



## **SAFETY AUDIT REPORT – 6 CONSTRUCTION STAGE**

### **FOR PACKAGE NO 15**

Six Laning of Tumkur-Chitradurga (Excluding Tumkur & Chitradurga Bypasses) section from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka to be executed as BOT (Toll) project on DBFO Pattern under NHDP Phase-V

Submitted by

Safety Consultant

HAKS Engineers, Architects and Land Surveyors, P.C.  
in association with InfoTrans Engineers Pvt. Ltd.



In Association with:



**February 2014**

**National Highways Authority of India**  
Ministry of Road Transport & Highways, Government of India

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## **Safety Audit Report 6 – Construction Stage**

Six Laning of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses) from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka to be executed as BOT (Toll) project on DBFO Pattern under NHDP Phase-V

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## **1.0 INTRODUCTION**

Six Laning of Tumkur-Chitradurga (Excluding Tumkur & Chitradurga Bypasses) section from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka to be executed as BOT (Toll) project on DBFO Pattern under NHDP Phase-V

Safety Consultant (SC) has conducted day and night time site audit of Four lane to Six lane of Tumkur – Chitradurga section (excluding Tumkur & Chitradurga Bypasses) on 19<sup>th</sup> & 20<sup>th</sup> February 2014.

This report is submitted as per S. No. 2 a) and S. No. 2 c) of clause 3.2. (Deliverables, Periodicity, Payment Schedule for Construction Period) of the Safety Consultancy Contract agreement. This Safety Audit Report – 6, for Construction Stage has to be read in continuation with SC's Safety Audit Report – 5, 4, 3, 2, 1 & 1A.

### **1.1. Project Background**

The Government of India, Ministry of Shipping Road Transport and Highways (MORT&H) is responsible for development and maintenance of National Highways in the country. The National Highway Authority of India (NHAI) is the executive wing of the MORT&H.

This project scope includes Up gradation, Operation and Maintenance from Km 75.00 to Km 189.450 of Tumkur–Chitradurga of NH-4 in the state of Karnataka to be executed as BOT (Toll) project on DBFOT Pattern under NHDP Phase-V.

In order to provide a better level of service to the vehicular traffic, it has been decided to augment the capacity of the Tumkur to Chitradurga section to six lanes.

### **1.2. The Concession Agreement**

The Concession Agreement for Design, Built, Finance, Operate and Transfer (DBFOT) Toll basis including maintenance of Tumkur – Chitradurga section from Km 75.000 to Km 189.450 of NH-4 in the State of Karnataka was signed on 16<sup>th</sup> August 2010 between National Highways Authority of India having principal office at G-5&6, Sector-10, Dwarka, New Delhi-110075 and IRB Tumkur–Chitradurga Toll way Private Limited as concessionaire having registered office at IRB Complex, Chandivali Farm, Chandivali Village, Andheri (East), Mumbai – 400 0072.

### **1.3. Independent Engineer (IE)**

The Concession Agreement envisaged the appointment of Independent Engineer (IE) by the NHAI. The Independent Engineer nominated by NHAI is The Intercontinental Consultants Technocrats Private Limited, India. The function of the IE is clearly defined in the Concession Agreement and must operate in the supervision of the Works, on behalf of the NHAI.

### **1.4. Safety Consultant (SC)**

It is stipulated in the Model Concession Agreement (MCA) of the PPP Projects that the Concessionaire shall develop, implement and administer a surveillance and safety program for providing a safe environment on or about the Project Highway and/or shall comply with the safety requirements set forth in **Schedule 'L'** of the Concession Agreement in Development, Construction and Operation & Maintenance Phase of the Project. It is also

## Safety Audit Report 6 – Construction Stage

Six Laning of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses) from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka to be executed as BOT (Toll) project on DBFO Pattern under NHDP Phase-V

stipulated in the Model Concession Agreement that NHAI shall appoint an experienced and qualified firm or organization as a “Safety Consultant” for carrying out safety audit of the Project Highway in accordance with the safety requirements set forth in Schedule-L for Development and Construction periods only.

HAKS Engineers, Architects & Land Surveyors P.C. in association with InfoTrans Engineers Pvt. Ltd., have been appointed as Safety Consultant (SC), by NHAI for Development and Construction Phase. The agreement between NHAI and HAKS-ITE was signed on 11<sup>th</sup> May 2012.

### 1.5. Project Details

|                                      |   |
|--------------------------------------|---|
| The Authority:                       | <b>National Highways Authority of India (NHAI)</b>  |
| Project Director:                    | <b>Mr. S.Vijay Kumar, NHAI – PIU, Chitradurga</b>   |
| Chief General Manager:               | <b>Mr. A. K. Mathur, NHAI – Regional Office, Bangalore</b>  |
| Concessionaire:                      | <b>M/s IRB Tumkur Chitradurga Tollway Pvt. Ltd., Mumbai</b>   |
| Independent Engineer:                | <b>M/s ICT</b>  |
| Road Safety Consultant:              | <b>HAKS Engineers, Architects and Land Surveyors, P.C. in association with InfoTrans Engineers, Pvt. Ltd.</b> |
| Length (Km) under Road Safety Audit: | <b>114</b>  |
| Concessionaire commencement date:    | <b>04.06.2011</b>   |
| Concession period:                   | <b>26 Years</b>   |
| Construction period:                 | <b>30 Months</b>  |
| Project Status:                      | <b>Construction in progress</b>   |

### Project Salient Details (Proposed)

|                         |   |
|-------------------------|---|
| 1. Project Chainage     | km 75.000 to km 189.000 (NH-4) (Length – 114 Km)  |
| 2. Flyovers             | 6 no  |
| 3. Major bridges        | 1 no (reconstruction on RHS)<br>3 no's existing<br>2 no's to be widened   |
| 4. Minor bridge         | Proposed: 2 no<br>Existing: 26 no (existing)<br>RCC Box structures– 14 nos., RCC Slab– 11,<br>With RCC, T beams - 1 |
| 5. Pedestrian underpass | Proposed: 15<br>Existing: 13  |
| 6. Cattle underpass     | Proposed: 5, Existing: 22   |
| 7. Foot over bridge     | Proposed: Nil, Existing: 9  |
| 8. Toll plaza           | 2 no @ km 104+530 & 173+230   |
| 9. Truck lay byes       | Proposed: 7<br>Existing: Nil  |
| 10. Bus bays            | Proposed: 38 & Existing: 17   |

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Six Laning of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses) from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka to be executed as BOT (Toll) project on DBFO Pattern under NHDP Phase-V

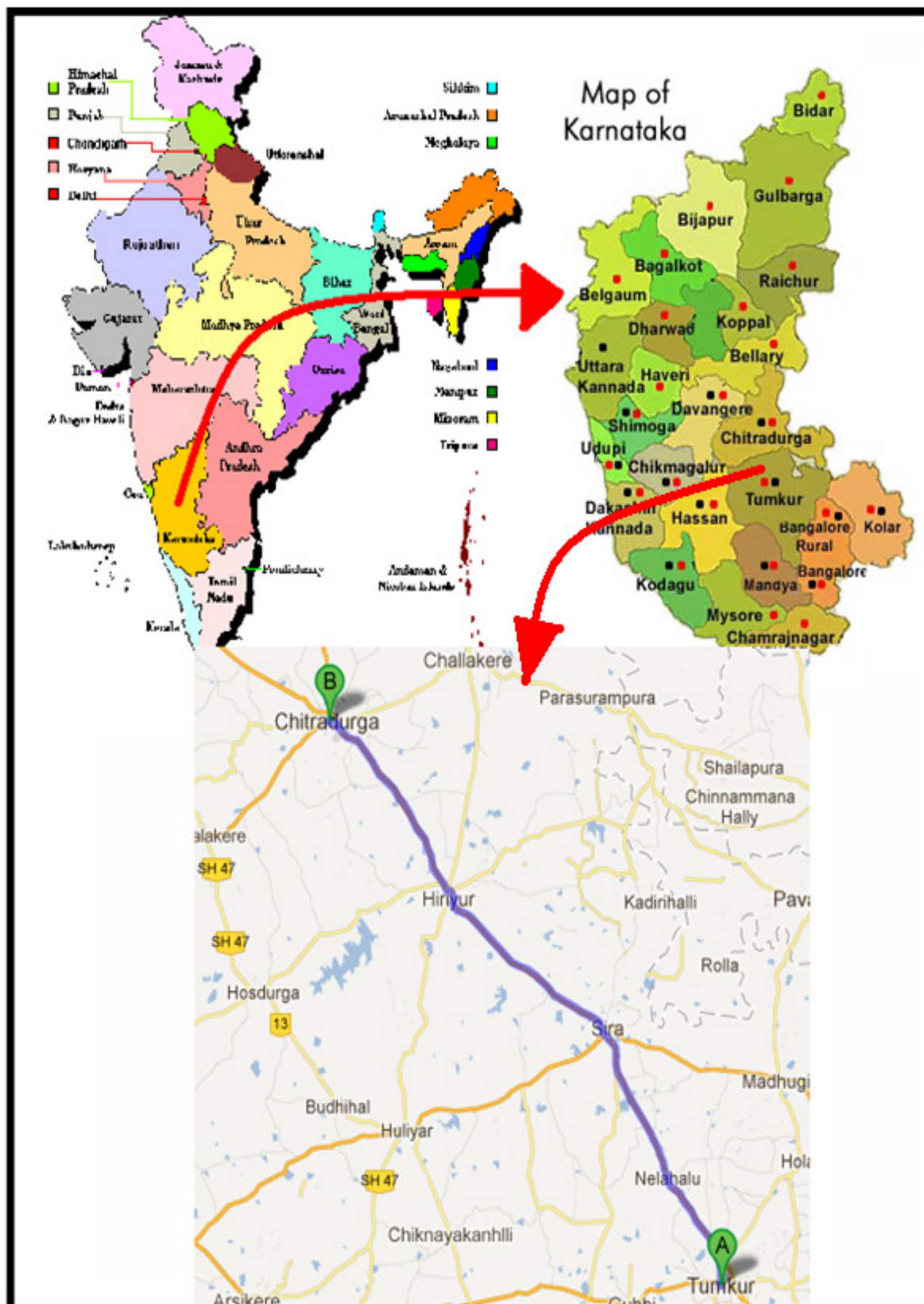


Figure: 1, Location Map

## Safety Audit Report 6 – Construction Stage

Six Laning of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses) from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka to be executed as BOT (Toll) project on DBFO Pattern under NHDP Phase-V

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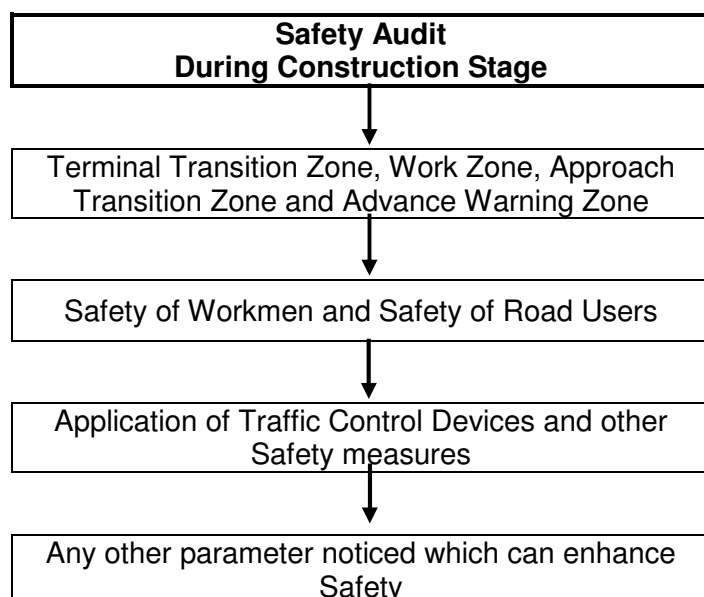
## 2.0 METHODOLOGY

In this report SC discusses the gap between what the road users are expected to do in a given situation and what they really do in that situation. Road Safety Audit (RSA) will review and report findings in this angle. The project highway is in advanced construction phase, where most of the section is under construction. The safety provisions for the sections of the highway where construction is either completed or not yet started have been audited and the findings are highlighted in this report.

The objective of RSA is to identify potential hazards during the *Construction Stage* of road projects by experienced road safety specialists and to evolve with possible remedial measures to improve road safety, with special emphasis on vulnerable road user group. Driver's behavior significantly changes as they traverse from construction to non – construction zones of the project highway. SC will inspect the Project Highway keeping into consideration the construction planning for the project and then identify the safety implications of the construction planning.

Construction zone is that area of the road which is affected by the construction works that affect traffic flow and safety of workers and road users. In this context it can also be called Traffic Control Zone. In rural areas, problem at these zones is accentuated by the reduced availability of carriageway, acquisition of land for diversions, etc. In urban areas, the problems are even more acute as diversions may have to be over adjacent road of the road network as well as the sharing of road space by different categories of road users. Traffic control zone can be divided into three major components i.e., Advance Warning Zone, Transition Zone and Work Zone. Manual on Traffic Management at Construction Zones is published by the Indian Roads Congress as IRC: SP: 55 should be referred to. Steps involved in the Audit are given below:

- Examination of Terminal Transition Zone, Work Zone, Approach Transition Zone and Advance Warning Zone with respect to safety point of view.
- Examination of safety measures adopted for workmen and road users.
- Examination of traffic control devices adopted at construction zone.



## Safety Audit Report 6 – Construction Stage

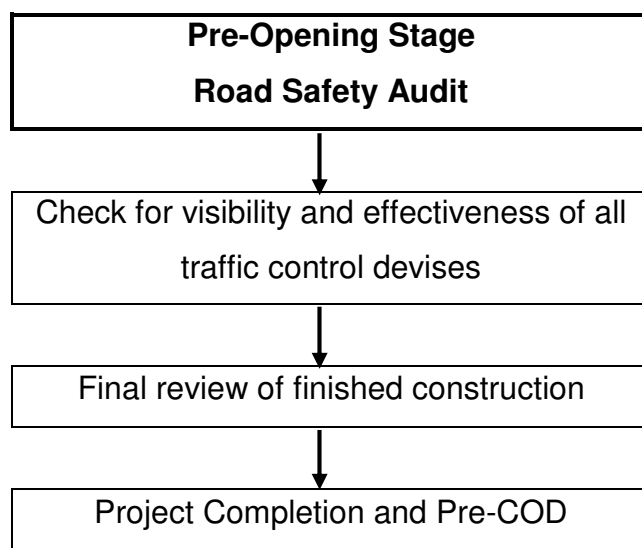
Six Laning of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses) from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka to be executed as BOT (Toll) project on DBFO Pattern under NHDP Phase-V

### Pre-Opening Stage Safety Audit

As per IRC: SP: 88-2010, the Pre-Opening stage is recommended immediately prior to opening of scheme. This should take the form of driving and when appropriate, walking and/or cycling the new route. This is checked also during night time to ensure that required night time safety standards have been achieved.

- A final review of the finished construction, to check from the standpoint of road safety that it is ready to be opened for traffic. It is particularly important to check the location and visibility of markings and other traffic control devices especially where changes were made during the construction period. The finished scheme should be assessed from the road users' point of view in daylight and in darkness.
- The auditor should examine whether or not road users are using the project facility in an appropriate manner.

Many schemes are constructed with the road open to traffic throughout the entire construction phase. When there is no question of an actual opening for traffic, an overall examination is to be carried out to audit whether the markings and all traffic control devices are in place. This examination is to be carried out by the auditor independently in the first instance and thereafter along with the Project Manager of the Contractor. Steps involved in Stage 5 Audit are given in Fig.1.



### 2.1. Safety Consultant's Project Activities

| S. No. | Activities taken up by SC      | Submissions   | References  |
|--------|--------------------------------|---|---|
| 1.     | Project start                  | Inception Report  | HAKS-ITE/ 2012/ P002/ RSC/ 15/NHAI/004 dated 16.06.2012 |
| 2.     | Conducting Training & Workshop | SC conducted 4 day training & workshop at BIT – Bangalore from 17 <sup>th</sup> to 20 <sup>th</sup> July 2012 |   |
| 3.     | Construction Stage             | Preliminary Safety Audit Report (for audit done during 8 <sup>th</sup> & 9 <sup>th</sup> Aug 2012)            | HAKS-ITE12/ P002/ RSC_15/ NHAI/ 006 dated 14.08.2012    |



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| S. No. | Activities taken up by SC | Submissions   | References  |
|--------|---------------------------|---|---|
| 4.     | Development Stage         | Safety Audit Report   | HAKS-ITE/2012/P002/RSC_15/NHAI/008 dated 29.08.2012 |
| 5.     | Construction Stage        | Safety Audit Report – 1<br>First Quarter (for audit done during 8 <sup>th</sup> & 9 <sup>th</sup> Aug 2012)                       | HAKS-ITE12/ P002/ RSC_15/ NHAI/011 dated 07.09.12   |
| 6.     | Construction Stage        | Safety Audit Report – 1A<br>First Quarter (for audit done during 8 <sup>th</sup> & 9 <sup>th</sup> Aug 2012)                      | HAKS-ITE12/ P002/ RSC_15/ NHAI/013 dated 08.10.12   |
| 7.     | Development Stage         | Accident Analysis Report (for Accident data collected for the period between Jan-2009 to Aug-2012)                                | HAKS-ITE12/P002/RSC_15/NHAI/015 dated 23.10.2012    |
| 8.     | Construction Stage        | Safety Audit Report – 2<br>Second Quarter (for audit done during 22 <sup>nd</sup> , 23 <sup>rd</sup> & 24 <sup>th</sup> Nov 2012) | HAKS-ITE12/P002/RSC_15/NHAI/024 dated 29.12.2012    |
| 9.     | Construction Stage        | One Day Site Work Shop Report - 1   | HAKS-ITE/2013/P002/RSC_15/NHAI/028 dated 21.01.2013 |
| 10.    | Others                    | Observance Report on 24 <sup>th</sup> National Road Safety Week   | HAKS-ITE/2013/P002/RSC_15/NHAI/029 dated 25.01.2013 |
| 11.    | Construction Stage        | Safety Audit Report – 3<br>Third Quarter (for audit done during 27 <sup>th</sup> & 28 <sup>th</sup> of Feb 2013)                  | HAKS-ITE/2013/P002/RSC_15/NHAI/033 dated 25.03.2013 |
| 12.    | Construction Stage        | Accident Analysis Report (for Accident data collected for the period between Sep-2012 to Feb-2013)                                | HAKS-ITE/2013/P002/RSC_15/NHAI/036 dated 18.04.2013 |
| 13.    | Construction Stage        | GAP Report  | HAKS-ITE/2013/P002/RSC_15/NHAI/039 dated 09.05.2013 |
| 14.    | Construction Stage        | One Day Site Work Shop Report - 2   | HAKS-ITE/2013/P002/RSC_15/NHAI/050 dated 26.06.2013 |
| 15.    | Construction Stage        | Safety Audit Report – 4<br>Fourth Quarter   | HAKS-ITE/2013/P002/RSC_15/NHAI/053 dated 19.07.2013 |
| 16.    | Construction Stage        | Safety Audit Report – 5<br>Fourth Quarter   | HAKS-ITE/2013/P002/RSC_15/NHAI/067 dated 17.12.2013 |
| 17.    | Construction Stage        | Accident Analysis Report (for Accident data collected for the period between MAR-2013 to OCT-2013)                                | HAKS-ITE/2013/P002/RSC_15/NHAI/068 dated 24.12.2013 |
| 18.    | Development Stage         | Comprehensive Safety Audit Report   | HAKS-ITE/2013/P002/RSC_15/NHAI/069 dated 04.01.2014 |
| 19.    | Construction Stage        | One Day Site Work Shop Report - 3   | HAKS-ITE/2014/P002/RSC_15/NHAI/081 dated 25.02.2014 |

**2.2. Safety Audit Team**

The physical inspection of the Project Corridor was carried out on 19<sup>th</sup> and 20<sup>th</sup> February 2014. Trips to the site were made during the day time as well as during the night time. The

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focus of primary observations was combined on road safety and measures taken for the safety of road users, work zones, protection of workers and pedestrians.

### **2.3. Safety Audit Report – 6: Construction Stage**

This Safety Audit Report – Construction Stage is the outcome of the physical inspection of the project corridor under construction (February 2014). This report will review the safety measures adopted by Concessionaire in the proposed construction activities and it will report potential hazards due to the noncompliance of safety norms. Further, it will review safety of completed project highway sections to identify gaps in implementation of safety measures recommended in Development Stage Safety Report. Note that this report's intent is to advise NHAI about immediate measures to be undertaken to improve work zone safety for all road users. Also the recommendations/improvements suggested herein are based on the philosophy of averting road accidents due to erroneous judgment of the drivers and to protect the vulnerable road users and workers in the work zone from getting involved in collisions.

### **2.4. Checklists (Included as Appendix – A)**

Checklists are useful to assist the audit team. These checklists describe the performance and situations that can affect the road safety. Checklists have been prepared for this Stage – Audit, as per IRC: SP: 88-2010. These checklists are used as a guide to focus audit towards important matters that should be covered and not overlooked. Each project is different and will raise specific issues that may contain further safety implications. When reviewing each of the points, the team considered that the road user would have to cope with conditions during night and in night/ adverse weather conditions.

### **2.5. Safety Audit Observations and Site Photos**

Safety Audit findings/ observations are listed in Appendix – B and corresponding site photos are attached as Appendix – C.

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### 3.0 DETAILED DISCUSSION AND RECOMMENDATIONS ON SPECIFIC SAFETY ISSUES

Road safety inspections have been conducted for the detailed assessment of defectives/deficiencies of the project highway by visual inspection. During the field investigations, the existing substandard features and roadway conditions, roadside obstructions, pavement markings, signs and other features were observed.

Though focus has been given to construction work zones, it was found that the entire length of the project roadway has non standard signage, non standard Exit/Entry ramps, unauthorized access, unprotected bridge approaches, non standard/retro reflective pavement markings and traffic control devices.

The detailed findings (direction wise and with chainage) from the audits carried out for each specific segment along with case specific mitigation measures have been given in the Summary Sheets placed at Appendix B. Appendix C give photographic descriptions (direction wise) of some of the more important deficiencies in safety measures at various locations. Below is a brief description of deficiencies as observed over various study sections comprising the entire study corridor.

#### 3.1. Access to Six Lane Highway:

SC has reviewed Six-Laning operations w.r.t. prevailing conditions at all existing openings along MCW. Overall, it is observed that there are many uncontrolled direct access points/U-turn facilities along the project highway. Slow moving vehicles entering MCW thru these openings from Service/ Side road/U-turn facilities and creating hazardous conditions for all as high speed thru traffic on MCW is unaware of these merging points. In light of the above please note the following:

- With reference to clause 1.3 of Manual of Specifications and Standards for Six Laning of National Highways through Public Private Partnership (Schedule – D of CA) states that: “access to the highway shall be provided only at pre-determined locations from service roads through properly designed entry/exit ramps and or from interchanges”.
- With reference to clause 2.2.1 of Manual of Specifications and Standards for Six Laning of National Highways through Public Private Partnership (Schedule – D of CA) states that “Inter connection between the service roads shall be through under passes only, Which will facilitate cross movement of local traffic from one side service road to other side service road.”
- Exit/Entry ramps should be provided with proper Deceleration/Acceleration Lane. It is observed that Kerbs are built at the exit locations from the MCW to S/R. SC recommends kerbs to be removed at such exit locations
- Provide standard pavement markings and Signing to guide the road user
- Install Road studs and Lighting at Exit/Entry Locations
- **RECOMMENDATION:** SC recommends that Independent Engineer is requested to review with Concessionaire on possibility of closing the open drain and utilize RCC Pipes to get additional lane/ space for deceleration/acceleration lanes for exit/entry ramps. IE & Concessionaire shall review SC’s recommendations to redesign Traffic Control Devices (Signs, Pavement Marking, Lighting) for Exiting traffic from MCW to S/R.

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Ch 80.000 Bullet type Exit without deceleration lane.

### 3.2. Traffic signs and road markings for guidance to user:

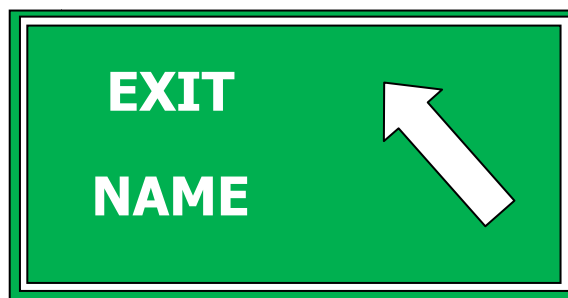
Note that Concessionaire is yet to submit revised Signage & Marking Plans addressing IE's & Safety Consultant observations. However, SC's observations on field review of installed signage are listed below:

- Placement and Design of IRC mandated minimum regulatory, cautionary, and informative sign were improper and not as per prescribed standards.
- At some locations none of IRC mandated signs were installed. Further, the Advance Direction signs/Flag Type Direction signs installed does not meet the dimension criteria as set forth in the specified Guidelines.
- **General Recommendations for Signing at the Exit/ Entry Ramps:**
  - a) At the entry point of the Service Road into the Main Carriageway "NO ENTRY" Sign to be provided. This is to prevent MCW traffic entering onto Service Road.
  - b) At the entry point of the Service Road into the Main Carriageway "GIVE WAY" Sign to be provided for the traffic entering the Main Carriageway.
  - c) "Merging Traffic Ahead" to be provided on the Main Carriageway min 180m ahead of the point of entry of the service road traffic into the main Carriageway.
  - d) For Exit Ramp from the Main Carriageway, Give Way Signs are recommended for Service Road Traffic. Only if the traffic is exiting into a through service road.
  - e) For grade separated intersections, (i.e. where the traffic movement occurs on two or more than two levels), two advanced direction signs should be provided. The first Advance Direction Sign is located 750m to 1.5km from the Exit, which should be preferably gantry mounted sign. The second Advance Direction Sign is located 250m to 750m from the exit. It should be gantry mounted; but at intersections where the number of through lanes remains constant, it may be shoulder mounted. Location of signs should be measured from the taper
  - f) A map type and stack type direction sign can be installed at 100m to 250m ahead of exit
  - g) An exit sign as shown below with name of the exit place can be installed at the start of deceleration lane

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Schematic Representation

- Majority of highway is furnished with non-retro reflective pavement marking. Remove old Pavement Markings
- Non-standard Private Advertisements are installed in the ROW.
- RECOMMENDATION: Concessionaire is required to install standard Signage, Retro Reflective Pavement Markings and remove private signs at the earliest.

### 3.3. Placement of Fixed Objects, Milestones to Travel Ways on MCW:

SC's field observations with respect of forgoing highways are listed below:

- KM stones are placed close to the edge of paved shoulder due to the presence of open ditch creating hazardous conditions for errant vehicles.
- RECOMMENDATION: It is recommended to relocate all KM stones to median side. Provide Standard and Retro reflective Hazard Markers ahead of metal crash beam railing was provided in front of ECBs



Ch 115.000 Km stone placed at the edge of shoulder.

### 3.4. Junctions, Median Openings & U-turn Facilities:

In SC's Field Review, it is noted that there are many direct access points along the project highway, where slow moving traffic from Service/ Side road/U-turn facility can directly access the high speed Six-Lane highway and Service Road / Cross Road/U –turn facility traffic can also cut across the highway thru median openings creating hazardous conditions to all road users. SC has raised this issue several times before through letters, reports, meetings & workshops and again it is requested that Concessionaire to review the following and take necessary actions:

- At-grade intersections/ U-turn facilities are not allowed on six-lane highways as they create unsafe operations at these locations and same is specified in Six-Laning Manual. Therefore, it is recommended to eliminate direct access from cross roads and services roads by providing combination of proper exits, entries and/or staggered median openings.

## Safety Audit Report 6 – Construction Stage

Six Laning of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses) from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka to be executed as BOT (Toll) project on DBFO Pattern under NHDP Phase-V

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Inter connections between S/R shall be through Under passes only, Which will facilitate cross movement of local traffic from one side service road to other side service road.”

- It is recommended to provide deceleration lane at U-turn facilities instead of using the outer lane as left turning lane
- It is recommended to remove the thru and Left turn lane pavement markings and provide thru lane marking only.
- It is recommended to close all unauthorized and unnecessary/redundant median openings.
- If Six-Laning Highway is required to have median openings, they should be designed to meet IRC standards with turning lanes, advanced warning along with proper delineation.



Ch 91.000 U-Turn Facility.

### 3.5. Accident Black Spot Intervention:

SC has reviewed and analyzed crash data for Development & Construction stage and prior 2-years and recommended that all black spot locations shall be provided with suggested interventions. Concessionaire shall review SC's Crash Analysis Report and implement all recommended interventions.

### 3.6. Lighting System:

Clause 2 (c) of the Concession Agreement states that: “The Project Highway shall be provided with lighting system in Urban stretches/ built up areas, grade separators, underpasses, pedestrian subways, toll plaza and its approaches, rest areas and bus stops. Lighting Systems shall have specifications mentioned in Schedule-D”.

Clause 4.23 of Manual of Specifications and Standards for Six Laning of National Highways through Public Private Partnership (Schedule – D of CA) states that:

- All light posts erected on the railings of bridges, structures shall have adequate height such that a uniform illumination of 40 lux is available.
- All high mast lights in the interchange area shall illuminate the interchange with intensity of 40 lux.
- All entry and exit ramp areas shall be uniformly illuminated with 40 lux intensity
- All underpasses shall be illuminated with minimum intensity of 30 lux.

In SC's field review it is observed that light poles with fixtures were installed at some locations and they are yet to be installed on many locations. Further, none of the installed lights fixtures are lit at the time of SC's night inspection.

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Six Lining of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses) from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka to be executed as BOT (Toll) project on DBFO Pattern under NHDP Phase-V

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**RECOMMENDATION:** Concessionaire is required complete installation of Required Lighting at the earliest. Lighting is required at all U-Turn Facilities, exit/entry points.

### 3.7. Illegal Cuts in the Stone Masonry Walls along built up sections:

SC vide various letters, reports, meetings and workshops, has been endorsing the view that gap (locals in the area have broken these wall to walk across the six lane highway) in stone masonry walls. SC recommends drivers shall be alerted about these locations by furnishing with cautionary flashing yellow beacons along with proper signage until a permanent solution is identified with local administration.



Ch 109.500 Unauthorized access from S/R to MCW and Unauthorized Median Opening.

### 3.8. Headlight Glare:

Headlight glare is severely affecting driving conditions at night on curves as well as on straight sections. Therefore, it is recommended that glare screen fence shall be installed along the median at subject locations.

### 3.9. Merging of Service road in to MCW at four lane Bridge Locations:

During Construction Stage Safety Audit Field Visit, Safety Consultants observed that service road merging in to high speed Main Carriage Way at new four lane bridge locations, which is a potential safety hazard

- With reference to clause 2.2.9 of Manual of Specifications and Standards for Six Lining of National Highways through Public Private Partnership (Schedule – D of CA) states that “Service roads and the main highway shall be physically separated in all circumstances so that there is no interference to the traffic on main highway due to the traffic on service roads and merging / diverging takes place at specified locations.”
- Entry/Exit from/to Service road from Main Carriage Way shall be through proper Acceleration/Deceleration lanes only at specified location
- It is recommended to remove sidewalks on Bridge locations to gain extra width of lane to provide/Continue safety Barriers/Iron Fence to separate Service road from Main Carriage Way at such locations.
- It is recommended to provide Road Studs/RPMs immediately at such locations



## Safety Audit Report 6 – Construction Stage

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Ch 158.400 Merging of S/R into MCW.

### 3.10. Transition/Approach Railing to Bridges & Culverts:

Majority of Bridge and Culvert Railing ends are yet to be treated with proper transition and/or delineation. Note the following:

- It is recommended that all culvert and Bridge headwall/railing ends shall be furnished with delineators/hazard marker and approach metal beam railing with proper end treatments.
- It is recommended that approach railing shall be properly attached to bridge and culvert rigid rails to ensure rigid blunt edges are not exposed to impacting vehicles.
- It is recommended to remove rigid concrete barriers installed in front of Culverts or Minor bridge railings which are furnished for the provision of safe walks. Installation of Safe walks on structures in isolated locations along highways without any approach sidewalks has no practical purpose.

### 3.11. Drainage ditch/Earthen drain

The drainage ditch along the project stretch is located close to the Main Carriage Way. It is observed that due to the close proximity of the drainage ditches the vehicles fall into the ditches. It is recommended that guide rails be installed at the locations where the drainage ditch/earthen drain are close to the MCW. Below are the pictures of such accidents





## Safety Audit Report 6 – Construction Stage

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### 3.12. Clear zone

As per the AASHTO (American Association of State Highway and Transportation Officials): Clear Zone is an unobstructed, traversable roadside area that allows a driver to stop safely, or regain control of a vehicle that has left the roadway. The width of the clear zone should be based on risk (also called exposure). Key factors in assessing risk include traffic volumes, speeds, and slopes. Clear roadsides consider both fixed objects and terrain that may cause vehicles to rollover. The recommended clear zone ranges are based on a width of 30 to 32 feet (9 meters) for flat, level terrain adjacent to a straight section of a 60mph highway with an average daily traffic of 6000 vehicles.

Also as per the DMRB (Design Manual for Roads and Bridges, United Kingdom) A clear zone next to the highway will make a large contribution to roadside safety. The DMRB advised a clear zone of 4.5 meters for trunk roads where speed limits were 50 mph and over. Taking these standards in account and with respect of safety of the project highway it is recommended to follow the UK standards of 4.5m.

Safety barriers are recommended to be installed at the locations where fixed objects such as milestones/ECBs, drainage ditches, transition or approaches to bridges and culverts are located within 4.5m of the edge of the paved highway (Clear Zone). (See above sections in this report, 3.3 Placement of Fixed Objects, Milestones/ECBs Close to Travel Ways on MCW, and 3.9 Transition/Approach Railing to Bridges & Culverts and 3.10 Drainage ditch / earthen drains)

### 3.13. High Embankments

SC has observed high embankments on curves as well as on tangent sections are under construction and they are yet to be furnished with Metal Beam Railings. It is recommended that a strip chart shall be generated to indicate existing and proposed metal beam railings for field review.



Ch 96.100 High Embankment .

### 3.14. Project Facilities

It has to be noted that the Concessionaire is yet to provide SC with details of Truck Lay Bay and Toll Plaza among others. Also, it is observed that construction activities for the facilities are started at some locations. At remaining locations work has not yet started due to land acquisition issues

## Safety Audit Report 6 – Construction Stage

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Ch 156+200 to Ch 156+400(LHS & RHS) Truck parking is observed on the Outer lane of MCW at this Location

### 3.15. Ambulance and Crane

The Concessionaire as per CA is responsible for providing Emergency response team of Ambulance, Crane and Route patrol, in case of any incidents along the project.



Ch 104+600 Ambulance and Crane

### 3.16. Accidents on MCW

In the case of unsafe conditions, vehicle breakdowns and accidents, the Concessionaire shall follow the relevant operating procedures, which shall include the setting up of temporary traffic cones and lights as well as the removal of obstruction and debris expeditiously. Such procedures shall be in accordance with Applicable Laws, Applicable Permits and provisions of the Concession Agreement.

### 3.17. Accident Records

Concessionaire is maintaining monthly accident records as per NHAI standard format and is submitting the same to PIU-Chitradurga, Independent Engineer and Safety Consultant.

### 3.18. Service Road

In Safety Consultants field review it is observed that, Service road construction has been completed and Exit/Entry ramps were provided from MCW to Service road at many locations and under construction at few locations. The following are the field observations

- Exit/Entry to service road without proper Acceleration/Deceleration lane is provided, which is major safety hazard

## **Safety Audit Report 6 – Construction Stage**

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- Pavement Markings are not provided on Service road, which makes difficult for night time driving
- Signage and Advance warning signs are not installed
- Unauthorized/Forced access were created from service road to MCW at many locations

### **Recommendations**

- Provide Acceleration/Deceleration lane for Exit/Entry from/to Service road with road markings
- Install Cautionary/Informatory signs ahead of Exit/Entry, VUP, CUP, PUP and Intersection locations
- Install Speed humps ahead of exit locations where high speed traffic from MCW exits into Service road
- Install speed humps on side roads
- Immediately close the Unauthorized/Forced access/openings.
- Install delineaters/Hazard Markers ahead of Footings of FOBs on Service Roads

### **3.19. Hazard Markers**

Hazard markers are warranted at:

- Beginning of Stone masonry wall at all villages/ towns.
- Masonry walls abutting pedestrian sub-ways.
- Beginning of retaining walls provided for structures (VUP, CUP, PUP etc.)
- Footings of FOBs on Service roads.
- Steps (abutting stone masonry walls) provided for pedestrians to access MCW from Service road.

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### 4.0 Work Zones Safety Audit

SC has noted that work zones are established at several locations along the project stretch without advanced signage alerting road users about on-going activities. In some instances, Outer/Inner lane of MCW is closed for longer periods without any signage or flagmen on site. This is unacceptable and this attitude of total disregard for road users should be penalized which may include work suspensions. We request Authority and Independent Engineer to review and take necessary action.

#### 4.1. Reduced Carriage way

The project highway is in its final construction phase. There are several locations where Three lane Main carriage way is reduced to two lane carriage way. At these locations either construction work is going on median or Culvert locations or Exit/Entry ramps. Transition from 3-2 Lane without proper channelization and advance warning signs and Transition areas are difficult to negotiate because of very poor transition area geometry. There are no flag men/Advance warning signs to guide or alert the road user regarding transition/Reduced Carriage way. Barricading provided are not consistent and are not as per IRC standards. Traffic diversion needs to be organized as per standards with necessary Barricading, signage and pavement markings.



Ch.98.250 Transition from 3-2 Lane

#### 4.2. Barricading of work area

Construction sites must be barricaded as per IRC Guidelines. These need to be supplemented with warning signs and delineators. Barricading has been generally found to be poor at those locations. No additional safety measures / traffic management measures or flagmen (not always desirable) are available for guiding the traffic. At many locations barricades are found to be Substandard and distance between barricades is more. High embankment locations are not barricaded at some locations. Plastic Tapes have been used to connect the barricades

Ch 158.400 Standard Practicing of Work zone Barricading procedure is not followed.



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### 4.3. Worker's Safety

In this section, the SC review covers aspects pertaining to provisions and use of Personal Protective Equipment such as helmets, masks, safety harness/belts, boots, gloves, eye's and hearing protection devices. The assessment also include review of safety provisions during operations such as loading and unloading of materials; bar bending and cutting; gas, excavation work; working near equipment/machinery; working at heights (including aspects pertaining to ladder, scaffolding, working platform, railing safety); safety during placement of traffic control devices.

The Concessionaire shall at all times keep and maintain an adequate supply of suitable personnel protective equipment which shall be readily available for use at all times on the sites, and would include amongst others the following items:

- a) Safety Helmets.
- b) Safety Vests.
- c) Protective Gloves.
- d) Safety Footwear.

At some locations SC noticed workmen working without wearing any of the above said safety equipment



Ch 158.400 Workmen without PPE.

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### 5.0 SUMMARY OF OBSERVATIONS

As project is at its advanced construction stage, traffic maneuvers thru completed 6 lane and under construction 4 lane stretches. Safety shortfalls observed in these areas are discussed with site photographs in Appendix – B & C. The Safety issues that need serious consideration (as revealed through audit) are:

- Access to the six lane highway: It is observed that there are many uncontrolled direct access points along the project highway. Slow moving vehicles entering MCW thru these openings from Service/ Side road and creating hazardous conditions for all as high speed thru traffic on MCW is unaware of these merging points.
- Traffic Signs: Placement and Design of IRC mandated minimum regulatory, cautionary, and informative signage were not as per IRC standards. At some locations none of IRC mandated signs were installed. Further, the Advance Direction signs/Flag Type Direction signs installed does not meet the dimension criteria as set forth in the specified Guidelines.
- Pavement markings: Several stretches of highway is furnished with non-retro reflective pavement marking. Also, some stretches are missing lane markings. Remove old pavement markings.
- Placement of Fixed Objects, Milestones: KM (Kilometer) stones are placed close to the edge of paved shoulder due to the presence of open ditch creating hazardous conditions for errant vehicles
- Junctions, Median Openings & U-turn Facilities: It is noted that there are many direct access points along the project highway, where slow moving traffic from Service/ Side road/U-turn facility can directly access the high speed Six-Lane highway and Service Road / Cross Road/ U-turn facility traffic can also cut across the highway thru median openings creating hazardous conditions to all road users
- Illegal Cuts in the Stone Masonry Walls along built up sections: There are many locations where illegal cuts were made in the Stone Masonry walls along the built up sections and used by pedestrians and two wheelers to cross the MCW.
- Lighting System: In SC's field review it is observed that light poles with fixtures were installed at some locations and they are yet to be installed on many locations. Further, none of the installed lights fixtures are lit at the time of SC's night inspection
- Headlight glare is severely affecting driving conditions at night on curves as well as on tangent section at locations where the median is less than 4.5m
- Transition/Approach Railing to Bridges & Culverts: Majority of Bridge and Culvert Railing ends are yet to be treated with proper transition and/or delineation
- Service road at Bridge Locations: service road shall be physically separated from MCW at new four lane bridge locations where service road continuing with high

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speed MCW. Entry from S/R to MCW shall be provided thru proper acceleration lane only.

- Drainage ditch/Earthen drain: The drainage ditch along the majority of the MCW is located close to the Main Carriage Way. It is observed that due to the close proximity of the drainage ditches to MCW is leading to accidents where the vehicles fall into these ditches
- High Embankments: SC has observed high embankments on curves as well as on tangent sections are under construction and they are yet to be furnished with Metal Beam Railings
- Clear Zone: Safety barriers are recommended to be installed at the locations where fixed objects such as milestones/drainage ditches/transition or approaches to bridges and culverts are located within 4.5m of the edge of the pavement
- Standard Practice of Guard fencing/Barricading has not been adopted for protecting the construction zone.
- Proper Entry/Exit is not demarcated for the construction vehicles moving around the site.
- Exit/Entry ramps with proper deceleration/acceleration lane shall be provided. Kerbs built at Exit/Entry locations to be removed and provide standard pavement markings and signing to guide the road user
- Sub standard work zone signage's placed in the work zone area.
- Damaged/broken crash barriers to be replaced/ repaired immediately.
- Pavement markings/Edge lane Markings are missing at some locations. Old Pavement Markings shall be removed
- Retro-Reflective bollards/Flashing Beacons/ median opening signs must be provided at appropriate locations.
- Truck parking particularly along the outer lane is seen over the entire stretch this needs to be dealt with seriously.



**APPENDIX A: CHECKLIST 4 - STAGE 4 AUDIT (DURING CONSTRUCTION STAGE)**

| <b>S. No.</b> | <b>Issue</b>  | <b>SC Observation</b>  |
|---------------|---|--|
| 1)            | Have all recommendations from the previous stage been followed?<br><br>If not, why not?   | Most of the Safety Consultant's recommendations submitted via Safety Audit Report – 1, 1A, 2, 3, 4 & 5 for construction stage of this project have not been followed.<br><br>Please refer IE's Observation/ Compliance reports on above said SC's audits:<br>1. ICT/IC/NHA/IND/NHDP-V/MC-II/BOT/1400/TL 1735<br>2. ICT/IC/NHA/IND/NHDP-V/MC-II/BOT/1400/ATL 1529<br>3. ICT/IC/NHA/NHDP-V/MC-II/BOT/1400/ATL 1192<br>4. ICT/IC/NHA/NHDP-V/MC-II/BOT/1400/TL 1372  |
| 2)            | Whether information regarding the construction zone approaching has been provided well in advance or not?   | Yes, advance warning & informatory signage regarding construction zones have been provided.<br><br>But, the night time visibility of these signs is not adequate.  |
| 3)            | Whether standard procedure and contract conditions provided for proper management of the construction site and road users are properly and safely accommodated? | Yes<br><br>Clause 2 of Schedule-L of the Concession Agreement states the Obligations of the Concessionaire, which he shall abide by as they are relate to safety of the Users.   |
| 4)            | Whether the transitions from the existing road to the site of works safe and clearly laid out?  | The project is in its final construction stage.<br>At very few locations Main Carriage way outer lane/inner lane traffic has been diverted/Merged to the remaining lanes.<br><br>These diversions are not in compliance with IRC SP 55   |
| 5)            | Whether the width of the lanes is satisfactory for the traffic passing through the works area?  | The project is in its final construction stage.<br>At very few locations Main Carriage way outer lane/inner lane traffic has been diverted/Merged to the remaining lanes.<br><br>These diversions are not in compliance with IRC SP 55   |
| 6)            | Whether sight and stopping distances adequate at site of works and at intersections?  | The project is in its final construction stage.<br>Ongoing Construction Activities are at Culverts, Crash Barriers, Embankment works, Electrical wiring in Median etc. and these are work sites are scattered along the project highway. Fast moving vehicles on the completed stretches are subjected to sudden lane shifts due to the works mentioned above.<br><br>Concessionaire to provide additional safety measures at these sites to increase night visibility and to inform the users about these work sites. |
| 7)            | Whether bus stops appropriately located with adequate clearance from the traffic lane for safety and visibility.  | No<br><br>All the buses are stopping on the MCW for pick up/ drop off. Bus stops are not appropriately located.  |



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**Appendix - A**

| <b>S. No.</b> | <b>Issue</b>  | <b>SC Observation</b>  |
|---------------|---|--|
| 8)            | Whether appropriate street lighting or other delineation provided at the road works to ensure that the site is safe at night? Check the night time visibility of traffic control devices.   | No<br><br>Delineation provided at all the construction sites are non retro-reflective/ their retro-reflectivity has been reduced due to accumulation of dirt/dust.   |
| 10)           | For clear and sufficient information to the road user, advance warning signs installed or not?  | No<br>Placement and Design of Advance warning signs installed were not as per Prescribed IRC standards   |
| 11)           | Is there any provision of marked lanes for safe and clearly guiding road users?   | The project is in its final construction stage.<br>Ongoing Construction Activities are at Culverts, Crash Barriers, Embankment works, Electrical wiring in Median etc. and these are work sites are scattered along the project highway. Fast moving vehicles on the completed stretches are subjected to sudden lane shifts due to the works mentioned above.<br><br>Concessionaire to provide additional safety measures at these sites to increase night visibility and to inform the users about these work sites. |
| 12)           | Whether suitable measures provided through construction zones to control driver behavior?   | SC observations on adequacy of Traffic Control Devices are discussed in detail under Safety Audit Report – 1, 1A, 2, 3, 4 & 5 for construction stage.<br><br>Please refer IE's Observation/ Compliance reports on above said SC's audits:<br>1. ICT/IC/NHAI/IND/NHDP-V/MC-II/BOT/1400/TL 1735<br>2. ICT/IC/NHAI/IND/NHDP-V/MC-II/BOT/1400/ATL 1529<br>3. ICT/IC/NHAI/NHDP-V/MC-II/BOT/1400/ATL 1192<br>4. ICT/IC/NHAI/NHDP-V/MC-II/BOT/1400/TL 1372  |
| 13)           | Check for the adequacy of traffic control devices (such as signs, markings, cones, drums, delineators, barricades, flashing lights etc.) required for each zone i.e., at advance warning zone, at approach transition zone and at work zone? Check for placement and visibility of these control devices. | SC observations on adequacy of Traffic Control Devices are discussed in detail under Safety Audit Report – 1, 1A, 2, 3 & 4 for construction stage.<br><br>Please refer IE's Observation/ Compliance reports on above said SC's audits:<br>1. ICT/IC/NHAI/IND/NHDP-V/MC-II/BOT/1400/TL 1735<br>2. ICT/IC/NHAI/IND/NHDP-V/MC-II/BOT/1400/ATL 1529<br>3. ICT/IC/NHAI/NHDP-V/MC-II/BOT/1400/ATL 1192<br>4. ICT/IC/NHAI/NHDP-V/MC-II/BOT/1400/TL 1372   |
| 14)           | Has permission been taken while changing the standard layouts from safety point of view?  | Concessionaire submitted Traffic Management Plans to IE for review and comments. He has submitted typical sections on which IE has already commented   |
| 15)           | Whether police and other emergency services been consulted?   | Yes<br>On occurrence of any accident along the project highway the Route Patrol Personnel immediately consult/ inform nearby Police Stations. This is the standard   |
| 16)           | Check for proper care and attention for pedestrian and non-motorized traffic at construction sites.   | Adequate safety provisions were not provided. Pedestrians and non-motorized traffic could enter construction sites. Construction sites were not protected.   |

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**Appendix - A**

| <b>S. No.</b> | <b>Issue</b>   | <b>SC Observation</b>  |
|---------------|--|--|
| 17)           | Check for adequate safety provisions for the elderly and persons with disabilities.  | No safety provisions for the elderly and persons with disabilities were observed   |
| 18)           | Whether construction workers provided with protective clothing etc. reflecting jackets, hard hats, gloves etc.?  | No   |
| 19)           | Whether flagmen are available on duty at the appropriate places? Check for proper traffic management practice to avoid inhibiting traffic to pass clear of work site and necessary attention to roadside safety. | No<br><br>Concessionaire's Safety Manual clearly defines the traffic management practice, but it is not implemented at site.   |
| 20)           | Whether the temporary diversion is provided at work zones in compliance with the contract and traffic management plan approved by the Engineer.  | Yes, Traffic Management Plan is reviewed and approved by the Independent Engineer.<br><br>At few locations, field application is not in compliance with the approved plans.<br><br>Refer IE letters mentioned in S.N. 1 of this checklist.   |
| 21)           | Whether the Traffic Management Plan at work site prepared and submitted by the Contractor to the Engineer for approval,  | Yes  |
| 22)           | Is the Supervision Engineer ensuring the required quality of traffic management plan?  | Yes/ No<br>Independent Engineer has raised this issue several times, the Concessionaire complied with both Safety Consultant's and Independent Engineer's comments/ observations on quality of implementation of traffic management plan at few locations.<br><br>Refer IE letters mentioned in S.N. 1 of this checklist.  |
| 23)           | Whether arrangements of First Aid Box and other emergency care exist for persons getting injured.  | Yes  |
| 24)           | Whether suitable speed reducing measures are provided at work zones.   | The project is in its final construction stage.<br><br>Ongoing Construction Activities are at Culverts, Crash Barriers, Embankment works, etc. and these are work sites are scattered along the project highway. Fast moving vehicles on the completed stretches are subjected to sudden lane shifts due to the works mentioned above.<br><br>Concessionaire to provide additional safety measures at these sites to increase night visibility and to inform the users about these work sites. |
| 25)           | Other checks made at discretion of auditor or client.  | N/A  |

| Sl. No. | Chainage |        | Side | Road Safety Audit Observations   | Reference Page in Appendix - C of this report |
|---------|----------|--------|------|--|---|
|         | From     | To     |      | 19th & 20th February 2014  |   |
| 1       | 75.000   |        | LHS  | Buses are stopping on the MCW. As the Buses are stopping on the main carriage way for pickup which results in lot of pedestrain movement around the MCW  | Page 1  |
| 2       | 76.900   |        | LHS  | Lot of Pedestrain Crossing movement is observed on the MCW   | Page 1  |
| 3       | 77.000   |        | LHS  | Entry/Exit from the Service road to Main Carriageway without Proper Acceleration/Deceleration lane   | Page 1  |
| 4       | 77.400   |        | LHS  | Exit from the Service road to Main Carriageway without Proper Deceleration lane. provide standard pavement markings and Signage to guide the road user   | Page 1  |
| 5       | 80.000   |        | LHS  | Bullet type Exit without proper deceleration lane. Kerbs built at Exit/Entry locations to be removed and provide standard pavement markings and signage to guide the road user   | Page 2  |
| 6       | 81.450   |        | RHS  | Buses are stopping on the MCW. As the Buses are stopping on the main carriage way for pickup which results in lot of pedestrain movement around the MCW  |   |
| 7       | 82.000   | 82.200 | LHS  | High Embankment area. Construction of W-Beam metal crash Barriers are yet to be completed.   |   |
| 8       | 82.400   |        | LHS  | At grade U-turn facility on Six lane Highway. Per MORTH Six lane highway manual there shall be no direct access to the MCW, all access shall be from service road through acceleration lane only. Inter connections between S/R shall be through Under passes only. Improper Channelization of traffic | Page 2  |
| 9       | 82.850   |        | LHS  | Non standard hazard marker   | Page 2  |
| 10      | 83.200   |        | LHS  | Provide Hazard markers ahead of approach of kerbs on shoulders   | Page 2  |
| 11      | 83.850   |        | LHS  | Unauthorised Median Opening  | Page 3  |
| 12      | 83.900   |        | LHS  | Bullet type Entry without proper acceleration lane. Kerbs built at Exit/Entry locations to be removed and provide standard pavement markings and Signage to guide the road user  |   |
| 13      | 84.100   |        | LHS  | Provide Hazard markers ahead of approach of kerbs on shoulders   |   |
| 14      | 84.450   |        | LHS  | Truck Parking on the shoulder is observed at this location   | Page 3  |
| 15      | 85.400   |        | LHS  | Bullet type Exit/Entry without proper Deceleration/Acceleration lane. Irregular Pavement Markings. Old Pavement Markings should be removed   | Page 3  |
| 16      | 86.650   |        | LHS  | Provide Hazard markers ahead of approach of kerbs on shoulders   |   |
| 17      | 87.250   |        | LHS  | Break in Masonry wall creating direct access to the MCW, which is a potential safety hazard and Unauthorized Median Opening  | Page 3  |
| 18      | 88.400   |        | LHS  | Provide Hazard markers ahead of approach of kerbs on shoulders   |   |
| 19      | 88.900   |        | LHS  | Bullet type Entry without proper acceleration lane. Kerbs built at Exit/Entry locations to be removed and provide standard pavement markings and Signage to guide the road user  | Page 4  |
| 20      | 89.000   |        | LHS  | Buses are stopping on the MCW. As the Buses are stopping on the main carriage way for pickup which results in lot of pedestrain movement around the MCW  |   |
| 21      | 90.250   |        | LHS  | High embankment area, crash barriers are not provided at this location   |   |

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|         | From     | To      |      | 19th & 20th February 2014  |   |
| 22      | 91.000   |         | LHS  | At grade U-turn facility on Six lane Highway. Per MORTH Six lane highway manual there shall be no direct access to the MCW, all access shall be from service road through acceleration lane only. Inter connections between S/R shall be through Under passes only. Improper Channelization of traffic | Page 4  |
| 23      | 91.800   |         | LHS  | Break in Masonry wall creating direct access to the MCW, which is a potential safety hazard  |   |
| 24      | 92.100   |         | LHS  | Bullet type Exit without proper deceleration lane. Kerbs built at Exit/Entry locations to be removed and provide standard pavement markings and signage to guide the road user   | Page 4  |
| 25      | 93.600   |         | LHS  | Pedestrians waiting for Bus/Pickup vans on MCW. Unauthorized Median Opening  | Page 4  |
| 26      | 95.000   |         | LHS  | Unauthorized opening creating direct access to MCW   | Page 5  |
| 27      | 95.600   | 95.800  | LHS  | Truck Parking on the shoulder is observed at this location   |   |
| 28      | 96.100   |         | LHS  | High embankment area, crash barriers are not provided at this location   |   |
| 29      | 97.400   |         | LHS  | Bullet type Exit without proper Deceleration lane  | Page 5  |
| 30      | 97.600   |         | LHS  | Retroreflective hazard markers are not placed at the entrance or headwall of the Structure   |   |
| 31      | 98.250   |         | LHS  | Construction work in progress, Standard practices of Guard fencing/Barricading/Diversion have not been followed for protecting the construction zone, No Flag man to warn the users. Workers without PPE   | Page 5  |
| 32      | 98.550   |         | LHS  | Unauthorized opening creating direct access to MCW   | Page 5  |
| 33      | 99.300   |         | LHS  | Unauthorized opening creating direct access to MCW   | Page 6  |
| 34      | 99.400   |         | LHS  | Buses are stopping on the MCW. As the Buses are stopping on the main carriage way for pickup which results in lot of pedestrian movement around the MCW  |   |
| 35      | 99.950   |         | LHS  | Bullet type Entry without proper acceleration lane. No Pavement Markings   |   |
| 36      | 100.000  |         | LHS  | Bullet type Entry/Exit without proper acceleration/Deceleration lane. No Pavement Markings   |   |
| 37      | 103.400  |         | LHS  | Direct access to Subway from MCW. Unauthorized Median Opening  | Page 6  |
| 38      | 105.100  |         | LHS  | No hazard marker is placed at the stone masonry wall which is not visible during nights  | Page 6  |
| 39      | 106.200  |         | LHS  | Bullet type Exit/Entry without proper Deceleration/Acceleration lane   | Page 7  |
| 40      | 107.800  | 107.900 | LHS  | Pedestrian on MCW waiting for Bus/Pickup Van. Break in Metal Beam Crash Barrier on Median.   | Page 7  |
| 41      | 108.500  |         | LHS  | Unauthorized opening creating direct access to MCW   | Page 7  |
| 42      | 109.500  |         | LHS  | Un authorized median opening and forced opening to access MCW from SR.   | Page 7  |
| 43      | 109.800  |         | LHS  | Bullet type Exit without proper deceleration lane. Kerbs built at Exit/Entry locations to be removed. Provide standard pavement markings and signage to guide the road user  |   |
| 44      | 110.400  |         | LHS  | Unauthorized opening creating direct access to MCW   |   |
| 45      | 111.150  |         | LHS  | Pedestrians waiting for Bus/Pickup vans on MCW.  |   |
| 46      | 111.750  |         | LHS  | Bullet type Exit without proper deceleration lane. Kerbs built at Exit/Entry locations to be removed. Provide standard pavement markings to guide the road user  | Page 8  |
| 47      | 113.600  |         | LHS  | Bullet type Entry from Service road to Main Carriageway without Proper Acceleration lane. Provide pavement markings and sigange to guide the road user   |   |
| 48      | 115.800  |         | LHS  | Unauthorized opening creating direct access to MCW   | Page 8  |

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|         | From     | To |      | 19th & 20th February 2014  |   |
| 49      | 117.200  |    | LHS  | Entry from the Service road to Main Carriageway without Proper Acceleration lane.  |   |
| 50      | 117.500  |    | LHS  | Entry from the Service road to Main Carriageway without Proper Acceleration lane.  |   |
| 51      | 118.600  |    | LHS  | Old Pavement Markings should be removed  |   |
| 52      | 119.800  |    | LHS  | Bullet type Exit without proper deceleration lane. Provide standard pavement markings and signage to guide the road user   |   |
| 53      | 120.100  |    | LHS  | Remove old Pavement Markings   | Page 8  |
| 54      | 120.600  |    | LHS  | Entry from the Service road to Main Carriageway without Proper Acceleration lane.  | Page 8  |
| 55      | 120.950  |    | LHS  | Provide Hazard markers ahead of approach of Metal Beam Crash Barrier   | Page 9  |
| 56      | 121.250  |    | LHS  | Unauthorized Median Opening  | Page 9  |
| 57      | 122.200  |    | LHS  | Retroreflective hazard markers are not placed at the entrance or headwall of the Structure   |   |
| 58      | 122.950  |    | LHS  | Bullet type Exit without proper deceleration lane. Provide standard pavement markings and signage to guide the road user   |   |
| 59      | 123.200  |    | LHS  | Provide standard and retro reflective hazard marker  |   |
| 60      | 124.800  |    | LHS  | Bullet type Entry without proper acceleration lane. Provide standard pavement markings and signage to guide the road user  |   |
| 61      | 126.600  |    | LHS  | Unauthorized opening creating direct access to MCW   |   |
| 62      | 127.150  |    | LHS  | Entry from the Service road to Main Carriageway without Proper deceleration lane and Pavement Markings   |   |
| 63      | 127.400  |    | LHS  | Exit from the Main Carriageway to Service road without Proper Acceleration lane and Pavement Markings  |   |
| 64      | 127.500  |    | LHS  | Unauthorized opening creating direct access to MCW   | Page 9  |
| 65      | 128.000  |    | LHS  | Unauthorized opening creating direct access to MCW   |   |
| 66      | 128.400  |    | LHS  | Unauthorized opening from S/R to MCW and Unauthorized Median Opening   | Page 9  |
| 67      | 128.600  |    | LHS  | Bullet type Exit without proper deceleration lane. Provide standard pavement markings and Signage to guide the road user   |   |
| 68      | 129.100  |    | LHS  | Provide Hazard markers ahead of approach of kerbs on shoulders   |   |
| 69      | 130.450  |    | LHS  | Unauthorized Median Opening  |   |
| 70      | 130.850  |    | LHS  | Entry from the Service road to Main Carriageway without Proper deceleration lane. Provide standard pavement markings and Signage to guide the road user                        |   |
| 71      | 131.700  |    | LHS  | Provide standard and retro reflective hazard marker  |   |
| 72      | 132.200  |    | LHS  | Bullet type Exit without proper deceleration lane. Provide standard pavement markings and Signage to guide the road user   | Page 10                                       |
| 73      | 132.500  |    | LHS  | Pedestrians waiting for Bus/Pickup Van on MCW  | Page 10                                       |
| 74      | 132.800  |    | LHS  | Bullet type Exit without proper deceleration lane. Kerbs built at Exit/Entry locations to be removed and provide standard pavement markings and Signage to guide the road user |   |
| 75      | 132.950  |    | LHS  | Entry from the Service road to Main Carriageway without Proper deceleration lane. Provide standard pavement markings and Signage to guide the road user                        |   |
| 76      | 133.900  |    | LHS  | Unauthorized opening creating direct access to MCW. Unauthorized Median Opening  |   |
| 77      | 135.850  |    | LHS  | Bullet type Exit without proper deceleration lane.provide standard pavement markings and Signage to guide the road user  |   |

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|         | From     | To      |      | 19th & 20th February 2014  |   |
| 78      | 136.500  |         | LHS  | Entry from the Service road to Main Carriageway without Proper deceleration lane. Provide standard pavement markings and Signage to guide the road user  |   |
| 79      | 138.200  |         | LHS  | Construction work in progress, Standard practices of Guard fencing/Barricading has not been followed for protecting the construction zone.   | Page 10                                       |
| 80      | 138.400  |         | LHS  | Unauthorized opening creating direct access to MCW   | Page 10                                       |
| 81      | 139.400  |         | LHS  | Entry from the Service road to Main Carriageway without Proper deceleration lane. Provide standard pavement markings and Signage to guide the road user  |   |
| 82      | 139.700  |         | LHS  | Bullet type Exit without proper declaration lane and Pavement Markings. Provide Object Hazard Marker   | Page 11                                       |
| 83      | 140.150  |         | LHS  | Buses are stopping on the MCW. As the Buses are stopping on the main carriage way for pickup which results in lot of pedestrain movement around the MCW  | Page 11                                       |
| 84      | 141.100  |         | LHS  | At grade U-turn facility on Six lane Highway. Per MORTH Six lane highway manual there shall be no direct access to the MCW, all access shall be from service road through acceleration lane only. Inter connections between S/R shall be through Under passes only.  |   |
| 85      | 144.500  |         | LHS  | At grade U-turn facility on Six lane Highway. Per MORTH Six lane highway manual there shall be no direct access to the MCW, all access shall be from service road through acceleration lane only. Inter connections between S/R shall be through Under passes only.  | Page 11                                       |
| 86      | 146.200  |         | LHS  | Provide standard and retro reflective hazard marker  |   |
| 87      | 147.600  |         | LHS  | At grade U-turn facility on Six lane Highway. Per MORTH Six lane highway manual there shall be no direct access to the MCW, all access shall be from service road through acceleration lane only. Inter connections between S/R shall be through Under passes only. Truck Parking is observed on the Shoulder and Outer lane of MCW at this location |   |
| 88      | 148.000  |         | LHS  | Culvert work in progress, Standard Practice of Guard fencing/Barricading has not been followed for protecting the construction zone  |   |
| 89      | 148.800  |         | LHS  | Provide Object Hazard Marker   |   |
| 90      | 149.100  |         | LHS  | Unauthorized opening creating direct access to MCW   |   |
| 91      | 153.000  |         | LHS  | Remove old Pavement Markings   |   |
| 92      | 153.900  |         | LHS  | Bullet type Exit/Entry without proper Deceleration/Acceleration lane. Provide hazard markers at the entrance of the Stone masonry wall which is not visible in the night   | Page 11                                       |
| 93      | 154.500  |         | LHS  | Unauthorized Median Opening. Slow moving vehicles like Bullock cart crossing the MCW at this location. Pedestrians using the Break in Masonry wall to access MCW.  | Page 12                                       |
| 94      | 155.000  |         | LHS  | Unauthorized opening creating direct access to MCW. Unauthorized Median Opening  |   |
| 95      | 156.200  | 156.400 | LHS  | Truck parking is observed on the Outer lane and Shoulder of the MCW at this location   | Page 12                                       |
| 96      | 157.400  |         | LHS  | Construction work in progress, Standard practices of Guard fencing/Barricading/Diversion has not been followed for protecting the construction zone, No Flag man to warn the users. Workers without PPE  | Page 12                                       |
| 97      | 158.100  |         | LHS  | Bullet type Exit from MCW to Side Road/Service Road without proper Deceleration lane   | Page 12                                       |

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|         | From     | To |      | 19th & 20th February 2014  |   |
| 98      | 159.400  |    | LHS  | Entry/Exit from the Service road to Main Carriageway without Proper Acceleration/Deceleration lane.<br>Unauthorized Median Opening   |   |
| 99      | 161.600  |    | LHS  | Bullet type Exit/Entry without proper Deceleration/Acceleration lane. Provide hazard markers at the entrance of the Stone masonry wall which is not visible in the night   |   |
| 100     | 163.500  |    | LHS  | Bullet type Exit/Entry from MCW to Service Road without proper Deceleration/Acceleration lane  |   |
| 101     | 164.600  |    | LHS  | Provide Hazard Marker  | Page 13                                       |
| 102     | 166.500  |    | LHS  | Bullet type Exit without proper deceleration lane. Kerbs built at Exit/Entry locations to be removed and provide standard pavement markings and Signage to guide the road user   |   |
| 103     | 168.200  |    | LHS  | Bullet type Entry without proper acceleration lane. Provide standard pavement markings and Signage to guide the road user  |   |
| 104     | 169.200  |    | LHS  | Bullet type Exit without proper deceleration lane. Kerbs built at Exit/Entry locations to be removed and provide standard pavement markings and Signage to guide the road user   |   |
| 105     | 170.100  |    | LHS  | Bullet type Entry without proper acceleration lane. Provide standard pavement markings and Signage to guide the road user  |   |
| 106     | 171.500  |    | LHS  | At grade U-turn facility on Six lane Highway. Per MORTH Six lane highway manual there shall be no direct access to the MCW, all access shall be from service road through acceleration lane only. Inter connections between S/R shall be through Under passes only. Truck Parking is observed on the Shoulder and Outer lane of MCW at this location |   |
| 107     | 174.600  |    | LHS  | Construction Vehicles on the main carriage way blocking a lane and only one lane to the flowing lane, Construction activities without any safety precautions of Flagman, helpers and TCD's   |   |
| 108     | 176.800  |    | LHS  | Bullet type Exit without proper deceleration lane. Kerbs built at Exit/Entry locations to be removed and provide standard pavement markings and Signage to guide the road user   |   |
| 109     | 177.400  |    | LHS  | Bullet type Entry without proper acceleration lane. Provide standard pavement markings and Signage to guide the road user  |   |
| 110     | 178.200  |    | LHS  | Bus stops on MCW to Pickup/Dropoff passengers at this location   |   |
| 111     | 178.800  |    | LHS  | Bullet type Entry without proper acceleration lane. Provide standard pavement markings and Signage to guide the road user  |   |
| 112     | 182.600  |    | LHS  | Construction work in progress, Standard practices of Guard fencing/Barricading have not been followed for protecting the construction zone.  |   |
| 113     | 183.400  |    | LHS  | Unauthorized opening creating direct access to MCW   |   |
| 114     | 188.600  |    | LHS  | Bullet type Exit without proper deceleration lane.provide standard pavement markings and Signage to guide the road user  |   |
| 115     | 188.600  |    | RHS  | Unauthorized opening creating direct access to MCW   | Page 13                                       |
| 116     | 187.000  |    | RHS  | Bullet type Exit without proper deceleration lane.provide standard pavement markings and Signage to guide the road user  |   |
| 117     | 183.500  |    | RHS  | Bullet type Exit without proper deceleration lane.provide standard pavement markings and Signage to guide the road user  |   |

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| 118     | 182.700  |    | RHS  | Construction work in progress, Standard practices of Guard fencing/Barricading have not been followed for protecting the construction zone.  |   |
| 119     | 180.000  |    | RHS  | Bullet type Exit without proper deceleration lane.provide standard pavement markings and Signage to guide the road user  |   |
| 120     |          |    | RHS  | Entry/Exit from the Service road to Main Carriageway without Proper Acceleration/Deceleration lane .provide standard pavement markings and Signage to guide the road user  |   |
|         | 179.000  |    |      |  |   |
| 121     | 178.900  |    | RHS  | Break in Masonry wall, which pedestrians using to access MCW for Buses/Pickup Van  | Page 13                                       |
| 122     |          |    | RHS  | Bullet type Entry without proper acceleration lane. Provide standard pavement markings and Signage to guide the road user  |   |
|         | 177.800  |    |      |  |   |
| 123     | 170.200  |    | RHS  | Bullet type Exit without proper deceleration lane. Kerbs built at Exit locations to be removed and provide standard pavement markings and Signage to guide the road user   |   |
| 124     | 170.000  |    | RHS  | Unauthorized opening creating direct access to MCW   |   |
| 125     |          |    | RHS  | Bullet type Entry without proper acceleration lane. Provide standard pavement markings and Signage to guide the road user  |   |
|         | 169.100  |    |      |  |   |
| 126     | 168.200  |    | RHS  | Bullet type Exit without proper deceleration lane. Kerbs built at Exit locations to be removed and provide standard pavement markings and Signage to guide the road user   | Page 14                                       |
| 127     | 166.800  |    | RHS  | High Embankment area. W-Beam metal crash Barriers are yet to be completed. Provide Hazard Marker   | Page 14                                       |
| 128     | 166.600  |    | RHS  | Bullet type Entry from S/R to MCW without proper acceleration lane. Provide standard pavement markings and Signage to guide the road user  |   |
| 129     | 163.500  |    | RHS  | Bullet type Exit without proper deceleration lane. Kerbs built at Exit locations to be removed and provide standard pavement markings and Signage to guide the road user   |   |
| 130     | 159.200  |    | RHS  | Bullet type Entry from S/R to MCW without proper acceleration lane. Provide standard pavement markings and Signage to guide the road user  | Page 14                                       |
| 131     | 158.400  |    | RHS  | S/R continuing into MCW at this new bridge location. S/R shall be physically separated from high speed MCW at this location. Access to MCW from S/R shall be provided through Entry Ramps only with proper acceleration lane.                                | Page 14                                       |
| 132     | 158.000  |    | RHS  | Bullet type Entry from S/R to MCW without proper acceleration lane. Provide standard pavement markings and Signage to guide the road user.Rigid safety barrier without any retro-reflective is placed at the entry of the service road which is major hazard | Page 15                                       |
| 133     | 157.600  |    | RHS  | Entry/Exit from the Service road to Main Carriageway without Proper Acceleration/Deceleration lane .provide standard pavement markings and Signage to guide the road user. Provide Hazard Marker   |   |
| 134     | 157.000  |    | RHS  | Truck parking is observed on the Outer lane and Shoulder of the MCW at this location   |   |
| 135     | 156.600  |    | RHS  | No pavement markings   | Page 15                                       |
| 136     | 156.000  |    | RHS  | Entry/Exit from the Service road to Main Carriageway without Proper Acceleration/Deceleration lane .provide standard pavement markings and Signage to guide the road user.   |   |



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| 137     | 155.000  |         | RHS  | Entry/Exit from the Service road to Main Carriageway without Proper Acceleration/Deceleration lane .provide standard pavement markings and Signage to guide the road user.  |   |
| 138     | 154.800  |         | RHS  | Unauthorized opening creating direct access to MCW.   |   |
| 139     | 154.400  |         | RHS  | Unauthorized Median Opening   | Page 15                                       |
| 140     | 154.000  |         | RHS  | Entry/Exit from the Service road to Main Carriageway without Proper Acceleration/Deceleration lane .provide standard pavement markings and Signage to guide the road user. Provide Hazard Marker  |   |
| 141     | 153.000  |         | RHS  | Entry/Exit from the Service road to Main Carriageway without Proper Acceleration/Deceleration lane .provide standard pavement markings and Signage to guide the road user. Provide Hazard Marker  |   |
| 142     | 152.250  |         | RHS  | Entry/Exit from the Service road/Side Road to Main Carriageway without Proper Acceleration/Deceleration lane .provide standard pavement markings and Signage to guide the road user. Provide Hazard Marker  |   |
| 143     | 148.000  |         | RHS  | Work zone not protected. Unsafe lane closing procedure  | Page 15                                       |
| 144     | 147.600  |         | RHS  | At grade U-turn facility on Six lane Highway. Per MORTH Six lane highway manual there shall be no direct access to the MCW, all access shall be from service road through acceleration lane only. Inter connections between S/R shall be through Under passes only. | Page 16                                       |
| 145     | 144.500  |         | RHS  | At grade U-turn facility on Six lane Highway. Per MORTH Six lane highway manual there shall be no direct access to the MCW, all access shall be from service road through acceleration lane only. Inter connections between S/R shall be through Under passes only. |   |
|         |          |         |      | Truck parking is observed on the Outer lane and Shoulder of the MCW at this location  |   |
| 146     | 143.000  | 143.200 | RHS  | High embankment area, crash barriers are not provided at this location  |   |
| 147     | 142.300  |         | RHS  | Non standard hazard marker  | Page 16                                       |
| 148     | 141.200  |         | RHS  | At grade U-turn facility on Six lane Highway. Per MORTH Six lane highway manual there shall be no direct access to the MCW, all access shall be from service road through acceleration lane only. Inter connections between S/R shall be through Under passes only. |   |
| 149     | 139.900  |         | RHS  | Buses are stopping on the MCW. As the Buses are stopping on the main carriage way for pickup which results in lot of pedestrain movement around the MCW   | Page 16                                       |
| 150     | 138.300  |         | RHS  | Entry/Exit from the Service road to Main Carriageway without Proper Acceleration/Deceleration lane .provide standard pavement markings and Signage to guide the road user. Provide Hazard Marker  |   |
| 151     | 136.700  |         | RHS  | Bullet type Exit without proper deceleration lane. Kerbs built at Exit locations to be removed and provide standard pavement markings and Signage to guide the road user  |   |
| 152     | 136.000  |         | RHS  | Bullet type Entry from S/R to MCW without proper acceleration lane. Provide standard pavement markings and Signage to guide the road user   |   |

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|         | From     | To |      | 19th & 20th February 2014   |   |
| 153     | 134.200  |    | RHS  | Provide standard and Retro reflective Hazard Marker   | Page 16                                       |
| 154     | 132.800  |    | RHS  | Bullet type Entry from S/R to MCW without proper acceleration lane. Provide standard pavement markings and Signage to guide the road user   |   |
| 155     | 131.600  |    | RHS  | Bullet type Entry from S/R to MCW without proper acceleration lane. Provide standard pavement markings and Signage to guide the road user   | Page 17                                       |
| 156     | 127.200  |    | RHS  | S/R continuing into MCW at this new bridge location. S/R shall be physically separated from high speed MCW at this location. Access to MCW from S/R shall be provided through Entry Ramps only with proper acceleration lane. |   |
| 157     | 125.800  |    | RHS  | Unauthorized opening creating direct access to MCW  | Page 17                                       |
| 158     | 124.900  |    | RHS  | Bullet type Exit without proper deceleration lane. Kerbs built at Exit locations to be removed and provide standard pavement markings and Signage to guide the road user  |   |
| 159     | 123.000  |    | RHS  | Bullet type Exit/Entry without deceleration/acceleration lane. Close the Temporary Median Opening   | Page 17                                       |
| 160     | 122.800  |    | RHS  | Entry/Exit from the Service road to Main Carriageway without Proper Acceleration/Deceleration lane .provide standard pavement markings and Signage to guide the road user.  |   |
| 161     | 121.200  |    | RHS  | Unauthorized Median Opening   | Page 17                                       |
| 162     | 120.700  |    | RHS  | Protect Structure Headwall with Metal Beam Crash Barrier.   | Page 18                                       |
| 163     | 120.600  |    | RHS  | Bullet type Exit without proper deceleration lane. Kerbs built at Exit locations to be removed and provide standard pavement markings and Signage to guide the road user  |   |
| 164     | 119.900  |    | RHS  | Bullet type Entry from S/R to MCW without proper acceleration lane. Provide standard pavement markings and Signage to guide the road user   |   |
| 165     | 119.800  |    | RHS  | Provide Object Hazard Marker  | Page 18                                       |
| 166     | 119.400  |    | RHS  | Unauthorized opening creating direct access to MCW  |   |
| 167     | 118.600  |    | RHS  | Provide standard and retro reflective hazard marker   | Page 18                                       |
| 168     | 114.800  |    | RHS  | Pedestrians on MCW waiting for Bus/Pickup Van   | Page 13                                       |
| 169     | 113.800  |    | RHS  | Bullet type Exit without proper deceleration lane.Provide standard pavement markings and Signage to guide the road user   |   |
| 170     | 112.200  |    | RHS  | Workmen without PPE   | Page 18                                       |
| 171     | 111.200  |    | RHS  | Unauthorized access creating direct access to MCW. Extend the Iron fence to the Start of Brick Masonry Wall   | Page 19                                       |
| 172     | 110.400  |    | RHS  | Bullet type Exit without proper deceleration lane.Provide standard pavement markings and Signage to guide the road user   |   |
| 173     | 109.500  |    | RHS  | Un authorized median opening and forced opening to access MCW from SR.  | Page 19                                       |
| 174     | 108.400  |    | RHS  | Break in Masonry wall creating direct access to the MCW, which is a potential safety hazard   | Page 19                                       |
| 175     | 107.900  |    | RHS  | Buses are stopping on the MCW. As the Buses are stopping on the main carriage way for pickup which results in lot of pedestrain movement around the MCW   |   |
| 176     | 106.400  |    | RHS  | Bullet type Entry from S/R to MCW without proper acceleration lane. Provide standard pavement markings and Signage to guide the road user   | Page 19                                       |
| 177     | 104.200  |    | RHS  | Truck Parking on the shoulder is observed at this location  |   |

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|---------|----------|----|------|---|---|
|         | From     | To |      | 19th & 20th February 2014   |   |
| 178     | 103.600  |    | RHS  | Buses are stopping on the MCW. As the Buses are stopping on the main carriage way for pickup which results in lot of pedestrian movement around the MCW   |   |
| 179     | 102.800  |    | RHS  | Provide Object Hazard Marker  | Page 20                                       |
| 180     | 101.800  |    | RHS  | Break in Iron fence creating direct access to the MCW, which is a potential safety hazard   |   |
| 181     | 98.600   |    | RHS  | Bullet type Entry from S/R to MCW without proper acceleration lane. Provide standard pavement markings and Signage to guide the road user   |   |
| 182     | 97.300   |    | RHS  | Bullet type Entry from S/R to MCW without proper acceleration lane. Provide standard pavement markings and Signage to guide the road user   |   |
| 183     | 93.600   |    | RHS  | Pedestrian on MCW waiting for Bus/Pickup van at this location (Seebi-Temple location). Unauthorized Median Opening  | Page 20                                       |
| 184     | 92.500   |    | RHS  | Break in Iron fence creating direct access to the MCW, which is a potential safety hazard. Pedestrians Waiting for Bus/Pickup van   |   |
| 185     | 91.600   |    | RHS  | Extend the Iron fence to the end/Start of Brick Masonry wall. Pedestrians on MCW for Bus/Pickup van   |   |
| 186     | 91.000   |    | RHS  | At grade U-turn facility on Six lane Highway. Per MORTH Six lane highway manual there shall be no direct access to the MCW, all access shall be from service road through acceleration lane only. Inter connections between S/R shall be through Under passes only. |   |
| 187     | 89.000   |    | RHS  | Bullet type Exit without proper deceleration lane. Kerbs built at Exit locations to be removed and provide standard pavement markings and Signage to guide the road user  | Page 20                                       |
| 188     | 87.300   |    | RHS  | Break in Masonry wall creating direct access to the MCW, which is a potential safety hazard. Unauthorized Median Opening  |   |
| 189     | 86.400   |    | RHS  | Entry/Exit from the Service road to Main Carriageway without Proper Acceleration/Deceleration lane .provide standard pavement markings and Signage to guide the road user. Provide Hazard Marker  |   |
| 190     | 84.800   |    | RHS  | Construction Vehicle on MCW. Unsafe Lane closing Procedure  |   |
| 191     | 83.800   |    | RHS  | Unauthorized Median Opening   | Page 20                                       |
| 192     | 83.200   |    | RHS  | Provide Object Hazard Marker  | Page 21                                       |
| 193     | 81.400   |    | RHS  | Break in Masonry wall creating direct access to the MCW, which is a potential safety hazard. Pedestrians Waiting for Bus/Pickup Vans  | Page 21                                       |
| 194     | 80.200   |    | RHS  | Bullet type Entry from S/R to MCW without proper acceleration lane. Provide standard pavement markings and Signage to guide the road user   | Page 21                                       |

## Safety Audit Report 6 – Construction Stage

## Appendix - C

Six Laning of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses)  
from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka  
to be executed as BOT (Toll) project on DBFO Pattern under NHDP Phase-V

### APPENDIX C: Site Pictures

|  |   |
|--|---|
|    |                    |
| Ch 75+000 (LHS) Bus Stop on MCW to Pick up Passengers  | Ch 76+900(LHS) Pedestrians crossing the MCW   |
|   |                   |
| Ch 77+000(LHS) Bullet type Exit/Entry without proper Deceleration/Acceleration lane. provide standard pavement markings and Signage to guide the road user | Ch 77+400(LHS) Bullet type Exit without proper Deceleration lane. Provide Object Hazard Marker (OHM). |

## Safety Audit Report 6 – Construction Stage

## Appendix - C

Six Laning of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses)  
from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka  
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Ch 80+000 (LHS) Bullet type Exit without proper deceleration lane. Kerbs built at Exit/Entry locations to be removed and provide standard pavement markings and Signage to guide the road user



Ch 82+400(LHS). At grade U-turn facility on Six lane Highway. Per MORTH Six lane highway manual there shall be no direct access to the MCW, all access shall be from service road through acceleration lane only. Inter connections between S/R shall be through Under passes only. Improper Channelization of traffic



Ch 82+850(LHS) Non standard hazard marker



Ch 83+200(LHS) Provide hazard marker at the face of headwall of flyover/Structure



## Safety Audit Report 6 – Construction Stage

## Appendix - C

Six Laning of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses)  
from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka  
to be executed as BOT (Toll) project on DBFO Pattern under NHDP Phase-V



Ch 83+850 (LHS) Unauthorized Median Opening should be closed



Ch 84+450(LHS) Truck Parking on the shoulder is observed at this location



Ch 85+400(LHS) Bullet type Exit/Entry without proper Deceleration/Acceleration lane. Irregular Pavement Markings. Old Pavement Markings should be removed



Ch 87+250(LHS). Break in Masonry wall creating direct access to the MCW, which is a potential safety hazard and Unauthorized Median Opening

## Safety Audit Report 6 – Construction Stage

## Appendix - C

Six Laning of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses)  
from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka  
to be executed as BOT (Toll) project on DBFO Pattern under NHDP Phase-V

|   |   |
|---|---|
|   |    |
| Ch 88+900(LHS) Bullet type Exit without proper Deceleration lane. Exiting directly into Pedestrian Subway.  | Ch 91+000(LHS) At grade U-turn facility on Six lane Highway. Per MORTH Six lane highway manual there shall be no direct access to the MCW, all access shall be from service road through acceleration lane only. Inter connections between S/R shall be through Under passes only. Improper Channelization of traffic |
|    |   |
| Ch 92+100(LHS) Bullet type Exit without proper deceleration lane. Kerbs built at Exit/Entry locations to be removed and provide standard pavement markings to guide the road user | Ch 93+600(LHS) Pedestrians waiting for Bus/Pickup vans on MCW. Unauthorized Median Opening  |

## Safety Audit Report 6 – Construction Stage

## Appendix - C

Six Laning of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses) from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka to be executed as BOT (Toll) project on DBFO Pattern under NHDP Phase-V

|   |  |
|---|--|
|   |   |
| Ch 95+000 (LHS) Unauthorized opening creating direct access to MCW  | Ch 97+400 (LHS) Bullet type Exit without proper Deceleration lane                    |
|    |  |
| Ch 98+250(LHS) Construction work in progress, Standard practices of Guard fencing/Barricading/Diversion have not been followed for protecting the construction zone, No Flag man to warn the users. Workers without PPE | Ch 98+550(LHS) Unauthorized opening creating direct access to MCW                    |



## Safety Audit Report 6 – Construction Stage

Six Laning of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses)  
from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka  
to be executed as BOT (Toll) project on DBFO Pattern under NHDP Phase-V

## Appendix - C



Ch 99+300 (LHS) Unauthorized opening creating direct access to MCW



Ch 103+400 (LHS) Direct access to Subway from MCW.



Ch 103+400(LHS) Two wheeler accessing Unauthorized Median Opening to cross the High Speed Six lane Main Carriage Way



Ch 105+100(LHS) No hazard marker is placed at the stone masonry wall which is not visible during nights

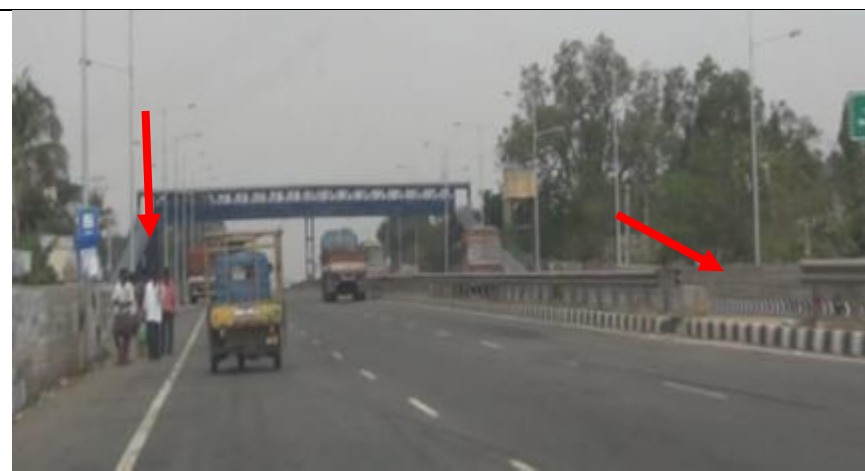
## Safety Audit Report 6 – Construction Stage

## Appendix - C

Six Laning of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses)  
from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka  
to be executed as BOT (Toll) project on DBFO Pattern under NHDP Phase-V



Ch 106+200 (LHS) Bullet type Exit/Entry without proper Deceleration/Acceleration lane



Ch 107+800(LHS) Pedestrian on MCW waiting for Bus/Pickup Van. Break in Metal Beam Crash Barrier on Median.



Ch 108+500(LHS) Unauthorized opening creating direct access to MCW



Ch 109+500(LHS) Un authorized median opening and forced opening to access MCW from SR.

## Safety Audit Report 6 – Construction Stage

## Appendix - C





Six Laning of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses)  
from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka  
to be executed as BOT (Toll) project on DBFO Pattern under NHDP Phase-V

|  |  |
|--|--|
|    |       |
| Ch 111+750(LHS) Bullet type Exit without proper deceleration lane. Kerbs built at Exit/Entry locations to be removed and provide standard pavement markings to guide the road user | Ch 115+800(LHS) Unauthorized opening creating direct access to MCW                       |
|   |      |
| Ch 120+100(LHS) Remove old Pavement Markings   | Ch 120+600(LHS) Bullet type Entry without proper acceleration lane and Pavement Markings |

## Safety Audit Report 6 – Construction Stage

Six Laning of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses)  
from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka  
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|   |   |
|---|---|
|   |    |
| Ch 120+950(LHS) Provide Object Hazard Marker  | Ch 121+250(LHS) Unauthorized Median Opening   |
|  |   |
| Ch 127+500(LHS) Unauthorized opening creating direct access to MCW                  | Ch 128+400 (RHS) Unauthorized opening from S/R to MCW and Unauthorized Median Opening |



## Safety Audit Report 6 – Construction Stage

## Appendix - C

Six Laning of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses)  
from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka  
to be executed as BOT (Toll) project on DBFO Pattern under NHDP Phase-V

|   |  |
|---|--|
|   |   |
| Ch 132+200(LHS) Bullet type Exit without proper deceleration lane.<br>Provide standard pavement markings and Signage to guide the road user                 | Ch 132+500(LHS) Pedestrians waiting for Bus/Pickup vans on MCW                       |
|    |  |
| Ch 138+200 (LHS) Construction work in progress, Standard practices of Guard fencing/Barricading has not been followed for protecting the construction zone. | Ch 138+400(LHS) Unauthorized opening creating direct access to MCW                   |

## Safety Audit Report 6 – Construction Stage

## Appendix - C

Six Laning of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses)  
from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka  
to be executed as BOT (Toll) project on DBFO Pattern under NHDP Phase-V



Ch 139+700(LHS) Bullet type Exit without proper declaration lane and Pavement Markings. Provide Object Hazard Marker



Ch 140+100(LHS) Pedestrian on MCW waiting for Bus/Pickup Van



Ch 144+500 (RHS) At grade U-turn facility on Six lane Highway. Per MORTH Six lane highway manual there shall be no direct access to the MCW, all access shall be from service road through acceleration lane only. Inter connections between S/R shall be through Under passes only.



Ch 153+900(LHS) Bullet type Exit/Entry without proper Deceleration/Acceleration lane. Provide hazard markers at the entrance of the Stone masonry wall which is not visible in the night

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Six Laning of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses)  
from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka  
to be executed as BOT (Toll) project on DBFO Pattern under NHDP Phase-V



Ch 154+500(LHS) Unauthorized Median Opening. Slow moving vehicles like Bullock cart crossing the MCW at this location. Pedestrians using the Break in Masonry wall to access MCW.



Ch 156+200 to Ch 156+400(LHS & RHS) Truck parking is observed on the Outer lane and Shoulder of the MCW at this location



Ch 157+400(LHS) Construction work in progress, Standard practices of Guard fencing/Barricading/Diversion has not been followed for protecting the construction zone, No Flag man to warn the users. Workers without PPE




Ch 158+100(LHS) Bullet type Exit from MCW to Side Road/Service Road without proper Deceleration lane



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Six Laning of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses) from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka to be executed as BOT (Toll) project on DBFO Pattern under NHDP Phase-V




|   |   |
|---|---|
|   |    |
| Ch 164+600(LHS) Provide Hazard Marker   | Ch 182+600(LHS) Construction work in progress, Standard practices of Guard fencing/Barricading have not been followed for protecting the construction zone. |
|  |   |
| Ch 188+600(RHS) Unauthorized opening creating direct access to MCW                  | Ch 178+900(RHS) Break in Masonry wall, which pedestrians using to access MCW for Buses/Pickup Van   |



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Six Laning of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses)  
from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka  
to be executed as BOT (Toll) project on DBFO Pattern under NHDP Phase-V

|  |  |
|--|--|
|    |   |
| Ch 168+200(RHS) Bullet type Exit without proper deceleration lane. Kerbs built at Exit/Entry locations to be removed and provide standard pavement markings and Signage to guide the road user | Ch 166+800(RHS) High Embankment area. W-Beam metal crash Barriers are yet to be completed. Provide Hazard Marker   |
|   |    |
| Ch 159+200(RHS) Bullet type Entry without proper acceleration lane   | Ch 158+400 (RHS) S/R continuing into MCW at this new bridge location. S/R shall be physically separated from high speed MCW at this location. Access to MCW from S/R shall be provided through Entry Ramps only with proper acceleration lane. |

## Safety Audit Report 6 – Construction Stage

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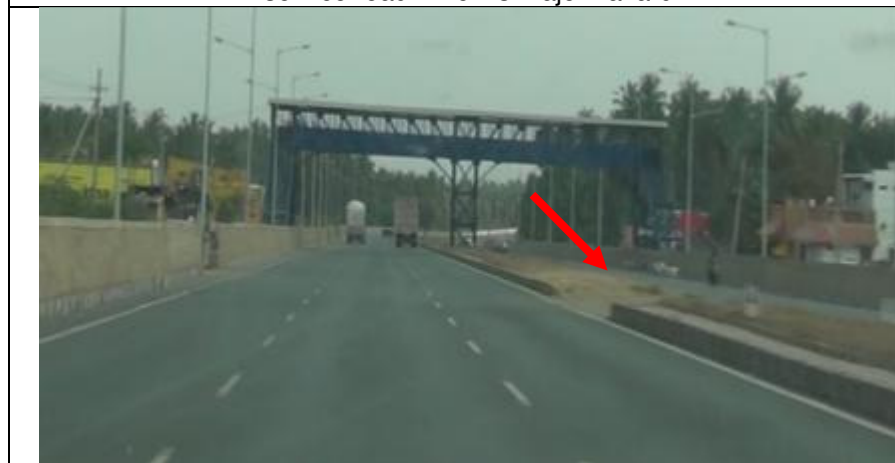
Six Laning of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses)  
from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka  
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Ch 158+000(RHS) Bullet type Exit without proper deceleration lane. Rigid safety barrier without any retro-reflective is placed at the entry of the service road which is major hazard



Ch 156+600(RHS) Bullet Type Entry without acceleration lane. No Pavement Markings at this location.



Ch 154+400(RHS) Unauthorized Median Opening



Ch 148+000 (RHS) Work zone not protected. Unsafe lane closing procedure

## Safety Audit Report 6 – Construction Stage

## Appendix - C

Six Laning of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses)  
from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka  
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Ch 147+600(RHS) At grade U-turn facility on Six lane Highway. Per MORTH Six lane highway manual there shall be no direct access to the MCW, all access shall be from service road through acceleration lane only. Inter connections between S/R shall be through Under passes only.



Ch 142+300(RHS) Non standard Hazard Marker



Ch 139+900(RHS) Pedestrian Crossing MCW at this location







Ch 134+200(RHS) Provide standard and Retro reflective Hazard Marker



## Safety Audit Report 6 – Construction Stage

## Appendix - C

Six Laning of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses)  
from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka  
to be executed as BOT (Toll) project on DBFO Pattern under NHDP Phase-V

|  |  |
|--|--|
|    |   |
| Ch 131+600(RHS) Bullet type Entry without acceleration lane. S/R continuing into MCW at this location. S/R shall be physically separated from high speed MCW at this location. | Ch 125+800(RHS) Unauthorized opening creating direct access to MCW                   |
|   |  |
| Ch 123+000 (RHS) Bullet type Exit/Entry without deceleration/acceleration lane. Close the Temporary Median Opening   | Ch 121+200 (RHS) Unauthorized Median Opening   |

## Safety Audit Report 6 – Construction Stage

Six Laning of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses)  
from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka  
to be executed as BOT (Toll) project on DBFO Pattern under NHDP Phase-V

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|  |  |
|--|--|
|                    |   |
| Ch 120+700 (RHS) Protect Structure Headwall with Metal Beam Crash Barrier.                           | Ch 119+800(RHS) Provide Object Hazard Marker   |
|                   |  |
| Ch 118+600(RHS) Protect Structure Headwall with Metal Beam Crash Barrier. Non standard Hazard Marker | Ch 112+200(LHS) Workmen without PPE  |

## Safety Audit Report 6 – Construction Stage

Six Laning of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses)  
from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka  
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## Appendix - C



Ch 111+200(RHS) Unauthorized access creating direct access to MCW.  
Extend the Iron fence to the Start of Brick Masonry Wall



Ch 109+500(RHS) Unauthorized opening creating direct access to MCW.  
Unauthorized Median Opening



Ch 108+400(RHS) Unauthorized opening creating direct access to MCW



Ch 106+400(RHS) Bullet type Entry without proper acceleration

## Safety Audit Report 6 – Construction Stage

Six Laning of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses)  
from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka  
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Ch 102+800(RHS) Provide Object Hazard Marker



Ch 93+600(RHS) Pedestrian on MCW waiting for Bus/Pickup van at this location (Seebi-Temple location). Unauthorized Median Opening



Ch 89+000(RHS) Bullet type Exit without proper Deceleration lane.






Ch 83+800(RHS). Unauthorized Median Opening



## Safety Audit Report 6 – Construction Stage

Six Laning of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses)  
from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka  
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|   |   |
|---|---|
|   |    |
| Ch 83+200 (RHS) No Object Hazard Marker   | Ch 81+400(RHS) Break in Masonry wall creating direct access to the MCW, which is a potential safety hazard. Pedestrians Waiting for Bus/Pickup Vans |
|  |   |
| Ch 80+200(RHS) Bullet type Exit/Entry without proper Deceleration/Acceleration lane |   |



## Safety Audit Report 6 – Construction Stage

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Six Laning of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses)  
from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka  
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### Night Audit:

|   |  |
|---|--|
|   |   |
| Exit not Visible during night. Bullet type Exit without proper deceleration lane.   | Non Standard and Non – Reflective Hazard Marker                                      |
|  |  |
| No Pavement Markings on Service road  | Break In Masonry wall, which pedestrians using to access MCW is Major Safety Hazard  |

## Safety Audit Report 6 – Construction Stage

## Appendix - C

Six Laning of Tumkur-Chitradurga section (Excluding Tumkur & Chitradurga Bypasses)  
from Km 75.000 to Km 189.000 of NH-4 (approx 114.00Km) in the state of Karnataka  
to be executed as BOT (Toll) project on DBFO Pattern under NHDP Phase-V

|   |  |
|---|--|
|   |   |
| Letters on Sign Board are not retro reflective                                      | Exit not Visible during night. Bullet type Exit/Entry without proper Deceleration/Acceleration lane. Kerbs built at Exit/Entry locations to be removed and provide standard pavement markings to guide the road user |
|  |    |
| Head light glare  | High embankment. Installation of Metal Beam Crash Barriers yet to be completed. Non-reflective MBCBs   |