness, flash rate, and duration must conform to general requirements. Refer to Section 7.5.2 of SHC 602. 	<ul style="list-style-type: none"> • Inspect and maintain all warning beacons to ensure correct operation and compliance with safety standards
MAIN OUTCOMES		

KEY STAKEHOLDERS

- CONTRACTORS
- CONSULTANTS

2.2.2 BARRIERS AND WARNING MEASURES

2.2.2.5 Flashing Warning Arrow Panels

Code Statement: Use flashing warning arrow panels to guide traffic away from Work Zones, especially during lane closures.

RATIONALE

Arrow panels enhance driver awareness and provide clear instructions, facilitating safe navigation around work sites and reducing confusion and potential accidents.

CONTEXT

Flashing Warning Arrow Panels guide traffic away from work areas during lane closures or detours, providing clear directional guidance. They enhance Warning signs in heavy traffic and high-speed areas, used for lane closures or slow-moving operations. Positioned where traffic must turn or leave its path, these panels feature yellow lights in an arrow or chevron shape on a matte black panel. The lights flash simultaneously, creating a clear effect. They can be mounted on vehicles, trailers, barriers, or standalone structures, especially on tapers and curves.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
REQUIREMENTS	
<ul style="list-style-type: none"> The Contractor shall install Flashing Warning Arrow Panels according to SHC 305 standards: <ul style="list-style-type: none"> Type A Panels: Minimum size 600 x 1200mm, 12 lamps, 0.80 km legibility distance. Used on local and collector streets with moderate traffic volumes. Type B Panels: Minimum size 750 x 1350mm, 13 lamps, 1.25 km legibility distance. Used on arterials and expressways, also suitable for some local and collector streets. Type C Panels: Minimum size 1200 x 2400mm, 15 lamps, 1.50 km legibility distance. heavily traveled expressways and situations requiring the best warning devices due to high speed and volume. Refer to table "Flashing Warning Arrow (Chevron) Panels Requirements". Ensure panels are capable of four indications: left arrow only, right arrow only, both arrows simultaneously, and Caution flashing of four or more lamps in a pattern which does not indicate a direction. Refer to Section 7.5.3 of SHC 602. 	<ul style="list-style-type: none"> Mount panels on trailers or trucks with controls accessible from the driver's position, ensuring that settings can be adjusted during operations. The special features of the arrow panel should be: <ul style="list-style-type: none"> 2 x 340mm LED corner lamps. 25 x 200mm LED flashing arrow lights. Lamp color to be amber: yellow Flash Rate of 60 to 90 flashes per minute. Daylight – 2,000 lm (minimum) Night-time – 400 to 800 lm. Not to exceed 800 lm at night. Panels should be mounted with the bottom of the panel at least 2.1 m above the roadway Arrow panels mounted on motor vehicles should normally have controls which will allow changing modes of indication from the driver's position (SHC 305).
MAIN OUTCOMES	
<ul style="list-style-type: none"> Tapered lane closures that are well managed and limit risk. 	

KEY REFERENCES

- SHC 305
- SHC 602

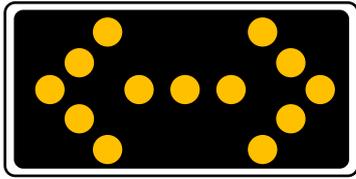


Figure 2.2.2.5.1: Flashing Arrow Panels (SHC 602)

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

Table 2.2.2.5.1: Flashing Warning Arrow (Chevron) Panels Requirements

Applicable Chapters, Forms and Templates

- [Chapter 2.2.2.9 Supplementary Material](#)

PROJECT LIFECYCLE			
Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE

 P1. Safe, Compliant & Controlled

SUCCESS MEASUREMENT

P1.1. **Safety Compliance**

- PI1.1.1. Percentage of projects with zero lost-time injuries

LINKED VIOLATION

 V6. Boards and Information Violations

Consider

Advise

REQUIREMENTS

- Use additional warning devices such as TMAs or mobile signage for blocking lanes to complement arrow panels, especially in dynamic work zones.
- In short-term work zones, whether static or mobile, traffic lanes or shoulders might be obstructed by a lane blocker, which can be mounted on a vehicle or carried on a stretcher.
- The lane blocking equipment consists of the standard arrangements with the signs R 11-1 or R 11-2 (from SHC 305), and the flashing lights, to guide the traffic to the left or to the right of the blocked lane
- Inspect all arrow panels regularly to confirm they are properly functioning and visible to approaching traffic under varying light conditions

MAIN OUTCOMES

KEY STAKEHOLDERS

- CONTRACTORS
- CONSULTANTS



2.2.2 BARRIERS AND WARNING MEASURES

2.2.2.6 Hand Signaling Devices, Flags and Warning Paddles

Code Statement: Use hand signalling devices for direct traffic control, particularly in emergency or initial setup phases.

RATIONALE

These devices provide immediate and adaptable traffic control, ensuring the safe movement of vehicles in dynamic or emergency situations, and maintaining work zone safety.

CONTEXT

Hand signalling devices, flags, and paddles provide direct control over traffic, particularly in emergency situations or during initial traffic control setup phases.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall
REQUIREMENTS
<ul style="list-style-type: none"> • Deploy hand signalling devices according to SHC 305 in emergency situations. • Flags for hand signalling: Minimum 600mm square, made of good grade, strong red cloth, fastened to a sturdy, light-weight staff approximately 1m in length. Free edge of the flag should be weighted to hang vertically, even in strong wind. • Sign Paddles: Octagonal, minimum 600mm wide, fabricated from suitable light-weight durable and semi-rigid material with reflectorized “STOP” and “SLOW” messages. The paddles shall be mounted at the top of a round, rigid handle about 2m in length. Letters at least one-third the height of the paddle. • One face of the paddle shall have the STOP message in reflectorized white letters on a reflectorized red background with a reflectorized white border. The other face shall have the SLOW message in black letters and red border on a reflectorized white background. • Flaggers: Flaggers ensure the safety of the Work Site crew and motorists and interact frequently with the public. They must be well-qualified. A flagger should meet the following qualifications: <ul style="list-style-type: none"> □ Competent in role. □ Good physical condition, including sight and hearing. □ Mental alertness. □ A courteous but firm manner, and neat appearance. □ Sense of responsibility for the safety of the public and the crew.
MAIN OUTCOMES
<ul style="list-style-type: none"> • Well planned traffic management.

KEY REFERENCES

- SHC 305
- SHC 602

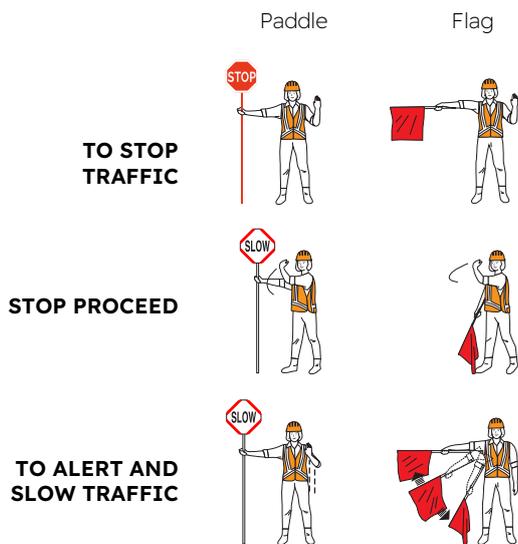


Figure 2.2.2.6.1: Use of Hand Signaling Devices by Flagger (SHC 602)

Applicable Chapters, Forms and Templates

- [Chapter 2.2.2.9 Supplementary Material](#)

PROJECT LIFECYCLE			
Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE	
	P1. Safe, Compliant & Controlled
SUCCESS MEASUREMENT	
P1.1. Safety Compliance	<ul style="list-style-type: none"> • P11.1.1. Percentage of projects with zero lost-time injuries • P11.1.2. Safety training completion rate
LINKED VIOLATION	
	V1. Barriers and Safety Compliance Violations

Should	Consider	Advise
--------	----------	--------

REQUIREMENTS

- | | | |
|--|---|---|
| <ul style="list-style-type: none"> • Flaggers shall wear a red-colored safety vest, shirt or jacket, and a red-colored safety hat. If flaggers work at night, their red safety clothing shall be reflectorized. • Flaggers should utilise handheld LED traffic batons/wands during night-time works. • The flagger’s functions require him/her to be clearly visible to approaching traffic. Drivers must see the flagger far enough in advance to comply with his directions and reduce speed appropriately. | <ul style="list-style-type: none"> • Flaggers are provided at Work Sites: <ul style="list-style-type: none"> ▫ to briefly stop traffic at intervals as necessitated by activities at the site, and ▫ to maintain a continuous flow of traffic past the Work Site at reduced speed to help protect the work crew. • Hand signalling devices, flags, and warning paddles may be deployed temporarily during initial traffic control setup. | <ul style="list-style-type: none"> • Position flaggers for maximum visibility to approaching traffic and provide clear instructions to drivers to manage flow safely around work zones |
|--|---|---|

MAIN OUTCOMES

KEY STAKEHOLDERS

- CONTRACTORS
- CONSULTANTS



2.2.2 BARRIERS AND WARNING MEASURES

2.2.2.7 Traffic Control Signals

Code Statement: Implement traffic control signals at construction and maintenance sites to manage traffic flow efficiently, ensuring all equipment meets regulatory standards and prioritizing traffic-actuated controls at intersections and crossings for optimal performance.

RATIONALE

Implementing traffic control signals in construction and maintenance zones is crucial for ensuring safety and efficiency. These signals help manage traffic flow, reducing the risk of accidents and minimizing disruptions. By using traffic-actuated controls, which adjust based on real-time conditions, the system becomes more responsive and efficient. This dynamic approach accommodates varying traffic volumes, enhancing the overall flow and safety for both motorists and workers. Properly timed signal intervals further ensure that traffic moves smoothly, supporting a safer and more organized work environment.

CONTEXT

Traffic control signals are critical components in managing traffic flow through construction and maintenance zones. These signals provide clear instructions to drivers and pedestrians, ensuring safe navigation around work areas. They are particularly important at intersections, detours, and one-lane sections where normal traffic patterns are disrupted. By using traffic-actuated signals, which respond to real-time traffic conditions, these systems can dynamically adjust to varying traffic volumes, enhancing overall traffic management and safety.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall

REQUIREMENTS

- All traffic signal and control equipment used in construction and maintenance areas, and the installation and operation, shall meet the requirements of Chapter 5 of SHC 305.
- Traffic control signals are a satisfactory and economical means for controlling traffic movements at construction or major maintenance work areas, including intersections with temporary “haul roads” or equipment crossings, detours with other streets or highways, and one-lane, two-way sections of highways.
- To provide alternating one-way movements on a one-lane section requires the following traffic control signal operation:
 - A green round signal indication to allow traffic to enter the section from one direction, and a simultaneous red round signal indication to prevent traffic from entering at the other end. The green interval should be long enough to allow most waiting vehicles to enter and is usually extendable by vehicle-detectors placed adjacent to or under the pavement.
 - A short (4 - 5 seconds) yellow round change interval shall follow the green interval.
 - A red round clearance indication shall follow the yellow interval. The red indication shall be shown simultaneously at both ends of the section. This red interval shall be long enough to allow vehicles which have entered on the green indication to drive the length of the section.
 - Upon completion of the all red clearance interval, the green indication is displayed to the opposing vehicles that had been waiting on the opposite approach.
 - In the absence of traffic on either approach, the signal shall continue to display a green round signal indication to the approach on which a detector was last actuated.

MAIN OUTCOMES

- Effective management of traffic flow, especially in one-lane sections, intersections, and detours, minimizing delays and disruptions.

KEY REFERENCES

- SHC 305

Applicable Chapters, Forms and Templates

- [Chapter 2.2.2.9 Supplementary Material](#)

PROJECT LIFECYCLE			
Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE	
	P1. Safe, Compliant & Controlled
SUCCESS MEASUREMENT	
P1.1. Safety Compliance	<ul style="list-style-type: none"> • P1.1.1. Percentage of projects with zero lost-time injuries • P1.1.2. Safety training completion rate
LINKED VIOLATION	
	V1. Barriers and Safety Compliance Violations

Should	Consider	Advise
REQUIREMENTS		
<ul style="list-style-type: none"> • Traffic-Actuated Control: Traffic-actuated control should usually be installed at intersections with other highways or equipment crossings. It is usually more efficient than manual or pretimed control. • Traffic-Actuated Signal Control: <ul style="list-style-type: none"> ▫ Requires a vehicle detector at each end of the one-lane section, located to activate before the stop line. ▫ Signal heads and indications at both ends must be connected to the same controller or interconnected if two controllers are used. ▫ Pretimed control is used where accurate detector actuation is difficult at both ends. ▫ Length of yellow and all red signal intervals are fixed, while green intervals lengths are timed by the controller based on traffic demand. 	<ul style="list-style-type: none"> • Ensure that all personnel involved in traffic control and those setting up signals and signs, are properly trained and competent in their roles. • Be prepared to adapt traffic control measures to changing conditions, such as weather, traffic volume, and work progress. 	<ul style="list-style-type: none"> • Maintain clear communication and coordination among all team members to ensure smooth operation and quick response to any changes or emergencies.
MAIN OUTCOMES		

KEY STAKEHOLDERS

- CONTRACTORS
- CONSULTANTS



2.2.2 BARRIERS AND WARNING MEASURES

2.2.2.8 Advance Warning Area Setup

Code Statement: Set up advance warning areas to alert drivers of upcoming changes in road conditions.

RATIONALE

Advance warnings help prevent accidents by preparing drivers in advance, reducing sudden maneuvers, and ensuring a smooth transition through and around work zones.

CONTEXT

The Advance Warning Area alerts road users to upcoming changes in road conditions, such as lane closures, speed reductions, or detours.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
REQUIREMENTS	
<ul style="list-style-type: none"> • Signage: The Contractor shall set out appropriate signage in the advance warning area as per RTMG Version 1. • Advanced warning for Work Sites must be installed to alert motorists that there are changes to the road conditions ahead. • Set up appropriate signage in the Advance Warning Area to inform drivers of: <ul style="list-style-type: none"> ▫ Road Closures, Traffic hazards, Speed reductions, Workers on foot, Stopped traffic, Changes to lane configurations ▫ Correct sign placement distances. Refer to the RTMG Version 1 for details. • Speed Reduction: Implement speed reductions to enhance safety, especially where lower speeds are needed to reduce accident risks. <ul style="list-style-type: none"> ▫ Speed reductions they shall be done in stages of 100 km/h to 80 km/h to 70 km/h to 50 km/h to 40 km/h as required. 	<ul style="list-style-type: none"> • Use consistent signage and spacing to provide clear, advanced notice, ensuring drivers have adequate response time. • Speed Limit: The Contractor shall set out appropriate signage for speed limits in accordance with regulations. • Define speed limits for vehicles approaching and passing through Work Zones to ensure smooth traffic management. • Table 2.2.2.8.1 shows the recommended maximum Work Zone speed limit per highway category (SHC 305). • The spacing of advanced warning signs should be as per the minimum sight distance detailed in the section on signs.
MAIN OUTCOMES	
<ul style="list-style-type: none"> • Sufficient warning for road users to limit speed 	

KEY REFERENCES

- SHC 305
- RTMG Version 1

Road Category / Type	Recommended Maximum Work Zone Speed Limit (km/h)
Urban Road	50
Rural Road	80
Freeways and Expressways	100

Table 2.2.2.8.1: Recommended Maximum Work Zone Speed Limits by Road Category (SHC 305)

Applicable Chapters, Forms and Templates

- [Chapter 2.2.2.9 Supplementary Material](#)

PROJECT LIFECYCLE			
Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE

 **P3. Clearly Communicated and Actively Engaged**

SUCCESS MEASUREMENT

P3.1. **Clear and Transparent Communication**

- PI3.1.2. Number of violations regarding information signage
- PI3.1.4. Public and private utilization rate of information access points

LINKED VIOLATION

 V6. Boards and Information Violations

Consider

Advise

REQUIREMENTS

- Add additional signs or devices at intersections or high-risk areas to reinforce advanced warnings.
- Utilise Variable Message Signs to alert motorists and divert traffic safely and effectively. This type of signage provides advance notice to road users and/or residents, and can also be used during works in the Advanced Warning Areas.
- Verify that all advance warning signs are correctly set out and provide the required visual impact to guide road users safely

MAIN OUTCOMES

KEY STAKEHOLDERS

- CONTRACTORS
- CONSULTANTS



2.2.2 BARRIERS AND WARNING MEASURES

2.2.2.9 Supplementary Material

Traffic Management Methods

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 		

Table 2.2.2.9.1: Traffic Management Methods for Various Work Lengths (SHC 305)

Traffic Management Methods

WHAT TO LOOK OUT FOR

Traffic Control - Zones – Contractor

- Is the recommended speed limit for work zone correctly set out?
- Are advanced warning signs correctly set out?
- Are the appropriate temporary traffic signs of suitable size and detail (& in alignment with the work control zone)?

2.2.2 BARRIERS AND WARNING MEASURES

2.2.2.9 Supplementary Material

Temporary Safety Barriers for Re-asphalting Works & Non-Long-term Utility Works

This table offers guidance on Selection of Safety Buffer Delineation and/or Barrier Type for all types of **Re-asphalting Works** as well as on Short/Medium Term and Mobile Utility Works. The requirements set out in the table are **applicable to all types of work (including those requiring excavation up to a depth of up to 0.3m).**

All safety barriers must comply with requirements of SHC 305 and be MASH tested and suitable for the traffic speed and lateral buffer zone provided. **The safety barriers and warning measure provided below are solely to separate live traffic from the work area.**

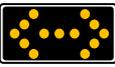
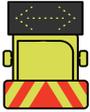
Site Traffic Speed [km/hr]	Distance from Work Area to Traffic (Lateral Buffer Zone)	Long Term Works Minimum Temporary Traffic Controls	Short/Medium Term Works Minimum Temporary Traffic Controls	Mobile Works Minimum Temporary Traffic Controls
≤ 50	< 1.2m	 	 	Works Not Permitted (Increase Buffer Zone)
	≥ 1.2m	 	 	 
51 – 100	≥ 1.5m			

Table 2.2.2.9.2: Minimum Temporary Traffic Controls for Re-asphalting Works & Non-Long-term Utility Works

Note: For Roads with Traffic Speed more than 50 km/h, no works are permitted when Lateral Buffer Zone is less than 1.5m.

Note: For site traffic speeds of **51 – 80km/h**, a temporary traffic speed reduction to 50km/h shall be provided (alongside the relevant temporary traffic controls provided in the Table 2.2.2.9.4). For site traffic speeds of **81 – 100km/h**, a temporary traffic speed reduction to 80km/h shall be provided.

Duration of Works

This table offers guidance on the type of works based on the relevant duration.

Type of Works	Duration
Long-term	Require occupancy of part/all of the roadway for at least 24 hours. Typically these are static work zones.
Medium -Short term	Require occupancy of part/all of the roadway for a limited number of hours, usually for work in the daylight of a calendar day. Works cannot exceed 8 hours.
Mobile	In no single location or multiple locations within a 1km section of road for longer than 15mins.

Table 2.2.2.9.3: Work Durations

Temporary Safety Barriers for Long-term Utility Works

Refer to this table for long-term service works adjacent to excavations deeper than 0.3 meters and wider than 0.1 meters. The temporary barriers shown ensure safety around open excavations, as detailed in the following tables.

Site Traffic Speed [km/hr]	Distance from Work Area to Traffic (Lateral Buffer Zone)	Long Term Utility Works Minimum Temporary Traffic Controls
≤ 30	< 1.2m	
	≥ 1.2m	
31 - 50	< 1.5m	 
	≥ 1.5m	 
51 - 100	≥ 1.5m	

Table 2.2.2.9.4: Minimum Temporary Traffic Controls for Long Term Works Adjacent to Open Excavations

Note: For Roads with Traffic Speed more than 50 Km/h, no works are permitted when Lateral Buffer Zone is less than 1.5m.

Note: For site traffic speeds of **51 – 80km/h**, a temporary traffic speed reduction to 50km/h shall be provided (alongside concrete jersey barriers, as per Table 2.2.2.9.5). For site traffic speeds of **81 – 100km/h**, a temporary traffic speed reduction to 80km/h shall be provided.

Temporary Safety Barriers for Re-asphalting Works

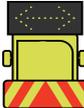
Site Traffic Speed [km/h]	Minimum temporary traffic control measures (less than 24 hours)	
	Width < 20 cm	Width > 20 cm
30 >		
31 - 50		
51 - 80		 + 
81 >	 + 	 + 
For Mobile Works		

Table 2.2.2.9.5: Minimum temporary traffic control measures (less than 24 hours)

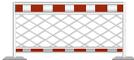
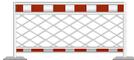
Site Traffic Speed [km/h]	Minimum temporary traffic control measures (more than 24 hours)	
	Width < 20 cm	Width > 20 cm
30 >	 + 	 + 
31 - 50	 + 	 + 
51 - 80	 + 	
81 >		
Note: Concrete barriers should not be used on sidewalks and barricades should be used.		

Table 2.2.2.9.6: Minimum temporary traffic control measures (more than 24 hours)

Temporary Safety Barriers for Re-asphalting Works

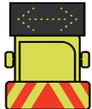
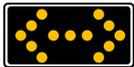
Table Key Explaining Symbols	
	Retro-reflective Traffic Cone
	Plastic Drum
	Plastic Safety Barrier, filled with sand or water, and continuous
	Concrete/Steel Safety Barrier
	Barricades
	Truck or Trailer Mounted Crash Attenuator (TMA) with Arrow Board/Panel
	Vehicle or Trailer Mounted Arrow Board/Panel
	Protection Mesh

Table 2.2.2.9.7: Symbols of Temporary Safety Barriers for Re-asphalting Works



2.2.2 BARRIERS AND WARNING MEASURES

2.2.2.9 Supplementary Material

Temporary Road Markings

Plastic Delineators

- The Contractor **shall** set out Temporary Pavement Markings in accordance with SHC 305 as indicated below.
- Delineators are retro-reflective devices, which can be seen in darkness under normal atmospheric conditions from a distance of 300m when illuminated by the upper beam of standard automobile headlights located at the point of observation (Section 7.4.2 of SHC 602).
- The reflective element of a delineator shall have a minimum area of not less than 0.01 m².
- Delineators, when used, shall be mounted on suitable supports so the reflecting unit is approximately 1.2 m above the near pavement edge. Delineators shall be placed between 1 and 2 m outside the outer edge of the berm or in the line of a guardrail, if used. The color of the reflecting element of delineators shall be white. Delineators should be spaced along the roadway in accordance with channelization devices.
- Delineators may be used in work areas and on detours to indicate the alignment of the roadway and outline the required vehicle path. Delineators shall not be used alone or in groups to warn of hazards. Delineators may have value on detours where the road is curving and frequent bends occur. Delineators are customarily used on roadway sections which may be travelled at or near normal speed. Barricades and similar channelizing devices rather than delineators are to be used in areas where traffic is being diverted from its normal path, or where more than usual hazard exists because of adjacent traffic, excavation, or other work (see Section 7.4.2 of SHC 602).



WHAT TO LOOK OUT FOR

Traffic Control – Contractor

- If temporary pavement markings are required, are they set out correctly?
- If temporary raised reflective markers are required, are they set out correctly?
- Are plastic delineators set out correctly?

Traffic Control Signals

Selection of Traffic Control Devices

Traffic Control Devices:

Traffic control devices for construction, maintenance, and utility Work Zones include signs, channelizing devices, temporary pavement markings, hand signalling signs or flags, lighting units, arrow panels, and high-level danger warning devices.

Work Area Signing:

The following items should be considered by the Contractor when selecting work area signing:

- Select signs that appropriately and accurately describe the work area situation.
- Select the message according to the action the driver is required to make.
- Place a Warning sign in advance of and at the beginning of the work area. As drivers approach the work area, other signs with increasingly more specific messages will be necessary.
- The overall effect of the sign series and the attendant supporting devices should be evaluated. This is to ensure that the driver is aware of the condition being approached and his resultant action is appropriate.

Basic Requirements:

Each situation requires varying the application of the devices to fit, but some basic requirements relate to most conditions:

- The flaggers shall be used only in emergency cases.
- Operations restricting vehicular movement, so traffic in both directions must use a single lane, shall only be allowed while flaggers are on duty or when a temporary traffic signal is installed to assign right-of-way.
- Steady burning lights used on Type I or Type II barricades (as per SHC 305) will not be required for day operations.
- A minimum of two flashing lights shall be used at night on each approach in advance of the work area. Flashing lights shall be installed above at least the first sign in the series.
- Longitudinal dimensions may be adjusted slightly to fit field conditions.
- All signs shall be post mounted if the closure time exceeds 7 days.
- When a side road intersects the highway where work is being performed, additional traffic control devices shall be erected as directed by the Engineer.

- RIPC may require hoarding surrounding the entire site if the closure time is of a longer-term activity period over and above maintenance or utility work.
- Cones may be substituted for barricades during day operations.
- All taper lengths are in accordance with cones.
- At the completion of the day's operations all temporary signs pertinent to the operation shall be removed or fully covered to not be visible.
- Type I or Type II (as per SHC 305) barricades and/or barriers used for delineation at night shall be equipped with steady burning lights.
- Roadwork signs are removed when no work is being performed. Any unattended obstacle or excavation in the work area shall be protected with Type I or Type II (as per SHC 305) barricades with flashing lights.
- Cones have a greater visibility than do tubular markers, but are not as visible as barricades, or panels. For this reason, they should only be used where the speed of traffic is low or moderate, and for temporary installations of a few hours at most.

2.2.2 BARRIERS AND WARNING MEASURES

2.2.2.9 Supplementary Material

Temporary Safety Barrier typologies

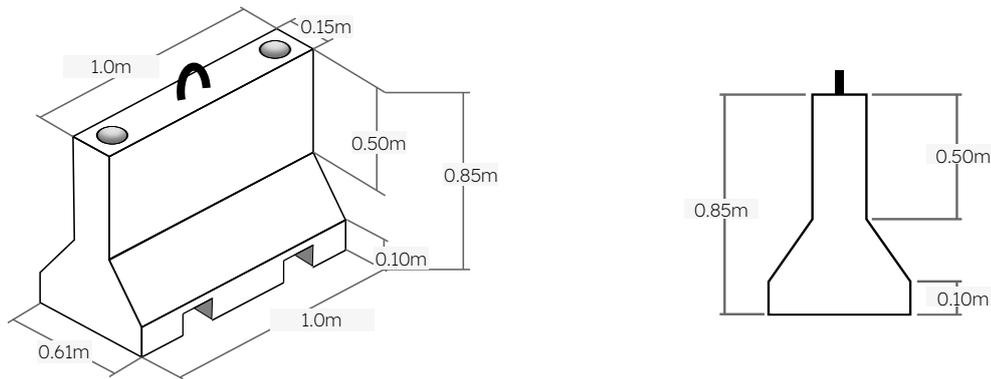


Figure 2.2.2.9.1: Barrier Specifications – 1m Barrier

Subject to the characteristics of the work control zone, temporary channelization of the works **shall** preferably be carried out by concrete jersey barriers.

These concrete jersey barriers **must** follow the guidelines defined in this document in terms of design, shape and arrangement.

The minimum length of a concrete jersey barrier must be 1m, and maximum 1.5m. Concrete barriers of a length >1m **should** feature 2 lifting eyes and 2 penetrations for insertion of signage. Shorter concrete barriers (1m in length) **shall** include at least 1 lifting eye and 2 penetrations.

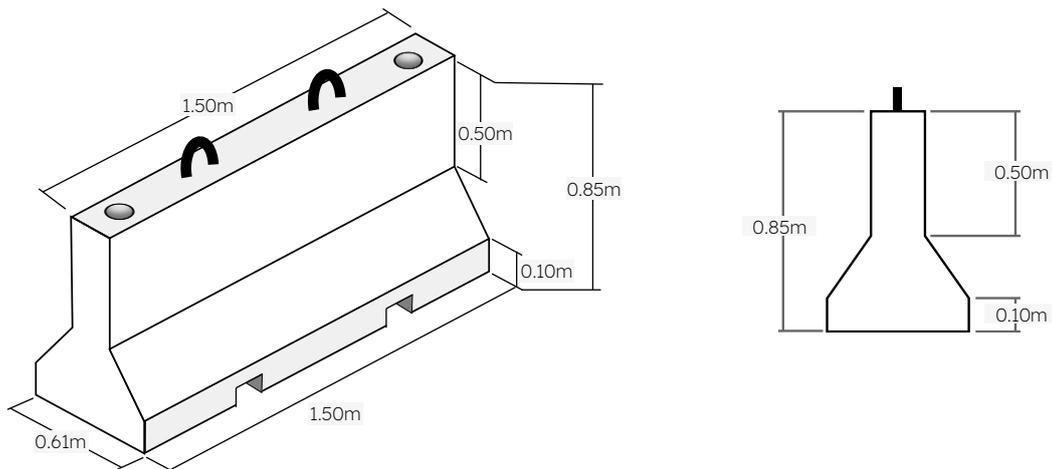


Figure 2.2.2.9.2: Barrier Specifications – 1.5m Barrier

Concrete barrier penetrations **should** have a minimum diameter of 51mm, suitable for mounting signs, PIBS, and any other accessories. Penetrations **should** be made at least 50mm from the edge and lateral face of the barrier (either end).

Each barrier should have two rectangular openings at the bottom for forklift maneuvering. The openings shall be 0.2 meters wide and 0.1 meters high, with a 0.4-meter spacing between the edges of the two openings. Appropriate waterproofing, weatherproofing, and relevant work-related proofing measures for these openings on the inside of the barrier shall be implemented to prevent any debris from reaching or leaking onto the road.

Temporary Safety Barriers typologies

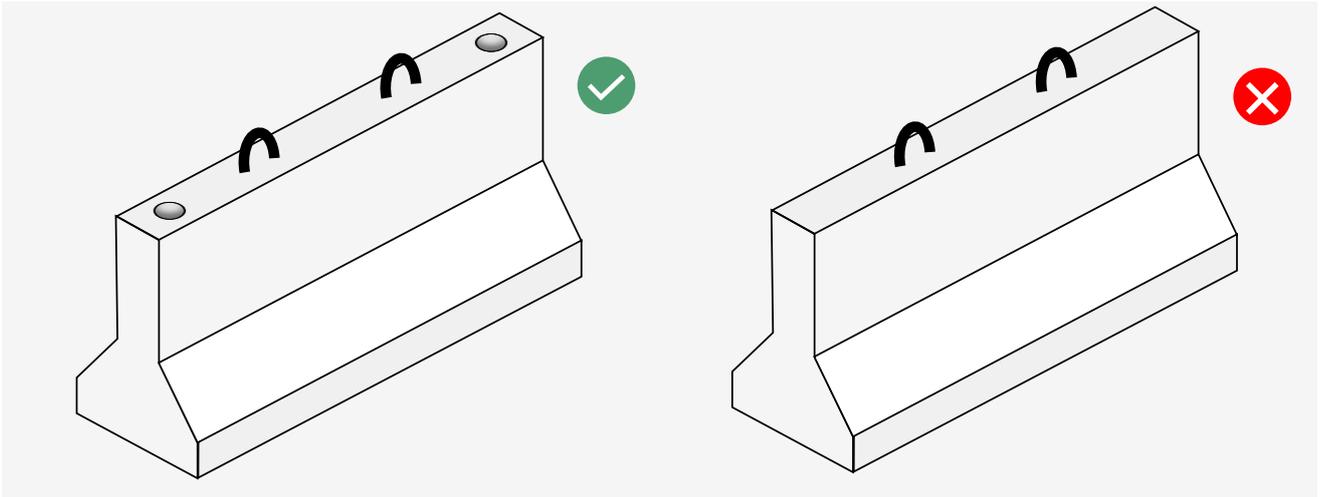


Figure 2.2.2.9.3: Concrete Barriers with and without Penetrations

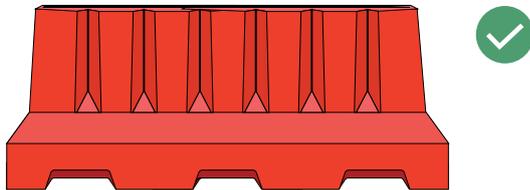


Figure 2.2.2.9.4: Plastic Barrier

Plastic barriers for short-medium term duration **shall** be water or sand filled, at the discretion of the Consultant responsible for establishing the Traffic Management Plan under their tasks associated with traffic management and control. Plastic barriers shall not be subject to the same branding as concrete barriers and will be red or white.

Plastic barriers **should** feature penetrations for beacons or signage.

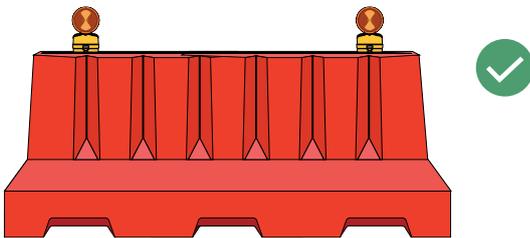


Figure 2.2.2.9.5: Plastic Barrier with Beacons

Plastic barriers **shall** be arranged in alternate colors (i.e. red, white, red, white).

Plastic barriers **shall** be subject to the same alignment rules as concrete barriers (i.e. uniform arrangement, interlocked, without gaps).

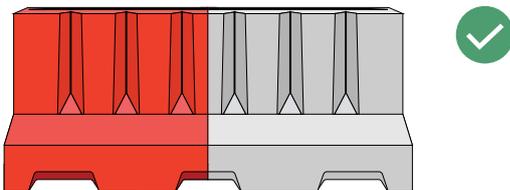


Figure 2.2.2.9.6: Plastic Barrier Arrangement

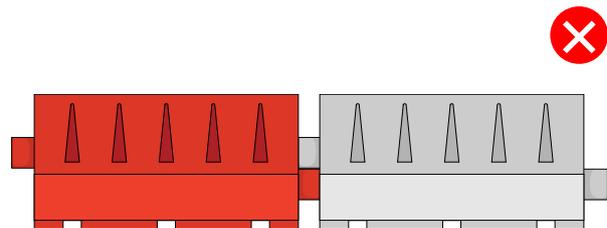


Figure 2.2.2.9.7: Plastic Barrier Not Interlocked

2.2.2 BARRIERS AND WARNING MEASURES

2.2.2.9 Supplementary Material

Temporary Safety Barriers Installation

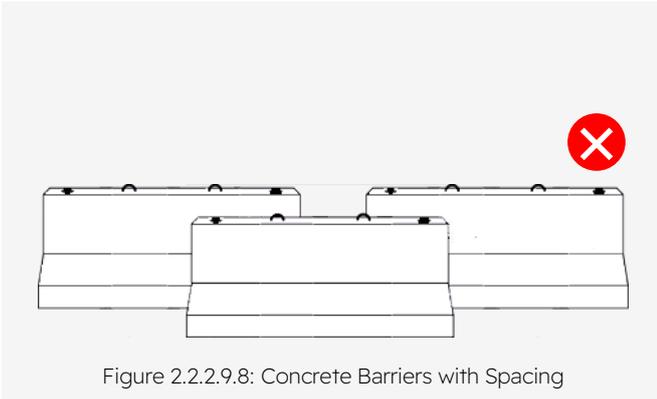


Figure 2.2.2.9.8: Concrete Barriers with Spacing

Barriers **shall** be positioned uniformly and **shall** be of standard approved colors and dimensions. In the case the wrong barrier is deployed, or no barrier is deployed when there should be barriers, penalties will be issued by RIPC to the Contractor. Below are examples of barrier positioning that will result in penalties.

Barriers **shall** be maintained in 'as new' condition. If RIPC Inspectors observe damaged barriers, penalties will be issued to the Contractor.

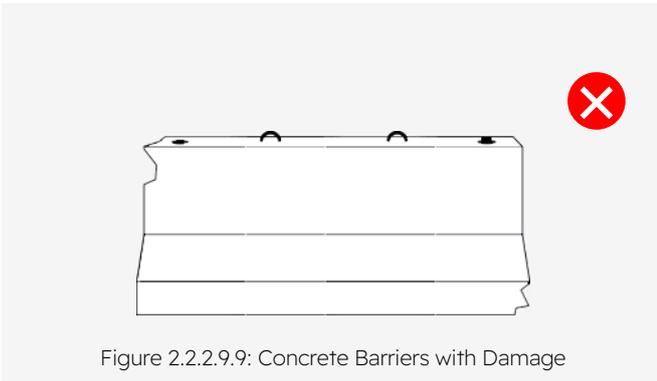


Figure 2.2.2.9.9: Concrete Barriers with Damage



Figure 2.2.2.9.10: Non-uniform Sizes of Barrier



Figure 2.2.2.9.11: Variation in Barrier Color

Temporary Safety Barriers Installation

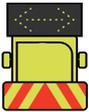
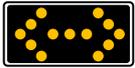
Table Key Explaining Symbols	
	Retro-reflective Traffic Cone (Or Other Approved Delineation Device)
	Plastic Drum
	Plastic Safety Barrier (can also be used for channelization purposes SASO-2980)
	Concrete/Steel Safety Barrier
	Barricades (Or Alternative Unified Plastic Safety Barriers)
	Temporary Speed Limit
	Truck or Trailer Mounted Crash Attenuator (TMA) with Arrow Board/Panel
	Vehicle or Trailor Mounted Arrow board/panel

Table 2.2.2.9.8: Explanation of Symbols for Traffic Management Equipment

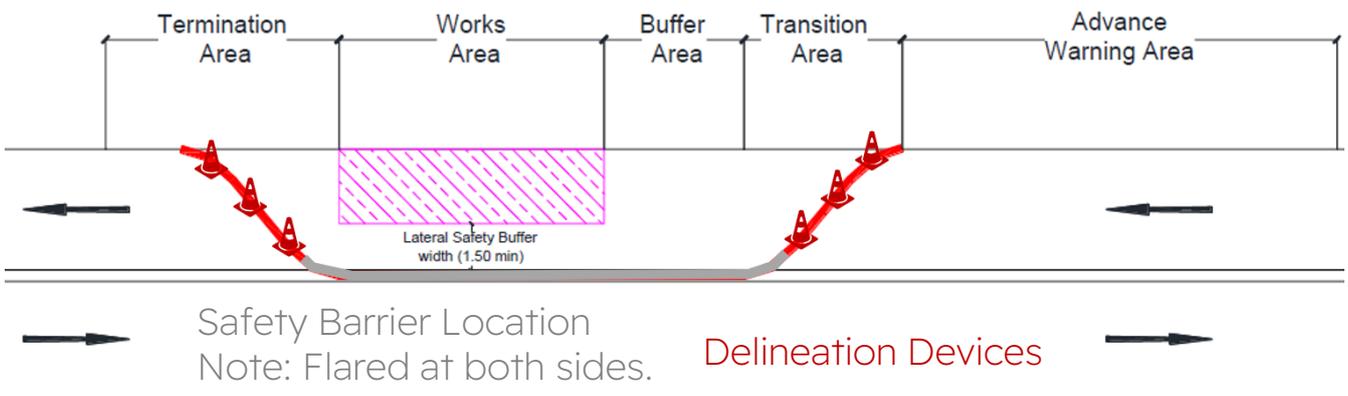


Figure 2.2.2.9.12: Safety Barrier Requirements and Applications in Work Zones (SHC 305)

2.2.2 BARRIERS AND WARNING MEASURES

2.2.2.9 Supplementary Material

Channelizing Devices and Barrier Placement

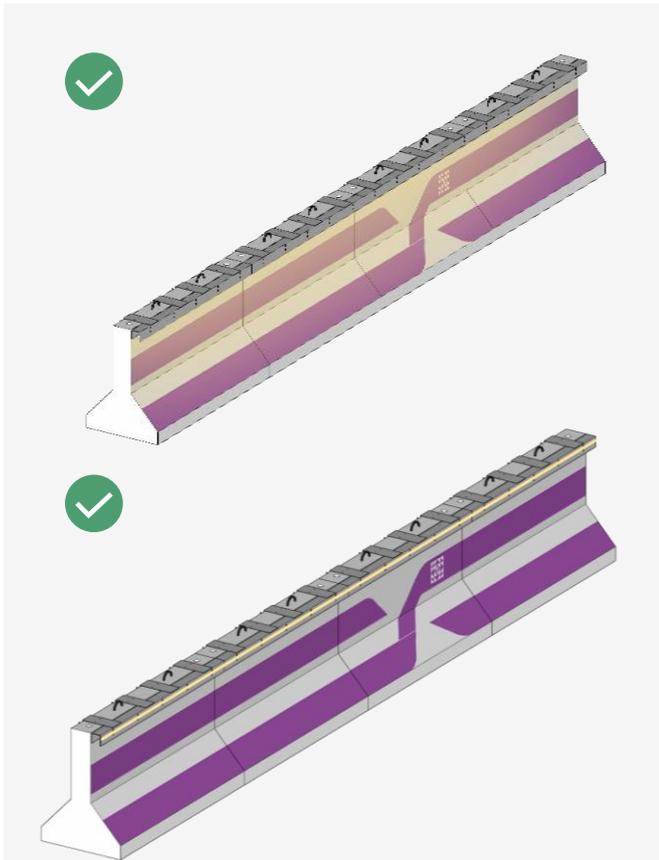


Figure 2.2.2.9.13: Lighting Requirements for Infrastructure Works

The lighting around barriers should be in a straight line over the entire work area and without any deviation.

The LED strip lighting shall be run in a straight line along concrete barriers, not draped.

The lighting around barriers should be uniform and consistent natural white color and there should be no color variation.

WHAT TO LOOK OUT FOR

Traffic Control – Contractor

- Are channelizing devices set out correctly?
- Are traffic control devices kept clean and regularly checked for position and cleanliness?
- Are barriers specified and installed correctly
- If hoardings are specified, are they installed correctly and maintained?

Luminaires technical requirements:

The described LEDs may be encapsulated by configuring watertight light lines. Encapsulation material: Aliphatic polyurethane resins or similar and equivalent.

- High resistance to solar radiation (UVA and IR).
- Dimmable: not required
- Protection rate IP65
- Class II
- Supply voltage 220 - 240 VAC
- Operate temperature: -20 degrees C to +50° C
- Impact protection IK06
- Meets CE & SASO safety standards
- Luminaire drivers not required

Light sources technical requirements:

A) Beaconing lighting

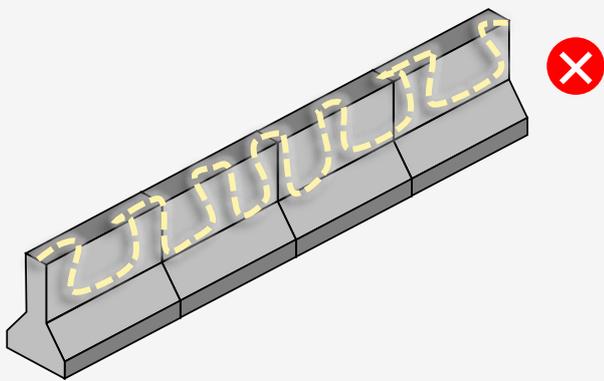
- LED type COB (Chip on Board)
- Luminous flux >600 lm/m
- CRI>60
- Color temperature of 3,000K
- Certified with L80B10 at 50.000 hours

B) Jersey Barrier lighting

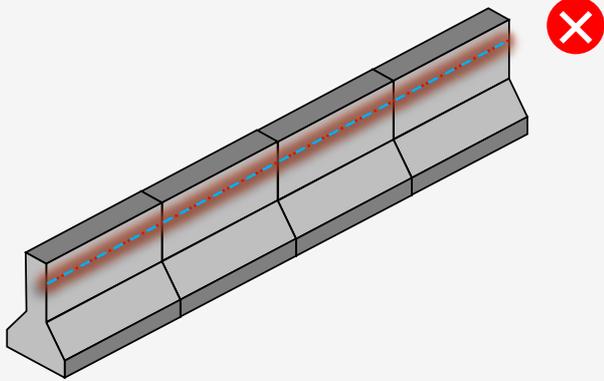
- LED type COB (Chip on Board)
- Luminous flux >1200 lm/m
- CRI>80
- Color temperature of 3,000K
- Certified with L80B10 at 50.000 hours

Temporary Safety Barriers Installation

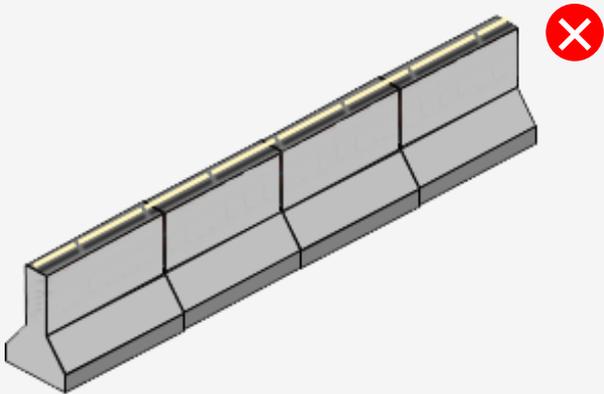
Common Errors:



Lighting not secured in a straight line along the top of the barriers.



Lighting of a different color or temperature other than that prescribed by RIPC.



Lighting of a different color or temperature other than that prescribed by RIPC.

Figure 2.2.2.9.14: Common Lighting Errors in Infrastructure Works

2.2.2 BARRIERS AND WARNING MEASURES

2.2.2.9 Supplementary Material

Channelizing Devices and Barrier Placement

Jersey barriers can be equipped with accessories to illuminate the vertical planes of the barrier. The proposed lighting channelizing device can be made of various materials, such as different metal-based materials, galvanized steel, or plastic. It is preferable for this device to be easily fitted to the jersey barrier.

However, the contractor may provide an alternative, provided that it meets the following requirements:

- The light source is hidden from the view of the observer/road user.
- The light source shall illuminate the vertical plane of the barrier from top to bottom avoiding light emitted to the sky.
- The U-shaped channel shall have a minimum size of 60 x 60mm.
- The fixture shall be removable and reusable.

Technical requirements for the channelizing devices:

- The supports shall be made a plate (metal or plastic or else) between 1.8 and 2mm thick.
- The parts forming the support shall be joined by continuous welding (if made from metal-based material or steel).
- It is not foreseen that the supports can be perforated (drilled) on site. The supports shall incorporate perforations already made in their design which may be used.
- The surface is suitable for the attachment of signage elements.

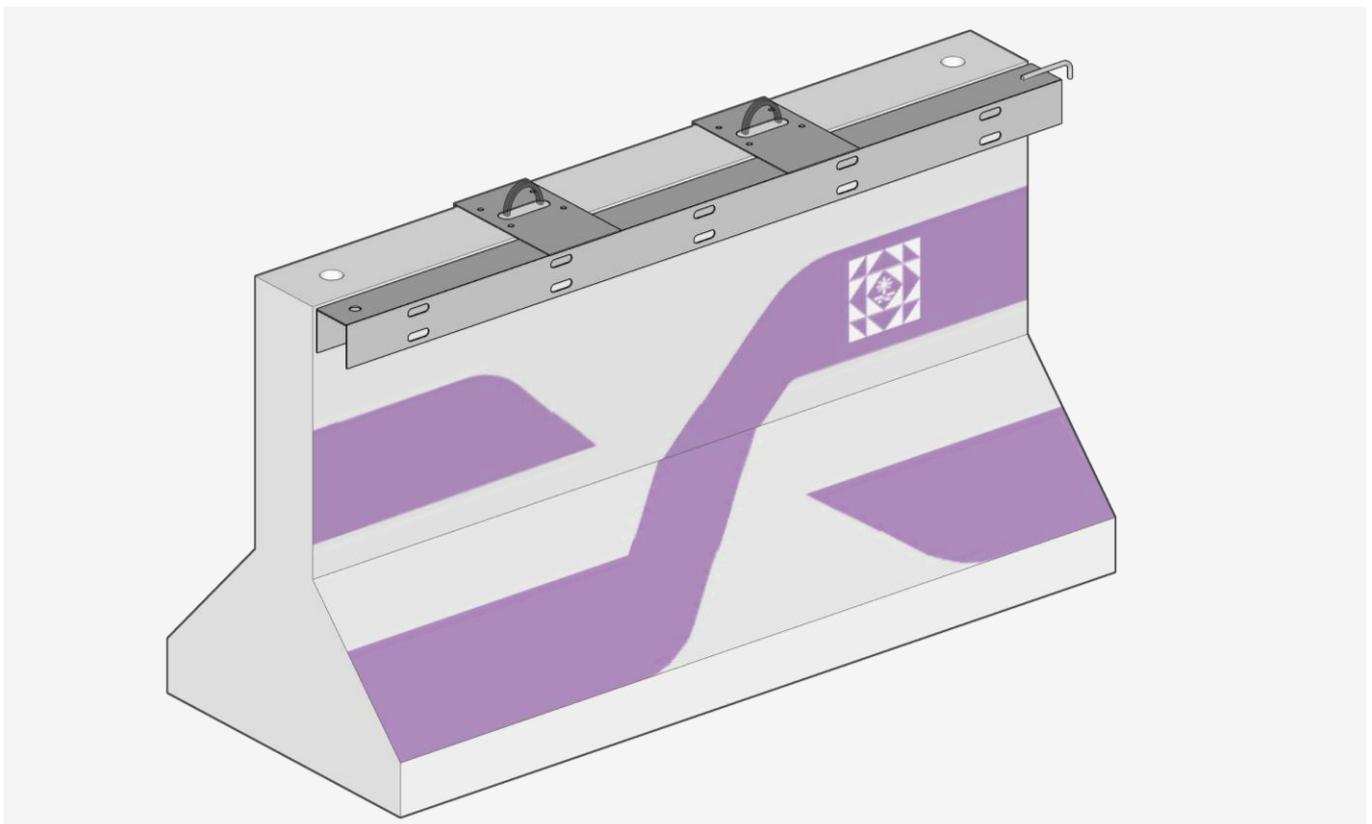
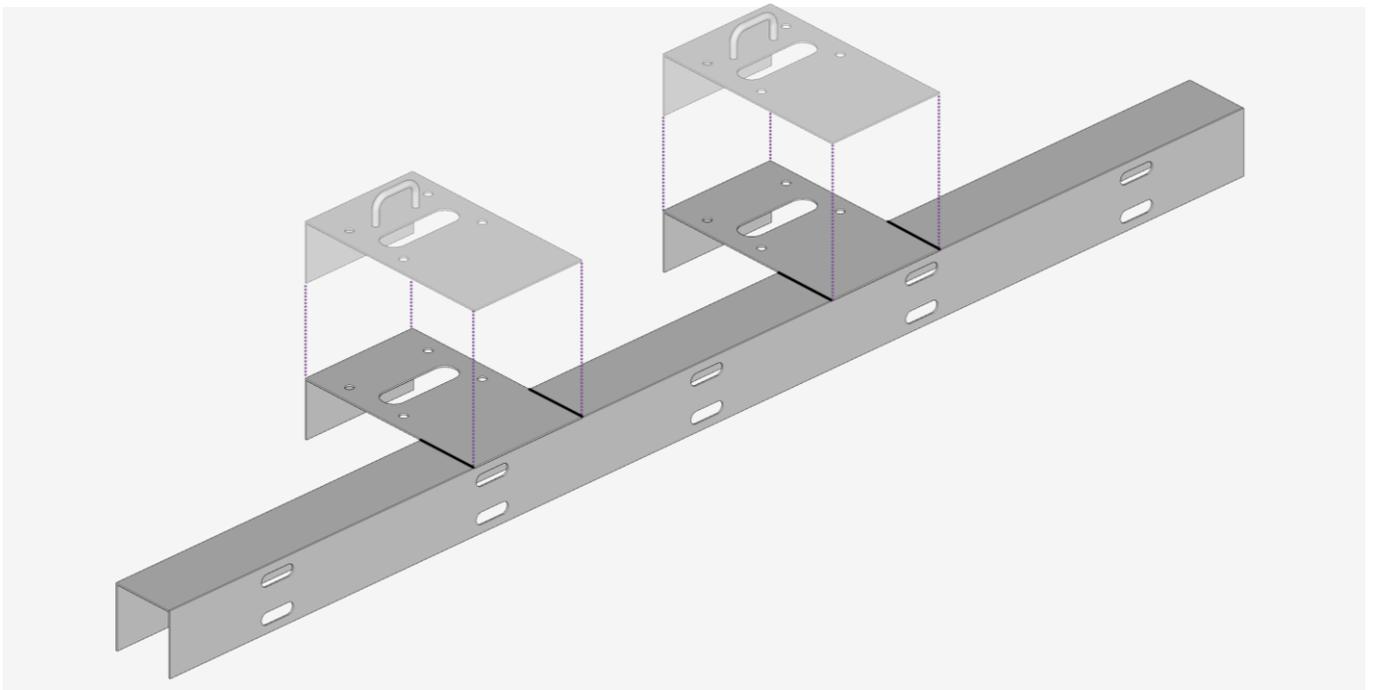


Figure 2.2.2.9.15: Channelizing devices installation

Channelizing Devices and Barrier Placement

Channelizing device consisting of 2 elements welded together (if made from metal-based material or steel) in accordance with the requirements indicated previously.

The main element is formed by a U-shaped steel profile of 60 x 60mm which includes perforations cut out for the luminaire to be fitted. Two folded plates with various perforations are joined to this element.



The accessory includes perforations that allow the option of attaching the accessory to the jersey barrier with bolts. In addition to the above-mentioned perforations, it has a slit perforation for the jersey barrier hook to pass through, allowing for proper adjustability.

For ease of installation, the channelizing device includes two handles (welded to the unit if made from steel-based material or steel).

The perforations in the main profile allow the luminaires to be fitted by means of zip ties. The luminaires shall be fitted on the inside of the accessory.

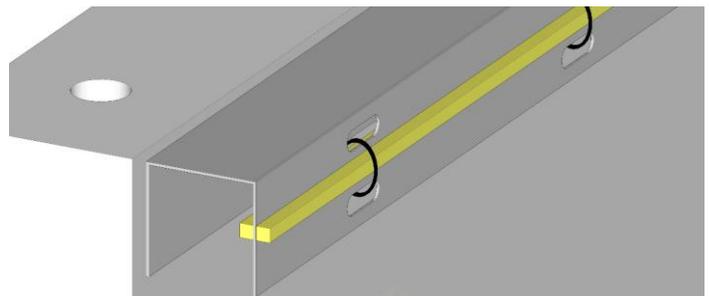
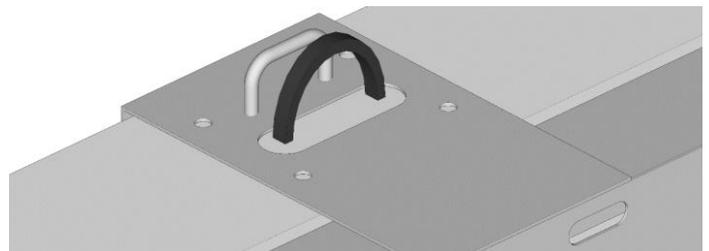


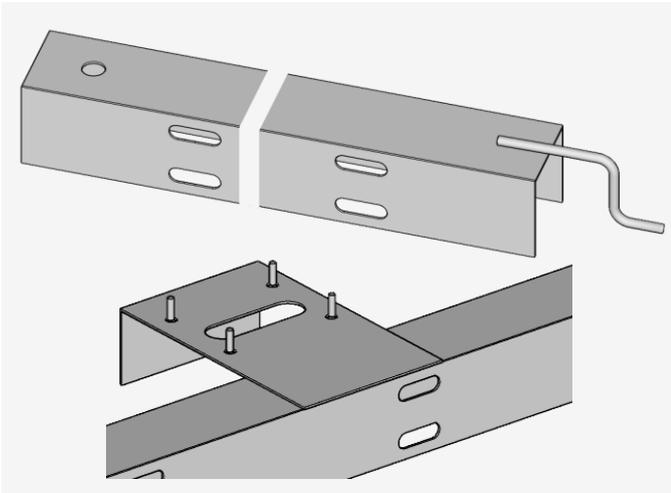
Figure 2.2.2.9.16: Channelizing device mounting diagrams

2.2.2 BARRIERS AND WARNING MEASURES

2.2.2.9 Supplementary Material

Channelizing Devices and Barrier Placement

In order to prevent vandalism and removal of the lighting channelizing devices, a system shall be devised to join the fixtures together in such a way that individual removal is not permitted. The first and last piece shall be bolted to the barriers to secure the whole system.



The lighting channelizing device consists of a perforation at the beginning and a hook at the end.

These elements will allow the pieces to be tongue and groove and create a continuous and secure assembly.

The final element will be bolted to the barrier to secure the whole assembly. These bolts are only required in the first and last pieces of the assembly.

Note: The lighting channelizing device and system are provided as examples only. The Contractor must select the most appropriate material for the accessory and determine the best method for attaching it to the barriers.

Figure 2.2.2.9.17. System for Securing Lighting

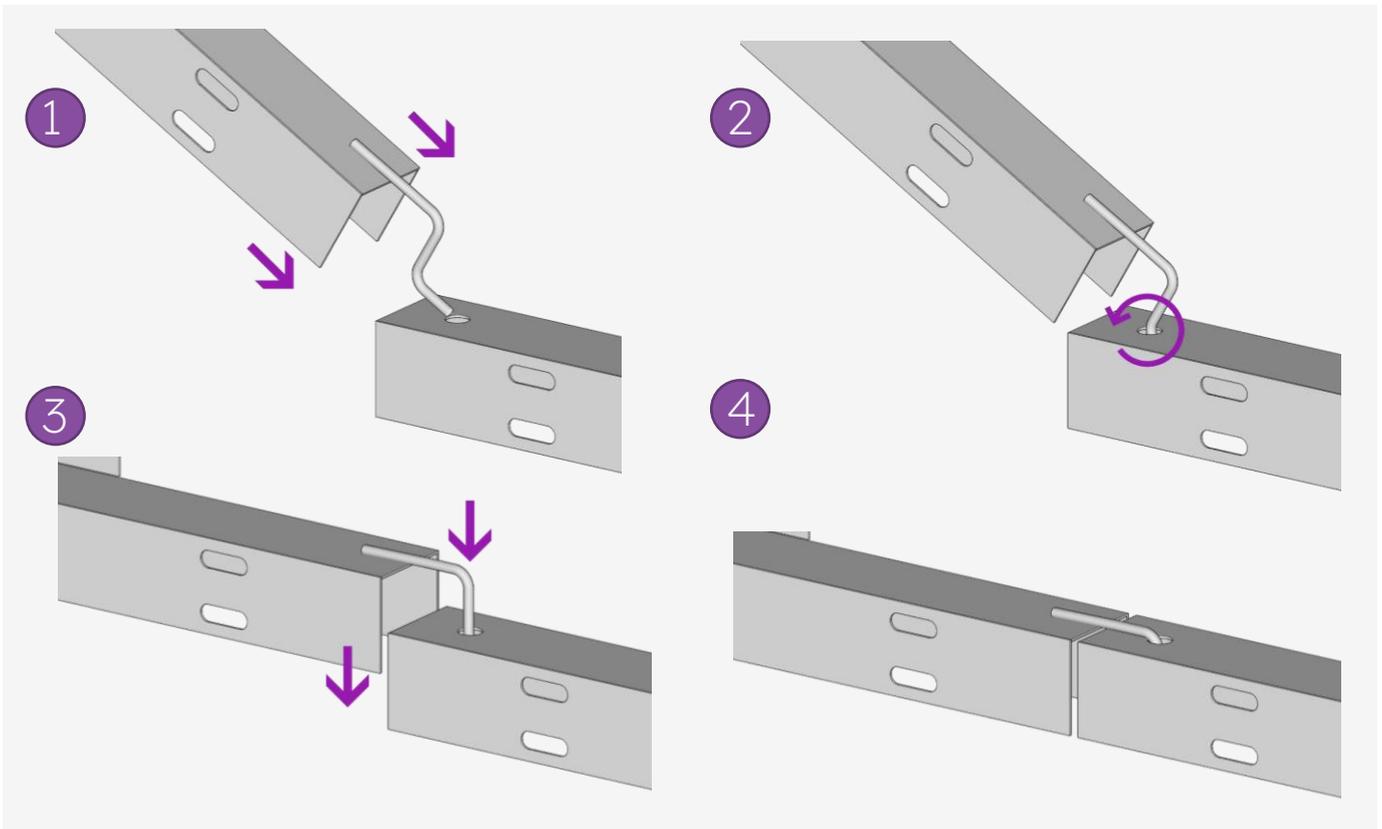


Figure 2.2.2.9.18. Jointing between lighting channelizing devices

Channelizing Devices and Barrier Placement Accessories

The lighting channelizing devices are designed with a reduced surface area in contact with the barrier.

This allows for the installation of different types of accessories that the site and works area may require. The diagrams below show typical installation for different typologies of accessories.

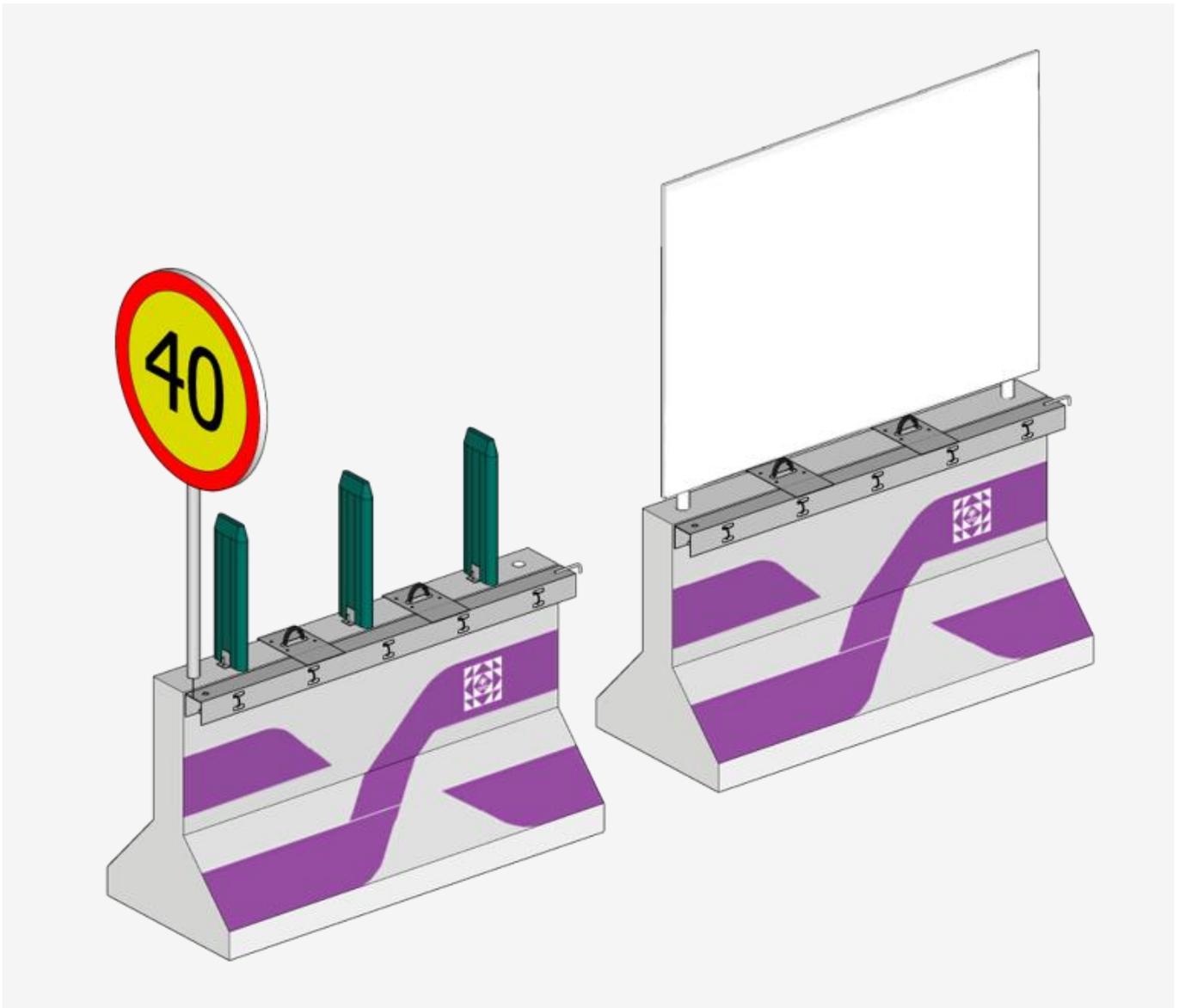


Figure 2.2.2.9.19. Channelizing devices equipped with different accessories

2.2.2 BARRIERS AND WARNING MEASURES

2.2.2.9 Supplementary Material

Temporary Safety Barriers Accessories

Concrete jersey barriers can be equipped with different accessories such as reflective markings, glare shields and lighting that enhances nighttime visibility. Each accessory serves a unique function, contributing to the overall safety, durability, and efficiency of traffic management systems.



Figure 2.2.2.9.20. Typical reflectors for jersey barriers



Figure 2.2.2.9.21. Typical glare shields for jersey barriers

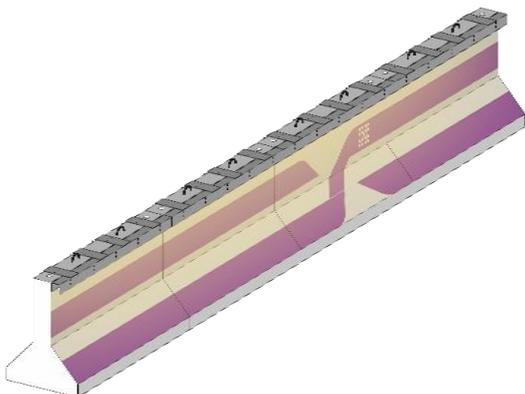


Figure 2.2.2.9.22. Lighting accessory described in The Manual

Reflectors

Reflectors are installed on jersey barriers primarily for visibility and safety. These reflectors can be installed on the upper part of the jersey barrier or on the sides.

Reflectors make jersey barriers more visible at night or in low-light conditions, such as during rainfall. The reflective material on the barriers helps drivers see the barriers from a distance, reducing the risk of collisions.

Reflectors can highlight the edges of the barriers, delineating them more clearly to help prevent drivers from unintentionally hitting them.

Glare Shields

Glare shield accessories are an essential addition to jersey barriers, designed to enhance road safety by reducing the impact of headlight glare on drivers. These shields, typically made of durable materials like metal or plastic, are mounted on the top of jersey barriers, usually in areas where nighttime driving conditions can be particularly challenging, such as near oncoming traffic, construction zones, or sharp curves.

One of the most critical functions of glare shields is to prevent drivers from being blinded by the headlights of oncoming vehicles, especially in areas where vehicles are closely spaced or moving at high speeds. By redirecting or diffusing the light, glare shields improve visibility and help drivers maintain better control of their vehicles. Glare shields shall be located in roads with traffic in both directions.

Lighting

Lighting is a crucial accessory for enhancing the effectiveness of barriers, particularly in low-visibility conditions such as nighttime driving. This manual provides a lighting accessory to integrate the lighting of the jersey barrier.

Temporary Safety Barriers Accessories

The purpose of this matrix is to simplify decision-making and ensure that the best safety features are deployed to protect both drivers and road workers. By aligning the correct accessory with the corresponding road conditions, we can maximize the effectiveness of safety barriers, reduce accidents, and improve overall traffic flow and safety.

Space Typology			Jersey Barrier Accessories				
			JB lighting	Reflectors	Glare shields	Traffic signals	Advertising pannels
Roads	Single direction	Low speed	●			●	●
		Medium speed	●	●		●	
	Double direction	Low speed	●		●	●	●
		Medium speed	●	●	●	●	
Tunnels & Underpasses	Single direction	Low speed	●			●	
		Medium speed	●	●		●	
	Double direction	Low speed	●		●	●	
		Medium speed	●	●	●	●	
Pedestrian areas	Sidewalks	Main road	●			●	●
		Typical road	●			●	●
	Parks & plazas	Parks & plazas	●			●	●

Shall	●
Should	●
Consider	●
Advise	●

Table 2.2.2.9.9: Concrete Barriers Accessories Matrix

2.2.2 BARRIERS AND WARNING MEASURES

2.2.2.9 Supplementary Material

Jersey Barrier Branding

The jersey barriers installed on all RIPC projects shall be customised according to the branding design defined below. The branding consists of two parts (A and B), which shall be placed together.

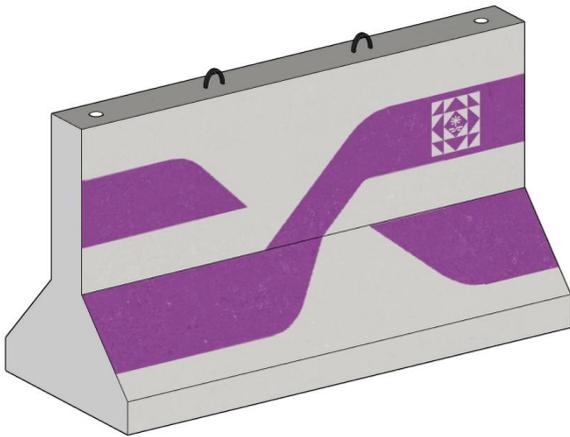


Figure 2.2.2.9.23. Jersey barrier design Part A

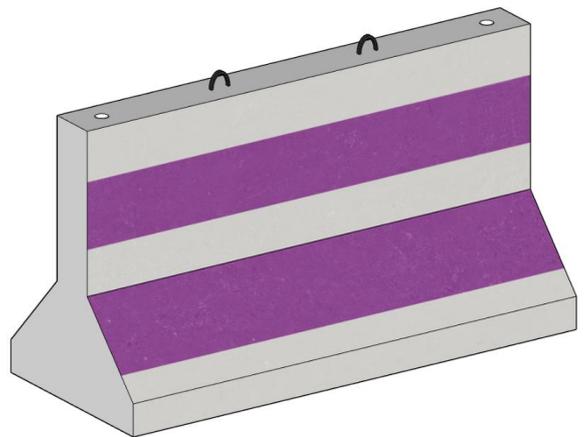


Figure 2.2.2.9.24. Jersey barrier design Part B

The majority design to be used will be Part B, however Part A should be placed in between.

The two elements should be distributed proportionally so that, although the length to be covered is reduced, a minimum amount of design Part A is ensured.

In any case the recommended ratio between design Part A and design Part B is advised to be 1/4, i.e. one design Part A for every 4 design Part Bs.

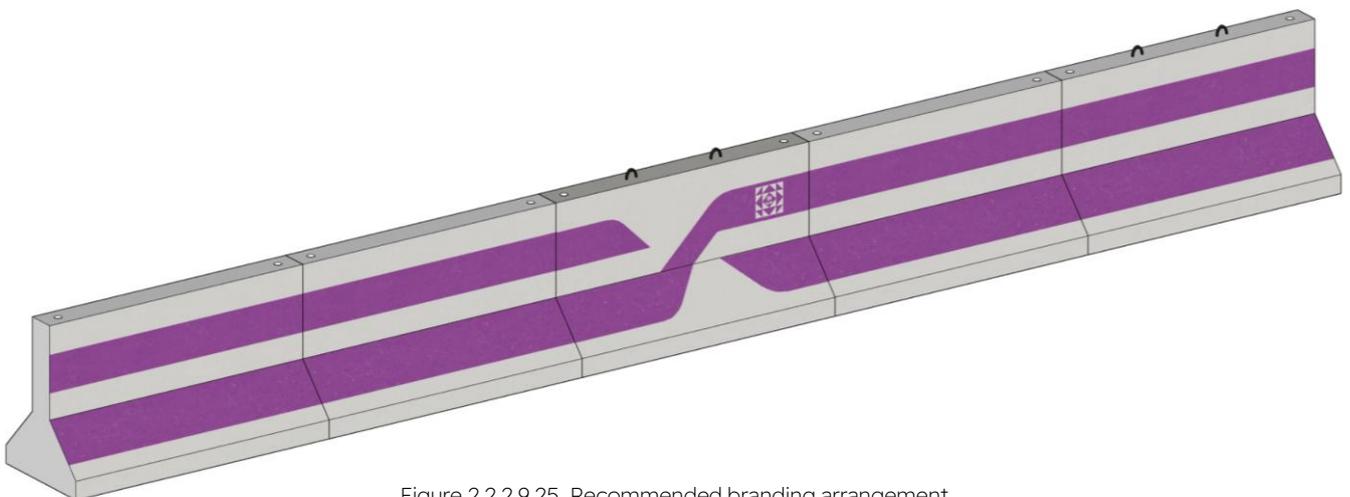
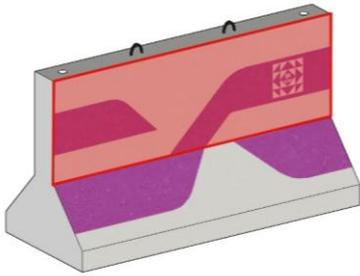


Figure 2.2.2.9.25. Recommended branding arrangement

Note: Refer to the approved designs for barriers, hoarding, and signage as described in this document. New projects and entities with a special branding are encouraged to consult and coordinate with RIPC to ensure consistency and compliance with the overarching infrastructure guidelines.

Jersey barrier branding design A – 1500mm Jersey Barrier



Upper part branding design definition

Note: all dimensions are in mm.

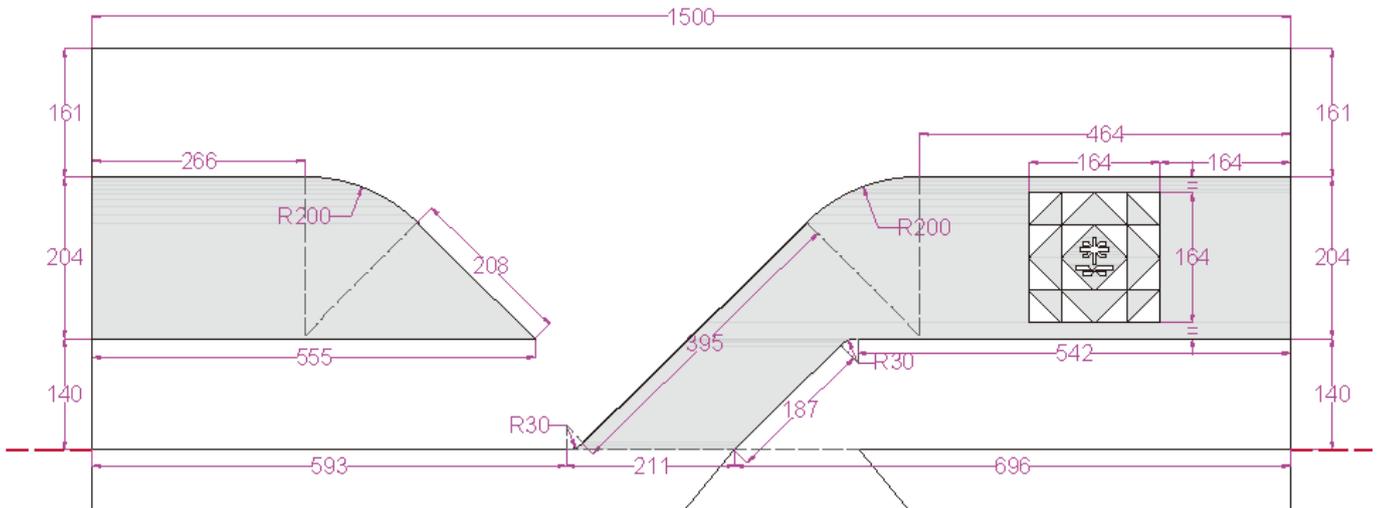
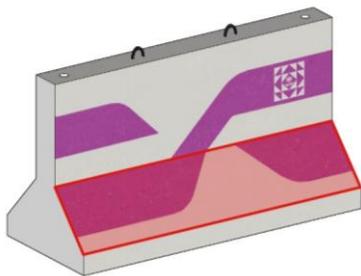


Figure 2.2.2.9.26. Design Part A – Upper Part Branding Design Definition (1500mm)



Lower part branding design definition

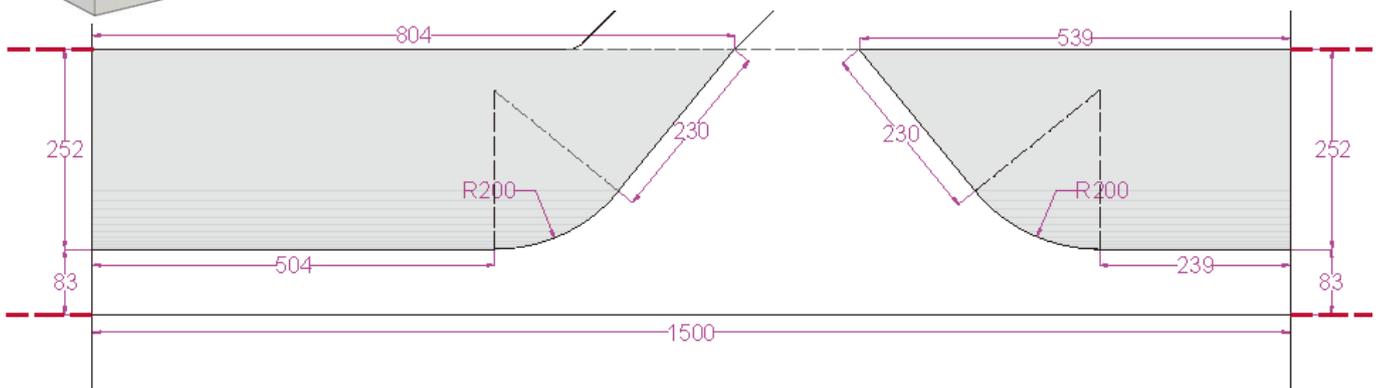


Figure 2.2.2.9.27. Design Part A – Lower Part Branding Design Definition (1500mm)

2.2.2 BARRIERS AND WARNING MEASURES

2.2.2.9 Supplementary Material

Jersey barrier branding design A - 1,500mm Jersey Barrier

Note: all dimensions are in mm.

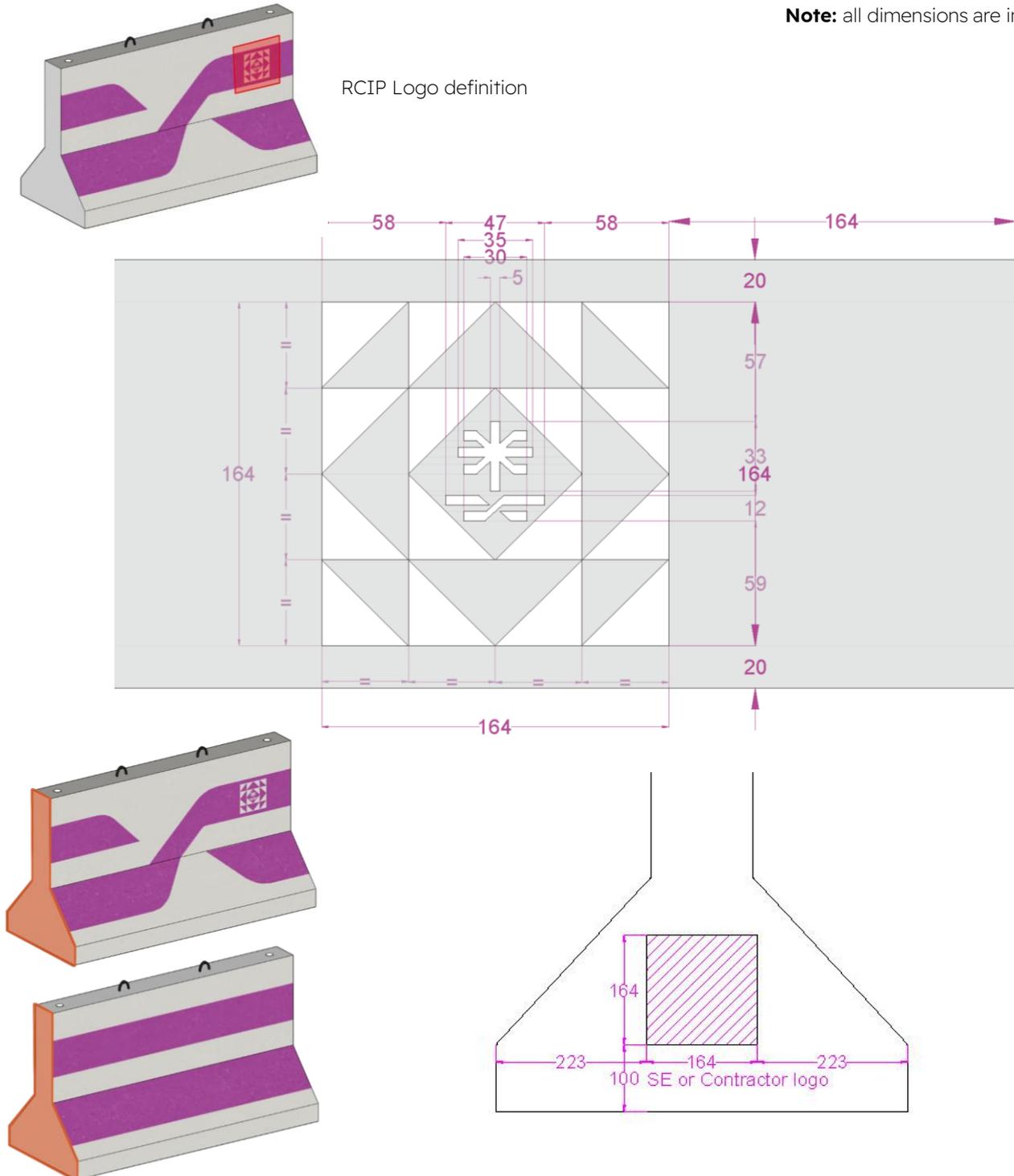
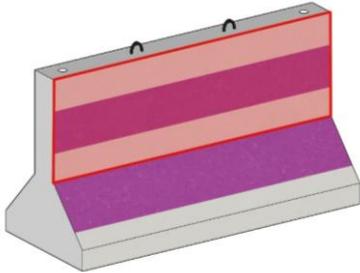


Figure 2.2.2.9.28. Design Part A - Logo Branding Design Definition (1500mm)

Jersey barrier branding design B – 1,500mm Jersey Barrier



Upper part branding design definition

Note: all dimensions are in mm.

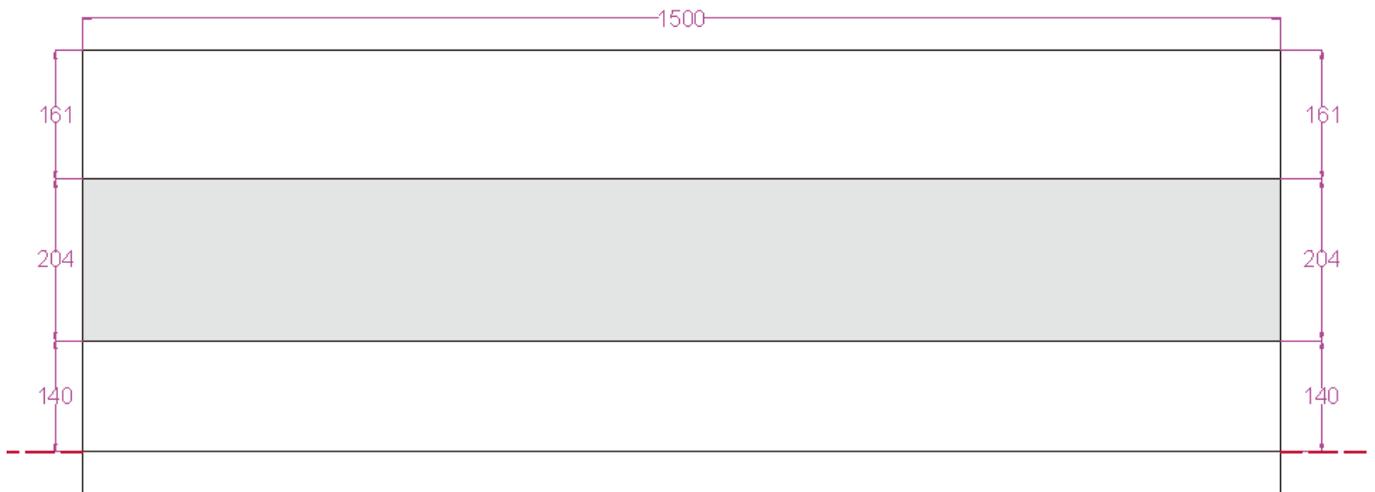
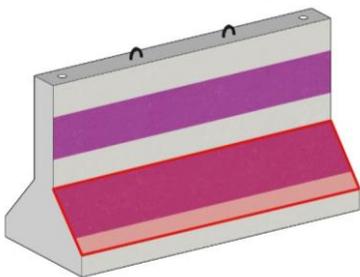


Figure 2.2.2.9.29. Design Part B – Upper Part Branding Design Definition (1500mm)



Lower part branding design definition



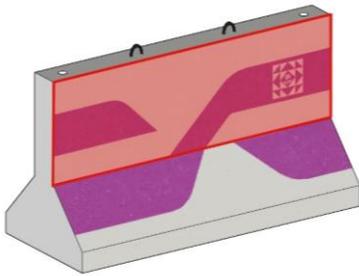
Figure 2.2.2.9.30. Design Part B – Lower Part Branding Design Definition (1500mm)



2.2.2 BARRIERS AND WARNING MEASURES

2.2.2.9 Supplementary Material

Jersey barrier branding design A - 1,000mm Jersey Barrier



Upper part branding design definition

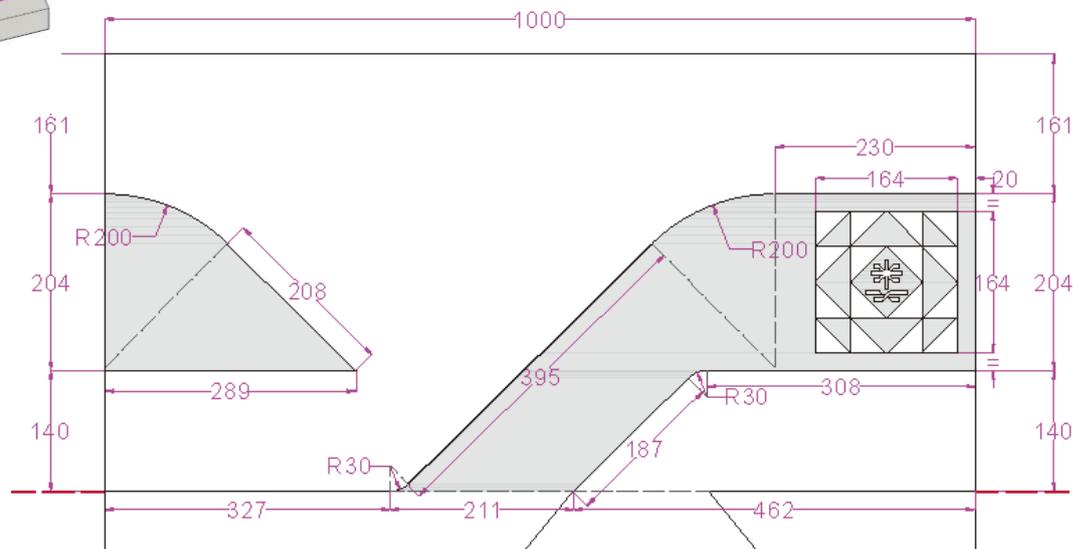
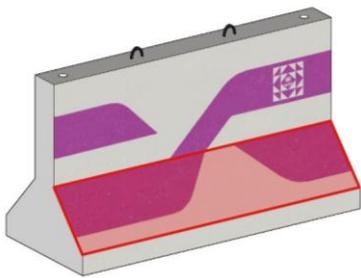


Figure 2.2.2.9.31. Design Part A - Upper part Branding Design Definition (1000mm)



Lower part branding design definition

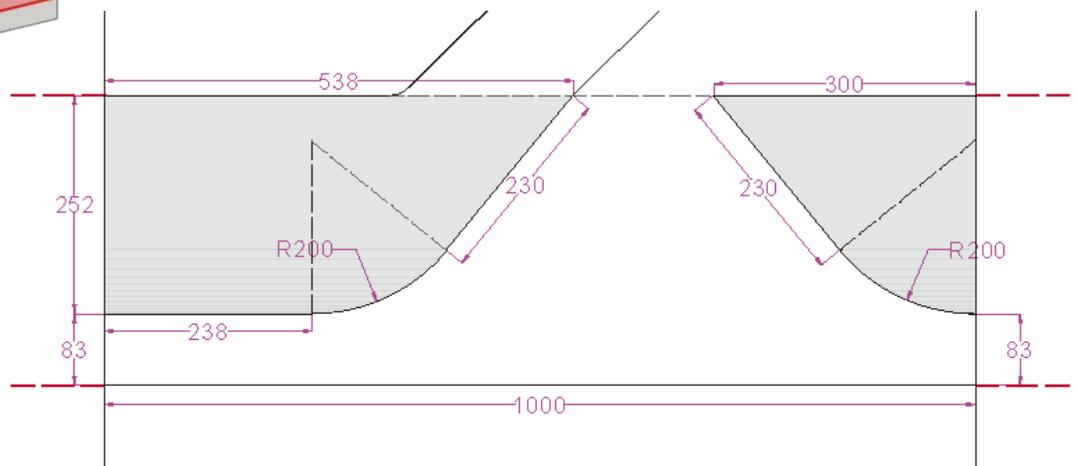
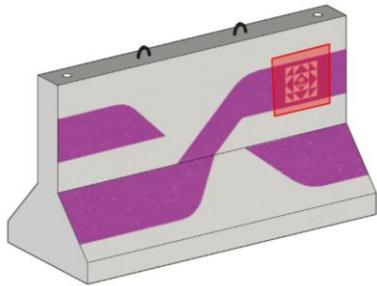


Figure 2.2.2.9.32. Design Part A - Lower part Branding Design Definition (1000mm)

Jersey barrier branding design A - 1,000mm Jersey Barrier



RCIP Logo definition

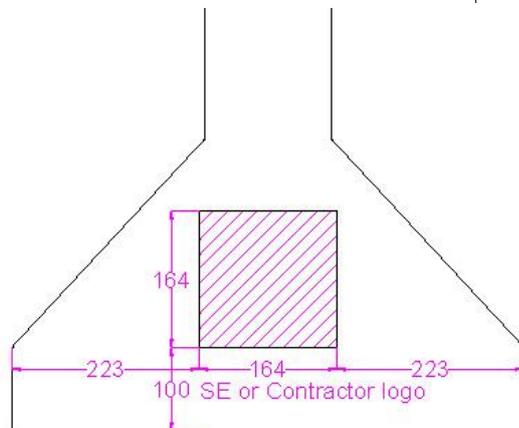
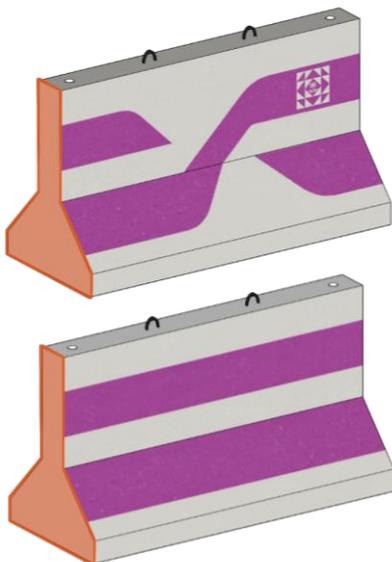
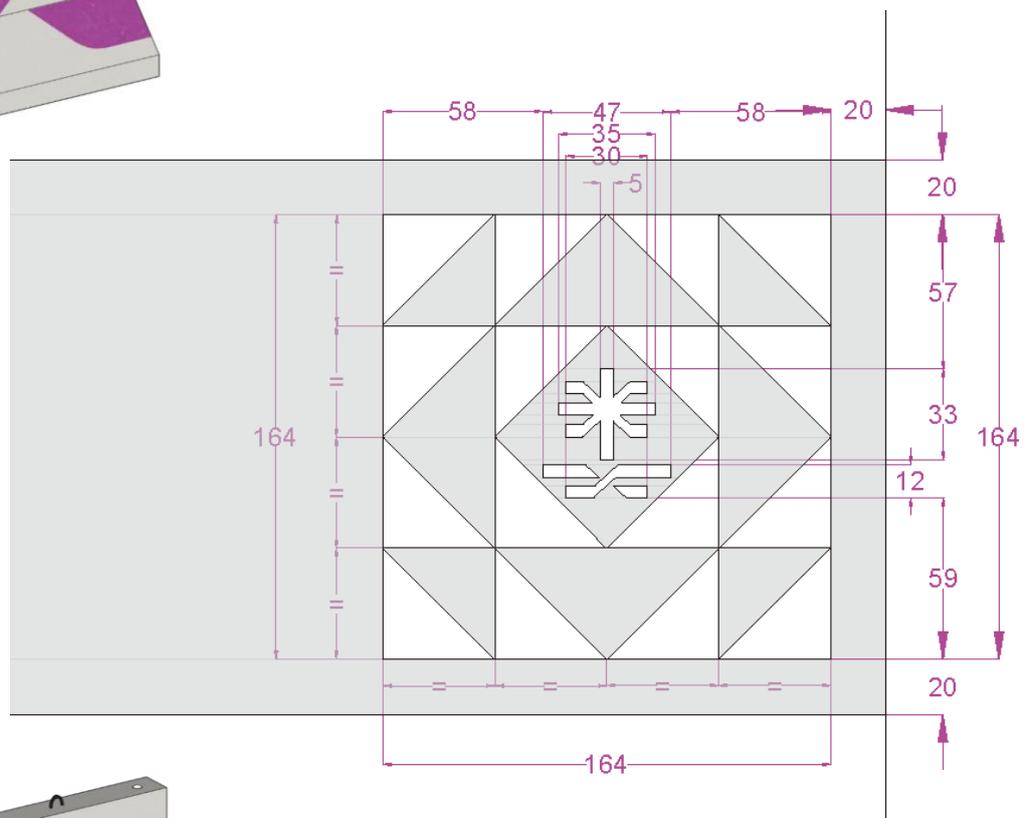


Figure 2.2.2.9.33. Design Part A - Logo Branding Design Definition (1000mm)

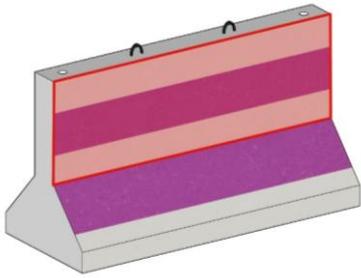


2.2.2 BARRIERS AND WARNING MEASURES

2.2.2.9 Supplementary Material

Jersey barrier branding design B - 1,000mm Jersey Barrier

Note: all dimensions are in mm.



Upper part branding design definition

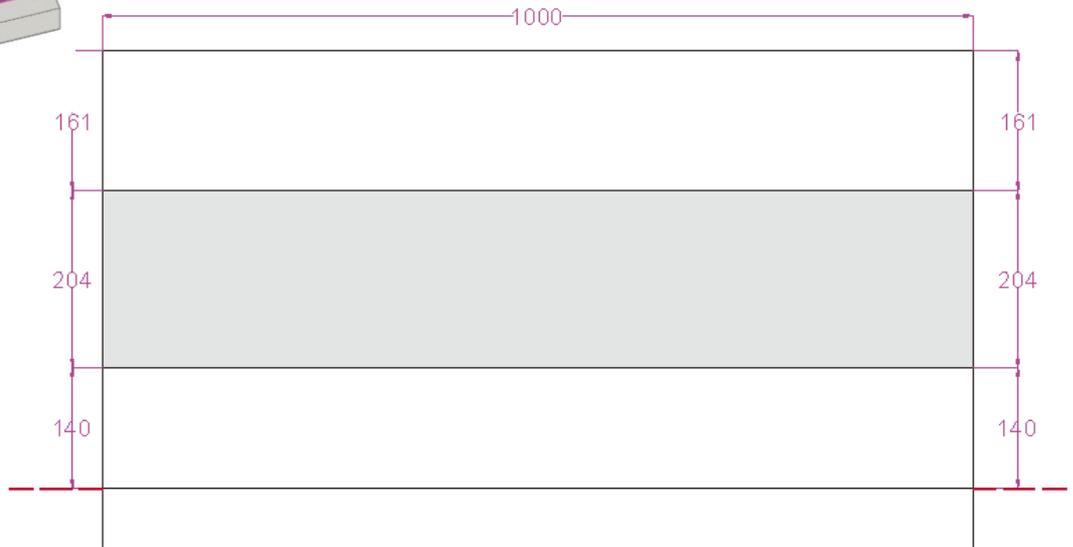
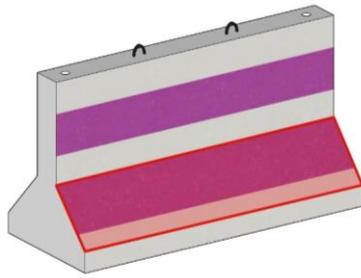


Figure 2.2.2.9.34. Design Part B - Upper Part Branding Design Definition (1000mm)



Lower part branding design definition



Figure 2.2.2.9.35. Design Part B - Lower Part Branding Design Definition (1000mm)

Typical case study



Figure 2.2.2.9.36. Typical case study (Day Time View)

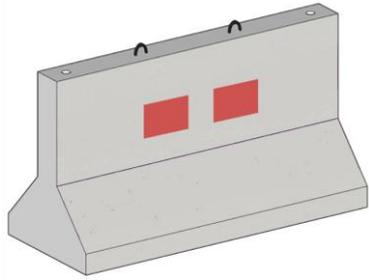


Figure 2.2.2.9.37. Typical case study (Night Time View)

2.2.2 BARRIERS AND WARNING MEASURES

2.2.2.9 Supplementary Material

Jersey Barrier – Service Entity & Contractor Logo Placement – 1,000mm Jersey Barrier



Note: all dimensions are in mm.

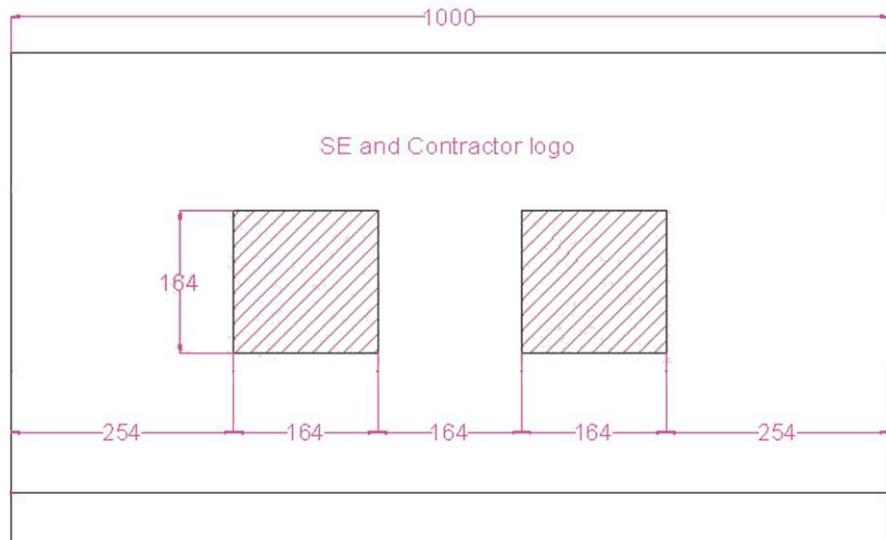
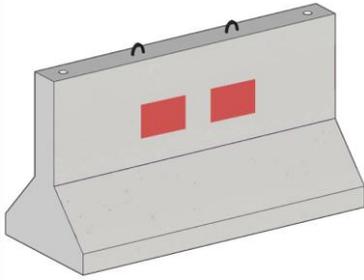


Figure 2.2.2.9.38. Jersey Barrier Service Entity & Contractor Logo Placement (1000mm)

Note: Service Entity and Contractor logos to be placed on the **inside face** of jersey barriers as indicated in Figures (2.2.2.9.38) and (2.2.2.9.39).

Jersey Barrier – Service Entity & Contractor Logo Placement – 1,500mm Jersey Barrier



Note: all dimensions are in mm.

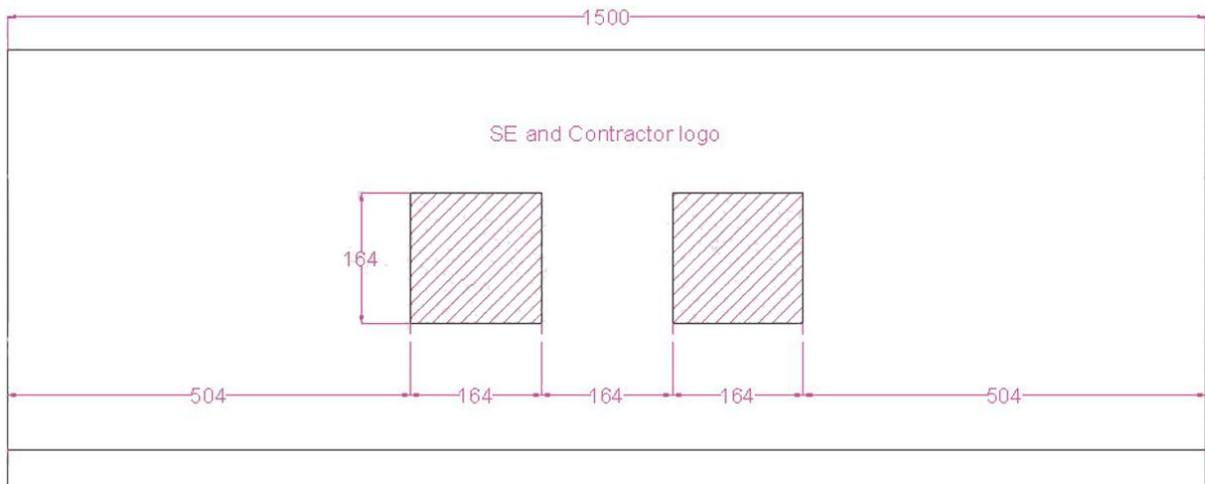
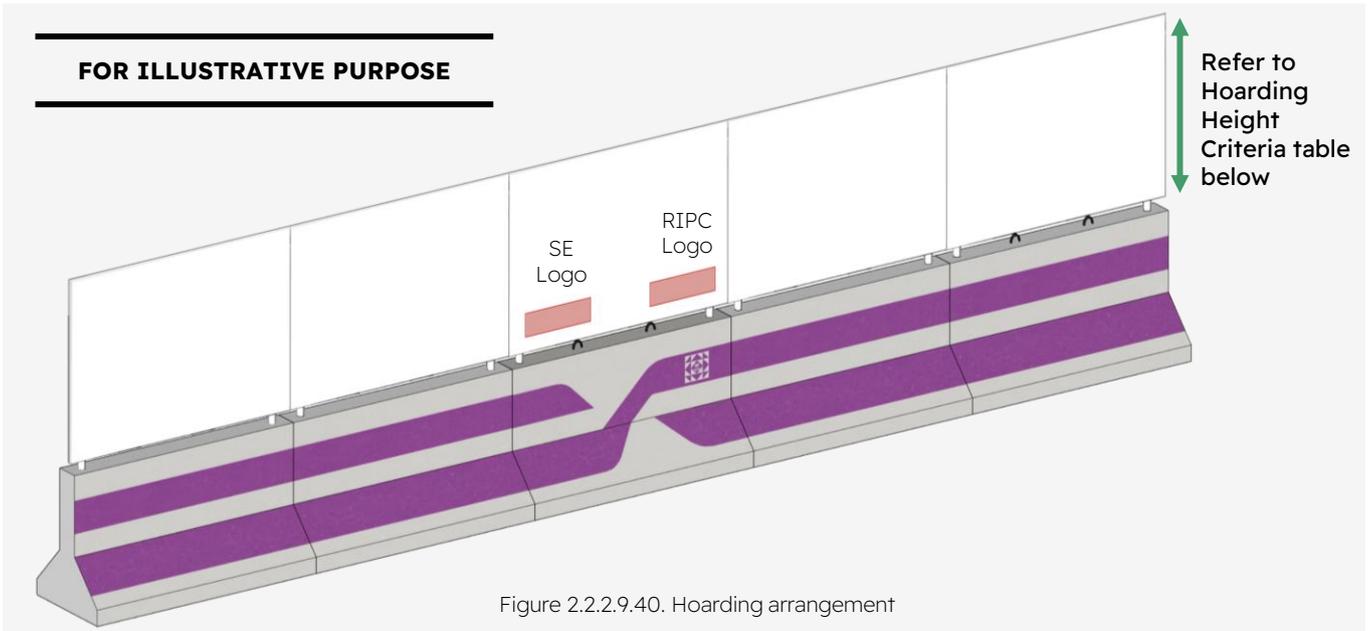


Figure 2.2.2.9.39. Jersey Barrier Service Entity & Contractor Logo Placement (1500mm)

2.2.2 BARRIERS AND WARNING MEASURES

2.2.2.9 Supplementary Material

Hoarding



Note: RIPC and Service Entity logos should be provided on hoarding panels as illustrated indicatively in the above figure. Logos should be provided atop jersey barriers with design branding Part A (at a minimum), however this is subject to specific site arrangements and layouts.

The hoarding design must reflect the nature of the works, the project, or the service provider. Using the hoarding for advertising is prohibited. All designs must be reviewed and approved by RIPC before use.

	Expressways	Freeways	Arterials	Collectors	Local
Indicative Hoarding Height	≥ 2.00m	≥ 2.00m	≥ 2.00m	≥ 1.00m	≥ 1.00m

Table 2.2.2.9.10: Hoarding Height Criteria

Criteria	Expressways	Freeways	Arterials	Collectors	Local
1 week	Yes	No	No	No	No
2 weeks	Yes	Yes	Yes	No	No
1 month	Yes	Yes	Yes	Yes	Yes
Roads adjacent to and leading to government entities, tourist attractions, parks, hospitals, schools, elderly care Centers, and nurseries.*	Yes	Yes	Yes	Yes	Yes

*Check with the Centre to learn more about this classification.

Table 2.2.2.9.11: Criteria for The Use of Hoarding

Note: The above standards represent the minimum requirements for work zones that are 300 meters or longer. For sites and work areas shorter than 300 meters, the placement of hoarding will be determined based on an appropriate risk assessment.

Battery-Operated 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	1,000m (Night)	350 m (Sunny Day)	100 m (Night)
Minimum Lens Diameter	150 mm	150 mm	150 mm
Hours of Required Operation	Dusk to Dawn	All Times	Dusk to Dawn

*Length of time instantaneous brightness is equal to or greater than effective brightness.

Table 2.2.2.9.12. Comparison of Light Characteristics for Types A, B, and C

WHAT TO LOOK OUT FOR

Traffic Control – Contractor

- Are hazard identification beacons installed and maintained correctly
- Are battery-operated warning and delineation lights installed and maintained correctly?

Flashing Warning Arrow Panels

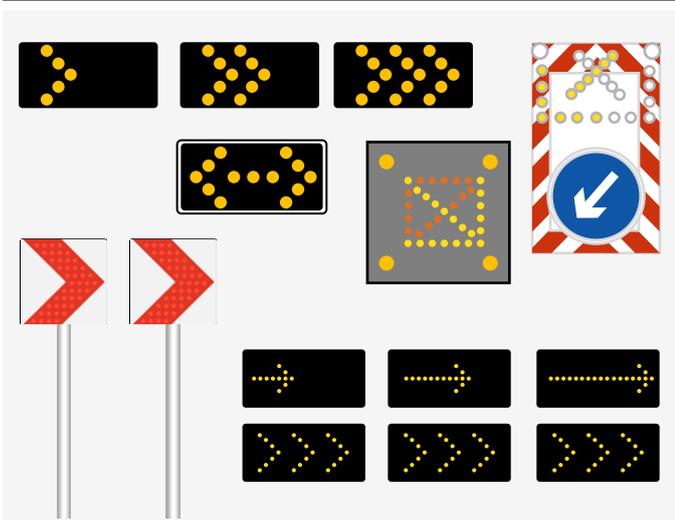


Figure 2.2.2.9.41. Flashing Warning Arrow Panels (SHC 305)

WHAT TO LOOK OUT FOR

Traffic Control – Contractor

- If flashing warning arrow panels are required, are they installed and maintained correctly?

Hand Signalling Devices, Flags and Warning Paddles

WHAT TO LOOK OUT FOR

Traffic Control Signals – Contractor

- Is the location appropriate for the use of traffic control signals?
- Are they install in accordance with standards?

2.2

SPATIAL PLANNING

2.2.3 WORK ZONE MANAGEMENT

- 2.2.3.1 Transition Zone Management
- 2.2.3.2 Safety Buffer Zone Requirements
- 2.2.3.3 Lateral Buffer Zone Specifications
- 2.2.3.4 Lane Width Adjustments in Work Zones
- 2.2.3.5 Termination Area and Work Zone Access Management
- 2.2.3.6 Pedestrian Walkways and Paths Management
- 2.2.3.7 Supplementary Material

2.2.3 WORK ZONE MANAGEMENT

2.2.3.1 Transition Zone Management

Code Statement: Manage transition zones to safely redirect traffic around work areas

RATIONALE

Effective transition zones minimize abrupt traffic shifts, reducing the risk of collisions and ensuring a controlled approach to navigating work zones.

CONTEXT

The Transition Zone is the area where traffic is safely redirected from its normal path around a Work Zone. It includes tapers that gradually guide vehicles and pedestrians into new traffic patterns. A taper is a gradual transition where traffic lanes are merged, shifted, or diverged. Tapers are created using traffic control devices such as cones, barrels, or barriers.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
REQUIREMENTS	
<ul style="list-style-type: none"> Set up Transition Zones in accordance with SHC 305 standards, with correct Taper Length Calculations. <p>Tapers</p> <ul style="list-style-type: none"> The length of the taper (or each taper) can be determined from the one of the two formulas provided in the attached table (as per SHC 305 guidelines). Refer to table 2.2.3.1.1 ‘Taper Length Calculations Based on Traffic Speed’. Ensure tapers are increased in length at locations with poor sight distances or speed compliance issues and are supported by a site-specific risk assessment and documented in the TMP. <p>Warning Devices</p> <ul style="list-style-type: none"> Any change in direction or width of the travel lane should be preceded by proper warning devices, such as signs and beacons, appropriate to the physical conditions and speed of traffic. Flashing Warning Arrow Panels are essential for attracting motorists’ attention and must be deployed during all lane closures on multilane roads and divided highways. 	<p>Tapers</p> <ul style="list-style-type: none"> When using multiple tapers, the distance between tapers (‘D’) should be calculated as: <ul style="list-style-type: none"> 4*S (preferred), 3*S (minimum), and 5*S (maximum) (where ‘S’ is the permanent posted speed in km/h). <p>Warning Devices</p> <ul style="list-style-type: none"> Use chevron signs on curves and tapers to provide additional emphasis and guidance, ensuring at least three chevron signs are visible to motorists at any time. Chevron signs shall be mounted on flexible supports.
MAIN OUTCOMES	
<ul style="list-style-type: none"> Tapers designed to limit congestion. 	

KEY REFERENCES

- SHC 305

Traffic Speed (km/hr)	Taper Length [m]
< 70	$L = WS^2 / 155.4$
≥ 70	$L = WS / 1.61$

Where;
L is total length of taper (m),
W is lateral distance traffic is to be moved (m),
S is traffic speed.

Table 2.2.3.1.1: Taper Length Calculations Based on Traffic Speed (SHC 305)

Applicable Chapters, Forms and Templates

- [Chapter 2.1.3 Traffic Control](#)
- [Chapter 2.2.3.7 Supplementary Material](#)

PROJECT LIFECYCLE			
Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE	
	P1. Safe, Compliant & Controlled
SUCCESS MEASUREMENT	
P1.1. Safety Compliance	<ul style="list-style-type: none"> • PI1.1.4. Percentage of major risks mitigated through risk assessment per project
P1.5. Traffic and Parking Control	<ul style="list-style-type: none"> • PI1.5.1. Number of traffic control-related complaints per project
LINKED VIOLATION	
	V1. Barriers and Safety Compliance Violations
	V5. Traffic and Parking Control Violations

Consider

Advise

REQUIREMENTS

- The combined length of each taper plus the combined distance between tapers makes up the Transition Zone.
- Consider the existing road layout and topography and set up the Transition Zone to ensure works can be completed safely whilst minimizing the impact to traffic flow.
- Regularly inspect the Transition Zone to ensure proper setup and maintenance, adjusting based on real-time traffic flow and conditions

MAIN OUTCOMES

KEY STAKEHOLDERS

- CONTRACTOR
- CONSULTANT



2.2.3 WORK ZONE MANAGEMENT

2.2.3.2 Safety Buffer Zone Requirements

Code Statement: Establish safety buffer zones to provide space between traffic and the work area.

RATIONALE

Buffer zones are essential for absorbing errant vehicles, protecting workers, and providing a safety margin that reduces the likelihood of accidents near work areas.

CONTEXT

The Safety Buffer Zone is an unoccupied space between the Transition Zone and the Work Area, allowing errant vehicles to slow or stop before entering the Work Area.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
REQUIREMENTS	
<ul style="list-style-type: none"> The Contractor shall set out the Safety Buffer Zone in accordance with SHC 305 and the guidelines below. When designing a TMP, provide a space of no less than 10m prior to the work area for the safety buffer. The recommended length of buffer zones is shown in the attached table, based on guidance in SHC 305. Refer to table “Recommended Buffer Zone Lengths Based on Traffic Speed”. 	<p>Restrictions:</p> <ul style="list-style-type: none"> Roadworks, storage of vehicles, plant, equipment, and stockpiled materials should not occur within safety buffers. Work vehicles may be parked in the safety buffer, but no other work activities are permitted. Road workers should not occupy the safety buffer area except when accessing the Work Zone. If additional space is needed for work or material laydown, incorporate this into the work area and adjust the transition zone and advance warning areas accordingly. <p>Departure:</p> <ul style="list-style-type: none"> Safety buffers are not required on departure. However, if road users can approach the Work Area from either end, provide a safety buffer, transition zone, and advance warning at both ends of the Work Area. A 10m departure safety zone is advised regardless.
MAIN OUTCOMES	
<ul style="list-style-type: none"> Buffer Zones that are designed to facilitate safe access and egress from site. Protecting workers and providing a safety margin to reduce the likelihood of accidents near work areas. 	

KEY REFERENCES

- SHC 305

Traffic Speed (km/hr)	Recommended Buffer Zone Length (m)
≤ 40	10
50	20
60	25
70	35
80	40
90	50
100	60

Table 2.2.3.2.1: Buffer Zone Lengths Based on Traffic Speed (SHC 305)

Applicable Chapters, Forms and Templates

- [Chapter 2.1.3 Traffic Control](#)
- [Chapter 2.2.3.7 Supplementary Material](#)

PROJECT LIFECYCLE			
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Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE

 **P1. Safe, Compliant & Controlled**

SUCCESS MEASUREMENT

P1.1. **Safety Compliance**

- PI1.1.1. Percentage of projects with zero lost-time injuries

P1.3. **Quality Assurance**

- PI1.3.4. Inspection pass rate

LINKED VIOLATION

 V1. Barriers and Safety Compliance Violations

Consider

Advise

REQUIREMENTS

- Extend buffer zones if additional space is required for the work or if high-risk conditions are identified during site assessments.
- Monitor the effectiveness of the Safety Buffer Zone continuously to ensure that it provides adequate protection from errant vehicles

MAIN OUTCOMES

KEY STAKEHOLDERS

- CONTRACTORS
- CONSULTANTS



2.2.3 WORK ZONE MANAGEMENT

2.2.3.3 Lateral Buffer Zone Specifications

Code Statement: Create lateral buffer zones to keep workers safe from adjacent live traffic.

RATIONALE

Lateral buffers enhance safety by providing clear separation, reducing the risk of traffic-related incidents, and maintaining a secure environment for construction activities.

CONTEXT

The Lateral Buffer Zone (or lateral safety buffer) is the space between the work area and the traffic control devices, i.e., cones and barriers. This safety buffer is essential for protecting workers from traffic and is one of the most critical aspects of temporary traffic control.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
REQUIREMENTS	
<ul style="list-style-type: none"> The Contractor shall set out the Lateral Buffer Zone in accordance with SHC 305 and the guidelines below. <p>Planning and Design</p> <ul style="list-style-type: none"> Work must be planned to provide maximum clearances for workers on foot and operating plant. A site or activity-specific risk assessment must be completed, demonstrating the application of the hierarchy of controls and consideration of all higher-order controls. <p>Minimum Distance</p> <ul style="list-style-type: none"> The lateral buffer zone shall be a minimum of 1.5m for all sites with a speed greater than 50km/h. A Lateral Buffer Zone should not be used for pedestrian routes. <p>Special Considerations</p> <ul style="list-style-type: none"> Special consideration for the safety of both workers and traffic must be given while traffic flow is adjacent to excavations. Install temporary safety barriers when traffic passes beside excavations deeper than 0.3m and within 3m of the travel path. If traffic is greater than 3m from the excavation, the need for a temporary safety barrier should be considered during the TMP development and risk assessment. 	<ul style="list-style-type: none"> Conduct a site-specific risk assessment for determining Lateral Buffer Zone dimensions and apply additional controls based on findings. <p>Long Term Works:</p> <ul style="list-style-type: none"> Use delineation devices to demonstrate the extent of the Work Area, especially on long-term projects where higher visibility and defined boundaries are required. For these projects, delineation devices are essential in addition to any safety barriers used to create the lateral buffer zone.
MAIN OUTCOMES	
<ul style="list-style-type: none"> Lateral Buffer Zones that are designed to protect road workers. 	

KEY REFERENCES

- SHC 305

Applicable Chapters, Forms and Templates

- [Chapter 2.1.3 Traffic Control](#)
- [Chapter 2.2.3.7 Supplementary Material](#)

PROJECT LIFECYCLE			
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Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE	
	P1. Safe, Compliant & Controlled
SUCCESS MEASUREMENT	
P1.1. Safety Compliance	<ul style="list-style-type: none"> • PI1.1.1. Percentage of projects with zero lost-time injuries • PI1.1.4. Percentage of major risks mitigated through risk assessment per project
LINKED VIOLATION	
	V1. Barriers and Safety Compliance Violations

Consider	Advise
----------	--------

REQUIREMENTS

Site-Specific Controls:

- The site-specific minimum controls for Work Zones are based on the lateral buffer zone, traffic speed, and types of works.
- Each site may require additional controls based on a risk assessment.
- The table named 'Minimum Temporary Traffic Controls Based on Site Traffic Speed, Type of Work, and Lateral Buffer Zone' in Section 2.2.2.1.0 outlines the minimum requirements; however, each site may require additional controls based on a risk assessment.

Speed Reduction:

- Speed reduction refers to a decrease in the speed limit or the actual speed at which vehicles are traveling, important for enhancing safety.
- Generally, each 20% reduction in speed requires a separate advanced warning zone (e.g., 100km/hr to 80 to 60 to 50 to 40).

Shadow Vehicle:

- A shadow vehicle provides protection and warning in Work Zones, acting as a barrier between oncoming traffic and workers or equipment.
- For sites with a speed greater than 50km/hr, the shadow vehicle must be MASH tested as per SHC requirements.

Temporary Safety Barrier:

- A temporary safety barrier provides protection and control in road Work Zones, creating a physical barrier to enhance safety.

- Inspect Lateral Buffer Zones regularly for compliance with safety standards, ensuring barriers and devices are functioning correctly.

MAIN OUTCOMES

KEY STAKEHOLDERS

- CONTRACTORS
- CONSULTANTS



2.2.3 WORK ZONE MANAGEMENT

2.2.3.4 Lane Width Adjustments in Work Zones

Code Statement: Adjust lane widths appropriately to maintain safety and traffic flow around work zones.

RATIONALE

Correct lane width management prevents congestion, minimizes the risk of collisions, and helps maintain orderly traffic movement, supporting overall road safety.

CONTEXT

To create the appropriate distance from the worksite, the reduction of the traffic lane width may be necessary (including even the road shoulder). Any reduction in the traffic lane width must be in accordance with the suggested speed limit as well as with the road category. Proper lane width adjustments are crucial for maintaining safety around work zones. Lane reductions must be carefully managed to accommodate different vehicle types and maintain traffic flow.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
REQUIREMENTS	
<ul style="list-style-type: none"> Where appropriate, reduce lane widths in accordance with SHC 305 guidelines: <ul style="list-style-type: none"> Minimum lane width for HGVs and buses: 3.0m, with traffic speed reduced to a maximum of < 50km/h. For speeds ≥ 50km/h, maintain a minimum lane width of 3.3m. The absolute minimum where only cars and light vehicles are present, reduce lane width to 2.5m, with traffic speed reduced to a maximum of 40km/h. Site-specific traffic using the route must always be considered and accommodated. Narrowing Two Way to One Way <ul style="list-style-type: none"> When narrowing two-way roads to one-way due to work occupancy, ensure the minimum width of 6.6m is maintained. If this cannot be achieved, complete road closure with a deviation or alternate traffic system must be implemented. 	<ul style="list-style-type: none"> Narrowing Two Way to One Way <ul style="list-style-type: none"> One-Way Road: In a one-way road with an alternate traffic system, safety barriers or other traffic equipment can narrow the road to 3.3m to emphasize the one-way function. The alternate traffic will operate with priority signs, stop signs, or portable signals depending on traffic flow and speed limit. Traffic Management: Stop signs (stop control) can be used for works up to 100m in length. Sign operators must have good visual and wireless communication, ensuring strong coordination. Portable traffic signals are suitable for works up to 300m. If these arrangements don't cover the road traffic, a complete road exclusion with a deviation can be applied upon request. Suitable control methods are shown in the table named 'Traffic Management Methods for Various Work Lengths' in Section 2.2.2.10 (Table 4-7 from SHC 305, Section 4.4). Operator Training: Operators of any form of traffic control shall be appropriately trained and accredited by the RGA.
MAIN OUTCOMES	
<ul style="list-style-type: none"> Reduce the risk of accidents, protecting both workers and the public. 	

KEY REFERENCES

- SHC 305

Applicable Chapters, Forms and Templates

- [Chapter 2.2.3.7 Supplementary Material](#)

PROJECT LIFECYCLE

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PRINCIPLE



P1. Safe, Compliant & Controlled



P2. Effectively Managed & Continuously Improved

SUCCESS MEASUREMENT

P1.5. **Traffic and Parking Control**

- PI1.5.2. Percentage of projects without traffic violations

P2.2. **Worksite Management**

- PI2.2.4. Percentage of projects without barriers and safety violations

LINKED VIOLATION



V3. Infrastructure and Roads Issues



V5. Traffic and Parking Control Violations

Consider

Advise

REQUIREMENTS

- Lane Width Adjustments is an acceptable form of temporary traffic control; however, the type of road vehicles and minimum allowable road width must be considered.
- Any reduction in lane width generally necessitates a consideration for a corresponding reduction in traffic speed as per Clause 4.5 of SHC 305.
- Check that lane reductions are specified correctly for the location and that they are installed and maintained as required.

MAIN OUTCOMES

- Ensure smooth traffic flow and minimize disruptions in and around work zones.

KEY STAKEHOLDERS

- CONTRACTORS
- CONSULTANTS



2.2.3 WORK ZONE MANAGEMENT

2.2.3.5 Termination Area and Work Zone Access Management

Code Statement: Ensure safe termination areas and controlled access/egress points for work vehicles.

RATIONALE

Proper access and termination zone management minimize disruptions, reduce the risk of accidents, and ensure the orderly re-integration of traffic flow.

CONTEXT

The Termination Area is the point where traffic returns to its normal flow. Proper access and egress management ensure work vehicle movement does not compromise road safety.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception		Economy & Business	Infra & Public Space	Environmental

Shall	Should
REQUIREMENTS	
<p>Termination Area</p> <ul style="list-style-type: none"> Install “End of Road Work” signs (see Section 2.1.3.7 ‘Common Warning Signs’ Supplementary Material) at the Termination Area. <p>Access and Egress to Work Zone</p> <ul style="list-style-type: none"> General Access: Once the Work Zone is established, Work Vehicles cannot access through locations requiring Temporary Safety barriers. Access should be through the Transition Zone, Buffer Zone, or Termination Area (areas without Safety Barriers). Internal Traffic Control Plan (ITCP): Design and implement an Internal Traffic Control Plan (ITCP) for long-term works and major projects to reduce the risk of impacts between work vehicles and ensure worker safety. The ITCP should be available on site and displayed appropriately. 	<p>Access and Egress to Work Zone</p> <ul style="list-style-type: none"> Access Gates: Provide access gates in areas with barricades or hoarding. Where a safety barrier is required, there shall be no access through the safety barrier into the lateral buffer zone or live traffic.
MAIN OUTCOMES	
<ul style="list-style-type: none"> Clear delineation between the site and its Work Zones under specific rules, and other areas under normal rules. 	

KEY REFERENCES

- SHC 305

Applicable Chapters, Forms and Templates

- [Chapter 2.1.3 Traffic Control](#)
- [Chapter 2.2.3.7 Supplementary Material](#)

PROJECT LIFECYCLE

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PRINCIPLE



P1. Safe, Compliant & Controlled



P2. Effectively Managed & Continuously Improved

SUCCESS MEASUREMENT

P1.1. **Safety Compliance**

- PI1.1.1. Percentage of projects with zero lost-time injuries

P2.2. **Worksite Management**

- PI2.2.2. Percentage of projects without worksite and cleanliness violation

LINKED VIOLATION



V1. Barriers and Safety Compliance Violations



V8. Community and Public Accessibility Violations

Consider

Advise

REQUIREMENTS

- ITCP Benefits for Work Site Entrances/Exits:
 - Isolating workers on foot from trucks and equipment.
 - Limiting/controlling vehicle access points.
 - Coordinating truck and equipment movements.
 - Providing guidance to workers on foot, truck drivers, and equipment operators.
- Verify that access and egress are provided safely, and ensure ITCP is prepared and implemented effectively.

MAIN OUTCOMES

- Safe site access and egress.

KEY STAKEHOLDERS

- CONTRACTORS
- CONSULTANTS



2.2.3 WORK ZONE MANAGEMENT

2.2.3.6 Pedestrian Walkways and Paths Management

Code Statement: Design and maintain pedestrian walkways and paths to ensure safety and accessibility.

RATIONALE

Well-managed pedestrian routes prevent accidents, ensure continuous access, and foster community trust by minimizing disruptions to daily movements.

CONTEXT

Pedestrian walkways and paths must be managed to ensure the safety and accessibility of pedestrians around construction areas. Proper delineation and protective measures are essential.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
REQUIREMENTS	
<ul style="list-style-type: none"> Set out and protect pedestrian walkways and paths per SHC 305 and the guidelines below. Maintenance of Routes: Maintain all pedestrian routes. Use delineation devices to separate pedestrians from the Work Zone on short-term works, with a risk assessment based on site-specific risks. Secure fencing is needed to separate the public from the Work Zone. Existing Routes: Maintain existing routes for micro-mobility and pedestrians around the Site Area. If no existing routes, conduct a risk-based analysis to determine if ways should be provided. Pedestrian Safety: Ensure pedestrian safety during roadworks, protecting them from work activity and traffic flow. Provide an alternative route if the sidewalk is closed, ensuring access to adjacent buildings and common areas. Footways should be at least 1.30 m wide, increasing to 1.50 m or more where possible. Choose the safest footway based on danger evaluation during pedestrian movement. 	<ul style="list-style-type: none"> Contraflow System: Address the need for a Contraflow System for micro-mobility or pedestrian routes in the TTCP preparation. Footway Alignment: A 1.30 m wide pedestrian route using the existing footway may be safer than a wider new route in the vehicle travel way. Construct new footways on flat surfaces without height variations or dangerous obstacles. Ensure steep ramps are safe for wheelchairs or non-tipping strollers. Delineation and Separation: Install appropriate equipment for delineation and separation from traffic and the work area (e.g., walls, fences, barricades, railings). Road safety barrier systems may be required to protect pedestrians from errant vehicles. Off-Road Pavement: Generally, pedestrian routes should be off the road pavement surface. When pedestrian routes are in the traveled way, install traffic signing and safety barriers before blocking the footway.
MAIN OUTCOMES	
<ul style="list-style-type: none"> Project sites that consider the needs, safety and accessibility of pedestrians. 	

KEY REFERENCES

Applicable Chapters, Forms and Templates

- [Chapter 2.1.3 Traffic Control](#)
- [Chapter 2.1.9 - Community outreach & accessibility](#)
- [Chapter 2.2.3.7 Supplementary Material](#)
- [2.2.4.1 Kerb Ramps and Footway Boards](#)

PROJECT LIFECYCLE

Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE



P1. Safe, Compliant & Controlled



P6. Community-Centric and Accessible

SUCCESS MEASUREMENT

P1.1. **Safety Compliance**

- PI1.1.4. Percentage of major risks mitigated through risk assessment per project

P6.1. **Public Accessibility**

- PI6.1.2. Number of violations relevant to public accessibility

LINKED VIOLATION



V8. Community and Public Accessibility Violations

Consider

Advise

REQUIREMENTS

- **Examples and Figures:**
 - An example of a footway diversion into the traveled way is shown in Figure 4-11 from SHC 305, Section 4.6).
 - Delineators, fences, barricades, and walls shall be provided to separate pedestrians from the works area or building development site and to prevent them from entering the safety buffer areas, as shown in Figure 4-13 from SHC 305, Section 4.6).
- Conduct risk assessments for all pedestrian and micro-mobility routes to ensure compliance with safety standards.

MAIN OUTCOMES

KEY STAKEHOLDERS

- RESIDENTS
- SERVICE ENTITIES
- RIPC
- CONTRACTORS

2.2.3 WORK ZONE MANAGEMENT

2.2.3.7 Supplementary Material

Lateral Buffer Zone

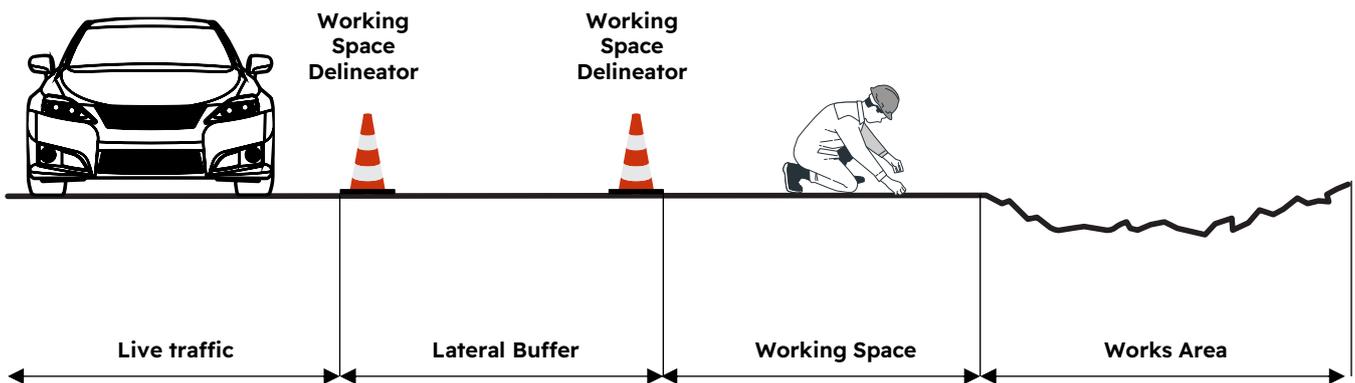


Figure 2.2.3.7.1: Illustrative Example of Lateral Buffer Zone

WHAT TO LOOK OUT FOR

Lateral Buffer Zones – Contractor

- Is the appropriate Lateral Buffer Zone correctly set out?

Pedestrian Walkways and Paths Management

WHAT TO LOOK OUT FOR

Pedestrian Walkways and Paths – Contractor

- Has a risk assessment been prepared?
- Does the pedestrian and micro-mobility route meet required standards?

Lane Width Adjustments in Work Zones

WHAT TO LOOK OUT FOR

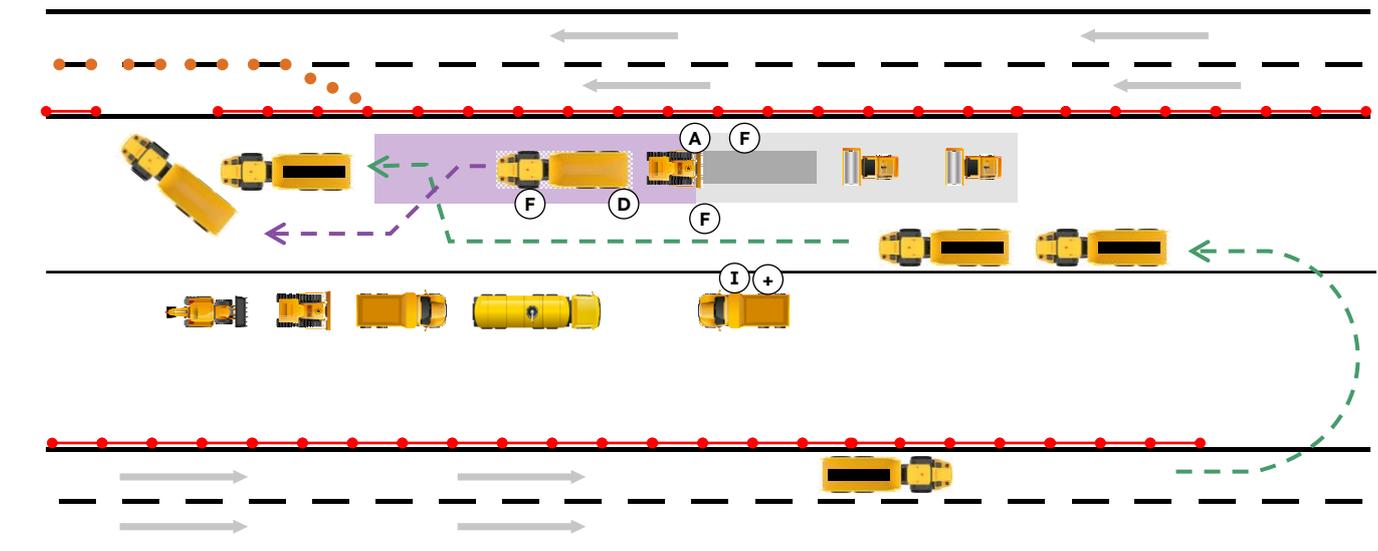
Reducing Lane Widths- Contractor

- If a reduction is appropriate, has the width been specified for the type of location and site?
- Has it been correctly installed and maintained?

Narrowing Two Way to One Way - Contractor

- If this is necessary, has it been correctly installed?
- Are operators trained and have good wireless communications on site?

Termination Area and Work Zone Access Management



	Bottom Dump (Full)		Dump Truck (Full)
	Bottom Dump (Empty)		Dump Truck (Empty)
	Paving Machine		Truck Movement
	Water Truck		Barrier
	Roller		Channelizing device
	Backhoe		Traffic direction
	Doze		
	Prohibited Areas for workers on foot		New pavement
			Existing pavement

	Foreman		Flagger		Other type of work
	Spotter		Worker foot		
	Inspector		Surveyor		

WHAT TO LOOK OUT FOR

Access and Egress - Contractor

- Is access and egress provided in a safe manner?
- Has an ITCP been prepared?

Figure 2.2.3.7.2: Example of an Internal Traffic Control Plan (ITCP) for Long-Term Works and Major Projects (SHC 305)

2.2

SPATIAL PLANNING

2.2.4 ACCESS AND COMMUNICATION PROTOCOLS

2.2.4.1 Kerb Ramps and Footway Boards

2.2.4.2 Project Information Boards

2.2.4.3 Advanced Communication with Stakeholders

2.2.4.4 Supplementary Material



2.2.4 ACCESS AND COMMUNICATION PROTOCOLS

2.2.4.1 Kerb Ramps and Footway Boards

Code Statement: Install kerb ramps and footway boards to provide safe crossings for all pedestrians.

RATIONALE

Ensuring accessible crossings maintains community mobility, reduces liability risks, and complies with accessibility standards, demonstrating commitment to inclusive infrastructure.

CONTEXT

Kerb ramps and footway boards are crucial for providing safe and accessible crossings for pedestrians, including those using wheelchairs and pushchairs. All spatial planning shall be as per SHC301 requirements.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
REQUIREMENTS	
<p>Kerb Ramps</p> <ul style="list-style-type: none"> Where pedestrians are diverted to temporary walkways in the carriageway, suitable Kerb Ramps shall be provided to enable wheelchairs or pushchairs to negotiate kerbs and safely use the pedestrian contraflow. <p>Temporary Footway Boards</p> <ul style="list-style-type: none"> Should be deployed at specific points across an excavation to allow safe pedestrian crossing and property access. These devices should be supported by barriers and signage. A Temporary Kerb Ramp should be deployed when public footways are closed due to site works and there is no option but to have footway users enter the road, supported by signage and barriers. Usage: <ul style="list-style-type: none"> Used for bridging excavations to service pedestrian and micro-mobility traffic during excavation works. Shall not be used on the road where vehicles will cross over them. In such cases, a more robust solution for vehicle crossing should be used (e.g., Road Plates). Ramps and footway boards shall be of a minimum width of 1.2m 	<p>Temporary Footway Boards</p> <ul style="list-style-type: none"> Specifications: <ul style="list-style-type: none"> Shall extend the full width of the temporary footway and should be rigidly fixed with sufficient length on either side of the excavation. Bitumastic material should not be used on non-bitumastic surfaces to maintain its integrity. Shall feature chamfered edges to prevent tripping and should be fenced to prevent falls where the edges of the boards are adjacent to an excavation. Shall be secured as appropriate. Provision: <ul style="list-style-type: none"> On every occasion where there is an excavation (even for a micro trench, or short duration works) in a pedestrian access route, a suitable footway board should be provided.
MAIN OUTCOMES	
<ul style="list-style-type: none"> Enable safe passage for pedestrians, including those using wheelchairs or pushchairs. 	

KEY REFERENCES

PROJECT LIFECYCLE			
Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE



P6. Community-Centric and Accessible

SUCCESS MEASUREMENT

P6.1. Public Accessibility

- PI6.1.1. Percentage reduction in traffic congestion due to alternative routes
- PI6.1.2. Number of violations relevant to public accessibility

LINKED VIOLATION



V8. Community and Public Accessibility Violations

Applicable Chapters, Forms and Templates

- [2.2.3.6 Pedestrian Walkways and Paths Management](#)
- [Chapter 2.2.4.4 Supplementary Material](#)

Consider	Advise
----------	--------

REQUIREMENTS

- | | |
|--|---|
| <ul style="list-style-type: none"> Ensure ramps and footway boards are made from durable materials that withstand loading and environmental conditions. | <ul style="list-style-type: none"> Verify ramps and boards are installed correctly, meet safety requirements, and are suitable for pedestrian and micro-mobility traffic. Ensure that ramps and boards are placed at a gradual slope. |
|--|---|

MAIN OUTCOMES

- Protect pedestrians and guide them safely through or around work zones.

KEY STAKEHOLDERS

- RESIDENTS
- CONTRACTOR

2.2.4 ACCESS AND COMMUNICATION PROTOCOLS

2.2.4.2 Project Information Boards (PIBs)

Code Statement: Display project information boards to keep the public informed about ongoing works.

Transparent communication through project boards builds public trust, reduces confusion, and ensures that stakeholders are aware of project impacts and how to address concerns.

Project Information Boards (PIBs) are used to inform the public about the nature of ongoing works, and provides contact information for questions, complaints, or emergencies.

POSITIVE IMPACTS



Health & Safety



Quality of Life & Well-being



Public Perception



Accessibility & Movement



Economy & Business



Infra & Public Space



Environmental

Shall	Should
REQUIREMENTS	
<ul style="list-style-type: none"> Design, implementation, and maintenance of PIBs are the responsibility of the Service Entity leading the works. At least one PIB should be positioned at the beginning of the Work Area, visible and easily readable by vehicles, pedestrians, and other road users. For work zones that are 300m or more in length (and include site hoarding), ensure at least one PIB is positioned at the mid-point of the work zone. PIB should be unobstructed and be erected in front of hoarding. PIB minimum dimensions: 80cm (W) x 150cm (H). Visibility and safety: <ul style="list-style-type: none"> PIBs must not block forward visibility to any roadside features. They must be securely erected to prevent falling and causing injury. PIBs should be displayed at an appropriate height – minimum 2m above ground (from ground level to bottom of board). 	<ul style="list-style-type: none"> Content: <ul style="list-style-type: none"> The PIB must contain: <ul style="list-style-type: none"> Project name and description Name of Contractor and Service Entity Start date of the works Contact information (incl. Emergency Contacts) Logo of Service Entity Additional information through QR Code may include: <ul style="list-style-type: none"> Project Designer Project Contractor Project Duration (weeks/months) Key contacts Diagrammatic information of the proposed works Ensure a minimum of one PIB is provided at any given site. Ensure PIBs are securely erected, do not obstruct visibility, and are positioned at an appropriate height. Provide suitable lighting to allow public to read information displayed on PIB (as per Supplementary Material).
MAIN OUTCOMES	
<ul style="list-style-type: none"> Ensure that all road users are well-informed about the project details, and contact information, reducing confusion and improving public awareness. 	

KEY REFERENCES

- RIPC Project Information Board (PIB) Guidelines

PROJECT LIFECYCLE			
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PRINCIPLE	
	P3. Clearly Communicated and Actively Engaged
SUCCESS MEASUREMENT	
P3.1. Clear and Transparent Communication	<ul style="list-style-type: none"> PI3.1.1. Stakeholder satisfaction score on communication and regulations clarity PI3.1.2. Number of violations regarding information signage
LINKED VIOLATION	
	V6. Boards and Information Violations

Applicable Chapters, Forms and Templates

- [Chapter 2.1.9 - Community outreach & accessibility](#)
- [2.2.2.1 Channelizing Devices and Barrier Placement](#)
- [Chapter 2.2.4.4 Supplementary Material](#)

Consider	Advise
-----------------	---------------

REQUIREMENTS

- | | |
|--|---|
| <ul style="list-style-type: none"> • Larger PIBs may be required for long-term works, as specified by RIPC. | <ul style="list-style-type: none"> • Check that PIBs are designed as per the Design Guide and correctly positioned as per the Traffic Management Plan. |
|--|---|

MAIN OUTCOMES

- Securely erected PIBs that do not obstruct visibility help prevent accidents and injuries, ensuring a safer environment for both workers and the public.

KEY STAKEHOLDERS

- CONTRACTORS



2.2.4 ACCESS AND COMMUNICATION PROTOCOLS

2.2.4.3 Advanced Communication with Stakeholders

Code Statement: Engage stakeholders early with clear communication to reduce disruptions and enhance coordination.

RATIONALE

Proactive communication fosters stakeholder collaboration, minimizes conflicts, and ensures smooth project execution by keeping the public informed and responsive to feedback.

CONTEXT

Advanced communication with stakeholders before works begin helps reduce disruptions and enhances coordination with other service entities.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
REQUIREMENTS	
<p>Before Attending Site – Advanced Communications Coordination:</p> <ul style="list-style-type: none"> Coordinate planned street works between Service Entities to reduce the number of excavations within streets. Liaise with RIPC, Service Entities, Riyadh Municipality, and Mega Projects (e.g., Green Riyadh, Sports Boulevard) to coordinate collective works under a ‘dig once’ approach to minimize repeated disruptions. <p>Advance Notices:</p> <ul style="list-style-type: none"> Post advance notices on site of impending works at least 2 weeks prior to commencement. Carry out a joint site visit in accordance with the Permitting process 	<p>Advance Communication:</p> <ul style="list-style-type: none"> Inform Business Owners, Residents, and Road Users through various channels about: <ul style="list-style-type: none"> The scope and purpose of the excavation work. Names and contact information of the entities performing the work. The anticipated scale and duration of the disruption. Steps to minimize the impact (e.g., parking in alternative locations, avoiding the road at certain times). How to obtain further information. <p>Communication Channels:</p> <ul style="list-style-type: none"> Consider using social media, flyers, and town halls prior to posting advanced notices. Maintain necessary communications with all stakeholders during the execution of the works to avoid conflict and delays.
MAIN OUTCOMES	
<ul style="list-style-type: none"> Ensure all stakeholders are well-informed and can plan accordingly. 	

KEY REFERENCES

Applicable Chapters, Forms and Templates

- [Chapter 2.1.9 - Community outreach & accessibility](#)
- [Chapter 2.2.4.4 Supplementary Material](#)

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PRINCIPLE



P3. Clearly Communicated and Actively Engaged

SUCCESS MEASUREMENT

P3.2.
Stakeholder Engagement

- PI3.2.1. Reach rate of communication channels
- PI3.2.5. Average response time to stakeholder concerns and feedback
- PI3.2.7. Community participation rate (e.g., Public consultation)

LINKED VIOLATION



V6. Boards and Information Violations



V8. Community and Public Accessibility Violations

Consider

Advise

REQUIREMENTS

- Conduct joint site visits with stakeholders as part of the Permitting process to address concerns early.
- Provide or collect details for the single point of contract from each stakeholder to ensure ease of communication.
- Ensure communication is maintained throughout the work duration, adapting to changes in the program and keeping stakeholders informed.

MAIN OUTCOMES

KEY STAKEHOLDERS

- RIPC
- CONTRACTORS
- SERVICE ENTITIES

2.2.4 ACCESS AND COMMUNICATION PROTOCOLS

2.2.4.4 Supplementary Material

Channelizing Devices and Barrier Placement

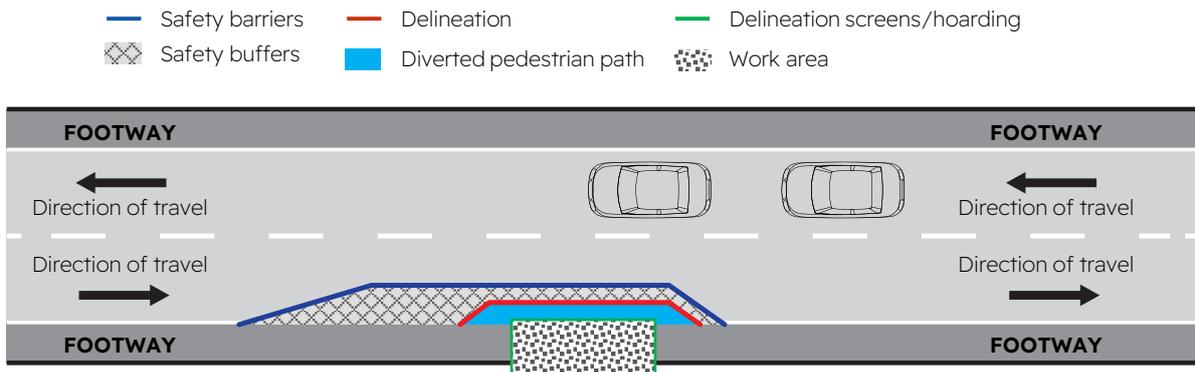


Figure 2.2.4.4.1: Footway Diversion Into the Travelled Way Based on Public Works (SHC 305)

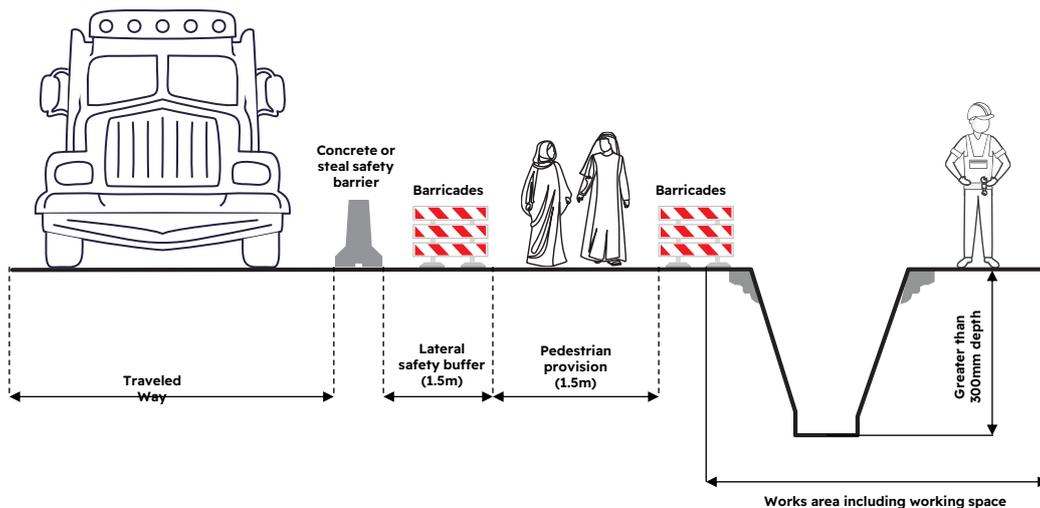


Figure 2.2.4.4.2: Pedestrian Provision (Increased Hazard) (SHC 305)



Figure 2.2.4.4.3: Deployment of Temporary Footway Boards for Safe Pedestrian Crossing

WHAT TO LOOK OUT FOR

Kerb Ramps and Footway Boards:

- Are these of a safe height, width, slope, guarding and material to minimise the possibility of slips and gathering of rainwater?
- Made from a material that is robust enough not to distort under loading nor damage the pathway?
- Designed to accommodate wheelchairs and pushchairs, pedestrian and micro-mobility traffic?
- Situated away from the road?
- Suitably fixed?
- Designed with chamfered edges and rails?

Project Information Boards (PIBs)

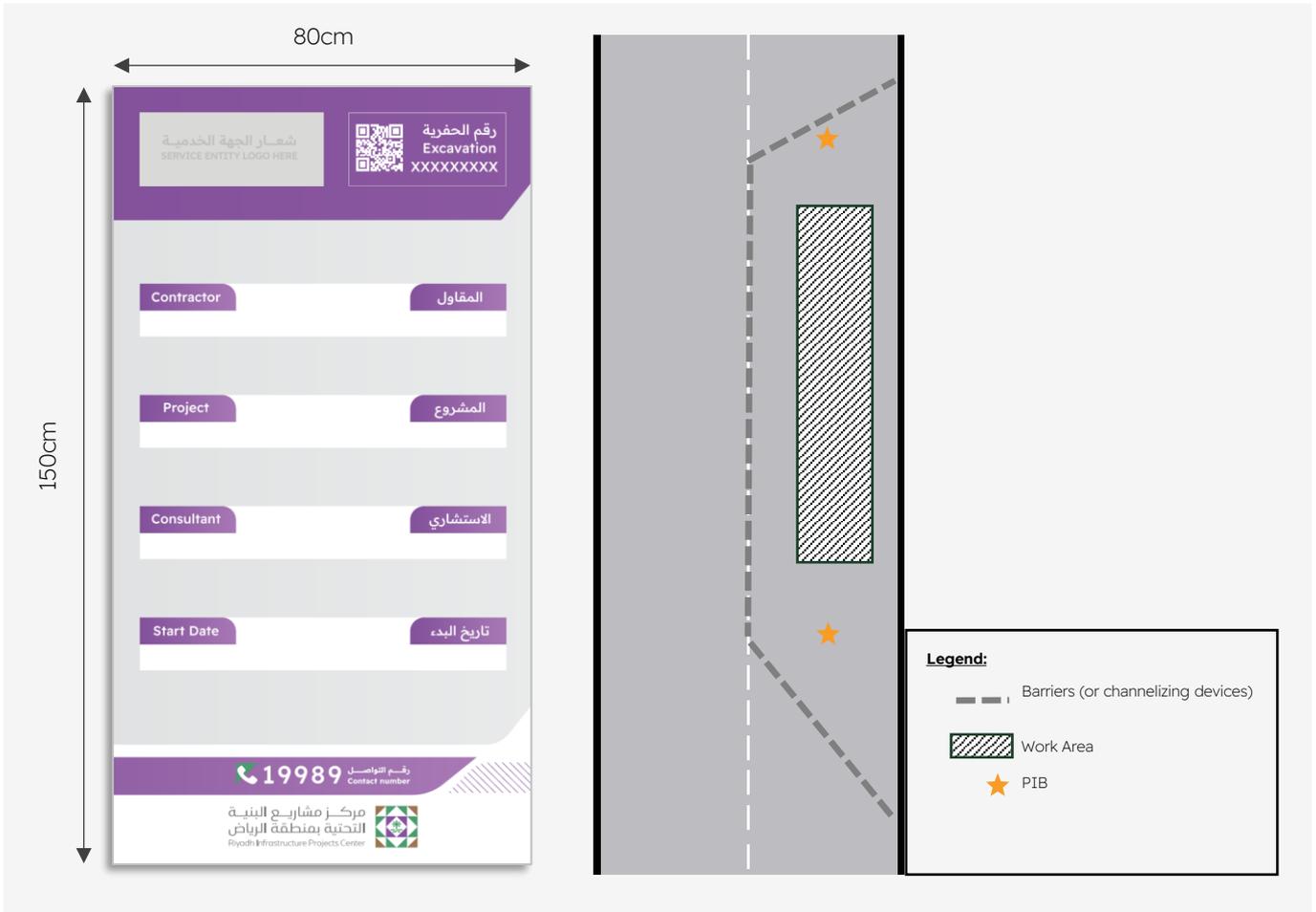


Figure 2.2.4.4.4: Project Information Boards placement (illustrative) and format

WHAT TO LOOK OUT FOR

Project Information Board - Contractor:

- Does the PIB contain: the project name and description, name of Contractor and Service Entity, start and end date of the works, duration of works, contact Information.
- Is the PIB designed as per the Design Guide?
- Is the PIB positioned as shown in the TMP

RIPC Logo - Contractor

- Is the logo clear and clean?
- Is it on all appropriate items?



2.2.4 ACCESS AND COMMUNICATION PROTOCOLS

2.2.4.4 Supplementary Material

Project Information Boards (PIBs)



Figure 2.2.4.4.5: Project Information Board

2.3

PROJECT EXECUTION

2.3

PROJECT EXECUTION

2.3.1 SITE PREPARATION AND MANAGEMENT

2.3.1.1 Pre-Mobilization and Site Preparation Requirements

2.3.1.2 Project Execution Process and Responsibilities

2.3.1.3 Site Management and Safety Protocols

2.3.1.4 Supplementary Material

2.3.1 SITE PREPARATION AND MANAGEMENT

2.3.1.1 Pre-Mobilization and Site Preparation Requirements

Code Statement: Ensure all pre-site activities, including document preparation, coordination, and equipment checks, comply with approved safety and technical standards before mobilization.

RATIONALE

Ensuring thorough pre-mobilization checks and preparation helps prevent delays and safety incidents once on-site work begins. By adhering to these initial requirements, Contractors can mitigate risks, ensure compliance with regulatory standards, and enhance communication with stakeholders. This proactive approach ensures that all involved parties are aware of the project scope, safety measures, and coordination needs, reducing the likelihood of conflicts or miscommunications that could impact project timelines and quality.

CONTEXT

Pre-mobilization and site preparation are critical steps that set the foundation for successful project execution. These requirements ensure that all necessary documentation, such as Risk Assessments, Work Execution Plans, and safety procedures, are prepared and approved before work begins. Coordination with other service authorities and compliance with permits ensure that excavation activities do not interfere with existing utilities and infrastructures. Proper signage and notifications to local stakeholders minimize disruptions and maintain public safety during the project initiation phase.

POSITIVE IMPACTS



Health & Safety



Quality of Life & Well-being



Public Perception



Accessibility & Movement



Economy & Business



Infra & Public Space



Environmental

Shall	Should
REQUIREMENTS	
<ul style="list-style-type: none"> Advance communication works signage installed and notification of local stakeholders before starting site activities. Documentation: <ul style="list-style-type: none"> Prepare, approve, and circulate the following documents: <ul style="list-style-type: none"> Risk Assessments and Method Statements: Evaluate risks and provide detailed steps for each activity. WEP: Outline the project execution approach. Emergency Procedures: Specify on-site emergency actions. Traffic Management Plan: Detail alternative routes and traffic management. Emergency Response Plan: Define roles, responsibilities, and actions for emergencies. HSE Plan: Ensure safety and environmental compliance. Quality Control Plan: Maintain standards for materials and workmanship. Equipment Checks: Equipment checks undertaken in line with the manufacturer's maintenance specification. Permits and Plans: Approved Excavation Permit must be received and verified before any excavation work begins. Adhere strictly to excavation plans according to the Street Section guidelines and its subsequent updates. 	<p>Coordination:</p> <ul style="list-style-type: none"> Coordinate with RIPC before excavation to prevent conflicts, particularly in areas where there have been previous extensions by another Service Entity. Re-coordinate with the owner of any conflicting utility with the approval of the relevant authorities if obstacles are encountered during excavation. <p>Design of Excavation Work</p> <ul style="list-style-type: none"> All excavations of 1.2m or more in depth require a Confined Space Entry permit (provided by Contractor or Service Entity). Any excavation with buried cables and pipelines must be designed by a competent individual with relevant knowledge, experience, and training to identify and mitigate hazards, construction methods, and soil types. Ensure safe means of entry and exit.
MAIN OUTCOMES	
<ul style="list-style-type: none"> Ensuring all documentation, risk assessments, and emergency procedures are in place and followed maintains high safety standards and regulatory compliance. 	<ul style="list-style-type: none"> Coordination and advance communication minimizes disruptions and conflicts, ensuring smooth project execution.

KEY REFERENCES

- National standards

Applicable Chapters, Forms and Templates

- [Chapter 2.1 Project Planning](#)
- [Chapter 2.3.1.4 Supplementary Material](#)

PROJECT LIFECYCLE

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PRINCIPLE

	P1. Safe, Compliant & Controlled
	P2. Effectively Managed & Continuously Improved

SUCCESS MEASUREMENT

P1.1. Safety Compliance	<ul style="list-style-type: none"> • PI1.1.1. Percentage of projects with zero lost-time injuries.
P1.2. Legal Compliance	<ul style="list-style-type: none"> • PI1.2.1. Number of legal non-compliance incidents.
P1.3. Quality Assurance	<ul style="list-style-type: none"> • PI1.3.1. Percentage of projects passing quality audits with no major issues.
P1.5. Traffic and Parking Control	<ul style="list-style-type: none"> • PI1.5.2. Percentage of projects without traffic violations.
P2.2. Worksite Management	<ul style="list-style-type: none"> • PI2.2.1. Number of site inspections conducted per project.

LINKED VIOLATION

	V1. Barriers and Safety Compliance Violations
	V2. Permit and Regulation Compliance Violations

Consider

Advise

REQUIREMENTS

Shoring and Safety:

- Install suitable shoring or bench/sloped sides for excavations 1.2m or more in depth, or for soil piles over 1.5m high.
- Emergency rescue equipment required.
- Consider the impact on emergency access and egress.

Traffic Management Plan: The design of excavations should influence the Traffic Management Plan.

Site Conditions: If site conditions differ from the planning stage, discuss with RIPC and seek special approval for changes.

Considerations:

- Purpose, size of excavation, and work to be performed.
- Soil classification (preferably by geotechnical/soil analysis).
- Stability and proximity of adjacent structures, including foundations.
- Consult and comply with utility companies for underground obstructions.
- Presence of nearby process equipment or piping with potential hazardous material release.
- Weather and soil moisture conditions, especially high-water table.
- Sources of soil vibrations (traffic, machinery, railroads).
- Location and type of barricades, signs, and lighting.
- Method of excavating and soil removal (open excavation or closed such as thrust-boring).
- Install appropriate advance communications and signage to notify all local stakeholders of upcoming works.
- Regularly check compliance with equipment maintenance standards and update plans based on real-time feedback from site conditions.

MAIN OUTCOMES

- Regular equipment checks, adherence to excavation plans, and adjustments based on real-time site conditions lead to efficient and effective project management.

KEY STAKEHOLDERS

- | | |
|--|--|
| <ul style="list-style-type: none"> • CONTRACTOR • CONSULTANT | <ul style="list-style-type: none"> • RIPC • SERVICE ENTITY |
|--|--|



2.3.1 SITE PREPARATION AND MANAGEMENT

2.3.1.2 Project Execution Process and Responsibilities

Code Statement: Implement and monitor all project activities in line with the Work Execution Plan, ensuring timely communication, coordination, and compliance with traffic and safety measures.

RATIONALE

Effective project execution relies on clear responsibilities and coordinated actions among all stakeholders to maintain compliance with technical and safety standards. By adhering to structured processes, the risk of errors, delays, and non-compliance is reduced. Continuous supervision and the use of technology for monitoring enhance transparency and accountability, allowing issues to be identified and addressed promptly, thus ensuring that the project remains on track and within regulatory frameworks.

CONTEXT

The project execution process encompasses all activities from pre-work notifications to the completion of the works, involving multiple stakeholders such as RIPC, Contractors, Consultants, and Testing Laboratories. Key responsibilities include coordinating utility works, ensuring compliance with approved plans, and managing traffic diversions to minimize disruptions. This section emphasizes systematic supervision and the use of digital tools for documentation and communication throughout the project lifecycle.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
REQUIREMENTS	
<ul style="list-style-type: none"> Carry out utility works, backfill, and testing according to the Work Execution Plan, technical specifications, and Traffic Management Plan. Execute necessary remedial works promptly and pay any violation fines incurred during the project. Set out the work site layout as per the approved Traffic Management Plan. Complete all works according to the approved specifications before vacating the site. 	<ul style="list-style-type: none"> Notify residents and those affected by the works 2 weeks in advance and 48 hours before work commences.
MAIN OUTCOMES	
<ul style="list-style-type: none"> Ensured project completion according to approved plans and specifications, with prompt execution of remedial works, adherence to traffic management, and compliance with technical standards, while addressing any violations promptly. 	

KEY REFERENCES

Applicable Chapters, Forms and Templates

- [Chapter 2.3.1.4 Supplementary Material](#)

PROJECT LIFECYCLE

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PRINCIPLE

	P1. Safe, Compliant & Controlled
	P3. Clearly Communicated and Actively Engaged

SUCCESS MEASUREMENT

P1.5. Traffic and Parking Control	<ul style="list-style-type: none"> • PI1.5.1. Number of traffic control-related complaints per project.
P2.1. Project Management	<ul style="list-style-type: none"> • PI2.1.4. Resource utilization efficiency rate.
P3.1. Clear and Transparent Communication	<ul style="list-style-type: none"> • PI3.1.1. Stakeholder satisfaction score on communication.
P3.2. Stakeholder Engagement	<ul style="list-style-type: none"> • PI3.2.5. Average response time to stakeholder concerns.

LINKED VIOLATION

	V2. Permit and Regulation Compliance Violations
	V5. Traffic and Parking Control Violations

Consider

Advise

REQUIREMENTS

- | | |
|---|---|
| <ul style="list-style-type: none"> • Supervise the works by uploading photos, videos, and control reports to the RIPC digital portal as required. • Coordinate closely with RIPC, the Backfill Contractor, Consultant, Utilities Contractor, and Testing Laboratory throughout the project execution. | <ul style="list-style-type: none"> • Continuously monitor the execution process, identify any issues, and address them in coordination with relevant stakeholders. |
|---|---|

MAIN OUTCOMES

- Assured through supervision and effective coordination with all relevant parties by documenting progress digitally and maintaining close collaboration throughout the project execution.

KEY STAKEHOLDERS

- | | |
|--|--|
| <ul style="list-style-type: none"> • CONTRACTOR • CONSULTANT | <ul style="list-style-type: none"> • RIPC • SERVICE ENTITY |
|--|--|



2.3.1 SITE PREPARATION AND MANAGEMENT

2.3.1.3 Site Management and Safety Protocols

Code Statement: Maintain site safety, cleanliness, and organization by managing access, equipment standards, and visitor protocols to minimize risks and ensure compliance.

Effective site management and adherence to safety protocols are vital for reducing risks and ensuring a safe work environment. Proper control of site access, equipment maintenance, and staff training mitigates potential hazards, prevents safety violations, and enhances overall project efficiency. Consistent application of these measures contributes to a safer worksite and fosters public confidence in the project’s management practices.

Site management involves maintaining a safe, organized, and compliant work environment, including managing access, egress, and equipment standards. Safety protocols ensure that all plant and equipment meet legislative requirements and are maintained properly. Visitor management, staff training, and continuous risk assessments are essential components to safeguard the site against accidents and operational inefficiencies.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
REQUIREMENTS	
<ul style="list-style-type: none"> Maintain the site in a safe, tidy, and workmanlike manner at all times. Ensure all barriers are maintained and RIPC signage is displayed as required. Access and egress must comply with the TMP and Work Zone requirements. Vehicles must be reverse-parked before unloading or setting up signs. All plant and equipment must be in good condition, meet legislative requirements, and be maintained regularly. 	<ul style="list-style-type: none"> Provide a comprehensive safety induction for all visitors. Install security measures to prevent unauthorized access. Install rotating flashing beacons on all site vehicles to aid safe maneuvers. Beacons should be visible at all times.
MAIN OUTCOMES	
<ul style="list-style-type: none"> Ensured a safe and compliant worksite by maintaining order, adhering to signage and access requirements, reverse-parking vehicles, and keeping all equipment in good condition and regularly maintained. 	

KEY REFERENCES

Applicable Chapters, Forms and Templates

- [Chapter 2.1 Project Planning](#)
- [Chapter 2.2 Spatial Planning](#)
- [Chapter 2.3.1.4 Supplementary Material](#)

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PRINCIPLE



P1. Safe, Compliant & Controlled



P2. Effectively Managed & Continuously Improved

SUCCESS MEASUREMENT

P1.1. **Safety Compliance**

- PI1.1.2. Safety training completion rate.

P2.2. **Worksite Management**

- PI2.2.1. Number of site inspections conducted per project.
- PI2.2.3. Number of worksites-related complaints.

LINKED VIOLATION



V1. Barriers and Safety Compliance Violations



V4. Worksite Management and Cleanliness Violations

Consider

Advise

REQUIREMENTS

- Use plant and vehicles that are appropriately sized to minimize disruption, particularly in residential areas.
- Conduct routine risk assessments and adjust site management practices as needed to ensure safety and compliance.

MAIN OUTCOMES

KEY STAKEHOLDERS

- CONTRACTOR
- CONSULTANT



2.3.1 SITE PREPARATION AND MANAGEMENT

2.3.1.4 Supplementary Material

Pre-Mobilization and Site Preparation Requirements

WHAT TO LOOK OUT FOR

Before Attending Site

- Have Business Owners, Residents, and Road Users been notified of the works at least 2 weeks in advance?
- Have different means of communication been used? (i.e. Digital Displays, face-to-face, social media, letters, etc.).
- Are stakeholder communications being effectively maintained as the program changes?

WHAT TO LOOK OUT FOR

Contractor

- Advance communications and signage?
- Equipment checks?
- Excavation Permit received?
- Co-ordination if circumstances change?
- Confined space entry permit required?
- Preparation, approval and circulation of all relevant documents?
- All design considerations for excavations greater than 0.3m deep taken into account by a competent individual?
- Safe means of entry and exit?

Project Execution Process and Responsibilities

Excavation Procedures Requirements

Open Excavation (Normal)

The Contractor shall undertake the following measures in relation to completing open excavations:

1. **Coordination:**
 - Coordinate with the Riyadh Amanah to transfer excavation waste to nearby locations.
2. **Utility Identification:**
 - Identify other utilities on the site and their depths before starting excavation work and take necessary protective measures.
3. **Adherence to Plans:**
 - Adhere to the dimensions of the excavation sectors as stipulated in the designs and plans attached to the excavation permit.
4. **Shoring:**
 - Install any necessary shoring.
5. **Backfilling:**
 - Backfill excavation trenches at the end of the day's work whenever feasible.
 - Depth of excavation below the utility serviced shall not be less than 0.3m, or according to the approved design, whichever is greater.
 - Backfill material shall be stored according to specifications.
6. **Steel Plates:**
 - Install steel plates to cover excavation trenches if

they must be left open for lengthy periods, ensuring they are of sufficient thickness to withstand traffic loads.

7. **Dewatering:**
 - Determine a suitable methodology to dewater the site, including well pointing.
8. **Restoration:**
 - Restoration width to extend 0.3mm each side of the trench as per the standard cross section.
 - Backfill in layers of approved materials in accordance with the General Specifications Guide for Civil Works in the Extension of Public Utilities Projects (Section 5.4.1 'Backfill Works').
 - Edges of the restoration area to be straight and parallel/perpendicular to the direction of traffic.
 - Resurface the full width of the traffic lane if the trench is more than 50% of the lane width.
 - Combine reinstatements less than 3m apart into one resurfacing finish.
 - Keep edges of reinstatement out of vehicle wheel track zones.
 - Edge of reinstatement to be cut in a straight line vertical with a suitable saw, to the sub-base/granular level.
9. **Surface Level Differences:**
 - The difference in level of the surface layer in bituminous works across joints for trench reinstatement shall not exceed 4mm.
 - The differences in level of the surface of concrete carriageways across joints shall not be more than 3 mm.

Project Execution Process and Responsibilities

The process for Project Execution (below) covers activities from Pre-work Notification to just before the application for the Completion Certificate.

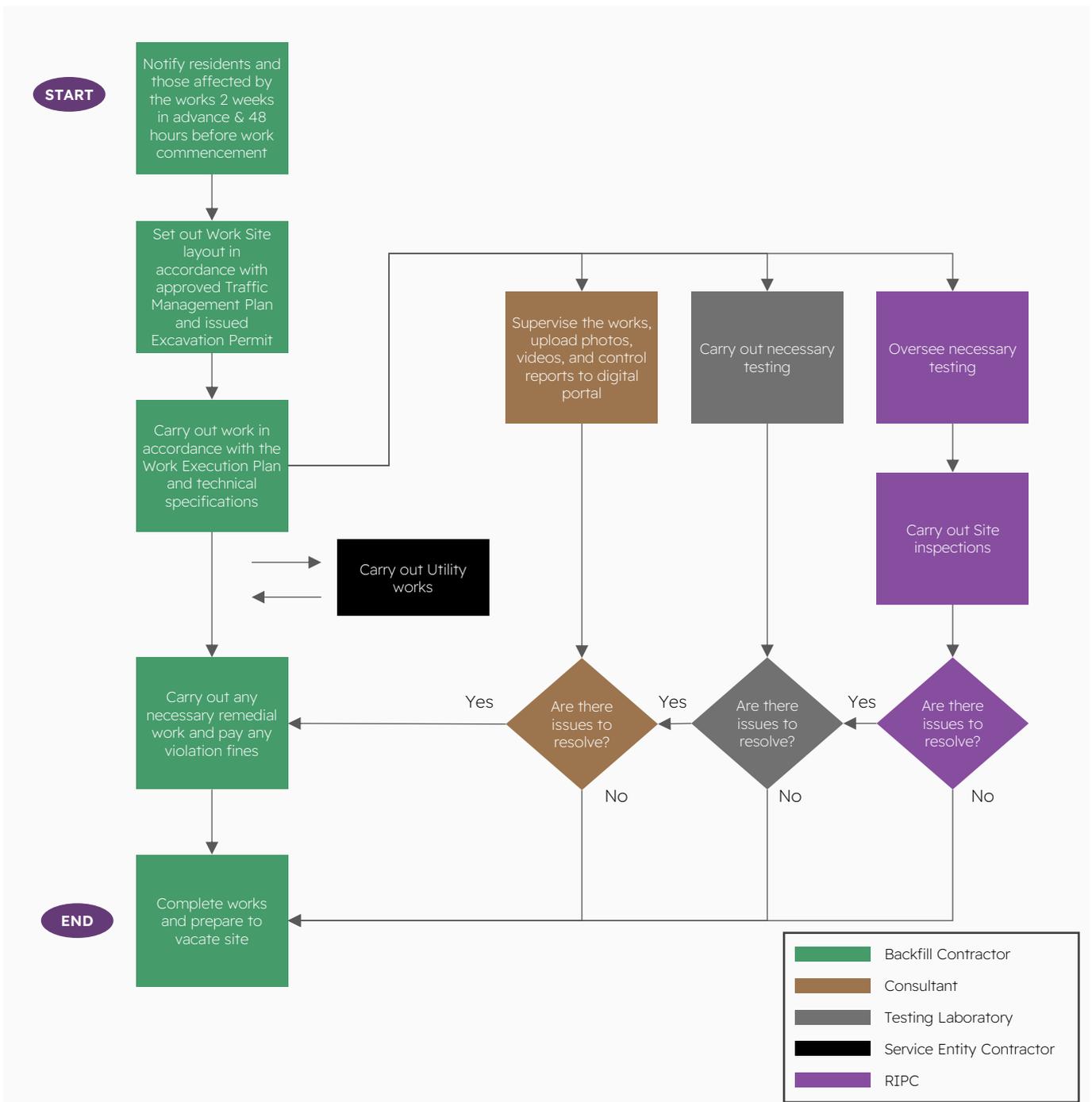


Figure 2.3.1.4.1: Project Execution Process



2.3.1 SITE PREPARATION AND MANAGEMENT

2.3.1.4 Supplementary Material

Site Management and Safety Protocols

Site Management

Before Starting Work Requirements

- 1. Familiarization:**
 - All members of the Work Party should be familiar with the Traffic Management Plan (TMP), Work Execution Plan, and associated Risk Assessments and Method Statements (RAMS).
- 2. Safety Checks:**
 - RIPC Inspectors will check that appropriate safety measures are in place, necessary equipment is available and functional, work sequencing, and means of communication are clear.
 - If there are any doubts about the instructions or aspects of the TMP, work cannot start until these issues are discussed with the Site Manager, Supervisor, Permit Holder, or RIPC Inspectors.

Maintenance of Site Requirements

- 1. Site Condition:**
 - The site shall be maintained in a safe, tidy, and workmanlike manner at all times with no visual distortion.
 - All barriers shall be maintained and kept in good condition throughout the duration of the works.
 - Agreed RIPC signage shall be displayed at all times.

Arriving on Site Requirements

- 1. Access and Egress:**
 - Access and egress shall be in accordance with the TMP Work Zone requirements.
- 2. Parking on Arrival:**
 - Vehicles must be reverse-parked before unloading or setting up signs.
 - If reverse parking is not achievable, ensure work vehicles can be seen clearly by road users through the use of beacons and signage.
 - Parking off-road should not create any obstructions to footways or cycle routes. Access to premises and driveways should be observed and maintained.
 - If vehicles are parked outside the work area, ensure they do not obstruct any existing road assets (e.g., traffic signs or traffic signals).
 - If a vehicle is part of the work area (e.g., Heavy Vehicle), it should be featured in the TMP.
- 3. Signing In:**
 - Once safely parked, personnel should report to the

designated area to sign in and receive any relevant updates (including site safety induction for first-time arrivals).

Vehicle Movements Requirements

- 1. Amber Beacon:**
 - Work vehicle operators intending to stop at the roadside or enter a site area should activate the roof-mounted amber beacon (if fitted).

Visitors Requirements

- 1. Visitor Safety:**
 - Sign all visitors in and out.
 - Provide a comprehensive induction.
 - Establish a point of contact for visitors.
 - Escort visitors at all times.
 - Install security measures to deter trespassers.
 - Carry out visitor-associated risk assessments.
 - Create an authorization process.
 - Mark access routes clearly.
 - Provide visitors parking.
 - Reduce the risk of slips and falls.
- 2. Visitor Responsibilities:**
 - Wear PPE.
 - Report to the Authorized Point of Contact.
 - Obey the site marshal.
 - Park in an authorized location.
 - Sign in/out.
 - Keep to designated routes.
 - Be trained in relevant hazards/attend site induction.

Plant and Equipment Requirements

1. Quality of Plant and Equipment:

Ensure all plant and equipment:

- Is in good condition, full working order, and kept clean.
- Meets appropriate legislation, including safety testing and marking.
- Is regularly maintained, tested, and inspected in line with legislation and manufacturer's requirements, with clear records.
- Is appropriate for the task.
- Is regularly calibrated, if required.
- Faults are immediately identified, reported, and taken out of service if there is a safety concern.

Site Management and Safety Protocols

- Is provided with a suitable means of isolating from all power sources.
- Is designed and used safely, without posing risks to safety, health, or the environment.
- Is operated only by trained personnel.
- Allows operators to work in appropriate positions, with braking devices, adequate vision, and necessary lighting.
- Is designed and operated so that as a minimum the following elements cannot cause harm to persons:
 - Moving machine parts
 - Machine parts or materials that are thrown out
 - Safely manages the creation of, among other things, smoke, gas, dust, dangerous substances and materials including:
 - Noise, vibrations, electricity, heat, cold, radiation, fire, explosion, overloading, imbalance, tipping, rollover, and crushing.

1. Instructions and Training:

- Ensure only adequately trained staff use the equipment.
- Provide a user manual for each item, detailing setup, operation, maintenance, and safety information.
- Include information on usage, training, PPE, starting, handling, setup, installation, storage, maintenance, repair, and disposal.

2. Selection of Plant Appropriate to Location:

- Use appropriately sized plant and vehicles, especially in residential areas, to minimize impact on local residents and businesses.

Works by Service Entity Contractor Requirements

1. Safe Access:

- Allow safe access for the Service Entity Contractor to complete their works.
- Brief the Service Entity Contractor on the Traffic Management Plan, Works Execution Plan, Waste Management Plan, HSE Plan, Emergency Response Plan, Quality Control Plan, and Environmental Impact Plan (if appropriate).

2. Specifications and Details:

- Provide necessary specifications and details for utility works, including bedding or protection works.

Access to Site for Consultant, Testing Laboratory, and RIPC Requirements

1. Safe Access:

- Allow safe access to the site at all times for staff representing the Consultant, Testing Laboratory, and RIPC.
- Provide full assistance to these parties for necessary testing, inspection, and record-keeping.



WHAT TO LOOK OUT FOR

Before Starting Work - Contractor

- Are all members of the Work Party familiar with project documents and plans?
- Has work been halted and approval sought if there are safety concerns?

Maintenance of Site - Contractor

- Is the site maintained in a safe, tidy and workmanlike manner at all times with no visual distortion?
- Are all barriers maintained and kept in good condition throughout the duration of the works?
- Is agreed RIPC signage displayed at all times?

Arriving on Site - All Parties

- Followed guidance for access, egress parking and signing in?
- System in place to manage and keep safe visitors

Plant and Equipment - Contractor

- Does it meet the required standards, quality, maintenance and inspection?
- Are staff appropriately trained?
- Are plant and vehicles of an appropriate size for any work in residential areas?
- Works by Service Entity Contractor - Contractor?
- Provided safe access?
- Briefed the Service Entity Contractor on project documents and plans?

Works by Service Entity Contractor - Service Entity

- Provided the necessary specification and details for utility works to be carried out by the Service Entity Contractor?

Access to Site for the Consultant, Testing Laboratory and RIPC - Contractor

- Provided safe access?
- Given full assistance to these parties?

2.3

PROJECT EXECUTION

2.3.2 EXCAVATION TYPES AND GUIDELINES

2.3.2.1 Open Excavation Techniques and Specifications

2.3.2.2 Closed Excavation Techniques and Specifications

2.3.2.3 Excavation Guidelines Based on Soil Type and Depth

2.3.2.4 Supplementary Material



2.3.2 EXCAVATION TYPES AND GUIDELINES

2.3.2.1 Open Excavation Techniques and Specifications

Code Statement: Adhere to excavation standards, ensuring utility protection, appropriate shoring, and site cleanliness in compliance with safety and environmental regulations.

Implementing detailed excavation procedures minimizes the risk of utility damage, worksite accidents, and environmental impacts. By following established guidelines for both open and specialized excavations, Contractors can maintain safety standards and protect public infrastructure. Consistent adherence to these procedures also helps avoid regulatory violations and fosters a controlled work environment, contributing to the overall quality and reliability of the project execution.

Excavation procedures involve stringent measures to protect existing utilities, manage excavation waste, and ensure site safety. These procedures cover open and micro/ultra micro excavations, each requiring specific dimensions, protective measures, and backfill protocols. Proper shoring, compliance with excavation depth requirements, and regular site cleaning are essential to maintain operational safety and prevent damage to nearby infrastructure.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
REQUIREMENTS	
<ul style="list-style-type: none"> • Open Excavation: <ul style="list-style-type: none"> ▫ Coordinate with Riyadh Amanah for excavation waste transfer to designated locations near the work site. ▫ Identify all utilities on-site, determine their depths, and implement necessary protective measures before starting excavation. ▫ Adhere to excavation dimensions and install required shoring. ▫ Steel boxes or trench shields must be used in all circumstances where a worker enters an excavation deeper than 1.2m. ▫ Backfill excavation trenches at the end of the day's work where feasible. ▫ The depth of excavation below the utility serviced shall not be less than 0.3m or according to the approved design, whichever is greater. ▫ Store backfill material according to specifications. ▫ Install steel plates of sufficient thickness to cover excavation trenches if left open, ensuring they can withstand traffic loads. ▫ Refer to Saudi specification SHC 309 for detailed design and reinstatement requirements, ensuring compliance with local standards and considering site-specific factors, with risks if utility details are altered by Service Entities. 	<ul style="list-style-type: none"> • Restoration width should extend 0.3m each side of the trench as per the standard cross-section. • Backfill in layers of approved materials as per national standards. • Non-destructive Digging (NDD) techniques should be implemented when excavating in close proximity to subsurface utilities. The cover level required before using NDD is determined by the Contractor's risk assessment, Service Entity guidelines, and RIPC's requirement that NDD must be adopted within 0.3m of all known utilities. • Refer to national standards for guidance and requirements attributed to stockpiling of material within the work zone.
MAIN OUTCOMES	
<ul style="list-style-type: none"> • Ensured safe and compliant excavation practices through coordination, utility identification, protective measures, adherence to dimensions, proper backfilling, material storage, and installation of traffic-resistant steel plates. 	

KEY REFERENCES

- SHC 306
- SHC 309
- National standards

Applicable Chapters, Forms and Templates

- [Chapter 2.3.1.1 Pre-Mobilization and Site Preparation Requirements](#)
- [Chapter 2.3.3 Reinstatement Works](#)
- [Chapter 2.3.2.4 Supplementary Material](#)

PROJECT LIFECYCLE

Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE

	P1. Safe, Compliant & Controlled
	P5. Environmentally Sustainable

SUCCESS MEASUREMENT

P1.1. Safety Compliance	<ul style="list-style-type: none"> • PI1.1.4. Percentage of major risks mitigated through risk assessment.
P1.3. Quality Assurance	<ul style="list-style-type: none"> • PI1.3.2. Frequency of inspections.
P2.2. Worksite Management	<ul style="list-style-type: none"> • PI2.2.2. Percentage of projects without worksite and cleanliness violations.
P5.3. Ecosystem Integration	<ul style="list-style-type: none"> • PI5.1.4. Number of violations regarding waste disposal practices.

LINKED VIOLATION

	V1. Barriers and Safety Compliance Violations
	V4. Worksite Management and Cleanliness Violations

Consider

Advise

REQUIREMENTS

- | | |
|---|---|
| <ul style="list-style-type: none"> • Clean the excavation area using high-pressure water hoses, and dry with compressed air tools. • Insert suitable supports for steel pipes in loose or non-cohesive soils. • Temporary works to be designed by a competent and suitably qualified Contractor in conjunction with permanent works and final reinstatement. | <ul style="list-style-type: none"> • Monitor all excavation activities closely, following all detailed technical requirements for both open and micro/ultra micro excavations as outlined in the Appendix. |
|---|---|

MAIN OUTCOMES

- Ensured proper trench restoration and backfilling by adhering to specified restoration widths and using approved materials in compliance with the General Specifications Guide

KEY STAKEHOLDERS

- | | |
|--|--|
| <ul style="list-style-type: none"> • CONTRACTOR • CONSULTANT | <ul style="list-style-type: none"> • LABORATORY |
|--|--|



2.3.2 EXCAVATION TYPES AND GUIDELINES

2.3.2.2 Closed Excavation Techniques and Specifications

Code Statement: Implement closed excavation techniques (Thrust Boring, HDD, Pipe Jacking) according to design specifications, ensuring minimal impact on adjacent structures and utilities.

Closed excavation methods are critical for projects in densely populated or sensitive areas where minimizing surface impact is essential. Adhering to the detailed specifications of each technique ensures the safety and effectiveness of the excavation, reducing the risk of structural damage or service disruptions. By following these standards, Contractors can maintain compliance and minimize environmental and public impacts while achieving the project’s technical objectives.

Closed excavation techniques, such as Thrust Boring, Horizontal Directional Drilling (HDD), and Pipe Jacking, are used when minimal surface disruption is required. Each method has specific technical requirements, including soil type verification, vibration control, and safe disposal of surplus materials. Protective measures, such as reinforced pit sides and safe access protocols, ensure that closed excavation activities do not compromise adjacent structures or public safety.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
REQUIREMENTS	
<ul style="list-style-type: none"> Confirm soil type against the design and adjust methods accordingly. Store surplus materials and fluids in holding tanks before disposal to an appropriate facility. Avoid vibrations that could damage sensitive soils, adjacent properties, or services. Identify all utilities on-site, determine their depths, and implement necessary protective measures before starting excavation. A survey report should be available at all times and provided to RIPC inspectors upon request. Across roadways, no deflections shall be permitted for closed excavation techniques. Survey monitoring instruments to be used to monitor and ensure compliance. 	<ul style="list-style-type: none"> Follow specific requirements for Thrust Boring, HDD, and Pipe Jacking: <ul style="list-style-type: none"> Thrust Boring: Protect pit sidewalls with steel sheet piling, provide safe access, and ensure pits are large enough to accommodate equipment. HDD: Complete drilling before reaming back, coat pipes to prevent corrosion, and prepare structural reports post-installation. Pipe Jacking: Reinforce pit sides, use support pipes in weak soils, and manage spoil disposal effectively. Consult with relevant service entities to ensure compliance with relevant backfilling and compaction requirements.
MAIN OUTCOMES	
<ul style="list-style-type: none"> Ensured safe and compliant excavation by confirming soil type, adjusting methods, properly storing surplus materials, and avoiding damaging vibrations. 	<ul style="list-style-type: none"> Ensured safe and effective execution of Thrust Boring, HDD, and Pipe Jacking by protecting pit sidewalls, providing safe access, preventing corrosion, reinforcing pit sides, and managing spoil disposal.

KEY REFERENCES

- SHC401
- SHC403

Applicable Chapters, Forms and Templates

- [Chapter 2.3.2.4 Supplementary Material](#)

PROJECT LIFECYCLE

Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE



P1. Safe, Compliant & Controlled



P4. Technologically Advanced & Data-driven.

SUCCESS MEASUREMENT

P1.3. **Quality Assurance**

- PI1.3.1. Percentage of projects passing quality audits.

P4.1. **Advanced Technologies**

- PI4.1.1. Efficiency improvement from modern methods.

P4.2. **Data Capture and Monitoring Methods**

- PI1.4.2. Percentage of laboratories passing audits.

LINKED VIOLATION



V1. Barriers and Safety Compliance Violations



V3. Infrastructure and Roads Quality Violations

Consider

Advise

REQUIREMENTS

- Modify the alignment or excavation techniques based on real-time feedback from site conditions.
- Monitor the progress of auger boring closely to detect potential cavity formations or subsurface issues.

MAIN OUTCOMES

KEY STAKEHOLDERS

- CONTRACTOR
- CONSULTANT
- LABORATORY



2.3.2 EXCAVATION TYPES AND GUIDELINES

2.3.2.3 Excavation Guidelines Based on Soil Type and Depth

Code Statement: Follow soil-specific guidelines for excavation, including maximum slopes, shoring, and competent personnel to ensure structural stability and safety.

Accurate assessment of soil type and appropriate excavation methods are crucial for maintaining site stability and safety. Adhering to guidelines based on soil and depth characteristics ensures that excavations are properly supported, minimizing the risk of accidents or structural failures. These precautions also facilitate compliance with legal and safety standards, enhancing the project's integrity and protecting workers and the public.

Excavation guidelines tailored to specific soil types and excavation depths ensure that the work is carried out safely and efficiently. The guidelines dictate maximum allowable slopes, required shoring, and the qualifications of personnel based on the complexity of the excavation. These measures protect against collapses and other hazards associated with varying soil conditions and excavation depths.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
REQUIREMENTS	
<ul style="list-style-type: none"> Follow maximum allowable slopes for each soil type as per Table 2.3.2.4.3: <ul style="list-style-type: none"> Stable Rock: Vertical (90°). Soil Type A: 3/4:1 (53°). Soil Type B: 1:1 (45°). Soil Type C: 1-1/2:1 (34°). Engage competent individuals based on excavation depth and soil type as specified in Table 2.3.2.4.1: <ul style="list-style-type: none"> Excavations 1.2m - 2.4m: Competent Individual. Excavations >2.4m & ≤6m: Civil/Structural or Geotechnical Engineer for all soil types. Excavations >6m: Civil/Structural or Geotechnical Engineer required for all soil types. 	<ul style="list-style-type: none"> Use additional shoring or other protective measures for soil types with reduced stability. Investigate existing ground conditions and complete necessary surveys (e.g. bore hole sampling) to accurately establish soil type and make-up. Proprietary temporary support systems for open excavations shall be used where necessary. All open excavations over 1.2m deep requiring bespoke temporary works support shall be designed by qualified structural designers. All temporary support systems must be validated by a qualified structural engineer. Ground conditions (and soil stability) to be assessed carefully following rainfall events.
MAIN OUTCOMES	
<ul style="list-style-type: none"> Ensured safe excavation practices by adhering to maximum allowable slopes for each soil type and engaging competent individuals based on excavation depth and soil type. 	

KEY REFERENCES

Applicable Chapters, Forms and Templates

- [Chapter 2.3.2.4 Supplementary Material](#)

PROJECT LIFECYCLE

Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE



P1. Safe, Compliant & Controlled



P2. Effectively Managed & Continuously Improved

SUCCESS MEASUREMENT

P1.1. **Safety Compliance**

- PI1.1.1. Percentage of projects with zero lost-time injuries

P1.3. **Quality Assurance**

- PI1.3.4. Inspection pass rate

P2.5. **System Resilience**

- PI2.5.1. Percentage of infrastructure passing stress tests

LINKED VIOLATION



V1. Barriers and Safety Compliance Violations



V3. Infrastructure and Roads Quality Violations

Consider

Advise

REQUIREMENTS

- Adjust excavation methods based on ongoing soil analysis and site inspections to ensure continued stability and safety.
- Regularly inspect excavation zones and adjust protective measures according to soil conditions.

MAIN OUTCOMES

KEY STAKEHOLDERS

- CONTRACTOR
- CONSULTANT
- LABORATORY

2.3.2 EXCAVATION TYPES AND GUIDELINES

2.3.2.4 Supplementary Material

Open Excavation Techniques and Specifications



Figure 2.3.2.4.1: Saw Cutting

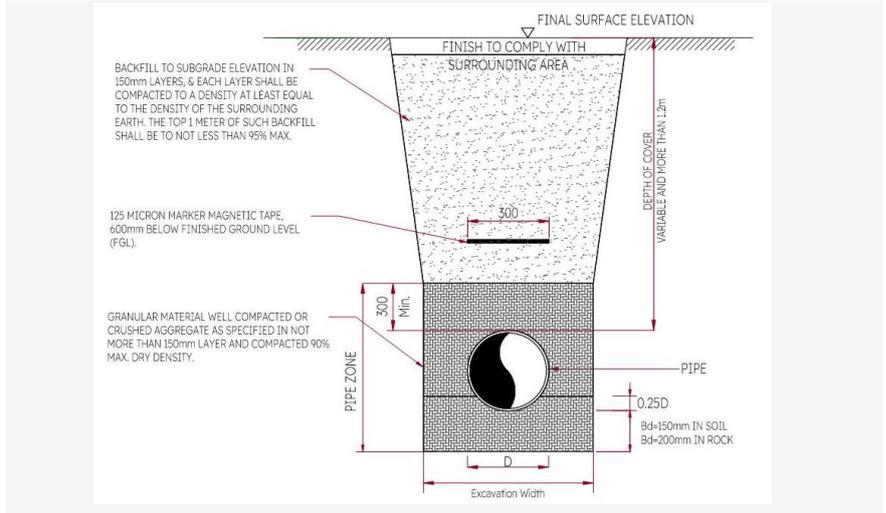


Figure 2.3.2.4.2: Illustrative Cross-section of Pipe Trench in Open Excavation



Figure 2.3.2.4.3: Temporary Excavation Covers



Figure 2.3.2.4.4: Road Plate



WHAT TO LOOK OUT FOR

- Followed detailed technical requirements for open excavations?
- Followed detailed technical requirements for micro/ultra micro excavations?

Open Excavation Techniques and Specifications

Micro/Ultra Micro Excavations Requirements

1. Dimensions:

- Micro trench: 100 – 200mm wide, no more than 600mm in depth.
- Ultra micro excavation: 20-80mm wide, no more than 300mm in depth.

2. Utility Confirmation:

- Confirm locations of existing utilities on-site through construction plans, test pits, and/or proprietary exploration devices.

3. Pit Construction:

- Construct launch, receiving, and any intermediate pits according to design details.
- Ensure sufficient structural supports for all pits.

4. Service Alignment:

- Distance of the new service alignment from the edge of the road should not be less than 100m if the road has no shoulders or sidewalks.

5. Excavation Segments:

- Excavate in 100/300m segments for ultra micro works.

6. Base Modification:

- If the base of the trench is not in cohesive materials, modify its location to suit.

7. Cleaning and Drying:

- Clean the excavation area using a high-pressure water hose and dry with compressed air tools.

8. Backfilling:

- Backfill the trench before trafficking with vehicles or pedestrians.
- Pipework or cables shall be heat resistant to 170°C if backfilling with asphalt concrete materials.

9. Concrete Mix:

- Concrete for both types shall be colored green.
- Concrete properties:
 - Micro systems: max aggregate 4-5mm, 1-3MPa @28days, 1650-1950 kg/m³ density; or, where structural backfill is required in wheel paths.

Concrete mix with 25 MPa @ 28 days. Control joints to be formed every 5 m, expansion joints every 30 m, with joints treated using a SAMI (installed per manufacturer guidelines) prior to asphalt placement.

- Ultra micro: max aggregate 1-2mm, 3-5 MPa @28days, 1800-2000 kg/m³ density.
- Both types to be self-compacting.

10. Excess Material Removal:

- Remove excess material by auger, compaction, or turning it into clay using water or Bentonite.

11. Supporting Pipe:

- In loose or non-cohesive soils, insert a suitable supporting steel pipe.

12. Ramps and Road Plates:

- Use ramps to slow traffic and act as an excavation cover or cover for cabling.
- Use road plates to cover deep excavations while maintaining use of all lanes. Refer to Section 2.1.4.1 for additional requirements.



2.3.2 EXCAVATION TYPES AND GUIDELINES

2.3.2.4 Supplementary Material

Open Excavation Techniques and Specifications

The tables below provide general guidance for excavation works. However, each open excavation should be considered as having its own unique set of individual characteristics. Great care should be exhibited when determining the type of temporary support required for all open excavations.

Depth	Stable Rock	Soil Type A	Soil Type B	Soil Type C
1.2 m - 2.4 m	Excavation Competent Individual	Excavation Competent Individual	Excavation Competent Individual	Excavation Competent Individual
> 2.4 m & ≤ 6 m	Excavation Competent Individual	Civil/Structural or Geotechnical Engineer	Civil/Structural or Geotechnical Engineer	Civil/Structural or Geotechnical Engineer
> 6 m	Civil/Structural or Geotechnical Engineer			

Table 2.3.2.4.1: Excavation Planning and Design Responsibilities

Soil Type	Description of Soil Type
Stable Rock	Natural solid mineral matter that can be excavated with vertical sides, such as sandstone.
Type A	Previously undisturbed cohesive or cemented soil, such as clay or marl.
Type B	Less cohesive soil, such as a mix of sand, rocks, and clay.
Type C	Less cohesive soil. Examples are: gravel, sand, muddy or freely seeping soils, submerged rock that is not stable, or a layered system. Previously disturbed soil is Type C soil.

Table 2.3.2.4.2: Summary of Soil Types

Soil Type	Maximum Allowable Slope (H:V)
Stable Rock	Vertical (90°)
Type A	3/4:1 (53°)
Type B	1:1 (45°)
Type C	1/2:1-1 (34°)

Table 2.3.2.4.3: Maximum Allowable Slopes

Open Excavation Techniques and Specifications

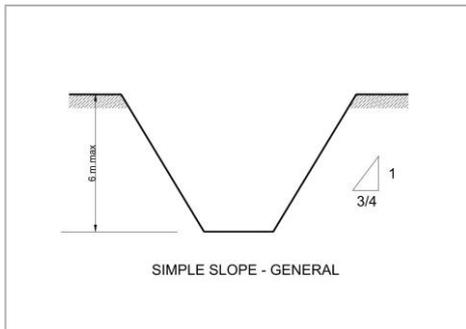


Figure 2.3.2.4.5: Example of a Simple Sloped Trench Excavation

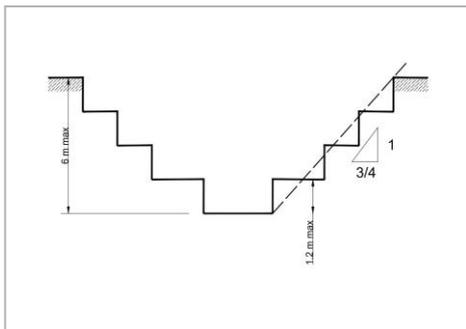


Figure 2.3.2.4.6: Example of a Benched Trench Excavation

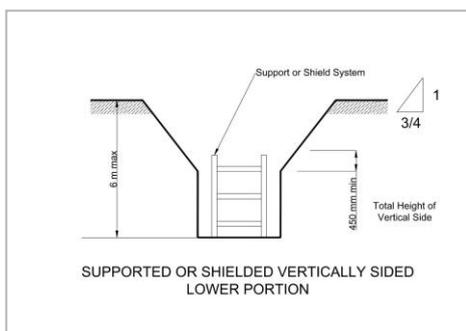


Figure 2.3.2.4.7: Example of a Supported or Shielded Excavation

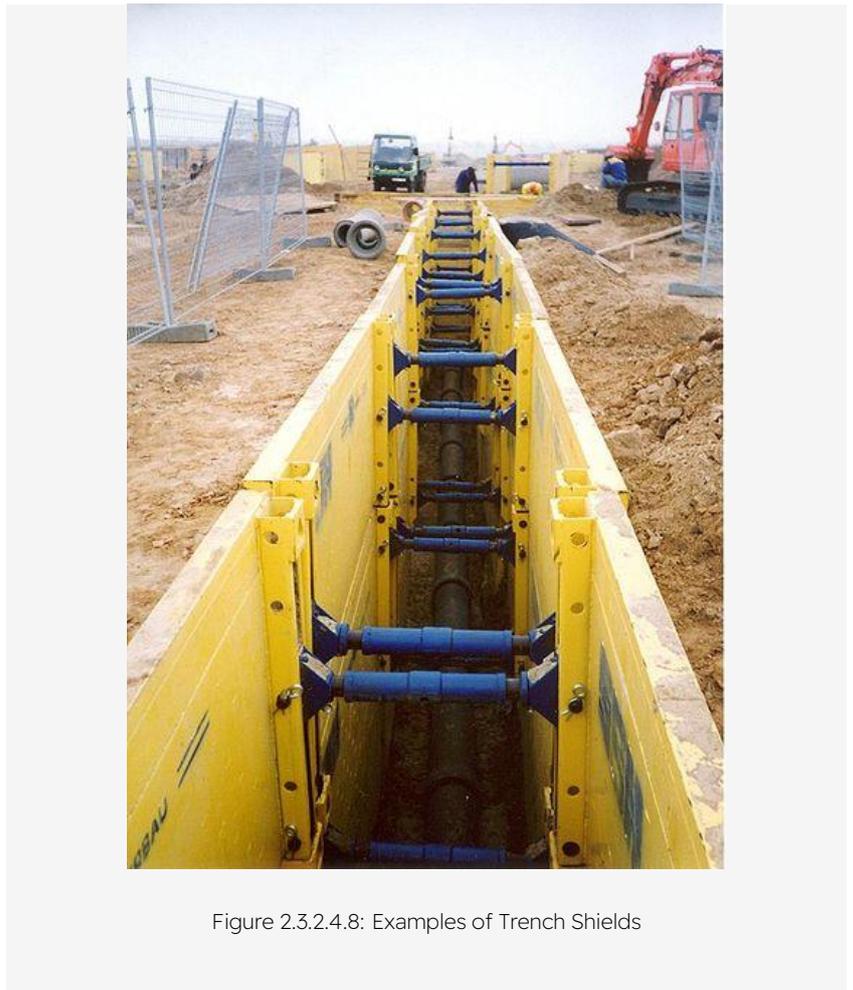


Figure 2.3.2.4.8: Examples of Trench Shields



2.3.2 EXCAVATION TYPES AND GUIDELINES

2.3.2.4 Supplementary Material

Closed Excavation Techniques and Specifications

Closed Excavation Requirements

General Measures for All Closed Excavation Techniques:

1. Confirm soil type against design.
2. Locate existing utilities and services with trial excavations (test pits).
3. Avoid vibrations that may damage sensitive soils and adjacent properties/services.
4. Store surplus materials and fluids in holding tanks prior to disposal at a suitable facility.
5. Adhere to design alignment.

Additional Specific Requirements for Thrust Boring:

1. Protect sidewalls of launching and reception pits with steel sheet piling or proper benching/sloping.
2. Provide safe means of access and egress.
3. Protect the perimeter of pits with solid barriers to prevent falls.
4. Ensure microtunnel pits are large enough to accommodate a full pipe joint.
5. Construct a concrete base to support hydraulic jacking equipment.
6. Reinforce rear walls with a thrust plate to bear jacking forces.
7. Install a dewatering system if necessary.
8. Bund Bentonite slurry storage tank areas to contain spillage.

Additional Specific Requirements for Horizontal Directional Drilling:

1. Begin reaming back only after drilling is complete and the drill head reaches the receiving pit.
2. Coat pipes with Vaughn Bonded Epoxy protective coating to prevent corrosion.
3. Provide seal plugs after backdrawing protective pipe to prevent water ingress.
4. Restore the worksite and pits and prepare a structural report for the excavated path.

Additional Specific Requirements for Pipe

Jacking:

1. Create pits as for micro tunnelling.
2. Reinforce pit sides based on soil type and jacking forces.
3. Carry or pressurize surplus excavations back prior to offsite disposal.
4. Use support pipe in weak soils as for micro tunnelling.

Additional Specific Requirements for Auger Boring:

1. Safely remove spoil drawn back to the launch pit.
2. Monitor the progress of the auger head and the amount of spoil withdrawn to detect potential cavities.

Non-Destructive Digging Techniques

Non-destructive digging refers to excavation techniques that allow for the removal of soil surrounding or covering critical assets without causing damage to any critical infrastructure assets or other foundations, roads, and pavements.

Technique	Description	Advantages
Hydro Drilling	High-pressure water will be used to break up the soil, which is then sucked into a tank.	<ul style="list-style-type: none"> • Precise and controlled excavation. • Reduces soil pressure. • Ideal for critical service locations.
Air Drilling	Compressed air is used to displace the soil, which is then removed by suction.	<ul style="list-style-type: none"> • Effective for dry and compacted soil. • Reduces the risk of damaging underground service assets.
Manual Drilling	Manual soil excavation using tools such as shovels and pickaxes.	<ul style="list-style-type: none"> • Allows full control over the excavation process, minimizing the risk of damage to underground service assets. • Can be used in narrow or hard-to-reach areas.
Suction Drilling	Combines water or air excavation with a suction system to remove soil and debris.	<ul style="list-style-type: none"> • High efficiency in removing excavated materials. • Clean and environmentally friendly.
Remote-controlled Drilling	Uses remotely controlled machines to perform excavation tasks.	<ul style="list-style-type: none"> • Reduces the risk of accidents by keeping operators at a safe distance. • Allows precise control in hard-to-reach areas.
Drilling Under Ultrasonic Vibration	Uses sonic or vibratory tools to break up soil without traditional digging.	<ul style="list-style-type: none"> • Reduces foundation vibrations. • Effective in various soil types.

Table 2.3.2.4.4: Non-Destructive Digging Techniques

2.3

PROJECT EXECUTION

2.3.3 REINSTATEMENT WORKS

2.3.3.1 Reinstatement Procedures and Quality Standards

2.3.3.2 Special Reinstatement Conditions Based on Road Category

2.3.3.3 Supplementary Material

2.3.3 REINSTATEMENT WORKS

2.3.3.1 Reinstatement Procedures and Quality Standards

Code Statement: Conduct reinstatement works to meet specified standards, ensuring structural integrity, surface quality, and environmental compliance through proper material use and testing.

Proper reinstatement is essential to maintaining the safety and usability of public infrastructure post-construction. By adhering to detailed specifications and conducting rigorous quality checks, Contractors can ensure that the reinstated areas meet the required standards for durability and aesthetics. Successful reinstatement reduces the need for future repairs, minimizes public inconvenience, and upholds the project’s overall quality and safety commitments.

Reinstatement involves returning the work site to its original condition through backfilling, compaction, and resurfacing as per specified standards. This process ensures the structural integrity of the infrastructure and compliance with performance criteria. Quality control measures, including testing of materials and adherence to proper workmanship, are critical to achieving long-term durability and functionality of the reinstated areas.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall
REQUIREMENTS
<ul style="list-style-type: none"> Comply with the specifications for materials, compaction, and workmanship as outlined in national standards. Ensure all required material testing is performed by SAAC-certified Testing Laboratory and supervised by the Consultant. No backfilling or reinstatement shall be undertaken until subsequent work phase has been approved by the Consultant. Backfill coverage above the utility service shall not be less than the design coverage specified according to the type and diameter of cables. The restoration width shall extend 0.3m on each side of the trench as per the standard cross-section provided. Compaction tests of each layer of backfill are to be conducted every 100m, alternating the location between layers. Resurface the full width of the traffic lane if the trench occupies more than 50% of the lane width. Resurfacing to include reinstatement of any road markings or cat’s eyes that were removed or damaged during excavation works. Utility covers must be installed to be level with the finished road surface to avoid impact loading on vehicle suspensions.
MAIN OUTCOMES
<ul style="list-style-type: none"> Ensured compliance with specifications and quality standards through thorough material testing, phased approvals, proper backfill coverage, regular compaction tests, and appropriate resurfacing

KEY REFERENCES

- | | |
|---|---|
| <ul style="list-style-type: none"> SHC 501 SHC 401 SHC 403 | <ul style="list-style-type: none"> SHC 503 National standards |
|---|---|

Applicable Chapters, Forms and Templates

- [Chapter 2.1.7.1 Quality Assurance & Control](#)
- [Chapter 2.3.3.3 Supplementary Material](#)

PROJECT LIFECYCLE

Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE



P1. Safe, Compliant & Controlled



P5. Environmentally Sustainable

SUCCESS MEASUREMENT

P1.3.
Quality Assurance

- PI1.3.1. Percentage of projects passing quality audits with no major issues.

P1.4.
Laboratory Assurance

- PI1.4.2. Percentage of laboratories passing audits.

P5.1.
Environmental Protection

- PI5.1.3. Percentage of waste diverted from landfill.

LINKED VIOLATION



V3. Infrastructure and Roads Quality Violations



V4. Worksite Management and Cleanliness Violations

Should

Consider

Advise

REQUIREMENTS

- | | | |
|--|--|--|
| <ul style="list-style-type: none"> • Allow sufficient time for conditions to stabilize before starting reinstatement work, ensuring that the asphalt cools adequately before reopening roads to traffic. • Reinstatements less than 3m apart should be combined into a single resurfacing to maintain uniformity. • Coordinate with RIPC during reinstatement related work. RIPC to oversee the process and ensure Contractor and/or Consultant have provided the relevant test results. • Bedding mortar or polymer-based grout should be used to prevent rocking or future sinking of covers. • When resurfacing roads, cover frames should be raised to the new pavement level rather than being left at original heights. | <ul style="list-style-type: none"> • Use innovative excavation, reinstatement, and repair methods to achieve high-quality, permanent results. • Utilize the E-portal where possible to manage the testing process and document all reinstatement activities. | <ul style="list-style-type: none"> • Keep the edges of the reinstatement out of vehicle wheel track zones to prevent early wear. • Cut the edges of the reinstatement vertically using a suitable saw, with alignment to match the existing surface (+/- 6mm). |
|--|--|--|

MAIN OUTCOMES

- Ensured quality and uniformity in road reinstatement by allowing adequate stabilization time, ensuring asphalt cools properly, and combining close reinstatements into a single resurfacing

KEY STAKEHOLDERS

- CONTRACTOR
- CONSULTANT
- LABORATORY

2.3.3 REINSTATEMENT WORKS

2.3.3.2 Special Reinstatement Conditions Based on Road Category

Code Statement: Apply specific resurfacing techniques tailored to road categories and conditions to maintain road functionality, safety, and appearance post-construction.

Applying road-specific reinstatement techniques ensures that repairs are appropriate for the road’s condition, enhancing longevity and safety. Adhering to these tailored guidelines prevents mismatches between the reinstated surface and existing road conditions, maintaining a consistent and reliable infrastructure. This approach helps manage public expectations, reduces maintenance costs, and supports efficient road network management by preserving surface quality across varied road categories.

Road conditions vary widely, necessitating tailored approaches to reinstatement based on specific classifications such as Excellent, Good, Acceptable, and Weak. The procedures account for the road’s current condition, determining the extent and method of resurfacing required. These guidelines ensure that road integrity and functionality are preserved, with specific requirements for different road types, including freeways and local streets.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
REQUIREMENTS	
<ul style="list-style-type: none"> Follow the guidance provided in the Supplementary Material for reinstatement type and width, matching the road category: <ul style="list-style-type: none"> Category (A) Excellent Roads: Resurfacing should cover the entire width of the traffic lane and the full length of the excavation. Category (B) Acceptable Roads: The resurfacing must cover the entire excavation path plus an additional 0.5m on each side. Local or Residential Roads: Resurface the entire width of the street along the excavation length. Comply with resurfacing procedures for all emergency works and home connections, which are designated as Type A only. Edges of all excavations that are resurfaced shall be sealed to prevent water ingress. This includes sealing all longitudinal and transverse asphalt joints between new and old asphalt. 	<ul style="list-style-type: none"> Apply resurfacing techniques suitable for the road condition, ensuring that any existing surface defects are addressed appropriately. The usage of specialised reinstatement material and/or techniques, such as foam concrete, is to be coordinated with the relevant Service Entity.
MAIN OUTCOMES	
<ul style="list-style-type: none"> Ensured appropriate and uniform road reinstatement by following specific guidelines for different road categories and complying with procedures for emergency works and home connections. 	

KEY REFERENCES

- SHC 501
- National standards
- Excavation and Civil Works Procedures in Riyadh published by the Riyadh Amanah

Applicable Chapters, Forms and Templates

- [Chapter 2.1.7.1 Quality Assurance & Control](#)
- [Chapter 2.3.3.3 Supplementary Material](#)

PROJECT LIFECYCLE

Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

	P1. Safe, Compliant & Controlled
	P6. Community-Centric and Accessible
SUCCESS MEASUREMENT	
P1.3. Quality Assurance	<ul style="list-style-type: none"> • PI1.3.4. Inspection pass rate.
P6.1. Public Accessibility	<ul style="list-style-type: none"> • PI6.1.1. Percentage reduction in traffic congestion due to alternative routes.
P6.2. Community Benefits	<ul style="list-style-type: none"> • PI6.2.3. Number of complaints about infrastructure works disruptions.
LINKED VIOLATION	
	V3. Infrastructure and Roads Quality Violations
	V8. Community and Public Accessibility Violations

Consider

Advise

REQUIREMENTS

- Combine closely spaced reinstatements into a single resurfacing effort to ensure a uniform and consistent road surface.
- Refer to the Appendix for a detailed process flow of reinstatement requirements and special conditions.
- Ensure that the resurfacing width and alignment are consistent with existing road structures, maintaining the functional and aesthetic quality of the roadway.

MAIN OUTCOMES

- Ensured a uniform and consistent road surface by combining closely spaced reinstatements into a single resurfacing effort, following detailed process flows and special conditions as outlined in the Appendix.

KEY STAKEHOLDERS

- CONTRACTOR
- CONSULTANT
- LABORATORY



2.3.3 REINSTATEMENT WORKS

2.3.3.3 Supplementary Material

Reinstatement Procedures and Quality Standards

Reinstatement Requirements

1. General Process:

- Reinstatement involves backfilling, compacting, resurfacing, and restoring any disturbed surfaces and materials to their original state.
- Follow detailed specifications as given in the relevant national standards.

2. Material Testing:

- Ensure all required material testing is carried out by the relevant Testing Laboratory.
- The Consultant shall supervise and record the works.
- The Service Entity Contractor and its Testing Laboratory are responsible for the specification and tests of utility materials.

3. Compliance and Quality:

- Comply with appropriate specifications for materials, match with existing materials, and ensure proper quality of workmanship.
- Use the E-portal to manage the testing process where possible.

4. Objectives:

- Maintain the structural integrity of the highway infrastructure and third-party apparatus.
- Produce a quality permanent reinstatement and highway repair that complies with performance criteria.
- Ensure the long-term performance of the highway structure and pavement.

5. Achieving Objectives:

- Provide proper training for operatives and supervisors.
- Use innovative excavation, reinstatement, and repair methods.
- Use appropriate equipment and materials, including recycled materials.
- Comply with compaction requirements and quality testing specifications.

6. Specific Notes:

- No backfilling or reinstatement until the subsequent work phase has been approved.
- Backfill coverage above the utility service surface shall not be less than the design coverage according to the type and diameter of cables.
- Depth of excavation below the utility serviced shall not be less than 0.3m or according to the approved design, whichever is greater.
- Store backfill material according to specifications.
- Determine a suitable methodology to dewater the

site, including well pointing.

- Restoration width to extend 0.3m each side of the trench.
 - Backfill in layers of approved materials in accordance with the General Specifications Guide for Civil Works in the Extension of Public Utilities Projects.
 - Conduct compaction tests of each layer of backfill every 100m, alternating the location between the layers.
 - Edges of the restoration area to be straight and parallel/perpendicular to the direction of traffic.
 - Resurface the full width of the lane if the trench is more than 50% of the lane width.
 - Combine reinstatements less than 3m apart into one resurfacing finish.
 - Keep edges of reinstatement out of wheel track zones.
 - Cut the edge of reinstatement vertically with a suitable saw.
 - Vertical alignment of edges to match the existing surface +/- 6mm.
 - Any pavement distress of any type described in SHC 501 with a severity level of "L" Low and above constitutes a warranty repair by Contractor.
- ##### 7. Allowing Sufficient Time for Works:
- Ensure conditions are suitable (e.g., site is dry and stable) before starting reinstatement.
 - Allow asphalt to cool sufficiently before reopening the road to traffic.
 - Only in exceptional circumstances should the Amanah or RIPC request backfilling or road reopening before the Contractor is content that conditions are suitable.



WHAT TO LOOK OUT FOR

Reinstatement – Contractor

- Works carried out to detailed specification shall be as given in relevant national standards.
- Ensure all required material testing is carried out by the relevant Testing Laboratory.
- Complied with the appropriate specifications for materials to be used, matched with existing materials and observed proper quality of workmanship to ensure the highest standards of reinstatement are achieved?
- Note all relevant technical guidance?

Special Reinstatement Conditions Based on Road Category

Special Conditions for Reinstatement

The existing roads in the Riyadh Municipality have been classified into two categories according to their condition, in order to determine the technical methods to be followed by the Contractors when resurfacing asphalt roads.

Road Category	Reinstatement type			
	(A) Excellent: no visible defects such as subsidence, cracks, slopes, volatility or other defects	(A) Good: limited defects and in locations that do not affect the movement of vehicles.	(B) Acceptable: have been excavated, backfilled and resurfaced and have some surface defects such as slopes, small depressions and some cracks	(B) Weak: relatively deteriorated, as a result of the aging of the asphalt layer and the appearance of large and scattered potholes
Freeways, Expressways, Arterials & Collectors (with widths of 30 metres or more)	Full width of the traffic lane and the full length of the excavation shall be resurfaced		The entire path of the excavation must be resurfaced, plus an additional metre for the width of the excavation (an additional half metre on each side)	
Local or Residential	Entire width of the street and the length of the excavation shall be resurfaced			

Table 2.3.3.3.1: Reinstatement Requirements (Excavation and Civil Works Procedures in Riyadh, Riyadh Amanah)

WHAT TO LOOK OUT FOR

Reinstatement – Testing Laboratory

- Carried out all required material testing?
- Tests of utility materials?

Reinstatement – Consultant

- Supervised and recorded the works?

Reinstatement – Service Entity

- Carried out specification and tests of utility materials?

Allowing Sufficient Time for Works – Contractor

- Before reinstatement started ensured that conditions are suitable - e.g. site is dry and stable - before starting work?
- Asphalt allowed to cool sufficiently before the road is re-opened to traffic?

WHAT TO LOOK OUT FOR

Special Conditions for Reinstatement – RIPC

- Followed flow chart for roads inside and outside maintenance programme?

Special Conditions for Reinstatement – Contractor

- Followed the guidance table for reinstatement type and width?

2.4

PROJECT INSPECTION & COMPLIANCE

2.4

PROJECT INSPECTION & COMPLIANCE

2.4.1 INSPECTIONS AND VIOLATIONS

2.4.1.1 Powers of RIPC to Inspect, Monitor, and Control

2.4.1.2 Roles & Responsibilities

2.4.1.3 Risk-Based Approach to Inspections and Violations

2.4.1.4 Supplementary Material



2.4.1 INSPECTIONS AND VIOLATIONS

2.4.1.1 Powers of RIPC to Inspect, Monitor, and Control

Code Statement: RIPC shall conduct inspections and enforce compliance through scheduled and unannounced visits to ensure adherence to project plans, safety standards, and regulatory requirements..

RATIONALE

Regular inspections and monitoring by RIPC are essential for maintaining high standards of safety, compliance, and quality throughout the project lifecycle. By exercising its control powers, RIPC identifies non-compliance early, allowing for timely corrective actions. This proactive approach not only helps prevent accidents and disruptions but also ensures that projects are completed on time and within regulatory frameworks. Effective enforcement of these measures promotes accountability among Contractors and Service Entities, leading to safer, more reliable infrastructure development.

CONTEXT

RIPC’s authority to inspect, monitor, and control infrastructure projects is crucial for ensuring adherence to safety and regulatory standards. Through scheduled and unannounced inspections, RIPC ensures that worksite activities align with approved plans such as Traffic Management Plans, Health and Safety Plans, and Environmental Impact Assessments. These inspections are systematically conducted at key stages, including the commencement of work, during critical project phases, and prior to issuing Completion Certificates. The use of standardized checklists helps maintain consistent oversight and reduces the incidence of violations.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall

REQUIREMENTS

- Inspections to be conducted at key stages:
 - Day of commencement: Confirm that the Work Site setup complies with required plans:
 - Traffic Management Plan, Works Execution Plan, HSE Plan, Waste Management Plan, Emergency Response Plan, Quality Control Plan, Environmental Impact Assessment (if applicable).
 - Check for any violations listed in the “Licensing Compliance and Controls for Infrastructure Projects in the Riyadh Region.”
 - During excavation, Service Entity works, backfilling, and reinstatement: At least one inspection during these stages to confirm work adheres to the documents listed in the Appendix.
 - Prior to issuing the Completion Certificate: Inspect the site once the Contractor applies for a Completion Certificate to verify:
 - Completion of works.
 - Site is cleared and in good condition.
 - No outstanding issues.
 - Check for violations as listed in “Licensing Compliance and Controls for Infrastructure Projects in the Riyadh Region”.
 - Final Excavation Inspection: Conduct an inspection during the Warranty Period, at least one year after the closure of the excavation permit, to check for defects and compliance.

MAIN OUTCOMES

- Ensure full compliance with safety and regulatory standards, minimize violations, and maintain quality throughout the project lifecycle.

KEY REFERENCES

- SHC 401
- Licensing Compliance and Controls for Infrastructure Projects in the Riyadh Region

Applicable Chapters, Forms and Templates

- [Chapter 2.4.1.4 Supplementary Material](#)
- [Chapter 2.4.2.1 Appeals Process for Contractors](#)

PROJECT LIFECYCLE

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PRINCIPLE

	P1. Safe, Compliant & Controlled
	P2. Effectively Managed & Continuously Improved

SUCCESS MEASUREMENT

P3.1. Clear and Transparent Communication	<ul style="list-style-type: none"> • PI3.1.1. Stakeholder satisfaction score on communication.
P3.2. Stakeholder Engagement	<ul style="list-style-type: none"> • PI3.2.5. Average response time to stakeholder concerns and feedback.
P6.1. Public Accessibility	<ul style="list-style-type: none"> • PI6.1.2. Number of violations relevant to public accessibility.
P6.2. Community Benefits	<ul style="list-style-type: none"> • PI6.2.3. Number of complaints about infrastructure works disruptions.

LINKED VIOLATION

	V1. Barriers and Safety Compliance Violations
	V2. Permit and Regulation Compliance Violations

Should

Consider

Advise

REQUIREMENTS

- | | | |
|--|--|--|
| <ul style="list-style-type: none"> • Ensure the checklist in the Appendix is used by both RIPC and the Contractor to raise standards and reduce violations. • Confirm that the site is properly set up and works adhere to approved plans and regulations. | <ul style="list-style-type: none"> • Conduct additional unannounced inspections based on risk factors such as project complexity, location, traffic flow, and previous performance of the Contractor. | <ul style="list-style-type: none"> • Use the checklist associated with RIPC inspections to ensure compliance at all stages. |
|--|--|--|

MAIN OUTCOMES

KEY STAKEHOLDERS

- RIPC
- CONTRACTOR



2.4.1 INSPECTIONS AND VIOLATIONS

2.4.1.2 Roles & Responsibilities

Code Statement: Service Entities, Contractors, and RIPC shall uphold defined roles and responsibilities to ensure compliance, quality, and safe execution of works, with accountability for supervision and defect rectification.

Clear delineation of roles and responsibilities enhances accountability and coordination among all stakeholders. This structured approach ensures that quality and safety standards are consistently met, minimizing the likelihood of violations and defects. Effective supervision and prompt response to non-compliance issues foster a disciplined work environment, reducing project risks and enhancing overall performance. By holding each party accountable for their roles, projects can be managed more effectively, ensuring adherence to standards and minimizing delays or quality issues.

The roles and responsibilities of Service Entities, Contractors, and RIPC are clearly defined to ensure that infrastructure projects are executed safely, efficiently, and in compliance with all relevant standards. Service Entities are responsible for supervising works and ensuring Contractors comply with the necessary rules and regulations. Contractors must guarantee the quality of executed works, rectify any defects promptly, and adhere to the requirements set by RIPC. The structured oversight by Service Entities and the involvement of Consultants provide an additional layer of quality control and risk management.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall

REQUIREMENTS

- Service Entity:
 - Fully supervise work on extending services, excavation, and backfilling at the site.
 - Verify Contractors comply with all approved requirements, rules, and regulations.
 - Ensure work does not commence before obtaining necessary authorizations.
 - Assign a Consultant to:
 - Submit periodic reports with photos to stakeholders.
 - Supervise site works, identify non-compliance, and take early corrective actions.
 - Identify hazards, calculate risks, and support in mitigation.
- Contractor:
 - Guarantee executed works for two years from the end date of the permit and the issuance of the Completion Certificate.
 - Address any defects identified during the Warranty Period within five days of notification.
- RIPC:
 - Record violations, note time and date, and ensure they are promptly rectified by the Contractor.

MAIN OUTCOMES

- Effective oversight and accountability to ensure project compliance and quality, with swift responses to any identified deficiencies.

KEY REFERENCES

- SHC 401

Applicable Chapters, Forms and Templates

- [Chapter 1.4 How to Use This Manual - Summary of Stakeholder's Roles and Responsibilities](#)
- [Chapter 2.4.1.4 Supplementary Material](#)

PROJECT LIFECYCLE

Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
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PRINCIPLE

	P1. Safe, Compliant & Controlled
	P2. Effectively Managed & Continuously Improved

SUCCESS MEASUREMENT

P1.1. Safety Compliance	<ul style="list-style-type: none"> • PI1.1.4. Percentage of major risks mitigated through risk assessment.
P1.2. Legal Compliance	<ul style="list-style-type: none"> • PI1.2.3. Percentage of legal compliance issues resolved.
P1.3. Quality Assurance	<ul style="list-style-type: none"> • PI1.3.1. Percentage of projects passing quality audits with no major issues.
P2.2. Worksite Management	<ul style="list-style-type: none"> • PI2.2.2. Percentage of projects without worksite and cleanliness violations.

LINKED VIOLATION

	V1. Barriers and Safety Compliance Violations
	V2. Permit and Regulation Compliance Violations
	V4. Worksite Management and General Cleanliness Violations

Should

Consider

Advise

REQUIREMENTS

- | | | |
|---|--|--|
| <ul style="list-style-type: none"> • Oversee the implementation of civil works, maintaining quality and compliance. • Consultants should provide ongoing supervision, reporting issues early to prevent violations. | <ul style="list-style-type: none"> • Implementing a structured methodology to manage the oversight of Contractors, focusing on compliance before work begins. | <ul style="list-style-type: none"> • Ensure clear communication channels between Service Entities, Contractors, and Consultants to streamline supervision and compliance efforts. |
|---|--|--|

MAIN OUTCOMES

KEY STAKEHOLDERS

- | | |
|--|--|
| <ul style="list-style-type: none"> • RIPC • SERVICE ENTITY | <ul style="list-style-type: none"> • CONTRACTOR • CONSULTANT |
|--|--|



2.4.1 INSPECTIONS AND VIOLATIONS

2.4.1.3 Risk-Based Approach to Inspections and Violations

Code Statement: RIPC categorizes projects based on risk profiles to prioritize inspections, enforce regulations effectively, and ensure safety and compliance are maintained.

RATIONALE

A risk-based approach enables RIPC to allocate its inspection resources efficiently, focusing more on high-risk projects that pose greater challenges to public safety and infrastructure integrity. By tailoring the level of oversight to the project’s risk profile, RIPC can enforce compliance more strategically, preventing significant disruptions and safeguarding public interests. This method also allows for targeted interventions, enhancing the effectiveness of regulatory actions and ensuring that high-priority projects receive the necessary attention and control to succeed.

CONTEXT

RIPC employs a risk-based approach to inspections, prioritizing resources and enforcement actions based on the project’s risk profile. Projects are categorized into High, Medium, and Low-risk levels, with each category dictating the frequency of inspections and the severity of regulatory enforcement. This approach ensures that projects with higher potential impacts on public safety, utility networks, and social infrastructure receive the necessary oversight and control measures to mitigate risks effectively.

POSITIVE IMPACTS



Shall

REQUIREMENTS

- Categorize projects into A, B, or C based on factors like traffic flow, utility capacity, and social infrastructure interfaces.
- Conduct inspections according to project category, with stricter enforcement for high-risk projects.
- **Project Categorization:**
 - Category A (High-Risk): Requires the highest level of coordination, planning, monitoring, and control. These projects often intersect with multi-modal public transport networks and extra high-capacity buried services (critical infrastructure).
 - Category B (Medium-Risk): Standard infrastructure projects with several complex interfaces. These projects may involve public transport with limited intersections and high-capacity buried services.
 - Category C (Low-Risk): Projects away from population-dense areas with minimal interfaces. These may include high-capacity buried services located away from public spaces.
- **Inspection Requirements by Category:**
 - Category A: Frequent inspections with strict enforcement and no escalation prior to penalties.
 - Category B: Inspections at key milestones with moderate enforcement, including written warnings before penalties.
 - Category C: Inspections at the beginning, middle, and end of the project with limited enforcement, escalating from verbal to written warnings before penalties.
- **Escalatory Approach to Penalties:**
 - Category A: Direct penalties for violations.
 - Category B and C: Written warnings with specified correction timelines, followed by penalties if not rectified.

MAIN OUTCOMES

- Enhanced focus on high-risk projects to prevent major disruptions, ensure safety, and uphold regulatory standards.

KEY REFERENCES

- SHC 401
- AASHTO M-145 and T-180

Applicable Chapters, Forms and Templates

- [Chapter 2.1.2 Work Execution Plan And Risk Management](#)
- [Chapter 2.1.2.6 Critical Infrastructure Guidelines](#)
- [Chapter 2.4.1.4 Supplementary Material](#)

PROJECT LIFECYCLE

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PRINCIPLE

	P1. Safe, Compliant & Controlled
	P4. Technologically Advanced & Data-driven

SUCCESS MEASUREMENT

P1.3. Quality Assurance	<ul style="list-style-type: none"> • PI1.3.4. Inspection pass rate.
P1.5. Traffic and Parking Control	<ul style="list-style-type: none"> • PI1.5.1. Number of traffic control-related complaints per project.
P2.5. System Resilience	<ul style="list-style-type: none"> • PI2.5.1. Percentage of infrastructure passing stress tests.
P4.1. Advanced Technologies	<ul style="list-style-type: none"> • PI4.1.1. Efficiency improvement from modern methods.

LINKED VIOLATION

	V1. Barriers and Safety Compliance Violations
	V2. Permit and Regulation Compliance Violations
	V3. Infrastructure and Roads Quality Violations

Should

Consider

Advise

REQUIREMENTS

- | | | |
|---|---|---|
| <ul style="list-style-type: none"> • Implement further unannounced inspections and audits during excavation, backfilling, and reinstatement phases based on project risk factors. • Conduct inspections in compliance with RIPC’s inspection operating model. | <ul style="list-style-type: none"> • Random sampling and testing of materials and workmanship during project inspections to ensure compliance with national standards. | <ul style="list-style-type: none"> • Maintain detailed records of inspections and use them to adjust enforcement strategies based on project compliance history. |
|---|---|---|

MAIN OUTCOMES

KEY STAKEHOLDERS

- | | |
|--|--|
| <ul style="list-style-type: none"> • RIPC • SERVICE ENTITY | <ul style="list-style-type: none"> • CONTRACTOR • CONSULTANT |
|--|--|



2.4.1 INSPECTIONS AND VIOLATIONS

2.4.1.4 Supplementary Material

Risk-Based Approach to Inspections and Violations

Project Monitoring & Control

Details of RIPC’s powers and ability to impose fines for violations are contained in “Licensing Compliance and Controls for Infrastructure Projects in the Riyadh Region”.

RIPC carries out control and inspection operations aimed at enhancing compliance through guidance, awareness, and enforcement of these controls, relevant regulations and rules. To achieve this, RIPC exercises control through automated or manual monitoring or other approved monitoring methods, whether in the office or in the field.

Inspections & Monitoring - Minimum Requirement for Inspections

For any site with a valid permit, the minimum requirements for RIPC inspections **should** be as in the table below. It is proposed RIPC and the Contractor both use the same checklist to raise standards and reduce violations.

Type of Inspection	Checklist for Inspection
<p>Day of commencement.</p> <p>An initial site visit to confirm the Work Site is being set up is in accordance with the documents listed.</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Traffic Management Plan? <input type="checkbox"/> Works Execution Plan? <input type="checkbox"/> Health Safety and Environment Plan? <input type="checkbox"/> Waste Management Plan? <input type="checkbox"/> Emergency Response Plan? <input type="checkbox"/> Quality Control Plan? <input type="checkbox"/> Environmental Impact Assessment - if appropriate? <input type="checkbox"/> Any violations as listed in “Licensing Compliance and Controls for Infrastructure Projects in the Riyadh Region”?
<p>During excavation, Service Entity works, backfilling and reinstatement.</p> <p>At least one visit during this stage to confirm the work is being delivered in accordance with the documents listed.</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Traffic Management Plan? <input type="checkbox"/> Works Execution Plan? <input type="checkbox"/> Health Safety and Environment Plan? <input type="checkbox"/> Waste Management Plan? <input type="checkbox"/> Emergency Response Plan? <input type="checkbox"/> Quality Control Plan? <input type="checkbox"/> Environmental Impact Assessment - if appropriate? <input type="checkbox"/> Any violations as listed in “Licensing Compliance and Controls for Infrastructure Projects in the Riyadh Region”?
<p>Prior to issuing the Completion Certificate.</p> <p>Once the Contractor has applied for a Completion Certificate,</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Are the works completed and notice of acceptance received from the relevant Service Entity? <input type="checkbox"/> Have lab test results been verified? <input type="checkbox"/> Is the work area clear and has been left in good condition? <input type="checkbox"/> Any outstanding issues at this stage? <input type="checkbox"/> Any violations as listed in “Licensing Compliance and Controls for Infrastructure Projects in the Riyadh Region”?
<p>Final Excavation Inspection.</p> <p>An inspection during the Warranty Period at least one year after the closure of the excavation permit.</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Are there any obvious or deep defects? <input type="checkbox"/> Any violations as listed in “Licensing Compliance and Controls for Infrastructure Projects in the Riyadh Region”?

Table 2.4.1.4.1: Minimum Requirement for Inspections

Risk-Based Approach to Inspections and Violations

Roles & Responsibilities

1. Service Entities

- Whilst the Contractor has an important role to perform the works in a safe, tidy and workmanlike manner there are monitoring obligations on the Service Entity.
- The Service Entity shall fully supervise the work of extending services, excavation and backfilling at the site.
- The Service Entity shall be responsible for the quality of implementation, and the consequences of poor implementation. However, this shall not exempt the Contractor from potential Violation penalties resulting from their breach of the quality of implementation and application of the procedures.
- The Service Entity shall verify its Contractors comply with all approved requirements, rules and regulations related to the implementation of civil works, and do not start work before obtaining the necessary authorisation.
- The Service Entity shall assign a Consultant to follow up on the works and do the following:
 - Submit periodic reports with photos and share them with Stakeholders.
 - Supervise and oversee the site works, identifying non-compliance and taking early corrective actions.
 - Identify hazards, calculating risks and supporting in their early mitigation.

2. Contractors

- The Contractor shall guarantee the executed works for a period of two years from the end date of the permit and issuance of the Completion Certificate.

3. RIPC

- If any violations are identified during inspections they should be entered into the violation process, with the appropriate fine issued and the technical violation dealt with promptly by the Contractor. RIPC staff should note the time and date of any Violations they observe.
- The Contractor is obliged to repair any defects associated with the works during in line with the Licensing Compliance and Controls for Infrastructure Projects in the Riyadh Region.



WHAT TO LOOK OUT FOR

Service Entity Obligations

- Is there a methodology to fully supervise the work of extending services, excavation and backfilling at the site?
- Is there a methodology to verify the Contractor complies with all approved requirements, rules and regulations related to the implementation of civil works, and do not start work before obtaining the necessary authorisation?
- Has a suitable Consultant been appointed?

Consultant Obligations

- Submitted periodic reports via online system?
- Deliver the executive plans on the ground.
- Submitted photos of the project?

Contractor Obligations

- Are the management systems in place for the two-year Warranty Period?



2.4.1 INSPECTIONS AND VIOLATIONS

2.4.1.4 Supplementary Material

Risk-Based Approach to Inspections and Violations

Risk-based Approach to Inspections and Violations

Project Categorization

With a geographical area under its purview of 400+ km sq., RIPC must ensure that resources are efficiently deployed such that it fully fulfils its mandate related to regulation (and its enforcement) and supervision of public realm infrastructure projects in the Riyadh Region. Categorising Projects supports this aim. The higher the

risk profile of the project, the greater RIPC’s involvement in its successful delivery through careful coordination and control mechanisms. Project Categories have been established through rigorous analysis and are based on several factors. These are qualitatively described in the table below.

Project Categorization

Project Category	Typical Characteristics				
	Description	Risk Profile ¹	Transport & Mobility ²	Utility Network Capacity ³	Social Infrastructure Interfaces ⁴
A	The most sensitive project types that require the highest levels of coordination, planning, monitoring and control.	High-Risk	Multi-modal public transport networks intersecting.	Extra high-capacity buried services whose precise routes are unknown (also referred to as critical infrastructure).	Multiple interfaces with places where people gather.
B	Standard infrastructure public realm projects having several complex interfaces that should be carefully managed and monitored.	Medium-Risk	Presence of public transport, with limited intersections.	Extra high, or high-capacity buried services whose routes are known, or low-capacity buried services whose routes may be unknown.	Some interfaces with places where people gather.
C	Infrastructure projects in the region that occur away from population dense areas, and having minimal interfaces, social and otherwise.	Low-Risk	Lack of public transport and no intersections between transport modes.	High-capacity buried services located away from the public realm; or low-capacity buried services whose routes are known or unknown.	Limited interfaces with places where people gather.

Table 2.4.1.4.2: Project Categorization for Risk-based Approach to Inspections and Violations

Risk-Based Approach to Inspections and Violations

1. Risk Profile is determined by several factors, including Land Access, Average Annual Daily Traffic (AADT), Traffic Flow, Road Design Speed, Vehicle Types, Transport & Mobility Interfaces, Utility Network Capacity, and Social Infrastructure (Interfaces) in proximity to the project site, Work Duration, etc.
2. Road Categories are not directly linked to Project Categories. A High-Risk Project Category could be linked to any Road Category.
3. “Capacity” refers to electrical voltage, water pressure, or telecommunications bandwidth wherein damage to the infrastructure would cause major and widespread disruption.
4. “Places where people gather” may include stadiums, parks, schools, hospitals, mosques, entertainment facilities, and other attractions that draw pedestrians and vehicles.

Note: Project Categories may not conform to all ‘Typical Characteristics’. The category will be determined by RIPC through quantified analysis and assigned during the early stages of the infrastructure project lifecycle. Similarly, the ‘Approach’ will be determined on a case-by-case basis.

Approach	
RIPC Inspections	Regulatory Enforcement
Frequent	Strict – no escalation prior to levying penalties.
At key milestones	Moderate – written warnings, escalating to penalties.
Beginning, Middle, and End	Limited – verbal and written warnings, escalating to penalties.



2.4.1 INSPECTIONS AND VIOLATIONS

2.4.1.4 Supplementary Material

Backfill and Compacted Material Inspection

Type of Inspection	Requirements for Inspection
Granular Gradient	<ul style="list-style-type: none"> ❑ The material should be well-graded to ensure proper compaction and stability. The gradation should comply with the specifications outlined in the AASHTO M-145 classification for soil-aggregate mixtures.
Thickness	<ul style="list-style-type: none"> ❑ The sub-foundation layer thickness is usually specified by the project engineer based on the load requirements and soil conditions. Commonly, the thickness ranges from 150mm to 300mm.
Tamping and Compaction	<ul style="list-style-type: none"> ❑ The material should be compacted to at least 95% of the maximum dry density as determined by the Modified Proctor test (AASHTO T-180). ❑ Compaction should be done in layers, typically not exceeding 200mm in loose thickness, to ensure uniform density and stability.
Leveling	<ul style="list-style-type: none"> ❑ The surface of the sub-foundation layer should be leveled to the specified grade and slope to ensure proper drainage and support for the subsequent layers. ❑ Laser leveling equipment is often used to achieve the required precision.
Testing Requirements	<ul style="list-style-type: none"> ❑ Moisture Content: The moisture content should be within the optimal range for compaction, typically within -3% to +2% of the optimum moisture content determined by the Proctor Test. ❑ Density Testing: Field density tests, such as the sand cone method (ASTM D1556) or nuclear density gauge (ASTM D6938), should be conducted to verify compaction levels. ❑ Gradation Testing: Sieve analysis (ASTM C136) should be performed to ensure the material meets the specified gradation requirements.

Table 2.4.1.4.3: Backfill and Compacted Material Inspection

2.4

PROJECT INSPECTION & COMPLIANCE

2.4.2 APPEALS AND COMPLAINTS

2.4.2.1 Appeals Process for Contractors

2.4.2.2 Complaints Management for Residents or Road Users

2.4.2.3 Supplementary Material



2.4.2 APPEALS AND COMPLAINTS

2.4.2.1 Appeals Process for Contractors

Code Statement: Contractors may appeal penalties within 60 days through a structured process, ensuring fair and transparent resolution of violations. Approval of works does not relieve the contractor of their responsibility to adhere to regulations and standards.

RATIONALE

The appeals process is integral to maintaining a balanced regulatory environment, where Contractors can voice concerns about penalties they believe are unjust. This mechanism fosters a sense of fairness and accountability, encouraging compliance while allowing for reconsideration in cases of dispute. By providing a clear and structured path for appeals, RIPC upholds the principles of due process, enhancing trust between regulatory bodies and Contractors, and ensuring that enforcement actions are both justified and transparent.

CONTEXT

The structured appeals process provides Contractors with the opportunity to contest penalties imposed by RIPC, ensuring fairness and transparency in the enforcement of regulations. Contractors have 60 days from the date of penalty notification to submit appeals through designated channels, which are reviewed by RIPC's Grievance Committee. If necessary, appeals can be escalated to the competent administrative court, providing a formal avenue for dispute resolution.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
REQUIREMENTS	
<ul style="list-style-type: none"> Submit appeals within 60 days of penalty notification via designated channels. Follow the appeals process, which involves review by the RIPC Grievance Committee and potential escalation to the competent administrative court. 	<ul style="list-style-type: none"> Thoroughly review penalty notifications and consider the grounds for appeal. Engage with the appeals process promptly to prevent unnecessary penalties.
MAIN OUTCOMES	
<ul style="list-style-type: none"> Fair adjudication of penalties, providing Contractors with a structured mechanism to contest violations. 	

KEY REFERENCES

Applicable Chapters, Forms and Templates

- **Chapter 2.4.1.1 Powers of RIPC to Inspect, Monitor, and Control**
- **Chapter 2.4.2.3 Supplementary Material**

PROJECT LIFECYCLE

Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE	
	P1. Safe, Compliant & Controlled
	P2. Effectively Managed & Continuously Improved
SUCCESS MEASUREMENT	
P1.2. Legal Compliance	<ul style="list-style-type: none"> • PI1.2.1. Number of legal non-compliance incidents. • PI1.2.4. Number of grievances resolved. • PI1.2.5. Average time to resolve grievances.
LINKED VIOLATION	
	V2. Permit and Regulation Compliance Violations

Consider

Advise

REQUIREMENTS

- | | |
|--|--|
| <ul style="list-style-type: none"> • Seeking legal advice during the appeals process, particularly if the case is escalated to court. | <ul style="list-style-type: none"> • Maintain clear documentation and evidence to support appeals, enhancing the chances of a successful outcome. |
|--|--|

MAIN OUTCOMES

KEY STAKEHOLDERS

- | | |
|--|--|
| <ul style="list-style-type: none"> • RIPC • SERVICE ENTITY | <ul style="list-style-type: none"> • CONTRACTOR • CONSULTANT |
|--|--|



2.4.2 APPEALS AND COMPLAINTS

2.4.2.2 Complaints Management for Residents or Road Users

Code Statement: RIPC shall manage complaints from residents and road users effectively, ensuring prompt resolution of issues related to safety, accessibility, and site maintenance.

RATIONALE

Efficient complaints management is crucial for maintaining public trust and ensuring minimal disruption to communities. By addressing complaints promptly, RIPC demonstrates responsiveness to public concerns, enhancing the overall reputation of infrastructure works. This process helps identify recurring issues, providing valuable feedback for improving project management and minimizing negative impacts. Effective handling of complaints not only resolves individual concerns but also contributes to broader project success by fostering a positive relationship with the community.

CONTEXT

Complaints from residents and road users about infrastructure projects are managed through RIPC’s structured complaints handling process. Issues related to worksite safety, accessibility, and other project impacts can be reported via the RIPC website or hotline. Complaints are categorized by priority, and resources are assigned to address each issue promptly, ensuring that public concerns are effectively managed and resolved.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
REQUIREMENTS	
<ul style="list-style-type: none"> Submit complaints through the RIPC website or hotline as detailed on the Project Information Board. RIPC to categorize complaints by priority, raise tickets, and assign resources to address issues. 	<ul style="list-style-type: none"> Resolve complaints promptly to minimize disruptions and maintain public satisfaction.
MAIN OUTCOMES	
<ul style="list-style-type: none"> Efficient handling of complaints, reducing negative impacts on the community and improving overall project management. 	

KEY REFERENCES

Applicable Chapters, Forms and Templates

- [Chapter 2.1.9.1 Community Outreach & Accessibility](#)
- [Chapter 2.4.2.3 Supplementary Material](#)

PROJECT LIFECYCLE

Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE

	P3. Clearly Communicated and Actively Engaged
	P6. Community-Centric and Accessible

SUCCESS MEASUREMENT

P3.1. Clear and Transparent Communication	<ul style="list-style-type: none"> • PI3.1.1. Stakeholder satisfaction score on communication.
P3.2. Stakeholder Engagement	<ul style="list-style-type: none"> • PI3.2.5. Average response time to stakeholder concerns and feedback.
P6.1. Public Accessibility	<ul style="list-style-type: none"> • PI6.1.2. Number of violations relevant to public accessibility.
P6.2. Community Benefits	<ul style="list-style-type: none"> • PI6.2.3. Number of complaints about infrastructure works disruptions.

LINKED VIOLATION

	V4. Worksite Management and General Cleanliness Violations
	V8. Community and Public Accessibility Violations

Consider

Advise

REQUIREMENTS

- Regularly review feedback from complaints to improve worksite management and address common issues.
- Ensure all project sites display clear and accessible contact information for submitting complaints.

MAIN OUTCOMES

KEY STAKEHOLDERS

- PUBLIC
- CONTRACTOR
- CONSULTANT



2.4.2 APPEALS AND COMPLAINTS

2.4.2.3 Supplementary Material

Appeals Process for Contractors

Escalatory Approach to Penalties

1. For Category A projects, Contractors will face direct penalties for recorded violations, without warning.
2. For Category B and C projects, Contractors will face Written Warnings with a prescribed timescale for correction. Within the timescale, the Contractor must respond to RIPC with evidence that the correction has been made, otherwise a penalty will be issued.

In addition to the inspections mentioned in the previous section, RIPC may consider carrying out further unannounced inspections and audits during excavation, Service Entity works, backfilling and re-instatement.

The schedule for these additional inspections is at RIPC's discretion and take a risk-based consideration of several factors, including:

- Duration of the works.
- Location risks, i.e., type of road, traffic flow, traffic speed and pedestrian access.
- Complexity of the works.
- Previous performance of the Contractor.
- Any other relevant issues.
- These inspections and audits may also include random sampling and testing of materials and workmanship. All such sampling and testing shall be in accordance with relevant national standards.

Appeals Process for Contractors

The Process for Appeals is shown below.

The violator may submit their grievance against the decision to impose a penalty within a period not exceeding 60 days from the date of notification through the designated means.

Appeals against the decision issued by the Grievance Committee may be conducted before the competent administrative court in accordance with the provisions of the relevant laws and regulations.

The penalty shall not be executed until the specified period for grievance stipulated in this article has elapsed, in accordance with the provisions of the relevant laws and regulations.

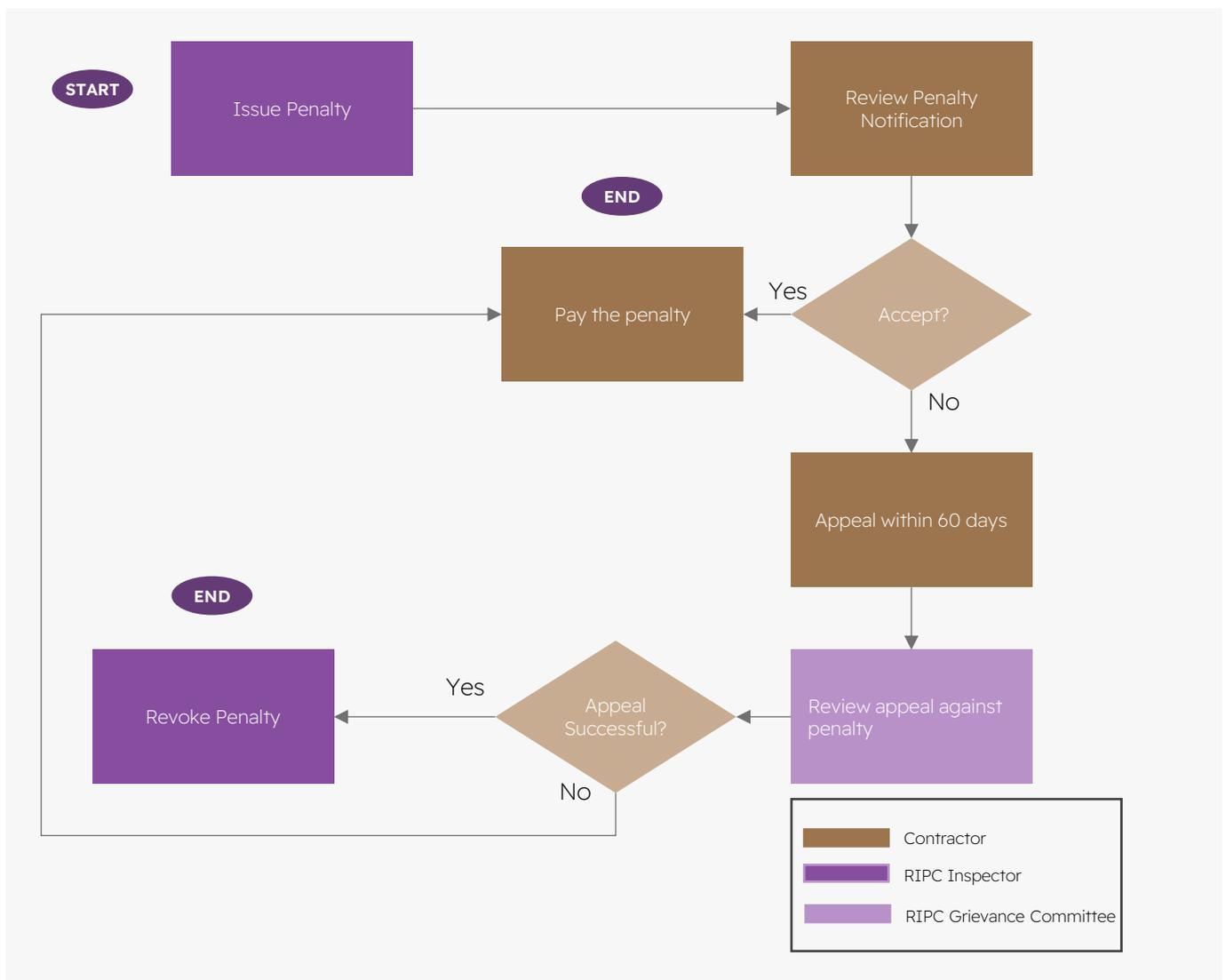


Figure 2.4.2.3.1: Appeals Process for Contractors



2.4.2 APPEALS AND COMPLAINTS

2.4.2.3 Supplementary Material

Complaints Management for Residents or Road Users

Complaints Management for Residents or Road Users

From time-to-time issues may arise which cause complaints. Examples could be poor Work Site maintenance causing safety or visual amenity.

In relation to residents and road users negatively impacted by the works, they should submit complaints through the RIPC website: <https://ripc.gov.sa/ar>

In addition to the complaints channel available online, the Project Information Board (PIB) also features a hotline that residents and road users may call in the event of complaints, emergencies, or comments and queries.

The RIPC process for addressing complaints is shown below.

WHAT TO LOOK OUT FOR

Contractor Obligations

- Is any grievance against any violation submitted within 60 days of notification?

RIPC

- Ensure process is in place for handling complaints

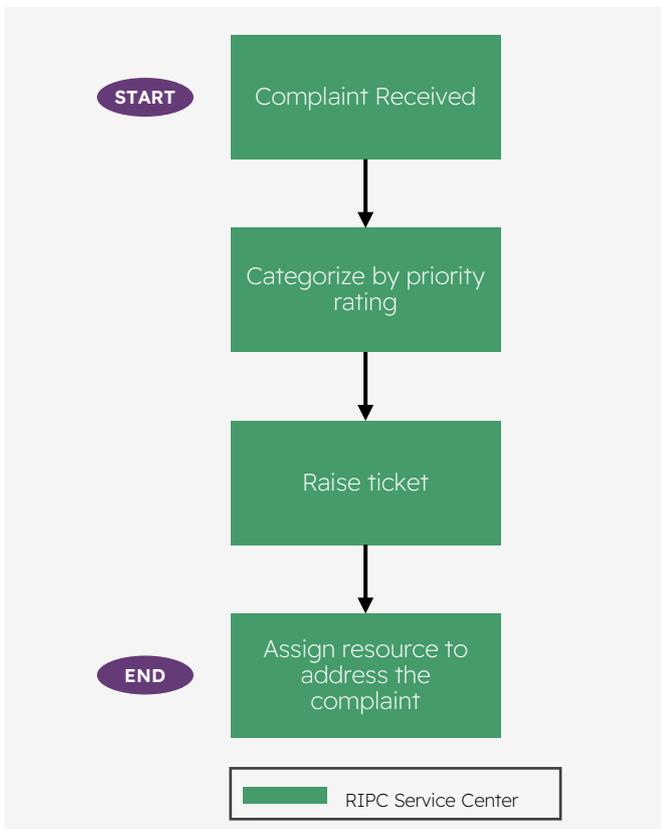


Figure 2.4.2.3.2: Complaints Management Process

2.5

PROJECT CLOSURE

2.5

PROJECT CLOSURE

2.5.1 PROJECT CLOSURE

2.5.1.1 Project Closure

2.5.1.2 Supplementary Material



2.5.1.1 PROJECT CLOSURE

Code Statement: Successfully completing infrastructure work benefits all stakeholders involved. Adhering to clear handover requirements and conducting inspections during the Warranty Period ensures the finished work meets standards and is maintainable.

RATIONALE

The effective completion, handover and monitoring of infrastructure projects is integral to ensuring the public realm is restored to its original state and is maintainable for years to come without any foreseeable issues. The key steps that are undertaken consist of materials testing, works inspecting, defects monitoring & rectification and exchanging of as-built information. This is underpinned by effective coordination between the Contractor, Consultant, Service Entity, RIPC, and others.

CONTEXT

Currently there are many challenges that RIPC faces during the project closure phase that primarily stem from lack of clear guidance and processes relating to materials testing, handing over of project (and asset) information, and excavation activities and works being reinstated poorly, which leads to misunderstanding and disputes between stakeholders and overall inefficiencies in completion of projects.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
REQUIREMENTS	
<ul style="list-style-type: none"> Complete all works to the highest standards and as per specification agreed in Stage 5. Reinstate the public realm to its preexisting state and vacate the site, ensuring it is left clean and without any defects. Provide necessary records such as as-built drawings, photos, material test results, etc. following Service Entities Templates. Submit the necessary material tests and comply with laboratory procedures. Rectify defects that are raised by RIPC during the final site inspection and two-year warranty period. Arrange for the vacation of site and closure of permit upon agreement with RIPC. Ensure the site area and associated Temporary Traffic Control (TTC) is cleared safely, removing all equipment, surplus material, barriers, signs, etc. 	<ul style="list-style-type: none"> The site should not be demobilized and TTC should not be removed until the necessary reinstatement and asphaltting is completed. Coordinate with RIPC in the inspection and monitoring of completed works, ensuring defects that are identified are agreed resolved in a timely manner. Provide evidence of works acceptance from the relevant Service Entity.
MAIN OUTCOMES	
<ul style="list-style-type: none"> Coordinated and efficient materials testing that ensures the public realm is reinstated to the highest standard without damage and defects. Timely closure of works permits. 	<ul style="list-style-type: none"> Site monitoring activates that encourage frequent and open communication between all parties involved in the project, resulting in a coordinated and efficient project closure process.

KEY REFERENCES

- Excavation and Civil Works Procedures in Riyadh published by the Riyadh Amanah

Applicable Chapters, Forms and Templates

- [Chapter 2.1.7.1 Quality Assurance & Control](#)
- [Chapter 2.5.1.2 Supplementary Material](#)

PROJECT LIFECYCLE

Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE



P1. Safe, Compliant & Controlled



P4. Technologically Advanced & Data-driven

SUCCESS MEASUREMENT

P1.2. **Legal Compliance**

- PI1.2.1. Number of legal non-compliance incidents (e.g. permit non-compliance)

P1.3. **Quality Assurance**

- PI1.3.2. Frequency of Inspections

P4.2. **Data Capture & Monitoring Methods**

- PI4.2.3. Data collection rate (number of project contributing data input/total number of projects)

LINKED VIOLATION



V1. Barriers and Safety Compliance Issues



V3. Infrastructure and Roads Issues



V4. Worksite Management and Cleanliness Violations

Consider

Advise

REQUIREMENTS

- | | |
|--|---|
| <ul style="list-style-type: none"> • Ensure continuous coordination between the project team (i.e. the Contractor, Consultant, and Service Entity) to enhance project efficiency during the completion stage. | <ul style="list-style-type: none"> • Plan ahead in the notification of works completion to avoid unnecessary delays during the completion stage. • Document lessons learnt at project closure, to avoid repeat project pitfalls and encourage continuous improvement. |
|--|---|

MAIN OUTCOMES

- Effective communication between all stakeholders.

KEY STAKEHOLDERS

- | | |
|---|--|
| <ul style="list-style-type: none"> • RIPIC • SERVICE ENTITY | <ul style="list-style-type: none"> • CONTRACTOR • CONSULTANT |
|---|--|



2.5.1.1 PROJECT CLOSURE

2.5.1.2 Supplementary Material

Project Closure

Responsibilities

The process for Project Closure is set out in the flowchart.

It is the responsibility of the Contractor, Consultant, Testing Consultant and Service Entity to have the work completed correctly and all relevant records completed and available for RIPC to review.

1. Contractor

- Upon completion of the final asphalt layer the Contractor shall advise the Service Entity to submit a request to vacate the site to RIPC via the portal or through an alternative method as necessary.
- The Contractor shall not remove the Work Zone barriers around the excavation site, until it is advised that the request has been submitted to RIPC.

2. Service Entities

- The Service Entity shall initiate the procedures for closing the permit, and verify compliance through the Consultant and the Testing Laboratory with several technical and regulatory requirements on the works carried out by the Contractor:
- Final field inspection of excavation, backfilling and asphaltting works.
- Fulfilment of all necessary laboratory tests
- Submission of all reports, tests, photographs etc. to RIPC.
- The Contractor shall not be released by the Service Entity before confirming the release of the Permit by RIPC.

3. RIPC

RIPC shall:

- Receive close-out reports which contains laboratory test results.
- Conduct a site visit and perform visual inspection and confirm all barriers etc. have been removed.
- Verify that there are no reported complaints relating to the site that need to be addressed before the party is evacuated.
- Verify that there are no outstanding violations or fines registered against the Contractor.
- At their discretion, require the Contractor to immediately repair any technical observations, failed tests, or clear residual debris left on site.
- Clear the permit closure if there are no observations.

- Provide details of the Contractor's risk-based approach to the project separately (as necessary).

4. Warranty Period

- The responsibility of addressing any defects that appear on the executed civil works shall remain on the Contractor during the two years warranty period, which commences upon issuance of the works Completion Certificate.
- The Contractor shall fix any defects in his works after notification from RIPC within a period not exceeding five days, to avoid any penalty.

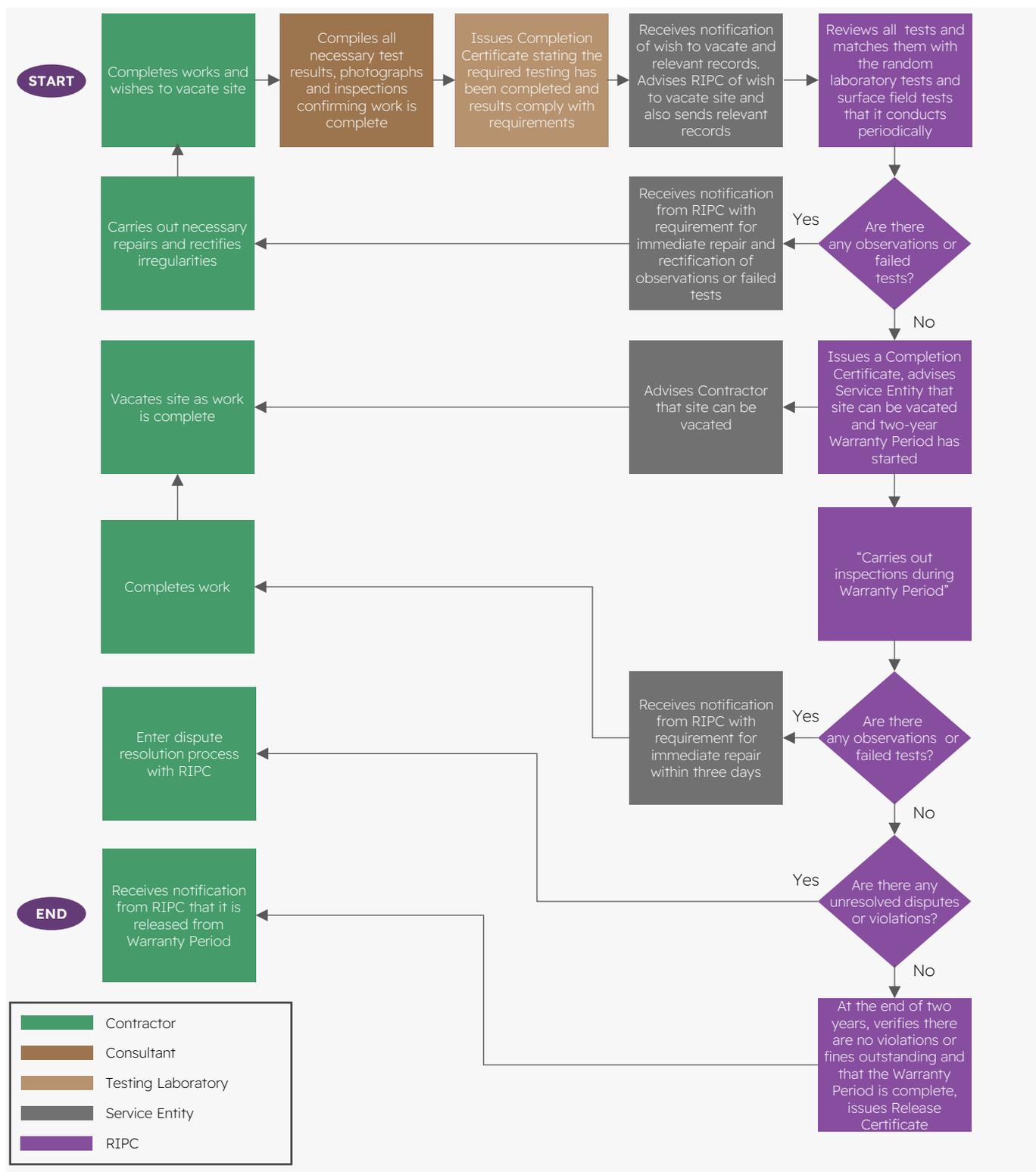


Figure 2.5.1.2.1: Project Closure Process

2.6

GENERAL CONSIDERATIONS

2.6

GENERAL CONSIDERATIONS

2.6.1 LEVERAGING TECHNOLOGY

2.6.1.1 Leveraging Technology



2.6.1.1 LEVERAGING TECHNOLOGY

RATIONALE

Technology offers innovative ways in which to plan and deliver projects. From low emission Heavy Vehicles to Lidar for precision measurements, capturing three-dimensional information, and detailed surface characteristics. Leveraging technology has numerous advantages that will have a direct and positive impact on public realm infrastructure works, including reducing environmental risks from oil spills, reducing noise, and improving visual appearance of Work Areas.

CONTEXT

Public realm infrastructure projects in the Riyadh Region have typically leveraged labour over technology, and traditional construction techniques over more advanced, cleaner, and innovative alternatives. No longer. RIPC will work in collaboration with Stakeholders to gradually increase the use of technology over time and will ensure that mechanisms are in place to support the transition.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
REQUIREMENTS	
<ul style="list-style-type: none"> Ensure that all lighting is of LED-type. Ensure that all drawings, specifications, and schedules are software-generated. 	<ul style="list-style-type: none"> QR codes readily available throughout the Work Site with links to work permits, reporting forms, etc. Deploy low emissions Heavy Vehicles. Deploy electric handheld equipment in place of petrol-fuelled. Examples of handheld equipment are electric jackhammers and grinders. Use RFID detectors on PPE to raise awareness of nearby Heavy Vehicles. Remote cloud-based cameras for site security. Solar powered lighting should be used for non-critical illuminated areas.
MAIN OUTCOMES	
<ul style="list-style-type: none"> Reduced noise levels 	<ul style="list-style-type: none"> Encourage cleaner air

KEY REFERENCES

- General Authority for Civil Aviation (GACA)

PROJECT LIFECYCLE			
Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
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PRINCIPLE

 **P4. Technologically Advanced & Data-driven**

SUCCESS MEASUREMENT

Additional Performance Indicators	<ul style="list-style-type: none"> Percentage of electric vehicles deployed at site Percentage of LED lamps as a total of all light fixtures Percentage of electric hand-held equipment as a percentage of total hand-held equipment
-----------------------------------	---

LINKED VIOLATION

 V6. Boards and Information Violations

Applicable Chapters, Forms and Templates

- [Chapter 2.2.1 Site Safety](#)

Consider	Advise
REQUIREMENTS	
<ul style="list-style-type: none"> Use Lidar techniques to map the site in 3 dimensions and generate a digital twin. Deploy EV Heavy Vehicles. Material source tracking. Use of asphalt with recycled aggregates. Crushing and recycling of concrete materials for use in either temporary or permanent works. Using drones for aerial surveys and to capture high-resolution images and videos of infrastructure, which can be analyzed for maintenance needs and urban planning. To formally apply for a drone permit, please visit the Unmanned Aircraft Systems (UAS) section of the General Authority for Civil Aviation (GACA) website. 	<ul style="list-style-type: none"> Remote cloud-based cameras for site security powered by A.I. to identify productivity, and incidents. Use Virtual Reality to enable remote virtual collaboration on the digital twin of the Work Site. Integrate AI based systems to optimize traffic flows dynamically during peak hours near work zones.
MAIN OUTCOMES	
<ul style="list-style-type: none"> Reduce disruption to road users/the public 	

KEY STAKEHOLDERS

- | | |
|--|---|
| <ul style="list-style-type: none"> CONTRACTOR RIPC | <ul style="list-style-type: none"> SERVICE ENTITIY CONSULTANT |
|--|---|

2.6

GENERAL CONSIDERATIONS

2.6.2 MAXIMIZING DATA CAPTURE

2.6.2.1 Maximizing Data Capture



2.6.2.1 MAXIMIZING DATA CAPTURE

Code Statement: Maximise data capture and analytics to support informed decision-making and innovative planning tools.

RATIONALE

Whether planning, permitting, mapping, or executing public realm infrastructure projects, data analytics should be at the centre of everything we do. Maximising the number of accurate data points, whether cable positions, pipe pressures, number of road traffic accidents around a Work Site, presents an opportunity to join up the points into a story from which we can derive insights and make informed decisions.

To facilitate the momentous project of building a digital map of utilities corridors, RIPC requires extensive collaboration from all partners and stakeholders. This includes service entities, their Consultants, and Contractors, to ensure the accurate and beneficial capture of data from all projects.

POSITIVE IMPACTS

						
Health & Safety	Quality of Life & Well-being	Public Perception	Accessibility & Movement	Economy & Business	Infra & Public Space	Environmental

Shall	Should
REQUIREMENTS	
<ul style="list-style-type: none"> Contribute to RIPC’s unified digital map of the Riyadh Region with entire data sets Service Entities: Verify and validate RIPC’s digital map. Submit Annual Plans for infrastructure projects (Service Entities) and road resurfacing (Riyadh Amanah) to RIPC. RIPC: Compile Annual Plans, identify gaps and clashes, enhance coordination between Stakeholders. Create reporting mechanisms wherein changes to as-built drawings are shared with Stakeholders. 	<ul style="list-style-type: none"> Capturing GIS points and polygons for all project sites. Create a process for maximising the accuracy of databases as part of project delivery. Identify gaps in data and use them to inform the Risk Register.
MAIN OUTCOMES	
<ul style="list-style-type: none"> Protection of the public realm 	<ul style="list-style-type: none"> Smooth project execution

KEY REFERENCES

- Saudi Authority for Data and Artificial Intelligence

PROJECT LIFECYCLE

Stage 1 Strategic Definition	Stage 2 Preparation and Briefing	Stage 3 Concept Design	Stage 4 Spatial Coordination
Stage 5 Technical Design	Stage 6 Construction	Stage 7 Handover	Stage 8 Operation & Maintenance

PRINCIPLE



P4. Technologically Advanced & Data-driven

SUCCESS MEASUREMENT

P4.2.
Data Capture and Monitoring Methods

- PI4.2.1. Percentage of data coverage of Riyadh infrastructure
- PI4.2.2. Data accuracy rate
- PI4.2.3. Data collection rate (number of project contributing data input/total number of projects)
- PI4.2.4. Decision-making improvement rate from data analytics

LINKED VIOLATION

N/A

N/A

Applicable Chapters, Forms and Templates

- [Chapter 2.1.1.1 Permitting Requirements](#)
- [Chapter 2.1.10 Protecting Assets and Minimizing Disruption](#)

Consider

Advise

REQUIREMENTS

- | | |
|---|---|
| <ul style="list-style-type: none"> • Establishing inter-entity data-sharing platforms wherein databases are linked, and updates can be efficiently shared. • Regular training in use of GIS software, clarifying why data capture is important, and how the data is used. • Use Building Information Modelling/3D modelling to accurately map out utilities now, and for the future, to elevate coordination between service entities and reduce risk of clashes. • Analyzing large datasets that can help identify trends, optimize infrastructure design, and improve the efficiency of construction processes. | <ul style="list-style-type: none"> • Using data to create publicly-accessible maps that show residents and visitors the locations and durations of projects such that they can plan journeys accordingly. • Automatic Traffic Counter (ATC) equipment to help track traffic/vehicle flows and speeds for road safety. • Develop a smart drain system that uses ultrasonic sensors fitted inside gullies to collect real time data, indicating silt levels and water flow levels to aid repair & maintenance. • Develop mobile apps that allow residents and road users to report issues such as potholes, broken streetlights, or dangerous site work areas, providing real-time data to RIPC. • Deploying Internet of Things (IoT) sensors on streetlights, traffic signals, and other street furniture to monitor air quality, noise levels, and pedestrian traffic. |
|---|---|

MAIN OUTCOMES

- Future-proofing infrastructure assets

KEY STAKEHOLDERS

- | | |
|---|---|
| <ul style="list-style-type: none"> • MOI • CONTRACTOR • RIPC | <ul style="list-style-type: none"> • SERVICE ENTITTY • CONSULTANT |
|---|---|



3.1 UPDATING THE MANUAL

3.2 LEGAL FRAMEWORK

03.

GOVERNANCE & LEGAL FRAMEWORK



This Chapter describes general rules for understanding The Manual and its implications, supported by a 4-tier linguistic hierarchy.

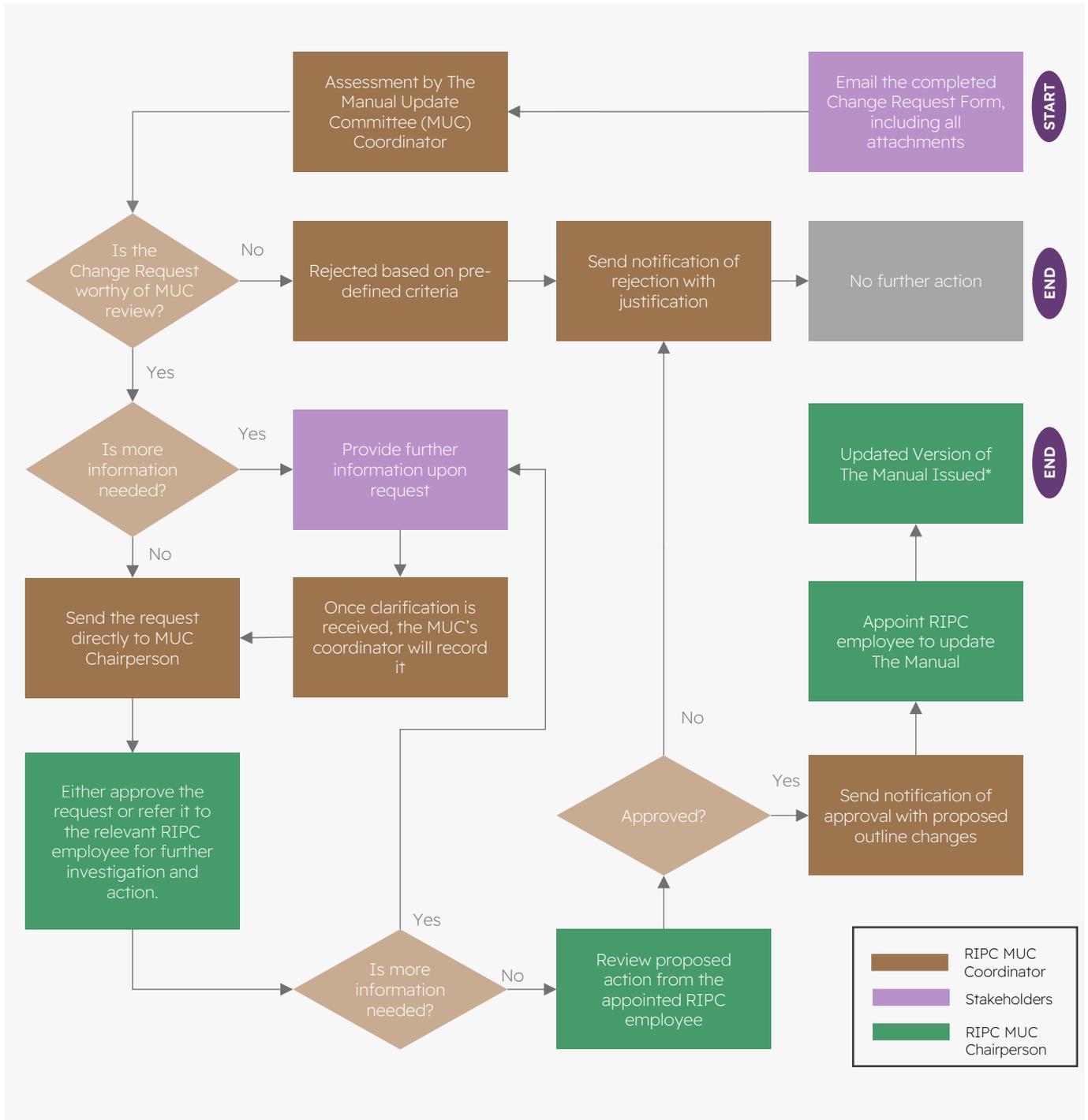
Also herein, RIPC explains how capturing updates of The Manual will be governed and implemented.

Finally, a general introduction to legal and regulatory compliance is provided, supported by deviation management. All of these topics fall under the umbrella of Legal Framework.



3.1 UPDATING THE MANUAL

Change Request Process



*See Manual Updating Process on next page

Figure 3.1.1: Change Request Process

For Change Requests or enquires regarding The Manual, complete the Change Request Form in the Appendix and email to ICM@ripc.gov.sa.

The purpose of Change Request Process is to ensure that important changes to The Manual are identified and formally approved. This process ensures Stakeholder involvement in the continuous improvement of The Manual.

The Change Request Process should be used, for example, in cases of:

- 1. Regulatory or Compliance Changes:** When new laws, regulations, or standards are introduced or existing ones are updated, stakeholders may request changes to ensure The Manual remains compliant.
- 2. Project-Specific Requirements:** If a project has unique conditions or requirements that are not covered by the existing manual, stakeholders might request amendments to address these specific needs.
- 3. Safety and Environmental Concerns:** Changes in safety protocols, environmental regulations, or best practices may prompt stakeholders to request updates to ensure The Manual reflects the latest safety and environmental standards.
- 4. Technological Advancements:** The introduction of new construction methods, materials, or technologies might require updates to The Manual to include these advancements.
- 5. Feedback from Project Implementation:** Lessons learned or feedback from ongoing or completed projects may reveal gaps or areas for improvement in The Manual, leading to requests for content changes.
- 6. Stakeholder Expectations:** Stakeholders, including Service Entities, Consultants, Contractors, or community groups, may have evolving expectations or requirements that necessitate changes to The Manual's content.
- 7. Error Correction:** Discovery of errors, inconsistencies, or outdated information in The Manual leading to requests for corrections or updates.
- 8. Performance Improvements:** If there is evidence that certain practices or guidelines in The Manual could be improved for better efficiency, quality, or cost-effectiveness, stakeholders might request revisions.

3.1 UPDATING THE MANUAL

The Manual Updating Process

A process has been devised for updating The Manual. It aims to facilitate a collaborative, streamlined approach for aligning The Manual with Stakeholders' needs and expectations. Updates will be captured as follows:

1. Based on Feedback and Change Requests:

The Manual may be updated based on Change Requests or commonly occurring enquiries from Stakeholders. Updates based on Feedback could be due to errors or could be due to sudden changes in the infrastructure landscape that have a significant impact on the content of the Code Manual.

2. Annual Review:

An Annual Review will be conducted to ensure that The Manual stays up-to-date with the latest regulations, standards, and industry best practices. This doesn't necessarily mean The Manual will be updated every year, but a review should be done to assess if updates are needed.

Annual reviews will cover:

- a) **Post-Project Evaluation Findings:** After the completion of major projects within RIPC, The Manual should be reviewed to incorporate lessons learned, feedback from stakeholders, and any identified areas for improvement. This might lead to updates if significant insights are gained. These insights will be incorporated in the nearest planned revision.
- b) **Regulatory Changes:** The Manual annual review will incorporate any relevant changes in laws, regulations, or standards that affect the content.
- c) **Changes in Organizational Policies:** If RIPC revises its internal policies or procedures, The Manual will be updated to align with these changes as necessary.
- d) **Technological or Methodological Advancements:** When new technologies or methodologies become widely adopted, The Manual should be updated to reflect these changes.

Note: The Manual will be updated every 6 months for the first two years after issue of Version 1, and may be updated annually thereafter, dependent on the outcome of reviews.

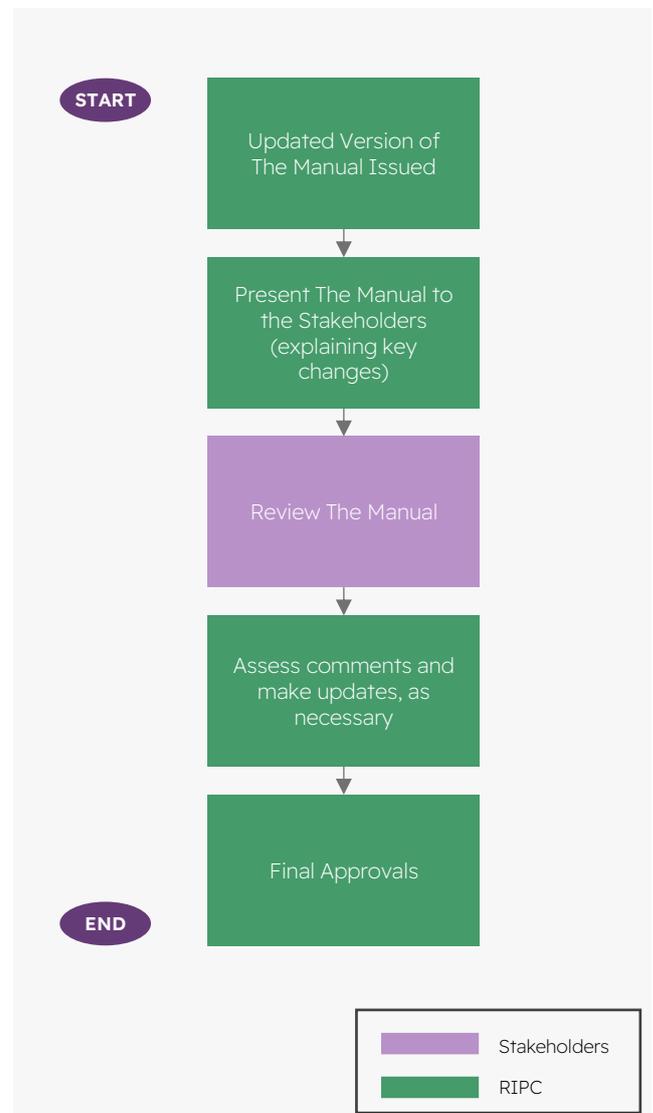


Figure 3.1.2: Manual Update Process

3.2 LEGAL FRAMEWORK

Legal Compliance

Infrastructure projects being delivered in the Riyadh Region are subject to legal obligations. These obligations are derived from Islamic Sharia law, the Basic Law of Governance, the Royal Decrees and Royal Orders, and the sector-specific laws and regulations that are issued by the relevant authorities (e.g. Executive Regulations for the Law of Municipal Licensing Procedures issued by MoMAH is not applicable to RIPC as it's mentioned on the Executive Regulation itself).

Most pertinent is that project parties and third parties comply with the Contract associated with their respective project. Contractual obligations may include the scope of work, the quality of service, the payment terms, the performance guarantees, the liability clauses, and the termination provisions.

Contracts for infrastructure projects being delivered in the Riyadh Region will all refer to overarching regulations, including this Manual.

In this regard, the MOF has prepared Standard Module Contracts for most of the infrastructure works that govern the obligations of Contractors and Government Entities.

Subject	Description
Licenses and Permits	Obtaining the necessary licenses and permits from the relevant authorities depending on the project, such as the MOMAH, the MOTLS, and the MEWA.
Standards and Specifications	Following the standards and specifications for design, construction, operation, and maintenance of infrastructure projects, such as roads, bridges, tunnels, railways, ports, airports, water, and electricity networks published by the respective ministry and SASO.
Environmental	Complying with the environmental and social impact assessment requirements and implementing the mitigation measures to minimize the negative effects of infrastructure projects on the natural and human environment published by MEWA.
Health and Safety	Adhering to the health and safety regulations and providing adequate protection and training for the workers and the public involved in or affected by the infrastructure projects. For example, the regulations issued by the Ministry of Human Resources in respect to the safety of workers in work sites/ locations.
Reporting	Reporting and disclosing the progress, performance, and outcomes of the infrastructure projects to the relevant stakeholders and authorities, ensuring the transparency and accountability of the sector.

are covered in the table below.

3.2 LEGAL FRAMEWORK

Regulatory Compliance

The authorities have the power to enforce compliance and to impose penalties and sanctions for violations and deviations. For example, RIPC has the power to enforce compliance of its regulation: “Licensing Compliance and Controls for Infrastructure Projects in the Riyadh Region”.

The general procedure for the ensuring legal compliance and regulatory compliance is as follows:

1. The authorities issue the licenses and permits for the infrastructure projects and services, based on the criteria and requirements stipulated in the laws and regulations.
2. The authorities monitor and evaluate the performance and quality of the infrastructure projects and services, based on the indicators and standards stipulated in the laws, regulations and contracts.
3. The authorities conduct inspections and audits of the infrastructure projects and services, based on the frequency and scope stipulated in the laws, regulations and contracts.
4. The authorities identify and report the violations and deviations of the infrastructure projects and services, based on the evidence and documentation collected during the monitoring, evaluation, inspection, and audit processes.
5. The authorities impose the penalties and sanctions for the violations and deviations of the infrastructure projects and services, based on the severity and frequency stipulated in the laws and regulations.
6. The authorities provide the opportunity for the appeal and review of the penalties and sanctions imposed for the violations and deviations of the infrastructure projects and services, based on the procedures and mechanisms stipulated in the laws and regulations.

Further detail of RIPC’s tailored approach to monitoring infrastructure works in the Riyadh Region is featured in Chapter 2.



Figure 3.2.1: Compliance Process

Deviation Management

Deviation management is generally known as the process of identifying, reporting, analysing, and resolving the deviations from the planned or expected outcomes of the infrastructure projects and services including planned scope, schedule, cost, quality, or performance of the projects. Deviations can occur due to various factors, such as human errors, technical failures, environmental conditions, design flaws, or external interferences. Deviation management aims to prevent or minimize the adverse impacts of the deviations on the project objectives, the stakeholders, and the society.

Note: The term “Contractor” used in this section may apply to any contracting party, including Consultants, but not Government Entities or those described as “First Party” under the MOF standard procurement Contract modules.

The current procedure for deviation management in infrastructure projects is subject to the terms of the contract modules prepared by MOF which is subject to the Government Tenders and Procurement Law issued by Royal Decree No. M/128 dated 13/11/1440H and its Implementing Regulations issued by Ministerial Resolution No. 1242 dated 21/03/1441H as amended by Ministerial Resolution No. 3479 dated 11/08/1441H (“the GTPL”). The main relevant provisions of the GTPL that would govern the deviations are summarised herein:

Variation Orders: known under Article 68 of the GTPL as ‘Change Orders’, allowed under certain exceptional circumstances as follows:

- Prices of contracts or frameworks agreements shall not be changed, either by increasing or decreasing them, except in the following cases:
 - i. Changes in the prices of main items or services covered by the tender, as specified by the Implementing Regulations.
 - ii. Adjustment of tariffs, fees, or taxes.
 - iii. If, in the court of contract execution, unforeseen financial difficulties arise.
- According to Article 69 of the GTPL, Government Entity may, in accordance with its actual needs, issue change orders to increase the Contract Value by no more than 10%, or decrease such value by no more than 20%, in accordance with the Implementing Regulations.

Performance Bonds: known under Article 61 of the GTPL as ‘Final Guarantee’ of 5% of the Contract Value submitted by the Contractor to ensure that it will perform works in accordance with the required standards and specifications.

Partial withdrawal and Execution at the Contractor’s Expense: known under Article 75 of the GTPL. The Government Entity may withdraw the works from the Contractor in specific circumstances after following specified notification requirements stipulated in the Implementing Regulations of the GTPL.

Contractual Obligations: the contract modules prepared by MOF impose on the Contractors direct strict obligations to perform the works based on the accepted standard and specifications. In case of failure to comply with such obligations, the Government Entity may take necessary process to redeem its losses.



3.2 LEGAL FRAMEWORK

Deviation Management

In practice, the escalation of deviations from the established standards, procedures, and requirements is managed as follows:

1. The Project Manager or the person responsible for the deviation should notify the Project Sponsor, the Client, and the relevant Stakeholders as soon as possible after discovering the deviation, using the approved Deviation Report Template.

Note: The Deviation Report should include the description, cause, impact, and proposed corrective or preventive actions for the deviation, as well as the approval status and the signatures of the authorized parties.

2. The Project Sponsor, the Client, and the relevant authorities should review the Deviation Report and either approve, reject, or request more information on the proposed actions within the specified time frame.
3. If the Deviation Report is approved, the Project Manager or the person responsible for the deviation should implement the approved actions and update the Project Plan, budget, schedule, and other documents accordingly.
4. If the Deviation Report is rejected or more information is requested, the Project Manager or the person responsible for the deviation should

revise the Deviation Report and resubmit it for approval or provide the additional information as requested.

5. The Project Manager or the person responsible for the deviation should monitor and control the deviation until it is resolved, and document the results and outcomes of the Deviation Management Process in the project records and reports.

An associated process is described on the following page.

Deviation Management

Below is a process that supports the procedure on the previous page.

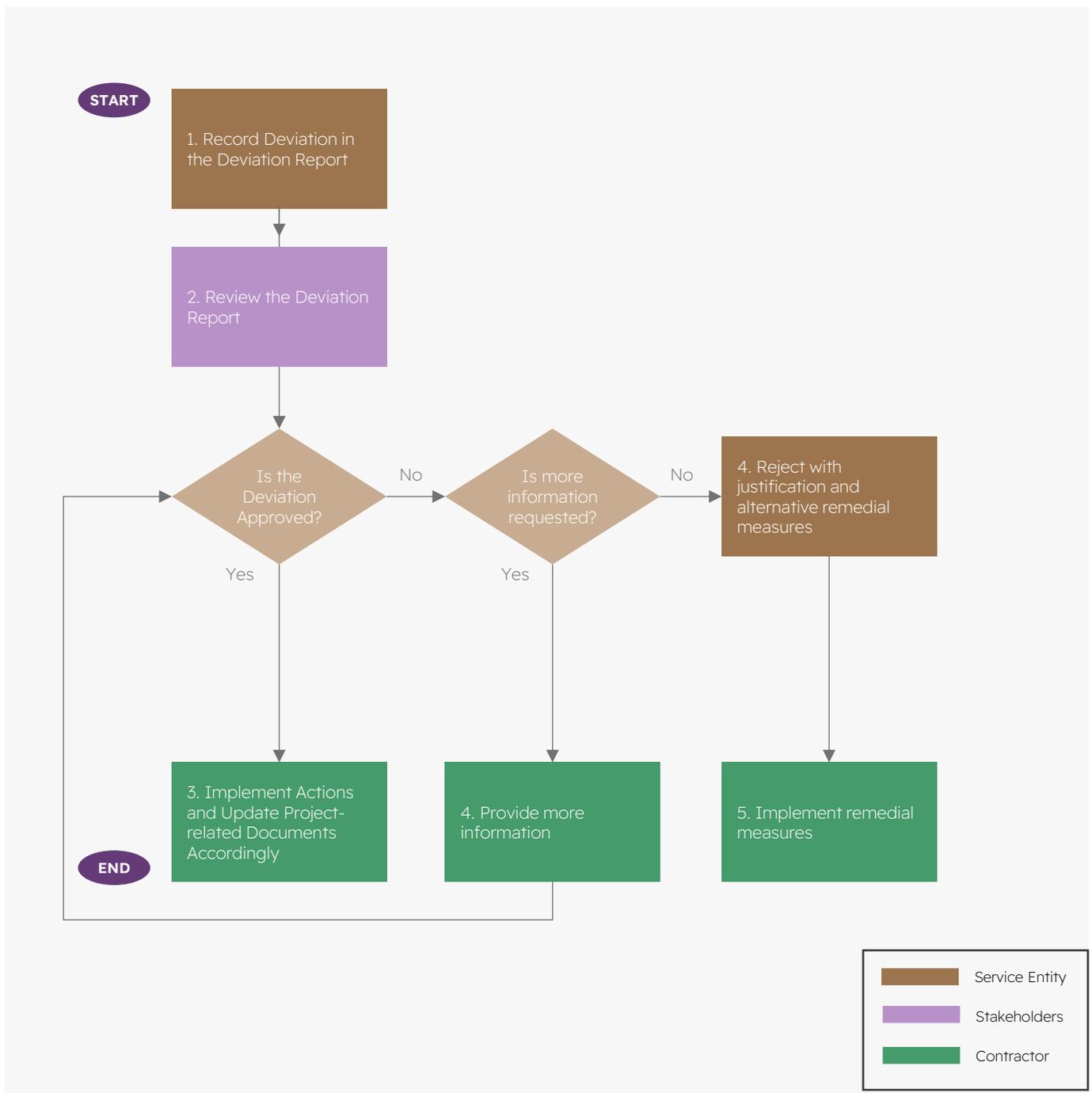


Figure 3.2.2: Deviation Management Process



04.

APPENDIX



4.1

APPENDIX

4.1

APPENDIX

4.1.1 CHAPTER 2.1 AND 2.2 APPENDIX





4.1 ATTACHMENTS FOR CHAPTER 2.1 AND 2.2

References

- American Society of Civil Engineers (ASCE) 38-22 'Standard Guideline for Investigating and Documenting Existing Utilities' and ASCE/UESI/CI 38-22 and 'Standard Guideline for Recording and Exchanging Utility Infrastructure Data' - ASCE/UESI/CI 75-22.
- 'Excavation and Civil Works Procedures in Riyadh' - Riyadh Amanah
- Saudi Highway Code 301 – Highway Geometric Design
- Saudi Highway Code 305 – Highway Facilities and Utilities Design – Work Zone Design
- Saudi Highway Code 309 – Material Specifications and Standardized Testing
- Saudi Highway Code 401 – Construction of Highways
- Saudi Highway Code 403 – Construction of Highway Facilities
- Saudi Highway Code 602 – Manual on Uniform Traffic Control Devices
- Saudi Highway Code 701 – Environmental Aspects of Highways
- US Occupational Safety and Health Administration (OSHA) standard 2226-10R 2015, Trenching and Excavation Safety
- Project Control in Work Areas - Ministry of Transport
- Manual on Uniform Traffic Control Devices for Streets and Highways—the MUTCD, 2009, Federal Highway Administration, US Department of Transport, 11th Edition
- Manual for Assessing Safety Hardware (MASH), 2016, AASHTO, Second Edition
- New Zealand Guide to Temporary Traffic Management (NZGTTM), 2022, NZ Transport Agency Waka Kotahi
- Traffic Control at Work Sites Technical Manual, 2022, version 6.1, Transport for NSW
- Street Works Manual, New York City Department of Transportation (2011)
- Safety at Street Works and Road Works, A Code of Practice, Department for Transport (UK), June 2014.
- Street Works Manual, New York City Department of Transportation (2011).
- Riyadh Traffic Management Guidelines (RTMG) Version 1.

- SASO Technical Regulation for Personal Protective Equipment and Clothing
- CIBSE Code for Lighting (2022)
- EN 60598-1, EN 60598-2-5, and EN 62471:2009
- NCHRP 350 (NCHRP, 1992)
- Saudi Accreditation Center
- ISO 9001:2015
- RIPC Critical Infrastructure Guidelines
- Code of Practice for the Co-ordination of Street and Road Works



4.1 ATTACHMENTS FOR CHAPTER 2.1



Figure 4.1.1: Project Planning Process



4.1 ATTACHMENTS FOR CHAPTER 2.1

Works Execution Plan (WEP) – Contractor

- Does the WEP cover the following in sufficient detail:
 - Project Information?
 - Scope of Work?
 - Work Sequence?
 - Risk Assessment?
 - Temporary Traffic Control Plan (TTCP)?
 - Environmental Management?
 - Roles and Responsibilities?
 - Tools and Equipment?
 - Communication Plan?
 - Review and Approval?
 - Tourist areas?
 - Industrial areas?
 - Mosque areas?
 - Cut-through traffic?
 - Has assessment been supported by a site visit?
- Have factors such as traffic volume, speed, visibility, and the presence of vulnerable road users been carefully assessed?
- Has the timing, duration, work zone set-up, and methodology of the works been considered?
- Do the plans comply with local regulations and standards (e.g. SHC 305) and have they been prepared by a competent individual?
- Is the site being continuously supervised and monitored for the effectiveness of traffic control measures and adjusted as necessary, based on real-time conditions and feedback?

Type of Roads and Associated Risks - Contractor

- Have relevant risks been considered in the development of the:
 - Traffic Management Plan (TMP)?
 - Work Execution Plan (WEP)?
 - Temporary Traffic Control Plan (TTCP)?

Site Specific Risk Categories - Contractor

- Have relevant risks been considered in relation to:
 - School zones?
 - Commercial zones?
 - Intersections and interchanges?

Risk Assessment - Key Risks and Hazards - Contractor

- Have the following key hazards (as a minimum) been assessed and mitigated in the WEP:
 - Live traffic?
 - Sub-surface utilities?
 - Overhead wires?
 - Moving plant?
 - Trenches?
 - Slips, trips and falls?
 - Confined spaces?
 - Noise and vibration?
 - Dust?
 - Environmental damage?
- Have any other risks been identified and mitigated?

WEP Risk Assessment - Key Risks and Hazards - RIPC

- Have the WEP and Risk Assessments been unprofessionally prepared, poorly presented, or have clear and apparent breaches from safety guidelines?
- Should the WEP and Risk Assessments be rejected?



4.1 ATTACHMENTS FOR CHAPTER 2.1

Further Information on Common Risks - Contractor

Subsurface Utilities

- Are Subsurface Utility Engineering (SUE) practices being used to accurately identify and map these utilities, mitigating risks and ensuring safer, more efficient project execution?
- Before any destructive excavation, has a minimum of Quality Level B (QL-B) been used the dig site to ensure the Work Zone is safe and that the utility data is accurate enough to avoid potential hazards?
- Has any excavation within 0.5m of a subsurface utility, or where excavations may clash with existing subsurface utilities had a QL-A locate?

Overhead Wires

- Identified if there are any overhead wires on-site?
- Established safe working distances based on risk identification?
- Installed warning signs where required?
- Restricted use of high-reach equipment where required?
- Trained workers on overhead wire safety and ensured the location of overhead lines on site are communicated to all workers?
- Had plans and procedures in place for emergencies?

Moving Plant

- Established clear zones for plant operation and movement (part of TMP/TTCP)?
- Set up barriers and signage to keep unauthorized personnel out of plant areas (part of TMP/TTCP)?
- Equipped machinery with high-visibility markings and lights. Flashing beacons are recommended for all moving plant?
- Used audible reversing alarms on all mobile plant?
- Designated secure parking areas for plant when not in use?
- Ensured all operators are properly trained and certified?

Trenches

- Have potential risks been mitigated by measures such as:
 - Edge barriers?
 - Safe means of access including control of entry?
 - De-watering?
 - Shoring?

Further Information on Common Risks - RIPC

- Has the Contractor adequately mitigated these risks in the WEP?

Site Safety – PPE - Contractor

- Does PPE, including high visibility clothing, conform to guidance set out within “Safety at Street Works and Road Works: A Code of Practice 2013” (UK)?
- Are PPE requirements based on a project-specific risk assessment?
- Does the risk assessment cover the usage of:
 - Hard hat?
 - High visibility jacket/vest?
 - Safety boots?
 - Eye protection?
 - Ear defenders?
 - Safety gloves?
- Are all site-based staff and visitors wearing suitable PPE within the site area (i.e., both inside and outside of the works area)?
- Has all PPE been fastened and maintained in a clean and useable condition?
- Do all equipment and safety tools comply with the KSA Standards (Metrology and Quality Organization (SASO) standards)?
- Does it avoid illuminating local residences or businesses?
- Has any cabling been installed in a manner that avoids damage to assets, or slips, trips, and falls?
- Has it been confirmed that cables are not trailing across access roads or pathways, and that there are no loose cables?
- Has the risk of electrocution been mitigated to as low as is reasonably practicable?
- Are all electrical items Ingress Protection (IP) rated, suitable for the outdoor work environment?

Site Safety – PPE - RIPC

- Has there been a project-specific risk assessment to determine PPE?

Site Safety – Works Site Lighting – Contractor

- Does the lighting installed on site comply with relevant regulations?
- Does it illuminate the work area in accordance with the recommended minimum illuminance for the type of area or work activity?



4.1 ATTACHMENTS FOR CHAPTER 2.1

Preparing a Traffic Management Plan – Contractor

- Is the Traffic Management Plan (TMP) prepared by an individual with suitable qualifications, and their details included on the TMP?
- Is the TMP presented clearly showing the existing details of the site and proposed Temporary Traffic Control (TTC) devices to be implemented?
- Are existing permanent traffic control devices around the site clearly shown?
- Do TMPs and traffic control devices implemented on site comply with relevant guidelines and standards?
- Has TTC been prepared and implemented in accordance with requirements set out in SHC 305 and other national standards, including any necessary diversions?
- Does the TMP stipulate that the Contractor shall be responsible for the management of HSE on site?
- Does the TMP include, as a minimum:
 - On site contact?
 - Individual who prepared plan?
 - Type of works?
 - Proposed location of works (Work Zone)?
 - General Site Plan?
 - Horizontal Projection Chart?
 - Typical Cross Sections Chart?
 - Traffic Management Plan Reports, including site furnishing, site evacuation, start/end dates for works, risk analysis and mitigation for traffic control measures, etc.
 - Proposed dates of occupancy?

- Proposed times of occupancy;
- Details of proposed impact on traffic flow: road closure (with diversion), lane closure, speed reduction, counterflow, etc.?
- If the work site occupies pedestrian sidewalks, has an alternative path been provided, and the continuity of pedestrian movement ensured? Are appropriate alternatives provided?
- Has the Contractors on-site representative contacted RIPC prior to closing road and traffic lane(s) or adjusting lane configurations, and again upon re-opening at completion of the works?
- Has a copy of the TMP and Excavation Permit been displayed clearly on site at all times?
- Has RIPC been kept informed of any change of details regarding the on-site contact or TMP?
- Do all traffic control devices, including signs, signals, speed bumps, markings, and delineation devices, adhere to the standards set forth in SHC 305?

Preparing a Traffic Management Plan – RIPC

- Is the TMP unprofessionally prepared or poorly presented, or have clear breaches from TTC guidelines? If so, has it been rejected?
- Is there a need to request the postponement of activities, even if permits with specific dates and times have been issued, in the case of unexpectedly heavy traffic or emergencies that necessitate the use of the road for other purposes?

Temporary Traffic Control Planning - Contractor

- Have the key objectives of TTC at work sites been considered:
 - Safety of Workers: protect workers from the risks posed by moving vehicles and construction equipment.
 - Safety of Road Users: safeguard drivers, cyclists, and pedestrians from the hazards associated with construction activities and changes in normal traffic patterns.
 - Efficient Traffic Flow: maintain as smooth and orderly a flow of traffic as possible to minimize delays and congestion.
 - Clear Communication: provide clear, concise, and advance warning to road users (including pedestrians) in relation to work zones, detours, and changes in traffic patterns).
 - Compliance with Regulations: ensure that traffic control measures comply with relevant local and national regulations and standards.
 - Minimize Environmental Impact: reduce the environmental impact of traffic delays, such as increased emissions and noise pollution.
- Does the TTCP have detailed information on the Work Control Zone, including (but not limited to; general Work Zone layouts, signage locations, traffic control devices, hoarding layouts, lighting, beacons, etc.)?
- Does the TTCP clearly set-out the Advanced Warning Zone, Transition Zone, Buffer Zone (longitudinal and lateral), Work Area and Termination Zone?
- Have the general guidelines for temporary traffic control at work sites which can be found in SHC 305 and Chapter 3 of SHC 602 been followed?
- Has the Risk Control Hierarchy for TMP setups and devices been considered when preparing their TTCP?
- Have the following issues been considered:
 - Proximity of work site to live traffic?
 - Interface with pedestrian and active travel routes?
 - Speed and volume of traffic?
 - Type of traffic?
 - Noise levels?
 - Heavy weather, and other delays to project programming?

Work Control Zone - Contractor

- Does the Work Control Zones include:
 - Work Area?
 - Advance Warning Area?
 - Transition Zone?
 - Safety Buffer Zone ?
 - Lateral Buffer Zone?
 - Termination Area (end of Work Zone)?



4.1 ATTACHMENTS FOR CHAPTER 2.1

Work Area - Contractor

- ❑ Are all workers situated within the Work Area at all times (except those workers managing traffic)?
- ❑ Have the following factors been considered when determining the parameters of a required Work Area:
 - ❑ Nature of the Works - The specific tasks to be performed, for example; trenching, paving, or utility installations. Each type of work has different requirements for space and safety measures. Consideration should also be given to the staging of the works.
 - ❑ Space Requirements - Plant and Equipment: Determine the amount of space needed for machinery and vehicles. This includes space for moving and operating equipment such as excavators, bulldozers, and cranes.
 - ❑ Set Down of Materials (Laydown Areas) - Allocate areas for the storage of materials and supplies. Ensure that materials are stored in a way that is accessible to workers and does not obstruct traffic or pedestrian pathways. Laydown areas are considered work areas and material lay down shall not occur in Advanced Warning Zone, Transition Zone, or Buffer Zones.
 - ❑ Zone of Influence - Consider the area influenced by the specific work being done. For example, a 3-meter deep trench would affect a larger surrounding area due to potential ground instability and safety risks (as outlined in Section 7.3 Project Execution). This influenced zone should be included in the work area to ensure comprehensive safety measures.
- ❑ Safety Considerations - Ensure that the work area is clearly separated from live traffic and pedestrian paths to prevent accidents. Ensure that the Work Control Zone complies with SHC 305 guidelines regarding temporary traffic control. Note: A minimum clearances of workers to traffic is required (lateral buffer zone).
- ❑ Logistical Needs - Identify and plan for entry and exit points for construction vehicles and deliveries. These should be located to minimize disruption to traffic flow and ensure the safety of workers. Ensure that emergency vehicles can access the work area if needed.

Traffic Signs - Contractor

- Are all temporary traffic control signs as per SHC 305?
- Are traffic signs positioned to maximize message effectiveness, and their placement adjusted according to highway design alignment?
- Are signs placed to allow the driver adequate time for response?
- Have signs been mounted securely and at the correct height (no less than 1.5m above road/pavement surface)?
- Are the sizes of signs appropriate for the speed limit?
- If there are permanent traffic signs within the work zone (that are not required) suitably removed or covered?

Traffic Control Devices - Contractor

- Do all traffic control devices (including signs, traffic cones, delineation devices, vertical panels, warning lights, traffic separators, barricades and rails, signals, speed bumps, markings, and delineation devices), used in accordance with and adhere to the standards in SHC 305?
- Are all traffic control devices kept clean and regularly checked for position and cleanliness?

Spacing of Channelizing Devices in Tapers - Contractor

- Have these been set out in accordance with SHC 305, relevant to the speed limit?

Hoardings - Contractor

- Have hoardings been requested by RIPC?
- Are they in accordance with SHC 305?

- Are they placed in accordance with guidance and maintained to a high standard?

Hoardings - RIPC

- Does the site require hoardings to limit longer-term visual distortion?



4.1 ATTACHMENTS FOR CHAPTER 2.1

Illumination of Barriers - Contractor

- If barricades or barriers are used for delineation, are they equipped with steady burning lights?
- Are these lights fastened or hanging and in a tidy manner to avoid visual distortion?

Temporary Pavement Markings - Contractor

- If these are required (for long-term sites), have they been laid out and installed in accordance with SHC 305?
- Have existing pavement markings been removed or altered accordingly?

Temporary Raised Reflective Marker - Contractor

- If these are required for long-term sites, have they been laid out and installed in accordance with SHC 305?

Plastic Delineators - Contractor

- Have they been laid out and installed in accordance with SHC 305?
- Are delineators suitably mounted?

Battery-Operated Warning and Delineation Lights - Contractor

- Have these been installed and maintained in accordance with SHC 305?
- Is the correct type (A, B or C) being used for the location?

Hazard Identification Beacons - Contractor

- Have these been installed and maintained in accordance with SHC 305?

- Are trailer mounted beacons in accordance with SHC 602?

Flashing Warning Arrow Panels - Contractor

- For appropriate sites, have these been installed and maintained in accordance with SHC 305?
- Is the correct type (A, B or C) being used for the location?
- For short-term or mobile works - has appropriate mobile signage been installed?

Hand Signalling Devices - Contractor

- Are there trained staff on site and suitable equipment available (in accordance with SHC 305), to be used in an emergency?

Traffic Control Signals - Contractor

- For appropriate sites, have these been installed and maintained in accordance with SHC 305?

Selection of Traffic Control Devices – Contractor

- ❑ Have the following been taken into consideration:
 - ❑ Select signs that appropriately and accurately describe the work area situation.
 - ❑ Select the message according to the action the driver is required to make.
 - ❑ Place a Warning Sign in advance of (and at the beginning of) the work area.
 - ❑ The overall effect of the sign series and the attendant supporting devices.
 - ❑ The deployment of flaggers (in emergency cases).
 - ❑ Traffic in both directions must use a single lane only when flaggers are on duty, or a temporary traffic signal is installed to manage right-of-way during operations that restrict vehicular movement.
 - ❑ The use of steady burning lights on Type I or Type II barricades (as per SHC 305) for night works & operations.
 - ❑ The minimum requirement of two flashing lights to be used at night on each approach, in advance of the work area.
 - ❑ Post mounted signs (if the closure time exceeds 7 days).
 - ❑ When a side road intersects the highway where work is being performed, additional traffic control devices to be erected as directed by the Engineer.
 - ❑ The installation of hoarding, for longer term site set-ups, where the work zone is greater than or equal to 300m, or as determined based on the risk assessment.
- ❑ The substitution of traffic cones for barricades during day operations.
- ❑ All taper lengths are in accordance with cones.
- ❑ Covering or removal of temporary works signs at the completion of the day's operations.
- ❑ Type I or Type II (as per SHC 305) barricades and/or barriers used for delineation at night, equipped with steady burning lights.
- ❑ The removal of works signs if there is no site work being undertaken. Any unattended obstacle or excavation in the work area shall be protected with Type I or Type II (as per SHC 305) barricades with flashing lights.



4.1 ATTACHMENTS FOR CHAPTER 2.1

Advance Warning Area – Contractor

- Has appropriate signage been set out?
- Is the Work Zone speed limit appropriate and shown?
- Are advance warning signs correctly set out in accordance with SHC 602?

Transition Zone - Contractor

- Has it been set out in accordance with SHC 305?
- Is the taper length appropriate?

Safety Buffer Zone – Contractor

- Has it been set out in accordance with SHC 305?
- Is the length appropriate?
- Is the Safety Buffer Zone clear of personnel, materials and vehicles (except when accessing the Work Area)?

Lateral Buffer Zone – Contractor

- Has it been set out in accordance with SHC 305?
- Is the width appropriate to traffic speed and the type of work?

Temporary Safety Barriers - Contractor

- Have temporary barriers been set out in accordance with SHC 305?
- Are the barriers installed in accordance with the manufacturer's recommendations?
- Have both ends of the barrier been flared where practicable?
- Is the type of barrier being used appropriate for the speed limit and the type of work?

Reducing Lane Widths - Contractor

- If a reduction is appropriate, has it been installed in accordance with SHC 305?

Narrowing Two Way to One Way - Contractor

- If a narrowing is appropriate, has it been installed in accordance with SHC 305?
- Are the signs/systems appropriate for the traffic speed?
- Are operators trained and have good wireless communications on site?

Termination Area (End of Work Zone) - Contractor

- Has the termination area been set out in accordance with SHC 305?

Access and Egress to Work Zone - Contractor

- Ensured this is not through area requiring temporary safety barriers?
- Has this been provided in the Transition Zone, Buffer Zone, or the Termination Area which do not require safety barriers?
- Have access gates been provided in areas with barricades or hoardings?
- Ensured where the need for a safety barrier has been determined, there shall be no access through the safety barrier into the lateral buffer zone/live traffic?
- For major long-term projects, has an Internal Traffic Control Plan been prepared?

- Has the TTCP preparation determined whether a contraflow system is required to facilitate micro-mobility routes?

- Is the footway at least 1.30m wide, with the possibility to increase to 1.50m or more where possible, to aid accessibility?

Pedestrian Walkways and Paths - Contractor

- Have these been set out and maintained in accordance with SHC 305?
- If pedestrian routes have to be located in the travelled way, have traffic signage and safety barriers been installed before the footway is blocked?
- Is secure fencing provided to separate the public from the Work Zone?
- Are existing routes for micro-mobility and pedestrians maintained around the Site Area?
- If there are no existing routes for micro-mobility or pedestrians, has a risk-based analysis determined whether ways should be provided?



4.1 ATTACHMENTS FOR CHAPTER 2.1

Kerb Ramps and Footway Boards - Contractor

- Where there is an excavation (even for a micro trench, or short duration works) in a pedestrian access route, has a suitable footway board been provided?
- Are these of a safe height, width, slope, guarding and material to minimise the possibility of slips and gathering of rainwater?
- Are ramps/boards of a material that is robust enough not to distort under loading nor damage the pathway?
- Have they been designed to accommodate wheelchairs and pushchairs, pedestrian and micro-mobility traffic?
- Situated away from the road and suitably fixed?
- Have they been designed with chamfered edges and rails?

Project Information Board - Contractor

- Does the PIB contain: the project name and description, name of Contractor and Service Entity, start and end date of the works, duration of works, contact information.
- Is the PIB designed as per the Design Guide?
- Is the PIB positioned as shown in the TMP
- Has RIPC asked for a larger PIB for major, long term works?

Project Information Board - RIPC

- Has RIPC asked for a larger PIB for major, long- term works?

RIPC Logo – Contractor

- Is the 164 x 164mm logo provided clearly on temporary traffic barriers and hoardings?

- Are these clear and clean?
- Is it on all appropriate items?

Before Attending Site - Contractor

- Have Business Owners, Residents, and Road Users been notified of the works at least 2 weeks in advance?
- Have different means of communication been used? (i.e. Digital Displays, face-to-face, social media, letters, etc.).
- Are stakeholder communications being effectively maintained as the program changes?

4.1

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4.1.2 CHAPTER 2.3 APPENDIX





4.2 ATTACHMENTS FOR CHAPTER 2.3

References

This process is based on information contained in:

- 'Excavation and Civil Works Procedures in Riyadh' - Riyadh Amanah
- 'Excavation Guideline for Infrastructure Projects in the City of Riyadh' prepared by Buro Happold for RIPC
- 'Safety at Streetworks and Roadworks, A Code of Practice, Department for Transport (UK)', June 2014
- Saudi Highway Code 305 – Highway Facilities and Utilities Design – Work Zone Design
- Saudi Highway Code 306 – Highway Facilities and Utilities Design - Public Utilities, Highway and Street Lighting, Control and Monitoring Devices
- Saudi Highway Code 309 – Material Specifications and Standardized Testing
- Saudi Highway Code 401 – Construction of Highways
- Saudi Highway Code 403 – Construction of Highway Facilities
- Saudi Highway Code 501 – Pavement Maintenance Management Systems



4.2 ATTACHMENTS FOR CHAPTER 2.3

Pre-mobilization – Contractor

- Has advanced communication works signage been installed and notifications provided to local stakeholders?
- Have the following documents been prepared, (approved by the Contractor’s senior managers and circulated to relevant parties):
 - Risk Assessments and Method Statements?
 - Work Execution Plan?
 - Emergency Procedure?
 - Traffic Management Plan?
 - Emergency Response Plan?
 - Health, Safety & Environment Plan?
 - Quality Control Plan?
- Have the relevant equipment checks been undertaken?
- Have works permits been approved and received?
- The excavation plans are adhered to according to the Street Section and its Updates?
- With regards to potential utilities clashes – has there been coordination with the asset owners, and approvals received for works to or around existing infrastructure?

Design – Contractor

- Do excavations that are of 1.2m (or more) in depth have a Confined Space Entry permit?
- For excavations deeper than 0.3m with the potential of existing buried cables and pipelines – have these been designed by a competent individual who can demonstrate relevant knowledge, experience, and training to identify and mitigate for existing and predictable hazards, construction methods, and soil types?
- Has the following been considered as part of the design:
 - Purpose, size of excavation, and work to be performed?
 - Soil classification?
 - Stability and proximity of adjacent structures, including the location and depth of foundations?
 - Consultation and compliance with utility companies to ascertain location of underground obstructions such as pipes, electric cables and other utilities?
 - Presence of nearby process equipment or piping with the potential for release of hydrocarbon or toxic materials (e.g., H₂S)?
 - Weather and soil moisture conditions, particularly high-water table?
 - Sources of soil vibrations (highway traffic, machinery, railroads, etc.)?
 - Location and type of barricades, signs and lighting?
- Method of excavating and removal of soil, i.e. whether it is an open excavation or closed, such as thrust-boring?
- Suitable shoring installation, or the sides of the excavation to be benched or sloped back to a safe angle?
- The requirement for emergency rescue equipment?
- The impact the excavation will have on access for emergency vehicles/personnel and egress of personnel in the event of an emergency?
- Has the design of the excavation and associated works influenced the information provided in the Traffic Management Plan?
- If conditions or constraints encountered on site are substantially different from those anticipated at the planning stage (and impact on the approved Work Execution Plan or Traffic Management Plan), have approvals been sought from RIPC and other relevant authorities?



4.2 ATTACHMENTS FOR CHAPTER 2.3

Open Excavation Procedures – Contractor

(Section 5.4.1 ‘Backfill Works’)

- Has there been coordination with the Riyadh Amanah to transfer any excavation waste to locations that are in close proximity to the work site?
- Prior to works commencing, have existing utilities been identified (including their locations & depths), and the necessary protection measures instructed?
- Have the dimensions of the excavation been adhered to, as per the excavation permit and design specification?
- Has excavation shoring been installed (where applicable)?
- Have excavation trenches been backfilled at the end of the day's work (whenever feasible)?
- Is the excavation depth below the utility service less than 0.3m, or as specified by the approved design, whichever is greater?
- Has backfill material been stored according to specifications?
- Have steel plates been placed to cover the excavation trenches (if they must be left open for lengthy periods)?
- Is there a suitable methodology to dewater site – including well pointing (where applicable)?
- Has the restoration width been extended to 0.3m each side of trench?
- Has the reinstatement been backfilled in layers with approved materials in accordance with General Specifications Guide for Civil Works in the Extension of Public Utilities Projects
- Have the edges of restoration areas been straightened and parallel/perpendicular to direction of traffic?
- If the trench is more than 50% of the land width, has the resurfacing covered the full width of the traffic lane?
- Have reinstatements that are less than 3m apart been combined into one resurfacing finish?
- Have the edges of reinstatement areas been kept out of vehicle wheel track zones?
- Edge of reinstatement cut in a straight line vertical with a suitable saw to the sub-base / granular level?
- Have trench reinstatement and asphalt resurfacing been completed in a manner that the difference in the surface layer is not greater than 4mm?
- For reinstatements in concrete carriageways, have differences in surface levels across joints been maintained so as not to exceed 3mm?

Micro/Ultra Micro Excavation Procedures – Contractor

- Is the micro trench 100 – 200mm in width and no more than 550mm in depth?
- Is the ultra-micro excavation 20-80mm in width and no more than 0.3m in depth?
- Have locations of existing on-site utilities been confirmed through construction plans, test pits, and/or proprietary exploration devices?
- Have launch pits, receiving pits and any intermediate pits been constructed according to design specifications?
- Has sufficient structural support been ensured for all pits?
- Has the distance of the new service alignment from the edge of the road been checked so that it is not less than 100m (if the road has no shoulders or sidewalks)?
- Has the excavation been carried out in 100/300m segments for ultra micro works?
- If the base of the trench is not in cohesive materials, adjust its location accordingly.
- Has the excavation area been cleaned using a high-pressure water hose and dried using compressed air tools?
- Have trenches been backfilled before allowing trafficking with vehicles or pedestrians?
- Has pipework or cabling been checked to ensure they are heat resistant to 170°C, if backfilling with asphalt concrete materials?
- Is the concrete for both mix types colored green?
- Has concrete specification been checked in alignment with guidance provided in Section 2.3.2?
- Has excess material been removed by auger, compaction, or by turning it into a clay using water or Bentonite?
- For excavation in loose or non-cohesive soils, has a suitable supporting steel pipe been inserted?



4.2 ATTACHMENTS FOR CHAPTER 2.3

Closed Excavation (Thrust Boring, Directional Drilling, Pipe Jacking) – Contractor

- Has the soil type been confirmed against design?
- Have existing utilities and services been located with trial excavations (test pits)?
- Have vibrations that could damage sensitive soils and nearby properties/services been prevented?
- Have surplus materials and fluids been stored in holding tanks before disposing them at a suitable facility?

Additional Specific Requirements for Thrust Boring – Contractor

- Have sidewalls of launching and reception pits been protected by steel sheet piling or been properly benched/sloped?
- Have safe means of access and egress been provided?
- Have the perimeters of the pits been protected with solid barriers to prevent personnel or animals from falling in?
- Are micro tunnel launching and reception pits large enough to accommodate a full pipe joint?
- Has a concrete base been constructed to support hydraulic jacking equipment?
- Have rear walls been reinforced with a thrust plate designed to bear the thrust forces generated by the jacking operation?
- Where necessary, has a dewatering system installed?
- Should bentonite slurry storage tank areas be banded to contain spillage?

Additional Specific Requirements for Horizontal Directional Drilling - Contractor

- Has material been reamed back as drilling is completed and the drill head approaches the receiving pit?
- Has the pipe been coated with Vaughn Bonded Epoxy protective coating to suppliers' recommendation to prevent corrosion?
- After backdrawing protective pipe, have seal plugs been provided to prevent water ingress?
- Have the worksite and pits been restored, and structural reports been prepared for the excavated path?

Additional Specific Requirements for Pipe Jacking - Contractor

- Have pits been created - as for micro tunnelling?
- Have the sides of pits been reinforced, depending on soil type and jacking forces?
- Carried or pressurized surplus excavations back prior to disposal offsite to a suitable facility?
- Have support pipes been used in weak soils - as for micro tunnelling?

Additional Specific Requirements for Auger Boring - Contractor

- Has spoil that is drawn back to the launch pit been safely removed?
- Has the progress of the auger head and the amount of spoil being withdrawn been monitored to detect potential of cavities?

Before Starting Work – Contractor

- Are all members of the Work Party familiar with the Traffic Management Plan (TMP), Work Execution Plan (WEP) and associated Risk Assessments and Method Statements (RAMS)?
- Are there any uncertainties regarding the instructions provided at this stage or aspects of the TMP? Should there be follow up coordination with the Site Manager, Supervisor, or RIPC Inspectors?

Maintenance of Site – Contractor

- Is the site maintained in a safe, tidy and workmanlike manner at all times with no visual distortion?
- Are all barriers maintained and kept in good condition throughout the duration of the works?
- Is agreed RIPC signage displayed at all times?

Arriving on Site – All Parties

- Has access and egress been provided in accordance with the TMP Work Zone requirements?
- Are vehicles reverse-parked before unloading or setting up signs? If reverse parking is not achievable, then ensure work vehicles can be seen clearly by road users through usage of beacons and signage.
- Has off street parking been monitored so as not to create any obstructions to footways or cycle routes?
- Has access to adjacent premises and driveways been observed and maintained?

- If vehicles are parked outside of the work zone, check that they do not obstruct any existing road assets (e.g., traffic signs or traffic signals).
- If a vehicle is part of work area (e.g., Heavy Vehicle) is it featured in the TMP?
- Once safely parked, do personnel report to the designated area to sign in and receive any relevant updates (including site safety induction for first time arrivals)?
- Are work vehicle operators intending to stop at the roadside or enter a site area activating the roof-mounted amber beacon (if fitted)?



4.2 ATTACHMENTS FOR CHAPTER 2.3

Visitors To Site - Contractor

- Have all visitors been signed in and been provided a comprehensive site induction?
- Has a point of contact been established for visitors whilst on site?
- Have visitors been escorted on site, and are they wearing the appropriate PPE?
- Have security measures been installed to deter trespassers?
- Have visitor associated risk assessments been completed, and has the risk of slips and falls in and around the site been mitigated?
- Have access routes been clearly marked?
- Is there adequate visitors parking?

Access to Site for the Consultant, Testing Laboratory and RIPC – Contractor

- Has safe access to the site been allowed at all times for staff representing the Consultant, Testing Laboratory and RIPC?
- Has assistance been provided to these parties to enable them to carry out the necessary testing, inspection and record-keeping?

Plant and Equipment – Contractor

Is plant and equipment:

- In good condition, full working order, and kept clean?
- Meets appropriate legislation, including safety testing and marking etc.? Has calibration been completed (if required)?

- Regularly maintained, tested and inspected in line with legislation and the manufacturer's requirements?
- Appropriate for the expected tasks?
- Inspected so that faults are immediately identified, reported, and equipment taken out of service if there is a safety concern?
- Provided with a suitable means of isolating the work equipment from all power sources including electric, hydraulic, pneumatic and gravitational energy?
- Designed and used in such a way that they do not pose a risk to safety, health or environment when they are installed and maintained and when they are used for what they are intended for?
- Operated only by persons with appropriate training?
- Designed so that operators shall be able to perform their work at or with the machine in appropriate working positions, with braking devices, adequate driver vision and, where necessary, lighting?

- Provided with user manuals which contain information on how to:
 - Use the item, including training and appropriate PPE?
 - Start/power on the item?
 - Set up and handle the item?
 - Install the item?
 - Store the item?
 - Maintain and repair the item?
 - Prepare the item for scrappage or recycling?
- Of an appropriate size that reduces the impact on local residents and businesses (if used in residential areas)?

Works by Utilities Contractor - Contractor

- Is there safe access for the Utilities Contractor to complete their works?
- Has a briefing been provided for the Utilities Contractor on the following:
 - The Traffic Management Plan (TMP)?
 - Works Execution Plan (WEP)?
 - Waste Management Plan?
 - HSE Plan?
 - Emergency Response Plan?
 - Quality Control Plan?
 - Environmental Impact Plan (if appropriate)?

Works by Utilities Contractor – Service Entity

- Have the necessary specification and details been provided for utility works to be carried out by the Utilities Contractor, including any details of bedding or protection works etc?



4.2 ATTACHMENTS FOR CHAPTER 2.3

Reinstatement - Contractor

- Have works been conducted as detailed in the relevant national standards?
- Has all required material testing been completed by the relevant Testing Laboratory?
- Is there compliance with the appropriate specifications for materials to be used, matched with existing materials and observed proper quality of workmanship to ensure the highest standards of reinstatement are achieved?
- Is there provision for appropriate training for operatives and supervisors, and encouragement for operatives to take ownership of the works?
- Has there been use of innovative excavation, reinstatement and repair methods?
- Has there been use of the appropriate equipment and materials, including recycled materials?
- Is there compliance with compaction requirements and quality testing specifications?
- Is there application of a 'first-time permanent' reinstatement philosophy?
- Is there assurance that no backfilling or reinstatement work has taken place until subsequent work phase has been approved?
- Has the backfill coverage above the surface of the utility service been checked so that it is not less than the design coverage according to the type and diameter of cables?
- Has the depth of excavation below the utility serviced been checked so that it is not less than 0.3m, or according to the approved design, whichever is greater?
- Has backfill material been stored according to specifications?
- Has a suitable methodology been established to dewater the site – including well pointing?
- Has the restoration width been extended 0.3m each side of the trench?
- Have excavations been backfilled in layers of approved materials in accordance with relevant national standards?
- Have compaction tests of each layer of backfill been completed every 100m, alternating the location between the layers?
- Have the edges of restoration areas been kept straight and parallel/perpendicular to direction of traffic?
- Has the full width of the traffic lane been resurfaced (if trench is more than 50% of lane width)?
- Have reinstatements that are less than 3m apart been combined into one resurfacing?
- Have edges of reinstatement areas been kept out of vehicle wheel track zones?
- Have edges of reinstatements been cut vertically using a suitable saw?
- Have the vertical alignments of edges been matched to the existing surface +/- 6mm?

Reinstatement – Testing Laboratory

- Has all the required material testing been completed?
- Has the E-portal been used (where possible)?
- Have tests associated with utility materials been completed?

Reinstatement – Consultant

- Have the works been sufficiently supervised and recorded?
- Has the E-portal been used (where possible)?

Reinstatement – Service Entity

- Carried out specification and tests of utility materials?

Allowing Sufficient Time for Works – Contractor

- Prior to reinstatement works commencing, have site conditions been monitored and checked if suitable, i.e. is the site dry and stable?
- Has the new asphalt been allowed to cool sufficiently before the road is re-opened to traffic?

Special Conditions for Reinstatement – RIPC

- Have the relevant processes been followed for roads inside and outside of the maintenance programme?

Special Conditions for Reinstatement – Contractor

- Has the relevant guidance been followed in relation to reinstatement type and width?

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4.3 ATTACHMENTS FOR CHAPTER 2.4

Inspection & Compliance Checklists

RIPC Powers to Inspect, Monitor, and Control – A Checklist for RIPC

- Are approved control plans in place or is inspection as a result of a complaint?
- To record a violation is there:
 - Information about the violator, a description of the violation, and the activity carried out by the violator?
 - The number corresponding to the violation and the specified penalty amount?
 - The date and time on which the monitoring practice occurred, including the day and hour?
 - Place of the violation (city, neighbourhood, street, or road)?
- Has as much detail as possible been recorded?
- Has the violator been notified, potentially by one of the following methods:
 - Sending a notice to their registered address, specifying a deadline for review according to the nature of the violation?
 - Sending a text message to the mobile number associated with their Permit?
 - Sending a notification through the designated service application (if available)?

- Affixing a notice at the site of the activity, requesting their presence?
- Requesting their attendance through the relevant authority?
- Has any record been taken of unwillingness of the Contractor (or relevant entity) to co-operate?

RIPC and Contractor Checklist During Project Execution, Closure, and Warranty Period

Note: It is proposed RIPC and the Contractor both use the same checklist to raise standards and reduce violations in relation to infrastructure works.

Day of commencement – has an initial site visit been conducted to confirm the work site is being set up in accordance with the documents listed below?

- Traffic Management Plan (TMP).
- Works Execution Plan (WEP).
- Health Safety and Environment Plan.
- Waste Management Plan.
- Emergency Response Plan.
- Quality Control Plan.
- Environmental Impact Assessment - if appropriate.
- Any violations as listed in “Licensing Compliance and Controls for Infrastructure Projects in the Riyadh Region”.
- Have site visits been conducted during excavation, Service Entity works, backfilling, and reinstatement, to confirm the work is being delivered in accordance with the documents listed above?

Prior to issuing the Completion Certificate, has the following been ensured?

- All works have been completed as per the design specification.
- The site is cleared and has been left in good condition.
- Outstanding on-site issues have been resolved with all parties.
- Violations have been addressed or resolved.

Final Excavation Inspection - during the Warranty Period, at least one year after the closure of the excavation permit:

- Are there any identified defects?
- Are there any violations identified?

Service Entity Obligations

- Is there a methodology to fully supervise the work of extending services, excavation and backfilling at the site?
- Is there a methodology to verify the Contractor has complied with all approved requirements, rules and regulations related to the implementation of civil works, and do not start work before obtaining the necessary authorisation?
- Has a suitable Consultant been appointed to facilitate the completion of the works?

Consultant Obligations

- Have periodic reports been submitted via the relevant online platform?
- Have photos of the completed works and overall project been provided?

Contractor Obligations

- Are the management systems in place for the two-year Warranty Period?
- Is any grievance against any violation submitted within 60 days of notification?

RIPC Obligations

- Ensure process is in place for handling complaints.

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4.4 ATTACHMENTS FOR CHAPTER 2.5

What to Look Out For

- **Contractor**

- Have completed all works to specification?
- Not left site until advised by Service Entity?
- Left site in clean and tidy condition?
- Resolved any issues promptly?

- **Consultant**

- Submit records to Service Entity?

- **Testing Laboratory**

- Submit Records to Service Entity?

- **Service Entity**

- Sent records to RIPC and advised of wish to vacate site?
- Advised Contractor of any RIPC concerns?
- Advised Contractor that site can be vacated after Completion Certificate received from RIPC?

- **RIPC**

- Reviewed all tests and carried out inspections?
- Raised issues?
- Issued Completion Certificate?
- Confirmed release of Warranty Period?

- Excavation and Civil Works Procedures in Riyadh published by the Riyadh Amanah
- Licensing Compliance and Controls for Infrastructure Projects in the Riyadh Region - RIPC



4.4 ATTACHMENTS FOR CHAPTER 2.5

Project Closure Checklists

Contractor

- Has the Service Entity been advised to submit a request to RIPC to vacate the site?
- Have any necessary repairs been completed and irregularities resolved, if observed by RIPC prior to receiving the Completion Certificate?
- Has the site been cleared, including all traffic management equipment/items and debris?
- Have violation fees been settled (if applicable)?
- Has the dispute resolution process been commenced (if applicable)?
- Have any necessary repairs been completed and irregularities resolved, if observed by RIPC during the Warranty Period?
- Has notification been received from RIPC regarding the release from the Warranty Period?

Consultant

- Have all required test results, photographs, and inspections verifying the completion of works been provided to the Service Entity?

Testing Consultant

- Has a Completion Certificate been issued to the Service Entity on satisfactory completion of materials testing?

Service Entity

- Has a notification been received in relation to closure of works and site vacation?
- Advised RIPC via digital portal of wish to vacate site and also sends relevant records?

- Received notification from RIPC with requirement for immediate repair and rectification of observations or failed tests?
- Has the Contractor been notified that the site can be vacated once Completion Certificate is received from RIPC?
- Has a notification been received from RIPC with the requirement for immediate repair within three days, and has this information been shared with the Contractor?

RIPC

- Have all tests in the portal been reviewed and matched with the random laboratory tests & surface field tests that are conducted periodically?
- Has a site visit and visual inspection of the site been completed to confirm all barriers, material, and works equipment have been removed?
- Are there any observations or failed tests?
- Has the Completion Certificate been provided to the Service Entity?
- Are there any unresolved disputes or violations or application to the dispute resolution procedure that need to be addressed?
- Prior to issuing the Final Completion Certificate/Release Certificate, have all violations and outstanding fines been settled?

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4.5 ATTACHMENTS FOR CHAPTER 3

Change Request Form

Change Request Template or Form or Required Content:

1. Subject Line (for Email) / Title (for Form):

"Change Request: [Brief Description of the Change]"

Example: "Change Request: Update Site Safety in Section 2.2.1"

2. Requestor Information:

Full Name:

Position/Role:

Department/Organization:

Contact Information (Email, Phone):

3. Date of Submission:

Date: This ensures a clear timeline is established for the change request.

4. Reference to Manual Version:

Current Manual Version: Indicate the specific version of The Manual to which the change request applies.

5. Section(s) Affected:

Section/Chapter/Paragraph: Clearly specify the exact section, chapter, and paragraph that the requested change applies to.

6. Description of the Requested Change:

Current Text/Content: Provide the existing text or content that needs to be changed.

Proposed Change: Describe the change being requested, including new or revised text, diagrams, or other content.

Rationale for the Change: Explain the reason for the change, including any relevant background information, data, or regulatory requirements that support the request.

Impact of the Change: Discuss the potential impact of the change, including how it will improve safety, compliance, efficiency, or other aspects of the project. Consider both positive and negative impacts.

7. Supporting Documentation:

Attach any relevant documents, reports, studies, or references that support the proposed change. Clearly label each attachment.

8. Urgency:

Priority Level: Indicate the urgency of the change (e.g., High, Medium, Low).

9. Additional Comments:

Any Other Relevant Information: Include any additional comments, observations, or considerations that might assist in the review process.

GENERAL INFORMATION	Change Statement	Brief Description of the Change	Change No.	
	Example: "Change Request: Update Site Safety in Section 2.2.1"		Report ID	
	Date		Time	

GENERAL INFORMATION	Requestor Information	Full Name	Position/Role	Organization and Department	Contact Information (Email, Phone)

CHANGE REQUEST INFORMATION	Request Urgency	Low	Medium	High	Change Type	Minor	Major	Standard	Emergency

CHANGE REQUEST INFORMATION	Manual Version and Affected Section	Manual Version	
		Section/Chapter /Paragraph	

CHANGE REQUEST INFORMATION	Current Text/Content	Provide a screenshot or a copy of the existing text or content that needs to be changed.
	Proposed Change	Describe the change being requested, including new or revised text, diagrams, or other content.
	Rationale for the Change	Explain the reason for the change, including any relevant background information, data, or regulatory requirements that support the request.
	Impact of the Change	Discuss the potential impact of the change, including how it will improve safety, compliance, efficiency, or other aspects of the project. Consider both positive and negative impacts.
	Supporting Documentation	Attach any relevant documents, reports, studies, or references that support the proposed change. Clearly label each attachment.

DECISION	Accepted		Committee Coordinator Name	Title	Signature	Date
	Rejected					
	More Info Requested		Committee Chair Name	Title	Signature	Date

4.5 ATTACHMENTS FOR CHAPTER 3

Manual Update Process

A process has been devised for updating The Manual. It aims to facilitate a collaborative, streamlined approach for aligning The Manual with Stakeholders' needs and expectations. Updates will be captured as follows:

1. Based on Feedback and Change Requests:

The Manual may be updated based on Change Requests or commonly occurring enquiries from Stakeholders. Updates based on Feedback could be due to errors or could be due to sudden changes in the infrastructure landscape that have a significant impact on the content of the Code Manual.

2. Annual Review:

An Annual Review will be conducted to ensure that The Manual stays up-to-date with the latest regulations, standards, and industry best practices. This doesn't necessarily mean The Manual will be updated every year, but a review should be done to assess if updates are needed.

Annual reviews will cover:

- a) Post-Project Evaluation Findings:** After the completion of major projects within RIPC, The Manual should be reviewed to incorporate lessons learned, feedback from stakeholders, and any identified areas for improvement. This might lead to updates if significant insights are gained. These insights will be incorporated in the nearest planned revision.
- b) Regulatory Changes:** The Manual annual review will incorporate any significant changes in laws, regulations, or standards that affect the content.
- c) Changes in Organizational Policies:** If RIPC revises its internal policies or procedures, The Manual will be updated to align with these changes if needed.

d) Technological or Methodological

Advancements: When new technologies or methodologies become widely adopted, The Manual should be updated to reflect these changes.

Note: The Manual will be updated every 6 months for the first two years after issue of Version 1, and may be updated annually thereafter, dependent on the outcome of reviews.

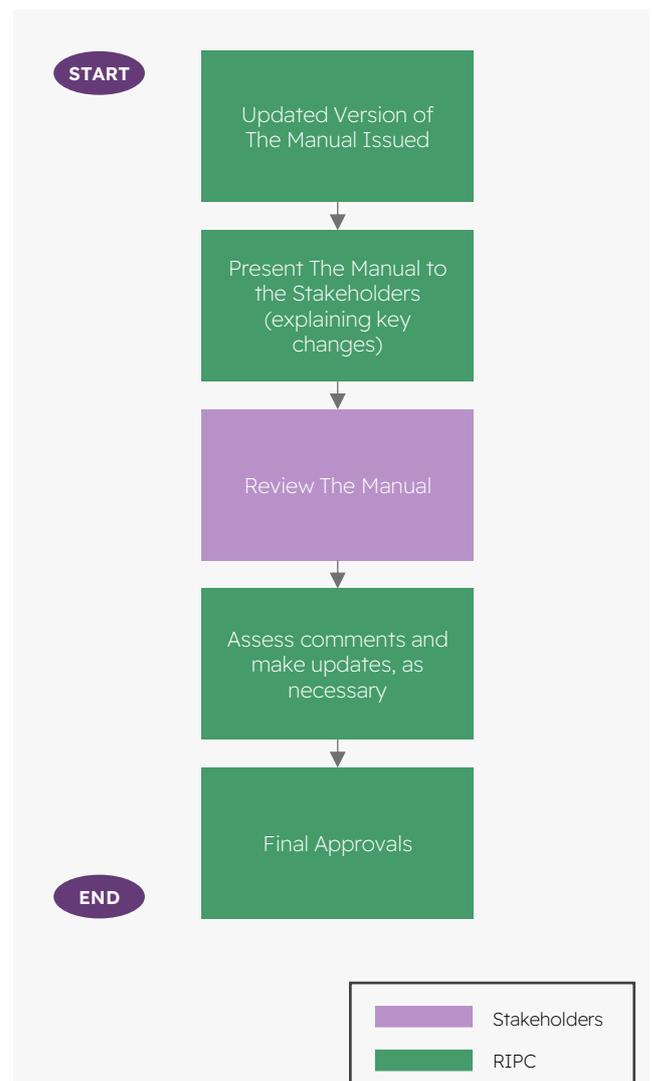


Figure 3.1.2: Manual Update Process

GENERAL INFORMATION	Update Statement	Brief Description of the Change			Update No.	
		Example: "Update: Incorporate new Site Safety in Section 2.2.1"			Report ID	
	Date				Time	
GENERAL INFORMATION	Requestor Information	Full Name	Position/Role	Organization and Department	Contact Information (Email, Phone)	

UPDATE INFORMATION	Update Source	Stakeholder Feedback	Change Request	Annual Review	Change Type	Minor	Major	Standard	Emergency

UPDATE INFORMATION	Manual Version and Affected Section	Manual Version	
		Section/Chapter /Paragraph	

UPDATE INFORMATION	Current Text/Content	Provide a screenshot or a copy of the existing text or content that needs to be updated.
	Rationale for the Update	Explain the reason for the update, including any relevant background information, data, or regulatory requirements that support the request.
UPDATE INFORMATION	Impact of the Update	Discuss the potential impact of the update, including how it will improve safety, compliance, efficiency, or other aspects of the project. Consider both positive and negative impacts.
UPDATE INFORMATION	Supporting Documentation	Attach and list any relevant documents, reports, studies, or references that support the proposed update. Clearly label each attachment.

DECISION	Accepted	
	Rejected	
	More Info Requested	

Committee Coordinator Name	Title	Signature	Date
Committee Chair Name	Title	Signature	Date

مركز مشاريع البنية
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