

Environmental and Social Due Diligence Report

Project Number: 47083-004
January 2022

INDIA: Accelerating Infrastructure Investment Facility in India – Tranche 3 Shamlaji Expressway Private Limited (Part 31 of 34)

Prepared by India Infrastructure Finance Company Limited for the India Infrastructure Finance Company Limited and the Asian Development Bank.

This environmental and social due diligence report is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

In preparing any country program or strategy, financing any project, or by making any designation of or reference to a particular territory or geographic area in this document, the Asian Development Bank does not intend to make any judgments as to the legal or other status of any territory or area.

CHETAK ENTERPRISES LIMITED

(CIN: U45500MH2018PTC307189)

Regd. Office: B-93, 2nd & 3rd floor, Vaishali Marg, Vaishali Nagar, Jaipur, Pin- 302021

Telephone: 0141-4031588 EMAIL: chetak_enterprises@hotmail.com, sepl.cel@chetakindia.com

PROJECT HSE ORGANIZATION CHART

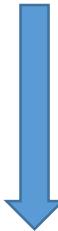
Project In-Charge



EHS –Manager



Safety Officer



Safety Supervisor



Safety Helper



NATIONAL HIGHWAYS AUTHORITY OF INDIA

(Ministry of Road Transport & Highways)

Government of India

Six laning of shamlaji to motachilodha from
km 401+200 to km 494+410 (length 93.210
km) section of NH 8 in the state of Gujarat
under NHDP Phase-V (Package-VI) on hybrid
ANNUITY Mode

TRAFFIC MANAGEMENT PLAN DURING CONSTRUCTION

Concessionaire: M/s Shamlaji Expressway Pvt Ltd.

Independent Engineer: TPF SITC

EPC Contractor: Chetak Enterprises Ltd.

Table of Contents

Table of Contents	0
List of diagrams	2
Project Scope	3
1. Purpose of Overall Traffic Management Plan	3
1.1. Construction Zone	3
1.2. Signs	4
2. Traffic Management Practices	4
3. Scope	5
4. Procedure for implementation of Traffic Management	6
5. Traffic Management Plan for Specific Conditions	7
5.1. Traffic Management Plan for co-centric widening with service road	7
5.2. Traffic Management for co-centric widening without service road	8
5.3. Traffic Management Plan for construction operation in Eccentric widening situation.....	9
5.4. Traffic Management Plan for construction operation of Bridge and Structures...	10
5.5. Traffic Management Plan for construction operation of Flyovers	11
5.6. Traffic Management during switching of traffic	12
6. Safety of Project workmen at Site	17
7. Maintenance of traffic control devices	17
8. Permanent Barricade	17
9. Pavement barricades	18
10. Delineators	18
11. Flashing Beacons	18
12. Construction entry/ exit points	18

List of diagrams

Figure 1: Stage I, Co centric widening with service road

Figure 2: Co centric widening with service road

Figure 3: Co centric widening without service road

Figure 4: Switching of traffic from existing carriageway to new carriageway and from new carriageway to existing carriageway

Figure 5: Diversion arrangement for bridge/ structure

Figure 6: Stage I, Service roads without drain under construction on both sides (traffic on existing carriageway)

Figure 7: Stage II, Main carriageway (flyover) under construction (traffic on service roads)

Figure 8: Main carriageway closed with diversion

Figure 9: Temporary diversion of traffic during emergency repairs of project highway

Figure 10: Permanent Barricade

Project Scope

Six laning of shamlaji to motachilodha from km 401+200 to km 494+410
(length 93.210 km) section of NH 8 in the state of Gujarat under NHDP
Phase-V (Package-VI) on hybrid ANNUITY Mode

The scope includes construction of co-centric widening and eccentric widening of road. There are eight flyovers and four major bridges and culverts in the scope of work. Service Roads will be constructed on both sides of the carriageway, in urban areas. The total length of road is 93.210 km,

1. Purpose of Overall Traffic Management Plan

The overall traffic management plan is designed and intended to specify adequate safety measures in advance against identified hazards and stipulated implementation of the said safety measures to ensure safe movement of traffic during the construction operations of Shamlaji to Motichilodha Road Project. The objective of safety standards is to provide safe travel to the drivers of vehicles plying on the Project Highway at all times of the day, throughout the year and provide protection to the Project workers when they are on the work. This overall traffic management plan delineates the safety standards in terms of Construction zones, Signs and Safety measures in work zones and during normal operations.

1.1. Construction Zone

Construction Zones are an integral part of any road construction system. The safety practices in construction will, therefore, be oriented towards reducing conditions, which lead to such hazards and consequent stress whereby risk of accident increases.

Safety measures will be aimed at avoiding hazardous conditions especially in work sub zones where major construction activities are going on. For all purposes, the entire stretch will be treated as work sub zone.

1.2. Signs

The construction and maintenance signs fall into the three major categories viz. regulatory signs, warning signs and guide signs as other traffic signs do. Ref: IRC: 67-2001 (Code of Practice for Road Signs). These signs will be placed on the left hand side of the road.

Some other signboards will also be used to regulate the Traffic, which have not been standardized. However they conform with the general requirement of shape and color, and their message is brief, legible and clearly understandable, i.e., CAUTION- Men and Machinery at work Go Slow, CAUTION- Work in Progress Go Slow etc.

The location, frequency and type of signboards will be governed by the kind of traffic situations arising during the construction. The same is listed in clause 3 (Scope) and the detailed signboard arrangements for each case is discussed in further sections. Signboards of the type '*men at work*' and '*speed limit*' will be provided at locations wherever required on a case-to-case basis.

2. Traffic Management Practices

The traffic management strategies include the following fundamental principles:

- i. Making the traffic safety an integral and high priority element of the project.
- ii. Avoid inhibiting traffic as much as possible.
- iii. Guide Drivers in a clear and positive way.
- iv. Routine inspection of traffic control element and traffic operations
- v. Protection to Project workers on work site

3. Scope

- Case I. Traffic Management during co-centric widening with service road
- Case II. Traffic Management during co-centric widening without service road
- Case III. Traffic Management during construction operation in Eccentric widening situation
- Case IV. Traffic Management during construction operation at Bridge and Structures
- Case V. Traffic Management during construction operation of Flyovers
- Case VI. Traffic Management during switching of traffic from existing 2-lane to service road
- Case VII. Traffic Management during switching of traffic from service road to existing 2-lane
- Case VIII. Traffic Management during switching of traffic from service road to widened portion
- Case IX. Traffic Management during switching of traffic from widened portion to service road
- Case X. Traffic Management during switching of traffic from service road to eccentrically widened carriageway
- Case XI. Traffic Management during switching of traffic from eccentrically widened carriageway to service road
- Case XII. Traffic Management during switching of traffic from existing carriageway to new carriageway and from new carriageway to existing carriageway in eccentric widening
- Case XIII. Traffic Management Plan during maintenance of road
- Case XIV. Traffic Management during main carriageway closed with diversion
- Case XV. Traffic management during night construction activities
- Case XVI. Traffic management during emergency situation due to special repairs on project highway
- Case XVII. Traffic Management during emergency situations arising on account of Force Majeure events or accidents/incidents on project highway

4. Procedure for implementation of Traffic Management

- i. The traffic management plan for a particular stretch along with the drawing will be submitted to consultant (TPF-SITC) for approval.
- ii. On approval of the plan traffic control devices will be installed at site.
- iii. The traffic will be diverted and construction activities will be commenced.
- iv. The maintenance of traffic control devices will be done by Section in charge/ Engineer of EPC contractor.

5. Traffic Management Plan for Specific Conditions

5.1. Traffic Management Plan for co-centric widening with service road

Stage I: The service roads on either side together with side drains will be constructed initially. During this period the main traffic will use the existing two-lane carriageway

5.1.1 Traffic Control Devices

(i) Warning Signs:

- The advance warning for the construction operation ahead will be provided by the warning sign '*Men at Work*' about 100 m earlier to the work zone.
- It will be followed by '*Over Taking Prohibited*' signboard. These signs will be placed on the left hand side of the road.

'Men at Work' and '*Overtaking Prohibited*' signboards will be as per IRC67: 2001.

(ii) Barricading: During the construction operation in Urban Section, work area will be barricaded using the GI sheets on wooden posts. The main intention of the barricading is to restrict the entering of the traffic in work area and protecting main carriageway traffic from falling in excavated or lower level area. These barricading will be provided at regular interval of 03mtr. To maintain the continuity of the barricade line; horizontal bamboos will be tied with wooden posts in the gaps except of approach to shops / residential premises.

The newly installed barricade will be painted.

(iii) Flagman: To avoid collision between construction vehicle and traffic; Flagmen with flags will be effectively used at the exit/entry points of working stretch.

The flags for signaling will be 0.60 m x 0.60 m size, made of a good red cloth and securely fastened to a staff of approximately 1m in length.

Figure 1 illustrates a typical arrangement according to the above plan.

Stage II: On completion of the Stage-I, the main traffic will be diverted on their respective directions to the newly constructed service roads and the additional four lanes will be constructed (2 lanes on each side) of the existing carriageway duly including the 1.5m wide central medians.

5.1.2 Traffic Control Devices

(i) Warning Signs

- The first sign '*Men at Work*' will be 1000 m prior to the actual diversion.
- This will be followed by another '*Men at Work*' sign 500 m prior to diversion.
- Third sign will be Left Hand Curve.
- Point from where the vehicle is expected to change the lane for the diversion '*Diversion of Route*' along with compulsory '*Turn Left Ahead*' will be provided.

(ii) **Barricading:** During the plying of traffic on service roads the working area would be barricaded using CGI/ hard barrication sheets on wooden posts. To maintain the continuity of the barricade line; horizontal bamboos will be tied with wooden posts in the gaps except of approach to shops / residential premises.

(iii) **Delineators:** At the location where the traffic is expected to get diverted to the other carriageway concrete delineators painted with black and white strips will be placed at regular intervals.

5.2. Traffic Management for co-centric widening without service road

Stage I: The traffic would continue to ply in both directions on the existing carriageway. New carriageway of width approximately 12.5 m and earthen shoulder of 2 m would be constructed on both sides of the existing carriageway.

5.2.1 Traffic control Devices

Barricading: During the construction operation in rural Section, area will be barricaded using the GI sheets on wooden posts or hard barricading. The main intention of the barricading is to restrict the entering of the traffic in work area and protecting main carriageway traffic from falling in excavated or low level area. These barricading will be provided at regular interval of 3m. To maintain the continuity of the barricade line; Horizontal bamboos will be tied with wooden posts in the gaps except of approach to shops / residential premises

Warning signs: The vehicles entering and leaving the construction will be warned in advance using warning signboards. The arrangement of signboards will be as below:

- ‘*Men at Work*’ board will be placed at a distance of 100 m from the start of construction zone.
- at 50 meters from the start of construction zone a ‘*No Overtaking*’ board will be put.

Stage II: After completion of widening of the existing carriageway on both sides, traffic would be diverted from the service road and existing carriageway to the widened new carriageway.

5.2.2. Traffic control devices

Warning signs:

- The first sign ‘*Men at Work*’ will be provided 100 m prior to the actual diversion.
- This will be followed by ‘*Diversion to the other carriageway*’ signboard 75 m prior to the diversion.
- Right hand curve signboard will be provided 50 m prior to the Diversion.

Barricading: During the plying of traffic on extended new carriageway the working area would be barricaded using GI sheets on wooden posts. These wooden posts would be erected on horizontal precast beams. To maintain the continuity of the barricade line; horizontal bamboos will be tied with wooden posts in the gaps except of approach to shops / residential premises.

5.3. Traffic Management Plan for construction operation in Eccentric widening situation

Stage I: The new carriageway will be constructed in the first stage, adjacent to the existing one and the shoulder in between would become part of the central median of the improved divided carriageway facility. The traffic would continue to ply in both directions on the existing carriageway.

5.3.1 Traffic control Devices

Barricading: The construction zone of new carriageway will be properly barricaded by CGI sheets at interval of 15 m. To maintain the continuity of the barricade line, Delineators and gunny bags will be placed in the gaps between individual barricade components.

Warning signs: The vehicles entering the construction zone will be warned in advance using warning signboards. The arrangement of signboards will be as below:

- ‘*Men at Work*’ board will be placed at a distance of 100 m from the start of construction zone.
- At 50 meters from the start of construction zone a ‘*No Overtaking*’ board will be put.

Stage II: In second stage of improvement, the strengthening of the existing carriageway will be taken up and the traffic would be allowed on the newly constructed carriageway. This would involve switching of the traffic from existing carriageway to new carriageway.

Installation of traffic control devices during switching will be as discussed in section 5.6.7.

The finished kerb on the median side of carriageway will act as a pavement barricade preventing the vehicles from entering into the area under construction.

5.4. Traffic Management Plan for construction operation of Bridge and Structures

A temporary (Head wall) brick wall of height 400 mm will be constructed or concrete delineators will placed at regular interval of 2 m, adjacent to the existing head wall. This will act as a confinement to construction zone of culvert. The brick wall will be white washed so that it will clearly visible in nighttime for passing traffic.

Sign Boards:

- Hazard Marker will be placed before the newly constructed head wall to avoid any collision with vehicles. Hazard marker will be retro reflective type for safe movement of traffic during night.
- The first sign ‘*CAUTION Deep Excavation GO SLOW*’ will be provided 200 m prior to the culvert construction work area.
- This will be followed by caution board ‘*Narrow Road Ahead*’ 100 m prior to the culvert.

Barricading: Alongside the headwall barricading of 5 m length will be done using the CGI sheets on wooden posts. The sheets will be painted white and red vertical strips. The main intention of the barricading to restrict the entering of the traffic in work area and avoid falling of traffic of main carriageway to excavated area.

5.5. Traffic Management Plan for construction operation of Flyovers

Stage I: The service road will be completed up to asphalt top, and the drain work will be taken up afterwards as drain /ducts are situated at the outer edge of service road.

Sign Board arrangement

- The advance warning for the construction operation ahead will be provided by the warning sign '*Men at Work*' about 100 m before work zone.
- It will be followed by '*Over Taking Prohibited*' signboard. These signs will be placed on the left hand side of the road.

Barricading: During the construction operation in Urban Section, work area will be barricaded using the GI sheets on wooden posts. The main intention of the barricading is to restrict the entering of the traffic in work area and protecting main carriageway traffic from falling in excavated or lower level area. These barricading will be provided at regular interval of 3 m. These GI sheets will be painted in vertical red & white strips.

Stage II: After completion of service road, traffic would be diverted to service road and construction of flyover will be taken up.

Sign Board arrangement:

- The advance warning for the construction operation ahead will be provided by the warning sign '*Men at Work*' about 100 m earlier to the work zone.
- The above sign will be followed by '*left hand curve*' sign at a distance of 75 m from the diversion
- At diversion, a compulsory keep left signboard and diversion of route signboard will be fixed.

Delineators: At the location where the traffic is expected to get diverted to the other carriageway, concrete delineators painted with black and white strips will be placed at regular intervals.

5.6. Traffic Management during switching of traffic

There would be the following situations of switching of traffic:

5.6.1 Switching of traffic from existing carriageway to service road

(i) Traffic control devices

- The first sign ‘*Men at Work*’ will be 1000 m prior to the actual diversion.
- This will be followed by another ‘*Men at Work*’ sign 500 m prior to diversion.
- Third sign will be ‘*Left Hand Curve / Right Hand Curve*’ (depending upon site situation).
- Point from where the vehicle is expected to change the lane for the diversion ‘*Diversion of Route*’ along with compulsory ‘*Turn right/Left*’ will be provided.

(ii) Barricading: During the plying of traffic on service road the projection of drain above FRL of service road will act as barricading and restrict the traffic to enter in construction zone of new carriage way. The projection of drain will be painted with black and white strips.

(iii) Delineators: At the location where the gap in median opening starts and traffic is expected to get diverted to the other carriageway concrete delineators will be placed at intervals.

5.6.2 Switching of Traffic from service road to existing carriageway

The arrangement of traffic control devices will be as specification.

Warning Signs:

- The first sign ‘*Right hand curve*’ will be provided 100 m prior to the actual diversion.

- This will be followed by ‘*compulsory keep right*’ signboard, at 50 m from diversion.

5.6.3 Switching of traffic from service road to widened carriageway

The arrangement of traffic control devices will be as per *figure 3*.

Warning Signs:

- The first sign ‘*Men at Work*’ will be provided 100 m prior to the actual diversion.
- This will be followed by ‘*Diversion to the other carriageway*’ signboard 75 m prior to the diversion.
- Right hand curve signboard will be provided 50 m prior to the diversion.

Barricading: During the plying of traffic on extended new carriageway the working area would be barricaded using GI sheets on wooden posts. These wooden posts would be erected on horizontal precast beams painted with black and white strips.

5.6.4 Switching of traffic from widened carriageway to service road

Warning Signs:

- The first sign ‘*Men at Work*’ will be 100 m prior to the actual diversion.
- This will be followed by ‘*Diversion to other carriageway*’ sign at 75 m prior to diversion.
- Third sign will be Left Hand Curve at 50 m distance.
- Point from where the vehicle is expected to change the lane for the diversion, ‘*Diversion left side*’ signboard will be provided.

5.6.7 Switching of traffic from existing carriageway to new carriageway and from new carriageway to existing carriageway in eccentric widening

The arrangement of traffic control devices will be as per specification.

In second stage of improvement, the strengthening of the existing carriageway will be taken up and the traffic would be allowed on the newly constructed carriageway. This would involve switching of the traffic from existing carriageway to new carriageway.

Warning sign arrangements:

- The first sign '*speed limit (30 kmph)*' will be provided 100 m prior to the actual diversion.
- This will be followed by '*men at work*' signboard 75 m before the diversion.
- This will be followed by '*Left/ Right hand curve*' sign 50 m prior to diversion.
- Point from where the vehicle is expected to change the lane for the diversion '*Diversion of Route*' along with '*compulsory turn left/ right ahead*' will be provided.

5.6.8 Temporary diversion of traffic for maintenance of existing carriageway

This condition may arise when the existing two lanes in use for the main traffic need emergency repairs (pothole repairs) and the new lanes under construction are not available for diversion of the traffic.

Warning sign arrangements: Men at Work sign will be provided prior to the work area on both direction of the work zone.

Flagman: To avoid any hit by the traffic to maintenance gang; Flagmen with flags will be effectively used at both points of working stretch.

The flags for signaling will be 0.60 m x 0.60 m size, made of a good red cloth and securely fastened to a staff of approximately 1m in length.

5.6.9 Main carriageway closed with diversion

The existing carriageway will be closed with barricades. Traffic control devices will be installed as below:

- '*Men at work*' signboard will be installed at 100 m from the diversion.
- This will be followed by '*Road ahead closed*' sign at 75 m and '*Right hand curve*' sign at 50 m from diversion.
- At the start of diversion, '*Diversion of route*' board will be installed.

Traffic flow from carriageway to diversion will be routed with the help of concrete delineators placed at regular interval. These delineators will be painted with white and black strips.

5.6.10 Traffic management during night construction activities

When construction works are carried out during night, special care would be taken to ensure that no unsafe condition exists. The area under construction will be well illuminated.

5.6.11 Traffic management during emergency situation due to special repairs on project highway

When special repairs need to be carried out on Project highway, it will be ensured that there is minimum disruption to the main traffic flow. Repairs on a single lane will be taken up at a time and the other lane will be used for vehicular movement. On completion of this lane the other lane will be taken up for repairs with the traffic moving on the former. Flagmen will be posted at both the start and end of the stretch under repair to control the direction of traffic along the single lane.

(i) Warning Signs:

- The advance warning for the repairs ahead will be provided by the warning sign ‘*Road Narrowing*’ about 01 km. earlier to the work zone.
- It will be followed by ‘*Men at Work*’ signboard. These signs will be placed on the left hand side of the road.
- Third sign will be ‘*compulsory keep left / right*’ as per site condition along with traffic lane close sign.

Smooth flow of traffic will be maintained with a series of delineators in transition zone.

5.6.12 Traffic management during emergency situation arising on account of Force Majeure events or Accidents/Incidents on Project Highway

These emergency situations will be taken care off on a case-to-case basis. In case, an element of the project highway under construction fails on account of such emergencies, alternate traffic arrangement can be provided in the form of diversions, wherever possible, as per the site conditions. Such arrangements will be made in consultation with the Independent Consultant and the local authorities.

6. Safety of Project workmen at Site

- Safety of the Project Workers at site during duty hours will be ensured. Safety measures appropriate (as per Project Safety Plan) for the job will be adopted.
- The job specific PPEs i.e. Helmets and Safety jackets will be provided to workmen at site and it will be compulsory for them to wear the same.
- Site engineers will ensure the use of PPEs by workmen.
 - (i) Use of Safety Jacket will be compulsory for the workmen engaged for roadwork.
 - (ii) Use of Safety helmet will be compulsory for all workmen including the staff.
- Labour Laws in force will be followed.

7. Maintenance of traffic control devices

For maintenance of installed traffic control devices, a separate gang consisting of 25 labors, two painters and two supervisors will be engaged. They will be provided with two vehicles for transportation of materials and labor. This group will periodically check for disturbed devices and maintain them accordingly.

8. Permanent Barricade

Permanent barricades provided along the construction work of road will channelise the vehicles along the existing road. Main intention of this barricade is to make traffic aware about the construction work in progress. This is a psychological barrier preventing vehicles from going astray in to construction area.

Permanent barricade will be made of GI sheets fixed with properly anchored with steel. GI wire will be used to fasten the sheets for better stability. These sheets will be painted with alternate yellow and black inclined strips or red and white vertical strips. For night visibility red reflective sheets will be fixed on barricades.

(After continuous observation over a span of three months, it has been noticed that, after providing these barricades there has been a considerable decrease in the number of accidents along the stretch of construction)

9. Pavement barricade

The finished kerb on the median side of carriageway will be pavement barricade preventing the vehicles from entering into the area under construction. The portion of kerb above the finished asphalt top will prevent vehicles from crossing the median under construction, and its further entry into construction area. In eccentric and concentric widening situations kerb will be the pavement barricade wherever its casting has been completed.

10. Delineators

Delineators will be of cylindrical shape and will be made of concrete. They will be painted with black and white circumferential strips. Red colored reflectors or retro-reflective sheet will be fixed to the delineator so as to make it visible to the traffic from either direction during night. These delineators will be placed at a suitable spacing to guide the drivers along a safe path and control the flow of traffic.

11. Flashing Beacons/ Road blinkers

Flashing beacons/ blinkers will be provided during night at places where construction activities will obstruct the main flow of traffic or at diversions where a switching of traffic occurs.

12. Construction Entry/ Exit points

Construction entry/ exit points will be clearly identified and marked. Construction traffic will be allowed to enter/ exit the construction area through these openings only. These will be marked with signboards or red colored flag

Six laning of shamlaji to motachilodha from
km 401+200 to km 494+410 (length 93.210
km) section of NH 8 in the state of Gujarat
under NHDP Phase-V (Package-VI) on
hybrid ANNUITY Mode

SAFETY MANUAL

SHAMLAJI EXPRESSWAY PVT LTD

TABLE OF CONTENTS

Sno.	CONTENTS	Page No
1	Cover Page	1
2	Table of Contents	2
3	Record of Amendments	3
4	Introduction	3
5	Responsibilities	7
6	Safety And Health Program Management Guidelines	8
7	Major Elements	8
8	Construction Safety Standards	10
9	Safety Inspections	27
10	Safety Meeting	28
11	Daily Inspection Report	28
12	Emergency Procedures To Be Followed	29
13	Minutes Of Safety Meetings	29
14	Tool Box Meeting	30
15	Workplace Injury And Disease Recording Form	31
16	Emergency Telephone Numbers	34
17	Surveillance	34
18	Induction	35

RECORD OF AMENDMENTS

Each copy of the Apex Manual contains complete record of amendments. This amendment page is to be updated with each amendment. Every amendment is sent along-with an acknowledgment slip to be signed and returned by all holders of controlled copies of this Apex Manual.

Amendment		Remove			Insert			Nature of Change No
NO	Date	Section	Page	Issue	Section	Page	Issue	

SAFETY & SURVEILLANCE MANUAL

1.0 INTRODUCTION

- 1.1 This Safety Manual has been prepared for implementation by M/s SamlajiExpressway Pvt Ltd as part ofthe Integrated Management System aimed at compliance to ISO-9001, ISO-14001 and OHSAS-18001.
- 1.2 **Scope** - The scope of safety encompasses the safety of the following:

a) Road users

b) Workmen involved in:

i. Construction phase activities, and

ii. Operation and Maintenance phase activities.

c) Construction Machinery and Equipment’s

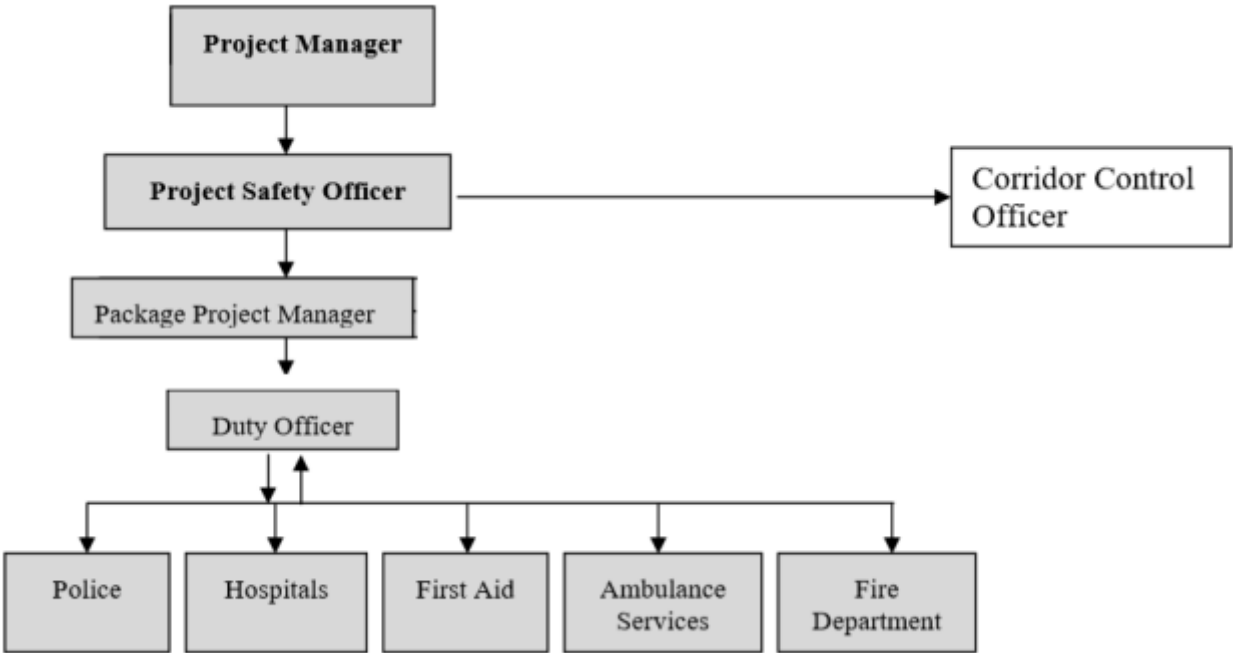
d) Project Assets

e) Environment

SHAMLAJI EXPRESSWAY PVT LIMITED

- 1.3
- Mere Safety Plan will serve no useful purpose. Strict and conscientious enforcement of Safety Plan is of utmost importance.
- 1.4
- Consideration of safety during construction is very essential for achieving the highest performance with the aim of creating and maintaining accident free days. In order to accomplish this mission a systemized approach is formulated to serve as a guideline. Though comprehensive, the plan will need to be honed as the execution proceeds. Periodic review and improvement is integral to the approach.
- 1.5
- SEPL's policy shall be to ensure efficient and safe road use and construction working conditions to road users and to the workmen respectively; and to preserve the precious human resources.
- 1.6
- Safety & Traffic Management Organization -**

The proposed safety and traffic management organization is as under:



1.7

O/M Requirements

- The Project road shall be constructed, operated and maintained during construction period.
- During Construction, the contractor for each package shall be responsible for the safe construction, operation and maintenance of the site in the area of responsibility.
- During construction period O/M requirements shall be complied with. The road will always remain open to uninterrupted, smooth and safe traffic flow at all times.
- During the Concession Period the SEPL as Concessionaire will organize the following :
 - > Inspections
 - > Highway Patrols
 - > Any other required activity
- The following shall be ensured in the areas of operation of the Construction Contracts:
 - > The safety of road users, workers or other persons on the Project facility,
 - > Integrity and value of highway assets
 - > Unimpaired performance of duties
 - > Applicable and adequate safety measures
 - > Avoid risk of adverse effects on the environment and on amenities enjoyed by owners and occupiers of property and land adjacent to Project road.
 - > Necessary measures during accidents and emergencies on the Project road & facilities and as quick a response as possible to minimize their adverse effect.
 - > Avoid risk of disturbance / damage / destruction to property of third party,

SHAMLAJI EXPRESSWAY PVT LIMITED

- > Give adequate information and/or warning about any event and/or matter affecting Project Road
- > Take reasonable steps to facilitate safe transit of abnormal indivisible loads along Project road
- > Liaise and co-ordinate with NHAI and other associated agencies to ensure safety

1.8 Emergency Response Protocol (ERP) - Refer Corridor Control Plan

- There shall be one centrally coordinated emergency response protocol of all the work sites. An ERP shall be developed by coordinating the requirements for different packages in consultation with the police, hospitals, ambulances services, fire departments, etc. in respect of the respective packages. The Concessionaire shall designate an officer for the purpose of overall safety viz. Project Safety Officer. The Duty Officers shall be designated for each construction package. They will assist the Project Safety Officer.
- Sufficient Plant, Machinery, Staff, equipment and materials shall be made available to the Duty Officers at all times to respond to the emergencies.
- The Duty Officers shall be available all the time and shall be empowered to mobilize all resources required to attend to the emergencies
- Procedure shall be developed for liaison between Project Safety Officer, Duty Officer & Police during emergencies.
- When emergency affects operations, obstruction shall be cleared, damage repaired to bring Project facility back to normalcy in minimum possible time.
- Sufficient provisions shall be made to ensure reasonable response time of 20 minutes maximum.

1.9 Safety & Traffic Management

Concessionaire shall ensure safety of road users and construction workers during construction period and during defect liability period. Each package Contractor shall provide an effective program that includes provision for systematic identification, evaluation and prevention or control of general work place hazards, specific job hazards and potential hazards that may arise from foreseeable conditions.

Concessionaire will designate a Project Safety Officer and Corridor Control Officer who shall also be Traffic Safety and Control Officer. He shall be responsible for making necessary arrangements for traffic safety & control. The duty officers shall be deputed for each package and safety supervisors shall be deputed for identified fronts. They will also act as support staff for Traffic Safety & Control Officer.

Safety of road users and construction/operation/maintenance personnel shall be a primary consideration for supervisors at all levels.

The construction package Duty Officers will co-ordinate safety arrangements with the Traffic Safety Officer for their respective area of responsibility.

When an accident / breakdown occurs threatening safety of road users/workmen/ others, immediate and effective steps will be taken to minimize adverse effects by the Corridor Control Centre.

All possible efforts shall be made to ensure implementation of safety procedures, precautions and measures.

1.10 Traffic Safety

The scope of traffic safety, signage, traffic zones, control devices, etc. are enclosed as Appendix A to this plan.

1.11 Traffic Management

Traffic management shall be carried out both during scheduled construction work/maintenance and emergency maintenance operations.

A mobile emergency lighting unit shall be kept standby at all times to be used in case of emergencies.

SHAMLAJI EXPRESSWAY PVT LIMITED

1.12 Safety of Project Assets and Environment

- It is the responsibility of the Concessionaire to ensure that the safety of the assets of the project facility is ensured. The Concessionaire will obtain the layout of the over ground and underground utilities from the NHAI/utility operating agency and ensure that no adverse effect takes place to these facilities. The Concessionaire shall ensure that the executing agency/Contractor are fully apprised and take action only after Concessionaire has necessary clearance from NHAI/utility operating agency. OFC Cables are running all along the alignment of the highway. These cables are very important and carry material security data, so the uninterrupted maintenance of which is of great importance. No mechanical equipment will be used for excavation in the areas where such facilities are running. Prior permission shall be taken from the concerned department through NHAI as and when it is necessary to excavate in such areas.
- No encroachment shall be permitted on the project facilities. In case of any effort by anyone to encroach on the project facility land, the matter shall be immediately reported to the concessionaire.
- The safety of environment has to be ensured to the best possible extent, both during the construction as well as O/M Phase.
- No trees shall be cut without obtaining prior and proper permission from the concerned Government Department/forest department/NHAI/Concessionaire.

1.13 Accidents

Some of the main causes of accidents that can be related to safety factor are:

- a) Lack of supervision during construction
- b) Adopting short cut and risky. Work procedure/method.
- c) Not using personal protective equipment's
- d) Carelessness in driving
- e) Carelessness in loading of load carrying vehicles
- f) Overloading of passenger/goods carrying vehicles
- g) Absence of barricades around excavated pits.
- h) Carelessness in use of construction plant/machinery/equipment.
- i) Electric cables not buried or hung on poles above ground
- j) unearthed electrical equipment
- k) Open, loose and unprotected electric connections
- l) Operation requiring requisite skills by an unskilled worker
- m) High scaffolding
- n) Working adjacent to fast moving traffic, heavy equipment or in noisy conditions where warning signals can go unheard
- o) Handling of heavy equipment
- p) Operating powerful tools
- q) Using compressed air/gases

1.14 Unsafe Acts

Some of the common unsafe acts at work site are :

- Nonuse of PPE
- Use of wrong tools
- Taking shortcuts
- Not following site rules
- Unauthorized driving - driving without proper license/ticket
- Over speeding
- Unskilled / inexperienced workers employed for a skilled job like Bituminous work.
- Tampering /Meddling with electrical connections.
- Climbing on staging by using bracing
- Throwing of materials & tools from height
- Standing under slung loads
- Not using rope guys for heavy loads
- Repairing running machine

SHAMLAJI EXPRESSWAY PVT LIMITED

1.15 Unsafe Conditions

Some of the unsafe conditions at work site are :

- Poorly maintained plant &equipment’s
- Non-standard electrifications and joints in cables, non-use of ELCB's, etc.
- Unprotected heights/staging/scaffolding
- Inefficient / improper supervision
- Unskilled handling of hot bituminous & bituminous mixes
- Improper access
- Not conducting induction training, tool box talks and safety meetings
- Cranes/lifting operations
- Welding/cutting
- Haphazard storage of Petrol, Oil and Lubricant (POL)
- Excavation not barricaded
- Work area not defined to road user
- Non indication of diversions

2.0 RESPONSIBILITIES

2.1 Safety of all the personnel working on the project corridor and road users during the construction and the operational & maintenance phase is the overall responsibility of the Concessionaire. Contactors or other agencies employed by the Concessionaire for execution of works will be responsible for the safety aspects enumerated in this document in their respective areas of responsibility ie. the area in which they are going to execute works pertaining to their contracts. The Contractors and other such agencies will be answerable to the Concessionaire.

2.2 Responsibilities of the Concessionaire:

The responsibilities of the Concessionaire in respect of safety are as follows:

- To provide a workplace free from recognized hazards that are causing and are likely to cause death or serious physical harm to employees.
- Examine workplace conditions to make sure that they conform to applicable standards, rules and regulations.
- Minimize or reduce hazards.
- Make sure employees have and use safe tools and equipment (including appropriate personal protective equipment), and that such equipment is properly maintained.
- Use color codes, posters, labels or signs to warn employees of potential hazards.
- Make sure that all-vertical approaches are safe ie. ladders, Ramps, Hoists, Scaffolds, etc.
- To ensure that the employees have necessary license to perform duties requiring licensed operators such as vehicle driving, machine operation, electrical repairs, etc.
- Establish or update operating procedures and communicate them so that employees follow safety and health requirements.
- Ensure Safety of road users against the hazards due to the following circumstances:
 - > Diversion
 - > Road condition
 - > Low visibility

 i.In hours of darkness

ii.In inclement weather conditions like fog etc.

- > Breakdown of vehicles on carriageway
- > Breaking of overhead electric wires
- > Disruption of pipeline leakages/spillages.
- > Workmen working on the facility/road in use while construction activity is in progress.

To ensure safety of environment

To co-ordinate the safety measures/systems/protocols with the Client as well as Construction agencies of various packages for their respective areas of responsibility, the Government agencies like police/traffic control department/departments handling utilities etc. and other agencies like hospitals, ambulances, etc.

SHAMLAJI EXPRESSWAY PVT LIMITED

To follow all applicable IRC codes for safety some of which are listed at Annexure A to this manual. The safety provisions of applicable IRC codes shall be implemented in letter and spirit. To trim all trees growing over the carriageway/service roads/slip roads and to ensure that they do not hit the road.

To maintain and prominently display the telephone numbers of police, ambulance, hospitals, fire department, labour officer, doctors, and project directors of the client/concessionaire/Contractors, project safety officers so that same are readily available in case of emergency.

2.3 Responsibilities of the employee

- Follow all employee safety and health rules and regulations, and wear or use prescribed protective equipment while engaged in work on the project highway.
- Report hazardous conditions to the supervisor.
- Report any job-related injury or illness to the employee, and seek treatment promptly.

3.0 SAFETY AND HEALTH PROGRAM MANAGEMENT GUIDELINES

Effective management of worker safety and health protection is a decisive factor in reducing the extent and severity of work-related injuries, illnesses and related costs. The Concessionaire shall maintain a program that provides adequate systematic policies, procedures, and practices to protect their employees from, and allow them to recognize job-related safety and health hazards.

An effective program includes provisions for the systematic identification, evaluations, and prevention or control of general workplace hazards, specific job hazards, and potential hazards that may arise from foreseeable conditions.

4.0 MAJOR ELEMENTS

4.1 Management Commitments and Employee Involvement:

The elements of management commitment and employee involvement are complementary and form the core of any occupational safety and health program. Management's commitment provides the motivating force and the resources for organizing and controlling activities within an organization. In an effective program, management regards worker safety and health as a fundamental value of the organization and applies its commitment to safety and health protection with as much vigor as to other organizational goals.

Employee involvement provides the means by which workers develop and / or express their own commitment to safety and health protection for themselves and for their fellow workers. In implementing a safety and health program, some recommended actions are:

- Develop a company work place health & safety statement.
- State clearly a workplace policy on safe and healthful working conditions, so that all personnel with responsibility at the site (and personnel at other locations with responsibility for the site) fully understand the priority and importance of safety and health protection in the organization.
- Establish and communicate a clear goal for the safety and health program and define objectives for meeting that goal so that all members of the organization understand the results desired and measures planned for achieving them.
- Provide visible top management involvement in implementing the program so that all employees understand that management's commitment is serious.
- Arrange for and encourage employee involvement in the structure and operation of the program and in decisions that affect their safety and health so that they will commit their insight and energy to achieving the safety and health program's goals and objectives.
- Assign and communicate responsibility for all aspects of the program so that managers, supervisors, and employees in all parts of the organization know what performance is expected from them.

SHAMLAJI EXPRESSWAY PVT LIMITED

- Provide adequate authority and resources to responsible parties so that assigned responsibilities can be met.
- Hold managers, supervisors and employees accountable for meeting their responsibilities so that essential task will be performed.
- Review program operations at least quarterly to evaluate their success in meeting the goals. The objectives can be revised when they do not meet the goal of effective safety and health protection.

4.2 Worksite Analysis

A practical analysis of the work environment involves a variety of worksite examinations to identify existing hazardous conditions and operations in which changes might occur to create new hazards. Lack of awareness about a hazard stemming from failure to examine the worksite is a sign that safety and health policies and / or practices are ineffective. Effective management actively analyzes the work and worksite to anticipate and prevent harmful occurrences. The following measures are recommended to identify all existing and potential hazards.

- Conduct comprehensive baseline worksite surveys for safety and health, update these surveys periodically and involve employees in this effort.
- Analyze planned and new facilities, processes, materials and equipments.
- Perform routine job hazards analyses.
- Assess Risk factors of economic applications to worker's tasks.
- Conduct regular site safety and health inspections so that new or previously missed hazards and failures in hazards controls are identified.
- Provide a reliable system for employees to notify management personnel about conditions that appear hazardous; to receive timely and appropriate responses; and encourage employees to use the system without fear of reprisal. This system utilizes employee's insight and experience in safety and health protection besides allowing their concerns to be addressed.
- Investigate accidents and near miss incidents so that their causes and means of prevention can be identified.
- Analyze injury and illness trends over time so that patterns with common causes can be identified and prevented.

4.3 Hazard Prevention and Control

Where feasible, workplace hazards are prevented by effective design of the job site. Where it is not feasible to eliminate such hazards, they shall be controlled to prevent unsafe and unhealthful exposure. Elimination or control shall be accomplished in a timely manner once a hazard or potential hazard is recognized. Specifically, as part of the program, Concessionaire shall establish procedures to correct or control present or potential hazards in a timely manner.

- Use engineering techniques where feasible and appropriate.
- Establish, before commencement, safe work practices and procedures that are understood and followed by all affected parties. Understanding and compliance are a result of training, positive reinforcement, correction of unsafe performance, and if necessary, enforcement through a clearly communicated disciplinary system.

Provide personal protective equipment when engineering controls are not practicable.
Introduce Safety Industries

Use administrative controls, such as reducing the duration of exposure. Maintain the facility and equipment to prevent environmental exposure. Plan and prepare for emergencies, and conduct training and emergency drills as needed, to ensure that proper responses to emergencies become "second nature" for all persons involved.

Establish a medical program that includes onsite first-aid, a physician nearby and emergency medical care in order to reduce the risk of any injury or illness that may occur.

SHAMLAJI EXPRESSWAY PVT LIMITED

4.4 Safety and Health Training

Training is an essential component of an effective safety and health program. Training helps identify the safety and health responsibilities of both management and employees at the site. Training is often most effective when incorporated into education on performance requirement and job practices. The complexity of training depends on the size and complexity of the worksite as well as the characteristics and potential of hazards.

Employee Training: Employee training programs shall be designed to ensure that all employees understand and are aware of the hazards to which they may be exposed and the proper methods for avoiding such hazards.

Supervisory Training: Supervisors shall be trained to understand the key role they play in job site safety so that they are able to carry out their safety and health responsibilities effectively. Training programs for supervisors shall include the following topics:

- Analysis of the work under their supervision to anticipate and identify potential hazards.
- Maintenance of physical protection in their work areas.
- Employees training on nature of potential hazards at work place, protective measures required, and importance of continual feedback.
- Employees' understanding of their safety and health responsibilities.

5.0 CONSTRUCTION SAFETY STANDARDS

Traffic Control Devices

Traffic control devices in the construction zones perform the crucial task of warning, informing and alerting the driver apart from guiding the vehicle movements so that the driver of the vehicle as well as the workers on site are protected and safe passage to the traffic is possible.

The primary traffic control devices such as signs, delineators, barricades, cones, pylons, pavement markings, flashing lights etc shall be used. They shall be such that they are easily understood without any confusion, are clearly visible during day and night, conform to the prevailing speeds in immediate vicinity, stable against sudden adverse weather conditions and are easy in installation, removal and maintenance.

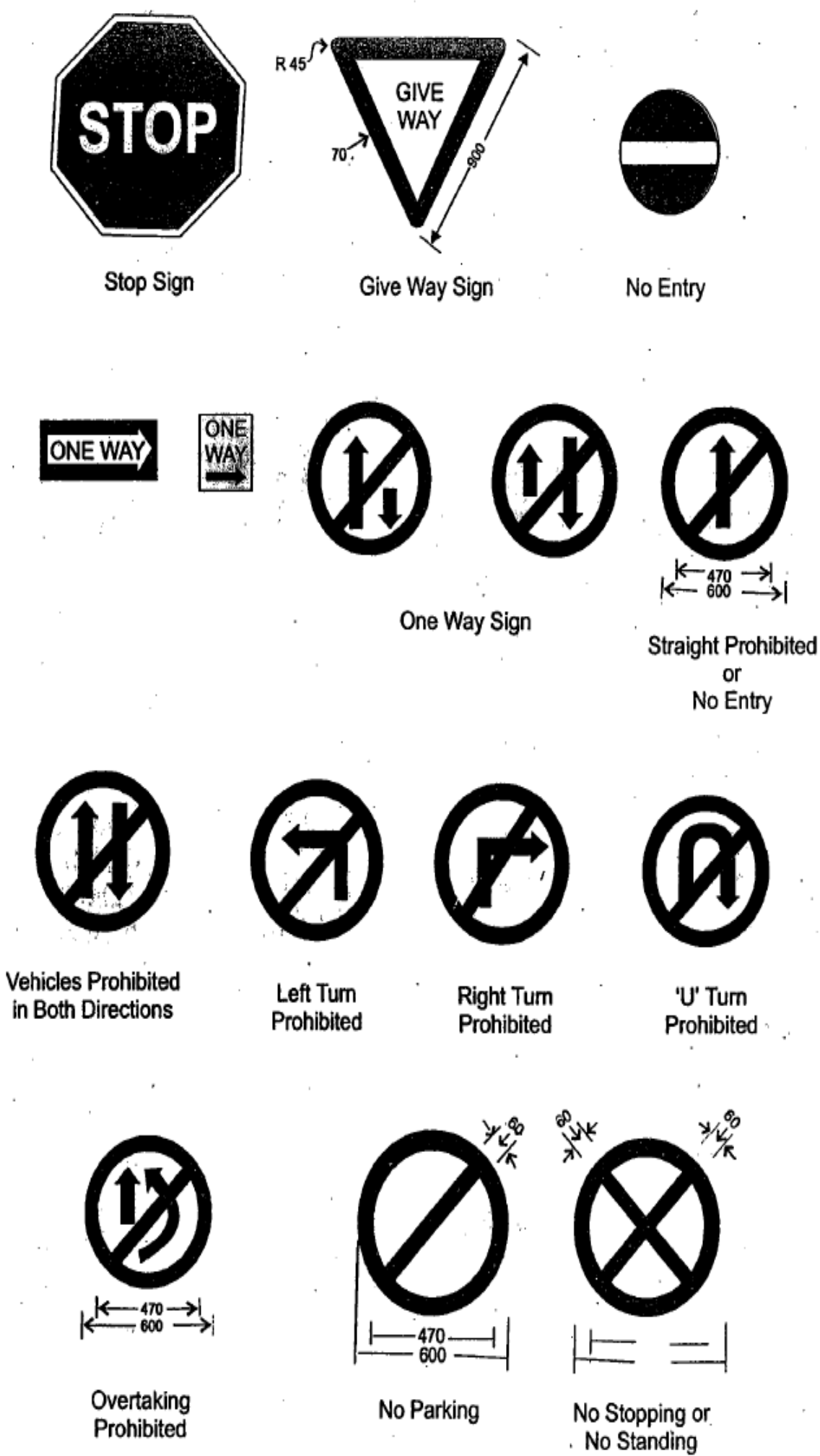
Signs -

The construction and maintenance signs viz. regulatory signs, warning signs and, guide signs shall be as per IRC: 67-2001 (Code of Practice for Road Signs). These signs shall be placed normally on the left hand side of the road. Some of the common type of signs which shall be provided in construction zones Wordings on Sign Boards shall be in English as well as in Hindi.

Regulatory signs

As regulatory signs impose legal restriction on all traffic, they shall be used only after consulting the local police and traffic authorities. The most likely type of regulatory signs shall be used in traffic control zones are: STOP, Give Way, Do Not Enter, One way, Straight Prohibited, Vehicle Prohibited in Both Directions, Left Turn Prohibited, Right Turn Prohibited, 'U' Turn Prohibited, Over taking Prohibited, No Parking, No Stopping and No Standing, Keep Left, Compulsory Left Turn, Compulsory Right Turn, Compulsory Straight, Compulsory Straight or Right Turn, Compulsory Straight or Left Turn, Priority to Vehicles in other directions, Priority to Vehicles in this Direction, Weight Limit, Axle Limit, Height Limit, Length Limit, Restriction Ends, Speed Limit.

(Fig. 1)

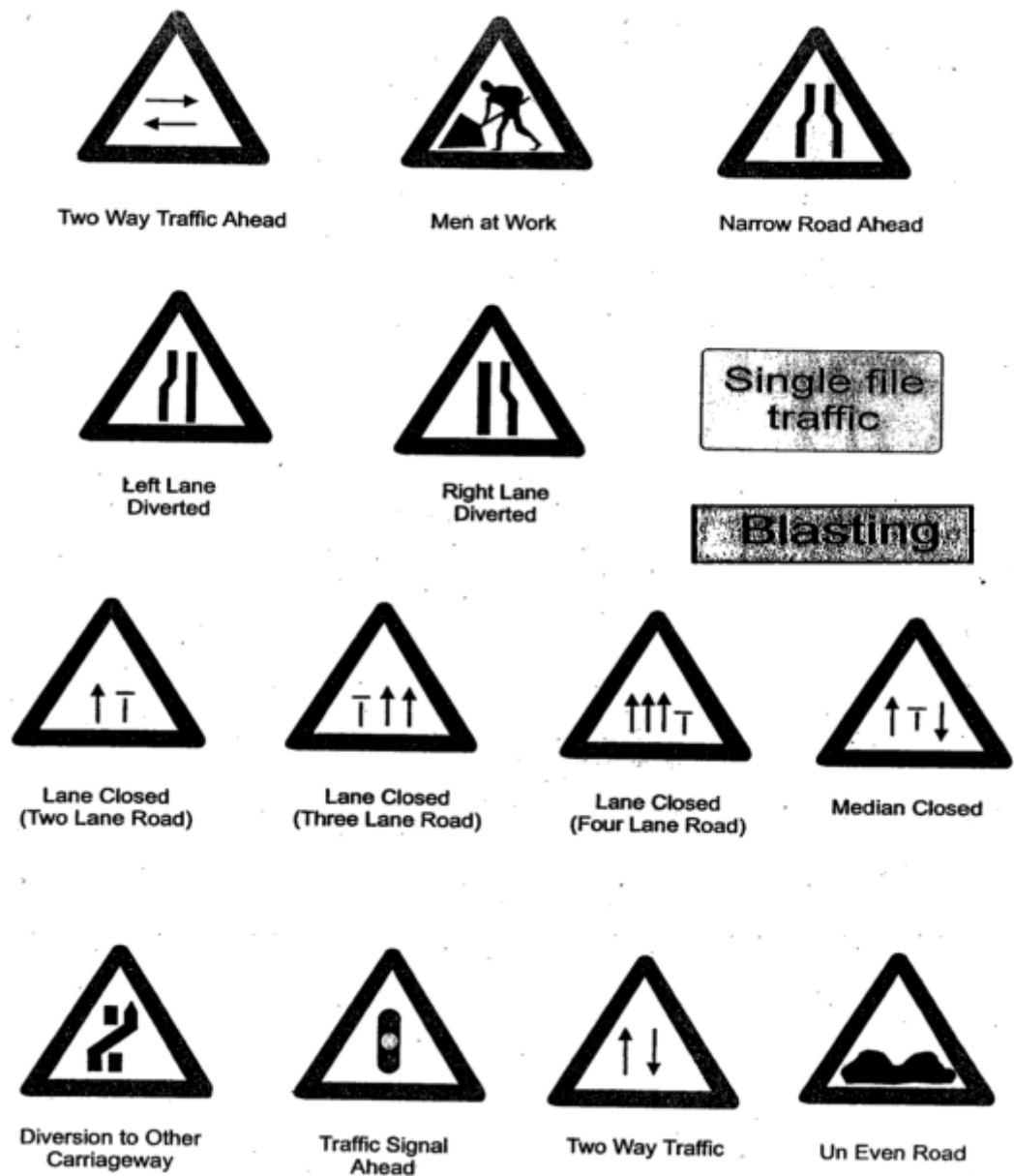


SHAMLAJI EXPRESSWAY PVT LIMITED

Warning Signs -

The warning signs to alert the drivers of the possible dangers ahead in construction zones are "Lane Closed". "Diversion to other Carriageway", "Divided Carriageway Starts", "Divided Carriageway Ends" and "Two Way Traffic" etc. These signs shall be explained with the help of rectangular definition plate of size appropriate to the size of warning triangle and placed 0.15 m below, from the bottom of the triangle.

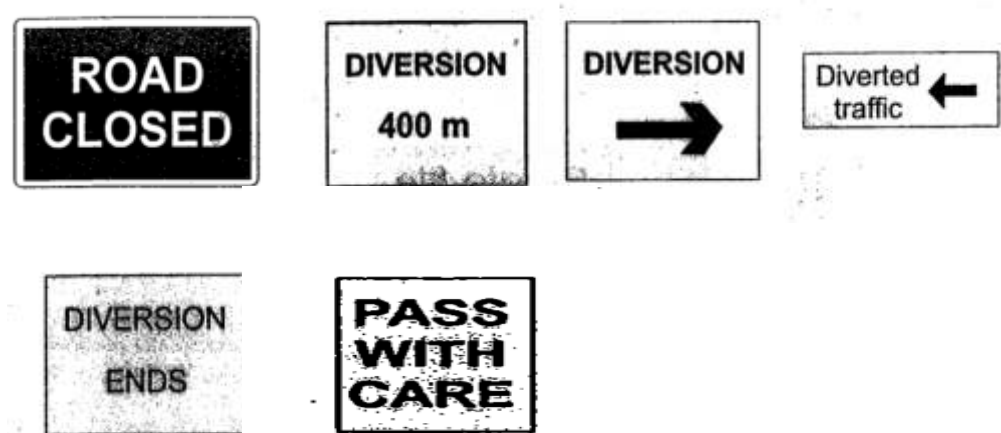
(Fig. 2)



Guide Signs -

Guide signs in construction zones shall have different background colour than the normal informatory signs of IRC: 67-2001. These signs shall have black messages and arrows on yellow (Traffic Yellow of IS: 5-1978) background. The commonly used guide signs are : "Diversion", "Road Ahead Closed" and "Sharp Deviation of route" etc.

(Fig. 3)



SHAMLAJI EXPRESSWAY PVT LIMITED

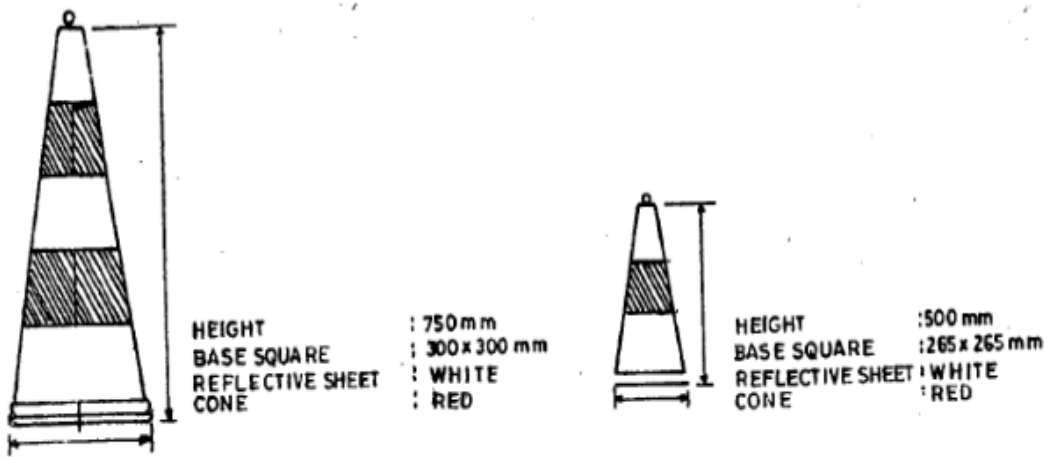
Delineators-

These channelling devices such as cones, traffic cylinders, tapes, drums shall be placed in or adjacent to the roadway to guide the drivers along a safe path and to control the flow of traffic. These shall be retro-reflectorised for- night visibility and shall be as per IRC: 79-1981 (Recommended Practice for Road Delineators). In addition the other delineators shall be provided as detailed below.

Traffic Cones and Cylinders -

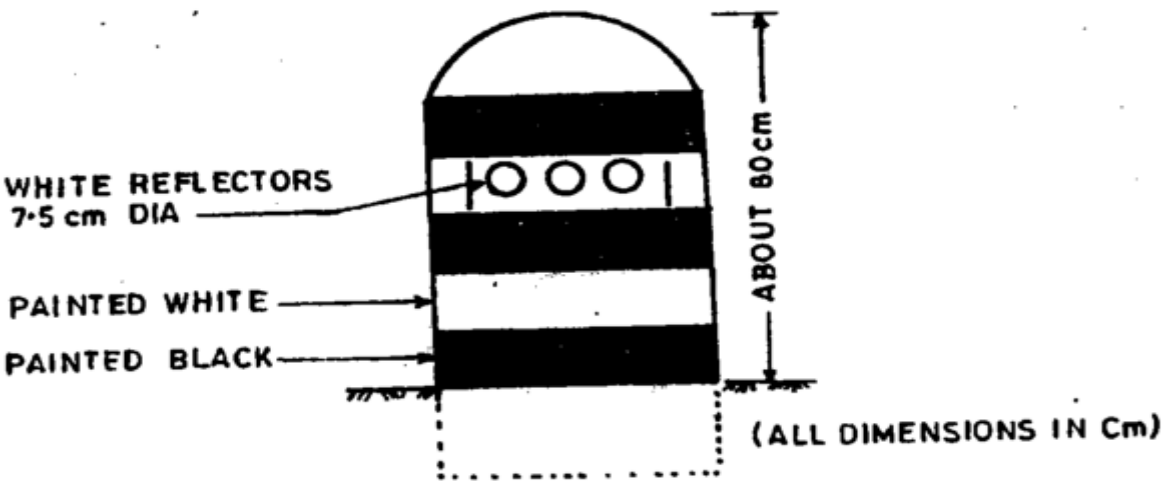
Traffic cones shall normally be 0.5m to 0.75 m high and 0.3m to 0.4m in diameter or in square shape at the base. These shall be made of plastic or rubber with retro reflectorised red and white band and should have suitable anchoring so that they are not easily blown over or displaced, it is preferable to use double cones, one over the other. The cones shall be placed close enough together to give an impression of the continuity. The spacing shall be 3m (close) to 9m (normal). Larger size cones shall be used for high speeds or where more conspicuous guidance is required.

(Fig. 4)



Drums -

Empty bitumen drums (made of metal) cut to the required height and painted distinctly can be used as Channelising devices. These drums can also be of plastic. As delineators these drums shall be about 0.80 to 1.0 m high and 0.30m. in diameter. They shall be painted in circumferential strips 0.10 m to 0.15 m wide, alternatively in black and white colours.



SHAMLAJI EXPRESSWAY PVT LIMITED

Barricades -

Whenever the traffic has to be restricted from entering the work areas, such as excavations or material storage sites so that protection to workers is provided or there is a need for separating the two way traffic, barricades shall be used. The barricades can be portable or permanent / Semi-permanent/Temporary type and shall be made of wooden planks, metal or other suitable material. The horizontal component facing the traffic shall be made of 0.30 m wide wooden/steel planks joined together and painted in alternate yellow and white strips of 0.15 m width and sloping down at an angle of 45 degree in the direction of the traffic.

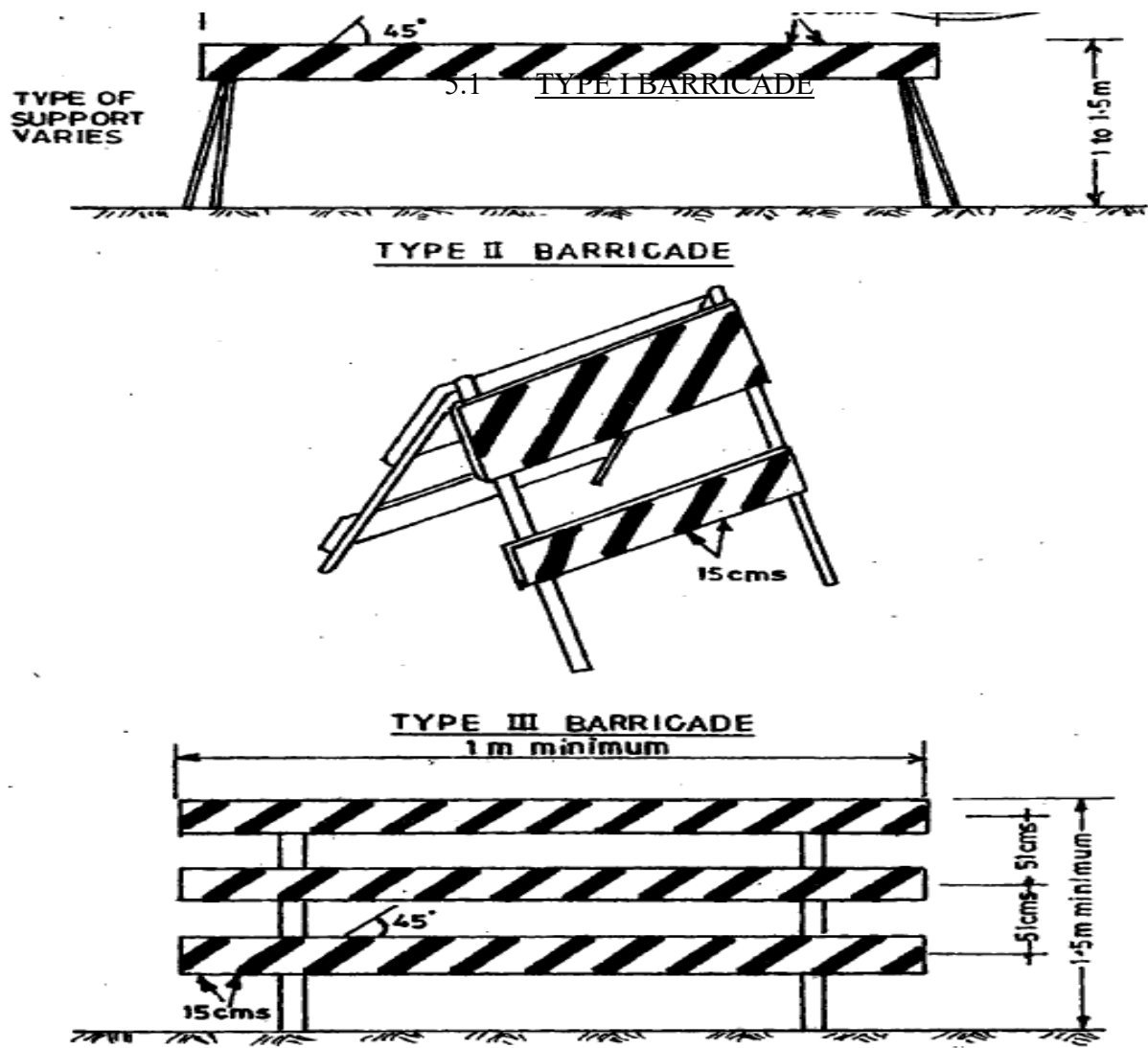
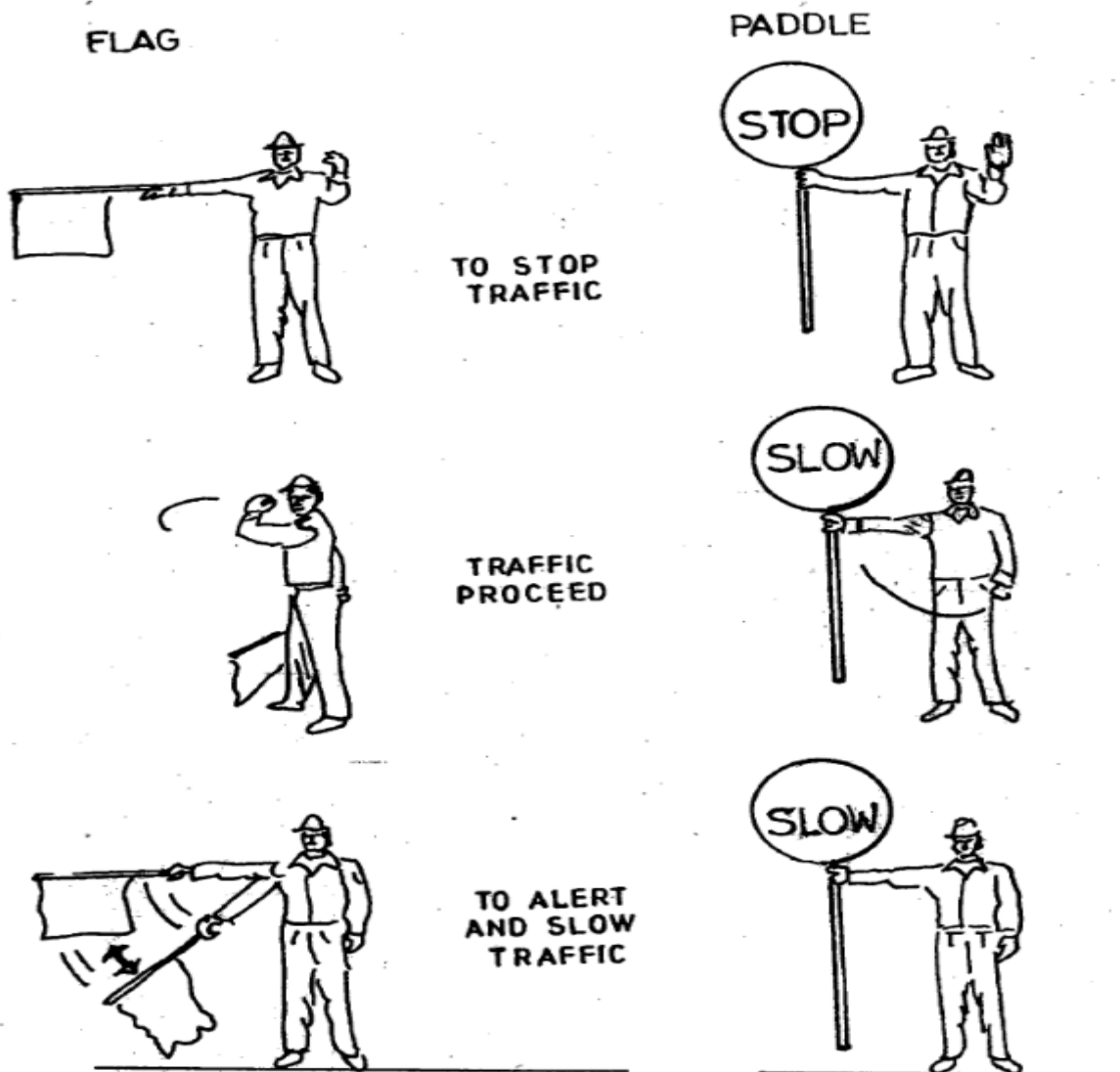


Figure shows three types of barricades. Type I and II are portable type and shall be used for small works and Type III is permanent type, suitable for major work areas. Suitable support or ballasting shall be provided so that they do not over turn or are not blown away in strong -winds. In case of a permanent type barricade, a gate or movable section shall be separately provided to allow the movement of construction/supervision vehicles.

SHAMLAJI EXPRESSWAY PVT LIMITED

Flagmen -

Flagmen with flags and sign paddles shall be used to guide the safe movements of traffic. The flags for signalling shall be 0.60 m x 0.60 m size, made of a good red cloth and securely fastened to a staff of approximately 1 mtr. in length. The sign paddles shall conform to IRC: 67-2001 and provided with a rigid handle.



Access to sites

- Pedestrian and vehicular access shall be separated.
- Adequate lighting and signs shall be posted on all routes.
- Routes shall be free of obstructions/tripping hazards.
- Ladders used, as access to heights shall be placed away from vehicle/equipment and secured at top.

5.2 Air Tools

Pneumatic power tools shall be secured to the hose in a positive manner to prevent accidental disconnection.

Safety clips or retainers shall be securely installed and maintained on pneumatic impact tools to prevent attachments from being accidentally expelled.

The manufacture's safe operating pressure for all fittings shall not be exceeded. Pressure measurement gauges shall be checked for being in good working condition and shall be calibrated in specified period.

SHAMLAJI EXPRESSWAY PVT LIMITED

5.3 Confined Spaces

All employees required to enter into confined or enclosed spaces shall be instructed about the nature to the hazards involved, the necessary precautions to be taken, and the use of required protective and emergency equipment. The contactor shall comply with any specific regulations that apply to work in dangerous or potential dangerous areas. Confined or enclosed spaces include, but are not limited to, storage tanks, process vessels, bins, boilers, ventilation or exhaust ducts, sewers, underground utility vaults, tunnels, pipelines and open top spaces more than 4 feet deep such as pits, tubs, vaults and vessels.

5.4 Concrete and Masonry Construction

No construction loads shall be placed on portion of a concrete structure unless the Supervisor determines based on information received from a person who is qualified in structural design, that the structure or portion of the structure is capable in supporting the loads.

All protruding reinforced steel onto and into which employees could fall shall be guarded to eliminate the hazard.

No employee shall be permitted to work under concrete buckets while buckets are being elevated or lowered into position. To the extent practical, elevated concrete buckets shall be routed so that no employee or the fewest number of employees are exposed to the hazards associated with buckets or concrete falling from it.

Form work shall be designed, fabricated, erected, supported, braced, and maintained so that it is capable of supporting without failure all vertical and lateral loads that may reasonably be anticipated to be applied to form work.

Forms (except those used for slabs on grade and slip forms) shall not be removed until it is determined that the concrete has gained sufficient strength to support its weight and superimposed loads. Such determination shall be based on one of the following:

- The plans, specifications and stipulated conditions for removal of forms or
- The concrete has been properly tested with an appropriate standard test method designed to indicate the compressive strength, and the test results indicate that it has gained sufficient strength to support its weight and superimposed loads.

To the practically feasible extent at site, a limited access zone will be established whenever a RE/masonry wall is under construction. The zone shall conform to the following as far as practicable:

- It shall be established prior to the start of construction of the wall.
- It shall be equal to the height of the wall to be constructed plus 1.2 meter's, and shall run the entire length of the wall.
- It shall be established on the side of the wall that will be unscaffolded or free standing/unsupported
- It shall be restricted to entry by employees actively engaged in construction the wall. No other employees shall be permitted to enter the zone.
- It shall remain in place until the wall is adequately supported to prevent overturning and to prevent collapse.

All masonry walls more than 2.4 meters in height shall be adequately braced to prevent overturning and to prevent collapse unless the wall is adequately supported so that the wall will not overturn or collapse. The bracing shall remain in place until permanent supporting elements of the structure are in place.

The project includes more than 12 Kms length of RE walls. The precautions to be taken while executing RE walls construction are as under:

- The RE walls shall be executed by a team comprising of trained personnel.

SHAMLAJI EXPRESSWAY PVT LIMITED

- All precautions stated in the manufacture's erection manual and literature shall be ensured by preparing checklists prior to the commencement of the erection and carrying out necessary checks during execution.
- Area of RE Walls shall be clearly demarcated.
- The RE Wall shall be continually checked during erection by the supervisors for tolerance limits of verticality, bulging, bowing, steps of joints and horizontal alignment along the top.
- Both walls shall be erected simultaneously.
- All precautions for use of cranes / hoisting equipment shall be taken as per clause 5.5 of safety manual.
- The workers handling RE wall panels shall be careful that body parts do not come between two panels or between the panel and the truck body.
- The panels shall be properly secured to the hoisting equipment before lifting.
- The panels stacked on the transport shall be safely secured to the vehicle against longitudinal / transverse slippage during transportation.
- A stack shall not contain more than six panels. Blocks shall be used to separate each panel to prevent damage to the panel face and reinforcing strips (tie strips).
- The first row of panels is placed on an unreinforced concrete leveling pad. These panels shall be braced with temporary props to ensure that they do not move from their initial position.
- Correct spacing between panels shall be maintained through use of spacer bars.
- Verticality and correct alignment of the panels shall be controlled as under :
 - > Wooden wedges shall be placed on the outside face of the wall in steps found near the dowel connection. Wedges shall be removed gradually as the wall rises.
 - > Each panel shall be clamped to the adjacent panels while back filling is in progress.
 - > The supervisor shall carefully monitor the panels for movement during compaction of the backfill.
- The RE wall shall be protected from the possibility of being hit directly by the vehicles moving on the adjoining diversion/slip roads.
- The outside pavement adjoining RE foundation pad shall not be excavated in long stretches. If unavoidable short lengths may be excavated after ensuring that the RE walls are supported properly.
- The ground shall be rolled by minimum 8 passes of the 8 - 10 T vibrating roller prior to the start of construction of RE walls and tested for compact and approved.

Placing and compaction of back fill material

- > Tracked equipment shall not be allowed to come in direct contact with reinforcing strips.
- > Heavy equipment shall not be allowed to come within 1.5m of wall. The limited access zone shall be marked with tape. "No heavy equipment beyond this point". Tags shall be slung from the tape every 25m.
- > Compaction of backfill close to the wall shall be done only with hand operated vibrating plate compactor or with light weight rollers. (less than 500 kg). The compactor shall move only parallel to the wall.
- > Props shall be placed on two layers for preventing outward movement before compaction is started.
To avoid kicking out backfill shall not be placed against the initial row of panels until the first row of reinforcement has been connected.

SHAMLAJI EXPRESSWAY PVT LIMITED

5.5 Cranes/Hoisting Works

- The use of a crane to hoist employees on a personnel platform shall be prohibited, except when the erection, use and dismantling of conventional means of reaching the worksite such as a personnel, hoist, ladder, stairway, aerial lift, elevating work platform or scaffold would be more hazardous.
- All unloading from cranes shall be carried out on firm ground to ensure stability of both the crane transporting vehicle.
- Materials to be unloaded shall be securely tied together so that they do not loosen up while being hoisted.
- Same precautions shall be observed during loading process.
- No overloading of hoisting equipment shall be allowed.
- No personnel shall be allowed to move under a hoisted loads during movement. It is the responsibility of the operator to ensure this.
- Periodic inspection of hoisting wire including shackles shall be made to ensure the integrity of these items.

5.6 Drinking Water

An adequate supply of potable water shall be provided in all places of employment.

Portable drinking water containers shall be capable of being tightly closed and equipped with a tap. Using a common drinking cup is prohibited. Where single service cups (to be used but once) are supplied, both a sanitary container for unused cups and a receptacle for used cups shall be provided.

5.7 Electrical Installations

Assured equipment grounding conductor program shall be implemented covering extension cords; cords and plugs connected equipments.

- A written description of the program shall be available.
- A qualified supervisor shall be deputed to implement the program.
- Daily visual inspections of extension cords, cord and plug connected equipment shall be carried out for defects. Equipment found damaged or defective shall not be used until repaired.
- Continuity test of the equipment grounding conductors or receptacles, extension cords, cord and plug connected equipment, shall be made every three months.
- Lamps for general illumination shall be protected from breakage.
- Only qualified personnel shall be allowed to handle electrical installations.

5.8 Electrical Work Practices

Concessionaire shall not allow employees to work near live parts of electrical circuits, unless the employees are protected by one of the following means:

- De-energizing and grounding the parts
- Guarding the part by installation

In work areas where the exact location of underground electrical power lines is unknown, employees using jack hammers, bars, or other hand tools that may contact the lines will be prevented from working until an electrical shutdown is arranged.

Barriers or other means of guarding shall be used to ensure that workspace for electrical equipment will not be used as a passageway during periods when energized parts of equipment are exposed.

Worn or frayed electrical cords or cables shall not be used. Extension cords shall not be fastened with staples, hung from nails, or suspended by wire.

Only qualified electricians shall be employed to undertake electrical works.

SHAMLAJI EXPRESSWAY PVT LIMITED

5.9 Excavating and Trenching

The established location of utility installations - such as sewer, telephone, fuel, electric, water lines, or any other underground installations reasonably be expected to be encountered during excavation work shall be determined prior to opening an excavation.

Utility companies or owners shall be contacted within established or customary local response times, advised of the proposed work, and asked to establish the location of the utility underground installations prior to the start of actual excavation.

When excavation operations approach the estimated location of underground installations, the exact location of the installations shall be determined by safe and acceptable means. While the excavation is open, underground installations shall be protected, supported or removed, as necessary, to safeguard employees.

Each employee in an excavation shall be protected from cave-ins by an adequate protective system except when:

- Excavations are made entirely in stable rock, or excavations are less than a meter and one half in depth and examination of the ground by a supervisor provides no indication of potential cave in.
- Protective systems shall have the capacity to resist all loads without failure, that are intended or could reasonably be expected to be applied or transmitted to the system.

Employees shall be protected from excavated or other materials or equipment that could pose a hazard by falling or rolling into excavations. Protection shall be provided by placing and keeping such materials or equipment at least a meter from the edge of excavations, or by the use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.

Daily inspections of excavations, the adjacent areas, and protective systems shall be made by Site Supervisor for evidence of a situation that could result in possible cave-in. All supervisors, prior to the start of work, shall conduct an inspection and as may be necessary during the shift. Inspections shall also be made after every rainstorm or other hazard increasing occurrences.

5.10 Explosives and Blasting

Use of explosives/blasting is prohibited.

5.11 Eye and Face Protection

Eye and face protection shall be provided when machines or operations present potential eye or face injury.

Employees involved in welding operations shall be furnished with filter lenses or plates of at least the proper shade.

5.12 Fire Protection

A firefighting system shall be followed throughout all phases of the construction and demolition work involved. It shall provide for effective firefighting equipment to be available without delay, and designed to effectively meet all fire hazards as they occur. Firefighting equipment shall be conspicuously located and readily accessible at all times, shall be periodically inspected and be maintained in operating conditions.

Only approved containers and portable tanks shall be used for storing and handling flammable and combustible liquids.

SHAMLAJI EXPRESSWAY PVT LIMITED

No more than one hundred liters of flammable or combustible liquids shall be stored in a room outside of an approved storage cabinet. No more than three storage cabinets shall be located in a single storage area.

Storage in containers outside building shall not exceed four thousand liters in any one pile or area. The storage area shall be graded to divert possible spills away from buildings or other exposures, or shall be surrounded by a curb or dike. Storage areas shall be located at least six meters from any building and shall be free from weeds, debris and other combustible materials not necessary to the storage. The base of the storage area shall be lined with an impermeable plastic liner.

5.13 Form Work

- Motorized saws will be operated only by well-trained experienced personnel for cutting of any timber.
- Fixing above 1.5m shall be done on safely erected scaffolding.
- Removed formworks to be reused and discarded shall be neatly stacked in separate groups.

5.14 Hand Tools

Use of unsafe hand tools shall not be permitted.

Wrenches shall not be used when jaws are sprung to the point that slippage occurs. Impact tools shall be kept free of mushroomed heads. The wooden handles of tools shall be kept free of splinters or cracks and shall be kept tight in the tool.

5.15 Head Protection

Head protective equipment (helmets) shall be worn without fail in all work areas to avoid possible danger of head injuries from impact, flying or falling objects, or electrical shock and burns, etc. No personnel, working on the project facility will be allowed on the site without head protecting equipment, irrespective of rank.

5.16 House Keeping

Form and scrap lumber with protruding nails and all other debris shall be kept clear from all work areas. Combustible scrap and debris shall be removed at regular intervals.

Containers shall be provided for collection and separation of all refuse. Covers shall be provided on containers used for flammable or harmful substances.

Wastes shall be disposed of at frequent intervals.

5.17 Jacking Equipment

Jacking equipment shall be capable of supporting at least two and one-half times the load being lifted during jacking operations and the equipment shall not be overloaded.

No employee, except those essential to the jacking operation, shall be permitted in the building/structure while any jacking operation is taking place unless the building/structure has been reinforced sufficiently to ensure its integrity during erection e.g. jacking for prestressing of precast girders shall be completed in an area barricaded off from the rest of the construction area.

5.18 Ladders

- Portable and fixed ladders with structural defects - such as broken or missing rungs, cleats or steps, broken or split rails or corroded components - shall be withdrawn from service.
- Repairs shall restore ladder to its original design criteria.
- Portable non-self-supporting ladders shall be placed on a substantial base, shall have clear access at top and bottom, and be placed at such angle so that the horizontal distance from the top support to the foot of the ladder is approximately one-quarter of the working length of the

SHAMLAJI EXPRESSWAY PVT LIMITED

ladder. All ladders shall be properly secured at the top by appropriate arrangement to eliminate any possibility of slipping.

- Ladders shall have nonconductive side rails if they are used where the worker or the ladder could contact electrical conductors or equipment.
- Job specific ladders shall be constructed for their intended use.
- Treads shall be uniformly spaced neither less than twenty-five centimeters nor more than thirty-five centimeters apart.
- A ladder (or stairway) shall be provided at all work points of access with a break in elevation of 1m or more except when a suitable ramp, runway, embankment or personnel hoist is provided for safe access to all elevations.
- Wood job made ladders with spliced side rails shall be used at an angle where the horizontal distance is one-eighth of the working length of the ladder.
- The ladder shall be secured at the top.
- Fixed ladders shall be used at a pitch not more than ninety degrees from the horizontal, measured from the backside of the ladder.
- Ladders shall not be used on slippery surfaces unless secured or provided with slip-resistant feet to prevent accidental movement. Slip-resistant feet shall not be used as a substitute for the care in placing, lashing or holding a ladder upon a slippery surface.

5.19 Medical Services and First Aid

The Concessionaire shall ensure the availability of medical personnel for advice and consultation on matters of occupational health hazards. All Contractors will ensure that First Aid kits are available at all work sites. The contents of the First Aid kit will be recouped as and when the same have been utilized. The items having a limited shelf life will be replaced well in time before the date of expiry. First Aid facilities will be provided at the site office and will be accessible to all workers. Following facilities will be stored in a dust proof cabinet marked "FIRST AID" with the name of First Aid attended on it. The safety box shall be maintained at the office under the arrangement of duty officer so that the unauthorized removal of contents of First Aid Box is checked and all personnel know as to where the first aid box will be available. The

First Aid Box shall also be kept at places at a distant work sites. The duty officer shall check the contents of the First Aid Box every Monday.

a) Antiseptic Savlon liquid	1 large bottle
b) Cotton wool for padding	50 gms
c) Scissors ordinary 12.5 cms long with both side sharp	1 Pair
d) Dispirin Tablets	10 Nos
e) Neospirin ointment	1 tube
f) Neospirin Powder	1 bottle
g) Safety Pins	10 Nos
h) Sterlised Burn Dressings	15 Nos
i) Adhesive dressing strips	15 Nos
j) Torch medium size	1 No.
k) First aid/shock treatment chart	1 No. for display
l) IpuBrufen - 500 mg	5 Nos.
m Avomin	10 Nos
)	
n) Iodex	2 Bottles
o) Burnol	2 Tubes
p) Distilled water	2 Lts
q) Toilet soaps	2 nos
r) Band-aid/sticking plaster shapes	1 Box containing 50 nos. of assorted
s) Eye wash solution	1 large phial
t) Flat Bandages	6 Nos assorted sizes
u) 4" Triangular Bandage for slings	2 Nos
v) Compressive Bandage for bleeding wounds	2 Nos
w) Disposable Gloves	1 Pair
x) CPR-DIN	1 No

SHAMLAJI EXPRESSWAY PVT LIMITED

A stretcher shall be kept in the first aid for emergency. A blanket shall be kept with the stretcher to protect injured person against shock.

5.20 Motor Vehicles and Mechanized Equipment

- All vehicles in use during construction/operation/maintenance shall be checked at the beginning of each shift to ensure that all parts, equipment, and accessories that affect safe operation are in proper operating condition and free from defects. All defects shall be corrected before the vehicle is placed in service.
- Heavy machinery, equipment, or parts thereof that are suspended or held aloft shall be substantially blocked to prevent falling or shifting before employees are permitted to work under or between them.
- The vehicles and mechanized equipments shall be so parked when not in use that they do not pose any obstruction to the traffic. In case it is unavoidable, these equipments shall be sufficiently notified to road users by providing blinker lights, etc.
- The vehicles and mechanized equipment will be driven only by valid license holders.
- Usage of site vehicles (Motorbikes, Jeeps, etc.) shall comply with the following :
 - > All vehicles shall be roadworthy, approved by Transport Department and properly insured with comprehensive policy for all approved riders. Passengers shall also be insured.
 - > Vehicles shall be properly equipped with first aid kits and accessories (jacks, spanners, screwdrivers, etc.) for use in emergency.
 - > Vehicles shall be serviced every 6000 km or 2 months whichever is earlier.

5.21 Personal Protective Equipment

The Concessionaire/Contractor shall be responsible for ensuring the wearing of appropriate personal protective equipment in all operations, in there respective area of responsibility, when exposure to hazardous conditions is indicated.

On the project corridor the wearing of protective helmet, orange coloured vest during day, orange coloured vest with reflective strips at night and covered shoes is mandatory for all personnel at all levels. The wearing of gloves and knee boots is mandatory for all workers handling bituminous material. The wearing of knee length gumboots is mandatory for workers employed on concreting operations.

Lifelines and safety belts shall be used for employees working at heights without platform.

Head protection, in the form of protective hats, shall do two things-resist penetration and absorb the shock of a blow. This is accomplished by making the shell of the hat of material hard enough to resist the blow, and by utilizing a shock absorbing lining composed of headband and crown straps to keep the shell away from the wearer's skull. Protective hats also protect against electrical shock.

Materials used in helmets shall be water resistant and slow burning. Ventilation is provided by a space between the headband and the shell.

Helmets shall not be stored or carried on the rear window shelf of an automobile, since sunlight and extreme heat may adversely affect the degree of protection.

Suitable eye protectors shall be provided for workers exposed to potential hazard for injury to the eyes or face from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, potentially injurious light radiations or a combination of these. Protectors shall meet the following minimum requirements:

- Provide adequate protection against the particular hazards for which they are designed.
- Be reasonably comfortable when worn under the designated conditions.

SHAMLAJI EXPRESSWAY PVT LIMITED

- Fit snugly without interfering with the movements or vision of the wearer.
- Be durable, cleanable and capable of being disinfected, and
- Be kept clear and in good repair.

There is no cure for noise induced hearing loss. Thus the prevention of exposure to excessive noise by ear plugs is the only way to avoid hearing damage.

Leggings protect the lower leg and feet from molten metal or welding sparks, Safety snaps permit their rapid removal.

Aluminum alloy, fiberglass, or galvanized steel foot guards can be worn over usual work shoes, although they may present the possibility of catching on something and causing workers to trip. Heat resistant soled shoes protect against hot surfaces like bituminous works.

A mechanic while repairing a machine, will leave a tag next to the ignition key of the machine/starting handle stating "MAN REPAIRING MACHINE, DO NOT START".

An electrician conducting electrical repairs, will remove the circuit breaker from the supply point and leave a tag at the electricity take of point stating "ELECTRICIAN REPAIRING CIRCUIT, DO NOT CONNECT THE LINE".

"SAFETY FIRST" stickers shall be displayed at prominent places at time offices.

5.22 Plant & Equipment

- Use of public roads shall be minimized wherever possible.
 - All vehicles entering into public roadways shall have license and must be approved to be road worthy by the relevant authorities.
- No overloading shall be allowed.
- Flagmen shall be assigned to direct the traffic safely through the areas affected by the construction work .
- Water shall be sprayed with a tanker to prevent dust and reduced visibility due to churning.
- Blinder lights shall be placed during working hours in the night.
- Plant equipment shall travel along designated haul road and other approved accesses to avoid congestion and incidents.
- Equipment shall be maintained and checked by experience foreman every month.

5.23 Railings

A standard railing shall consist of a top rail, intermediate rail, toe board, and posts and shall have a vertical height of approximately 1-meter from the upper surfaces of the top rail to the floor or platform.

The top rail of a railing shall be smooth -surfaced, with a strength to withstand at least 90 kilograms, the minimum requirement applied in any direction at any point on the top rail, with a minimum of deflection. The intermediate rail shall be approximately halfway between the top rail and the floor.

A stair railing shall be constructed similar to a standard railing with a vertical height of 75 centimeters from the upper surface of top rail to the surface of tread in line with face of riser at forward edge of tread.

5.24 Rebar Works

- Only competent and experienced people shall be allowed to operated bar cutting and bending machines.
- Rebar fixing at height higher than 1.5m will be done on safely erected scaffolding.

SHAMLAJI EXPRESSWAY PVT LIMITED

5.25 Scaffolds (General)

Scaffolds shall be erected on sound, rigid footing, capable of carrying the maximum intended load without setting or displacement. Scaffolds and their components shall be capable of supporting without failure, at least 4 times the maximum intended load.

All scaffolding and accessories shall have any defective parts immediately replaced or repaired. An access ladder or equivalent safe access shall be provided.

5.26 Sling Safety

The ability to handle materials is vital to all segments of industry whether moving from one location to another or during transit at work site. For example, materials must be moved in order to manufacture, sell, utilize or for being produced.

Slings are the most commonly used piece of materials handling apparatus because cranes and hoist rely upon slings to hold their suspended loads.

The operator shall exercise intelligence, care and common sense in the selection and use of slings. Slings shall be selected in accordance with their intended use, based upon the size and type of load and the load and the environmental conditions of the workplace. All slings shall be visually inspected before use to ensure that there is no obvious damage.

A well trained operator can prolong the service life of equipment and reduce costs by avoiding the potentially hazardous effects of overloading equipment, operating it at excessive speeds, taking up slack with a sudden jerk, and suddenly accelerating or decelerating equipment. The operator can look for cause and seek corrections whenever a danger exists. He or she shall co-operate with co-workers and supervisors and become a leader in carrying out safety measures not merely for the good of the equipment and the production schedule but more importantly for the safety of everyone concerned.

Care shall be taken when using alloy chain slings because they are subject to damage by sudden shocks. Misuse of chain slings could damage the sling, resulting in sling failure and possible injury to an employee.

Chain slings are the best choice for lifting materials that are very hot.

All slings types shall be visually inspected prior to use. When inspecting alloy steel chain slings, pay special attention to any stretching, wear in excess of the allowances made by the manufacturer and risks and gouges.

Wire Rope Sling selection. When selecting a wire rope sling to give the best service, there are four characteristics to consider: strength, ability to bend without distortion, ability to withstand abrasive wear and ability to withstand abuse.

1. Strength : - The Strength of wire rope is a function of its size, grade and construction. It shall be sufficient to accommodate the maximum load that will be applied.
2. Fatigue (Bending without failure) : - A wire rope shall have the ability to withstand repeated bending without the failure of the wires from fatigue. Fatigue failure of the wires in a rope is the result of the development of small cracks under repeated applications of bending loads. It occurs when ropes make small radius bends. The best means of preventing fatigue failure of wire rope slings is to use blocking or padding to increase the radius of bend.
3. Abrasive Wear : - The ability of wire rope to withstand abrasion is determined by the size, number of wires and construction of the rope. Smaller wires bend more readily and therefore, offer greater flexibility but are less able to withstand abrasive wear. Conversely,

SHAMLAJI EXPRESSWAY PVT LIMITED

the large wires of less flexible ropes are better able to withstand abrasion than smaller wires of the more flexible ropes.

4. Abuse:- All other factors being equal, misuse or abuse of wire rope will cause a wire rope sling to become unsafe long before any other factor. Abusing a wire rope sling can cause serious structural damage to wire rope, such as kinking or bird caging, which reduces the strength of the wire rope.

Storage : Wire rope slings shall be stored in a well-ventilated, dry building or shed. Never store them on the ground or allow them to be continuously exposed to the elements because this will make them vulnerable to corrosion and rust. And, if it is necessary to store wire rope slings outside, make sure that they are set off the ground and protected. There are four primary factors to take into consideration when safely lifting a load. They are (1) the size, weight and center of gravity of the load; (2) the number of legs and the angle the sling makes with the horizontal line; (3) the rated capacity of the sling; and (4) the history of the care and usage of the sling.

Chain slings shall be cleaned prior to each inspection, as dirt or oil may hide damage. The operator shall be certain to inspect the total length of sling. Periodically looking for stretching, binding wear or risks and gouges.

Wire ropes shall be lubricated according to manufacturer instructions. Lubrication prevents or reduces corrosion and wearing due to friction and abrasion.

5.27 Stairs

A stairway or ladder shall be provided at all access points with a more than 50cm break in elevation and no ramp, runway, sloped embankment or personnel hoist is provided.

Skeleton metal frame structures shall not be used as steps except during construction of the actual stairway.

Single point access between levels shall be kept clear to permit free passage for workers. Second point of access shall be used if access becomes crowded.

When two or more points of access are provided between levels, at least one point shall be kept clear.

Stairway and ladder fall protection system shall be provided as per rules before work begins.

Temporary stairways not forming part of the permanent structure on which construction work is to be performed shall have at least 75 centimeters deep and 55 centimeters wide landing at every vertical rise of 3.6 meters or less.

Stairways shall be installed between 30 degrees to 50 degrees, from the horizontal.

A platform shall be provided for doors or gates opening directly onto a stairway. The swing of the door shall not reduce the effective width of the platform to less than 50 centimeters. The metal pan landings and treads shall not be used for temporary storage except during actual construction of the stairway. Treads and landings worn below the top edge of the pan shall be replaced.

Stairways having four or more risers, or rising more than 75 centimeters, whichever is less, shall have at least one handrail. A stair rail shall be installed along each unprotected side or edge. When the top edge of a stair rail system serves as a handrail, the height of the top edge shall be between 90 to 95 centimeters.

To prevent walking on tread width less than 15cm, a spiral stairway shall be equipped with a handrail with sufficient offset.

Midribs, screens, mesh, intermediate vertical members, or equivalent intermediate structural members shall be provided between the top rail and stairway steps of the stair rail system.

SHAMLAJI EXPRESSWAY PVT LIMITED

Midrails, when used shall be located midway between the top of the stair rail system and the stairway steps.

The height of handrails shall not be more than 95 centimeters nor less than 90 centimeters from the upper surface of the handrail to the surface of the tread in line with face of riser at forward edge of tread.

The height of the top edge of a stair rail system used as a handrail shall not be more than 95 centimeters nor less than 90 centimeters from the upper surface of the stair rail system to the surface of the tread in line with face of riser at forward edge of tread.

Temporary handrails shall have a minimum clearance of 70 centimeters between the handrails and walls, stair rail systems and other object.

Unprotected sides and edges of stairway landing shall be provided with a standard 1.2 meters handrail and kick board.

5.28 Underground Construction / Underwater Construction

The Concessionaire shall control access to all openings to prevent unauthorized entry underground. Unused chutes, man ways, or other openings shall be tightly covered, bulk headed, or fenced off, and shall be posted with signs. Complete or unused sections of the underground facility shall be barricaded.

Unless underground facilities are sufficiently completed so that the permanent environmental controls are effective and the remaining construction activity will not cause any environmental hazard or structural failure within the facilities, the Concessionaire shall maintain a check-in / check-out procedure that will ensure that aboveground designated personnel can determine an accurate count of the number of persons underground in the event of an emergency.

All employees shall be instructed to recognize and avoid hazards associated with underground construction activities.

Fresh air shall be supplied to all underground work areas in sufficient quantities to prevent dangerous or harmful accumulation of dust, fumes, mists, vapors of gases.

Wall openings, from which there is a drop of more than 1.8 meters and the bottom of the openings is less than 1 meter above the working surface, shall be guarded.

When an employee is exposed to falling objects, the company shall ensure that each employee wear a hard hat and erect screens, or guardrails systems; or erect a canopy structure and keep potential falling objects far enough from the edge of the higher level; or barricade the area to which objects could fall.

5.29 Washing facilities

The Concessionaire shall provide adequate washing facilities for employees engaged in operations involving harmful substances.

Wire ropes, chains, ropes and other rigging equipment shall be inspected prior to use and as necessary during use to ensure their safety by safe supervisor. Defective gear shall be removed from service.

Job or shop hooks and links or makeshift fasteners formed from bolts, rods or other such attachments shall not be used.

5.30 Work Area Barricading

In order to provide protected areas, segregated from road traffic, to workmen, all work areas shall be barricaded with portable or permanent barricades of suitable materials according to IS code. The barricades shall be paint marked with alternate yellow/white stripes sloping at 45° towards the direction of traffic. The barricades shall be heavy and strong enough to withstand

SHAMLAJI EXPRESSWAY PVT LIMITED

strong winds. A gate or movable section should be provided to allow movement of personnel and machinery. The movements of personnel /machinery from work area to the road where traffic is plying, shall be properly controlled. The work area shall be demarcated by blinker lights placement suitably during day and night.

5.30 (A) Barricades for Structure Construction

Barricades for structures Construction work Area

- (a) Continuous barricades will be provided around structures work construction area. These shall be secured to ground.
- (b) The barricades shall be suitably marked to show traffic direction at turnings by reflective tape.
- (c) Blinkers will be provided at suitable spacing during night or during day when the visibility is low.
- (d) Provision will be made for movable sections/gates for entry / exit of machinery / vehicles.

5.30 (B) Barricades for Highway Construction

- (a) At all intersections, continuous barricades will be provided for 100m along Project on LHS and RHS, before taking up construction work. Reflective tapes will be provided for visibility.
- (b) The steel barricades at 7.5m spacing with barrier mesh between the open spaces shall be provided.

5.30 (C) Review of barricading / Delineating

The policy of barricading / delineating will be reviewed periodically, depending on effectiveness of the pattern in use.

6. SAFETY INSPECTIONS

6.1 Procedure

To control and minimize unsafe practices a daily inspection check is to be carried out in routine manner. This inspection is to be carried out by Safety Supervisors once every day. A comprehensive checklist is given below which covers the primary hazards:

- a) Contract Number
- b) Storage and use of inflammable materials, bottled gases
- c) Transportation or movement of heavy objects
- d) Sharp pointed objects
- e) Falling objects
- f) Excavating areas
- g) High rise structures
- h) Slippery surfaces
- i) Electrical connections
- j) Machinery's in running and idle condition
- k) Gas cutting sets & welding machines with other accessories
- l) General condition of the working zone, workmen and other salient features
- m) Tagging and tag removal in affected area
- n) Signature of Inspector.

SHAMLAJI EXPRESSWAY PVT LIMITED

6.2 Disciplinary Action

In case of poor safety performance, the concerned person shall be interviewed and then counseled. This shall be applicable to sub-Contractors who remain contractually bound on safety matters as well. In case no perceptible progress is made in safety performance, the personnel responsible shall be warned of possible disciplinary action.

A defaulting worker will be verbally warned on the first safety lapse. On second lapse a written warning will be issued. The third lapse will warrant termination of employment. IE A "three strokes and your'e out" rule will apply.

7. Safety Meeting

The safety officer/site manager will conduct the safety meeting at regular intervals. The agenda of the meeting will include the review of the previous meeting, future planning, accidents occurred during the period, preventive action taken. The minutes of the meeting will be recorded and circulated among the supervisors at all level and the safety officers.

8. Daily Inspection Report

- a. Contract No. :
- b. Name of work :
- c. Date of Inspection :
- d. Designated person to look after safety aspects :
- e. Number of employees in area :
- f. Any hazardous condition to be reported :
- g. Inspection to be carried out in the following items
 - Personal Protective Equipment :
 - Scaffolding/Access/Ladders :
 - Work Platforms :
 - Light Duty suspended stage :
 - Barricades :
 - Barriers Around Excavation :
 - Roadway working :
 - Portable Powered Tools & Equipment :
 - Mobile Plant :
 - Static Plant :
 - Cranes/Mobile Machinery :
 - Gas Cylinders :
 - Welding Protection :
 - Housekeeping :
 - Electrical connection & checking :
 - Other item if any :
 - Electrical Wiring :
 - Road marking on diversions/roads in bad condition :
 - Lighting of work areas at night :

8.1 Additional Remarks (hazardous or unsafe acts/conditions seen)

8.2 Action Taken on Unsafe Acts/Condition

8.3 Signature of Inspection authority

SHAMLAJI EXPRESSWAY PVT LIMITED

9.0 EMERGENCY PROCEDURES TO BE FOLLOWED:

The procedure to be followed while attending to an injured person shall be in the following sequence:

- D - Danger - Do not unnecessarily endanger yourself or others.
- R - Response - Assess the situation, check for any response from the injured person and decide your response.
- A - Airway - Check that the injured person's airway is not blocked
- B - Breathing - Check whether the injured person is breathing.
- C - Circulation - Check whether the heart of the injured person is working.
- CPR - Cardiac Pulmonary Resuscitation - In case the heart is not working or

Patient not breathing resort to mouth to mouth resuscitation.

A) FIRE

- 1. Raise vocal alarm immediately by shouting "Fire,Fire"
- 2. Direct all attention to the affected area.
- 3. Arrange to get and use the fire extinguisher as early as possible. Try to keep additional extinguisher ready for use if needed.
- 4. Emergency services like fire brigade, police and ambulance shall be contacted.
- 5. Mobilize workforce to tackle the fire before the arrival of fire brigade.
- 6. Try to retrieve important items from the area affected by the fire.

B) ACCIDENT AND INJURY

- 1. Do not take unnecessary risks
- 2. Do not subject others to unnecessary risks
- 3. Assess risk of prevailing situation
- 4. Provide prompt medical attention to the injured.
- 5. Check through first aid qualified person whether the patient is breathing and has a pulse. Qualified person should render first aid.
- 6. If necessary kiss of life to be given to the patient.
- 7. Do not remove the injured person unless he is in danger
- 8. Call an ambulance if the accident is of serious nature
- 9. Cordon off the area of accident
- 10. Do not disturb the location of the objects from the scene of accident.
- 11. Prepare a report on the accident including number of casualties.

10. MINUTES OF SAFETY MEETINGS

- a) Meeting No.
- b) Date
- c) Recorded by
- d) Name with designation of the Persons who attended the meeting :
- e) Agenda of the meeting :
- f) Review of the last meeting
- g) Review of work procedures :
- h) Hazardous Materials on work site :
- i) Audio visual program on safety if any :
- j) List of specific action items
- k) Other items if any
- l) Distribution to
 - 1. Project Manager / Safety Coordinator
 - 2. Consultant's Safety Officer
 - 3. Client's Safety Officer

SHAMLAJI EXPRESSWAY PVT LIMITED

11. TOOL BOX MEETING

11.1 Agenda for Tool Box Meeting

The following items are to be discussed on a fortnightly basis at Toolbox Meetings. The Project Manager and / or Safety Officer will determine the frequency and content of these regular items.

- a. Items of general safety importance to the Total work Site (generally as advised by the Project Manager or Safety Officer).
- b. Items of safety interest to the particular group (generally from the Supervisor's / Foreman's own walk around or from Safety Talk Tips - See Section 11.2.
- c. Review differing items of the HSP each fortnight.
- d. Employees responsibilities.
- e. Frequently reiterate:
 - Personnel search and no matches, lighters.
 - No smoking regulations
 - Permit and Certificates regulations
 - Clothing requirements
 - Personnel protective equipment regulations Quote any instances where employees have not complied
- f. Review employees understanding of isolation tag procedures and permit systems - have sample tags available.
- g. Discuss use of hazardous materials on the work site.
- h. Feedback to the management through Safety Officer.

11.2 Show and tell Safety Talk Tips

In general examples or instances of unsafe work practices or bad housekeeping's around respective work group shall be addressed, with physical examples

- a. Protection is the name of the game, whether it's a fence around your yard or a guard around a machine. Both serve useful purpose. Use a piece of security screen mesh as point of discussion on the value of guarding. Just as the security mesh can protect your home from intruders, the machine guards around the work place can protect you from serious injury. Ask the men to report when any fences are being by passed or removed, or any dangerous situation, which should be guarded but is not. You may be surprised at the knowledgeable answers you get.
- b. Quote recent examples of people in plaster casts. Ask your men how come people have to wear this sort of things. If any of them has worn a cast, have him tell some of the ways it was inconvenient, uncomfortable, restraining or disadvantageous. Discuss accidents involving slips, trips, falls and broken bones. Have the men identify hazards in their workplace that could such accidents and ways to eliminate them.
- c. Put your fingers in a loaded rattrap? Not likely! Pull back the spring on the rap and, after your fingers are in a safe position, let it fly. You'll certainly get everyone's attention when it slams shut. But more important, you can equate the rattrap with the very real dangerous hand traps in the area. The point: think of every unsafe position for your hands as a possible rat trap and watch your fingers: they have to last a lifetime. Make a survey of your area, pointing out all potential hand traps.
- d. A few spools empty of thread strung along a rubber band make an excellent model of the human spinal column. This "model" can be used to illustrate the danger of moving an injured person, when the spinal column should not be flexed. When the spools at either end are lifted, the row will bend in the middle, simulating the flexing of the spinal column. Moving an injured person with a broken back could sever the vital spinal cord. Similarly, the spools can be used to illustrate how little supporting strength the flexible backbone has, when "lifting", unless it is in an almost vertical position.
- e. Exhibit two grinding wheels, a new one and broken one. Have dialogue about the proper way to check, install, use and maintain this type of wheel. Review the

SHAMLAJI EXPRESSWAY PVT LIMITED

deadly hazard of exploding wheels and the need for consistent and correct use of guards, protective equipment and work procedure.

- f. A hammer with a cracked handle, a chisel with a mushroomed head, or any similar defective tool used in your work is an excellent visual contact for talk on hand-tools safety, Bring the tools to the meeting, and pass them around. Explain the difference kinds of injuries that could occur because of their poor condition. If an accident has already occurred, feel free to discuss it, especially if one of your own crew was injured. Tell the men what to do when one of their hand tools becomes damaged.
- g. Bring a dart or two and a small target. Ask for a volunteer to stand in front of the target while you throw a dart. When the guys tell you are crazy, you can tell them you are no crazier than the guys you have seen standing, without eyes protection, in front of the generators, chippers or whatever other machinery you have. After all, a chip can blind as easily as a dart. Discuss aspects of eye safety with the men.
- h. Display an electric tool or appliance with a frayed or cut cord. Explain that this kind of defect can kill, and shall be reported. A man touching this cord could be electrocuted, especially if he were touching metal piping or standing in water. Each man shall carefully check tools before they are used.
- i. Safety glasses that have saved someone's sight tell a compelling story, especially if that " someone" works for you or works in your business. Bring the safety glasses to the meeting and tell the facts about the accident. Let everyone see the impact they absorbed. Those with vivid imaginations can guess what the result would have been if the eye, instead of the glad had been hit.
- j. Ask your men, without looking, to tell the location of the fire extinguishers, and if they can, which kind of fire each of the extinguishers will fight. You may be amazed to find that almost no one can answer the question. Take this opportunity to take everyone on a "Cook's tour". Stop at each of the area of extinguishers, and explain to each of the men how it operates and what kind of fires it can put out
- k. Somewhere around the work area there may be an old piece of lumber with a big fat rusty nail sticking through it. Bring it to your meeting. Show it to your men and tell them where you found it. The danger is that the puncture inflicted by this nail may be filled with millions of tetanus germs. Without proper cleaning, medical treatment, and possibly a tetanus shot, the wound could become infected, with deadly lockjaw the possible result. Remind your crew to remove these nails or to bend them over. Proper safety shoes with sturdy soles are another precaution.

11.3 Minutes of Site Safety (Tool Box) Meeting Record:

Contractor's Supervisor / Foreman

Contractor's Project Manager /

Safety Officer:

Client Representative:

The following Contractor's Employees:

Items Reviewed and Discussed : (Write "NR" if not reviewed or discussed)

1. Review of Action Items from Last Meeting
2. Items of General Safety Importance to the Total Work Site
3. Items of safety interest to this Group (eg hazards or safety conditions applicable to this group's area.
4. Review of Work Procedures
5. Review of Following Items from HSP
6. Employees Responsibilities
7. Reminder Items

Tick as appropriate which item is reviewed and discussed

Personal	
protective equipment	Housekeeping
Electrical equipment	condition
Gas bottle	safety
Special Client Requirement	eg No smoking Regulations
Permit and Certificate	Regulations

8. Hazardous Materials on Works Site
9. Show and Tell Safety talks Tips
10. Safety Hand Outs.

Personal Details of the injured worker

Date of Birth

Basis of Employment: Starting Time

Other - State

Number of Hours ☐ 8 Hours or less ☐ more than 8 hrs.

- Job Details :

	X	X	S
Main tasks performed			

Training provided

- ☐ Induction Training
- ☐ Task specific Training
- ☐ Both of the above
- ☐ Neither of the above

- Details of the injury or disease

a. Date injury occurred

b. Time injury occurred

(24 hours clock format)

c. Nature of injury or disease

d. Bodily location of injury or disease

e. Description of occurrences of injury or disease

f. In which part of the workplace did the

Injury or disease exposure occurred

(Eg. Machine Shop, freezer room, mine)

g. What was the worker doing at the time ?

h. What happened unexpectedly?

i. Include the name of any particular chemical,

product, process or equipment involved

(eg. Brakes, failed on fork lift truck, slipped

on wet floor, scaffolding collapsed, arm started

hurting on a work processor)

j. How exactly was the injury or disease sustained :

k. Include the name of any chemical product, Process or equipment involved (eg.

Head hit on cabin of fork lift/truck, lacerated knee when landing on ground, arm hurt

after long period of typing)

SHAMLAJI EXPRESSWAY PVT LIMITED

- Lost time Injury / Disease :

(Additional questions to be answered for cases, which result in a fatality or permanent disability or where there was time, lost from work of one or more days/shifts. These questions shall be completed as soon as possible after the injury or disease is reported.)

Employee's preferred language

- Type of Employment
- ☐ Full time permanent
☐ Full time casual
☐ Part time Permanent
☐ Part time casual

- Type of employee
- Wage / Salary
- ☐ Trainee
☐ Casual
☐ Apprentice
☐ Other

Worker's experience in task being carried out when injury or disease occurred

Years _____ Months _____

- Proportion of shift worked
- ☐ 25% or less
☐ 26% - 50%
☐ 51% - 75%
☐ Not required

- Was the injury or disease
- ☐ Fatal
☐ Non-Fatal

Preventive action proposed or taken (tick one or more boxes as appropriate)

- Yes
- Change to induction training

Change to ongoing training

Equipment/Machinery modification

Change to work procedures

Change to work environment

Equipment/machinery maintenance

Other job redesign

Other preventive action

Date of resumption of work

Short-tem alternative duties

Permanent alternative duties

Normal duties
- ☐

☐

☐

☐

☐

☐

☐

☐

☐

☐

☐

☐

(Enter each data where applicable)

Total number of working days lost

(Shall be computed only when the worker has resumed permanent duties)

- Details of person completing this form

Name _____

Safety Officer _____

Signature _____ Date _____
- Other Details

Name of person in charge and position _____

Has the person completed report? Yes / No

Are there any witnesses? Yes / No

Has the injured worker returned to work? Yes / No

If no, are there any alternative duties the worker can perform?

SHAMLAJI EXPRESSWAY PVT LIMITED

Is this a recurrent injury?
Was there a definable occurrence?
Has a worker's Compensation Claim been rejected?
Were other workers affected by this occurrence?

• Preventive Action

Changes to Induction / Ongoing Training?	Yes / No
Equipment/Machinery Modification	Yes / No
Change to work Procedures	Yes / No
Job Re-Design	Yes / No

Supervisor	Time and date investigated	AM/PM
	Time and date injury was reported	AM/PM

Comments : What action has been taken, or recommended, to prevent recurrence?

- Safety Officer's Comments Signed _____
- Manager's Comments Signed _____
- Management's Instruction Signed _____

13. EMERGENCY TELEPHONE NUMBERS:

POLICE	100
FIRE BRIGADE	101
AMBULANCE	102
HOSPITAL	102
PROJECT SAFETY OFFICER	
CORRIDOR CONTROL ROOM	
G.M. CORRIDOR CONTROL	
STRUCTURAL GENERAL MANAGER	

14. SURVEILLANCE

Around the clock surveillance of the project area shall be done in addition to the review of daily safety inspection report and other periodic review/meeting in order to achieve the desired goal of highway safety. The highway surveillance will be focused on the following:

- Enforcing the implementation of highway safety programme and procedures

SHAMLAJI EXPRESSWAY PVT LIMITED

- Improving the driving and construction environments
- Preventing the precious human resources
- Ensuring safety of road users and construction/operation/maintenance personnel
- Ensuring implementation of traffic management plan including traffic enforcement and adherence to traffic safety measures like use of signage, traffic zones, traffic control devices, delineators, etc. to reduce the frequency and severity of highway accidents.
- Ensuring safety of public utilities and project assets including checking all kinds of encroachments and unauthorized construction
- Ensuring safety of environments
- Keeping strict watch on activities leading to major causes of accidents like inadequate supervision, non use of personal protective equipments, carelessness in work, unsafe acts, unsafe conditions, etc. and ensuring necessary remedial/preventive measures.
- Accident investigations and future preventive measures.
- Proper co-ordination of safe measures with concerned agencies
- Adoption of defined emergency procedures and ensuring prominent display of telephone nos. of emergency service, fire brigade, police, ambulance, hospital, fire, doctor, project director etc. and availability of first aid.
- Observance of safety during hazardous construction activities and provision of warning measures for potential hazards, their prevention and control.
- Holding periodical seminars and safety campaigns
- Effective Management of workers safety and health practice
- Involvement of local authorities in the road safety campaign
- Control of access to all openings to prevent unauthorized entry

The Surveillance shall be carried out under the direction and supervision of the Project Safety Officer who is responsible for the overall safety and control. He shall however be assisted by a duty officer for each construction package.

15. INDUCTIONS

All persons entering the project work area will be inducted. This will require;

- The explanation of possible dangers
- Nature of work being carried out
- Explanation of Personal Protective requirement.

Once inducted, the new employee must sign the induction form, which be kept on record.

APPENDIX - A

IRC:2 - 1968	Route marker Signs for National Highways (First Revision)
IRC:30 - 1969	Standard Letters and Numerals of Different Heights for use on Highway Signs.
IRC:31 - 1969	Route marker signs for State Routes
IRC:70 - 1977	Guidelines for regulation and Control of Mixed Traffic in Urban Areas.
IRC:99 - 1981	Recommended Practices for road delineators
IRC:99 - 1988	Tentative guidelines on the provision of Speed Breakers for Control of vehicular traffic.
IRC:SP:55 - 2001	Guidelines for Safety in Construction Zones.



SPEED LIMIT SIGN BOARD



Chainage No-503+000, RHS, Diversion Maintained



Chainage No-503+000, RHS, Diversion Maintained



Traffic diversion



Chainage no-450+860, LHS





NEW DIVERSION CH. NO-491+660 RHS SIDE (MOTIPURA)



NEW DIVERSION - CH. NO-520+980 RHS



DIVERSION MAINTENANCE AT CH.NO. -485+902 LHS(KAKROL



DIVERSION MAINTENANCE AT CH.NO. -488+540 RHS



**RE WALL EXCAVATION AREA BARRICADE BY DELINEATOR AT CH. NO 520+400
TO 505+020 TO 100**



**PIPE CULVERT AREA BARRICADE BY DELINEATOR WITH DANGER TAPE
CH NO 503+030 RHS**



**PIPE CULVERT AREA BARRICADE BY DELINEATOR WITH DANGER TAPE
CH NO 502+260 RHS**