

Hindustan Construction Company Ltd.

DMRC DC-06 Project, New Delhi

Safety Initiatives in Logistics implemented in DMRC DC-06 Delhi Metro Project

Introduction:

HCC Ltd. Has been constructing metro since Phase-1 of Delhi Metro and has delivered numerous projects of National Importance in the past providing innovative engineering solutions to complex scenarios. During our past metro construction experience, we had faced many problems regarding safety concern of logistics and equipment usage. We had experienced accidents due to mishandling of dumper and other construction equipment. Our top management team and our project Manager decided to take initiative to zero down the safety concern related to the logistics at the beginning of the DMRC DC-06 Project.

Identifying the Safety Issues:

The plan to zero down the safety concern in the Phase-4 of Delhi Metro started with identifying the prime issues faced during the construction phase of the underground metro works. All the staffs were invited to be a part of the team right from our top Mangement to the bottom most person in the hierarchy to contribute to the problem identification process. The Project team reaped the benefits of the brainstorming and following problems were identified :

1. At the project sites, it is the prime duty of the operator / driver to operate the equipment himself and not allow any other unauthorized person or helper to operate the same. However, it was observed that at many a times during the night, the operators are entrusting the operation to their helpers. This serous lapse has led to many accidents due to improper handling of the equipment resulting in grave injuries / fatalities as the helpers are not as competent as the operators / drivers.
2. During the spot checking of documents (drivers information, equipments papers, etc.) for any equipment / logistics by the safety team, it was found that the system was quite disarrayed and it was a daunting task to get hold of all the documents on the spot itself. This was a serious issue as we were not able to track the condition either our or subcontractor's equipments on the spot. Thus, even disqualified equipments used to be operated at site under the garb of unavailability of proper documents on the spot which led to serious breakdowns and accidents also.
3. Reversing of construction equipment is very challenging due to the sheer size and area required for maneuvering the equipment. Practically, the operator is not able to comprehend the blind spot behind the equipment during operation. Sometimes, while operating in night or without proper manpower assistance, accidents have happened leading to serious injuries and fatalities too.
4. Construction of metro projects happen in urban scenario and the construction vehicles have to run amidst the urban traffic. In case of Delhi the matter worsens due to the sheer volume of traffic

during day hours and unruly driving in the night hours. Many accidents happen due to sudden collision of two wheelers coming under the wrap of the transit mixers / dumpers resulting into on spot fatalities. The accidents due to the under run inside the construction vehicles have always been reason of road accidents since long.

5. When excavation or mining activity performed in our site, then disposal of excavated soil to the recommended/allotted dumping grounds by means of Dumper is very challenging in the urban city of Delhi like monitoring the location of dumper and its speed on public road and there are chances of uncontrolled movement and wayward driving by the drivers. Such uncontrolled movements can create serious issues in the traffic and also be detrimental to the overall planning of the project.

The Innovative Solutions implemented :

The Project team came with innovative solutions and implemented with full effect to zero down the above issues as below:

1. Biometric based equipment control - we implemented bio-metric based equipment operation wherein only the authorized and approved operators were provided with the biometric access (Fig.1 below) to start the engine thereby avoiding any chances of operation by untrained helpers or unauthorized persons.



Figure 1 : Biometric based engine starting system

2. Quick Response (QR) code: In order to streamline the availability of various documents pertaining the mechanical operation and maintenance, equipment related documents and operators details at the spot work front, QR Code (fig.2 below) was implemented. It enabled the site team to deposit the related data (all details such as drivers competency, driving license, equipment's PO, etc.) which can be extracted on the spot by QR Code. This QR Code is pasted on the vehicle itself which can be accessed anytime in the site.

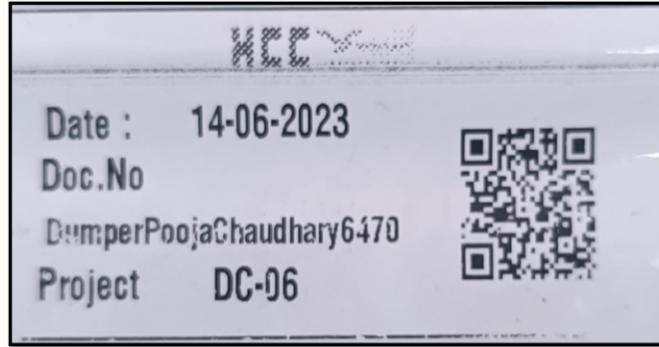


Figure 2 : QR Code Sample

3. Rear view cameras are installed to prevent over run while reversing of Dumper, helpers are made mandatory in all Dumper vehicle to assist the driver while reversing and maneuvering turns in the site.(Fig. 3 below) this arrangement has greatly helped the operators and drivers by eliminating the blind spot behind their equipments which has led to total elimination of any accident during the reversal of any equipment in the project.

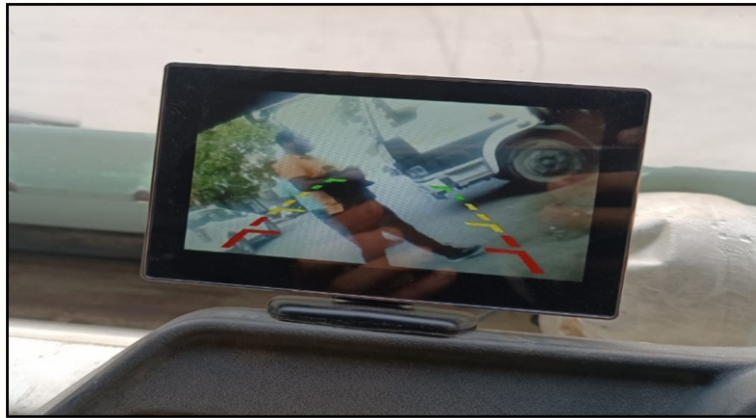


Figure 3 : Rear View Cameras

4. Lateral Under Protection Device (LUPD) & Rear Under Protection Device (RUPD) were installed in all the construction vehicles which helped in providing a safety protection by eliminating the chances of under run inside the vehicles and thus helped in stopping any chances of accidents. This is a very simple addition to the vehicle both in the lateral sides as well as rear end and can be easily installed at the time of induction and commissioning of the vehicle in site. (Ref. Fig. 4 & 5 below)



Figure 4 : LUPD



Figure 5 : RUPD

- GPS monitoring installed to track the movement and location of dumper, speed governor system installed to monitor speed and to avoid rash driving and to avoid untoward accident/ incident. In case of any wayward movement or unruly driving the driver can be contacted and reprimanded for returning to the planned route and speed. It greatly helps in controlling the movement of vehicles used in earth/muck disposal or transfer of materials like RMC, etc. (Fig. 6 below).

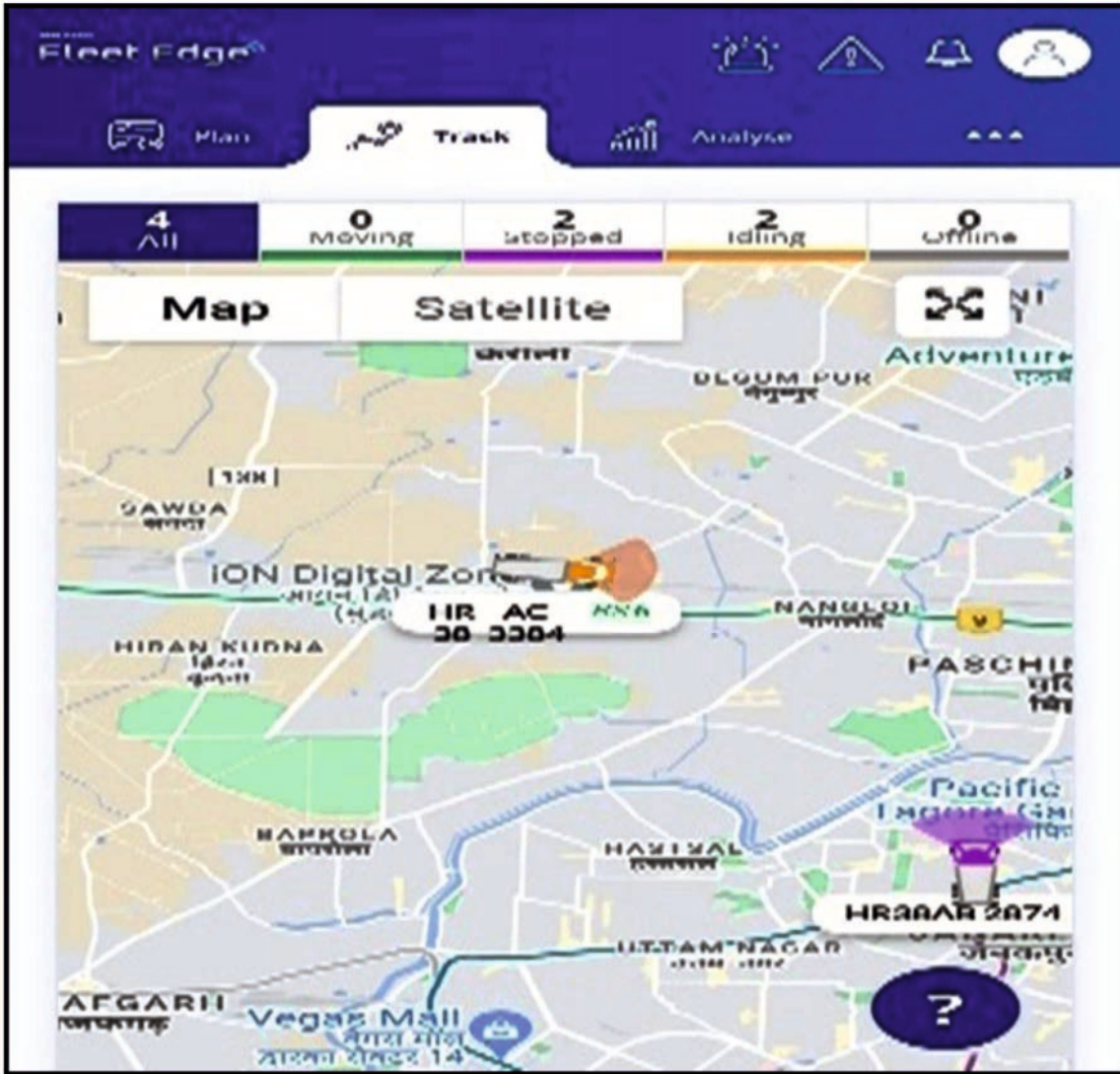


Figure 6 : GPS Tracking