Environmental and Social Monitoring Report

Second Quarterly Report
(April 2015 – June 2015)

India: Jaipur Metro Rail Line 1-Phase B Project

Prepared by Jaipur Metro Rail Corporation Limited for the Asian Development Bank.

CURRENCY EQUIVALENTS

(as of 30th June 2015)

Currency unit	-	Indian Rupee (INR)
INR 1.00	=	$ 0.0157
$1.00	=	INR 63.7549

ABBREVIATIONS

ADB	-	Asian Development Bank
ADF	-	Asian Development Fund
CEC	-	Continental Engineering Corporation
CSC	-	Construction Supervision Consultant-
ES	-	Environmental Specialist
DMRC	-	Delhi Metro Rail Corporation
EMP	-	Environmental Management Plan
EA	-	Execution Agency
EIA	-	Environmental impact Assessment
EARF	-	Environmental assessment and review framework
ESMS	-	Environmental and social management system
EMR	-	Environmental Monitoring Report
GPR	-	Ground penetrating radar
HSO	-	Health and Safety Officer
IEE	-	Initial environmental examination
IPP	-	Indigenous People Plan
JMRC	-	Jaipur Metro Rail Corporation
PAM	-	Project Administration Manual
PCAG	-	Public Consultation and Addressing of Grievances
RP	-	Resettlement Plan
SHE	-	Safety Health & Environment Management Plan
SPS	-	Safeguard Policy Statement
VMR	-	Vibration Monitoring Results

WEIGHTS AND MEASURES

km	-	Kilometer
m	-	Meter

NOTES

In this report, "$" refers to US dollars

CONTENTS

6. Layout plan of casting yard and labour camp
7. Monthly status report of Heritage consultant
8. Accident Report
9. License from A&M Department, GoR
10. Application receipt to State Pollution Control Board
11. Photolog of Public Interaction Meetings
12. Sample attendance list of Public Interaction Meetings

EXECUTIVE SUMMARY

1. This report is the 2nd quarterly report on environmental and social safeguards compliance of the Jaipur Metro Rail Line -1 Phase B Project. It covers the period from April 2015 to June 2015. Line 1-Phase B of the project inlcudes constrcution of 2.3 km underground portion from Chandpole to Badi Chaupar, with two stations. Line 1–Phase B is being financed by ADB and expected to be completed by March 2018 at a cost of Rs 1126 Crore.

2. Jaipur Metro Rail Corporation (JMRC) is the Executing Agnecy for the Project. The sole civil works contract package under the project was awarded to Continental Engineering Corporation (CEC) in September 2013. The General Consultant overseeing the design and supervision of physical works is Delhi Metro Rail Corporation Limited (DMRC). Progress in construction works as of June 2015 are: i) production of main rings in casting yard is ongoing; ii) civil works for Chandpole launching shaft is completed and Tunnel Boring Machine (TBM) – 1 has started working; iii) TBM – 2 has been commissioned; iv) guide wall, D-wall and station top slab construction of Chhoti Chaupar station toward Chandpole side is completed and road work is in progress; (v) After complete documentation of the second layer of kund found at Chhoti Chaupar in the previous reportig period, Chhoti Chaupar Tank has been refilled for purpose of constrcution work of station; and vi) initial utility shifting activities and tree transplantation activities are ongoing in Badi Chaupar station. Tunneling with TBM-1 from Chandpole station has started. As of June 2015, total physical and financial accomplishment are about 11% and 11%, respectively. The contract has achieved 3% physical and 1% financial progress during this reporting quarter ending June 2015.

3. The environmental and social safeguards of the project are being implemented in compliance with the loan covenants, project agreement and contractor is complying with the proposed mitigation measures described in the Environmental Management Plan (EMP); Safety, Health and Environment (SHE) Manual and the contract specifications. The implementation of environmental and social safeguards are being monitored at Project Management and General Consultant (GC) level. With exception of few issues the project is being implemented in compliace with project requirements.

4. A baseline study carried out on heritage structures located in the project area found that 6% of the structures are in critically unstable condition and need immediate remedial measures, 56% are in partly unstable condition and require remedial measures before tunneling works begin and 38% are in stable condition. These conditions of the structures have prevailed for the past few decades and are not related to the project. Till the reporting period of report i.e. up to June 2015 no changes in the condition of structures were reported.

5. A re-evaluation of the structural stability of the shops along the metro route alignment from Chandpole gate to Chhoti Chaupar was conducted by the Joint committee comprising of engineers from JMRC, DMRC and M/s CEC. The list of structures requiring immediate action is being shared with Jaipur Nagar Nigam, so that to ensure no damage during the tunneling work. Preventive measures like propping of the verandahs and the shops along the above length will be taken care by contractor during the tunneling work

6. For structures located around the Chaupars (station sites) where construction works are ongoing proactive measures of providing propping support to unstable structures is being carried out by the contractor under instructions of the ‘engineer’ (General Consultants). In addition regular monitoring of weak structures through installation of crack, tilt and vibration meters and building settlement markers is also being done.

7. The project has minor social and resettlement impacts such as the acquisition of a strip of private land (10 by 10 meters) outside Chandpole station and the tunnel construction start point, as the shops (3 Shopkeepers) on that strip are blocking traffic. JMRC has identified and acquired land from the government of Rajasthan across the street to relocate the three shops affected. Shop and land owners have been consulted and have agreed to relocate. The construction of alternative shops has already begun by the affected shopkeepers and the process of shifting will soon begin. When the work of Phase 1B started it was found that 6 temples were falling in the station box area of Chhoti Chaupar and Badi Chaupar where digging is necessary for construction of stations, hence this required immediate relocation. For the purpose of smooth construction work and traffic flow around the construction site, JMRC in consultation with local agencies prepared traffic diversion plan. The numbers of temples falling in the area of entry/exit structures and traffic diversion were finalizes and 7 additional temples i.e three at Chhoti Chaupar and four at Badi Chaupar were identified which were falling in the design of entry/exit structure and traffic diversion scheme. Necessary measures were taken for relocation of such identified temples. 6 Temples of Chhoti Chaupar have already been relocated to Old Atish market with proper rituals. 7 temples of Badi Chaupar will be relocated to Tanwar Ji Ka Nauhra.

8. Two accidents were reported during the monitoring period. The first accident occurred on 15.04.2015 afternoon at casting yard involving hydra. One person was injured in the accident. The cause of accident has been analysed as lack of supervision and ineffectiveness of the operator.

9. On 04.05.2015, during the construction of D Wall at Chhoti Chaupar, while lowering the D-Wall cage, the Crane rope holding the cage snapped and the boom descended and fell over the Shop no. 377-378 (Udai Singh Ji ki Haveli No. 98). Immediately mitigation measures were taken up and fortunetly there were no Human casualties. Crane available on site was utlized to retrieve boom from the building and it was safely lowered to the barricaded area. JMRC has taken up repair works in priority to the satisfaction of the owners. The incident investigation reports are attached as **Appendix-8.**

10. On excavation work being undertaken at Chhoti Chaupar under supervision of Heritage consultant M/s Abha Narain lambah Associates, another layer of kund was discovered which also revealed 4 historic tunnels which were laid as water inlet and outlet channels to the kund functioning at that time. At some point these channels were left defunct when infrastructure services were being laid in the city criss crossing under the roads. One of the tunnels in the north direction has been unearthed all the way up to 80 metres and one can walk through the tunnel. Complete documentation, videography and photography has been conducted with a view of recreating it at later stage. After complete documentation of the second layer of tank found at Chhoti Chaupar, for the purpose of station work at Chhoti Chaupar and approved traffic diversion scheme, the tank has been filled up and after completetion of the construction work, old tank will be recreated on the site.

11. The construction works are proceeding in accordance with the provisions of the EMP such as review of monitoring report format, regulatory compliance action plan and camp layout review and approval by the GC. The environmental monitoring plan is successfully being implemented by the JMRC through an independent instrumentation company engaged by executing agency with the approval of ‘Engineer’.

12. JMRC and DMRC officials have regularly been meeting with the local people and business associations in the project area to inform them about the construction works. Measures have been taken to address concerns of the local businesses such as stopping of work and providing proper pathways for customers during festivals. All reports and information on the project is disclosed on the JMRC website. In addition JMRC has a full-time Public Relation Officer dealing with media/press issues and also maintains a facebook page and twitter account for disclosing project information and responding to queries and concerns from the general public. Inspite of all these measures, some members of the public are still concerned about the impacts of the project on structures and the cultural value of Jaipur city. To deal with this JMRC will conduct another round of consultation with concerned stakeholders to clearly explain the precautionary measures being taken to protect the heritage structures particularly to people who do not have access to the internet.

13. Various proactive measures are being taken to implement project in compliance with requirements, prevent damages to heritage structures, coordinate with relevant agencies, communicate with the public and address grievances of the local public. Areas such as public communications, documentation and reporting need further enhancement.

14. The actions recommendations during previous monitoring period have been implemented. There were no significant environmental impacts observed during the reporting period and a fewshort-comings on follow-up with regulatory agencies, regular technical support by supervision consultant's enviornmental expert, public communications, documentation and reporting were observed for which necessary corrective measures have to be taken.

1. INTRODUCTION

A. Purpose of the Report

15. The objective of environmental monitoring is to allow ADB and the Jaipur Metro Rail Corporation (JMRC) gather information to: i) evaluate the environmental management plan (EMP) progress by establishing compliance status, ii) detect and correct non-conformances, iii) identify unanticipated impacts and implement necessary mitigation measures, and iv) provide evidence to support enforcement of penalty provisions of the civil works contract to deter non-compliance.

16. Environmental monitoring and disclosure of quarterly or semi-annual monitoring reports is an ADB requirement for environmental category-A projects like Jaipur Metro Rail Line-1 Phase B. Environmental monitoring is part of project implementation process to be complied by both ADB and JMRC. The preparation and submission of the quarterly or semi-annual monitoring reports is the responsibility of JMRC while supervision to provide guidance is the role of ADB.

17. As many sensitive heritage structures of the Pink City exist above the metro underground alignment it was agreed during project preparation that quarterly environmental monitoring reports will be prepared and disclosed for this project. However, since tunneling works which is the key activity that poses risks to the heritage structures have not begun until March 2015 and significant physical construction works starts only in July 2015, it was agreed with ADB that first monitoring report will be submitted for six month period. Accordingly first semi-annual monitoring report (July 2014 – December 2014) has been submitted to ADB and disclosed on ADB and JMRC websites. First quarterly monitoring report (Jan 2015 – March 2015) has been submitted to ADB and disclosed on ADB and JMRC websites.This report is the second quarterly environment and social monitoring report for reporting period April 2015 to June 2015.

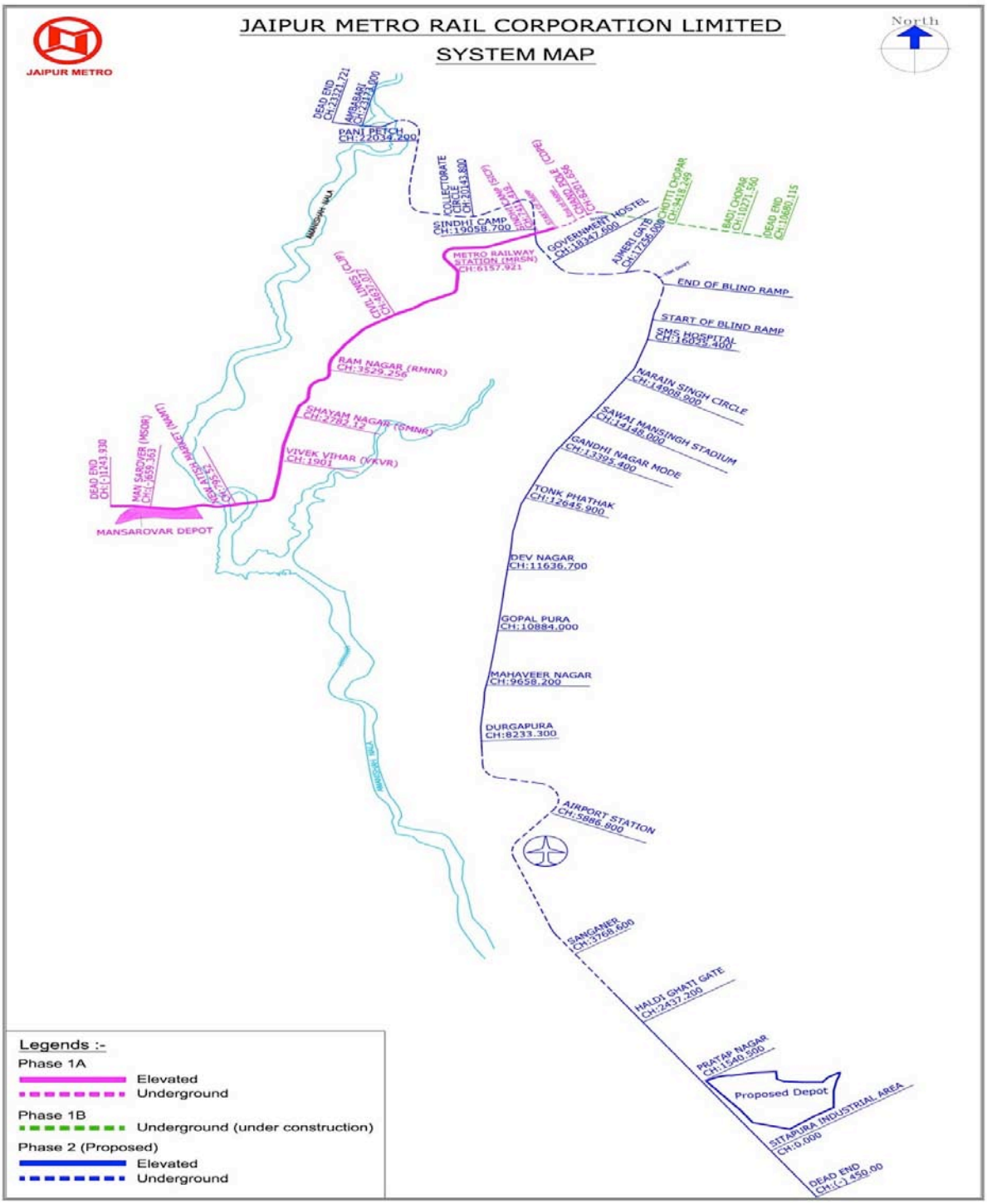
B. Project Description

18. Jaipur, the capital of the Indian state of Rajasthan, is one of the fastest growing cities in India. The fast paced industrial and commercial development has resulted in a steep rise in travel demand, but the city's existing public transport infrastructure is inadequate in terms of capacity and service. With the growing economy, passengers are shifting to private modes of transport, as evident in the rise in vehicle ownership, aggravating congestion and pollution. The modal share for public transport was 19% in 2009—one of the lowest in cities with more than 3 million inhabitants in India[1].

19. In 2009, Jaipur Development Authority developed a comprehensive mobility plan, seeking to provide an overall transport plan, up to 2031, that emphasizes the preeminence of public transport for the movement of people, not just vehicles, and integrating land use with transport networks. The plan recommended, among others, the development of high capacity metro lines along the east–west corridor of 12 km from Mansarovar to Badi Chaupar, and the north–south corridor of 23 km from Ambabadi to Sitapura. In January 2010, the government of Rajasthan established the Jaipur Metro Rail Corporation (JMRC) to implement the metro rail lines. Line 1- Phase A (9.7 km elevated portion from Mansarovar to Chandpole) and Line 1-Phase B (2.3 km underground portion from Chandpole to Badi Chaupar, with two stations).

[1]http://www.adb.org/sites/default/files/project-document/79730/46417-001-rrp.pdf

20. Line 1 – Phase B is being financed by ADB and expected to be completed by March 2018 at a cost of Rs. 1126 Crore[2]. Figure 1 show the system map of the Project.



Source: JMRC

Figure 1. JMRC Project System Map

[2]https://www.jaipurmetrorail.in/Present%20Status

C. Project Implementation Arrangement

21. The Government of Rajasthan acting through the Urban Development and Housing Department and Jaipur Metro Rail Corporation (JMRC) is the executing agency of the Project. JMRC has established an environment safeguard cell to look after implementation and monitoring of the safeguards measures associated with the Project. It constitute six officials of JMRC. Organization structure of Safeguards Cell is show in Figure 2.

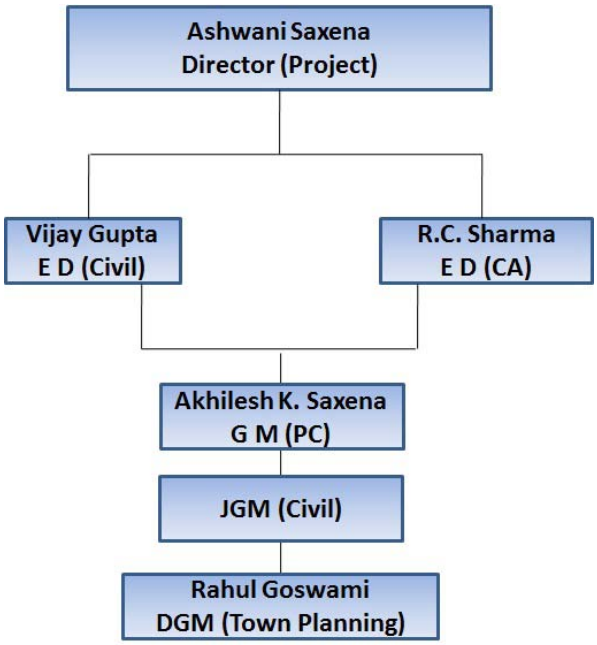


Figure 2: Organization Structure of Safeguards Cell of JMRC

D. Project Implementation Progress

22. As of June 2015, total physical and financial accomplishment are about 11% and 11%, respectively. The status of various construction activities is provided in the Table 1. Photolog demonstrating the progress of works is provided in Appendix 1.

Table 1: Status of Construction Works as of June 2015

<table>
<tr><th>S.N.</th><th>Activities</th><th>Location</th><th>Status</th></tr>
<tr><td>1</td><td>Earthworks:

Earthwork is to be done for construction of Launching shaft at Chandpole, construction of underground stations at Chhoti Chaupar and Badi Chaupar by cut &cover method. During the tunnelling earth will be excavated with Tunnel Boring Machine (TBM).</td><td>
<table>
<tr><th>Location</th><th>Estimated quantity (in cum)</th></tr>
<tr><td>Chandpole</td><td>8000</td></tr>
<tr><td>Chhoti Chaupar</td><td>120000</td></tr>
<tr><td>Badi Chaupar</td><td>120000</td></tr>
<tr><td>Tunnelling Work</td><td>180000</td></tr>
<tr><td>Cut & cover</td><td>60000</td></tr>
</table>
</td><td>
<table>
<tr><th>Location</th><th>% Completion</th></tr>
<tr><td>Chandpole</td><td>100%</td></tr>
<tr><td>Chhoti Chaupar</td><td>5%</td></tr>
<tr><td>Badi Chaupar</td><td>1%</td></tr>
<tr><td>Tunnelling Work</td><td>0.1%</td></tr>
<tr><td>Cut & cover</td><td>0%</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>S.N.</th><th>Activities</th><th>Location</th><th>Status</th></tr>
<tr>
<td>2</td>
<td>Spoils Disposal:

<table>
<tr><td>Location</td><td>Estimated quantity *(in cum)</td></tr>
<tr><td>Chandpole</td><td>8000</td></tr>
<tr><td>Chhoti Chaupar</td><td>108000</td></tr>
<tr><td>Badi Chaupar</td><td>108000</td></tr>
<tr><td>Tunnelling Work</td><td>180000</td></tr>
<tr><td>Cut & cover</td><td>60000</td></tr>
</table>
*Estimated quantity of soil which will be disposed during complete project duration</td>
<td>1. Sumel
2. Govindpura/Ropada
3. Mathuradaspura
4. Langariyawas</td>
<td>➢ Jaipur Development Authority has allotted following soil disposal sites vide letter dated 01.09.2014

1. Sumel
2. Govindpura/Ropada
3. Mathuradaspura

➢ Jaipur Nagar Nigam has allotted following soil disposal sites vide letter dated 08.09.2014:

1. Langariyawas

➢ Spoil disposed at different disposal sites during the reporting period is as under:

<table>
<tr><td>Location</td><td>Estimated quantity (in cum)</td></tr>
<tr><td>Sumel</td><td>7000</td></tr>
<tr><td>Govindpura/ Ropada</td><td>0</td></tr>
<tr><td>Mathuradaspura</td><td>21304</td></tr>
<tr><td>Langariyawas</td><td>0</td></tr>
</table></td>
</tr>
<tr>
<td>3</td>
<td>Vegetation and Plant Clearing:

Some trees are coming in the metro route in launching shaft at Chandpole, station box and in entry exit at Chhoti Chaupar and Badi Chaupar. These trees are to be cut or relocated with the prior approval of District Collector.</td>
<td>• Location of the trees as per survey which are to be cut or located as under:

<table>
<tr><th>Location</th><th>Trees</th></tr>
<tr><td>Metro route</td><td>90</td></tr>
<tr><td>Entry/Exit at Chhoti Chaupar & Badi Chaupar</td><td>35</td></tr>
<tr><td>Ancillary Building area at Chhoti Chaupar</td><td>20</td></tr>
</table>
• The tree species include Gulmohar, Banyan tree & Pipal tree.
• The trees are being transplanted at Ghat ki Guni.</td>
<td>Permission for cutting/ transplantation of 20 trees has been obtained from ADM, Jaipur vide their letter dated 24.04.2015 and the copy is placed in Appendix 5.

Details of trees cut or transplanted is as under:

<table>
<tr><th>Location</th><th>Trees</th></tr>
<tr><td>Metro route</td><td>52</td></tr>
<tr><td>Entry/Exit at Chhoti Chaupar & Badi Chaupar</td><td>0</td></tr>
<tr><td>Ancillary Building area at Chhoti Chaupar</td><td>0</td></tr>
</table></td>
</tr>
</table>

<table>
<tr><th>S.N.</th><th>Activities</th><th>Location</th><th>Status</th></tr>
<tr><td>4</td><td>Utility Shifting:

Utility shifting is an important activity for underground station work.

Underground electric cables, water supply lines and telecom lines are to be realigned at Chandpole for launching shaft and underground station at Chhoti Chaupar and Badi Chaupar.</td><td><table>
<tr><td>Chandpole – Launching shaft</td></tr>
<tr><td>Electric cables</td></tr>
<tr><td>Water supply lines</td></tr>
<tr><td>Telecom lines</td></tr>
<tr><td>Chhoti Chaupar</td></tr>
<tr><td>Electric cables</td></tr>
<tr><td>Water supply lines</td></tr>
<tr><td>Telecom lines</td></tr>
<tr><td>Badi Chaupar</td></tr>
<tr><td>Electric cables</td></tr>
<tr><td>Water supply lines</td></tr>
<tr><td>Telecom lines</td></tr>
</table></td><td>Status during reporting period is as under:

<table>
<tr><td colspan="2">Chandpole – Launching shaft</td></tr>
<tr><td>Electric cables</td><td>100%</td></tr>
<tr><td>Water supply lines</td><td>100%</td></tr>
<tr><td>Telecom lines</td><td>100%</td></tr>
<tr><td colspan="2">Chhoti Chaupar</td></tr>
<tr><td>Electric cables</td><td>100%</td></tr>
<tr><td>Water supply lines</td><td>100%</td></tr>
<tr><td>Telecom lines</td><td>100%</td></tr>
<tr><td colspan="2">Badi Chaupar</td></tr>
<tr><td>Electric cables</td><td>Work in Progress</td></tr>
<tr><td>Water supply lines</td><td>Work in Progress</td></tr>
<tr><td>Telecom lines</td><td>Work in Progress</td></tr>
</table></td></tr>
<tr><td>5</td><td>Traffic Management and Diversion:

For the construction of launching shaft at Chandpole, underground stations at Chhoti Chaupar and Badi Chaupar, traffic is to be diverted.

Project specific traffic management plan has been developed and the same has been approved by Jaipur Traffic Authority.</td><td>Chandpole Launching Shaft

Traffic from Station Road to Jhotwara Road has been diverted via Pareek College Road.

Chhoti Chaupar

Direct access from Chandpole Bazar to Tripolia Bazar. Traffic is diverted via Nahargarh Road – Gangauri Bazar – Cheeni Ki Burj.

Badi Chaupar

Traffic Diversion Plan is under preparation</td><td>Chandpole Launching Shaft

Traffic Management & diversion is continuing.

Chhoti Chaupar

Traffic Management & diversion is continuing. JMRC is aiming for opening the traffic blockade on Chandpole side by first week on July 2015 and on Tripolia side by end of July 2015.

Badi Chaupar

Traffic Diversion Plan is under preparation</td></tr>
<tr><td>6</td><td>Launching shaft:

Launching shaft is to be constructed for tunnel boring machine. A launching shaft has diaphragm wall/concrete wall and it is built to be permanent. Once the access shaft is completed, Tunnel Boring Machine will be lowered to the bottom and</td><td>Chandpole</td><td>Launching shaft work has been completed.</td></tr>
</table>

<table>
<tr><th>S.N.</th><th>Activities</th><th>Location</th><th>Status</th></tr>
<tr><td></td><td>excavation will start. Launching shaft is the main entrance & exit of the tunnel until project is complete.

Launching shaft is rectangular in shape and constructed with reinforce cement concrete M50 grade. Walls of launching shaft are 800 mm thick. Dimension of launching shaft at Chandpole is 24m X 20m and a depth of 14m.</td><td></td><td></td></tr>
<tr><td>7</td><td>Tunnel Boring Machine

Tunnel boring machine will be used in excavating and advancing tunnels through any type of ground strata for the complete tunnelling work.

The underlying principle of the EPB method is that the excavated soil or muck itself is used to provide continuous support to the tunnel face by balancing earth pressure against the forward pressure of the machine.

As the shield advances at the face, the cutter head on the TBM rotates through the earth. The excavated soil is then mixed together with a special foam material that actually alters its viscosity or thickness and transforms it into flowing material. The use of a foaming agent to break down muck into a liquefied form provides some obvious benefits. The muck is then stored and controlled in a pressurized chamber located inside the cutter head, and is used to apply support and balance pressure to the tunnel face during the excavation process. The foam acts as a lubricant that conditions the soil to a suitable fluidity, in effect</td><td>The main activities of these TBMs are as under:

<table><tr><th colspan="2">TBM 1</th></tr><tr><td>Refurbishment</td><td></td></tr><tr><td>Lowering in launching shaft</td><td></td></tr><tr><td>Tunneling work</td><td>3750 meter</td></tr><tr><th colspan="2">TBM 2</th></tr><tr><td>Refurbishment</td><td></td></tr><tr><td>Lowering in launching shaft</td><td></td></tr><tr><td>Tunneling work</td><td>3750 meter</td></tr></table></td><td><table><tr><th colspan="2">TBM 1</th></tr><tr><td>Refurbishment</td><td>100%</td></tr><tr><td>Lowering in launching shaft</td><td>100%</td></tr><tr><td>Tunneling work</td><td>0.1% tunneling completed.</td></tr><tr><th colspan="2">TBM 2</th></tr><tr><td>Refurbishment</td><td>100%</td></tr><tr><td>Lowering in launching shaft</td><td>100%</td></tr><tr><td>Tunneling work</td><td>Initial drive commenced</td></tr></table></td></tr>
</table>

S.N.	Activities	Location	Status
	reducing the risk of clogging in the pressurized chamber head or muck storage area. A screw conveyor then removes excess fluidized muck in controlled volumes from behind the cutter head and in front of the "Pressure bulkhead", synchronizing the screw conveyor with the actual speed of the tunnel boring machine, and equalizing the actual volume of soil travelling into and out of the machine and establishes earth pressure balance during excavation, thereby also reducing the risk of surface or ground settlement. The performance of the EPBV machine, however, largely depends on the actual properties of the excavated muck. The soil may be coarse sands, gravel or stiff clays. The EPB TBM also has the unique capability of placing a continuous ring of segment liners from within the tail shield of the machine inside the tunnel as it advances. These concrete segments provide critical additional reinforcement and support and accomplish all tunnel construction in one pass. Tunnelling works from Chandpole to Badi Chaupar will be done by the two TBMs. Diameter of the cutting head of TBM is 6.55 meter. The tunnel size is of 5.60 meter internal diameter.		
8	**Segment casting:** Internal lining of the tunnel will be done by precast reinforced cement concrete	Segment casting will be done at casting yard in Bhankarota.	Rings casted are as under:

<table>
<tr><th>S.N.</th><th>Activities</th><th>Location</th><th>Status</th></tr>
<tr><td></td><td>segments. The segments are to be constructed with M 50 concrete having outer diameter of 6.35 meter. One ring comprises 6 segments.</td><td><table><tr><td>Rings</td><td>3200 (19200 segments)</td></tr></table></td><td><table><tr><td>Rings</td><td>15% (480)</td></tr></table></td></tr>
<tr><td>9</td><td>Guide wall and D wall at Chhoti Chaupar & Badi Chaupar stations:

For the construction of D-Wall initially guide walls are constructed so as to keep the D-Wall in proper alignment.

Guide walls are constructed with reinforce cement concrete of M20 grade. The thickness of guide wall is about 600 mm and depth is 1.5 m.

Diaphragms walls are constructed with reinforce cement concrete of M35 grade. The thickness of diaphragms wall is about 800 mm and depth is about 26 m.</td><td><table><tr><td>Location</td><td>Length (m)</td></tr><tr><td colspan="2">Chhoti Chaupar</td></tr><tr><td>Guide Wall</td><td>590</td></tr><tr><td>D-Wall</td><td>590</td></tr><tr><td colspan="2">Badi Chaupar</td></tr><tr><td>Guide Wall</td><td>590</td></tr><tr><td>D-Wall</td><td>590</td></tr></table></td><td><table><tr><td>Location</td><td>% Completion</td></tr><tr><td colspan="2">Chhoti Chaupar</td></tr><tr><td>Guide Wall</td><td>68% (404)</td></tr><tr><td>D-Wall</td><td>68% (404)</td></tr><tr><td colspan="2">Badi Chaupar</td></tr><tr><td>Guide Wall</td><td>20.7% (122)</td></tr><tr><td>D-Wall</td><td>0</td></tr></table></td></tr>
<tr><td>10</td><td>Roof Slabs at Chhoti Chaupar & Badi Chaupar Station

Stations are to be constructed with top down method. Top slab, roof slab, concourse slab & base slab are to be constructed.</td><td><table><tr><td>Location</td><td>Area (sqm)</td></tr><tr><td colspan="2">Chhoti Chaupar</td></tr><tr><td>Top slab</td><td>4600</td></tr><tr><td>Roof slab</td><td>7000</td></tr><tr><td>Concourse</td><td>7000</td></tr><tr><td>Base slab</td><td>7000</td></tr><tr><td colspan="2">Badi Chaupar</td></tr><tr><td>Top slab</td><td>4600</td></tr><tr><td>Roof slab</td><td>7000</td></tr><tr><td>Concourse</td><td>7000</td></tr><tr><td>Base slab</td><td>7000</td></tr></table></td><td><table><tr><td>Location</td><td>Area (sqm)</td></tr><tr><td colspan="2">Chhoti Chaupar</td></tr><tr><td>Top slab</td><td>1780</td></tr><tr><td>Roof slab</td><td>0</td></tr><tr><td>Concourse</td><td>0</td></tr><tr><td>Base slab</td><td>0</td></tr><tr><td colspan="2">Badi Chaupar</td></tr><tr><td>Top slab</td><td>0</td></tr><tr><td>Roof slab</td><td>0</td></tr><tr><td>Concourse</td><td>0</td></tr><tr><td>Base slab</td><td>0</td></tr></table></td></tr>
<tr><td>11</td><td>Establishment of construction camp:

➢ A construction camp for labourers has been established near to casting yard area in November 2014.</td><td>Casting Yard, Bhankrota
<table><tr><td>Number of blocks</td><td>9</td></tr><tr><td>Total Camp Area</td><td>6227 sq.m</td></tr><tr><td>Capacity</td><td>9X48</td></tr></table></td><td>Completed.
<table><tr><td>Number of blocks</td><td>9</td></tr><tr><td>Area of each block</td><td>692sqm</td></tr><tr><td>Workers staying</td><td>190</td></tr></table></td></tr>
</table>

<table>
<tr><th>S.N.</th><th>Activities</th><th>Location</th><th>Status</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th colspan="2">Facilities to be provided</th></tr>
<tr><td>Bathing room</td><td></td></tr>
<tr><td>Dining room</td><td></td></tr>
<tr><td>urinal& toilet</td><td></td></tr>
<tr><td>Drinking water with cooling facility</td><td></td></tr>
<tr><td>fans</td><td></td></tr>
<tr><td>playground</td><td></td></tr>
</table>
</td><td>
<table>
<tr><th colspan="2">Facilities installed</th></tr>
<tr><td>Bathing room</td><td>yes</td></tr>
<tr><td>Dining room</td><td>yes</td></tr>
<tr><td>urinal& toilet</td><td>yes</td></tr>
<tr><td>Drinking water with cooling facility</td><td>yes</td></tr>
<tr><td>fans</td><td>yes</td></tr>
<tr><td>playground</td><td>yes</td></tr>
</table>
</td></tr>
<tr><td>12</td><td>Other Facilities:

➢ Batching Plant,
➢ Laboratory,
➢ RO Plant
➢ Chiller Plant
➢ Diesel Generating Set
➢ Briquette Boiler</td><td>Following facilities are provided at casting Yard, Bhankrota:

<table>
<tr><th>Item</th><th>Capacity</th></tr>
<tr><td>Batching Plant</td><td>(i) 30 cum/hr
(ii) 60 cum/hr</td></tr>
<tr><td>Quality Control Laboratory</td><td>Installed</td></tr>
<tr><td>RO Plant</td><td>2 kl/hr</td></tr>
<tr><td>Chiller Plant</td><td>100 TR</td></tr>
<tr><td>Diesel Generating Set</td><td>500 KVA</td></tr>
<tr><td>Briquette Boiler</td><td>2 TPH</td></tr>
</table>
</td><td>Completed.</td></tr>
<tr><td>13</td><td>Establishment and operation of quarry/ borrow area:

For the construction work following material is sourced:

➢ Sand
➢ Aggregate
➢ Cement
➢ Steel</td><td>Quarry area and borrow area of construction material is as under:

<table>
<tr><th>Material</th><th>Quarry / borrow area</th></tr>
<tr><td>Sand</td><td>Banas</td></tr>
<tr><td>Aggregate</td><td>Shakun, Lakher</td></tr>
<tr><td>Cement</td><td>Lafarge</td></tr>
<tr><td>Steel</td><td>SAIL, VIZAG,TATA</td></tr>
</table>
</td><td>Volume of the material extracted is as under:

<table>
<tr><th>Material</th><th>Volume (MT)</th></tr>
<tr><td>Sand</td><td>15768.87</td></tr>
<tr><td></td><td>22408.51*</td></tr>
<tr><td>Aggregate</td><td>8843.58</td></tr>
<tr><td></td><td>18237.68*</td></tr>
<tr><td>Cement</td><td>3286.17</td></tr>
<tr><td></td><td>6451.46*</td></tr>
<tr><td>Steel</td><td>867.6</td></tr>
<tr><td></td><td>1598.6*</td></tr>
</table>
* Up to date quantity</td></tr>
</table>

2. COMPLIANCE TO SAFEGUARDS PROVISIONS IN AGREEMENTS UNDER THE PROJECT

A. Compliance to Loan Agreement

23. The environmental and social safeguard requirements are explicit provided in the Loan Agreement 3062-IND between ADB and State of Rajasthan through the Urban Development and Housing Department (UDH) and Jaipur Metro Rail Corporation (JMRC). These loan agreement provisions and compliance status are provided in Table 2.

Table 2: Status of Compliance to Environmental Provisions of the Loan Agreement

S. N.	Environmental Provision	Compliance Status
1	**Schedule 4. Item 7(a):** <u>Conditions for awards of contracts, commencement of Works</u> 7. As condition for award of any contract under the project the EA shall ensure the following: a. JMRC shall not award any Works contract which involves environmental impacts until JMRC incorporated the relevant provisions from the EMP and SHE into the Works contract,	Complied. SHE (Safety, Health and Environment) Manual and Environmental Management Plan (EMP) is a part of bidding document. Section 6 of Contract Agreement includes condition of contract on SHE and EMP, requiring the Contractor to implement the EMP and comply with requirements of SHE.
2	**Schedule 4. Item 8:** <u>Conditions for award of contracts; commencement of Works</u> 8. "As a condition for commencement of Works contract under the Project which involves environmental impacts and if it requires environmental clearances, the State thorough the JMRC shall ensure that the final approval of environmental clearances including the EIA, SHE, from appropriate *authority* has been obtained."	Complied. The project did not require environmental clearance, as railways including metro projects in India are not included in the EIA Notification 2006 of GoI.
3	**Schedule 5. Item 3:** <u>Environment</u> 3. "The Borrower shall ensure or cause the State through JMRC to ensure that the preparation, design, construction, implementation, operation and decommissioning of the Project facilities comply with (i) all applicable laws and regulations of the Borrower and State relating	Being complied. ➢ Requirements on permits and clearance are being followed. ➢ SHE is strictly being complied with.

	to environment, health, and safety including SHE; (ii) the Environmental Safeguards; and (iii) all measures and requirements set forth in the EIA and the EMP, and any corrective or preventative actions set forth in a Safeguards Monitoring Report."	➢ Requirements of EIA and EMP are being implemented.
4	**Schedule 5. Item 4(a):** <u>Land Acquisition and Involuntary Resettlement</u> 4 (a) Where the need arises, the Borrower shall ensure or cause the State through JMRC to ensure that all land and all rights-of-way required for the Project, and all Project facilities are made available to the Works contractor in accordance with the schedule agreed under the related Works contract and all land acquisition and resettlement activities are implemented in compliance with (i) all applicable laws and regulations of the Borrower and State relating to land acquisition and involuntary resettlement; (ii) the Involuntary Resettlement Safeguards; and (c) all measures and requirements set forth in the respective RP, and any corrective or preventative actions set forth in a Safeguards Monitoring Report.	Being complied. All land acquisition and resettlement activities are implemented as per provisions of Indian Law.
5	**Schedule 5. Item 4 (b)** <u>Land Acquisition and Involuntary Resettlement</u> 4 (b) Without limiting the application of the Involuntary Resettlement Safeguards, or the RP, the Borrower shall ensure or cause the State through JMRC to ensure that no physical or economic displacement takes place in connection with the Project until: (a) compensation and other entitlements have been provided to affected people in accordance with the RP; and (b) a comprehensive income and livelihood restoration program has been established in accordance with the RP.	Being complied. Compensation and other entitlements are being provided to affected people in accordance with applicable laws by JMRC.
6	**Schedule 5. Item 5** <u>Indigenous Peoples</u> 5. Where the need arises, the Borrower shall ensure or cause the State through JMRC to ensure that the preparation, design, construction, implementation and operation of	Not applicable. No issues on Indigenous peoples have arisen during the reporting period.

	the Project, and all Project facilities comply with (a) all applicable laws and regulations of the Borrower and the State relating to indigenous peoples; (b) the Indigenous Peoples Safeguards; and (c) all measures and requirements set forth in the respective IPP, and any corrective or preventative actions set forth in a Safeguards Monitoring Report.	
7	**Schedule 5. Item 6(a) & 6(b)** <u>Human and Financial Resources to Implement Safeguards Requirements</u> 6 (a) "The Borrower shall ensure or cause the State through JMRC to ensure that all necessary budgetary and human resources to fully implement the EMP, and the RP and the IPP as required" 6 (b) "The Borrower shall ensure or cause the State through JMRC to ensure that at least one expert each is designated to supervise implementation of the EMP, and the RP and the IPP as required"	Being complied. ➢ Safeguards cell comprising of 06 officers has been established in JMRC since 2013. ➢ A JV of M/s Abha Narain Lambah Associates and M/s Shashank Mehendale & Associates has been engaged as Heritage Consultant through ICB. ➢ The Heritage Consultant is to monitor the heritage structures lying along the metro route of Phase 1B. ➢ JMRC has also engaged 3 senior Archaeological Consultants to supervise the excavation of Chhoti Chaupar and Badi Chaupar. ➢ Safeguards experts are part of the PMC (DMRC) team and civil works contractor team. ➢ Adequate budget allocation has been made for implementation of safeguards activities.
8	**Schedule 5. Item 7(a)** <u>Safeguards – Related Provisions in Bidding Documents and Works Contracts.</u> 7 (a) "comply with the measures and requirements relevant to the contractor set forth in the EIA, the EMP, SHE, the RP and the IPP as applicable (to the extent they concern impacts on affected people during construction), and any corrective or preventative actions set out in a Safeguards Monitoring Report.	Being complied. Safeguards experts are part of the PMC (DMRC) and civil works contractor teams are implementing safeguard measures. Adequate budget allocation is being made for implementation of safeguards activities.

9	**Schedule 5. Item 7(b)** Safeguards – Related Provisions in Bidding Documents and Works Contracts. 7 (b) "make available a budget for all such environmental and social measures"	Being complied.
10	**Schedule 5. Item 7(c)** Safeguards-Related Provisions in Bidding Documents and Works Contract. 7 (c) "provide the JMRC with a written notice of any unanticipated environmental, resettlement or indigenous peoples risks if any, or impacts that arise during construction, implementation or operation of the Project that were not considered in the EIA, the EMP, and the RP and the IPP if any;"	Being complied. Appropriate measures are being and will be taken to address these issues, as they arise.
11	**Schedule 5. Item 8(a)** Safeguards – Related Provisions in Bidding Documents and Works Contracts. 8 (a) submit quarterly Safeguards Monitoring Reports to ADB and disclose relevant information from such reports to affected persons promptly upon submission"	Being complied. First semi-annual report for July 2014 to December 2014 has already been disclosed on ADB and JMRC website. https://www.jaipurmetrorail.in/pdf/First%20Environment%20and%20Social%20Monitoring%20Report.pdf 1st quarterly report (January 2015-March 2015) on environmental and social safeguards compliance has been already been uploaded on ADB and JMRC website. https://www.jaipurmetrorail.in/pdf/2015_07_16%20First%20Quarterly%20Env%20and%20Social%20Monitoring%20Report_Jan_March%202015.pdf This report is the 2nd quarterly report (April 2015 – June 2015) on environmental and social safeguards compliance.

12	**Schedule 5. Item 8(b)** <u>Safeguards – Related Provisions in Bidding Documents and Works Contracts.</u> 8 (b) "if any unanticipated environmental and/or social risks and impacts arise during construction, implementation or operation of the Project that were not considered in the EIA, the EMP, SHE, and RP and IPP as applicable, promptly inform ADB of the occurrence of such risks or impacts, with detailed description of the event and proposed corrective action plan.	Being complied.
13	**Schedule 5. Item 8(c)** <u>Safeguards – Related Provisions in Bidding Documents and Works Contracts.</u> 8 (c) Report any breach of compliance with the measures and requirements set forth in the EMP, SHE and the RP or the IPP if any, promptly after becoming aware of the breach.	Being complied.
14	**Schedule 5. Item 9** 9. The Borrower shall ensure or cause the State through JMRC to ensure that no proceeds of the Loan under the Project are used to finance any activity included in the list of prohibited investment activities provided in Appendix 5 of ADB's Safeguard Policy Statement (2009).	Being complied
15	**Schedule 5. Item 10** <u>Other Social Measures</u> 10. The EA shall ensure that civil works contracts under the Project follow all applicable labor laws of the Borrower and State and that these further include provisions to the effect that contractors; (i) carry out HIV/AIDS awareness programs for labor and disseminate information at worksites on risks of sexually transmitted diseases and HIV/AIDS as part of health and safety measures for those employed during construction; and (ii) follow and implement all statutory provisions on labor (including not employing or using children as labor, equal pay for equal work), health, safety, welfare,	Complied. ➢ Various awareness programmes have been conducted during the reporting period. ➢ HIV/AIDS awareness programmes are conducted on regular basis. ➢ Monthly environmental training, physical training and general housekeeping training are conducted in line with India Government's Swachha Bharat Abhiyan. Details of Awareness Programs and Meetings are provided in **Appendix 2**

	sanitation, and working conditions. Such contracts shall also include clauses for termination in case of any breach of the stated provisions by the contractors.	
16	**Schedule 5. Item 11** 11. The EA shall ensure the safety and status of the heritage sites and structures involved in the Project site at its own cost and in this regard ensure all appropriate steps included as detailed in the PAM.	Being complied. ➢ In the bidding document, provision was made to conduct Baseline Building condition survey, wherein the structural stability of structures lying on 30 m on either side of the route alignment of Phase 1B was recorded so as to help monitor any changes which may occur during construction. ➢ JMRC through CEC (AIMIL) got the Building Condition Survey before commencement of work at site. ➢ For the purpose of monitoring heritage structures along with the metro route alignment of Phase 1B, JMRC has engaged Heritage Consultant M/s Abha Narain Lambah Associates and M/s Shashank Mehandale & Associates (JV). ➢ Mitigation and preventive measures are being taken up by M/s CEC in order to avoid any damage.
17	**Schedule 5. Item 12** <u>Gender</u> 12. The EA shall ensure that the Project is undertaken in conformity with the stakeholder communication strategy as agreed between ADB, the Borrower, State, and JMRC and referred in the PAM.	Being complied.

B. Compliance to Project Administration Manual

24. The Project Administration Manual[3] (PAM), describes how the JMRC will implement the project and deliver the results on time, with quality, within budget, and in accordance with government and Asian Development Bank (ADB) policies and procedures. The PAM is mandatory and serves as the main document describing implementation details. The status of implementing the safeguards requirements set out in PAM are provided in Table 3.

[3]http://www.adb.org/sites/default/files/project-document/79731/46417-001-pam.pdf

Table 3: Compliance to PAM

SN	Details	Compliance Status
1.	**Section VII.** **Safeguards** **40. Implementation of SHE and EIA.** The safeguards cell within JMRC will coordinate and ensure that all environment safeguard requirements under the project are met. The SHE and EIA report including site specific EMP will be included in the contract documents. The contractors must include in their bid adequate budget for implementation of all items in the SHE and EIA. The safeguards cell through the project management consultant (Delhi Metro Rail Corporation) will monitor and report on the environmental compliance of contractors with the SHE and EIA and ensure proper implementation of the grievance and redress mechanism. Key implementation activities for each stage of the project are as follows:	Being complied. Sample monthly monitoring report is provided in **Appendix 3.**
2.	**(i)Pre-construction**: All contractors will complete the following activities no later than 30 days from the issuance of Notice to Proceed: 1. Submit appointment letter and resume of the Contractor's Health and Safety Officer (HSO) who will be the on-site focal person for environment safeguards;	Being complied. HSO's CV was submitted on 9 May 2014 and it was approved was GC 15 May 2014.
	2. HSO will engage CSC-Environment Specialist, and JMRC safeguards cell to a meeting to discuss in detail the SHE and EIA seek clarification and recommend corresponding revisions if necessary;	SHE and EIA have been discussed in detail by HSO with CSC-Environment Specialist, and JMRC safeguards cell. Details of meetings provided in **Appendix 2**.
	3. HSO will request CSC-ES copy of monthly monitoring formats and establish deadlines for submission;	Formats for Monthly Monitoring Report has been finalize with CSC-Environment Specialist. Monitoring report is being sent on monthly basis in prescribed format. Sample monthly report is provided in **Appendix3**.
	4. HSO will submit for CSC-ES approval an action plan to secure all permits and approvals needed during construction stage such as for operation	HSO has submitted plan and action is being taken accordingly.

SN	Details	Compliance Status
	of crushers and hot mix plants, transport and storage of hazardous materials, waste disposal sites, use of ground water etc.	
	5. HSO will submit for approval of CSC-ES the construction camp layout before its establishment where camps are required, and	Camp has been constructed as per approved layout diagram **Appendix 6.**
	6. Before start of construction, the contractor will post signs in and around the construction site with information on the names, positions, contact numbers, and addresses of key people for receiving grievances	Adequate relevant signage has been displayed. Photolog is in **Appendix 1**.
3.	**(ii)Construction**: The JMRC safeguards cell through the PMC will monitor the Contractor's compliance to the SHE and EIA. In case of non-conformances, the safeguards cell will recommend corrective measures and ensure their timely implementation. If any unanticipated impacts become apparent, the safeguards cell will inform ADB. If required the EIA report will be updated, and mitigation measures and resources to address the new impacts will be identified	Being complied.
4.	**(iii)Post-construction**: The safeguards cell through the PMC will certify works completed in accordance with SHE and EIA and ensure all construction sites are satisfactorily rehabilitated and restored or otherwise recommend withholding of payments	Not yet due. Will be done in accordance with SHE & EIA.
5.	**41. PMC Environmental Specialist:** JMRC will ensure PMC (Delhi Metro Rail Corporation) to provide an Environmental Specialist who will, full time during construction, to monitor compliance by the contractor to the SHE and EIA in support of JMRC safeguard cell. The key qualification and experience consist of (a) minimum of a Master's Degree in Environmental Impact Assessment (EIA) or Environmental Engineering orrelated subjects; and (b) experience of minimum of 5 years of working experience in conducting Environmental Assessments, implementing and/or supervising environment management activities in infrastructure projects. The objective is to ensure contractor's compliance to the Safety Health and Environment (SHE) Guidelines and EIA in accordance with the requirements of the ADB	Partially complied. Mr. S.A. Verma, AGM/DMRC/Delhi is designated by PMC as its Environmental Specialist to monitor compliance by the Contractor for SHE and EIA. His assistants are doing full time monitoring in Jaipur.

SN	Details	Compliance Status
	Safeguard Policy Statement (SPS) 2009 as well as relevant policies of the Government of India. The main output is the Quarterly monitoring report during the construction period. The responsibilities include:	
6.	• Review EIA report including site specific EMP and SHE guidelines to understand the environmental issues in the project area and mitigation and monitoring requirements of the project.	Complied. EIA, EMP and SHE guidelines have been reviewed.
	• Update the site specific EMP if there are any significant changes in the project scope or environmental conditions to incorporate all new environmental issues and mitigation measures	Being complied. EMP will be updated as per requirements.
	• Prepare monitoring checklists/ templates for daily or weekly monitoring on implementation of the SHE and site specific EMP by the contractor.	Complied. Site specific monitoring checklists/ templates for daily or weekly monitoring on implementation of the SHE and EMP has been prepared.
	• Organize a consultation meeting with JMRC safeguards cell, contractors Health and Safety Officers (HSO), Site Engineer and Heritage Expert before the start of physical works to clarify roles and responsibilities of each party. After start of physical works organize a coordination meeting at least every quarter to provide updates, clarify and follow up on pending issues etc.	Being complied. A consultation meeting between JMRC's Safeguard Cell, Contractor, Health and Safety Officers (HSO), Site Engineer and Heritage Expert held before the start of physical work to clarify roles and responsibilities of each party. Coordination meetings in between JMRC's Safeguard Cell, Contractors, Health and Safety Officers (HSO), Site Engineer and Heritage Expert are being held regularly.
	• Where necessary organize technical training programs to enhance the field level staff's understanding on environmental issues such as health impacts of dust and noise, waste/debris disposal and management, safety issues etc.	Being complied. Environmental training programs are conducted on regular basis. The training is conducted by contractor's HSO. If required additional training will be provided by third party agencies on environmental issues. Details of training sessions are provided in **Appendix 2**.

SN	Details	Compliance Status
	• Monitor implementation of the SHE and site specific EMP by the contractor on a daily or weekly basis. In doing so complete the daily or weekly monitoring checklists.	Being complied. Monitoring of implementation of SHE and site specific EMP are being done by Contractor's HSO on regular basis. SHE meeting is held with participation from JMRC, DMRC and Contractor and sub-contractors to ensure compliance and implementation of SHE requirements and EMP.
	• Provide site based technical advice to the contractors where necessary during construction activities	Site based technical advice to the contractors is being given by DMRC experts.
	• Co-ordinate with the contractor's site engineers on monitoring and data collection on noise and vibration generated during tunnelling works and operation of heavy machinery	PMC's environment team is coordinating with contractor's site engineers on monitoring and data collection on noise and vibration generated during operation of heavy machinery. It will also be monitored during tunnelling works.
	• Coordinate with the Heritage Expert on getting data on monitoring and status of heritage structures above ground.	PMC's environment team is coordinating with the Heritage Expert on getting data on monitoring and status of heritage structures above ground.
	• Facilitate the functioning of the Grievance Redress Mechanism and maintain proper records of all environment related grievances and details on how they were addressed.	A system is in place to facilitate the functioning of the Grievance Redress Mechanism and maintain proper records of all environment related grievances and details on how they are addressed.
	• Prepare quarterly Environmental Monitoring reports based on monitoring site visits, completed checklists and quarterly meetings for submission to JMRC safeguards cell and ADB. Amongst other environment safeguard issues, the monitoring report must cover: ➢ compliance to the SHE and site specific EMP by the contractor ➢ vibration monitoring activities conducted by contractor's engineers ➢ grievances redress mechanism ➢ monitoring and status of heritage sites above ground	Noted for compliance. ➢ For compliance of the SHE and site specific EMP by the contractor regular visit is being done by the Environmental team of CSC. ➢ For monitoring of the vibration during the construction instrumentation has been done by M/s CEC as per approval given by CSC. The monitoring will be done by a third party agency i.e. M/s. AIMIL.

SN	Details	Compliance Status
		➢ Grievances redress mechanism is in place. ➢ For monitoring the status of heritage site above the ground a Heritage Consultant i.e. M/s Abha Narain Lambah Associates and M/s Shashank Mehendale and Associates (JV) has been appointed by JMRC. During the tunneling the team of heritage consultant will be at site to monitor the status of buildings and heritage structures along the metro route.
7.	**42. Monitoring of Heritage Structures** JMRC through DMRC will retain at its own cost the current Heritage architect as the Heritage site expert during construction of the underground metro section. The expert will be responsible for conducting a baseline survey of heritage sites above the metro alignment and conducting regular monitoring of the status of the heritage sites throughout the construction period. The expert will be responsible for coordinating necessary procedures if any historical/traditional artifacts are found during tunneling works. He/she will also provide advice on technical measures during construction to prevent damages to the heritage structures. In the event of any damage to a heritage structure he/she will immediately alert JMRC and recommend appropriate mitigation or restoration measures. Key outputs are: (a) Monthly monitoring report; (b) No damage on heritage structures; and (c) in the event of damage, implementation of immediate restoration and mitigation measures. The main responsibilities are:	Being complied. ➢ JMRC through competitive bidding has engaged heritage consultant M/s Abha Narain Lambah Associates and M/s Shashank Mehendale & Associates (JV) to monitor the heritage structures lying along the metro route of Phase 1B. ➢ JMRC has also engaged 3 senior Archaeology Consultants to supervise the excavation of Chhoti Chaupar and Badi Chaupar. ➢ Heritage Consultant got conducted Baseline survey for existing building's condition along the metro route and has submitted Building Inventory report. ➢ Structural survey of buildings along the metro route has also conducted and submitted report, wherein they categorized buildings under 3 categories 1. Unstable Structures requiring preventive propping and immediate demolition/ evacuation.

SN	Details	Compliance Status
		2. Part of structure unstable requiring propping & partial replacement /demolition. 3. No major instability. These reports have been shared with ADB and concerned local agency who will be further taking necessary action. A re-evaluation for the structural conditionof the shops along Chandpole launching site (from Chandpole gate to Chhoti Chaupar) was conducted by the Joint team of JMRC, DMRC and M/s CEC engineers. Preventive measures like propping of the verandahs and the shops along the above length have been taken care by contractor. The consolidated list of unstable structures requiring immediate attention will be further shared with local agency (Jaipur Municipal Corporation) for further course of action.
8.	• At least one month before the start of construction activities conduct a baseline survey of all heritage structures above the metro alignment and record detailed information including, but not limited to: list of heritage structures with details on location and distance from the metro alignment, exact height of structures above ground, existence of cracks/ damages prior to start of construction, detailed photographs etc.	Complied. ➢ Before the start of construction activity, Building Condition Survey of all structure along the metro route with photograph of existing cracks and damages was conducted by CEC through AIMIL. ➢ Before the start of construction activity, Baseline Survey of all the structure along the metro route with detailed photographs was conducted by Heritage Consultant i.e. M/s Abha Narain Lambah Associates and M/s Shashank Mehandale and Associates (JV). ➢ Based on the reports and survey submitted by Heritage consultant, CEC is regularly monitoring status of buildings and the status is reported through daily and weekly reports.
	• Monitor the condition of the heritage structures on a monthly basis throughout the construction period and compare the status with the baseline status to ensure that there are no changes from the baseline condition.	
	• Coordinating necessary procedures if any historical/traditional artifacts are found during tunnelling works.	
	• Provide advice on technical measures during construction to prevent damages to the heritage structures.	
	• In the event of observation in any damage to any heritage structure/s immediately alert JMRC and recommend appropriate mitigation or restoration measures.	

SN	Details	Compliance Status
	• Provide technical advice on and supervise the mitigation or restoration activity.	➢ Heritage Consultant entrusted to advice on measures during construction to prevent damages to the heritage structures. ➢ Heritage Consultant is submitting monitoring report on monthly basis to record activities implemented and monitoring findings to JMRC.
	• Prepare a monitoring report on a monthly basis to record activities implemented and monitoring findings and submit to JMRC safeguards cell as well the Environmental Specialist. Findings of the report will be included in the quarterly environmental monitoring report that will be prepared by the environmental specialist.	
9.	**Section VII- Safeguards** **b) Social – Involuntary resettlement.** 44. If any changes or additional land requirements or involuntary resettlement impacts are identified, a resettlement plan will be prepared in accordance with the ADB *Safeguard Policy Statement (2009)* and the same is further approved by ADB before award of related civil works contract and implemented before commencement of the relevant section of the civil works contract as applicable.	Being complied. When the work of Phase 1B started it was found that 6 temples falling in the station box area of Chhoti Chaupar and Badi Chaupar where digging is necessary for construction of stations, hence this required immediate relocation. For the purpose of smooth construction work and traffic flow around the construction site, JMRC in consultation with local agencies got prepared Traffic diversion plan. The numbers of temples falling in the area of entry/exit structures and traffic diversion were finalizes and 7 additional temples i.e. three at Chhoti Chaupar and four at Badi Chaupar were identified which were falling in the design of entry/exit structure and traffic diversion scheme. Necessary measures were taken for relocation of such identified temples. 6 Temples of Chhoti Chaupar have already been relocated at Old Atish market. 7 temples of Badi Chaupar will be relocated to Tanwar Ji Ka Nauhra.
10	**Section VII - Safeguards** **c) Social – Indigenous people** 45. In case of any adverse impacts if identified during implementation on indigenous people, the JMRC will ensure that the Indigenous Peoples Plan (IPP) is prepared in accordance with the ADB *Safeguard Policy Statement (2009)* and the same is further approved by ADB before award of related civil works	Not Applicable.

SN	Details	Compliance Status
	contract and implemented before commencement of the relevant section of the civil works contract as applicable.	
11	**Section VIII - Gender and Social Dimensions** **47 Gender consultation and participation** Meaningful consultations that are gender inclusive and responsive will be carried out as early as in the project preparation stage and will be carried out on an ongoing basis throughout the project cycle. JMRC shall ensure that the bidding documents provide clauses to ensure that all civil works contractors comply with labor laws by not employing child labor; encouraging the employment of the poor, particularly women; and not offering different wages to men and women on work of equal value.	Complied. This provision is a part of the bidding document.
12	**Section VIII - Gender and Social Dimensions** **49. HIV and AIDS** JMRC will ensure that all civil works contractors (i) carry out awareness programs for labor on the risks of sexually transmitted diseases/AIDS and human trafficking; and (ii) disseminate information at worksites on the risks of sexually transmitted diseases and HIV/AIDS as part of health and safety measures for those employed during construction. Contracts for the project will include specific clauses on these undertakings, and compliance will be strictly monitored by JMRC.	Complied. Periodically awareness about HIV/AIDS is discussed in morning tool box talk and apart from this the medical officer visits the labour camp and explains the risk of sexually transmitted disease on periodic basis. **Appendix 2**.
13	**Section VIII - Gender and Social Dimensions** **50. Health**. JMRC shall ensure that contractors provide adequately for the health and safety of construction workers and further ensure that bidding documents include measures on how contractors will address this, including an information and awareness raising campaign for construction workers on sexually transmitted diseases, HIV/AIDS, and human trafficking.	Complied. Various type of awareness programme has been conducted during this period. Apart from this monthly environmental training, physical training and general housekeeping training are conducted in line with India Government's Swatch Bharat Abhiyan.
14	**Section VIII - Gender and Social Dimensions** **51. Labor** JMRC shall ensure that:	Complied.

SN	Details	Compliance Status
	i. civil works contractors comply with all applicable labor laws and regulations, do not employ child labor for construction and maintenance activities, and provide appropriate facilities for women and children in construction campsites; ii. people directly affected by the projects are given priority to be employed by the contractor; iii. contractors do not differentiate wages between men and women for work of equal value; and iv. specific clauses ensuring these will be included in bidding documents. The construction supervision consultants monitor the provisions.	➢ Civil work contractor is complying with all applicable labour laws and regulations. ➢ No child labour is employed. ➢ Preference is being given to people directly affected by the project. ➢ Complying with equal remuneration Act. ➢ Specific clause for ensuring labour law etc. has been included in the bidding document.
15	**Section IX - Performance Monitoring, Evaluation, Reporting and Communication** **B. Monitoring.** **Disclosure of Environmental Assessments and Monitoring Reports** ADB and JMRC will disclose on their respective websites the EIA Report. The quarterly monitoring reports will also be disclosed on the ADB website.	Being complied. EIA report has already been disclosed on ADB and JMRC websites. The link to JMRC site is given below: https://www.jaipurmetrorail.in/pdf/EIA_Final_April_2014.pdf First Semi Annual Monitoring Report has been disclosed on the websites of ADB and JMRC. https://www.jaipurmetrorail.in/pdf/First%20Environment%20and%20Social%20Monitoring%20Report.pdf 1st Quarterly Monitoring Report (January 2015 - March 2015) on environmental and social safeguards compliance has been already been uploaded on ADB and JMRC website. https://www.jaipurmetrorail.in/pdf/2015_07_16%20First%20Quarterly%20Env%20and%20Social%20Monitoring%20Report_Jan_March%202015.pdf

SN	Details	Compliance Status
16	**Section IX - Performance Monitoring, Evaluation, Reporting and Communication** **B. Monitoring** **55. Safeguards monitoring - Resettlement** If impact is identified during project implementation, a monitoring system will be established based on the ADB *Safeguard Policy Statement (2009)* and Government of India regulations.	Being complied. All resettlement and relocation issues will be settled on mutually agreed terms.
17	**Section IX - Performance Monitoring, Evaluation, Reporting and Communication** **B. Monitoring** **56. Indigenous People** If impact is identified during project implementation, a monitoring system will be established based on the ADB *Safeguard Policy Statement (2009)* and Government of India regulations.	No impact is identified.
18	**Section IX - Performance Monitoring, Evaluation, Reporting and Communication** **B. Monitoring** **58. Grievance Redress Mechanism** Grievances related to the implementation of the project, particularly regarding the land acquisition and R&R will be acknowledged, evaluated, and responded to the complainant with corrective actions. Any grievance regarding the land acquisition and R&R is received by OSD (Land), JMRC and is addressed through the decision of the "Negotiation Committee".	Being complied JMRC regularly conducts meetings with project affected people and maintains proper documentation to track their redressal. The details are at Table 12 in this report.

C. Compliance to the Civil Works Contract Agreement

25. The contractor is liable to comply with the safeguards clauses included in the contract agreement. Table 4 below provides an update on the status of safeguards compliance by the civil works contractor.

Table 4: Compliance to the safeguards Clauses of the Civil Work Contract

S.N.	Description	Compliance Status
1	**GCC Sub Clause 4.8** **Safety Procedures** The Contractor shall:	

S.N.	Description	Compliance Status
	a) comply with all applicable safety regulations, b) take care for safety of all persons entitled to be on the Site, c) use reasonable efforts to keep the Site and Works clear of unnecessary obstruction so as to avoid danger to these persons, d) provide fencing, lighting, guarding and watching of the Works until completion and taking over under Clause 10 [Employer's Taking Over], and e) Provide any Temporary Works (including roadways, footways, guards and fences) which may be necessary, because of the execution of the Works, for the use and protection of the public and the owners and occupiers of adjacent land.	Being complied. Contractor is taking adequate measures to comply with regulations on safety of workers.
2	**GCC Sub-Clause 6.7** **Health and Safety**	
	The Contractor shall at all times take all reasonable precautions to maintain the health and safety of the Contractor's Personnel. In collaboration with local health authorities, the Contractor shall ensure that medical staff, first aid facilities, sick bay and ambulance service are available at all times at the Site and at any accommodation for Contractor's and Employer's Personnel, and that suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics.	Being complied. Contractor is taking adequate measures as per the provision of SHE, which is also a part of bidding document.
	The Contractor shall appoint an accident prevention officer at the Site, responsible for maintaining safety and protection against accidents. This person shall be qualified for this responsibility, and shall have the authority to Issue instructions and take protective measures to prevent accidents. Throughout the execution of the Works, the Contractor shall provide whatever is required by this person to exercise this responsibility and authority.	HSO is also working as accident prevention officer.
	The Contractor shall send, to the Engineer, details of any accident as soon as practicable after its occurrence. The Contractor shall maintain records and make reports concerning health, safety and welfare of persons, and damage to property, as the Engineer may reasonably require.	Being complied.

S.N.	Description	Compliance Status
	PCC Sub-Clause 4.8 and 6.7 **Safety Procedures and Health & Safety** "The Contractor shall throughout the execution of the Works including the carrying out of any testing, commissioning (including Integrated Testing and Commissioning), or remedying of any defects: (a) take full responsibility for the adequacy, stability, safety and security of the Works, Plant, Rolling Stock, Contractor's Equipment, Temporary Works, operations on Site and methods of manufacture, installation, construction and transportation; (b) have full regard for the safety of all persons on or in the vicinity of the Site (including without limitation persons to whom access to the Site has been allowed by the Contractor), comply with all relevant safety regulations, including provision of safety gear, and insofar as the Contractor is in occupation or otherwise is using areas of the Site, keep the Site and the Works (so far as the same are not completed and occupied by the Employer) in an orderly state appropriate to the avoidance of injury to all persons and shall keep the Employer indemnified against all injuries to such persons; (c) provide and maintain all lights, guards, fences and warning signs and watchmen when and where necessary or required by the Engineer or by laws or by any relevant authority for the protection of the Works and for the safety and convenience of the public and all persons on or in the vicinity of the Site; and (d) where any work would otherwise be carried out in darkness, ensure that all parts of the Site where work is being carried out are so lighted as to ensure the safety of all persons on or in the vicinity of the Site and of such work. Contractor is required to take note of all the necessary provisions in Employer's Safety, Health and Environment Manual (SHE Manual) and the Contractor's price shall be inclusive of all the necessary costs to meet	Being complied. Adequate health and safety measures are being implemented as per the provision of SHE, which is also a part of bidding document.

S.N.	Description	Compliance Status
	the prescribed safety standards. Precaution shall be taken by the Contractor to ensure the health and safety of his staff and labour. The Contractor shall, in collaboration with and to the requirements of the local health authorities, ensure that medical staff, first aid facilities, sick bay and ambulance service are available at the accommodation and on the Site at all times, and that suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics. The Contractor shall maintain records and make reports concerning health, safety and welfare of persons, and damage to property, as per the Engineer's requirement and will ensure complete compliance with relevant clauses of Employer's Health, Safety and Environment Manual (SHE Manual). The Contractor's Site Safety Plan shall be developed from his Outline Safety Plan as per Employer's Requirements and SHE Manual of the Employer. The Contractor shall appoint a member of his staff at the Site to be responsible for maintaining the safety, and protection against accidents, of personnel on the Site. This person shall be qualified for his work and shall have the authority to issue instructions and take protective measures to prevent accidents.	
	Safety Precautions Within 8 weeks of the date of Notice to Proceed, the Contractor shall submit a detailed and comprehensive contract-specific Site Safety Plan based on the Employer's Safety, Health and Environmental Manual (SHE Manual). The Contractor is required to make himself aware of all the requirements of the Employer's Safety, Health and Environmental Manual in this regard and comply with them. The Site Safety Plan shall include detailed policies, procedures and regulations which, when implemented, will ensure compliance with Sub-Clauses 4.8 and 6.7 of the General Conditions of Contract.	Being complied. Contractor has submitted site specific Safety plan and the same have been approved by CSC.
	GCC Sub-Clause 4.18 **Protection of the Environment**	

S.N.	Description	Compliance Status
	The Contractor shall take all reasonable steps to protect the environment (both on and off the Site) and to limit damage and nuisance to people and property resulting from pollution, noise and other results of his operations. The Contractor shall ensure that emissions, surface discharges and effluent from the Contractor's activities shall not exceed the values indicated in the Employer's Requirements, and shall not exceed the values prescribed by applicable laws.	Being complied.
	PCC Sub-Clause 4.18 **Protection of the Environment** The Contractor shall be responsible and liable for any stoppage, closure or suspension of the works due to any contravention of statutory requirements relating to the protection of the environment and shall indemnify and keep indemnified the Employer in this regard. The Contractor's Site Environmental Plan shall be developed from his Employer's Safety. Health and Environmental Manual (SHE Manual), as per the Employer's Requirements and Special Conditions of Contract. Nothing extra shall be payable to the Contractor on this account and his Bid price shall be inclusive of expenditure required to be incurred for working as per SHE Manual. Outline Environmental Plan means the environmental plan forming part of the Tender, setting out, in summary form, the Contractor's proposed means of complying with his obligations in relation to environmental quality. Site Environmental Plan means the site environmental plan including all supplements thereto, or any amended or varied version thereof, as submitted by the Contractor in accordance with Employer's Safety, Health and Environmental Manual (SHE Manual), this Clause and which has received the Engineer's consent. The Site Environmental	Being complied.

S.N.	Description	Compliance Status
	Plan shall include detailed policies, procedures and regulations which, when implemented, will ensure compliance with this Clause. The Contractor is required to make himself aware of all the requirements of the Employer's SHE Manual in this regard and comply with them. Within 8 weeks of the date of the Notice to Proceed, the Contractor shall submit a detailed and comprehensive Site Environmental Plan based on the Employer's Safety, Health and Environmental Manual (SHE Manual), and shall include such further material, which the Contractor considers necessary and relevant. Upon the Engineer notifying his consent to the Site Environmental Plan, or any supplemental part thereof, the Contractor shall adhere to the principles and procedures contained in such document save to the extent that the Engineer may give his consent to any amended or varied version thereof. The Contractor shall provide all necessary access, assistance and facilities to enable the Engineer and the Employer to monitor and conduct tests to verify that the Site Environmental Plan is being properly and fully implemented."	

3. COMPLIANCE TO THE ENVIRONMENTAL MANAGEMENT PLAN

26. The environmental management plan (EMP) for the project was provided in Annexure 4 of the EIA report and also attached to the contract documents. As per EMP, five (05) environmental management activities were required to be implemented during the pre-construction stage (PC 1 – PC5); ten (10) activities are required to be implemented during the construction stage (C1.0 – C1.4, C.1.4.1 and C2 – C6); and three (03) activities are required to be implemented during the operation stage (O1 – O3). The following Table 5 lists out the status of activities during the pre-construction and construction stage as of June 2015.

Table 5: Status of Compliance to the EMP

SN	Activity	Mitigation measures	Compliance attained (Yes, No, Partial)	Comment/Reasons for Partial or Non-Compliance	Issues for further action and target dates
		PRE-CONSTRUCTION STAGE			
PC1	Contractor Preparatory Works (Upon issuance of Notice to Proceed)	The Contractor will complete the following activities no later than 30 days upon issuance of Notice to Proceed			
		1) Submit appointment letter and resume of the Contractor's Health and Safety Officer (HSO) and environmental focal person to CSC.	Yes. Mr. Ramaraju has been appointed as Contractor's HSOandhe is working full time on site. CV were submitted to CSC.		
		2) HSO will engage CSC-Environment Specialist to a meeting to discuss in detail the EMP, seek clarification and recommend corresponding revisions if necessary	Yes. EMP and SHE have been discussed with CSC-Environment Specialist.		
		3) HSO will request CSC-ES copy of monthly monitoring formats and establish deadlines for submission.	Yes. Formats and schedule of monthly monitoring reports has been finalized. Sample attached in **Appendix 3 & 4.**		
		4) HSO will submit for CSC-ES approval an action plan to secure all permits and approvals needed to be secured during construction stage which include but not limited to-	Yes.		
		i). operation of crushers and hot mix plants,	Partial. No crushers and hot mix plant established by contractor. However the permit for the	Application for permit to establish batching plant has already been applied with State Pollution Control Board on 19.06.2015 **Appendix 10**	Action plan for securing permits and approvals is still under preparation

SN	Activity	Mitigation measures	Compliance attained (Yes, No, Partial)	Comment/Reasons for Partial or Non-Compliance	Issues for further action and target dates
			batching plant has not been secured yet.		
		ii) transport and storage of hazardous materials (e.g. fuel, lubricants, explosives),	Yes		
		iii) waste disposal sites and disposal management plan,	No, under process	Application for securing consent for storing hazardous waste at site will be processed once approval for establishing batching plant is obtained.	Action plan for securing permits and approvals is still under preparation
		iv) temporary storage locations,	Yes		
		v) water use, and	Permission has been obtained from state authority for extraction of ground water for drinking purpose at Chhoti Chaupar. Application will be submitted for extraction of ground water for construction purpose to concerned authority.	Application under preparation.	Action plan for securing approvals to be submitted by contractor.
		vi) emission compliance of all vehicles. Arrangements to link with government health programs on hygiene, sanitation, and prevention of communicable diseases will also be included in the action plan.	Yes.		
		5) HSO will submit for approval of CSC-ES the construction camp layout before its establishment.	Yes, Construction camp has been established as per approved layout plan.		

SN	Activity	Mitigation measures	Compliance attained (Yes, No, Partial)	Comment/Reasons for Partial or Non-Compliance	Issues for further action and target dates
PC2	Coordinate with the Jaipur Development Authority on Traffic Management Plan to avoid nuisance from traffic congestion	The Contractors will discuss and coordinate the implementation of the traffic re-routing scheme particularly in Chhoti Chaupar and Badi Chaupar when it starts the cut and cover activities and the hauling and disposal of excavated materials to the Ambabari village. At the minimum, the traffic management plan will have the following components: construction traffic, ensuring access to properties, accommodating pedestrians, parking, access by construction vehicles, faulty traffic lights and problem interchanges, use of public roads, parking provision during construction, use of residential streets and traffic diversion due to temporary road closures, and construction and use of temporary access roads.	Yes, Proper traffic management plan is in place in coordination with government agencies.		
PC3	Community Liaison to avoid complaints and/or address complaints if any	To ensure that ongoing feedback is provided on the progress of the JMRP together with feedback on the environmental management performance of the project. Contractor will provide a minimum of two (2) weeks notification to directly affected residents, businesses and other relevant groups of the intended construction commencement date. In providing a mechanism for communication between the contractor and the community and informing the public of construction details (timing, expected impacts), the concessionaire will undertake consultation and information activities.	Yes		
PC4	Ground staking to address chance find of artifacts	At least 30 days before the start of tunneling, the Contactor with supervision from the Archeology Department will employ a ground penetrating radar (GPR), detect the presence of buried artifacts along the tunnel alignment. The Contractor, in behalf of the JMRC, will coordinate with the Archeology Department to designate an on-site representative during the	Yes. GPR survey has already been submitted and has been uploaded on JMRC website. https://www.jaipurme		

SN	Activity	Mitigation measures	Compliance attained (Yes, No, Partial)	Comment/Reasons for Partial or Non-Compliance	Issues for further action and target dates
		entire duration of the project.	trorail.in/pdf/2015.04.16%20GPR%20Received%20from%20CEC.pdf JMRC is coordinating with Archeology Department for excavation work.		
PC5	Briefing on working near heritage resource to avoid damages to heritage resources and avoid cultural conflicts	All workers will undergo a briefing with the Archeology Department to ensure safeguarding of heritage resource and cultural/religious practices. A proof of compliance to this requirement to include the name of participants and date and location of briefing will form part of the monthly report to the CSC.	Yes. Briefing is being carried out by the Archaeological Consultant namely Mr. R.D. Singh, Dr. S.K. Sharma and Mr. P.K. Jain engaged by JMRC on regular basis.		
		CONSTRUCTION STAGE			
C1.0	Avoid damage to the following heritage resources during tunnel boring namely Chandpole Gate, IsarLat, Jantar Mantar, Hawa Mahal, Chhoti Chaupar, and Badi Chaupar.	No heritage resources are inadvertently damaged during construction.	Yes. No heritage resources are inadvertently damaged during construction.	Complying through instrumentation & online monitoring of structures of historic importance.	
C1.1	To avoid ground settlement under the	The contractor will ensure that no inadvertent damage is incurred to the Chandpole gate. Estimated settlement under the Chandpole gate is	Yes. ➢ Under passing scheme prepared		

SN	Activity	Mitigation measures	Compliance attained (Yes, No, Partial)	Comment/Reasons for Partial or Non-Compliance	Issues for further action and target dates
	Chandpole Gate during tunnel boring	less than 5mm. The contractor will ensure that the design value is not exceed and the trigger value = 3.5mm and Allowable value = 4.2 meters are implemented. Tilt meters will be installed at key positions on the gate to ensure the 2/1000 design value is observed with trigger and allowable values of 1.4/1000 and 1.7/1000, respectively Crack meters will be installed at key positions to ensure design value of 3.0mm is not exceeded with 2.1mm trigger value and 2.5 mm allowable value The contractor will immediately cease all operation if any of the trigger values are breached. The CSC will advise the contractor mitigation measures and practices to control settlement, tilt, and cracks to include but not limited to structural reinforcement and operation parameters of the TBM. The contractor will ensure that no structural damage is incurred and cosmetic damages are repaired under the supervision and control of the Jaipur Archeology Department.	by M/s Omikron Kappa, of Greece, structural consultant of M/s CEC has been proof checked by M/s Ayesa of Spain. ➢ Structural consultant of Heritage consultant has also given his comments on the underpassing scheme of M/s CEC. ➢ Under passing scheme of Chandpole gate has also been proof checked by IIT Delhi. ➢ Work will be done as per approved method statement & GCC		
C1.2	To avoid cosmetic and structural damages to the structures along the underground metro alignment along Chandpole Bazar and Tripola Bazar	Expected vibration at the Chandpole Gate during tunneling is 0.682 mm/s which is lower that internationally accepted 5mm/s. However, to be on the safe side and as practice in DMRC, the Contractor is to ensure that vibration levels at the Chandpole Gate foundation will not exceed 2.0 mm/s	Not yet due. Online monitoring will be done when the TBM will pass through the Chandpole Gate.		

SN	Activity	Mitigation measures	Compliance attained (Yes, No, Partial)	Comment/Reasons for Partial or Non-Compliance	Issues for further action and target dates
	due to vibration from the tunnel boring machine				
C1.3	To minimize surface noise from excavating equipment in Chhoti and Badi Chaupar and avoid disturbance to patients in the Pink City Hospital near Chandpole, Chaudary Hospital, Majaraja School at the corner of Chhoti Chaupar. To avoid damage and nuisance to Jantar Mantar, and Hawa Mahal.	The contractor will ensure that noise from construction activities does not result to exceedances of relevant limits prescribed in the Indian Ambient Air Quality Standards for Commercial Area and Silence Zone. Mitigation measures to be implemented by the Contractors are: 1) liaise with local residents on how to best minimize construction noise along the Chhoti and Badi Chaupars. 2) local residents and shop owners should be informed of the nature and duration of intended activities prior to commencement and kept updated as to changes in the management and mitigation plan 3) equipment compounds will be located off-site 4) noise barriers will be installed at critical work areas particularly around the Chaupars 5) enclose especially noisy activities if above the noise limits 6) employ transportable noise screens between noise sources and identified noise sensitive areas for the duration of noisy construction activities 7) maximize the possibility of scheduling noisy activities at the same time to minimize the duration of exposure Noise from vehicles particularly for hauling of excavated materials to the dump site will be controlled through strict adherence to operating and maintenance instructions, routing of heavy vehicles way from noise sensitive areas whenever possible, conform with speed limits, and	Yes, Only newly manufactured equipment & regular servicing of equipment is being used in construction. Noise monitoring is being done and necessary mitigation measures are taken as required.		

SN	Activity	Mitigation measures	Compliance attained (Yes, No, Partial)	Comment/Reasons for Partial or Non-Compliance	Issues for further action and target dates
		construction vehicles will only use routes specified in the traffic management plan.			
C1.4	To ensure careful demolition and proper restoration of Chhoti and Badi Chaupars	The project calls for the demolition of the Chhoti and Badi Chaupar and its restoration to its original condition as a requirement from Jaipur Development Authority. The demolition and restoration will be under the supervision and control of these agencies.	Yes, ➢ JMRC through competitive bidding has engaged heritage consultant M/s Abha Narain Lambah Associates and M/s Shashank Mehendale & Associates (JV) to monitor the heritage structures lying along the metro route of Phase 1B. ➢ JMRC has also engaged 3 senior Archaeology Consultants to supervise the excavation of Chhoti Chaupar and Badi Chaupar. ➢ The work will be done as per approved method statement. Also the work will be done under the supervision of		

SN	Activity	Mitigation measures	Compliance attained (Yes, No, Partial)	Comment/Reasons for Partial or Non-Compliance	Issues for further action and target dates
			said agencies.		
C1.4.1	To address Chance heritage finds during the cut and fill operations	Please refer to FIDIC Sec. 4.24 Fossils. Recording (including chain of custody) will be made by the contractor to be validate by the CSC, and expert verification will be made by the Jaipur Archeology Department. Temporary work stoppage in the immediate area of the chance find for up to 72 hours to allow for the on-site representative of Archeology Department to visit the site to make an assessment and provide instructions. Work in the areas adjacent to the chance find will continue as provided in the detailed design.	Yes During the excavation of Chhoti Chaupar, Gomukhs were extracted & were handed over to Archeological & Museum department, Government of Rajasthan.		
C2	To avoid the following issues from spoil disposal activities: generation of sediment laden runoff from the work site during monsoon; Contamination of disposal sites from construction debris; Community hazard of uncollected and improperly	A spoil management plan will be implemented that details the location of spoil disposal sites, transporting soil, and disposing of soil. The Contractor will perform the following: 1) disposed spoils on permitted sites as instructed by the JMRC 2) ensure the adequacy of the disposal site to handle the volume of spoils the will be generated 3) Prepare, submit and seek approval from the CSC a spoil dump plan that provides the: i) dump size, layout, and form, ii) means of controlling water and wind erosion, iii) measures to prevent spoil dump contamination, vehicular, and public access. 4) Explore the possibility of using spoil materials to rehabilitate borrow pits to 5) All hauling vehicles should be maintained at an acceptable working order and serviced regularly 6) Haul vehicles should be routed away from noise sensitive areas 7) Speed limit in built up areas is 40 km/h 8) All haul vehicles should be covered or soil	Yes, Are being disposed in the approved area only. All other conditions are also being fulfilled.		

SN	Activity	Mitigation measures	Compliance attained (Yes, No, Partial)	Comment/Reasons for Partial or Non-Compliance	Issues for further action and target dates
	disposed materials.	sprayed with water before leaving the site specially during windy condition 9) Spoil dumps shall have slopes no steeper that 1V:2.5H 10) Final shaping, topsoiling, and immediate revegetation 11) No vehicles are to be allowed to enter in revegetated spoils dump			
C3	To avoid depletion of groundwater and competition with existing groundwater users due groundwater Extraction for the construction works	The Contactor shall secure permission for groundwater extraction from CGWA pertinent groundwater authorities before establishing bore wells. Water conservation and recycling will be observed in all aspects of constructions to include water main breaks, watering roads for dust control, spraying concrete, equipment cleaning and site clean-up.	Partial,	Application under preparation	
C4	To avoid nuisance from temporary damage or shifting in utilities particularly buried water pipes and electrical lines and disruption of essential services	The Contractor will ensure that the public will be minimally affected when constructing in close proximity to essential services through: 1) coordinate and secure necessary permits for utility shifting with the Jaipur Development Authority and other service utility agencies to locate al services prior to construction in any particular area 2) inform residents of planned interruptions through local media, fliers, and public address system 3) all planned interruptions schedules will be submitted to the safeguards cell JMRC no later than 10 working days before the interruption 4) all affected landowners, tenants, institutions, and businesses to be notified in writing prior to commencement and kept updated in	Yes, Care is taken to avoid inconvenience to uses by shifting as per instruction of concerned authorities.		

SN	Activity	Mitigation measures	Compliance attained (Yes, No, Partial)	Comment/Reasons for Partial or Non-Compliance	Issues for further action and target dates
		changes of schedule 5) in the event of unforeseen disruptions, the contractor will take all reasonable actions to have the service promptly restored 6) relevant utility agencies will be informed of the construction proximity to essential service line and be kept on standby in the event of unforeseen disruption All unplanned interruption will be immediately reported to the safeguards cell within 24 hour through an incident report.			
C5	To address occupational health and safety issues of the construction workers and local community	The contractor will comply with the occupational health and safety requirements as provided in SHE.	Yes		
C6	Implementation of Cleanup Operations and Restoration and Rehabilitation	Contractor shall prepare site restoration plans, which shall be subject for review and approval by the CSC, JMRC Safeguard Cell, Jaipur Development Authority and the Archeology Department to ensure consistency with zoning and town plans. The clean-up and restoration operations are to be implemented by the Contractor prior to demobilization. All spaces excavated and not occupied by the foundation or other permanent works shall be refilled with earth up to surface of surrounding ground.	Not yet due.		

4. ACTIVITIES UNDERTAKEN FOR PROTECTION AND MONITORING OF HERITAGE STRUCTURES

A. Findings in Badi Chaupar and Chhoti Chaupar

27. Under Jaipur Metro Rail Project Phase 1B, an underground Metro line is under construction from Chandpole to Badi Chaupar. While Metro tunnel will be constructed using Tunnel Boring Machines, the two underground Metro Stations at Chhoti Chaupar and Badi Chaupar will be constructed by cut and cover method, requiring excavation from top to bottom.

28. To enable construction of underground stations at Chhoti Chaupar and Badi Chaupar, the dismantling of existing Chaupars and excavation underneath was necessary. In this regard, historical background of Chaupars was studied and after detailed discussion it was decided that digging at Chaupars will be done with utmost care and heritage elements, if any, will be handed over to Albert Museum for safe keeping.

29. Careful dismantling and excavation of Chhoti Chaupar and Badi Chaupar was done. During the excavation, an old water tank was found under each Chaupar which were shown to the Joint Committee on Metro and Monumental Heritage consultant and also to the renowned heritage consultant Ms. Abha Narain Lambah.

30. After seeing the water tank found at Chhoti Chaupar, which was unearthed first, heritage consultant M/s Abha Narain Lambah Associates submitted a report with following recommendations :-

1. To undertake detailed measured drawings survey, photographs and video documentations to create thorough and accurate database for future.
2. Excavation under supervision of professional experienced archaeologist, preferably retired archaeologist from ASI.
3. Proper documentation numbering of historical elements.
4. As the in-situ restoration is not possible therefore, reconstruction should be undertaken under the supervision of archaeologist
5. Artifacts like Gomukhs may be kept in custody of State Archaeology department.

31. State Government also asserted over the recommendations made by Heritage Consultant.

32. Thereupon, dismantling of old water tank was done under the supervision of Shri R D Singh, Dr. S K Sharma and Shri P K Jain, archaeology/restoration experts specially engaged by JMRC for the purpose. As agreed, 8 Gomukhs of Chhoti Chaupar were handed over to Superintendent, Albert Hall Museum, Department of Archaeology and Museums, GoR.

33. During the dismantling, the above-named archaeology/restoration experts of JMRC observed that two ‘masonary nullahs’ were crossing under the tank. As advised by them, further excavation was carried out and some more steps and a second bottom of the tank were found as a lower layer. Detailed documentation of the ‘masonary nullahs’, steps and second bottom of the tank has been done.

34. Site was inspected by the key expert of heritage consultants, M/s. Abha Narain Lambah Associates and reported that the site and historic records both reveal two layers of historic layering in the Chaupars, an older 18th century layer with a deeper tank and more steps, and a later 19th century layer with a central fountain and marble *goumukhs* lining the edge of the tank.

35. The consultant observed that the present design of the station at Chhoti Chaupar has been kept well below the ground to accommodate the reinstating of the water tank, even if it is reconstructed to the lower, 18th century layer. There is thus in the station design, adequate flexibility to reinstate the tanks as per historic levels.

36. On excavation work being undertaken at Chhoti Chaupar, it was revealed that there are 4 historic tunnels in which were laid as water inlet and outlet channels to the kund fucntioning at that time. At some point these channels were closed when infrastucture services were being laid in the city criss crossing under the roads. One of the tunnels in the north direction has been unearthed all the way upto 80 metres and one can walk through the tunnel. The other tunnels are in the process of being excavated.

37. The tunnels would probably connect to Jal Mahal or the Talkatora reservoir and is in a well preserved state with arched masonry and lime plastered lined walls. It has also been instructed in the site meetings to keep the rubble masonry for future use and stack the usable material properly.

38. It has been decided to explore the possibility of re-aligning the exit staircase in a manner without disturbing the function of the station designed to pass through the tunnel and expose the commuters and public to an important layer of history which has been lying buried for so many years. The Heritage consultant's detailed report is attached herewith as Appendix-7.

39. Consultant also opined that retaining the tunnel within the station box is not feasible; it would be worthwhile to explore the possibility of recreating architectural drawings and graphic models of these tunnels along the exhibit display within the concourse.

40. As of now on the basis of approved traffic diversion plan and construction process plan, Chhoti Chaupar will be refilled so as to proceed with the constrcution work of station area at Chhoti Chaupar.



B. D-Wall Construction

41. The D-walls (Diaphragm Walls) act as a structural member for the station box. Prior to the commencement of the D-walls, the utilities are diverted. The construction of D-walls is executed through grabbing machines after completion of the guide wall which act as the guide for the excavation. During the operations the grabbing machines removes the soil, the soil is stabilized using Polymud to avoid the collapse of soil. After reaching the desired level, the grabbing operations are stopped and the reinforcement cage is lowered into the excavated area and concrete is poured through tremie.

42. To monitor the impact of the operations we have provided tilt meters, crack meter and settlement meters to measure the impact and report any abnormality in the reading. Aprat from the above, to protect the existing verandahs, we have done the propping and jacking and also in the shops identified as critical.

43. The top slab work including D-Wall construction, plunge column at Chandpole side of Chhoti Chaupar station area is planned to be completed and the traffic blockade will be opened for public in the first week of July 2015. The constrcution of D-Wall is going on towards Tripoliya side and will be completed by end of next month i.e. July 2015

C. Chandpole Gate Tunnel Underpass Scheme

44. Chandpole Gate is coming right in the center of alignment, attracting maximum settlement, but original drawings relating to its foundation were not available. Therefore, the foundation of Chandpole Gate has been physically examined by a team of engineers, by making several trial pits around the gate.

45. For the determination of the structure's foundation, special survey was carried out by CEC and nine trial pits were executed in certain locations near the gate.

46. The foundation of Chandpole Gate has been found to be in a sound condition which can sustain the impact of tunnel-making underneath.

47. To assess the ground settlement due to tunneling by TBM & its effect on structural safety of Chandpole Gate, a detailed 3D analysis has been carried out by M/s Omikron Kappa – Indus Consultrans JV and a detailed report submitted.

48. As per this report, considering that Chandpole gate is in category "Slight" according to the pre-condition survey, "negligible" damage is expected for settlements <6.7mm and angular distortion <1/750. As already derived from the 3D analysis, the maximum calculated settlements and angular distortion are 5mm and 1/1200 respectively, values which are related with "negligible" damage even in the case of "High" vulnerable structures.

49. Considering all the above, a set of values were established for the displacement and deflection of the Chandpole Gate, as presented in the following table.

Measurement	Trigger Level	Alarm Level	Limit values
Settlements	4mm	5mm	6mm
Angular Distortion	1/1400	1/1200	1/1000

50. On the advice of Archaeology & Museums Department, the work of further examination/proof check of underpassing scheme of Chandpole Gate was assigned to Indian Institute of Technilogy (IIT) Delhi. After conducting the proof check of underpassing scheme of Chandpole Gate, IIT Delhi has reported that analysis and other details given in the report are in order. The scheme of Chandpole Gate underpassing by Tunnel Boring Machines is considered safe as it will have no impact on the stability of existing Chandpole Gate.

51. Archaeology & Museums Department, GoR, which vide its letter dated 19.06.2015 has issued license under Rule 20 of the Rajasthan Monuments, Archaeological sites and Antiquities Rules, 1968 for construction of twin metro tunnels under Chandpole Gate. **(Appendix9).**

D. Results of the Ground Penetrating Radar

E.1 Introduction

52. Ground penetrating radar survey is a non-destructive geophysical method that produces a continuous cross-sectional profile or record of subsurface features, without drilling, probing, or digging. Ground penetrating radar (GPR) profiles are used for evaluating the location and depth of buried objects and to investigate the presence and continuity of natural subsurface conditions and features. It is a high-resolution geophysical method, which is based on the propagation of high frequency electromagnetic waves. The GPR method images structures in the ground that are related to changes in dielectric properties. In sediments, the water content primarily causes the changes in dielectric properties.

53. The equipment used for the scanning includes SIR-3000 (GPR) of Geophysical Survey Systems Inc. (GSSI), USA, 100 MHz paired antenna with other peripherals as shown in the Figure 2.

Figure 2: Equipments used for GPR survey

E.2 Methodology

54. GPR model SIR-3000 of GSSI, USA was used for the survey along with 100 MHz paired antenna (with fiber optic) for scanning down to depth of 22m or so as it was indicated that the average depth of the tunnel bottom would be around 16m or so. The use of 100 MHz pair antenna provides good resolution down to a depth of 22-25m but it

does not provide good resolution in the upper layers where there could be a number of utilities. The resolution within first 5m or so becomes poor using 100 MHz pair antenna alone and therefore, nothing can be inferred down to a depth of 5m. It becomes imperative to use 400 MHz to detect utilities which are normally available within first 3-4m. The same was also demonstrated during the survey. A part of the entire stretch was also taken up for utility survey. The results of the same have also been provided towards the end of the report. As the objective of the work was to scan the subsurface for different litho units down to a depth between 15-22m, 100 MHZ paired antenna was used.

55. The methodology adopted for the study includes:

- Geophysical survey using Ground Penetration Radar (GPR) with 100 MHz paired antennae for subsurface scanning
- Processing and assimilation of GPR surveys using RADAN software of the scans collected using 100 MHz pair antennae

E.3 Study Area

56. In order to prioritize the scanning work, the entire stretch between Chandpole & Badi Chaupar has been sub-divided into following sectors:

Sector-1: Along the tunnel alignment for the stretch between Chandpole Metro station to Chhoti Chaupar.
Sector-2: Chhoti Chaupar Metro station.
Sector-3: Along the tunnel alignment for the stretch between Chhoti Chaupar to Badi Chaupar.

E.4 Conclusion

57. Survey using Ground Penetration Radar with 100 MHz paired antenna has provided scanning down to a depth of 22m.

58. The interpretation of all these scans shows that two distinct layers exits upto the scanned depth for the entire stretch between Chandpole and Badi Chaupar. This is depicted in the scans provided at Figure 10 to 27 of the report. The 3-dimensional model (surface and block) provides variation in terms of depth for the two layers. The drill hole core too in the area indicates presence of two layers of silty sand/sandy silt as defined by grain size analysis of the soil as per geotechnical report. A small portion in the entire stretch indicates more reflective zone which could be on account of anomalous material such as presence of metallic substance, high moisture content or an object.

59. A part of the entire stretch was also taken up for utility survey. This indicates the importance of GPR survey for locating utilities before excavating the area. This helps in planning the excavation work without damaging the existing utilities.

60. The summary report of the GPR done for the project is available online at JMRC webportal.

5. SUMMARY OF ENVIRONMENTAL MONITORING

A. Summary of Inspection Activities

61. A total of 09 SHE Walk inspections were conducted by the CSC-ES during the reporting period. Further details on the inspections carried out and key findings are provided in Table 6.

Table 6: Field Inspections carried out during reporting period

Date of Inspection	Location	Participants	Key Findings
03.04.2015	Chhoti Chaupar	13	Safety & Environment
10.04.2015	Casting yard	11	Safety & Environment
17.04.2015	Chandpole	04	Safety & Environment
30.04.2015	Casting yard	09	Safety & Environment
15.05.2014	Casting yard	10	Safety & Environment
31.05.2015	Chhoti Chaupar	06	Safety & Environment
12.06.2015	Chhoti Chaupar	10	Safety & Environment

Note: Sample copy of SHE Walk attached with Appendix.

B. Monitoring of Cracks, Settlements of Structures

62. The entire area where the stations as well as the tunnels underpasses fall under heritage structures. In order to observe the conditions and behaviors of the structures during the operations, monitoring is being done through instrumentations.

63. **Location and Quantity of Instrument which is installed:** Chandpole area we have installed Inclinometer in the D-Wall of Shaft area. In Chhoti Chaupar station area we have installed some building instruments and their quantity is mentioned below.

SN	Instrument Name	Location	Total Quantity
1	Inclinometer	Chandpole Shaft Area	3
2	Tilt Meter	Chhoti Chaupar	35
3	Crack Meter	Chhoti Chaupar	58
4	Optical Target	Chhoti Chaupar	70
4	Building Settlement Point	Chhoti Chaupar	48
5	Pavement Settlement Point	Chhoti Chaupar	12

64. **Monitoring Frequency at Station, C&C and Launching Shaft**

SN	INSTRUMENT	FREQUENCY
1	Inclinometer	Once daily during excavation then once weekly
2	Soil Settlement Marker	Once daily during excavation then once weekly

3	Pavement Settlement Marker	Once daily during excavation then once weekly
4	Crack Meter	Once daily during excavation then once weekly
5	Tilt Meter	Once daily during excavation then once weekly

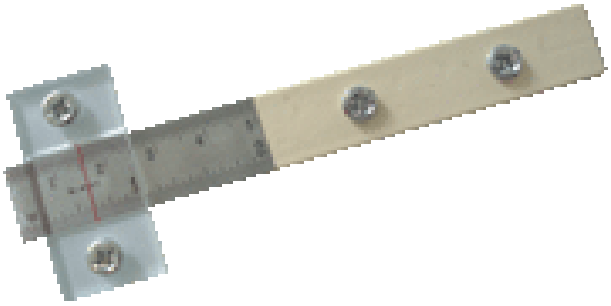
Note: Monitoring frequency may be changed depending upon whether any deformation is observed.

65. **Inclinometer Model AIM-741 or equivalent:** The purpose of inclinometer monitoring is to observe and monitor any lateral movements within structures or strata and analysis whether remedial works are required to subdue any such movements.

66. **Tilt meter-Model AIM-5410 or equivalent:**Portable tilt meters are mainly used to monitor buildings, structures, utilities, etc. As well as the inclination and rotation of retaining walls, dams, piers, piles, etc. It may also be used to evaluate the performance of bridges, struts and the stability of structures in land slide areas.

67. The EAN-70 portable tilt meter system consists of three components: tilt plate, tilt meter, and readout unit.

68. **Crack meter- Model AIM-100SC or equivalent:**The crack meter is suitable for measuring structured cracks ranging from 0.5 to 100 mm with a hairline cursory markin two directions i.e. vertical and horizontal.The advantages of this instrument are: reliable and accurate, simple to install, simple to operation and low cost. This is very simple and accurate instrument to monitor the hair crack. The mechanical crack meter is made of polycarbonate transparent sheet with graduated marks. The both sheets will be assembled on crack with the help of fasteners.



69. **Bi- Reflex Target:**

70. The bi-reflex target is one of the surveying equipment to measure deformations and settlements of the structures surrounding the construction site. It is rugged prcise and low cost with an accurancy of +/- 0.1mm.

Vibration Monitoring:

71. **Need for Vibration Monitoring:** The construction of underground rail and road infrastructures in metropolitan and cosmopolitan cities are mostly through developed area under challenging soil conditions. The alignment of structure is passing through densely inhabited areas with many heritage structures falling in the zone of influence of construction activities.

72. Construction vibration sources generate elastic waves in soil and have a wide range of energy, displacement, velocity and acceleration transmitted on the ground. These may be harmful to adjacent and remote structures, sensitive instruments and people. Their effects range from serious disturbance of working conditions for sensitive devices and people, to visible structural damage.

73. It is important to assess the dynamic effect before the beginning of construction activities and at the time of construction. Therefore monitoring of construction vibrations have to be started prior to the beginning of construction works at a site and be continued during construction to provide the safety and service ability of sound and vulnerable structures.

74. It is required to carry out base line monitoring to determine the Pear Particle Velocity and their respective frequency band that are persisting even before carrying out any construction activities. The recorded values shall form the base line and shall be compared to the corresponding values recorded during construction activities and the influence of construction may be determined accordingly.

Methodology:

75. **About the Equipment:** The equipment used for monitoring ground vibrations should be able to evaluate the parameters of vibrations in all three planes i.e. Longitudinal, Transverse and Vertical. Kelunji Echo, Seismic Recorder is used for the present monitoring requirement. This equipment can be universally used for many seismic monitoring applications, including earthquake monitoring (permanent or portable installations), structural monitoring, as well as blast and other vibration monitoring.

76. The equipment consists of Geophones and Kelunji Echo Seismic Recorder which is able to monitor the effect of vibration on all three planes. It is equipped with three geophones, capable of picking up signals in all the three planes described above. It is able to perform full field analysis of the event to evaluate the peak pulse velocity, peak frequency, peak acceleration and peak displacement.

77. The Echo is simple to use, easy to install and maintain, and light and robust enough to enable use of single equipment for monitoring different locations of the same structure or different structures. Ethernet based communications such as VSAT, ADSL, and some radios allows easy configuration of networks for data telemetry. GSM, GPRS, CDMA & PSTN are also supported.

78. The core Echo, by using it a built-in GPS timing system, can act as a Network Time Server for synchronizing other NTPv4 enabled timing-critical equipment. From this core base, the Echo can be expanded with an internal tri-axial accelerometer, external 3-channel sensor interface, internal PSTN modem, LCD panel, Compact Flash memory, or any combination of these optional modules. Every Echo comes supplied with eqWave software for waveform analysis and manipulation. EqWave runs on most computing platforms that run a Java Virtual Machine, including Windows, Unix, Linux and MacOS X. Echo seismic data is recorded in PC-SUDS file format, stored in a standard file system. A logical hierarchy is implemented for simple copying to PC using a CF-USB reader or via FTP. In telemeter applications, ES &S produces a range of software to compliment the Echo. Collectively known as eqSuite, the programs automatically process Echo data for on-screen display and archiving, raises event alerts, and prepares data for interactive refinement.

Table 7: Vibration Monitoring

Station/ Tunnel	Location (Shop/House No.)	Land Mark	Structure Id (BCS)	Category
Chhoti Chaupar	Shop No. 189	Infront Corner Column	CP-CC-UP-0071	Very Severe

Station/ Tunnel	Location (Shop/House No.)	Land Mark	Structure Id (BCS)	Category
CP to CC Tunnel	Up Line Wall Design No. 31 Left Wall while entering the wall 30 cm. In & 40 cm. from Corner (near CP-0016)	Chandpole Wall UP	CP-0016	Very Severe
CP to CC Tunnel	Up Line Small Gate near Noor Bhai Pahalwan Shop aprox 3.5 mtr before & 30 cm. in From Small Gate.	Chandpole Gate	CP-CC-DN-0154	Severe
Chhoti Chaupar	Up Line Verandah of Shop No.379 Left Col. From Shop Just before 25 CM. From Left Col. Direction L-R for distance. (RHS Col. Of Shop No. 380).	Infront Corner Column	CC-BC-DN-0001	Very Severe

Photograph of the location where Vibration Monitoring Reading has been taken.

C. Noise Monitoring

79. Noise level survey was conducted by 3rd party J.M.Enviro Pvt. at all project sitesfor Day & Night shifts viz Bhankrota, Chandpole launching shaft Area, Pink City Hospital, Chhoti Chaupar, Maharaja school, Chaudhry Hospital, Krishna temple, Hawa Mahal, and Jantar Mantar for Day & Night shifts.

80. It has been observed from the results that no noise level exceedance was recorded at any site both for day time and night time. In the month of May,2014 the noise level at Maharaja School and Hawa Mahal were found marginally higher side. Results are

summarised in Table 8 and 9 and graphical representation of results are also given below. Complete monitoring reports are provided in Appnedix 7.

Table 8: Noise Monitoring Results (Day time)

Date	Leq Night dB(A)							
	Location							
	Casting Yard	Chand pole	Maharaja School	Chaudhri hospital	Pinkcity Hospital	Krishna Temple	Jantar Mantar	Hawa Mahal
20.04.2015 to 24.04.2015	57.7	63.61	63.86	55.31	57.31	60.5	56.6	59.93
26.05.2015 to 30.05.2015	61.11	61.41	62.95	60.05	60.80	59.51	43.51	43.77

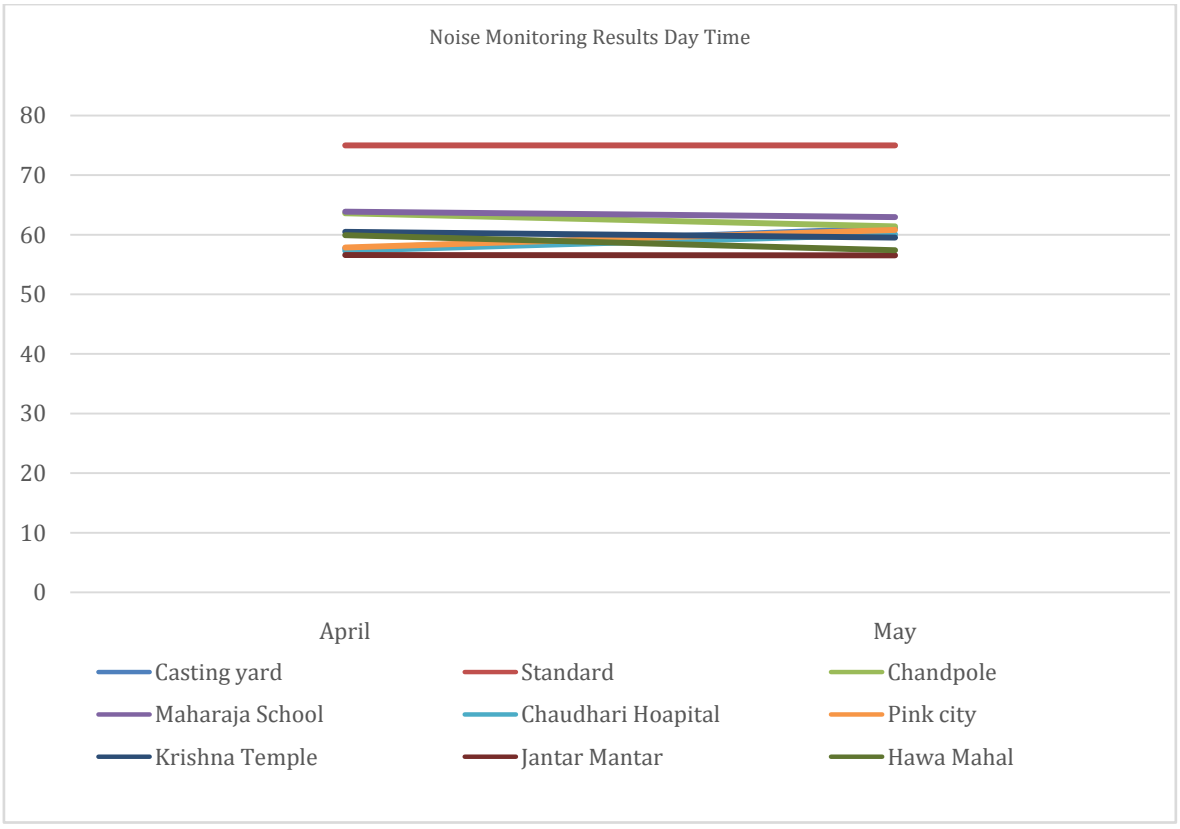
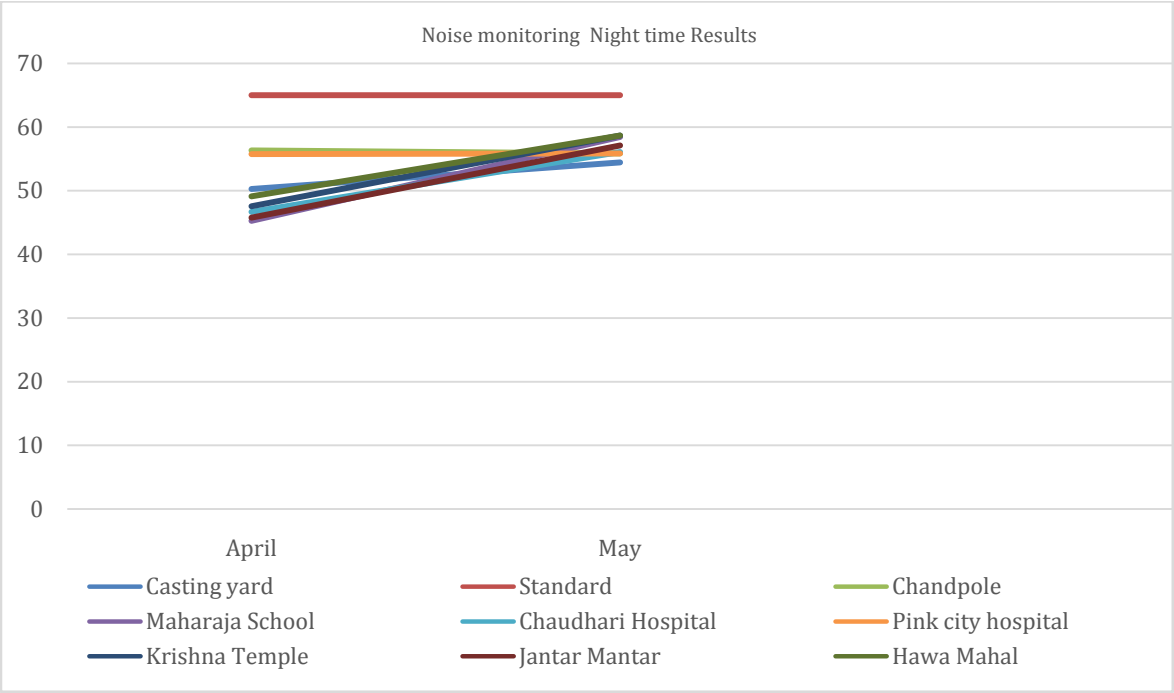


Table 9: Noise Monitoring Results (Night time)

Date	Leq Night dB(A)							
	Location							
	Casting Yard	Chand pole	Maharaja School	Chaudhri hospital	Pinkcity Hospital	Krishna Temple	Jantar Mantar	Hawa Mahal
20.04.2015 to 24.04.2015	50.27	56.32	45.27	46.66	55.74	47.55	45.76	49.11
26.05.2015 to 30.05.2015	54.43	55.84	58.43	56.07	55.84	58.67	57.10	58.67



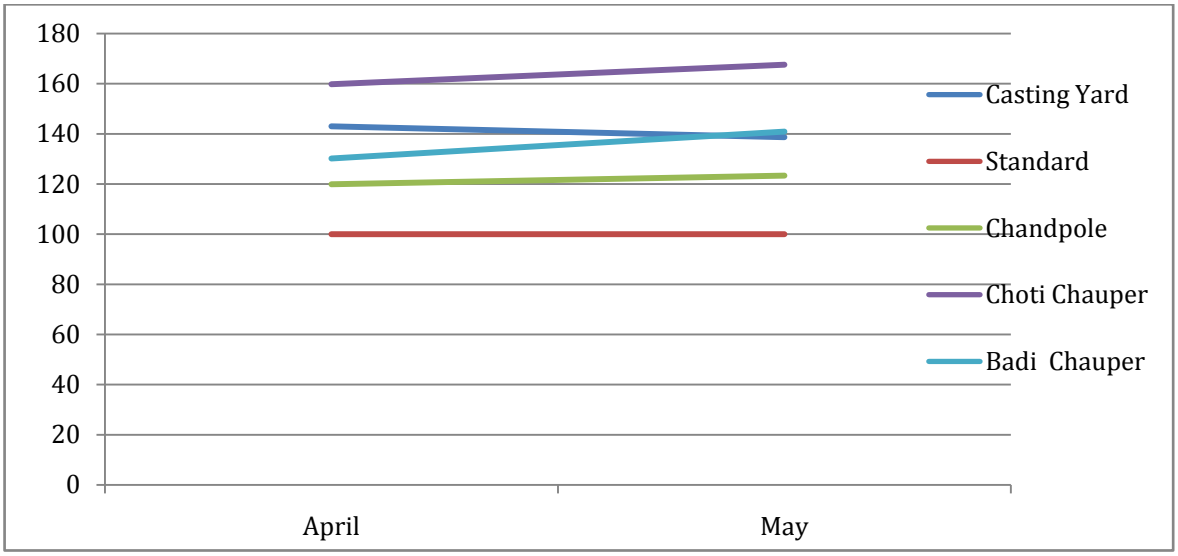
D. Air Quality

81. The ambient status of five major air pollutants viz. Total Suspended Particulate Matter (TSPM); PM_{10}, Sulphur Dioxide (SO2), Oxides of Nitrogen (NOx) and Carbon Monoxide (CO) representing the quality of pollution level have been assessed by monitoring air quality at four locations viz. Casting Yard,Chandpole launching shaft, Chhoti Chaupar & Badi Chaupar. The air quality monitoring results indicate that PM_{10} concentration exceeds the limits specified by CPCB for all sites However the concentration of PM_{10} was within baseline concentration value of 180 $\mu g/m^3$ (2012 monitoring). The reason for higher concentration could be due to soil excavation, movement of construction machineries, and internal roads which was dusty. Rest of the three parameters were found within the limits.

82. Air monitoring was carried out for the month of April and May. However, monitoring could not be conducted for the month of June due to non-availability of monitoring agency. Testresults are summarised in Table 10. Complete monitoring reports are given in **Appendix 7**.

Table-10: Air Quality Monitoring Results

Date	PM 10 (Unit µg/m3)			
	Location			
	Casting Yard	Chandpole	ChhotiChaupar	BadiChaupar
20.04.2015 to 24.04.2015	143.0	119.9	159.8	130.2
26.05.2015 to 30.05.2015	138.7	123.4	167.6	140.9
26.05.2015 to 30.05.2015	138.7	123.4	167.6	140.9



83. **Air Pollution Control:** The mitigation measures, which have adopted to reduce the air pollution are: all transportation of construction materials should be covered manner. To minimize dust emission due to handling of aggregate and cement at site, there are two time sprinkling of water on the internal roads. Vehicle speed restriction of 5-10 km/hrs have been followed at site, tyre washing facility have been provided for cleaning of vehicles/tyresat Chandpole exit gate.

E. Water Quality

84. Water samples were collected from nearby bore wells during May 2015 to check the quality of the water. Quarterly water analysis results are compared with IS 10500:2012 and found within permissible limited. Results are summarised in Table 11 and monitoring reports are provided in **Appendix 4**.

Table 11: Water Quality Monitoring Results

Sr. No	Parameters	Units	Results			
Sample Identification			Casting Yard		Chandpole	
1.	pH(at 25 ºC)		7.94	8.09	7.67	7.87
2.	Turbidity	NTU	2.0	1.0	1.0	2.0
3.	Conductivity	µs/cm	897.00	920.00	1554.00	1709.00
4.	Total Dissolved Solids	mg/L	580.00	635.00	1013.00	1128.00

Sr. No	Parameters	Units	Results			
Sample Identification			Casting Yard		Chandpole	
5.	Total Suspended Solids	mg/L	1.2 0	1.40	1.20	1.80
6.	Oil and Grease	mg/L	nill	nill	N ill	nill
7.	Dissolve Oxygen	mg/L	5.20	5.40	5.20	5.10

6. SOCIAL AND RESETTLEMENT IMPACTS

A. Impacts on Structures

A.1 Shifting of Temples

85. When the work of Phase 1B started it was found that 6 temples falling in the station box area of Chhoti Chaupar and Badi Chaupar where digging is necessary for construction of stations, required immediate relocation. Three of these temples are at Chhoti Chaupar & another three at Badi Chaupar, as under:

1. Hanuman Mandir (Chhoti Chaupar)
2. Shiv Mandir (Chhoti Chaupar)
3. Rojgareshwar Mandir (Chhoti Chaupar)
4. Shiv Mandir (Badi Chaupar)
5. Ganesh Mandir (Badi Chaupar)
6. Hanuman Mandir (Badi Chaupar)

86. As per the decision taken by High Power Committee chaired by Chief Secretary GoR, an office order was issued on 16.10.2014, that GAD land at Tripolia Bazar i.e. Tanwar Ji ka Nauhra (around 200 mt from Chhoti Chaupar) which has two courtyards admeasuring 542 sqmt and 645 sqmt respectively be handed over to Jaipur Metro Rail Corporation for relocation of 6 temples and development of Two Wheeler Parking, respectively.

87. The possession of the land has already been taken over by JMRC from Public Works Department on 17.11.2014.

88. Necessary measures have been taken for relocation of identified temples and 6 Temples of Chhoti Chaupar have already been relocated at Old Atish market.

Figure a: Location of Tanwar Ji Ka Nauhra (Land identified for temple relocation)

89. As the planning and designing of station at Chhoti Chaupar and Badi Chaupar progressed, 7 additional temples were identified which etiher infringed the entry exit strcuture or came in mid of the traffic diversion scheme. The detail of the additional temples is as below:

1. Barah ling Mahadev (Chhoti Chaupar)
2. Rameshwar Mahadev (Chhoti Chaupar)
3. Bajrangbali Mandir (Chhoti Chaupar)
4. Peepleshwar Mahadev (Badi Chaupar)
5. Mahadev Ji/Mataji/Hanuman Mandir (Badi Chaupar)
6. Mahadev Mandir (Badi Chaupar)
7. Mahadev/Hanuman Mandir (Badi Chaupar)

90. Proper documentation and measurement have been taken and recorded for all the temples.

91. On 11.05.2015/12.05.2015, six temples of Chhoti Chaupar were shifted to Old Atish Market and Murti Sthapna was done along with proper ritual ceremony.

92. Apart from Tanwar Ji Ka Nauhra land, another land at old Atish Market has been identified, in which planning for relocation is under process. All matters related to compensation and relocation of temples at Chhoti & Badi Chaupar are being dealt with at the level of Collector, Jaipur.

B. Land Acquisition and Resettlement

93. For the purpose of easing the traffic diversion near Sanjay Circle, Chandpole, JMRC has processed for acquisition of 3 shops located at Sansar Chand Road. Details are given below.

Sl.No.	Shop Detail	Name of Shop Owner	Name of Shopkeeper	Area (sq.m)
1	Shekhawat Rajput Dhaba (Part of Shop No. 12)	Mohd. Salim, S/o Yaseen Khan	Mukut Bihari, Satynarayan, S/o Banshilal Mehra	7.49

2	Bharat Cold Drink (Part of Shop No. 12)			3.90
3	Shiv Pan Bhandar (Part of Shop No. 12)		Bihari Lal S/o Nandlal Saini	1.30
4	DCB ATM	Smt. Mamta Kanwar W/o Sohan Singh Shekhawat	DCB Bank	5.46

94. Considering the time required for land acquisition process per new Land Acquisition Act of GOI, it was agreed and decided by JMRC (in consultation and discussion with shop owners) to resettle the shop owners on the other side of the road near Chandpole station (Near Church land). Besides resettling shops, JMRC also agreed to provide assistance during relocation process including any loss of income during the relocation process. Shop owners also agreed that new shops will be rented to same shopkeepers who are currently running these shops.

95. The shopowners have given their consent to the proposal. JMRC is in the process of getting written consents from shopowners and shifting will be done in consutations with shop owners before start of work near these shops.

96. The site selected for relocation of these shops is getting prepared and construction is ongoing. Very soon the shop owners will be given possession of the newly constrcuted shops.

7. PUBLIC CONSULTATIONS AND ADDRESSING OF GRIEVANCES

A. Public Consultations carried out

97. Consultations are being held regularly with the local people in the project area including relevant government agencies, the business associations in the project are such as the Chandpole Bazaar Vyapar Mandal and Tripolia Bazaar Vyapar Mandal.

98. JMRC has taken all possible measures to ensure that following concerns are regularly addressed:

a) Heritage character of Jaipur
b) Traffic diversion during construction
c) Inclusion of all key stakeholders

99. During the period of this report (April 2015-June 2015) following consultations were held:

Table 12: Consultations held during the reporting period

Date	Venue	Participants	Detail of discussion held	Action Taken
04.04.2015	Old Atish Market Temple Site	Shopkeepers of Atish market	Discussion with shopkeepers and to listen to their general grievances regarding Chhoti Chaupar temples being shifted to Market parking area	It was informed to shopkeepers that the nearest and most feasible government land available for relocation is the parking area of Atish market
17.04.2015	Tripolia Bazar	Representatives from Tripoliya Bazar shopkeepers	Regarding propping work to be undertaken for extra strengthening	Shopkeepers were informed that why extra propping is being provided so that to provide strength to the existing structure.
28.04.2015	Tripolia Bazar	Representatives from Tripoliya Bazar shopkeepers	Regarding provision of extra lighting during night time	Issue was resolved and directions were given to provide extra lighting during night time
01.05.2015	Chandpole Vyapar mandal	Shopkeepers	Regarding start of Tunneling work	Shopkeepers were informed about the process of TBM and tunneling process
05.05.2015	Collectorate Office	Local MLA, District Collector, Police officials and other representatives	Regarding Temple issue/Traffic Diversion	The meeting was to address the grievances of local representatives over problems due to metro construction work, traffic diversion. Necessary instructions and directions were provided by Collector

Date	Venue	Participants	Detail of discussion held	Action Taken
				Jaipur to concerned officers for quick redressal.
07.05.2015	Old Atish Market	Chhoti Chaupar 6 Temple owners	Regarding shifting of temple to Old atish market parking area	To show the site to temples owners who provided their consent over relocation.
18.06.2015	Mansarovar Depot	Vyapar mandal Representatives, ADB Mission Team	Progress of Phase 1B and general discussion over Phase 1A commercial opening	CMD Jaipur Metro Chaired the meeting and the meeting was to present current status of Phase 1B work.
22.06.2015	Chhoti Chaupar Tank Site	Vyapar Mandal representatives	About opening of Traffic blockade at Chhoti Chaupar	JMRC ensured opening of traffic blockade at Chhoti Chaupar toward Chandpole side by first week of July and tripoliya side by end of July.

Note: The matters related to compensation and relocation of temples at Chhoti & Badi Chaupar are being dealt at the level of Collector, Jaipur and therefore record of such meetings are not available with JMRC.

B. Complaints and Requests Received

100. During the period of reporting (April to June 2015) no written grievances and requests application was received from the local people in the project area.

8. UNANTICIPATED SAFEGUARDS ISSUES

101. **Discovery of new layer of kund and tunnels at Chhoti Chaupar.** After a detailed documentation of tankat Chhoti Chaupar was done. Gaumukhs from Chhoti Chaupar tank were carefully taken out and handed over to Archaeology & Museum Department as per the decision that was taken in the meeting chaired by Hon'ble CM. Then the dismantling of Chhoti Chaupar commenced. The paving stones were removed and kept in old police head quarters for safe storage of these materials till the same are used at the time of recreation of this tank. Further dismantling of this tank was done under the supervision of archeology consultants of JMRC. When the flooring was removed from Chhoti Chaupar tank, a deeper layer of Kund (water tank) was found below the water tank layer with stone paving. This deeper tank is having 7 steps all around and 4 water channels (tunnels) on its four sides.

102. In addition to the earlier levels of a stepped water tank, further excavation work revealed:

- a deeper layer of the square shaped kund measuring 13.1mt x 13.1 mt
- 7 additional steps that run all around the tank
- Four tunnels openings in the cardinal directions, the East (Tripolia bazar) and West (Chandpole) tunnels are arcuated openings, the South side (Kishanpole) tunnel has a flat lintel and the North side opening has a slab at top which is rounded at base.
- Lime concrete finishing on steps.

103. After carefull detailed documentation of the second layer of tank found at Chhoti Chaupar, the tank was refilled for construction and traffic diversion purpose.

104. **Relocation of Chhoti Chaupar temples:** Shifting and Relocation of the 6 temples at Chhoti Chaupar was done by Collector, Jaipur. Assistance were provided by the Police Administration, Civil Defence, Devsthan Department and Jaipur Metro Rail Corporation for smooth shifting and relocation of these temples.After taking consent from the temple owner/trust these 6 temples identified at Chhoti Chaupar were relocated in admeasuring 325 sqmt of land in Old Atish market. Each of the temples have been constrcuted as per the satsifaction of temple pujaris. The temples were shifted with the ritual procedures as directed by the temple pujaris themselves. The development works in temple premisesare being executed.

105. **Crane incident at Chhoti Chaupar work site**: On 04.05.2015, during the construction of D Wall at Chhoti Chaupar, while lowering the D-Wall cage, the Crane rope holding the cage snapped and the boom descended and fell over the Shop no. 377-378 (Udai Singh Ji ki Haveli No. 98). Immediate mitigation measures were taken up and fortunetly there were no human casualties. Crane available on site was utlized to retrieve boom from the building and it was safely lowered to the barricaded area. JMRC has taken up repair works in priority to the staisfaction of the owners.

Enclosed: Site Visit Photos

Damaged Parapet Wall, Cracks on below wall

9. CONCLUSION

A. Summarize the overall Progress of Implementation of safeguard Measures[4]

106. The implementation of environmental management measures in this project face some difficulties but it can be concluded that the overall progress of implementing environmental and social safeguard measures show a highly satisfactory level. Table 14shows a comparative scenario of implementing environmental management measures for each package.

Table 14: Overall Progress

Site Safety	Workers Safety	Protection of Environment	Protection of Heritage structures	Statutory Approvals	Filling of Checklists	Overall Rank
2	1	1	2	2	1	2

B. Problems Identified and Actions Recommended

107. During the previous reporting period (January 2015-March 2015) some of the issues were identified such as consultation and communication with affected communities and shopkeepers, follow-up with regulatory / government agencies to get pending approvals/permits, full time environmental specialist by the CSC, proper documentations and record keeping, and information disclosure. Then DMRC and Contractor were advised to perform their works to comply with environmental regulations and to the mitigation measuresand then proper supervision has been given wherever needed.

108. As a result, during the current monitoring period, it has been observed that adequate measures have been taken to minimize the impacts on heritage structures, and consultation and coordination with communities and shopkeepers. Table 15 present the actions that are proposed in the previous monitoring report and actions taken to address these problems:

Table 15: Status of Actions Suggested in previous Monitoring Report

Action Recommended	Measures Taken	Remarks
Seek advice from the heritage consultants and also consult the Department of Archaeology (Government of Rajasthan) to preserve heritage structures including ancient water tanks.	JMRC has engaged three heritage consultants and seeking their advice to preserve heritage structures. The work has been carried out in consultation with heritage consultants. JMRC also consulted Archeological Department to seek their advice and	Continuous follow up required during the implementation of project.

[4]Overall sector environmental management progress could be described in qualitative terms or be evaluated based on a ranking system, such as the following:

1. Very Good
2. Good
3. Fair
4. Poor
5. Very Poor

Additional explanatory comments should be provided as necessary.

	heritage structures are being preserved in coordination with Archeological Department of Rajasthan.	
Follow-up with regulatory / government agencies to get pending approvals/permits.	Application has already submitted for obtaining consent to establish batching plant and draw ground water.	Expedite process to get pending clearance on priority basis.
PMC's environmental specialist to provide technical support and guidance to the contractor and JMRC on full time basis	DMRC has deputed junior expert to the site to provide technical support to contractor and JMRC.	Full time environmental specialist is required at site. JMRC to take action on priority.
Appoint a consultant for community mobilization and more effecting community liaison particularly with regard to heritage issues, safety issues, utility shifting and anticipated temporary suspension of services. He will also facilitate Consultation with concerned stakeholders to clearly explain particularly to people who do not have access to the internet, the precautionary measures being taken to protect the heritage structures and to retrieve the lost layers of history.	A JV of M/s Abha Narain Lambah Associates and M/s Shashank Mehendale & Associates has been engaged as Heritage Consultant through ICB. JMRC has also engaged 3 senior Archaeological Consultants to supervise the excavation of Chhoti Chaupar and Badi Chaupar. These consultants together with JMRC are responsible for maintaining regular communications with communities and stakeholders.	Continuous follow up required.
Improvements in maintenance of records and reporting of interactions and communication with the stakeholders.	Records of the stakeholder and community interactions are being maintained at Contractor, DMRC and JMRC end.	
Extra precaution will need to be taken during tunneling works under the Chandpole gate	JMRC is taking extra precautions. To this end, prior to commencing tunneling under Chandpole gate, under passing scheme has been got proof checked with the help of IIT Delhi. DMRC/CEC has been asked for proof checking of under passing scheme/soil stabilization by Geo Consultant before commencement of	

	tunneling work under Chandpole Gate Tunneling work under Chandpole Gate is expected to commence in the month of July 2015.	

109. Two accidents were reported during the monitoring period. The first accident occurred on 15.04.2015 afternoon at casting yard involving hydra. The second accident happened on 04.05.2015 involving crane at Choti Chouper. Immediate actions were taken to deal with accidents and adequate precautions are being taken to avoid any such accidents in futute.

110. Finally, according to the field observations and investigations it was able to identify that the most of the environmental requirements are being complied with regulations. Actions such as regular follow up with regulatory agencies to get pending permits; mobilization of full time environmental staff from supervision consultant side, and contineous coordination with shopkeepers and tample authorities to relocate the temples and shopsrequired immediate followup.

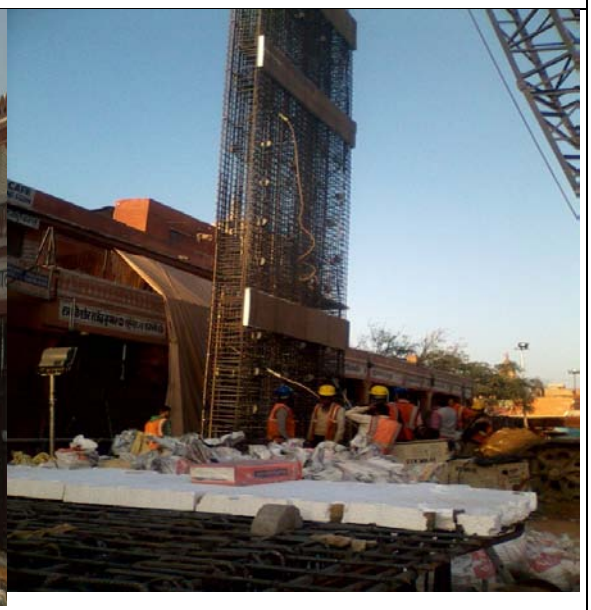
APPENDICES

1. Photolog
2. Record of SHE Training
3. Sample format of Monthly SHE report
4. Environment Quality Monitoring Report
5. Tree Cutting approval
6. Layout Plan of casting yard and labour camp
7. Monthly status report of heritage consultant.
8. Accident Investigation report.
9. License from A&M Department, GoR
10. Application receipt to State Pollution Control Board
11. Photolog of Public Interaction Meetings
12. Sample attendance list of Public Interaction Meetings

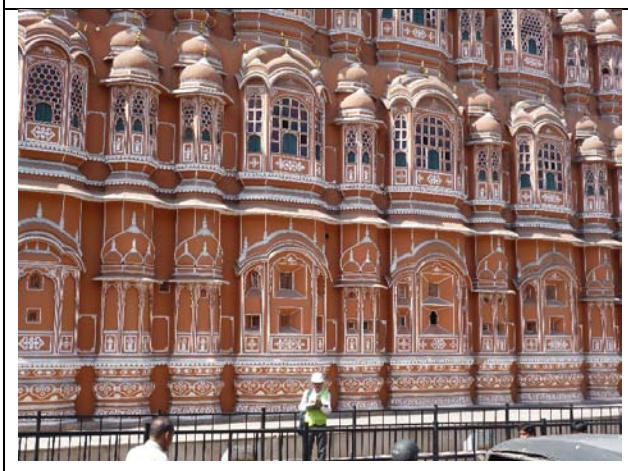
Appendix 1: Photolog of Progress

Roof Slab Febrication at Chhoti Chaupar

D-Wall Grabbling at Chhoti Chaupar

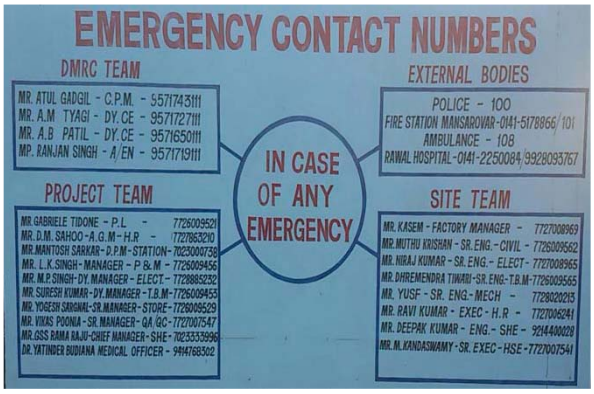


D-Wall Cage at Choti Chauper

	
Monthly SHE Committee meeting held on 13th June 2015	Tilting of TBM-2 at Chandpole Launching Shalft
	
French Collum Excavation at Chhoti Chaupar	Soil Excavation for Top slab at Chhoti Chaupar
	
Noise Monitoring	Air Monitoring Setup

World Environment Day Training Session

96-HoursTraining on Site



Emergency Contact Numbers are displayed at works sites

Color Coded Dustbins on Site

Appendix 2: Record of SHE Trainings

1. Details of SHE training conducted in the month of April, 2015

SN	DATE	LOCATION	TOPIC	No. of person	TRAINING PERIOD
1.	13.04.2015	Casting yard	lifting training	37	1.20 Hrs
2.	04.04.2015	Chandpole	Hot work safety	20	1.05 Hrs
	07.04.2015	Chhoti Chaupar	PPE'S Use & Care	22	1.05 Hrs
3.	09.04.2015	Chandpole	Lifting & Rigging	8	1.15 Hrs
4.	12.04.2015	Chhoti Chaupar	FIRE SAFETY	19	1.05 Hrs
5.	18.04.2015	Chandpole	Power tool & its maintenance	33	1.07 Hrs
6.	21.04.2015	Chandpole	Handling of electrical power tool	15	0.45 Hrs
7.	24.04.2015	Chhoti Chaupar	Dismantling of Hierological structure	13	1.07 Hrs
8.	23.04.2015	Chandpole	Lifting operation	37	1.05 Hrs
9.	17.04.2015		General Environmental Guideline, Sources of Air pollution & mitigation measure	19	1.05 Hrs
10.	24.04.2015	Chandpole	MANUAL MATERIAL HANDLING	19	0.45 Hrs
11.	23.04.2015	Casting yard	Hot work Training	19	1.05 Hrs
12.	28.04.2015	Chandpole	BBS & PPE's	15	1.05 Hrs

2. Details of SHE training conducted in the month of May, 2015

SN	DATE	LOCATION	TOPIC	No. of person	TRAINING PERIOD
1.	05.05.2015	Casting yard	*Safe operation and maintenance of hydra crane*	11	1.20 Hrs
2.	05.05.2015	Casting yard	*Emergency preparedness plan for evacuation {security team}*	11	1.07 Hrs
3.	14.05.2015	Casting yard	*Fire fighting*	17	1.05 Hrs
4.	14.05.2015	Casting yard	*Defensive Driving Training*	12	1.05 Hrs
5.	16.05.2015	Casting yard	*Compress Gas hazard*	44	1.15 Hrs
6.	17.05.2015	Badi Chaupar	Manual Handling	15	1.05 Hrs
7.	19.05.2015	Chandpole	Compress gas	44	1.05 Hrs
8.	20.05.2015	Casting yard	*Right Tool For the Right Job*	53	1.05 Hrs
9.	22.05.2015		General Environmental Guideline, Sources of Air pollution & mitigation measure	08	1.05 Hrs
10.	23.05.2015	Casting yard	*Fall protection and Demonstration on PPE*	24	1.07 Hrs
11	26.05.2015	Chandpole	Safe equipment	11	1.05 Hrs
12.	28.05.2015	Casting yard	*1. Health Dehydration, precaution/Presentation.* *2.First aid treatment in accident case*	56	0.45 Hrs
13.	29.05.2015	Chandpole	Fire Safety	38	0.45 Hrs

3. Details of SHE training conducted in the month of June, 2015

SN	DATE	LOCATION	TOPIC	No. of person	TRAINING PERIOD
1.	05.06.2015	Chandpole	PPE'S	50	1.05 Hrs
2.	05.06.2015	Badi Chaupar	Partha Banerjee	05	1.05 Hrs
3.	04.04.2015	Casting yard	Pre Manson Electrical Safety	22	1.05 Hrs
4.	07.04.2015	Casting yard	Training On Rigging & Lifting Opration	31	1.05 Hrs
5.	09.04.2015	Casting yard	Heat Stress	30	1.15 Hrs
6.	12.06.2015	Chandpole	Power Tools safety	28	1.07 Hrs
7.	13.04.2015	Casting yard	Safe Working on Cutting & Banding Machine	13	1.20 Hrs
8.	17.06.2015	Badi Chaupar	Partha Banerjee &S.K.Dewedi	07	1.05 Hrs
9.	19.05.2015	Chhoti Chaupar	Compress gas	25	0.45 Hrs
10.	19.06.2015	Chandpole	Fire Safety	20	1.20 Hrs
11.	23.06.2015	Chandpole	CPR Training	19	0.45 Hrs
12.	26.06.2015	Chandpole	Hot work safety	18	1.05 Hrs
13.	26.05.2015	Chhoti Chaupar	Safe equipment	10	1.07 Hrs

Appendix 3: Sample format of Monthly SHE report

CONTINENTAL ENGINEERING CORPORATION

MONTHLY SAFETY, HEALTH & ENVIRONMENTAL REPORT JUNE- 2015

DOCUMENT No.RP/JMRC/SHE/UG1B/PHOF/012
Revision =00 .Date 07.07.2015

	PREPARED BY	REVIEWED BY	APPROVED BY
NAME	S.K. Dewedi	GSS Rama Raju	Christopher Mark Cooper
DESIGNATION	Senior Environment Engineer	Chief SHE Manager	Project leader
DATE	06/7/15	7/7/15	7/7/15

DESIGN AND CONSTRUCTION OF TUNNEL BETWEEN CHANDPOLE AND BADI CHOUPER AND REVERSAL LINE BY SHIELD TBM,UNDERGROUND METRO STATION AT CHOTI CHOUPER AND BADI CHOUPER BY CUT & COVER METHOD ON EAST-WEST CORRIDOR OF JAIPUR METRO (PHASE 1B) AT JAIPUR, RAJASTHAN, INDIA

CONTRACT NO: JMRC 1B

Appendix 4: Environment Quality Monitoring Report

JMJMKJ

J.M. EnviroLab Pvt. Ltd. INTERNATIONAL ENVIRONMENTAL RESEARCH AND DEVELOPMENT CENTRE

Environmental, Mineral & Food Testing Laboratory

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E-mail: jmenvirolab@hotmail.com • Website : www.jmenvirolab.com

TEST REPORT

Sample Number	**JME/CEC/A/04**	Report No.	**JME/A/150530004**
Name & Address of Unit	**M/s. Continental Engineering Corporation Plot No. 860, Kesavpura Ajmer Road Bhankrota, Jaipur (Raj.)**	Format No.	**5.10 F-04**
		Party Reference No.	**NIL**
		Reporting Date	**05/06/2015**
Sample Description	**AMBIENT AIR QUALITY MONITORING**	Receipt Date	**30/05/2015**

General Information

Client Representative (Name & Designation)	:	**Mr. Sanjay Dwivedi (Sr. Exe. Env. Engineer)**
Sample Collected by (Name & Designation)	:	**Mr Kamlesh Yadav (Field Coordinator)**
Sampling Location	:	**Badi Chaupar**
Latitude	:	**26°55'22.9" N**
Longitude	:	**75°49'36.3" E**
Instrument Used	:	**RDS**
Instrument Code	:	**JME/RDS/01/06**
Instrument Calibration Status	:	**Calibrated**
Meteorological Condition during monitoring	:	**Clear Sky**
Date of Monitoring	:	**26/05/2015 to 27/05/2015**
Time of Monitoring	:	**10.10 to 07:30**
Actual duration of Monitoring (Minutes)	:	**1085.4**
Ambient Temperature (°C)	:	**Max. 42.9, Min. 28.8**
Surrounding Activity	:	**Human & Vehicular Activities**
Scope of Monitoring	:	**Regulatory Requirement**
Control measures if Any	:	**No**
Sampling & Analysis Protocol	:	**IS-5182**
Parameter Required	:	**TSPM, PM_{10}, NO_2, SO_2 & CO**

TEST RESULTS

S. No.	Parameter	Protocol	Result	Unit	*NAAQS
1	Particulate Matter (PM10)	IS:5182 (P-23), 2006	140.90	µg/m3	100
2	Nitrogen Dioxides (NO2)	IS: 5182 (P-6), 1975 Reaffirmed-1988	34.23	µg/m3	80
3	Sulphur Dioxide (SO2)	IS: 5182 (P-2), 2001	14.76	µg/m3	80
4	Carbon Monoxide (CO)	IS: 5182 (P-10), 1999	0.82	mg/m3	4
5	Total Suspended Particulate Matter (TSPM)	IS: 5182(P-4, 1999)	436.00	µg/m3	--

*NAAQS-National Ambient Air Quality Standards, Schedule-VII [Rule 3(3B)][Part-II Sec.3(i)] 16.11.2009

Tested by

Checked by

Authorized Signatory

Note:

1. This test report has been prepared at your request and test results pertain to the tested sample received.
2. This report is for your reference only and not to be used for any legal purpose.
3. Any discrepancy in the test report or any remarks regarding the test results shall be brought to our knowledge within 7 days of the issue of this report.
4. Total liability or any claim in case of dispute is limited to the invoice raised by the laboratory.
5. The sample will be destroyed after retention time unless otherwise specified.
6. Endorsement of the product tested by the laboratory is neither inferred nor implied.
7. All disputes are subject to exclusive jurisdiction of jaipur court only.

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TEST REPORT

Sample Number	**JME/CEC/A/03**	Report No.	**JME/A/150530003**
Name & Address of Unit	**M/s. Continental Engineering Corporation Plot No. 860, Kesavpura Ajmer Road Bhankrota, Jaipur (Raj.)**	Format No.	**5.10 F-04**
		Party Reference No.	**NIL**
		Reporting Date	**05/06/2015**
Sample Description	**AMBIENT AIR QUALITY MONITORING**	Receipt Date	**30/05/2015**

General Information

Client Representative (Name & Designation)	:	**Mr. Sanjay Dwivedi (Sr. Exe. Env. Engineer)**
Sample Collected by (Name & Designation)	:	**Mr. Kamlesh yadav (Field Coordinator)**
Sampling Location	:	**Chhoti Chaupar**
Latitude	:	**26°55'29.4" N**
Longitude	:	**75°49'04.6" E**
Instrument Used	:	**RDS**
Instrument Code	:	**JME/RDS/01/06**
Instrument Calibration Status	:	**Calibrated**
Meteorological Condition during monitoring	:	**Clear Sky**
Date of Monitoring	:	**27/05/2015 to 28/05/2015**
Time of Monitoring	:	**09:30 to 7.20**
Actual duration of Monitoring (Minutes)	:	**1236.00**
Ambient Temperature (°C)	:	**Max. 43.1, Min. 29.6**
Surrounding Activity	:	**Human, Construction & Vehicular Activities**
Scope of Monitoring	:	**Regulatory Requirement**
Control measures if Any	:	**No**
Sampling & Analysis Protocol	:	**IS-5182**
Parameter Required	:	**TSPM, PM_{10}, NO_2, SO_2 & CO**

TEST RESULTS

S. No.	Parameter	Protocol	Result	Unit	*NAAQS
1	Particulate Matter (PM10)	IS:5182 (P-23), 2006	167.60	µg/m3	100
2	Nitrogen Dioxides (NO2)	IS: 5182 (P-6), 1975 Reaffirmed-1988	39.80	µg/m3	80
3	Sulphur Dioxide (SO2)	IS: 5182 (P-2), 2001	17.68	µg/m3	80
4	Carbon Monoxide (CO)	IS: 5182 (P-10), 1999	0.88	mg/m3	4
5	Total Suspended Particulate Matter (TSPM)	IS: 5182(P-4, 1999)	506.00	µg/m3	--

*NAAQS-National Ambient Air Quality Standards, Schedule-VII [Rule 3(3B)][Part-II Sec.3(i)] 16.11.2009

Tested by

Checked by

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Authorized Signatory

Note:

1. This test report has been prepared at your request and test results pertain to the tested sample received.
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TEST REPORT

Sample Number	**JME/CEC/A/02**	Report No.	**JME/A/150530002**
Name & Address of Unit	**M/s. Continental Engineering Corporation Plot No. 860, Kesavpura Ajmer Road Bhankrota, Jaipur (Raj.)**	Format No.	**5.10 F-04**
		Party Reference No.	**NIL**
		Reporting Date	**05/06/2015**
Sample Description	**AMBIENT AIR QUALITY MONITORING**	Receipt Date	**30/05/2015**

General Information

Client Representative (Name & Designation)	:	**Mr. Sanjay Dwivedi (Sr. Exe. Env. Engineer)**
Sample Collected by (Name & Designation)	:	**Mr. Kamlesh yadav (Field Coordinator)**
Sampling Location	:	**Chandpole Launching Shaft Area**
Latitude	:	**26°55'36.1" N**
Longitude	:	**75°48'27.9" E**
Instrument Used	:	**RDS**
Instrument Code	:	**JME/RDS/01/06**
Instrument Calibration Status	:	**Calibrated**
Meteorological Condition during monitoring	:	**Clear Sky**
Date of Monitoring	:	**28/05/2015 to 29/05/2015**
Time of Monitoring	:	**08.20 to 07.10**
Actual duration of Monitoring (Minutes)	:	**1227.00**
Ambient Temperature (°C)	:	**Max. 42.8 , Min. 29.4**
Surrounding Activity	:	**Human, Construction & Vehicular Activities**
Scope of Monitoring	:	**Regulatory Requirement**
Control measures if Any	:	**No**
Sampling & Analysis Protocol	:	**IS-5182**
Parameter Required	:	**TSPM, PM_{10}, NO_2, SO_2 & CO**

TEST RESULTS

S. No.	Parameter	Protocol	Result	Unit	*NAAQS
1	Particulate Matter (PM10)	IS:5182 (P-23), 2006	123.40	µg/m3	100
2	Nitrogen Dioxides (NO2)	IS: 5182 (P-6), 1975 Reaffirmed-1988	30.98	µg/m3	80
3	Sulphur Dioxide (SO2)	IS: 5182 (P-2), 2001	15.43	µg/m3	80
4	Carbon Monoxide (CO)	IS: 5182 (P-10), 1999	0.67	mg/m3	4
5	Total Suspended Particulate Matter (TSPM)	IS: 5182(P-4, 1999)	389.00	µg/m3	--

*NAAQS-National Ambient Air Quality Standards, Schedule-VII [Rule 3(3B)][Part-II Sec.3(i)] 16.11.2009

Tested by

Checked by

J.M. ENVIROLAB PVT. LTD. INDIA — Authorised Signatory

Authorized Signatory

Note:

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7. All disputes are subject to exclusive jurisdiction of jaipur court only.

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TEST REPORT

Sample Number	**JME/CEC/A/01**	Report No.	**JME/A/150530001**
Name & Address of Unit	**M/s. Continental Engineering Corporation Plot No. 860, Kesavpura Ajmer Road Bhankrota, Jaipur (Raj.)**	Format No.	**5.10 F-04**
		Party Reference No.	**NIL**
		Reporting Date	**05/06/2015**
Sample Description	**AMBIENT AIR QUALITY MONITORING**	Receipt Date	**30/05/2015**

General Information

Client Representative (Name & Designation)	:	**Mr. Sanjay Dwivedi (Sr. Exe. Env. Engineer)**
Sample Collected by (Name & Designation)	:	**Mr. Kamlesh yadav (Field Coordinator)**
Sampling Location	:	**Bhankrota Casting Yard**
Latitude	:	**26°52'27.5" N**
Longitude	:	**75°42'44.3" E**
Instrument Used	:	**RDS**
Instrument Code	:	**JME/RDS/01/06**
Instrument Calibration Status	:	**Calibrated**
Meteorological Condition during monitoring	:	**Clear Sky**
Date of Monitoring	:	**29/05/2015 to 30/05/2015**
Time of Monitoring	:	**09:25 to 07.15**
Actual duration of Monitoring (Minutes)	:	**1312.00**
Ambient Temperature (°C)	:	**Max. 43.0, Min. 30.0**
Surrounding Activity	:	**Human, Construction & Vehicular Activities**
Scope of Monitoring	:	**Regulatory Requirement**
Control measures if Any	:	**No**
Sampling & Analysis Protocol	:	**IS-5182**
Parameter Required	:	**TSPM, PM_{10}, NO_2, SO_2 & CO**

TEST RESULTS

S. No.	Parameter	Protocol	Result	Unit	*NAAQS
1	Particulate Matter (PM10)	IS:5182 (P-23), 2006	138.70	µg/m3	100
2	Nitrogen Dioxides (NO2)	IS: 5182 (P-6), 1975 Reaffirmed-1988	32.23	µg/m3	80
3	Sulphur Dioxide (SO2)	IS: 5182 (P-2), 2001	14.52	µg/m3	80
4	Carbon Monoxide (CO)	IS: 5182 (P-10), 1999	0.71	mg/m3	4
5	Total Suspended Particulate Matter (TSPM)	IS: 5182(P-4, 1999)	418.00	µg/m3	--

*NAAQS-National Ambient Air Quality Standards, Schedule-VII [Rule 3(3B)][Part-II Sec.3(i)] 16.11.2009

Tested by

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Authorized Signatory

Note:

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3. Any discrepancy in the test report or any remarks regarding the test results shall be brought to our knowledge within 7 days of the issue of this report.
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5. The sample will be destroyed after retention time unless otherwise specified.
6. Endorsement of the product tested by the laboratory is neither inferred nor implied.
7. All disputes are subject to exclusive jurisdiction of jaipur court only.

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TEST REPORT

Sample Number:	JME/CEC/AN/08	Report No.	JME/AN/150530008
Name & Address of Party:	M/s. Continental Engineering Corporation Plot No. 860, Kesavpura Ajmer Road Bhankrota, Jaipur (Raj.)	Format No.	5.10 F-04
		Party Reference No.	NIL
		Reporting Date	05/06/2015
Sample Description:	AMBIENT NOISE LEVEL MONITORING	Receipt Date	30/05/2015

General Information

Client Representative (Name & Designation)	:	Mr. Sanjay Dwivedi (Sr. Exe. Env. Engineer)
Sample collected by (Name & Designation)	:	Mr. Manish Jeph (Field Asst.)
Sampling Location	:	Jantar Mantar
Latitude	:	26°55'30.9" N
Longitude	:	75°49'27.6" E
Date of Monitoring	:	26/05/2015 to 27/05/2015
Time of Monitoring	:	06:00 AM to 06:00 AM
Instrument used	:	Sound Level Meter
Instrument code	:	JME/SLM/01/06
Instrument calibration status	:	Calibrated
Meteorological Condition during monitoring	:	Clear Sky
Ambient Temperature (^{0}C)	:	Max. 42.9, Min. 28.8
Surrounding activity	:	Human & Vehicular Activities
Scope Of Monitoring	:	Regulatory Requirement
Control measure if Any	:	No
Protocol used for Monitoring & Analysis	:	IS-9989
Sampling Duration	:	24.0 Hrs.
Parameter Required	:	Hourly Leq

TEST REPORTS

S. No.	Monitoring Time	Result Unit in dB(A)	Monitoring Time	Result Unit in dB(A)
1	06:00	45.16	18:00	59.97
2	07:00	50.06	19:00	58.48
3	08:00	55.71	20:00	52.47
4	09:00	59.21	21:00	47.38
5	10:00	58.68	22:00	42.91
6	11:00	58.78	23:00	41.90
7	12:00	59.67	24:00	41.59
8	13:00	60.01	01:00	41.84
9	14:00	59.48	02:00	42.27
10	15:00	59.88	03:00	41.60
11	16:00	59.90	04:00	43.18
12	17:00	59.93	05:00	45.55
13	Leq day dB(A)	Average	06:00 AM to 10:00 PM	56.55
14	Leq Night dB(A)	Average	10:00 PM to 06:00 AM	42.60

CPCB NOISE STANDARDS

Category of Zones	Leq in dB(A)	
	Day	Night
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone	50	40

1. Day Time is from 6.00 AM to 10.00 PM.
2: Night Time is reckoned between 10.00 PM to 6.00 AM
3. SilenceZone is defined as an area up to 100 m around premises of Hospitals, Educational Institutions and Courts. The silence zones are to be declared by competent authority. Use of vehicle horn, loudspeaker and bursting of crackers is banned in these zones.

Note: Mixed categories of areas be declared as one of the four above mentioned categories by the competent Authority and the corresponding standards shall apply

Tested by

Checked by

Authorized Signatory

Note:

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2. This report is for your reference only and not to be used for any legal purpose.
3. Any discrepancy in the test report or any remarks regarding the test results shall be brought to our knowledge within 7 days of the issue of this report.
4. Total liability or any claim in case of dispute is limited to the invoice raised by the laboratory.
5. The sample will be destroyed after retention time unless otherwise specified.
6. Endorsement of the product tested by the laboratory is neither inferred nor implied.
7. All disputes are subject to exclusive jurisdiction of jaipur court only.

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TEST REPORT

Sample Number:	JME/CEC/AN/07	Report No.	JME/AN/150530007
Name & Address of Party:	M/s. Continental Engineering Corporation Plot No. 860, Kesavpura Ajmer Road Bhankrota, Jaipur (Raj.)	Format No.	5.10 F-04
		Party Reference No.	NIL
		Reporting Date	05/06/2015
Sample Description:	AMBIENT NOISE LEVEL MONITORING	Receipt Date	30/05/2015

General Information

Client Representative (Name & Designation)	:	Mr. Sanjay Dwivedi (Sr. Exe. Env. Engineer)
Sample collected by (Name & Designation)	:	Mr. Kamlesh Yadav (Field Coordinator)
Sampling Location	:	Hawa Mahal
Latitude	:	26°55'26.2" N
Longitude	:	75°49'37.2" E
Date of Monitoring	:	26/05/2015 to 27/05/2015
Time of Monitoring	:	06:00 AM to 06:00 AM
Instrument used	:	Sound Level Meter
Instrument code	:	JME/SLM/01/08
Instrument calibration status	:	Calibrated
Meteorological Condition during monitoring	:	Clear Sky
Ambient Temperature (°C)	:	Max. 42.9, Min. 28.8
Surrounding activity	:	Human & Vehicular Activities
Scope Of Monitoring	:	Regulatory Requirement
Control measure if Any	:	No
Protocol used for Monitoring & Analysis	:	IS-9989
Sampling Duration	:	24.0 Hrs.
Parameter Required	:	Hourly Leq

TEST REPORTS

S. No.	Monitoring Time	Result Unit in dB(A)	Monitoring Time	Result Unit in dB(A)
1	06:00	49.50	18:00	59.98
2	07:00	56.19	19:00	59.16
3	08:00	58.58	20:00	49.96
4	09:00	60.12	21:00	48.03
5	10:00	59.58	22:00	47.69
6	11:00	59.40	23:00	44.27
7	12:00	59.67	24:00	43.60
8	13:00	60.03	01:00	44.31
9	14:00	59.88	02:00	44.26
10	15:00	58.94	03:00	44.24
11	16:00	59.42	04:00	44.52
12	17:00	59.78	05:00	48.35
13	**Leq day dB(A)**	**Average**	**06:00 AM to 10:00 PM**	**57.39**
14	**Leq Night dB(A)**	**Average**	**10:00 PM to 06:00 AM**	**45.15**

CPCB NOISE STANDARDS

Category of Zones	Leq in dB(A)	
	Day	Night
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone	50	40

1. Day Time is from 6.00 AM to 10.00 PM.
2: Night Time is reckoned between 10.00 PM to 6.00 AM
3. SilenceZone is defined as an area up to 100 m around premises of Hospitals, Educational Institutions and Courts. The silence zones are to be declared by competent authority. Use of vehicle horn, loudspeaker and bursting of crackers is banned in these zones.

Note: Mixed categories of areas be declared as one of the four above mentioned categories by the competent Authority and the corresponding standards shall apply

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TEST REPORT

Sample Number:	JME/CEC/AN/06	Report No.	JME/AN/150530006
Name & Address of Party:	M/s. Continental Engineering Corporation Plot No. 860, Kesavpura Ajmer Road Bhankrota, Jaipur (Raj.)	Format No. Party Reference No. Reporting Date	5.10 F-04 NIL 05/06/2015
Sample Description:	AMBIENT NOISE LEVEL MONITORING	Receipt Date	30/05/2015

General Information

Client Representative (Name & Designation)	:	Mr. Sanjay Dwivedi (Sr. Exe. Env. Engineer)
Sample collected by (Name & Designation)	:	Mr. Manish Jeph (Field Asst.)
Sampling Location	:	Krishna Temple
Latitude	:	26°55'27.4" N
Longitude	:	75°49'13.2" E
Date of Monitoring	:	27/05/2015 to 28/05/2015
Time of Monitoring	:	06:00 AM to 06:00 AM
Instrument used	:	Sound Level Meter
Instrument code	:	JME/SLM/01/08
Instrument calibration status	:	Calibrated
Meteorological Condition during monitoring	:	Clear Sky
Ambient Temperature (^{0}C)	:	Max. 43.1, Min. 29.6
Surrounding activity	:	Human & Vehicular Activities
Scope Of Monitoring	:	Regulatory Requirement
Control measure if Any	:	No
Protocol used for Monitoring & Analysis	:	IS-9989
Sampling Duration	:	24.0 Hrs.
Parameter Required	:	Hourly Leq

TEST REPORTS

S. No.	Monitoring Time	Result Unit in dB(A)	Monitoring Time	Result Unit in dB(A)
1	06:00	53.18	18:00	60.85
2	07:00	61.17	19:00	58.35
3	08:00	61.15	20:00	55.16
4	09:00	60.83	21:00	52.62
5	10:00	61.69	22:00	48.08
6	11:00	60.34	23:00	43.76
7	12:00	61.10	24:00	43.17
8	13:00	60.17	01:00	41.97
9	14:00	61.74	02:00	41.20
10	15:00	61.46	03:00	45.67
11	16:00	60.51	04:00	49.21
12	17:00	61.78	05:00	51.01
13	Leq day dB(A)	Average	06:00 AM to 10:00 PM	59.51
14	Leq Night dB(A)	Average	10:00 PM to 06:00 AM	45.51

CPCB NOISE STANDARDS

Category of Zones	Leq in dB(A)	
	Day	Night
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone	50	40

1. Day Time is from 6.00 AM to 10.00 PM.
2. Night Time is reckoned between 10.00 PM to 6.00 AM
3. SilenceZone is defined as an area up to 100 m around premises of Hospitals, Educational Institutions and Courts. The silence zones are to be declared by competent authority. Use of vehicle horn, loudspeaker and bursting of crackers is banned in these zones.

Note: Mixed categories of areas be declared as one of the four above mentioned categories by the competent Authority and the corresponding standards shall apply

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TEST REPORT

Sample Number:	JME/CEC/AN/05	Report No.	JME/AN/150530005
Name & Address of Party:	M/s. Continental Engineering Corporation Plot No. 860, Kesavpura Ajmer Road Bhankrota, Jaipur (Raj.)	Format No.	5.10 F-04
		Party Reference No.	NIL
		Reporting Date	05/06/2015
Sample Description:	AMBIENT NOISE LEVEL MONITORING	Receipt Date	30/05/2015

General Information

Client Representative (Name & Designation)	:	Mr. Sanjay Dwivedi (Sr. Exe. Env. Engineer)
Sample collected by (Name & Designation)	:	Mr. Kamlesh Yadav (Field Coordinator)
Sampling Location	:	Chhoti Chaupar at near By Maharaja School
Latitude	:	26°55'29.4" N
Longitude	:	75°49'04.6" E
Date of Monitoring	:	27/05/2015 to 28/05/2015
Time of Monitoring	:	06:00 AM to 06:00 AM
Instrument used	:	Sound Level Meter
Instrument code	:	JME/SLM/01/06
Instrument calibration status	:	Calibrated
Meteorological Condition during monitoring	:	Clear Sky
Ambient Temperature (^{0}C)	:	Max. 43.1, Min. 29.6
Surrounding activity	:	Human & Vehicular& Machinery Activities
Scope Of Monitoring	:	Regulatory Requirement
Control measure if Any	:	No
Protocol used for Monitoring & Analysis	:	IS-9989
Sampling Duration	:	24.0 Hrs.
Parameter Required	:	Hourly Leq

TEST REPORTS

S. No.	Monitoring Time	Result Unit in dB(A)	Monitoring Time	Result Unit in dB(A)
1	06:00	54.20	18:00	66.48
2	07:00	58.84	19:00	59.88
3	08:00	63.86	20:00	53.07
4	09:00	67.46	21:00	50.64
5	10:00	66.79	22:00	50.20
6	11:00	63.87	23:00	51.82
7	12:00	68.25	24:00	49.60
8	13:00	65.99	01:00	48.14
9	14:00	65.15	02:00	47.12
10	15:00	66.49	03:00	51.24
11	16:00	68.26	04:00	52.21
12	17:00	68.54	05:00	53.87
13	Leq day dB(A)	Average	06:00 AM to 10:00 PM	62.99
14	Leq Night dB(A)	Average	10:00 PM to 06:00 AM	50.53

CPCB NOISE STANDARDS

Category of Zones	Leq in dB(A)	
	Day	Night
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone	50	40

1. Day Time is from 6.00 AM to 10.00 PM.
2: Night Time is reckoned between 10.00 PM to 6.00 AM
3. SilenceZone is defined as an area up to 100 m around premises of Hospitals, Educational Institutions and Courts. The silence zones are to be declared by competent authority. Use of vehicle horn, loudspeaker and bursting of crackers is banned in these zones.

Note: Mixed categories of areas be declared as one of the four above mentioned categories by the competent Authority and the corresponding standards shall apply

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TEST REPORT

Sample Number:	JME/CEC/AN/04	Report No.	JME/AN/150530004
Name & Address of Party:	M/s. Continental Engineering Corporation Plot No. 860, Kesavpura Ajmer Road Bhankrota, Jaipur (Raj.)	Format No.	5.10 F-04
		Party Reference No.	NIL
		Reporting Date	05/06/2015
Sample Description:	AMBIENT NOISE LEVEL MONITORING	Receipt Date	30/05/2015

General Information

Client Representative (Name & Designation)	: Mr. Sanjay Dwivedi (Sr. Exe. Env. Engineer)
Sample collected by (Name & Designation)	: Mr. Kamlesh Yadav (Field Coordinator)
Sampling Location	: Pinkcity Hospital
Latitude	: 26°55'30.3" N
Longitude	: 75°48'41.3" E
Date of Monitoring	: 28/05/2015 to 29/05/2015
Time of Monitoring	: 06:00 AM to 06:00 AM
Instrument used	: Sound Level Meter
Instrument code	: JME/SLM/01/08
Instrument calibration status	: Calibrated
Meteorological Condition during monitoring	: Cloudy Sky
Ambient Temperature (^{0}C)	: Max. 42.8, Min. 29.4
Surrounding activity	: Human & Vehicular Activities
Scope Of Monitoring	: Regulatory Requirement
Control measure if Any	: No
Protocol used for Monitoring & Analysis	: IS-9989
Sampling Duration	: 24.0 Hrs.
Parameter Required	: Hourly Leq

TEST REPORTS

S. No.	Monitoring Time	Result Unit in dB(A)	Monitoring Time	Result Unit in dB(A)
1	06:00	53.37	18:00	62.03
2	07:00	60.23	19:00	61.18
3	08:00	60.93	20:00	57.98
4	09:00	62.80	21:00	56.14
5	10:00	62.09	22:00	50.83
6	11:00	63.35	23:00	45.77
7	12:00	62.14	24:00	44.63
8	13:00	62.37	01:00	42.82
9	14:00	62.83	02:00	41.53
10	15:00	62.01	03:00	45.05
11	16:00	62.68	04:00	47.68
12	17:00	61.97	05:00	49.62
13	**Leq day dB(A)**	**Average**	**06:00 AM to 10:00 PM**	**60.88**
14	**Leq Night dB(A)**	**Average**	**10:00 PM to 06:00 AM**	**45.49**

CPCB NOISE STANDARDS

Category of Zones	Leq in dB(A)	
	Day	Night
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone	50	40

1. Day Time is from 6.00 AM to 10.00 PM.
2. Night Time is reckoned between 10.00 PM to 6.00 AM
3. SilenceZone is defined as an area up to 100 m around premises of Hospitals, Educational Institutions and Courts. The silence zones are to be declared by competent authority. Use of vehicle horn, loudspeaker and bursting of crackers is banned in these zones.

Note: Mixed categories of areas be declared as one of the four above mentioned categories by the competent Authority and the corresponding standards shall apply

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TEST REPORT

Sample Number:	JME/CEC/AN/03	Report No.	JME/AN/150530003
Name & Address of Party:	M/s. Continental Engineering Corporation Plot No. 860, Kesavpura Ajmer Road Bhankrota, Jaipur (Raj.)	Format No.	5.10 F-04
		Party Reference No.	NIL
		Reporting Date	05/06/2015
Sample Description:	AMBIENT NOISE LEVEL MONITORING	Receipt Date	30/05/2015

General Information

Client Representative (Name & Designation)	:	Mr. Sanjay Dwivedi (Sr. Exe. Env. Engineer)
Sample collected by (Name & Designation)	:	Mr. Manish Jeph (Field Assit.)
Sampling Location	:	Chaudhary Hospital
Latitude	:	26°55'41.6" N
Longitude	:	75°48'40.0" E
Date of Monitoring	:	28/05/2015 to 29/05/2015
Time of Monitoring	:	06:00 AM to 06:00 AM
Instrument used	:	Sound Level Meter
Instrument code	:	JME/SLM/01/08
Instrument calibration status	:	Calibrated
Meteorological Condition during monitoring	:	Cloudy Sky
Ambient Temperature (^{0}C)	:	Max. 42.8 Min. 29.4
Surrounding activity	:	Human &Vehicular Activities
Scope Of Monitoring	:	Regulatory Requirement
Control measure if Any	:	No
Protocol used for Monitoring & Analysis	:	IS-9989
Sampling Duration	:	24.0 Hrs.
Parameter Required	:	Hourly Leq

TEST REPORTS

S. No.	Monitoring Time	Result Unit in dB(A)	Monitoring Time	Result Unit in dB(A)
1	06:00	52.55	18:00	61.48
2	07:00	59.81	19:00	59.94
3	08:00	62.21	20:00	60.12
4	09:00	61.62	21:00	52.26
5	10:00	61.73	22:00	49.83
6	11:00	61.16	23:00	42.21
7	12:00	61.12	24:00	42.22
8	13:00	61.10	01:00	42.08
9	14:00	62.19	02:00	42.25
10	15:00	61.27	03:00	43.84
11	16:00	61.27	04:00	45.89
12	17:00	60.99	05:00	48.70
13	Leq day dB(A)	Average	06:00 AM to 10:00 PM	60.05
14	Leq Night dB(A)	Average	10:00 PM to 06:00 AM	44.63

CPCB NOISE STANDARDS

Category of Zones	Leq in dB(A)	
	Day	Night
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone	50	40

1. Day Time is from 6.00 AM to 10.00 PM.
2: Night Time is reckoned between 10.00 PM to 6.00 AM
3. SilenceZone is defined as an area up to 100 m around premises of Hospitals, Educational Institutions and Courts. The silence zones are to be declared by competent authority. Use of vehicle horn, loudspeaker and bursting of crackers is banned in these zones.

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TEST REPORT

Sample Number:	JME/CEC/AN/02	Report No.	JME/AN/150530002
Name & Address of Party:	M/s. Continental Engineering Corporation Plot No. 860, Kesavpura Ajmer Road Bhankrota, Jaipur (Raj.)	Format No.	5.10 F-04
		Party Reference No.	NIL
		Reporting Date	05/06/2015
Sample Description:	AMBIENT NOISE LEVEL MONITORING	Receipt Date	30/05/2015

General Information

Client Representative (Name & Designation)	: Mr. Sanjay Dwivedi (Sr. Exe. Env. Engineer)
Sample collected by (Name & Designation)	: Mr. Kamlesh Yadav (Field Coordinator)
Sampling Location	: Chandpole Launching Shaft Area
Latitude	: 26°55'36.1" N
Longitude	: 75°48'27.9" E
Date of Monitoring	: 28/05/2015 to 29/05/2015
Time of Monitoring	: 06:00 AM to 06:00 AM
Instrument used	: Sound Level Meter
Instrument code	: JME/SLM/01/06
Instrument calibration status	: Calibrated
Meteorological Condition during monitoring	: Cloudy Sky
Ambient Temperature (°C)	: Max. 42.8, Min. 29.4
Surrounding activity	: Vehicular & Heavy Machinery Activities
Scope Of Monitoring	: Regulatory Requirement
Control measure if Any	: No
Protocol used for Monitoring & Analysis	: IS-9989
Sampling Duration	: 24.0 Hrs.
Parameter Required	: Hourly Leq

TEST REPORTS

S. No.	Monitoring Time	Result Unit in dB(A)	Monitoring Time	Result Unit in dB(A)
1	06:00	52.06	18:00	62.86
2	07:00	54.92	19:00	60.29
3	08:00	61.48	20:00	56.71
4	09:00	64.98	21:00	50.97
5	10:00	62.79	22:00	52.98
6	11:00	64.71	23:00	50.81
7	12:00	66.45	24:00	50.05
8	13:00	63.93	01:00	49.02
9	14:00	61.02	02:00	47.91
10	15:00	66.80	03:00	48.12
11	16:00	66.67	04:00	50.76
12	17:00	65.92	05:00	51.53
13	Leq day dB(A)	Average	06:00 AM to 10:00 PM	61.41
14	Leq Night dB(A)	Average	10:00 PM to 06:00 AM	50.15

CPCB NOISE STANDARDS

Category of Zones	Leq in dB(A)	
	Day	Night
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone	50	40

1. Day Time is from 6.00 AM to 10.00 PM.
2: Night Time is reckoned between 10.00 PM to 6.00 AM
3. SilenceZone is defined as an area up to 100 m around premises of Hospitals, Educational Institutions and Courts. The silence zones are to be declared by competent authority. Use of vehicle horn, loudspeaker and bursting of crackers is banned in these zones.

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5. The sample will be destroyed after retention time unless otherwise specified.
6. Endorsement of the product tested by the laboratory is neither inferred nor implied.
7. All disputes are subject to exclusive jurisdiction of jaipur court only.

NABCB QM 002

J.M. EnviroLab Pvt. Ltd.

INTERNATIONAL ENVIRONMENTAL RESEARCH AND DEVELOPMENT CENTRE

Environmental, Mineral & Food Testing Laboratory

Accredited from MoEF-EPA (Govt. of India), NABL, MSME, NSIC, ISO 9001 : 2008, ISO 14001 : 2004 & OHSAS 18001 : 2007

SCO-16, Sector-10A, Gurgaon-122 001 (Haryana) INDIA • TEL.: +91-124-4873400 • FAX: +91-124-4141029

E-mail: jmenvirolab@hotmail.com • Website : www.jmenvirolab.com

TEST REPORT

Sample Number:	JME/CEC/AN/01	Report No.	JME/AN/150530001
Name & Address of Party:	M/s. Continental Engineering Corporation Plot No. 860, Kesavpura Ajmer Road Bhankrota, Jaipur (Raj.)	Format No.	5.10 F-04
		Party Reference No.	NIL
		Reporting Date	05/06/2015
Sample Description:	AMBIENT NOISE LEVEL MONITORING	Receipt Date	30/05/2015

General Information

Client Representative (Name & Designation)	:	Mr. Sanjay Dwivedi (Sr. Exe. Env. Engineer)
Sample collected by (Name & Designation)	:	Mr. Kamlesh yadav (Field Coordinator)
Sampling Location	:	Bhankrota Casting Yard
Latitude	:	26°52'27.5" N
Longitude	:	75°42'44.3" E
Date of Monitoring	:	29/05/2015 to 30/05/2015
Time of Monitoring	:	06:00 AM to 06:00 AM
Instrument used	:	Sound Level Meter
Instrument code	:	JME/SLM/01/08
Instrument calibration status	:	Calibrated
Meteorological Condition during monitoring	:	Cloudy Sky
Ambient Temperature (^{0}C)	:	Max. 43.0, Min. 30.0
Surrounding activity	:	Human ,Vehicular & Construction Activities
Scope Of Monitoring	:	Regulatory Requirement
Control measure if Any	:	No
Protocol used for Monitoring & Analysis	:	IS-9989
Sampling Duration	:	24.0 Hrs.
Parameter Required	:	Hourly Leq

TEST REPORTS

S. No.	Monitoring Time	Result Unit in dB(A)	Monitoring Time	Result Unit in dB(A)
1	06:00	58.59	18:00	62.67
2	07:00	60.33	19:00	58.67
3	08:00	61.57	20:00	56.02
4	09:00	61.94	21:00	54.94
5	10:00	64.26	22:00	51.30
6	11:00	61.04	23:00	49.58
7	12:00	63.27	24:00	50.35
8	13:00	59.83	01:00	49.62
9	14:00	60.45	02:00	47.93
10	15:00	65.26	03:00	47.85
11	16:00	64.20	04:00	51.88
12	17:00	64.79	05:00	55.19
13	Leq day dB(A)	Average	06:00 AM to 10:00 PM	61.11
14	Leq Night dB(A)	Average	10:00 PM to 06:00 AM	50.46

CPCB NOISE STANDARDS

Category of Zones	Leq in dB(A)	
	Day	Night
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone	50	40

1. Day Time is from 6.00 AM to 10.00 PM.
2: Night Time is reckoned between 10.00 PM to 6.00 AM
3. SilenceZone is defined as an area up to 100 m around premises of Hospitals, Educational Institutions and Courts. The silence zones are to be declared by competent authority. Use of vehicle horn, loudspeaker and bursting of crackers is banned in these zones.

Note: Mixed categories of areas be declared as one of the four above mentioned categories by the competent Authority and the corresponding standards shall apply

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Tested by Checked by Authorized Signatory

TÜV NABCB QM 002

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JMJMKJ

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E-mail: jmenvirolab@hotmail.com • Website : www.jmenvirolab.com

TEST REPORT

Sample Number:	JME/JMRC/W/01	Report No.:	JME/W/150530002
Name & Address of Party:	M/s. Continental Engineering Corporation Plot No. 860, Kesavpura Ajmer Road Bhankrota, Jaipur (Raj.)	Format No.:	5.10 F-01
		Party Reference No.:	NIL
Sample Description:	WATER (One water sample from Borewell)	Reporting Date :	05/06/2015
Sampling Location :	Chandpole launching area	Receipt Date	30/05/2015
Client Representative (Name & Designation) :	Mr. Sanjay Dwivedi (Sr. Exe. Env. Engineer)	Sampling Date :	29/05/2015
Sample collected by (Name & Designation) :	Mr. Kamlesh Kumar yadav (Field Coordinator)	Type of Sampling :	Grab
Latitude:	26°55'36.9" N	Preservation :	Refrigerated
Longitude :	75°48'27.4" E	Sample Quantity:	2.0 Ltr.
Sampling & Analysis Protocol:	IS-10500, APHA 22nd Edition 2012	Parameter Required :	As per work Order

TEST REPORTS

S. No.	Parameter	Protocol	Result	Unit	Limits of IS: 10500-2012	
					Desirable Limit (Max)	Permissible Limit in the Absence of Alternate Source (Max)
1	pH (at 25°C)	APHA 22nd Edition, 4500-H+B	7.87	-	6.5 to 8.5	No Relaxation
2	Turbidity	APHA 22nd Edition,2130(B)	2.0	NTU	1	5
3	Total Dissolved Solids	APHA 22nd Edition, 2540 C	1128.00	mg/l	500	2000
4	Total Suspended Solid	APHA 22nd Edition,2540 D	1.80	mg/l	--	--
5	Oil and Grease	APHA 22nd Edition, 5520, E	BDL (DL 0.40 mg/l)	mg/l	--	--
6	Dissolve oxygen	APHA 22nd Edition, 4500, OB	5.10	mg/l	--	--
7	Conductivity	APHA 22nd Edition, 2150 B	1709.00	µs/cm	--	--

*BDL-Below Detection Limit, *DL-Detectable Level

Tested by

Checked by

Authorized Signatory

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TEST REPORT

Sample Number:	JME/JMRC/W/02	Report No.:	JME/W/150530003
Name & Address of Party:	M/s. Continental Engineering Corporation Plot No. 860, Kesavpura Ajmer Road Bhankrota, Jaipur (Raj.)	Format No.:	5.10 F-01
		Party Reference No.:	NIL
Sample Description:	WATER (One water sample from Borewell)	Reporting Date :	05/06/2015
Sampling Location :	Bhankrota Casting Yard	Receipt Date	30/05/2015
Client Representative (Name & Designation) :	Mr. Sanjay Dwivedi (Sr. Exe. Env. Engineer)	Sampling Date :	29/05/2015
Sample collected by (Name & Designation) :	Mr. Kamlesh Kumar yadav (Field Coordinator)	Type of Sampling :	Grab
Latitude:	26°52'21.0" N	Preservation :	Refrigerated
Longitude :	75°42'51.8" E	Sample Quantity:	2.0 Ltr.
Sampling & Analysis Protocol:	IS-10500, APHA 22nd Edition 2012	Parameter Required :	As per work Order

TEST REPORTS

S. No.	Parameter	Protocol	Result	Unit	Limits of IS: 10500-2012	
					Desirable Limit (Max)	Permissible Limit in the Absence of Alternate Source (Max)
1	pH (at 25°C)	APHA 22nd Edition, 4500-H+B	8.09	-	6.5 to 8.5	No Relaxation
2	Turbidity	APHA 22nd Edition,2130(B)	1.0	NTU	1	5
3	Total Dissolved Solids	APHA 22nd Edition, 2540 C	635.00	mg/l	500	2000
4	Total Suspended Solid	APHA 22nd Edition,2540 D	1.40	mg/l	--	--
5	Oil and Grease	APHA 22nd Edition, 5520, E	BDL (DL 0.40 mg/l)	mg/l	--	--
6	Dissolve oxygen	APHA 22nd Edition, 4500, OB	5.40	mg/l	--	--
7	Conductivity	APHA 22nd Edition, 2150 B	920.00	µs/cm	--	--

*BDL-Below Detection Limit, *DL-Detectable Level

Tested by

Checked by

J.M. ENVIROLAB PVT. LTD. Authorised Signatory

Authorized Signatory

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TUV NABCB QM 002

Appendix 5: Approval for Tree Cutting

ED(C)

कार्यालय जिला कलेक्टर एवम् जिला मजिस्ट्रेट, जयपुर
www.jaipur.nic.in

क्रमांकः आर–1( )14/पेड/2697 दिनांकः 24-4-15

निदेशक (प्रोजेक्ट)
जयपुर मेट्रो रेल कॉरपोरेशन लि0
जयपुर।

विषयः– जयपुर मेट्रो के फेज प्रथम बी में आ रहे पेडों को काटने/पुर्नरोपण की स्वीकृति के संबंध में।
प्रसंगः– आपका पत्र क्रमांकः एफ.7 (C-55)JMRC/Tree-1B/2013-14/1907 दिनांकः 04.03.2015 के संबंध में।

उपयुक्त विषयान्तर्गत प्रासंगिक पत्र द्वारा जयपुर मेट्रो रेल के फेज प्रथम बी योजना में छोटी चौपड पर निर्माण में बाधित 20 पेडों को काटने/पुर्नरोपण की अनुमति के संबंध में तहसीलदार जयपुर से रिपोर्ट प्राप्त की गई। जिसके अनुसार निर्माण में बाधित 35 पेडों को काटने/शिफ्ट करने की अनुमति दिया जाना उचित बताया गया है।

अतः निर्देशानुसार तहसीलदार जयपुर की रिपोर्ट अनुसार जयपुर मेट्रो रेल के फेज प्रथम बी योजना में छोटी चौपड पर निर्माण में बाधित 20 पेडों को काटने/पुर्नरोपण की अनुमति इस शर्त पर दी जाती है कि काटे/शिफ्ट किये जाने वाले 20 पेडों की एवज में उपर्युक्त स्थल पर 20X5=100 पेड लगाये जावेगें तथा काटे गये पेड की लकडी की नीलामी से प्राप्त राशि संबंधित तहसील कार्यालय में भू–राजस्व 0029 मद में जमा कराया जावेगा।

JAIPUR METRO RAIL CORPORATION * JAIPUR * Receipt No. 2360 Date 28/4/15

(राजीव जैन)
अति0 कलक्टर –प्रथम,
प्रभारी अधिकारी राजस्व शाखा,
जयपुर

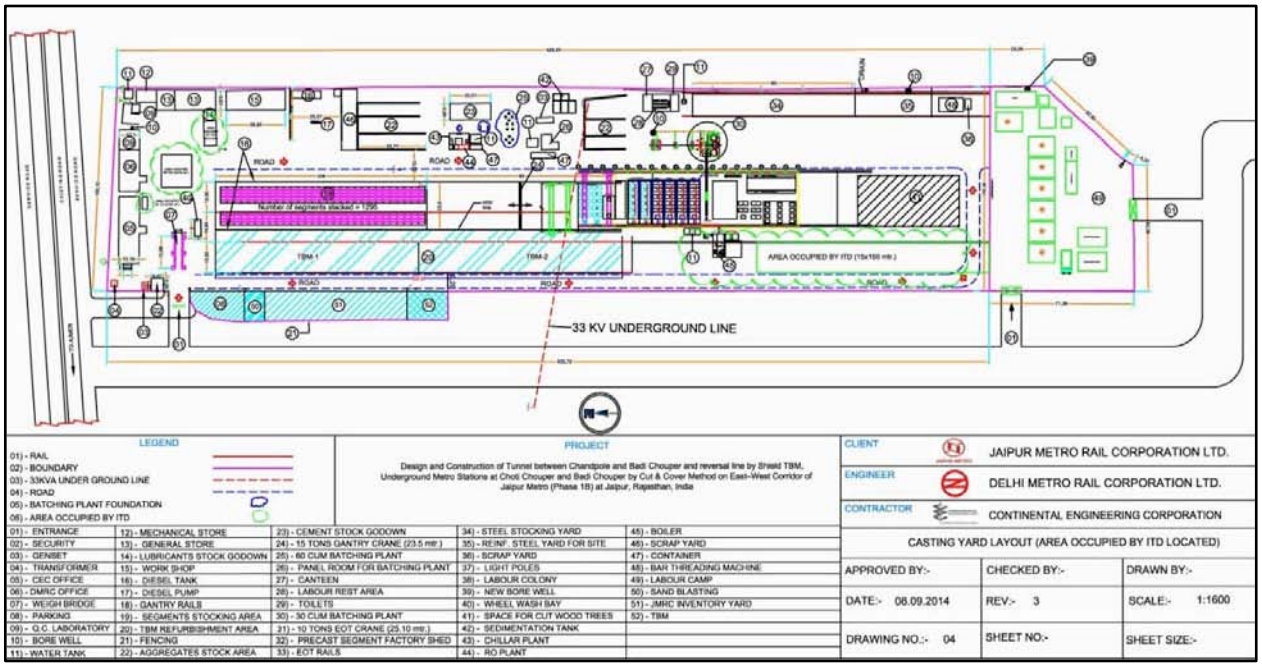
क्रमांकः आर–1( )15/पेड/ दिनांकः
प्रतिलिपिः– तहसीलदार जयपुर को उनके पत्र क्रमांकः आरए/2015/166 दिनांकः 09.04.2015 के सन्दर्भ में उपरोक्तानुसार पालना हेतु प्रेषित है।

(राजीव जैन)
अति0 कलक्टर –प्रथम,
प्रभारी अधिकारी राजस्व शाखा,
जयपुर

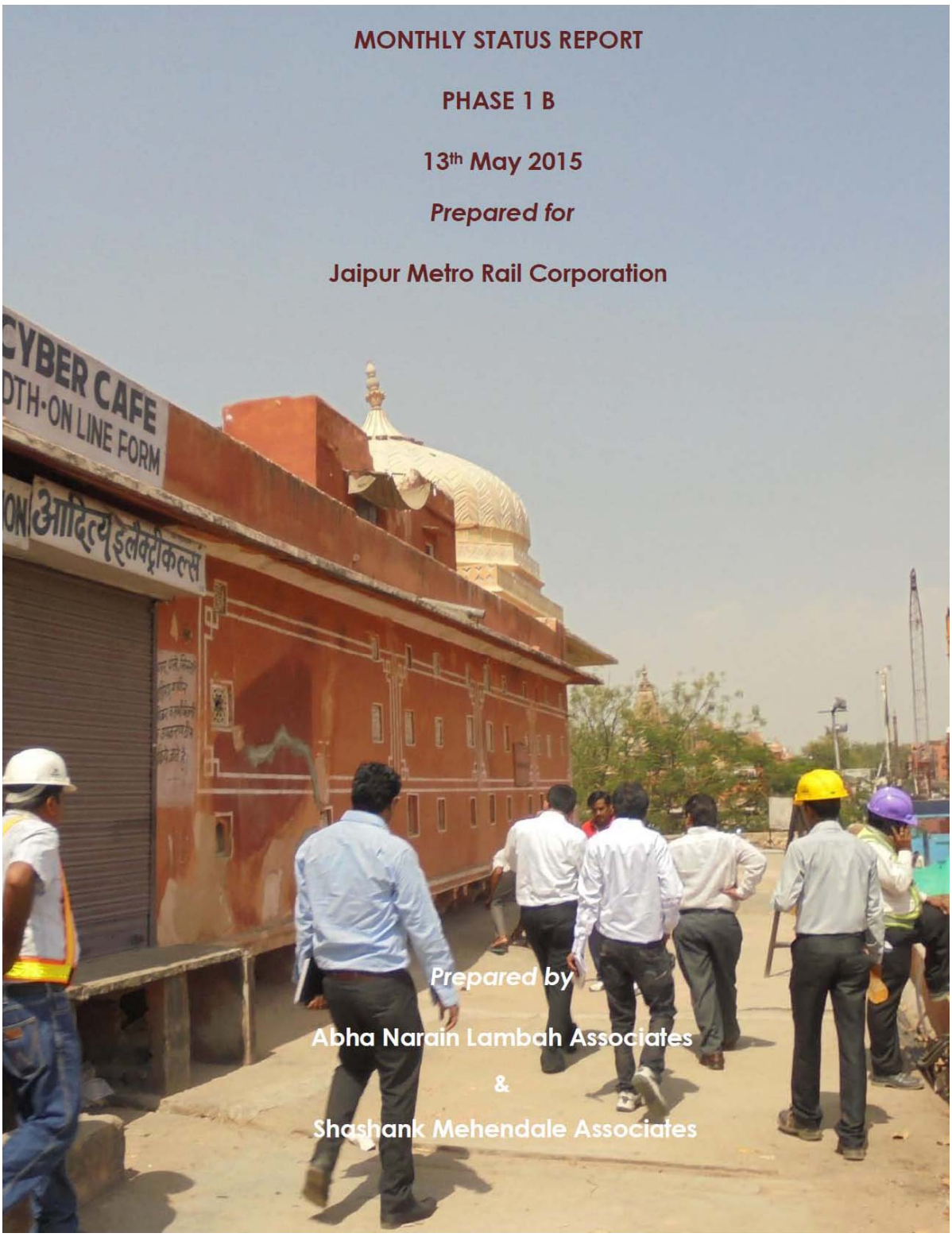
DP/R/4535 29/4/15

☎ 0141-2209001(O) 0141-2209000(Fax) Email:- dm-jaip-rj@nic.in

Appendix 6: Layout Plan of casting yard and labour camp



Appendix-7: Monthly status report by Heritage Consultant



Architectural Report:

1st May 2015 – 30th May 2015

Site Visit to inspect shop 374 – 376 above Naval Kishor Temple near Tripolia Bazar at Chandpol launching shaft, by Key Experts and Non Key Experts were made in this month with JMRC, DMRC and CEC experts convened on 13th May 2015.

Key Experts Visits

Krishna Iyer

13th May 2015 - Site visit with JMRC, DMRC and CEC to inspect the above

Non Key Experts

Mr. Shashank Mehendale

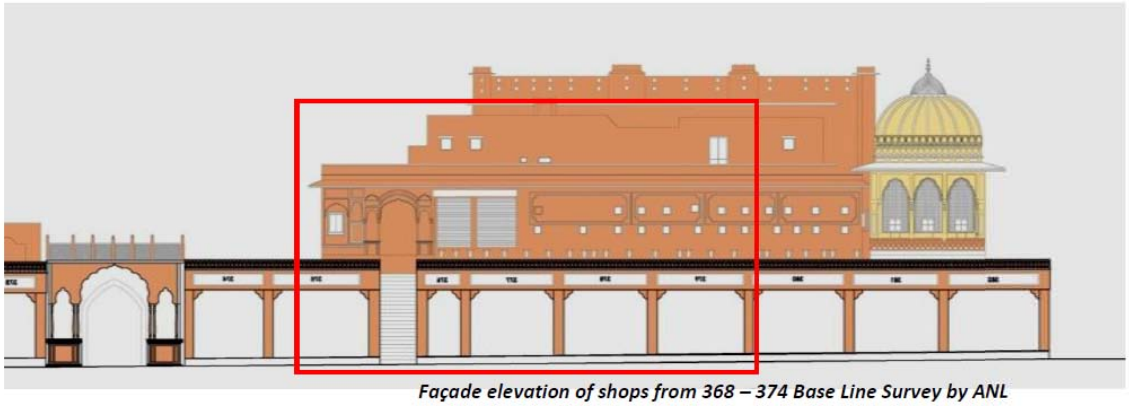
13th May 2015 - Site visit with JMRC, DMRC and CEC to inspect the above

Mr. Sanjay Takekar,

13th May 2015 – Site visit with JMRC, DMRC and CEC to inspect the above

13th May 2015- Site Visit with JMRC, DMRC and CEC to inspect shop 374 – 376 above Naval Kishor Temple at Tripolia bazar near Chanpol Launching shaft

A site visit was made to inspect the shops 374 – 376 above Naval Kishor Temple due to a crane toppling incident on 7th May 2015 and hence a site visit was called upon by JMRC.



Façade elevation of shops from 368 – 374 Base Line Survey by ANL

Changes or new Impacts: It was observed that a parapet wall was damaged due the falling of the crane above shop no 374-376 near Naval Kishor Temple. A portion of the masonry parapet wall was damaged causing cracks on the 1st floor walls of the Naval Kishor Temple.

Recommendation was to prop the structure extensively and monitor the cracks periodically. Mapping of cracks, recording its length and width with dates was also recommended. New crack meters and tilt meters were recommended on the above cracks to observe the manner of the cracks.

Passive cracks were also found during the base line survey by ANLA-SMA indicating possible settlement of the above location due to loosening of soil due to a possible water acitivity below ground level.

Seperation cracks were also observed which indicate tilt and seperation of the wall elements.

Photographs of damaged parapet wall above shops 374 - 376 next to Naval Kishor Temple

Chance finds: Fortunately, no Archeological or any historic elements were damaged during the incident.

Activities on preservation and restoration of heritage structures: Remedial measures such as installing crack meters, recording crack lengths and widths at all crack locations were taken care of within the inner portion of the walls.

The verandah portion, due to its precarious condition requires careful dismantling and reinstalling or reconstruction. For now, the verandahs are been propped well using ant propping system. Seperation cracks that have occurred and caused seperation between the walls, monitoring of such cracks using tilt monitors have been executed.

Most of the passive cracks or new develped cracks due to impact of boom, those cracks were recommended to be monitored for atleast 7 days to identify these passive cracks and these cracks be attended by using staples, helibars, grouting and crack filling.

It has also been observed that cracks have developed on the walls of the 1st of the first floor atop the beam. It was recommended that the beams be strenghtened by installing steel RSJs on either sides of the beam. Simaltaneusly the ground walls would be required to be strenghtened as well as repaired before starting repairs to the beams.

Active monitoring of these cracks have been undertaken by representatives of CEC and noted down and forwarded to JMRC and ANLA-SMA.

Photographs of reconstruction of tripolia bazar verandah of shops from 370-374

Photographs of monitoring of cracks; development of new cracks on the inner portion of the Naval Kishor Temple due to settlement or impact of crane boom over the masonry; repairs to the upper parapet been executed; propping of

MONTHLY STATUS REPORT

PHASE 1 B

18th – 19th June 2015

Prepared for

Jaipur Metro Rail Corporation

Prepared by

Abha Narain Lambah Associates

&

Shashank Mehendale Associates

Architectural Report:

1st June 2015 – 1st July 2015

Site visit by Key Experts and Non Key Experts were made in this month for ADB Mission on Environment Safegaurd with JMRC, DMRC and CEC along with ADB representatives convened on 18th June and 19th June 2015.

Key Experts Visits

Krishna Iyer

18th June 2015	- Site visit from Chandpol to Badi Chaupar with ADB, JMRC, DMRC, CEC team
19th June 2015	- To attend meeting on Environment & Social safeguard with ADB, JMRC, DMRC and CEC

Non Key Experts

Mr. Jayesh Malankar

19th June 2015	- To attend meeting on Environment & Social safeguard with ADB, JMRC, DMRC and CEC

18th June 2015 - Site visit with Chandpol to Badi Chaupar ADB, JMRC, DMRC and CEC

19th june 2015 - Meeting on environmental & Social safeguard with ADB, JMRC, DMRC and CEC

Summary: The 2nd shaft prepared for the TBM to initiate has been prepared and the tunneling works have begun. The tunneling from Choti Chaupar has reached upto 3 mts.

This will pass under the Chandpole Gate and the exact time for the same needs to be made known to the consutants to be able to monitor any vibration/movement in the gate above when the TBM will pass under it.

The entire tunneling is to reach Chandpol gate within 1.5 to 2 months.

Chances or new impacts from baseline conditions: A re-valuation for the structural unstability of the shops along chandpol launching site towards chandpol gate to Choti Chaupar was conducted by the Structural Consultants. Out of the 14 shops submitted by the structural consultants, the list have been revaluated to 22 number of shops. Preventive measures like propping of the verandahs and the shops along the above length have been taken care by CEC representatives.

The seven temples that were dismantled along the Choti Chaupar have been shifted to Old Attish Marg and shrines have been built in consultation with the local priests by JMRC representatives.

Right: Picture showing the construction of the D- Wall at Choti Chaupad

The ADB representatives were adviced that the both the chaupars would be developed as a pedestrian plaza or a square with cultural activities during the day and evening. The historic layering for the Badi chaupar is of the 19th century, thus freezing the period layering and developed as a plaza, while the Choti chaupad was excavted upto 18th century historic layering, thus freezing the historic layering and again will be developed as a pedestrian square with cultural activities.

There has been no new chance findings or archeological findings after the exposing of the tunnels and the historic steps in the Choti Chaupad.

Photographs of excavation and restoration process been undertaken for Badi and Choti Chaupars

Activities on preservation and restoration of heritage structures: Presently no preservation or restoration of the heritage structures is underway. The excavations of Badi and Choti Chaupars have bought out the historic layering and identified the periods for both the tanks.

Structural propping of shops and adequate structural strenghtening of shops and verandahs are currently underway.

It was also noted that for chandpol gate, additional structural support system will have to be provided while tunneling underneath the gate by structural consultants SMA. JMRC representatives have approached the State Archeology Department Jaipur circle for permission to carry out excavations under the chandpol gate. CEC representatives had approached IIT as consultants to review the structural inputs provided by the consultants. After approval from IIT and submission of their report, the State Archeological Department has given permission to carry out activities to the JMRC officials. However the structural consultants – SMA have advised and instructed that the grouting process be carried out by proper channeling and licensing firms.

DELHI METRO RAIL CORPORATION

DANGEROUS OCCURENCE INVESTIGATION REPORT

04.05.2015

CONTRACT: UG – 1B

CHHOTI CHAUPAR: TRIPOLIA SIDE

M/s CONTINENTAL ENGINEERING CORPORATION LIMITED

(JAIPUR METRO PROJECT)

TABLE OF CONTENTS

PARTICULARS OF DANGEROUS OCCURENCE

1. **Particulars of Contractor**

Main Contractor	:M/s Continental Engineering Corporation Limited (UG – 1B)
Sub – Contractor	:M/s D Thakker Constriction Pvt. Ltd.

2. **Date, Time & Location**

Location	:	Chhoti Chauper, Tripolia Side, Jaipur
Date	:	Monday, 04th May, 2015
Time	:	01:15 hrs

3. **Activity being performed**

Lowering of cage for Diaphragm Wall (D-Wall) panel DW - 41 with the help of Crawler Crane (TATA TFC - 280)

DANGEROUS OCCURENCE REPORT

DANGEROUS OCCURENCE REPORT

1.0 THE INCIDENT

Construction of D wall panel DW - 41 was in progress. Lowering of cage was being done using TFC 280 crane. A cage weighing 3 tons approx had already been lowered in excavated panel and was rested over the support beams. The work was carried out during the day shift without any concerns.

Balance cage lifting and lowering was undertaken by the night shift starting from 2000 hrs. At around 2300 hrs, the balance cage weighing around 16 tons was hoisted, aligned and supported over the previously lowered cage and necessary welding and connecting works were carried out.

After completion of connecting the two cages, lowering of combined D-wall cage was done at around 00.45 hrs. It has been reported that at 01.10 hrs while the cage was almost lowered, the wire rope holding the boom snapped and boom started to descend. It fell over nearby public property; Haveli no 98, Shop no(s) 377-378. The boom got bent at two locations where it rested on building structures.

Immediately the site team evaluated the situation and informed to Senior Project persons. The first priority was to assess any human injury and medical assistance required. It was noted that only a part of structure got damaged and no human injury had occurred.

Immediately the crane available on site was utilized to retrieve the boom from the building and it was safely lowered in the barricaded area.

A joint site visit was carried out along with DMRC Jaipur team and Contractor's site personnel on 06th May, 2015 to carry out detailed investigation and for interaction with key eye witnesses and persons involved in the activity being performed.

Interactions were held with the following concerned persons for understanding the sequence of events leading to descend of boom:

1) Mr. Gaurav Upadhayay, Site Engineer, M/s CEC
2) Mr. Om Prakash, Mechanical Engineer, M/s CEC
3) Mr. Akhilesh Kumar, Safety Supervisor, M/s CEC
4) Mr. Jawed, Site Engineer, M/s D. Thakkar, sub-contractor of M/s CEC
5) Mr. Jai Singh, Rigger foreman, M/s D. Thakkar, sub-contractor of M/s CEC
6) Mr. Virender, Crane Operator, M/s D. Thakkar, sub-contractor of M/s CEC
7) Mr. Ashok, Crane Operator, M/s D. Thakkar, sub-contractor of M/s CEC

In addition, representative of OEM (Original Equipment Manufacturer) M/s Tata Hitachi Construction machinery Company Limited was also requested to join the investigation. Mr. H Ansari, Manager Product Support was present during the investigation. His expert opinion is attached as Annexure – 4.

2.0 INVESTIGATION FINDINGS:

On the basis of the site visit and interaction with above mentioned site personnel, following are the findings:

1. The involved Crane TATA TFC 280 has been tested and certified by DMRC approved competent person on 8th April'15. The validity of certificate is until 07th Oct'15.
2. The crane operator was certified competent by M/s D. Thakkar and a certificate issued having validity upto 12th June, 2015. The same has been verified by main contractor M/s CEC.
3. The lifting permit completed by Rigger foreman (Mr. Jai Singh) was endorsed by his Site Engineer Mr. Jawed of M/s D. Thakkar and finally verified by Site Engineer of M/s CEC viz. Mr. Gaurav Upadhyaya.
4. Till date, total number of 57 panels out of 127 panels has been constructed using same resources and methodology successfully.
5. The crane was having a 120 feet long boom and lifting radius of 9 mtrs at the time of the lift.
6. As per the manufacture's load chart, safe working load at the above configuration was 17.78 tons.
7. The weight of the cage being lifted was 16.5 tons and along with spreader beam, lifting hook and other lifting tackles, the total weight being lifted was 19 tons.
8. In view of the above, the crane was lifting a total load of 19 tons against the safe working load of 17.78 tons.
9. The lifting permit which mentioned allowable load as 23 tons against the load chart load of 17.78 tons.
10. It was confirmed by the crane operator and site teams that while lowering the cage, some times the cage encounters localized obstructions near almost the base of the panel. This may be due to concrete intrusion from neighboring panel or some

localized ground obstruction which is mitigated by giving a free fall of the cage and hitting the obstruction to clear.

11. It was confirmed by the contractors plant department as well as crane manufacturer TATA's representative that this free fall jerk can add additional load on the crane.
12. The lowering of cage was almost completed and process of removal of spreader beam was in progress. Site teams of main contractor M/s CEC & sub-contractor M/s D. Thakker, has confirmed that there had been a defect in the boom lowering mechanism and it got struck while attempts were being made to lower it. The crane operator left his seat and went behind within his cabin to examine any visual defects/snags in acceleration/breaking mechanism. When he came back and again attempted to lower boom, the boom rope failed and boom started to descend.
13. The cage was being lowered in two pieces with smaller piece weighing around 3 tons was lowered first while the bigger piece weighing around 16.5 tons was lifted and suspended for around 90 minutes for joining procedure and after the joining the cage was completely lowered. This sequence of cage lowering differed from the approved method statement which mentioned the cage will be lowered in one piece.

3.0 EXPERT OPINION OF OEM REPRESENTATIVE

To have expert opinion of OEM, representative of M/s Tata Hitachi Construction Machinery Company Limited (Mr/ H. Ansari) was requested to visit the site, inspect the damaged crane & submit his expert advise about the nature & cause of failure.

As per his report, the crane boom rope had snapped causing descend of boom. In his opinion, there might have been sudden impact during handling of D-wall cage. Since the boom length is high (120 ft) and angle of boom is also large (70 – 75degree), any

jerk and free fall during the handling of load will transmit tremendous load on boom rope and can cause snapping of rope.

Based upon this expert opinion of OEM Rep. and nature of failure of wire rope observed, it is evident that the boom rope has snapped from the location of gantry/winch assembly while being on round object (pulley or a shaft).

4.0 CONCLUSION & RECOMMENDATIONS

From the investigation findings, it is evident that this dangerous occurrence was totally avoidable and had the Contractor's Senior Management & Site team remained alert, this incidence would have not happened.

However to prevent re-occurrence of similar incidents, the following is recommended:

1. Competency assessment based Lifting Engineers training to be conducted by expert agencies and certified participants to be nominated as Competent Lifting Engineer for each worksite and as and when lifting is being carried out, to approve lifting operation and to supervise the same.
2. All Operator's of Construction Plant & Machinery shall undergo training from OEM or his authorized agency/representative and be got certified as competent to operate the machine.
3. Contractor shall arrange training on "Lifting Operation Safety" for their site staff including Rigger/banksman & Operators.
4. Safe work procedure for lifting operations to be developed.
5. Lifting plan to be made for all the critical lifts and to be approved by DMRC prior to lifting.
6. Lifting permit to be implemented effectively. Correct information along with confirmation by Contractors Safety Officer and Lifting Engineer to be ensured.

7. The safe working load to be calculated considering all the lifting gears, lifting appliances, spreader beams and crane hook.
8. The crane should never be overloaded and strict compliances to safe working load vis a vis lifted load to be ensured.
9. Compliance to method statement to be ensured. Any deviation to be approved prior to implementation.
10. The cage lowering procedure to be reviewed, suggested lowering sequence to be heaviest part to be lowered first and lighter part to be suspended for jointing works thus far reducing the risk of holding the heaviest part for almost more than one hour.
11. Manufacturers recommended maintenance regime for lifting machines to be complied and audited by the manufacturer at regular intervals.

Lifting is a very critical and high risk activity. Proper planning, load calculations, competent lifting crew, competent supervision and machine limitations to be always considered prior to any lifting operation. The incident was avoidable if the Site Engineer would have checked the load chart and safe working load before signing the lifting permit. Due to severe site constraints it is strongly recommended to have a strict implementation and compliance of lifting requirements.

09/05/2015

(Devendra Gill)

AGM/Safety/DMRC

09.05.15

(F M Dohadwala, Din)

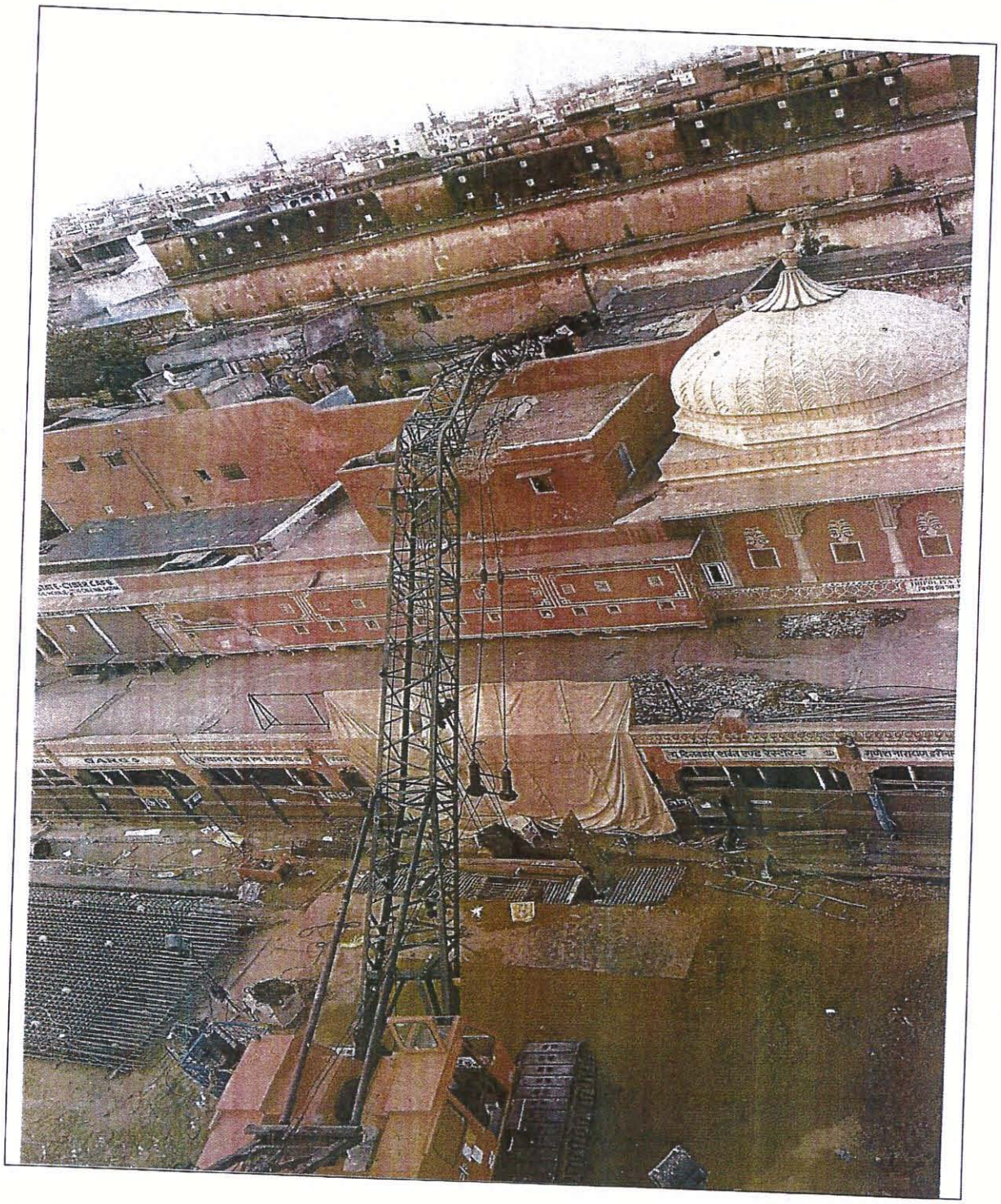
Chief Safety Expert/GC

PD/Jaipur

Director Business Development

ANNEXURE - 1

SITE PHOTOGRAPHS



DELHI METRO RAIL CORPORATION

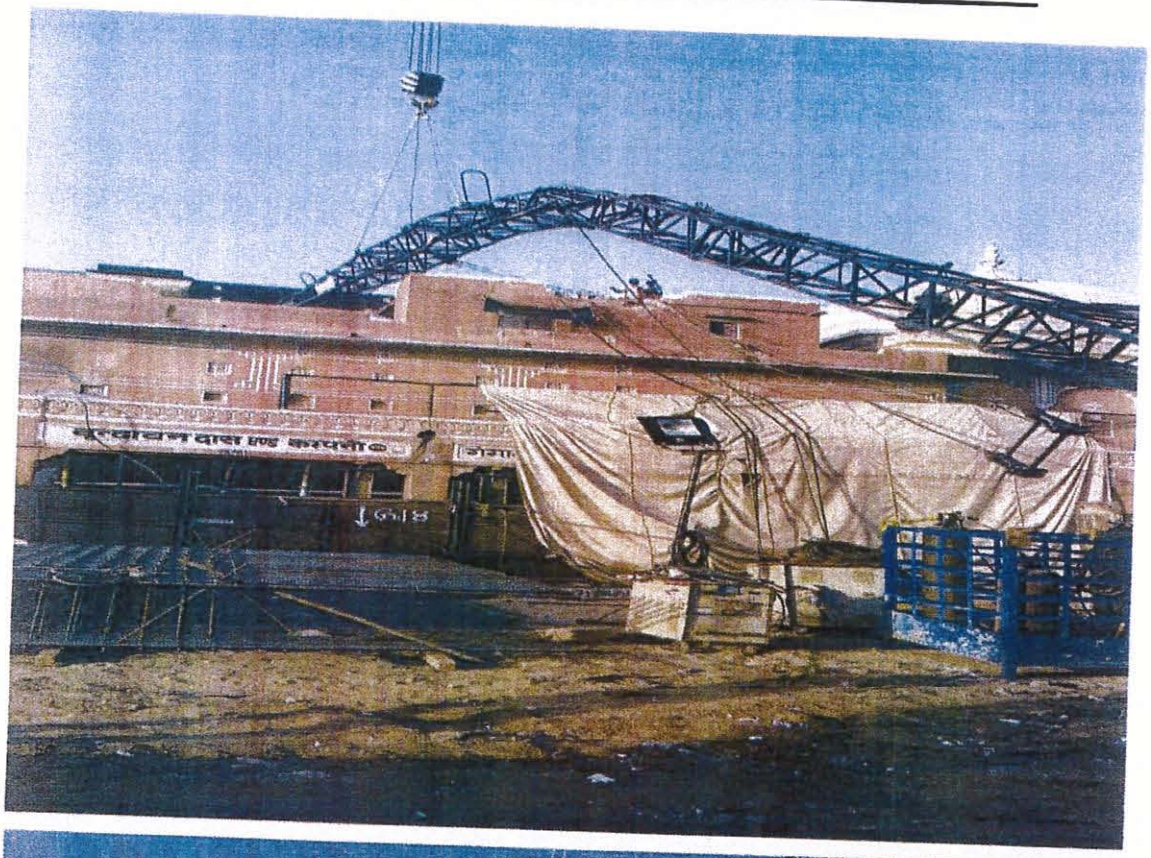
DANGEROUS OCCURENCE INVESTIGATION REPORT

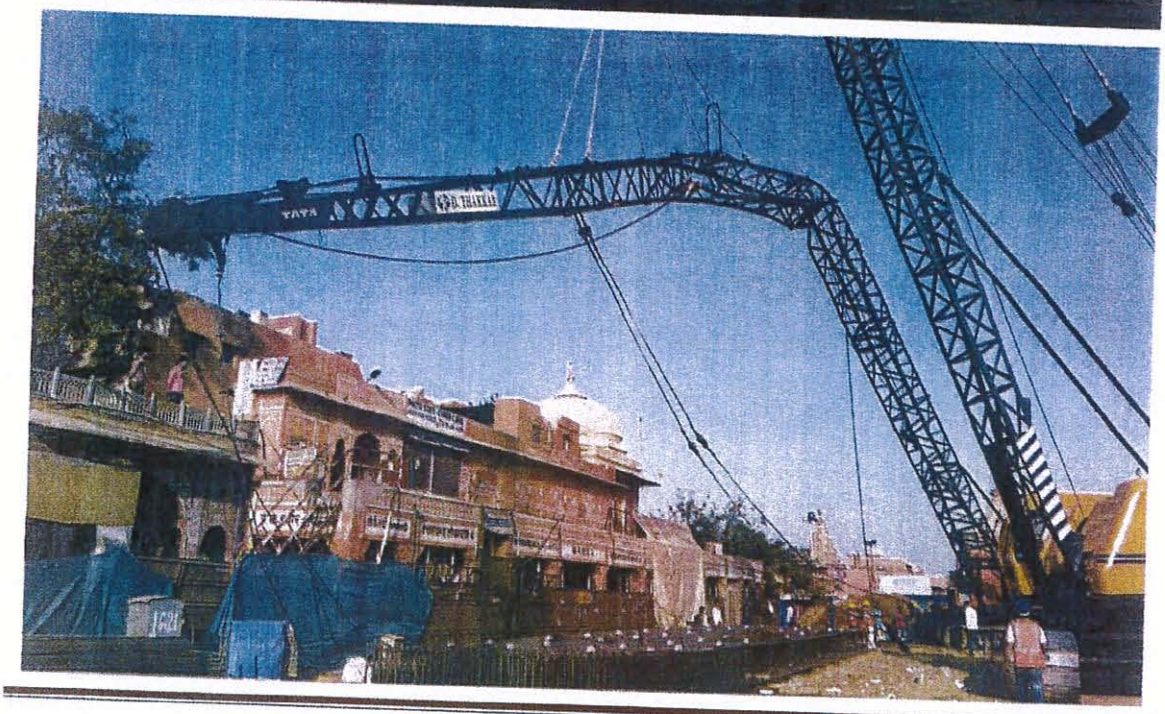
CRAWLER CRANE: BOOM DESCEND

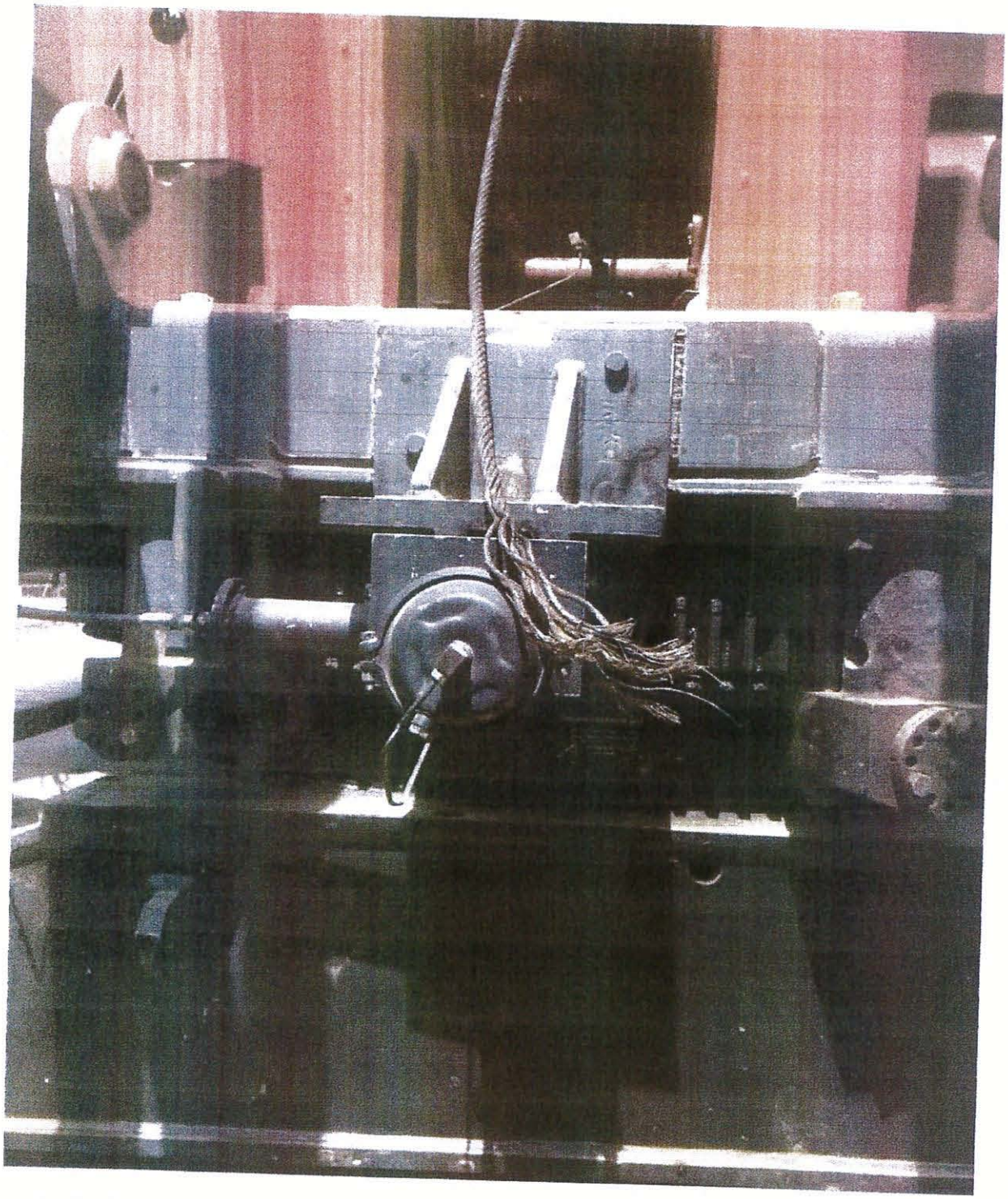
CHHOTI CHAUPER: TRIPOLIA SIDE, JAIPUR

CONTRACT - UG – 1B: M/s CONTINENTAL ENGINEERING CORPORATION LIMITED

04th May, 2015







ANNEXURE - 2

CONTRACTOR's PRELIMINARY REPORT

DELHI METRO RAIL CORPORATION

DANGEROUS OCCURENCE INVESTIGATION REPORT

CRAWLER CRANE: BOOM DESCEND

CHHOTI CHAUPER: TRIPOLIA SIDE, JAIPUR

CONTRACT - UG – 1B: M/s CONTINENTAL ENGINEERING CORPORATION LIMITED

04th May, 2015

CEC INT'L CORP INDIA PVT. LTD. A MEMBER OF CONTINENTAL HOLDINGS	SHE MANAGEMENT SYSTEM	DOC. No.	24
		REV No.	00
JMRC UG 1B	PREMILINARY INCIDENT / DANGEROUS OCCURRENCE / NEAR MISS REPORT	DATE	28/09/2014
		PAGE	1 of 1

PREMILINARY INCIDENT / **DANGEROUS OCCURRENCE** / NEAR MISS REPORT

Name of the Job site : Choti choupper

Name, Age, Sex & Designation of the injured : N/A

Name of the contractor / Department : M/S D. Takkar

Date & Time of the accident / Incident / dangerous occurrence / near miss: 04/05/2015; 01:15hrs

Location of the incident : Choti chouper (Tripolia side in front of shop no- 377)

Brief Description of the accident / property Damage (Add sketches and additional Sheet if Necessary:

On 04/05/2015 M/s D Thakkar Operator Mr Virendra Kumar Rai has lowered cage no-DW-S41 by TFC280 Crane (make of 2013). After lowering the cage the rigger gave the signal to the Operator to descend the boom for disconnecting the spreader beam. At this point the crane gantry wire rope got snapped off and the boom fallen on the building (House No-98, Haveli) above the shop no 377 & 378. It got rested on the parapet wall damaging the parapet walls and three water tanks. No personnel injury.

Nature of the injury (Fractures, superficial injuries, burns, effect of electric current, multiple injuries, other please specify) : Nil

Unsafe acts / conditions that caused the Accident : Snapping of crane gantry wire rope

Safety appliances (relevant used) : N/A

Any other relevant information : Nil

Witness : **Mr. Javed sidiqui (Shift engineer)**
Mr. Jai singh (Rigger)

ANNEXURE - 3

D-WALL LIFTING PERMIT

DELHI METRO RAIL CORPORATION

DANGEROUS OCCURENCE INVESTIGATION REPORT

CRAWLER CRANE: BOOM DESCEND

CHHOTI CHAUPER: TRIPOLIA SIDE, JAIPUR

CONTRACT - UG – 1B: M/s CONTINENTAL ENGINEERING CORPORATION LIMITED

04th May, 2015

SHE OPERATIONAL CONTROL PROCEDURE

PERMIT TO WORK - LIFTING OPERATION

Document No:
Revision No: 1
Date: 3/5/15
Page: 1 of 1

(A) PLAN

Work Permit No.- CEC/JMRC-1B/LP/ 02

Person In Charge of the Work: Gaurav — Date: 3/5/15

Name of the Operator: Virendra — Position: [illegible]

Name of the Rigger: Jai prakash — Signature: [illegible]

Name of the Signal man: Atmaram — Signature: [illegible]

Location of Work: tripolia — Signature: [illegible]

Department doing the work: Civil Deptt

Brief Description of Work: Cage lifting.

Description/Identification of Lifting Machinery / Tools / Equipments: 2, m – 3 sling 2.5 – 2 Sling – 36 mm IHC 200 Lifter Beam – 0.25 ton 25 ton 2 Shackles 13.5 ton – 3 Shackles 13.5 ton 50 scl SS.

Issue time: ______ (Permit is valid only for particular lift)

(B) INSPECT

General	Yes	No	N/A		Yes	No	N/A
External condition of vehicle	✓			Limit switches working	✓		
Condition of Soil (Stabilization)	✓			Swing alarm working	✓		
Lifting gear's has valid test certificate	✓			Lifting tackles have relevant color coding	✓		
Next Due Date of Third Party Inspection:	3/11/015			Fire extinguisher placed in the vehicle	✓		
Operators Competency Certificate Displayed	✓			Working area free from Overhead Power lines	✓		
Automatic Safe load indicator in working condition	✓			Traffic Marshall deployed			
Swing Radius barricaded				Name of the marshall			
Operational radius:				Are Guide Ropes used	✓		
Load Chart displayed				workers with ID Cards			
Allowable Load as per Load Chart	23 ton						
Length of Boom in meters	36 m				**Good**	**Bad**	**N/A**
Maximum SWL				Condition of Weather	✓		
Weight to be lifted in metric-tonne	17.5 ton			Condition of Slings / wire ropes	✓		
Certificates available / up to date	—			Condition of Out riggers	✓		
Other Measures:- No				Condition of Boom	✓		

PPE	Yes	No	N/A
Mandatory PPE			
Hard Hat	✓		
Safety Shoes	✓		
Reflective Jacket	✓		
Hand gloves	✓		
Optional PPE			
[illegible]			
Ear plugs			
Nose mask			

(C) COMMUNICATE

	Yes	No
Has the SOP communicated to each person who will be performing this work through PRE-TASK BRIEFING?	✓	
Does everyone understand the plan, their part in the plan and the controls required?	✓	
Have all persons who may be affected by this work been adequately informed of the consequences and the control measures required?	✓	
Is it safe to proceed?	✓	

(D) CONTROL

NO WORK TO BE CARRIED OUT UNDER THIS PERMIT UNTIL ALL THE ITEMS UNDER SECTION (B) & (C) HAVE FULFILLED

I confirm that I have been given charge of the above mentioned work and I will take all necessary precautions to avoid danger to the workers engaged at the work as well as property. I will abide by the recommendations of the Safety Representative and implement them and I will assign jobs to only trained personnel. I assure that Buddy system is followed during work.

Name & signature of the Engineer / Supervisor: [signature]

Name & signature of the Person In charge / Authorised Person: [signature] Date: 3/5/15 Time: 8:00

Handover the Signed Permit to :- [signature] (SHE Department) Date: 3/5/15 Time: [illegible]

Reason for Permit Suspension: ______ Date: ______ Time: ______

Suspended by: ______ Date: ______ Time: ______

CLEARANCE / CANCELLATION

Work is completed and is in safe condition. Tools / Materials / Equipments have been removed and the area is clean and orderly.

Work completed (Including Housekeeping) Time: ______ Date: ______

Name & signature of the Person In charge / Authorised Person: ______ Time: ______ Date: ______

ANNEXURE - 4

CRAWLER CRANE LOAD CHART

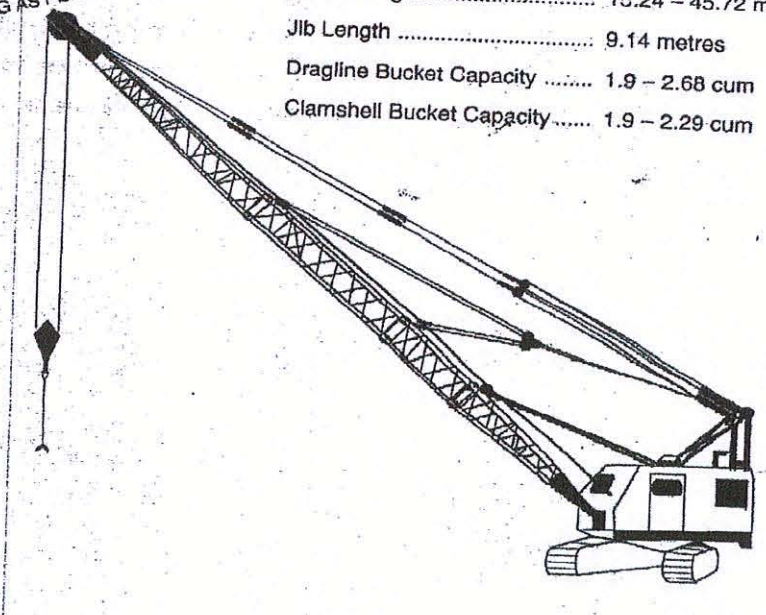
CEHC

TATA TFC-280-45

CRAWLER CRANE CLAMSHELL & DRAGLINE 75 TON

SPECIFICATIONS
(RATING AS PER IS. 4573)

Max. Lifting Capacity	75 tonnes
Boom Length	15.24 – 45.72 metres
Jib Length	9.14 metres
Dragline Bucket Capacity	1.9 – 2.68 cum
Clamshell Bucket Capacity	1.9 – 2.29 cum



TATA TFC 280-45

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TATA TFC - 280 - 45

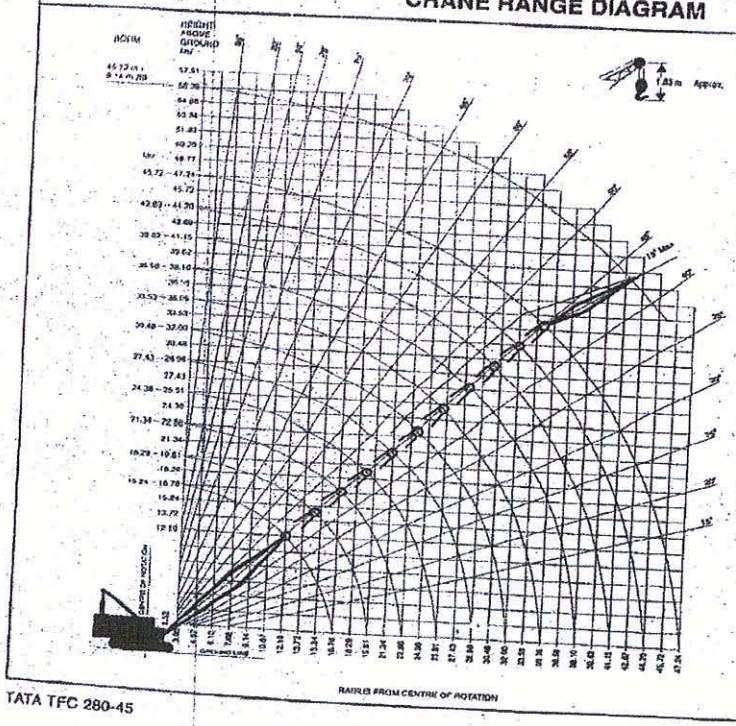
Max. Lifting capacity ..... 75 Tonnes
Boom Length ..... 15.24 - 45.72 metres
Lattice FLy Jib ..... 9.14 metres

Crawler Crane - Load Chart

RATED CRANE LOADS IN KG (AS PER IS 4573)

Operating radius	15.24 m boom	18.29m boom	21.34m boom	24.38m boom	27.43m boom	30.48m boom	33.53m boom	36.58m boom	39.62m boom	42.67m boom	45.72m boom
3.67	75000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4.57	52185	51980	.....	.....	.....	.....	.....	.....	.....	.....	.....
6.10	32660	32455	32320	32115	31980	.....	.....	.....	.....	.....	.....
7.62	24010	23835	23700	23495	23360	23155	23020	.....	.....	.....	.....
9.14	19005	18800	18665	18460	18325	18120	17985	17780	.....	.....	.....
10.67	15600	15400	15260	15060	14920	14720	14580	14380	14240	14040	.....
12.19	13155	12950	12815	12610	12475	12270	12130	11930	11790	11590	11450
13.72	11340	11135	11000	10795	10660	10455	10320	10115	9980	9775	9640
15.24	9885	9685	9545	9345	9205	9005	8865	8660	8525	8320	8185
16.76	.....	8595	8460	8255	8120	7915	7780	7575	7440	7235	7095
18.29	.....	7885	7550	7345	7210	7005	6870	6665	6530	6325	6190
19.81	.....	.....	6735	6530	6395	6190	6055	5850	5715	5510	5375
21.34	.....	.....	6055	5850	5715	5510	5375	5170	5035	4830	4695
24.38	.....	.....	.....	4850	4715	4510	4375	4170	4035	3830	3695
27.43	.....	.....	.....	.....	3900	3695	3560	3355	3220	3015	2880
30.48	.....	.....	.....	.....	.....	3060	2925	2720	2585	2380	2245
33.53	.....	.....	.....	.....	.....	.....	.....	2220	2085	1880	1745
36.85	.....	.....	.....	.....	.....	.....	.....	.....	.....	1425	1290

CRANE RANGE DIAGRAM



TATA TFC 280-45

NOTE :

(a) Ratings are as per IS 4573, i.e. 75% of tipping load for forward stability and 70% for backward stability.
(b) Capacities include the weight of the hook block, slings, etc.
(c) Capacities are for machine standard on firm, level uniform supporting surface and depend upon the mounting, Ground, boom length, radius of operation and proper handling; all of which must be taken into account by the user.
(d) Deduct 680 kg for 6.10m jib and 910 kg for 9.14m jib.

CAUTION
Machine must not be used for lifting operations with the gantry in lowered position.

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TATA TFC - 280 - 45

Max. Lifting capacity ..... 75 Tonnes
Boom Length ..... 15.24 - 45.72 metres
Lattice FLy Jib ..... 9.14 metres

Crane Specifications

BOOM

Angle lattice alloy steel construction; with pin joints. Open throat with four boom point sheaves on anti-friction-bearings of bottom diameter 610 mm.
10 part boom hoist reeving standard for all boom lengths.

Maximum Rated Load ..... 75,000 kg
at 3.67 m operating radius

Basic Boom Length ..... 15.24 m
(in two sections)

Boom Upper .. 9.14 m (30 ft)
Boom Lower .. 6.10 m (20 ft)

Operating Weight ..... 70,480 kg
[Equipped with 75 tonne capacity hook and 21.6 tonne counter weight]

Boom Inserts ..... 3 m (10 ft) Optional
6 m (20 ft) Optional

Hook Block

75 tonne 4 sheave with swivel hook and 8 part hoist line ..... Standard

Weight of Hook Block Assembly with 4 sheave ..... 998 kg

This hook block assembly can be converted to 3 sheave or 2 sheave or single sheave by using required spacers.

Hoist Reeving and Hook Block Assembly

No. of Sheaves	4	3	2	1	
No. of parts of line	8	6	4	2	1
Maximum Load kg	75,000	68,040	45,360	22,680	11,340
Hook Block Weight kg	*998	*946	721	669	

* Note : Use 171.5 kg cheek plate

Drum Shaft Assembly

Lifting Crane Drums Pitch dia (mm)	Cable dia. (mm)	Cable Capacity 1st wrap (m)	Line * Pulls (kg)	Line * Speeds (mpm)
FRONT 635	26	39.32	15730	49
REAR 635	26	22.25	16787	49

* Line pulls and speeds based on first layer of rope and engine at full load speed.

Ground Pressure

	STANDARD	OPTIONAL
Shoe width	914 mm.	1067 mm.
Ground Pressure	0.73 kg/sq.cm.	0.64 kg/sq.cm.

JIB

Angle lattice alloy steel construction,
Two jib lengths are available.

..... 6.10 m (20 ft)
..... 9.14 m (30 ft)
Jib Hook Block Weight..... 300 kg
Capacity..... 7000 kg

MAXIMUM JIB RATINGS		
Offset angle jib to boom under full load	6.10 m jib kg	9.14 m jib kg
5°	6350	5895
10°	6125	5670
15° (max)	5895	5445

Jib ratings at any operating radius are the same as Crane ratings shown in table for main boom when operated at that radius but not to exceed maximum jib ratings shown. Maximum jib operating radius not to exceed length of main boom on which it is being used.

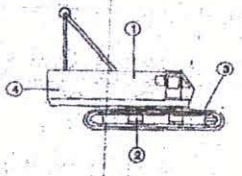
TATA TFC - 280 - 45

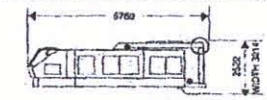
Max. Lifting capacity ..... 75 Tonnes
Boom Length ..... 15.24 - 45.72 metres
Lattice FLy Jib ..... 9.14 metres

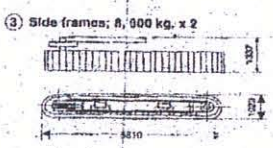
Crawler Crane

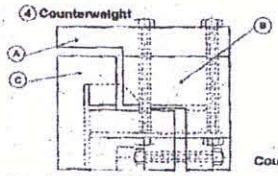
TRANSPORTATION DATA

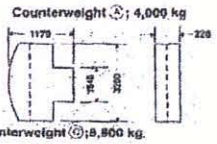
Basic Machine

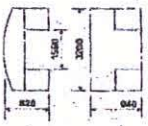






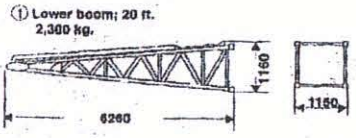


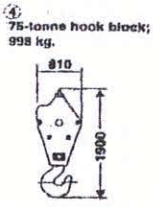


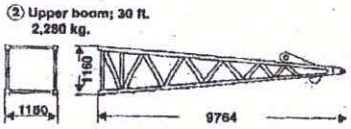


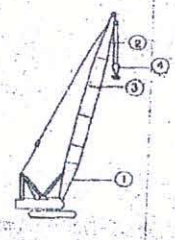
Note: All dimensions in mm

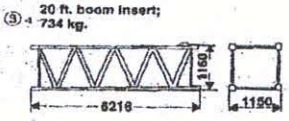
Crane Attachment

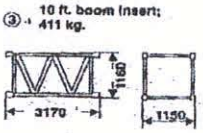












Note: All dimensions in mm

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TATA TFC 280-45

ANNEXURE - 5

OEM EXPERT's OPINION

DELHI METRO RAIL CORPORATION

DANGEROUS OCCURENCE INVESTIGATION REPORT

CRAWLER CRANE: BOOM DESCEND

CHHOTI CHAUPER: TRIPOLIA SIDE, JAIPUR

CONTRACT - UG – 1B: M/s CONTINENTAL ENGINEERING CORPORATION LIMITED

04th May, 2015

TATA HITACHI

Reliable solutions

NOTI No.
ORDER No.
P.O. No.
BILLING DOC No.

SERVICE REPORT (For Friction Machines)

All boxes must be filled up before submitting

CUSTOMER D. Thakkar Construction Pvt Ltd.
OFFICE ADDRESS Metro Construction Work. Jaipur.
MACHINE LOCATION Chhoti Chopar DISTRICT Jaipur STATE Rajasthan

REPORT NO. ND HTA/008
DATE 5-5-2015
ZONE Jaipur

MACHINE MODEL	SERIAL NO.	INSPECTION DATE	HOUR METER	
TFC-280	280C-1347	FM 04-05-2015	1795	HRS.
ENGINE MODEL	SERIAL NO.	TO 05-05-2015		HRS.
6CTA				

TYPE OF VISIT
- S0 50 HRS / 3 DAYS
- S1 250 HRS / 1 MTHS.
- S2 500 HRS / 2 MTHS.
- S3 1000 HRS / 6 MTHS.
- S4 1500 HRS / 9 MTHS.
- ☐ Inspection

ATTACHMENT Crane with 120 ft boom.
CAPACITY 75 Ton.

NATURE OF WORK: Diaphragm wall
HANDLING MATERIAL: formation
DENSITY: KG/M³

Check Points : Legend : ✓ Satisfactory : X Unsatisfactory : ⊗ Corrected R Replaced : NA Not Application

FLUID LEVELS
- ✓ ENGINE CRANK CASE
- ✓ RADIATOR
- ✓ ALL REDUCTION CASES
- ✓ POWER BOX
- NA ENGINE GEAR BOX
- ✓ CAM CLUTCH
- ✓ BATTERY ELECTROLYTE

INSTRUMENTS
- ✓ ENG. OIL PR. GAUGE
- ✓ AMMETER
- NA TRANS. OIL PR. GAUGE
- ✓ AIR PRESSURE GAUGE
- ✓ WATER TEMP. GAUGE
- ✓ HOUR METER

MAINTENANCE
- ✓ DRAINING OF DIESEL TANK
- ✓ DRAINING OF AIR TANK
- ✓ O.G LUBRICANT GEARS & ROPES
- ✓ LUBRICANT TO PLANETARY PINIONS
- ✓ OIL TO PROPEL DRIVE CHAIN
- ☐ LUB USING LUB CHART

RECORD THE FOLLOWING

Eng. water temp. ... Crane is stopped
Air Pressur ... kg/m²
Engine RPM low ... due to ... High ...
Eng Oil Pr: Min ... accident ... Max ...

CHECK CONDITION OF
- ✓ ENGINE & ACCESSORIES
- ✓ ANY LEAKAGES
- ✓ ALL CARBON BRUSHES
- ✓ CLUTCHES & BRAKE LININGS
- ☐ ATTACHMENT & ACCESSORIES
- ✓ PROPEL DRIVE CHAIN
- ✓ ALL ROPES other ropes found ok
- ✓ GANTRY
- ✓ CAB
- ✓ UNDER CARRIAGE PARTS
- ✓ REAR DRUM BRAKEBAND
- ✗ FOUND BEND Boom/Boom inserts
- ☐
- ☐

CHECK FUNTIONS OF
- HOIST OPERATIONS
- BOOM HOIST/LOWER
- LOAD LOWERING
- SWING LOCK & BRAKE
- TRAVEL
- STEERING
- SWING
- ☐ SAFETY DEVICES

ADJUSTMENTS
- ☐ ALTERNATOR BELT
- ✓ ENGINE CLUTCH
- ✓ ALL CLUTCHES
- ✓ ALL BRAKES
- ✓ FOOT PEDALS
- ✓ ALL CONTROL LEAVERS
- ✓ SWING/PROPEL SHIFT LEVER
- ✓ BACKLASH BETWEEN BEVELGEARS/ PINIONS
- ✓ HOOK ROLLERS
- ✓ POWER BOX CHAIN
- ✓ TRACK CHAIN DRIVE CHAIN

REPLACEMENT OF OIL/ FILTERS / PARTS (IF ANY)

Crane met with accident/Boom rope snapped, and boom fell over nearby house and rested there on wall. The following boom/inserts found damaged: boom upper/inserts 20 ft & 10 ft. Observations

RECOMMENDATIONS TO CUSTOMER report enclosed with this report.

Estimation of Parts required to be replaced will be submitted within a day/two.

The service/inspection has been attended to our entire satisfaction.

Annexture of Service Report

Boom rope snapped during operation/load handling

Condition of Job/Job handling/Crane.

(1) Crane boom length – 120 ft.
(2) Boom angle at the time work – 70 to 75°
(3) Material being handled – Diaphragm Wall
   (a) Weight – 1.1 ton (Excluding hook/rope weight)
   (b) Job height – 25.5 Meter.
   (c) Width – 4.5 Meter.
(4) Time of accident – 9.15 AM (04-05-2015)

I have checked the following technical points

(1) Boom rope – No any cut/kinking/core of rope bulging/rope on drum layer found proper. No abnormal wear on rope.
(2) Checked all pulleys of boom rope circuit and found all pulley free. No breakage any where in pulley or groove (pulley)
(3) No jamming of gear drive pawl line in power flow circuit.
(4) Boom pawl lock and pawl seat on drum OK.
(5) Failure point of rope, found in between drum and upper spreader (near to gantry pulley)
(6) No any failure found in Cam clutch bearing broken or pinion teeth broken.

(7) Conclusion :- There might have been sudden impact during sinking of diaphragm wall. Since the boom length (120 ft) and crane at a higher angle any jerk given due to lifted load and make free fall will transmit tremendous load on boom rope and can cause snapping of rope in a single moment.

Suggestion :- Suggesting to avoid jerky operation with longer boom and overloading.

(11) Periodical checks of all ropes to be carried out for any kink/cut/deterioration/and lubrication. as Condition Compound.

ANNEXURE - 6

OPERATOR'S DOCUMENT &

THIRD PARTY TEST CERTIFICATE OF CRANE

DELHI METRO RAIL CORPORATION

DANGEROUS OCCURENCE INVESTIGATION REPORT

CRAWLER CRANE: BOOM DESCEND

CHHOTI CHAUPER: TRIPOLIA SIDE, JAIPUR

CONTRACT - UG – 1B: M/s CONTINENTAL ENGINEERING CORPORATION LIMITED

04th May, 2015

D.THAKKER CONSTRUCTION PVT LTD
JAIPUR METRO RAIL PROJECT
OPERATOR COMPETENCY CERTIFICATE

Name:- Vinodkumar Rai Age:- 32 yrs Designation TFC 250 (Opt)

Type of licence:- LMV/HTV/HGV/HMV/ HMV Licence No.:- 5011015760

Valid upto: 12/6/2015

This certificate confirms that you have been authorised to DRIVE / OPERA equipment listed below. This is to be Kept with you whenever you are operating the machi to authorised personnel when required. Person who is not possession of a valid certificate must not drive veh owned or rented by the company.

I am familiar with the safe operation and rules / regulations of the mobile plant outlined below and will comply them.

Vikas Rai (Signature of Driver) 03/1/15 (Date)

Following mobile plant may be driven / operated by the appointed person (named above)

Full Description of mobile plant / Equipment (including, where appropriate type and machine number)	Authorised Company representative's confirmation of training / Experience	
	Signature	Date
1. TFC-280 Crane	Kamar Sharma	3/1/15

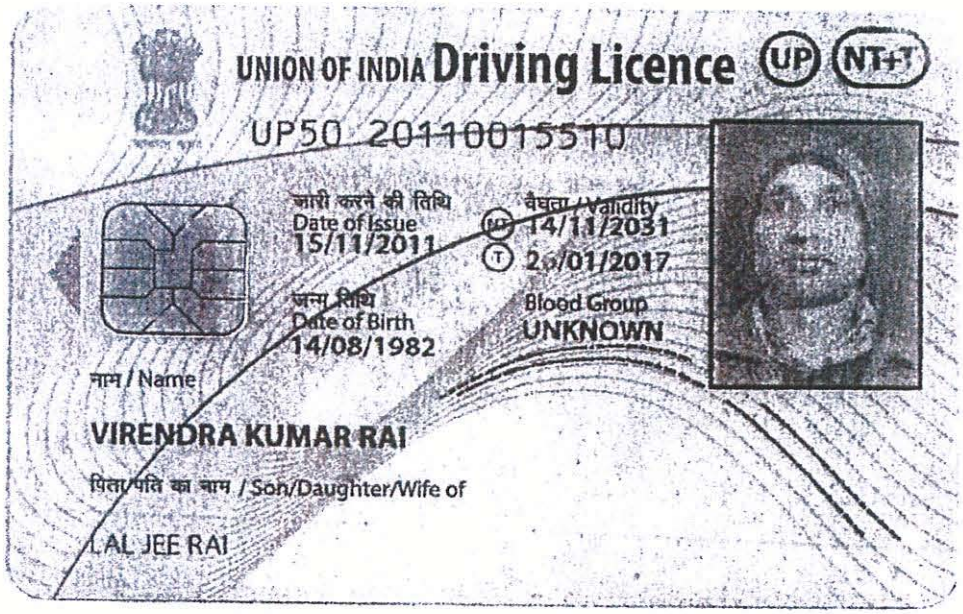
C.VALIDITY / WITHDRAWL

This Certificate of appointment is only valid whilst the appointment person is employed by the company. Howe the appointment may be withdrawn by an authorised company representative at any time.

This appointment has been withdrawn with effect from _____ (Date)

_____ (Signed by authorised company representative – Engr., Sr. Engr., Plant Manage

Distribution: Original to Driver / Operator, Copy to Records.


UNION OF INDIA Driving Licence
UP NT+T
UP50 20110015510
जारी करने की तिथि
Date of Issue
15/11/2011
वैधता / Validity
14/11/2031
T 26/01/2017
जन्म तिथि
Date of Birth
14/08/1982
Blood Group
UNKNOWN
नाम / Name
VIRENDRA KUMAR RAI
पिता/पति का नाम / Son/Daughter/Wife of
LAL JEE RAI

DELHI METRO RAIL CORPORATION

DANGEROUS OCCURENCE INVESTIGATION REPORT

CRAWLER CRANE: BOOM DESCEND

CHHOTI CHAUPER: TRIPOLIA SIDE, JAIPUR

CONTRACT - UG – 1B: M/s CONTINENTAL ENGINEERING CORPORATION LIMITED

04th May, 2015

ER. P.P. TRIPATHI

Competent Persons under Factories Act, Competent Persons under Petroleum Rules.
Chartered Engineers (India), Surveyors & Loss Assessors, Valuers (Registered by CBDT).
Office: B-13, Vaishali Nagar, Jaipur - 302 021

Report of Testing / Examination of Truck Mounted Hydraulic Telescopic Boom Crane
Under Section 28 Factory Act & Rajasthan Factory Rules 57A

Ref. No. PPT/2015/138 (1) **Dated: 08.04.2015**

1	Name of Occupier / Organisation	**M/s. D. Thakkar Constructions Pvt. Ltd.**
2	Situation & address of Testing	Choti Chopar Metro Station, Jaipur
3	Distinguishing Number or mark, if any & descripting sufficient to identify the lifting machine, chain, rope or tackle.	**Crawler Mounted Mobile Crane**
	Make	TATA
	Model	TFC 280
	Capacity	**40 Ton on 4 Falls**
	Sr. No.	280C-1347
	Engine No.	25780550
	Location of Testing	Choti Chopar Metro Station, Jaipur
4	Date when the machine, was first taken into use at this site.	09.10.2014
5	Details of certificate relating to tests examination made	Visual examination, operation & Load Test at Radius 18.30 Mtr, Angle - 65° Boom Lenth 36.58 Mtr and Lifted Load 7 Tons as per Chart found OK
6	Date of last periodical through examination made	09.10.2014
7	Particulars of any defects, affecting the safe working-load found at any such through examination or after annealing of the steps taken to remedy such defects.	No defects
8	Remarks	
	Wire Rope Dia-26 mm	OK
	Structure	OK
	Flash Light and Hooter	OK
	SLI	**Fitted and Found Working OK**
	Controlls	**OK**
	Crawler Pins and Chain	**OK**

I certify that I have thoroughly examined the Crawler Mounted Mobile Crane and the same is **found safe** for operation. This report is a true report of my inspection. Advised that the oprator sitting on steering should have vailid driving license . It is advised that operator in controli should have good experience on working of this crane.

Date of Inspection : 08.04.2015
Next Due Date: 07.10.2015

(Er. P.P. TRIPATHI)
Competent Person under Factories Act.
B-13, Vaishali Nagar, Jaipur - 302 021.
Mobile : 098290-53557, 0141-2353557
E-mail: tripathi_pp@yahoo.com

P. P. TRIPATHI
Ph. 0141-2353557
COMPETENT PERSON
UNDER FACTORIES ACT
B-13, VAISHALI NAGAR, JAIPUR-21

Appendix 9: License from A&M Department, GoR for tunnel work under Chandpole gate

राजस्थान सरकार
कार्यालय निदेशक, पुरातत्त्व एवं संग्रहालय विभाग, राजस्थान जयपुर

क्रमांकः पु.सं./तक./जय0मेट्रो/15/ 7077 दिनांकः– 19.6.2015

श्री अश्विनी सक्सैना,
निदेशक (प्रोजेक्ट),
जयपुर मेट्रो रेल कॉपोरेशन लिमिटेड,
खनिज भवन, तिलक मार्ग,
सी–स्कीम, जयपुर–302005

विषयः– चांदपोल गेट के नीचे मेट्रो हेतु दो सुरंगों के निर्माण कार्य की अनुमति बाबत।

प्रसंगः– आपका पत्रांक F.7(A-19)JMRC/A&M/2013/1638 दिनांक 07.01.2015

महोदय,

उपरोक्त विषयान्तर्गत प्रसंगोक्त पत्र के क्रम में संरक्षित स्मारक नगर दीवार स्थित चांदपोल गेट रक्षित क्षेत्र में चांदपोल गेट के नीचे मेट्रो हेतु दो सुरंगो के निर्माण कार्य हेतु "राजस्थान स्मारक पुरावशेष स्थान तथा प्राचीन वस्तु नियम 1968 के नियम 20" के अन्तर्गत आप द्वारा प्रस्तुत नक्शे के अनुरूप अनुमति इस शर्त पर प्रदान की जाती है कि स्मारक को किसी प्रकार की क्षति नहीं पहुँचे तथा विभागीय अधिनियम व नियमों के प्रावधानों की पूर्ण पालना की जाये।

संलग्नः– प्रपत्र–5

भवदीय

निदेशक

क्रमांकः पु.सं./तक./जय0मेट्रो/15/ दिनांकः–

प्रतिलिपि निम्न को सूचनार्थ एवं आवश्यक कार्यवाही हेतु :–

1. निजी सचिव, प्रमुख शासन सचिव, कला एवं संस्कृति विभाग, जयपुर।
2. अधीक्षक, पुरातत्त्व एवं संग्रहालय विभाग, जयपुर वृत, जयपुर को उक्त प्रपत्र–5 द्वारा दिये गये लाईसेन्स एवं नक्शे की प्रति संलग्न कर लेख है कि आप जयपुर मेट्रो द्वारा किये जाने वाले निर्माण कार्यों का समय–समय पर निरीक्षण करें एवं यह सुनिश्चित करें कि स्मारक को किसी प्रकार की क्षति नहीं पहुँचे।

निदेशक

Appendix 10: Application receipt to State Pollution Control Board

----- Forwarded Message -----
From: "donotreply.rspcb@raj.gov.in" <donotreply.rspcb@raj.gov.in>
To: pccipltd@yahoo.com
Sent: Friday, 19 June 2015 4:28 PM
Subject: RSPCB - Your Application Information

Dear Contiental Engineering Corporation,

Online Application Submitted Successfully,at Rajasthan State Pollution Control Board.
Please use following application details for further use.
Your Unit Id. : 66141
Your Application No. : 115418
Your Registered E-mail: pccipltd@yahoo.com
Kindly print the submitted application

Note: Please wait along with your original documents for the next communication from the RSPCB.
Please be in touch with our website to check your application status.

Thanks

Rajasthan State Pollution Control Board
4, Institutional Area,
Jhalana Doongri, Jaipur
Rajasthan. Pin: 302 004
Phone: 0141-5159609 Email: acp.rpcb@rajasthan.gov.in" target='_blank' rel=external>acp.rpcb@rajasthan.gov.in

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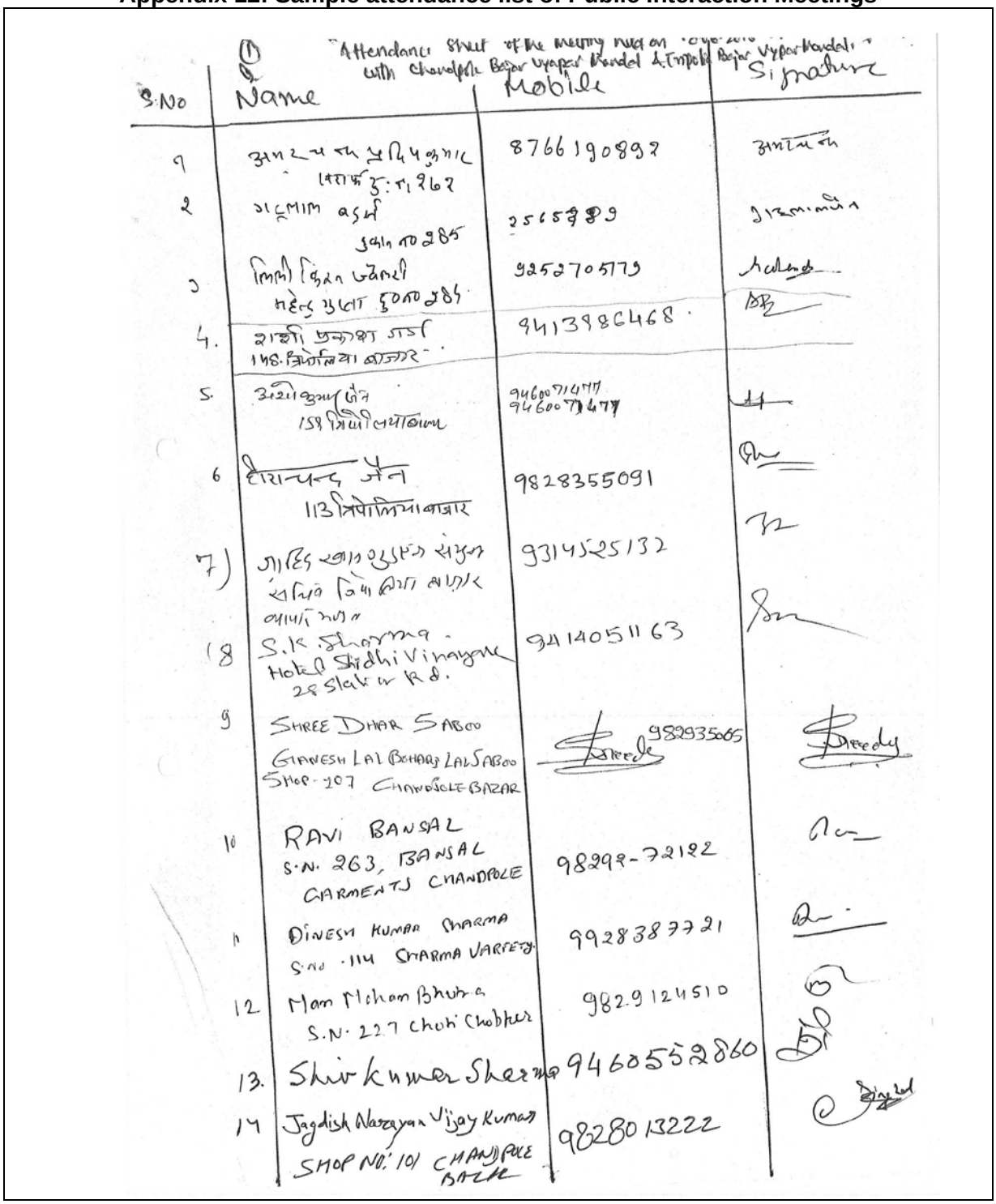
This is a system generated email. Please do not reply.

Appendix 11: Photolog of Public Interaction Meetings

Appendix 12: Sample attendance list of Public Interaction Meetings



"Attendance Sheet of the meeting held on ... with Chandpole Bajar Vyapar Mandal & Tripolia Bajar Vyapar Mandal"

S.No	Name	Mobile	Signature
1	[illegible]	8766190893	
2	[illegible]	25155899	
3	[illegible]	9252705779	
4.	[illegible]	9413986468	
5.	[illegible]	9460071477 9460071477	
6	हीराचन्द जैन 113 त्रिपोलिया बाजार	9828355091	
7)	[illegible]	9314525132	
8	S.K. Sharma Hotel Siddhi Vinayak 28 Station Rd.	9414051163	
9	SHREE DHAR SAREE GANESH LAL BOHARI LAL SAREE SHOP-107 CHANDPOLE BAZAR	98993565	
10	RAVI BANSAL S.N. 263, BANSAL GARMENTS CHANDPOLE	98299-72122	
11	DINESH KUMAR SHARMA S.No. 114 SHARMA VARIETY	9928387721	
12	Mam Mcham Bhutra S.N. 227 Choti Chobler	982.9124510	
13.	Shivkumar Sharma	9460552860	
14	Jagdish Narayan Vijay Kumar SHOP NO. 101 CHANDPOLE BAZAR	9828013222	

S.No	Name	Mobile	Signature
15	Er R N Pathak	9460191930	[illegible]
1	SITARAM	9636734354	[illegible]
17	GIRIRAJ PANSARI	9783457756	G. [illegible]
18	NARESH SHARMA SHOP NO - 119-120 CHAND POLE BAZAR JAIPUR	9461017800 2320775	[illegible]
	[illegible] 247	2321659 9351399084	[illegible]
	[illegible] 259	9414058606	[illegible]
21	Chetan Agarwal Radhey Ram Jewellers. 462-B. C.P. BAZAR	9829018935	[illegible]
22	[illegible] 196. C.P. [illegible]	9414600187	
23	[illegible] 367 [illegible]	9414115301	[illegible]
24	Panchulal [illegible] 103 C.P. Bazar	9460358454	[illegible]
25	Praveen Sharma 379 C.P. Baz	8947918579	P. Sharma
26	Pawan Agarwal 184 C.P. Ba	9829018839	[illegible]
27	Arun Gangwal	9829032593	[illegible]