HTOA
Hydraulic
Trailer
Owners
Assocation

Volume 1 Issue 6
June 2016

HEAVY HAULERS

FIRST HEAVY LIFT JOURNAL OF INDIA

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नितिन गडकरी
NITIN GADKARI

सत्यमेव जयते

मंत्री
सड़क परिवहन, राजमार्ग
एव पोत परिवहन
भारत सरकार
MINISTER OF ROAD TRANSPORT,
HIGHWAYS AND SHIPPING
GOVERNMENT OF INDIA

Message

I hereby congratulate HEAVY HAULERS on going into second year of publication.

HTOA has acted as an extended arm to the Government for understanding the constraints in system at ground level and also work out logical solutions to promote Government's initiative on "Ease of doing Business"

It feels good to share that Ministry has amended CMV Rules, 1989 on 18th April 2016 for easing Registration process of Modular Hydraulic Trailer & Puller Tractor.

I feel pleasure in conveying that Ministry is in the process of launching Vahan-4 portal which will act as single largest data base of motor vehicles under single platform. This will promote the benefits of digitalization.

I wish HTOA all success in future and expect that it will continue regular interaction with Ministry for overcoming hurdles, if any in OD/OWC movements in India and also promote transparency through wide circulation of Government Policies through HEAVY HAULERS.

(Nitin Gadkari)

Transport Bhawan, 1 Sansad Marg, New Delhi-110 001, Tel. 23711252, 23710121 (O), 23719023 (F)
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Regd Office: “Automotive House”, 108, Bazar Ward, Kurla West Mumbai 400070

Website: http://www.automotiveml.com

Rajeev Gupta
Director

MESSAGE

I wish to congratulate HTOA for the publication of HEAVY HAULERS – a journal which gives an inside view on heavy cargo movement and promotion of safe practices through regular interaction with all stakeholders.

Ease of doing business through online permission system has led to major reduction in transit time and also achieves our delivery schedules.

I wish entire HTOA team grand success in future and also look forward for development of over weight corridors by the Government to align with growing need of the Industry.

For Inox Wind Limited

Inox Wind Limited Noida

Rajeev Gupta

Director

INOX WIND LIMITED (Registered Office & WTG Plant) : Plot No. 1, Khasra No. 264 to 267, Industrial Area, Village-Basal, Distt. Una-174 303, (H.P.) INDIA
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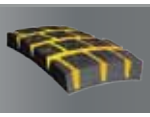

EXTRA MILEAGE
High NSD for longer initial tread mileage.

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10.00 R20	7.5x20	16	1066	282	19.0	K(110)	146/143
11.00 R20	8.0x20	16	1091	298	19.9	K(110)	150/147

contents

Hydraulic Trailer Owners Association

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Fax: 91-22-61775500
E-Mail: htoa@htoa.org
Website: www.htoa.org

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Hydraulic Trailer Owners Association

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Nilesh Sinha

From the desk of Chairman

Manish Kataria
Chairman
Hydraulic Trailer Owners Assocation

ODC Movements
Moving to a safer era

I am delighted to inform that Heavy Haulers has successfully entered into its second year of publication.

Country has also seen two years of Central Governance under able leadership of Shri.Narendra Modi, Hon'ble Prime Minister of India.

Government's focus on developmental activity across the Nation has also lead to improvement in load availability for hydraulic trailers which can be felt with the data being generated through Online movement permission portal being managed by the Ministry.

With the growing volumes and increased focus on Road Safety by the Union Government as well as serious concern on safety issues by the manufacturing fraternity, it is high time that our fellow member and hydraulic trailer operators across the Country align with the thought process and work hard on compliances of safety norms & procedures.

HT operators being a responsible element of Road Transport community must feel their social & moral responsibility for concern on Environment, Health & Safety of their crew, equipment, cargo, public property & society.

It is important to note that the cargo being moved on hydraulic trailers is high value & critical component for the customer and as such any compromise on safety issues may lead to otherwise avoidable mishaps which have cumulative impacts:

i. Damage to cargo
ii. Damage to transport equipment
iii. Project Delay
iv. Ir-repairable human loss
v. Damage to Public Property
vi. Financial disputes with customer
vii. Hit to future business
viii. Litigations

HTOA since its inception has always acted for promotion of safe practices in close co-ordination with all concerned agencies.

With the increase in dimensions & weight of the cargo, HT operators should avoid unfair competition by compromising on EHS issues for operating cost reduction. Special precaution be taken while moving:

a. Over height cargo and passing under electric service or transmission lines to avoid electrocution hazards
b. Over width cargo for passage to other vehicles on road
c. Over length cargo during overtaking

Indian Bridge Management system becoming a reality in near future will lead to transparent data sharing on health & condition of bridges, it will be therefore in overall interest of all stakeholders to opt for safe structures and route. If needed, necessary civil works be undertaken by Government/customers for safe movement on Indian Roads & Bridges.

This issue of Heavy Haulers is dedicated to Environment, Health & Safety promotion in movement of over dimensional & over weight consignments over hydraulic trailers.

I am thankful to the editorial board who has put rigorous efforts in getting information on global safe practices procedures and making them part of this issue.

JAI HIND

Manish Kataria
Chairman-HTOA

अध्यक्ष की कलम से

मनीष कटारिया
अध्यक्ष
हाइड्रौलिक ट्रेलर ओनर्स एसोसिएशन

ओडीसी सड़क परिवहन
एक सुरक्षित युग की ओर

मुझे यह बताते हुए खुशी हो रही है कि हैवी हौलर्स ने सफलतापूर्वक अपने प्रकाशन के दूसरे वर्ष में प्रवेश कर लिया है।

देश ने भी भारत के माननीय प्रधानमंत्री श्री नरेंद्र मोदी जी के कुशल नेतृत्व में केंद्रीय सुशासन के दो साल देखें हैं।

देश भर में विकासोन्मुख गतिविधियों पर सरकार द्वारा विशेष ध्यान देने के कारण हाइड्रोलिक ट्रेलरों के लिए लोड उपलब्धता में सुधार हुआ है जोकि मंत्रालय द्वारा संचालित ऑनलाइन मूवमेंट परमिशन पोर्टल के द्वारा उत्पन्न हो रहे आंकड़ो के जरिये महसूस किया जा सकता है।

बहुआयामी भारी माल की बढ़ती मात्रा एवं केंद्र सरकार द्वारा सड़क सुरक्षा पर विशेष ध्यान, विनिर्माण बिरादरी द्वारा सुरक्षा के मुद्दों पर गंभीर चिंता के साथ, यह उचित समय है कि हमारे साथी सदस्यों और देश भर में हाइड्रोलिक ट्रेलर ऑपरेटरों के विचारों में तालमेल हो और सब सुरक्षा नियमों और प्रक्रियाओं के अनुपालन पर कड़ी मेहनत करें।

सड़क परिवहन समुदाय के एक जिम्मेदार सदस्य होने के कारण एचटी ऑपरेटरों को पर्यावरण, अपने चालक दल के स्वास्थ्य और सुरक्षा, उपकरणों, कार्गो, सार्वजनिक संपत्ति और समाज के प्रति अपनी सामाजिक और नैतिक जिम्मेदारी महसूस करनी चाहिए।

यह ध्यान रखने योग्य बात है कि हाइड्रोलिक ट्रेलरों पर ले जाया जा रहा माल ग्राहक के लिए

अत्याधिक महत्वपूर्ण और उच्च मूल्य का है। सुरक्षा के मुद्दों पर किसी भी तरह का समझौता अप्रिय दुर्घटनाओं को जन्म दे सकता है तथा इसके निम्नलिखित परिणाम हो सकते हैं :

1. माल की क्षति
2. परिवहन उपकरणों को क्षति
3. परियोजना में विलम्ब
4. अपूर्णीय मानवीय क्षति
5. सार्वजनिक संपत्ति को क्षति
6. ग्राहक के साथ वित्तीय विवाद
7. भविष्य में कारोबार का क्षति
8. कानूनी मुकदमें

अपनी स्थापना के समय से एचटीओए ने सदैव सभी संबधित एजेंसियों के साथ नजदीकी समन्वय बनाने एवं सुरक्षित तरीकों को बढ़ावा देने का काम किया है।

माल के आकार और वजन में वृद्धि के साथ, एचटी ऑपरेटरो को परिचालन लागत में कमी के लिए ईएचएस मुद्दों पर समझौता कर अनुचित प्रतिस्पर्धा से बचना चाहिए। चलते समय निम्नलिखित विशेष एहतियात बरतनी चाहिए :

1. बिजली के खतरों से बचने के लिए अधिक ऊंचाई वाले माल और बिजली सेवा या पारेषण लाइनों के नीचे से निकलने से बचना चाहिए
2. सड़क पर अन्य वाहनों को रास्ता देने के लिए अधिक चौड़ाई वाला माल
3. ओवरटेकिंग के दौरान ज्यादा लंबाई वाला माल

इंडियन ब्रिज मैनेजमेंट सिस्टम निकट भविष्य में एक वास्तविकता बनेगा जिससे पुलों की मजबूती और हालात पर पारदर्शी डेटा साझा करने में मदद मिलेगी, इसलिए यह सुरक्षित संरचनाओं और मार्ग का चुनाव करने में सभी हितधारकों के हित में होगा। यदि जरुरत पड़ती हैं तो भारतीय सड़कों और पुलो पर सुरक्षित आवाजाही के लिए सरकार/ ग्राहकों द्वारा आवश्यक सिविल कार्य कराया जाना चाहिए।

हैवी हौलर का यह परिशिष्ट हाइड्रोलिक ट्रेलरों के ऊपर ज्यादा भारी और बहुआयामी माल के परिवहन में पर्यावरण, स्वास्थ्य और सुरक्षा को बढ़ावा देने के लिए समर्पित है।

मैं संपादकीय बोर्ड का आभारी हूँ जिन्होंने वैश्विक सुरक्षित पद्धतियों एवं प्रकियाओं के बारे में जानकारी इकठ्ठा कर इसे मुहिम का हिस्सा बनाने के लिए कठोर प्रयास किये हैं।

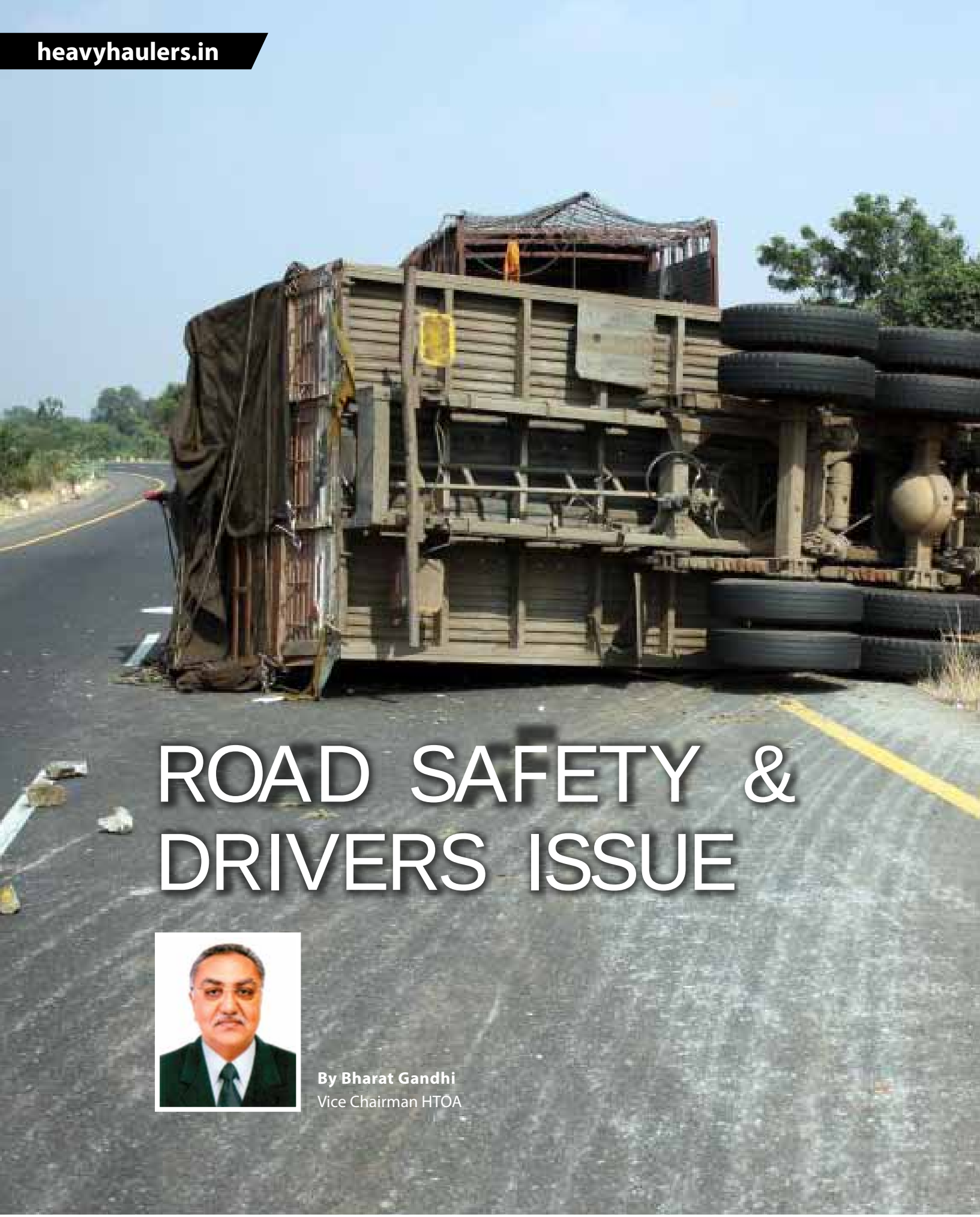
जय हिन्द

मनीष कटारिया
अध्यक्ष, एचटीओए

HTOA Meetings During
February, 2016 to June, 2016

Date	Dignitaries/officials met	HTOA oficials Present	Issues Discussed	Venue
3-Feb-16	**Shri. Nawal Kishore Sharma,** Director-Toll, MoRTH	**Shri. Manish Kataria** Chairman **Shri. Sandeep Gupta**	Toll policy on hydraulic trailer combinations	Parivahan Bhawan, New Delhi
10-Feb-16	**Shri. Shyam Vardhane**	**Shri Bharat Gandhi** Vice Chairman **Shri Sukhvinder Singh** Treasurer	Courtesy Call on new joining	Transport Commissioner Office, Bandra, Mumbai
11-Feb-16	**Shri. Nitin J Gadkari,** Union Minister for Road, Transport & Highways, GOI	**Shri. Manish Kataria** Chairman **Shri. Jignesh Patel** Secretary **Shri. T.G. Ramalingam** Jt. Gen. Secretary	Inland waterways infra development for ODC movement, Skill Development for drivers & hydraulic axle operating crew, State Roads Permission system.	Parivahan Bhawan, New Delhi
11-Feb-16	**Dr. Sanjeev Kumar** (IAS), P. S. to Minister of Railways		Online Permission for Railway power block	Rail Bhawan, New Delhi
16-Feb-16	**Shri. Kaushik Basu,** Chief Engineer (Mechanical), MoRTH, IRC3 Committee meeting	**Shri. Ravi Kumar** TII Sales **Shri. Sandeep Gupta**	Review of IRC 3 code	IRC Bhawan, New Delhi
19-Feb-16	BHP-2016 Break Bulk Heavy Cargo Exhibition & Seminar	**Shri. Manish Kataria** Chairman **Shri. Bharat Gandhi** Vice Chairman **Shri. Jignesh Patel** Secretary **Shri. T.G. Ramalingam** Jt. Secretary **Shri. Sukhvinder Singh** Treasurer	Innaugaration by Shri. Anant Geete, Union Minister for Heavy Industries and Shri.Manish Kataria represented HTOA in innaugural session panel discussions	Convention & exhibition Centre, Goregaon (E), Mumbai
22-Feb-16	National Meet chaired by **Shri. Nitin J Gadkari** Unon Minister for Road, Transport & Highways	**Shri. Manish Kataria** Chairman **Shri. Bharat C Gandhi** Vice Chairman	37th Transport Development Council & 16th Road Safety Council Meeting	NDMC Convention Centre, Janpath, New Delhi
	Shri. Sanjay Mitra Secretary-RTH **Shri. S.N. Das** DGRD&SS **Shri. R.K. Singh** Coordinator **Shri. A.K. Pandey** SE (Bridges)	**Shri. Manish Kataria** Chairman **Shri. Bharat C Gandhi** Vice Chairman	Follow up on pending issues on RLW Notification & improvement in online permission system	Parivahan Bhawan, New Delhi

24-Feb-16	**Shri. Nitin J Gadkari,** Union Minister for Road, Transport & Highways, GOI Dr.Jochen Landes-MD-TII India Ltd. & TII management	HTOA Managing Committee	Innauguration of TII India Ltd., Bawal manufacturing plant	Imperial Hotel, New Delhi
21-Mar-16	**Shri. Amitabh Verma** Chairman-IWAI **Shri. Shrikant Mahiriya** Member Traffic, IWAI	**Shri. Manish Kataria** Chairman **Shri. Bharat C Gandhi** Vice Chairman	Development of Waterways for OD/OWC transportation & handling	IWAI Bhawan, Noida
4-May-16	**Shri. Abhay Damle** Jt. Secretary-Transport **Shri. Priyank Bharti** Director-MVL **Smt. Dharkat U Liang** Under Secretary **Shri. R.K. Singh** Coordinator **Shri. B.K. Sinha** Chief Engineer **Shri. A.K. Pandey** SE-Bridges	**Shri. Manish Kataria** Chairman **Shri. Bharat C Gandhi** Vice Chairman **Shri. Sukhvinder Singh** Treasurer	Persuance of pending issues on Notifications	Parivahan Bhawan, New Delhi
	Shri. Hanish Yadav PS to Minister of Railways, GOI	**Shri. Manish Kataria** Chairman **Shri. Bharat C Gandhi** Vice Chairman **Shri. Sukhvinder Singh** Treasurer	Online Permission for Railway power block	Rail Bhawan, New Delhi
12-May-16	**Shri. Kishore Kumar** DRM-East Central Railway, Mughalsarai **Shri. Adhar Raj** Sr. DOM-East Central Railway, Mughalsarai	**Shri. Manish Kataria** Chairman **Shri. Mohan Rao** **Shri. Vimlesh Singh** **Shri. Shailendra**	Railway Power Block charges abnormality	DRM office, Mughalsarai
24-May-16	**Dr. Suprabha Dahiya** IAS, Transpoirt Commissioner, Haryana	**Shri. Manish Kataria** Chairman **Shri. Bharat C Gandhi** Vice Chairman **Shri. Jignesh Patel** Secretary **Shri. Pradeep Bansal** **Shri. Atul Loomba**	Age restriction on renewal of fitness & N.P. for hydraulic trailers	Transport Commissioner-Haryana office, Chandigarh
14-Jun-16	**Shri. Nitin J Gadkari** Union Minister for Road, Transport & Highways, GOI	**Shri. Manish Kataria** Chairman	Completion of 2 years of Governance	Parivahan Bhawan, New Delhi



ROAD SAFETY & DRIVERS ISSUE

By Bharat Gandhi
Vice Chairman HTOA

We should have more Advertisement/audio visual showing safe disciplined driving on SH/NH through print media or through various regional TV CHANNELS, highlighting importance of safe highway driving on State/National highways.

DVD should show proper parking and driving on SH/NH, and good driving habits i.e do not drink and drive etc.

Now A days condition of all road be it State/National Highway is very much improved & modernized, but still a long way to go in this direction because this SH/NH do not have proper parking bays for trucks & trailers & Non availability of sanitized restroom where driver community can rest during their break journey from long drive on SH & NH. Also there should be proper medical facilities at such resting bays.

Due to non availability of proper parking bay drivers of all vehicle specially Heavy ODC/OWC vehicle is parked on side of the SH/NH, with the result that driver of small vehicle has to overtake them and this may cause the road accident.

Drivers of all goods/Heavy vehicle they do not observe their lane discipline and so when in all three lane goods/heavy vehicle is plying it becomes difficult for small vehicle to drive straight and they starts going left to right for getting proper way and this may cause the road accident. There should be strict lane discipline on the SH/NH.

Parking bay/petrol Pumps:

There should be enough space available at minimum distance of 500 meters off Highways with proper double line entry and exit on service

roads and there should be separate parking bay for each category of vehicles such as 2 wheelers, four wheelers, luxury buses, truck, tempo, trailers, ODC multi modular axles etc,Which will reduce highway accidents.

CAUSES OF ACCIDENT;

1. **Speed**
2. **Overloading**
3. **Mechanical failure**
4. **Lack of driving /traffic sense.**

1. Today vehicles crosses the speeding limit indicated on express/ national /state Highways due to better condition of road. High speeding vehicle which makes vehicle uncontrollable due to excess speed and causes accident on the road. Moreover all luxury buses are speeding at more than 100 Km P.H. due to smooth and improved road conditions they indulge in overtaking by

throwing caution to wind which causes major road accident.

2. Overloading: today in spite of overloading restriction on vehicles on NH/SH highways, vehicles plying at short distance area and within the district limits carrying sand /stones etc are indulging at over speeding, being overloaded which causes damages to road and bridges and are also responsible for many road accident.

3. Mechanical failure: due to sudden failure of vehicle on the road and when driver do not display danger sign or they do not show their parking light when a vehicle has failed on the road, this parked vehicle may become the cause of major road accident.

4. Lack of driving /traffic sense: our driver community has not gone through any proper training though school of driving or any institute, they just become driver from truck cleaner hence illiteracy is the cause of reading driving instruction whereas they go by the practice taught by his master and they are not able to adopt the correct method of driving on SH/NH.

Driver community should be educated to follow traffic rules and they should be explained importance of road safety of their and others life also who travels on Highways.

We should ask government to take initiative in building proper rest bay at all the state and national highways with Healthy rest rooms with entertainment facilities, food facilities and with small medical centre to take of any road injuries. These Bays should be huge in area by dividing proper parking places between truck /trailers and ODC vehicles so that each vehicle can easily get in or get out of the bay.

Drivers should be taught of wearing seat belts and incase of ODC load all danger signs red light bulbs , red flags etc or a sign of a long trailer should indicate that a lengthy vehicle is plying on the road.

Diversion on SH/NH:

Now days any SH/NH road repair is carried by the authority though contractor, they are putting up small board at the starting of diversion which not visible from long distance and suddenly vehicle has to swerve on diversion road, which is very rough and unevenly made which takes huge toll of new modern vehicles. Diversion should be at the proper height of 10' to 12' indicating diversion ahead and should be with the glowing sign so that it is properly visible at night, which will reduce road accident at such diversions.

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Delivering Your Valued Assets Across

Long Vehicle Loads

By Marco J van Daal
Lecturer/Author/Speaker

While on route from origin to destination, Heavy Transports often encounter areas where maneuvering is critical and demanding on both equipment and personnel. Notorious in many cases are port areas and sites that are still in the process of construction. Both are unpredictable in nature, even when a route survey has been conducted, it is difficult (if not impossible) to predict what will change between the time of the survey and the time of execution. In ports all over the world, cargo arrives on a continuous basis, and is often stored temporarily in various areas inside the port vicinity. Sites that are still under construction are often subject to excavations, road diversions or partial new infrastructure. In particular when transporting long cargo this can become a major challenge. Long cargo is here identified as cargo being transported on fixed transporters (no bolsters or turn tables) of at least 18-24 axle lines.

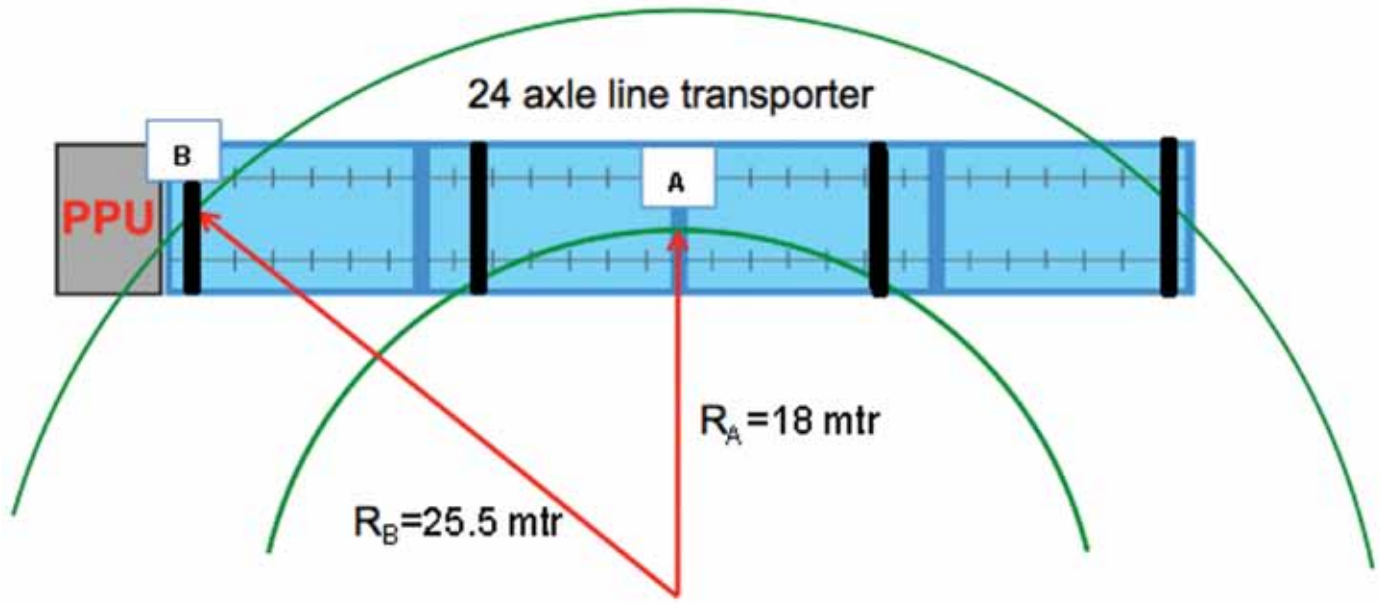
The figures shown in this article are examples of such transports that have gone wrong for one reason or the other. These types of mishaps we do not see often for two reasons.

1. only a small percentage of cargo is transported this way

2. if it does happen it is often in a secluded area (site or port) with little or no access for general public

If there is a risk that such incidents can happen, one could ask the question why such long vehicles are used. As it turns out there is a multitude of reasons.

When transporting long vessels one can opt for a long vehicle or one can opt for a configuration with turn tables. The decision process involves; availability of equipment, time (due to possible change of configuration), Center of Gravity (which is higher when using turn tables),



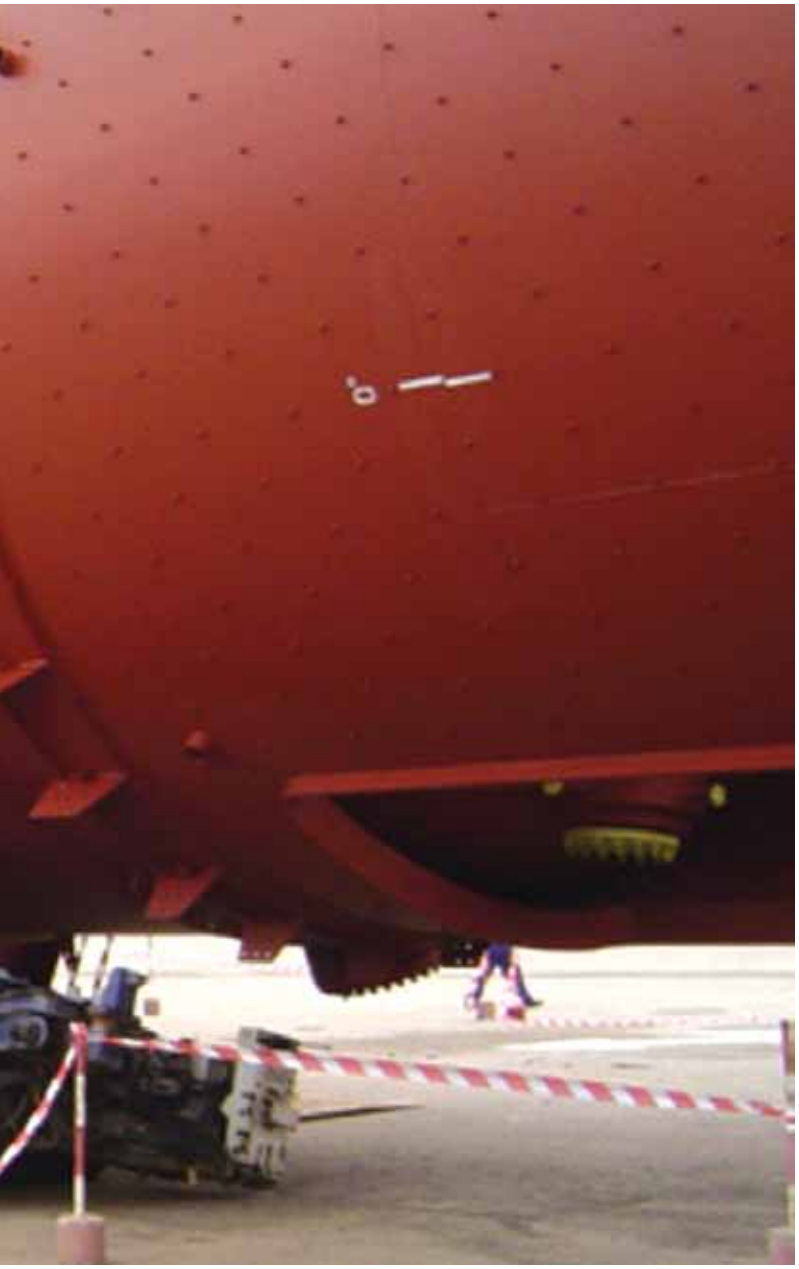
infrastructure and many more.

For the transport of pipe racks, this decision process is often (not always) shorter as many pipe racks are not structurally strong enough to be supported in only two (turn table) locations.

In addition, in case of pipe racks, there are often a large number of such units due to the modularization concept and the time involved to load and unload becomes an important factor.

Once it has been decided that that long vehicle will be used for the transport there are two important aspects that have to be taken into account. First, the engineering of such long vehicle loads are not straightforward. Secondly, the velocity parameters (read speed limitations) that are assumed at an engineering level are to be communicated to the operations level. A deviation away from those assumed limits can have devastating results.

When performing transport calculations we normally assume that external forces such as acceleration, deceleration, road cambers and curve impact (or centripetal force) apply to the (combined) center of gravity, which in turn affects the load per each axle. We then add up all those forces and ensure that sufficient lasing is applied to the cargo to compensate for these forces. A perfectly correct approach.



It is the centripetal forces that can cause problems if not interpreted and determined correctly. Figure 1 shows a sketch of a 24 axle line self propelled transporter. This transporter carries a load supported by four (4) transport saddles. These transport saddles are shown in black. The Center of Gravity of the load is located in point "A" at the centerline of the transporter. Assuming that the transporter makes a turn of which the radius measured from point A is 18 mtr (59 ft). Furthermore we assume that the mass of the cargo is 360,000 kg (793,000 LBS) and the transporter velocity is 5 km/hr or 1.38 mtr/sec (3.1 MPH). The formula to determine the centripetal force is;

$$F = \frac{mV^2}{r}$$

Centripetal force is directed away from the center and is perpendicular to the transport direction.

Note: The explanation of centripetal vs. cetrifugal force is outside the scope of this article.

$$F_A = \frac{mV^2}{r} = \frac{360,000 * (1.38)^2}{18} = 38kN$$

This is the cetripetal force on the cargo in point "A" and roughly equals 3.8 ton.

This is however not the centripetal force that the cargo applies to the transporter. Review again Figure 1 and note that there is a transport saddle located at one of the extremes of the transporter, in point "B". Also note that the radius to that point "B" measures 25.5 mtr (as opposed to the 18 mtr to point "A"). When the transporter makes a full circle, point "B" has traveled a longer distance (the circumference of the circle) than point "A".

Point "A" has traveled 2*18 mtr * Pi equals
(18 * 2) * 3.14 = 113 mtr (370 ft)

Point "B" has traveled 2*25.5 mtr * Pi equals
(25.5 * 2) * 3.15 = 160 mtr (525 ft)

If point "B" has traveled a longer distance than point "A" in the same time, it can only mean that Point "B" is traveling at a higher speed. Indeed, if point "A is traveling at 1.38 m/s, than point "B" is traveling at 1.955 m/s and this results in an increased centripetal force at these extremes of the transporter.

This can be experienced when riding a bus (as a passenger). When seated towards the center of the bus one experienced a much lower centripetal force than when seated at the front or rear of the bus.

$$F_B = \frac{mV^2}{r} = \frac{360,000 * (1.955)^2}{25.5} = 54kN$$

Note: Any cargo supported in more than 2 locations represents a so-called "statically undetermined" situation where it is not possible to calculate how much each support point carries. In this example it is assumed that the entire weight of the cargo was carried by the support

point at the extremes of the transporter as this results in the worst case scenario against which lashing is to be applied.

As we are all human we all have human short comings. As mentioned before, pipe racks come in multiple units. Human nature is the behaviour that after having transported a number of these pipe racks the operator becomes (over) confident and increases his velocity. Lets assume that he increases his velocity to 10 km/hr or 2.77 m/s (up from 5 km/hr or 6.2 MPH)

As an immediate result the centripetal force in point "A" increases accordingly.

$$F_A = \frac{mV^2}{r} = \frac{360,000 * (2.77)^2}{18} = 153kN$$

Once again, the centripetal force against which lashing is to be applied is much higher as these occur in point "B" as a result of a much higher velocity (3.92 m/s compared to 2.77 m/s).

$$F_B = \frac{mV^2}{r} = \frac{360,000 * (3.92)^2}{25.5} = 217kN$$

In Summary;

Figure 4 shows an overview of the applicable centripetal forces in each of the 4 scenarios. As one can see these have increased from 38 kN to 217 kN, an increase of over 500 %.

A higher centripetal force means that certain axles and axle groups are now exposed to a higher load as the cargo is "pushed" toward that side of the transporter. Likewise, certain axles and axle groups, on the other side of the transporter, now experience a lower load. This in itself is not necessarily a problem as long as these higher loads are still within the hydraulic and structural limits of the transporter, as long as the lower loads do not create an uplift and as long as the applied lashing can cope with the centripetal forces in question. In addition, when centripetal forces increase, the higher forces onto the axles and axle groups cause more deflection of the tires. Together with lesser tire deflection on the other side of the transporter, it can be stated that the transporter deck will tilt under the influence of the centripetal forces. When underestimated this can result in an unrecoverable situation.

This example has demonstrated that it is of great importance that the velocity parameters or speed limitations are communicated to the operating crew and that these speed limitations (5 km/hr or 3.1 MPH) are not to be exceeded.

The figures shown is this article clearly shows that the transport ran into some sort of problem as one see. The theory as outlines above could be one explanation, it does not have to be the only one. This article highlights one of the possible problems one can run into when centripetal forces are underestimated.

Bio.

Marco J. van Daal has been in the heavy lift & transport industry since 1993 starting with Mammoet Transport from the Netherlands and later with Fagioli PSC from Italy, both esteemed companies and leading authorities

V_A=5 km/h= 1.38 m/s	V_A=10 km/h= 2.77 m/s
F_A=38 kN= 3.8 ton	F_A=153 kN= 15.3 ton
F_B=54 kN= 5.4 ton	F_B=218 kN= 21.8 ton
An increase of 42%	**An increase of 574%**

in the industry. His 20 year plus experience extends to 5 continents and over 55 countries and has resulted in a best selling book "The Art of Heavy Transport" which is available at www.the-works-int.com. Marco has a real passion for sharing knowledge and experience, the prime reason for his frequently held seminars all over the world. He currently resides in Aruba, Dutch Caribbean, with his wife and two daughters.

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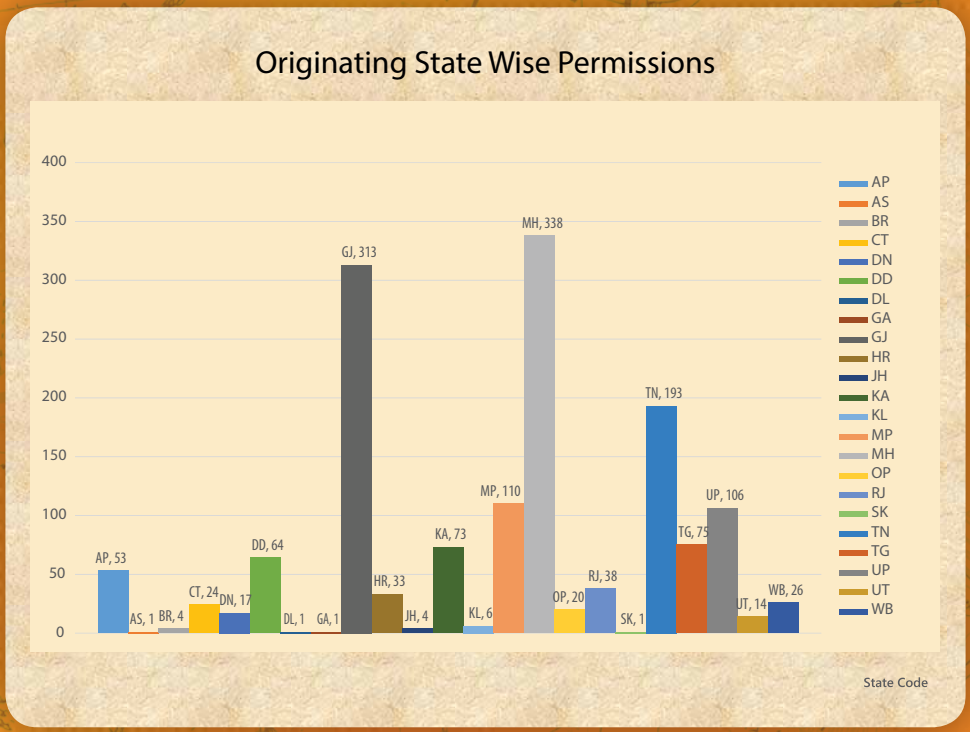

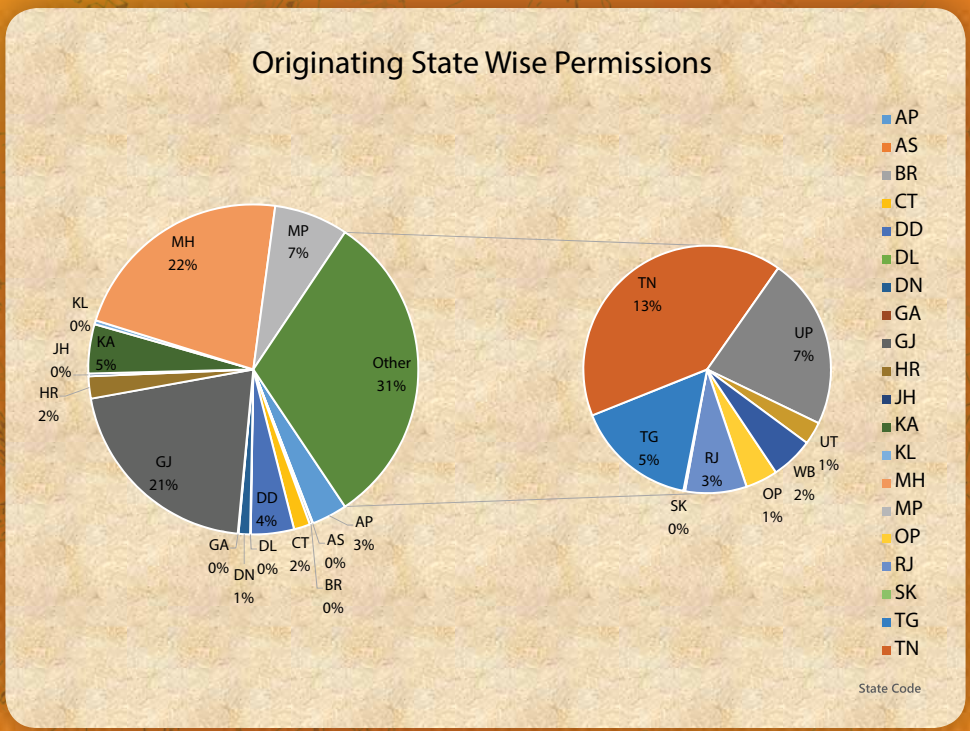

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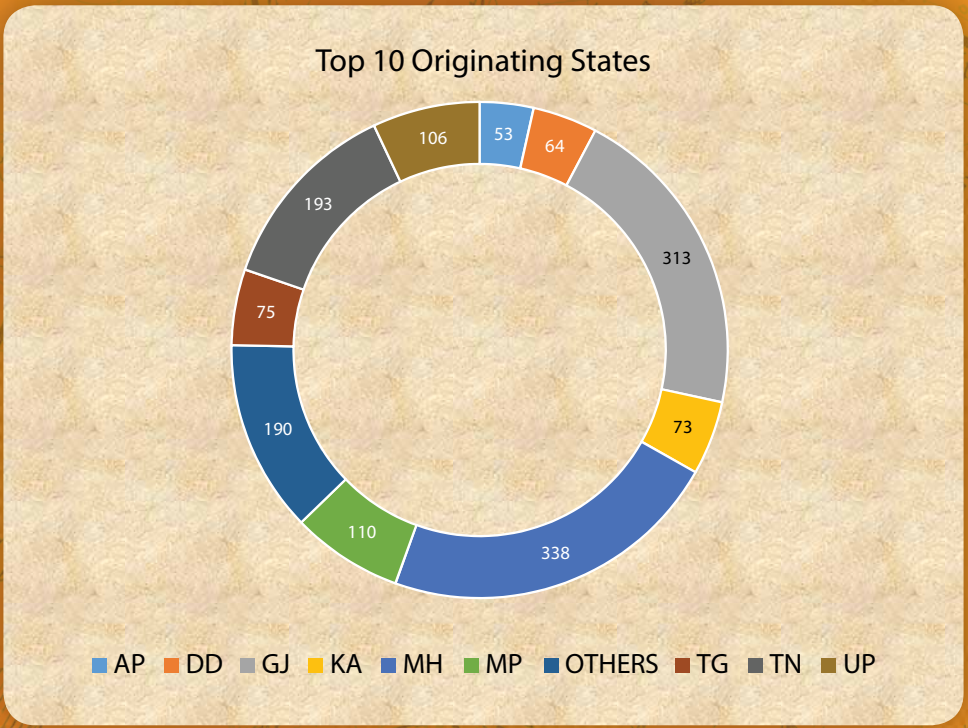

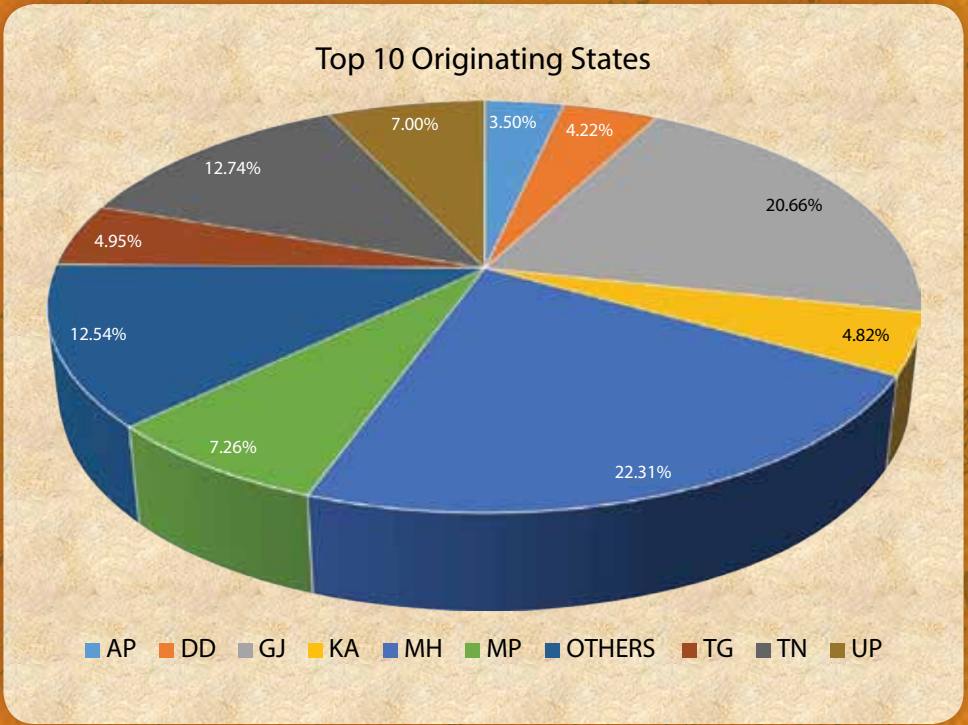

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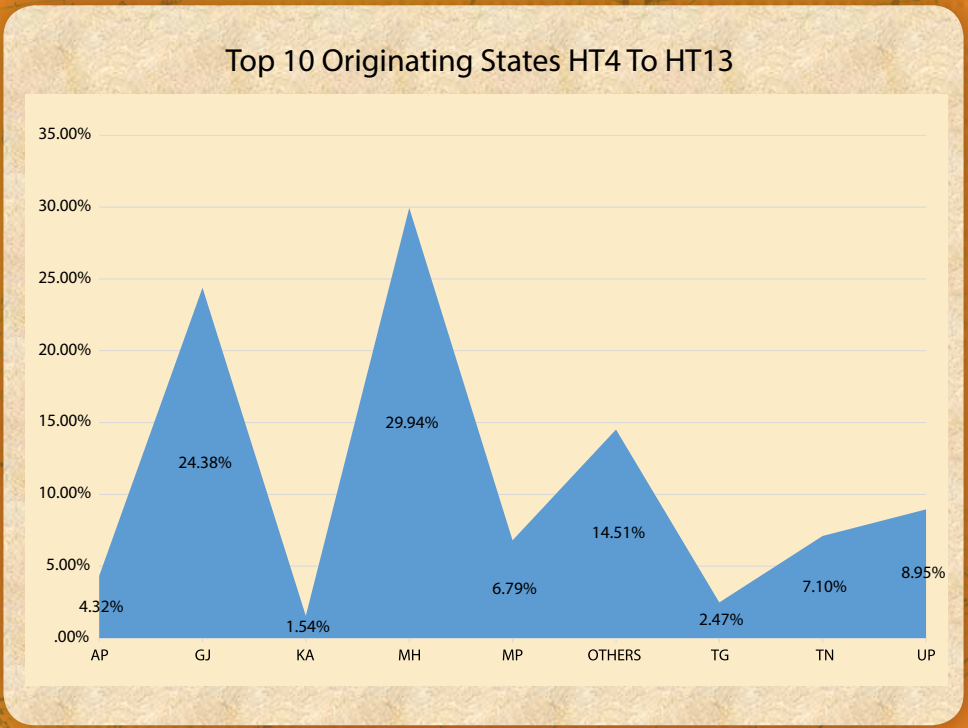

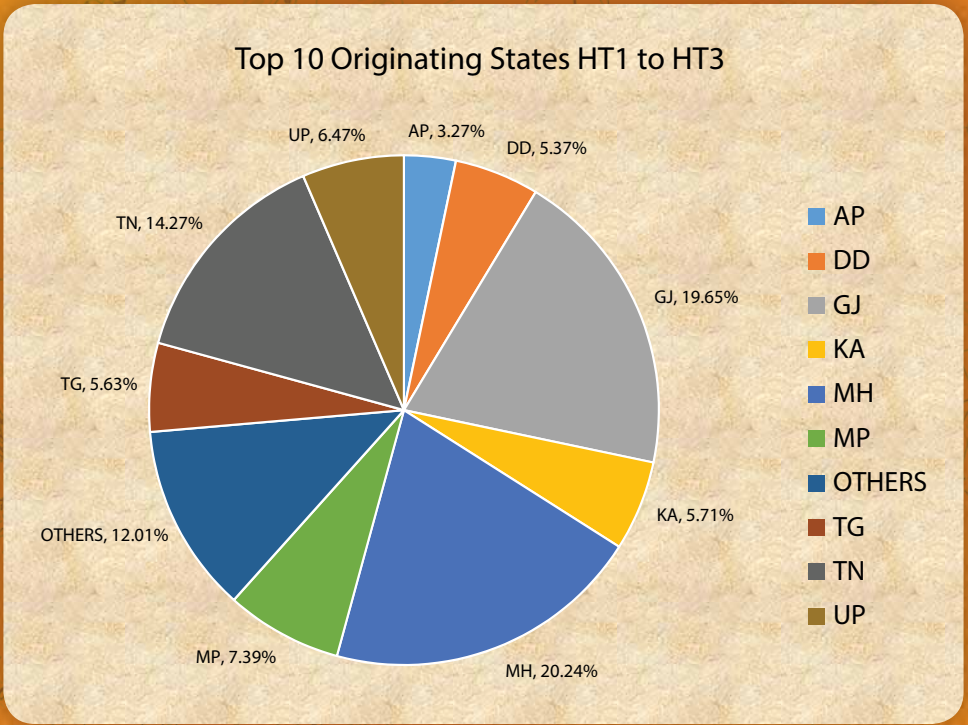

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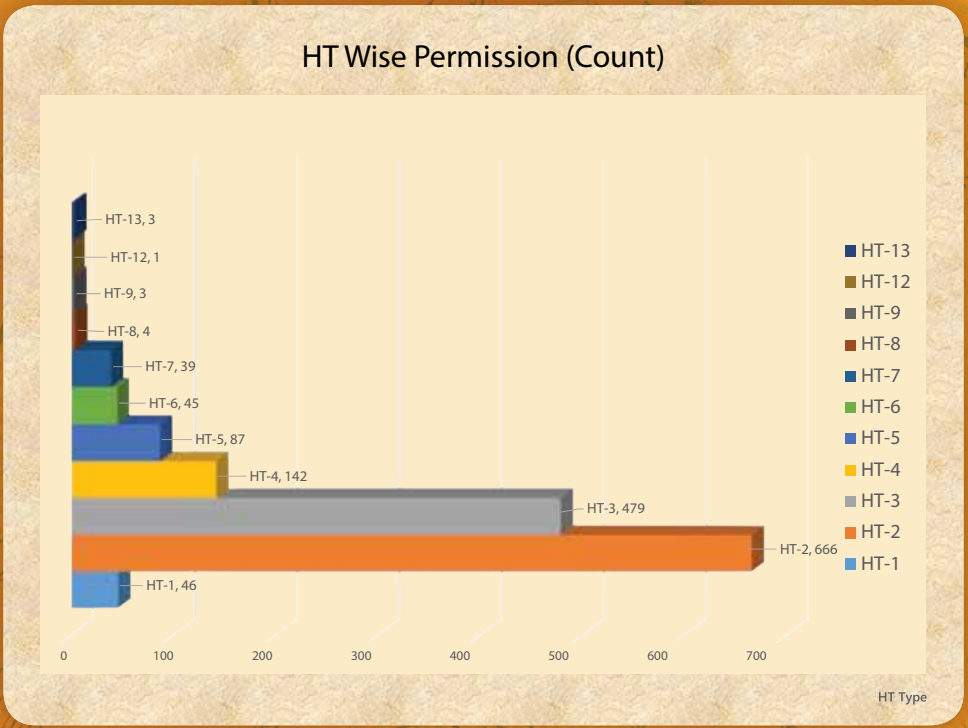

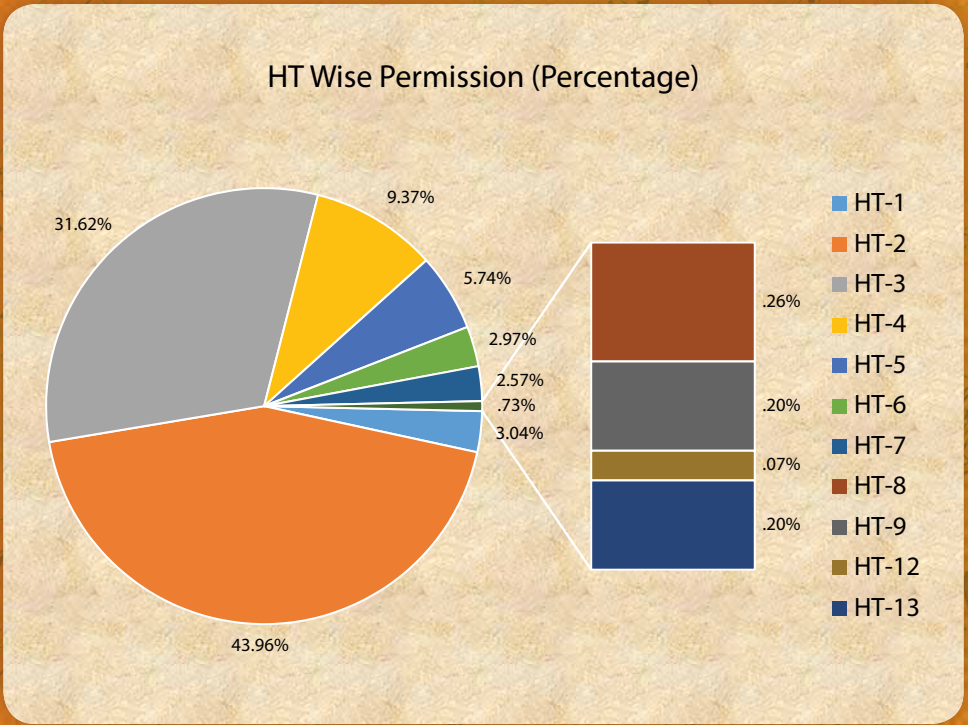

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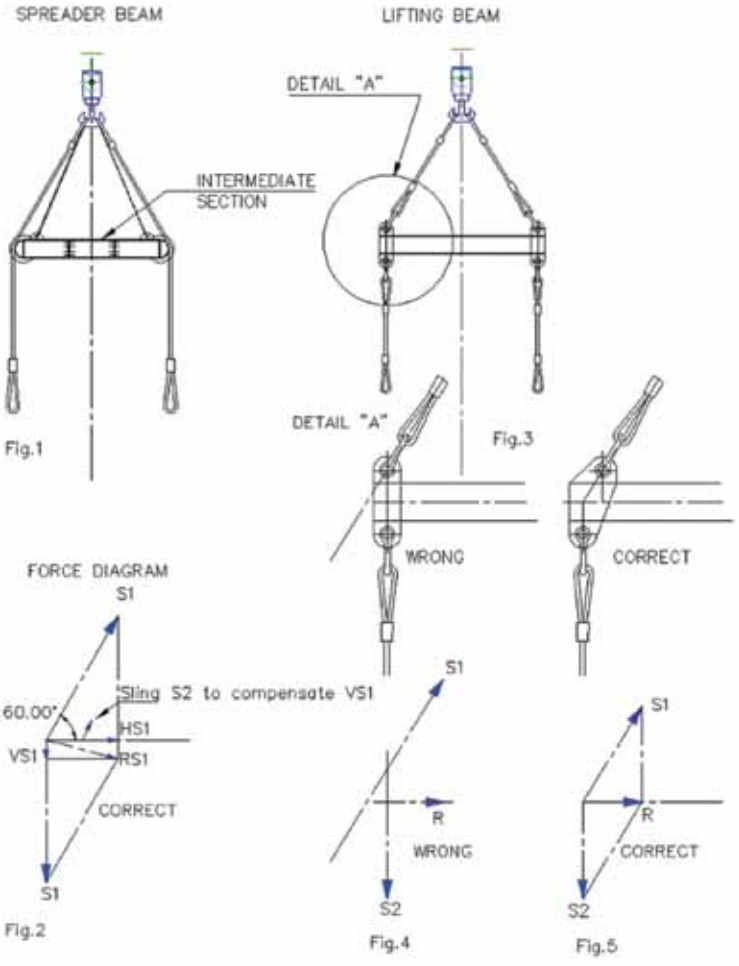
USE OF SPREADER- AND LIFTING BEAMS

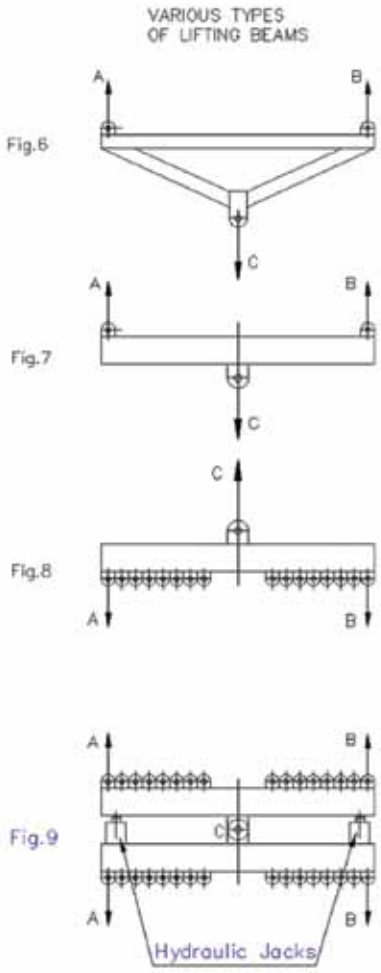
Richard L. Krabbendam
Heavy Lift Specialist

Cargo handling, especially when cranes are involved, requires in many cases the use of special lifting- or spreader beams. Usually stevedores or crane operators dispose of a set of lifting- or spreader beams, that can be used for various types of cargo. As long as the cargo weights are not extreme (<40 Ts), and the dimensions are within what we consider normal sizes (2-3 m wide and 8-12 m long) one can use beams which belong more or less to standard type of equipment of crane operators.

When weights and sizes are beyond normal dimensions, the need for special lifting- and spreader beams becomes a requirement. What considerations should we observe in applying lifting beams or spreader frames and how can we improve efficiency in handling these items. I will try to give a summary of various types of lifting appliances, although I know that it can't be complete within the limited scope of this article.

First, I will explain what we understand under a lifting beam and what I define as a spreader beam. A lifting beam, used in a rigging arrangement, is usually transferring forces through the pad eyes of the lifting beam itself (See Fig.3+4+5+6+7+8), whereby a





spreader beam usually is applied to keep the lifting slings under a certain angle in relation to the lifting lugs of the item to be lifted. The lifting forces are not transferred through the spreader beam itself. The only forces in the spreader beam, are the compression forces, caused by the resultant of the lifting forces. (See Fig.1+2)

When do we use spreader beams?

When a piece of cargo needs to be lifted by a single hook lift and one has to attach the lifting slings to two or more lifting lugs, which only allow vertical forces, then we need to use a lifting beam or spreader frame. The only purpose of the beam is to ensure that the lifting lugs are not loaded under an unacceptable angle. Flat plate type of lifting lugs can usually only be loaded in one plain, parallel to the plain of the lifting lug. Forces perpendicular to this plain are in most cases unacceptable, in which case we have to use a spreader- or lifting beam. For the typical difference between a Spreader beam and Lift beam see Fig. 10. If the task of the lifting appliance only is the verticality of the lifting slings, then the use of a spreader beam is most appropriate. See Fig. 1. The disadvantage of this spreader beam is the loss of lifting height due to the slings which go to the main lifting hook under an angle of 60º.

The design of the spreader beam can be quite simple, as the only task it has to do, is to keep the slings under a certain angle. One has to be careful though and make sure that the spreader beam is applied in the correct way. When we look at the force diagram of a spreader beam (See Fig.2), the force S1 in the sling to the main hook is the same as the force S1 underneath the spreader. Force S1= Force S1 (as it is the same sling). When we work out the resultant force of forces S1, we will find Force RS1, which is pointing slightly downwards, and can be split in a compression force HS1 in the direction of the spreader beam and a Force VS1, which points vertical downwards.

If we do not take precautions, the spreader beam will fall down due

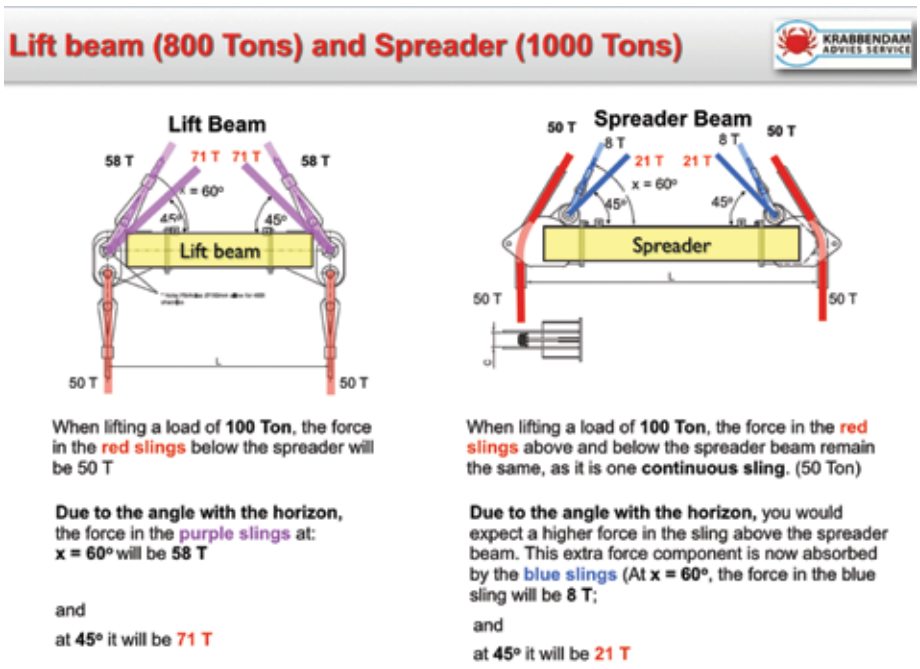


Fig.10 Difference between a Lift beam and spreader beam

Fig.11 A simple Spreader beam made of a HE-400 B beam

to its' own weight as well as due to the vertical force VS1. It is therefore necessary to attach the spreader beam by means of two additional slings S2 to the main lifting hook. Be aware that these slings are not only there to support the spreader beam's own weight but mainly to compensate the vertical force VS1. With heavy loads, the force VS1 must be calculated and suitable slings should be used to hold the spreader beam in position. Let's assume for calculation purposes that sling S2 goes under the same angle to the main hook as slings S1. (See Fig.2)

Force HS1 = S1.Cosα. Force VS1 = HS1/Tg((90+α)/2), so VS1 = S1.Cosα/Tg((90+α)/2). The force in Sling S2 = VS1/sinα. When lifting a load of 200 Tons, the load in sling S1=100 Tonnes and the load in sling S2 =(S1.cos60º/tg75º)/sin60º = 15.47 Tonnes, which cannot be ignored!!

The great advantage of using a spreader beam according above described principle is that it can be a relatively simple H-beam or pipe that can be easily adapted to the length which is required, even for quite big loads.

Only two end pieces of, i.e. 0.5 m should be fabricated combined with intermediate sections of 0.5 m, 1 m, 2 m, 3 m. The flange bolt connections of the intermediate sections make the adjustment to the required spreader beam length quite simple. See fig. 11.

The disadvantage of the spreader beam is that it can only be used for the diameter it was set for, whereby a lifting beam with various lifting pad eyes can be used for different diameter loads. In some cases a combination of spreader and lifting beams is used. In most cases we will loose a lot of the available lifting height. fig. 12.

Fig.12 A combination of Lift- and spreader beams

When do we apply lifting beams

As explained before, the lifting beam does a lot more then just spreading the slings. When fitted to the main lifting hook of the crane, it actually is an extension of that hook and offers its' users the advantage that the slings can be positioned in different positions (See fig. 8+13), which suits the lifting lugs of the load the best. As can be seen from fig. 7+8, these lifting beams are subject to bending forces and shear forces. The pad eyes or lifting trunions used on the lifting beam transfer the forces through the beam itself. A stress analysis on its' own is not sufficient anymore and the lifting beam should be tested for the Safe Working Load it was designed for. Especially when it concerns lifting beams for loads above 100 Tons in weight, one can expect the testing of such a beam to be an expensive exercise. Once the lifting beam has a valid test certificate, it is a very versatile lifting appliance. It is therefore very important to incorporate all practical as well as theoretical knowledge and experience within the design of a lifting beam. The design and fabrication of lifting- and spreader beams should be done by specialists.

Fig.13 Unstable load, due to using wrong type of lift beam

Some important parameters to be observed are:

- Own weight of lifting beam should be as low as possible
- Decrease of lifting height should be as little as possible
- The design of the lifting beam should suit a wide variety of loads
- Fitting and handling of the lifting beam must be easy
- Be aware of Stability of the load, when lifting from lift points below the CoG of the load. See fig13.

In case two identical lifting beams are fabricated, the testing of these lifting beams can sometimes be done with hydraulic jacks as shown in fig.9.

Design mistakes in lifting beams

One of the most common design mistakes in lifting beams is the incorrect position of the lifting pad eyes at the end of the beam. In many cases I have seen pad eyes positioned on lifting beams as shown in Fig.3+14. In this case, one has not observed the working line of the lifting forces, resulting in a possible overload of the pad eyes. It cannot be expressed strongly enough: Leave the design and fabrication of lifting beams to specialist fabricators, who have a large track record and extensive experience. Wrong design and or bad workmanship can easily lead to fatalities. Lifting beams should only be used under lifting angles as specified by the fabricator. In some cases different angles are allowable under reduced loads.

Fig.14 Typical lift beam, incorrect design

Combinations of lifting beams and spreaders.

Depending on the position of the lifting lugs, one can sometimes use a combination of more then one lifting beam or spreaders. A disadvantage is that more lifting beams require more lifting height. In case that is not available, a special tailor made lifting beam might be the answer.

Fig.15 Combination of Spreader and lift beams

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नई दिल्ली, 18 अप्रैल, 2016

का.आ.1434(अ).— केन्द्रीय सरकार, मोटर यान अधिनियम, 1988 (1988 का 59) की धारा 58 की उपधारा (1) द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए, भारत सरकार के तत्कालीन भूतल परिवहन मंत्रालय की अधिसूचना सं. का.आ. 728(अ), तारीख 18 अक्तूबर, 1996, जिसे भारत के राजपत्र, असाधारण, भाग II, खंड 3, उपखंड (ii), तारीख 18 अक्तूबर, 1996 में प्रकाशित किया गया था, में निम्नलिखित संशोधन करती है, अर्थात्:-

उक्त अधिसूचना की अनुसूची में मद III और उससे संबंधित प्रविष्टियों के पश्चात् निम्नलिखित मद और उससे संबंधित प्रविष्टियां अंतःस्थापित की जाएंगी, अर्थात्:-

1	2	3	4
"IV	**मोडुलर हाइड्रोलिक ट्रेलर**		
(i)	तीन एक्सल वाला पुलर ट्रेक्टर (मोडुलर हाइड्रोलिक ट्रेलर को खींचने के लिए कर्षण प्रयोजन हेतु स्थिरक भार सहित):		
	आगे वाले एक्सल पर 2 टायर टैंडम एक्सल पर 8 टायर	36	आगे वाले एक्सल पर 7.5 टन पिछले टैंडम एक्सल पर 28.5 टन
(ii)	मोडुलर हाइड्रोलिक ट्रेलर – पंक्ति मोड्यूल: (1) 2 पंक्ति मोड्यूल (2) 3 पंक्ति मोड्यूल (3) 4 पंक्ति मोड्यूल (4) 5 पंक्ति मोड्यूल	 (1) 36 (2) 54 (3) 72 (4) 90	 18 टन प्रति एक्सल रेखा"

	(5) 6 पंक्ति मोड्यूल (6) 7 पंक्ति मोड्यूल (7) 8 पंक्ति मोड्यूल **टिप्पण**: (क) एक्सल रेखा में एक पंक्ति में दो एक्सल सम्मिलित होते हैं, जिसमें प्रति एक्सल 4 टायर होते हैं। (ख) पंक्ति मोड्यूल में दो या अधिक एक्सल रेखाएं सम्मिलित होती हैं। (ग) भिन्न-भिन्न मोड्यूलों के संयोजन की दशा में, अनुज्ञेय सकल यान भार व्यष्टिक मोड्यूलों के रजिस्ट्रीकृत लदाई भार (आरएलडब्ल्यू) का कुल योग होगा। (घ) 8 एक्सल रेखाओं से अधिक वाले बड़े संयोजन के लिए संचलन, संबद्ध प्राधिकारियों के अनुमोदन के अधीन होगा।	(5) 108 (6) 126 (7) 144	

[फा. सं. आरटी-11042/13/2008-एमवीएल]

अभय दामले, संयुक्त सचिव

टिप्पण: मूल अधिसूचना को भारत के राजपत्र, असाधारण, भाग II, खंड 3, उपखंड (ii) में अधिसूचना सं. का.आ. 728(अ) तारीख 18 अक्तूबर, 1996 में प्रकाशित किया गया था और उसमें अंतिम संशोधन अधिसूचना सं. का.आ. 41(अ) तारीख 7 जनवरी, 2016 द्वारा किया गया था।

MINISTRY OF ROAD TRANSPORT AND HIGHWAYS

NOTIFICATION

New Delhi, the 18th April, 2016

S.O. 1434(E).— In exercise of the powers conferred by sub-section (1) of section 58 of the Motor Vehicles Act, 1988 (59 of 1988), the Central Government hereby makes the following amendment in the notification of the Government of India in the erstwhile Ministry of Surface Transport No. S.O. 728(E) dated the 18th October, 1996 published in the Gazette of India, Extraordinary, Part-ll, Section 3, sub-section (ii), dated the 18th October, 1996, namely:—

In the Schedule to the said notification, after item III and entries thereto, the following item and entries relating thereto, shall be inserted, namely:—

1	2	3	4
"IV	**Modular hydraulic trailers**		
(i)	Three axle puller tractor (with ballast weight for traction purpose to pull modular hydraulic trailer): 2 tyres on front axle 8 tyres on tandem axle	36	7.5 tonne on front axle 28.5 tonne on rear tandom axle

(ii)	Modular hydraulic trailer - row modules: (1) 2 row module (2) 3 row module (3) 4 row module (4) 5 row module (5) 6 row module (6) 7 row module (7) 8 row module **Notes:** (a) Axle line consists of two axles in a row with 4 tyres per axle. (b) Row module consist of two or more axle lines. (c) In case of combination of different modules, the permissible Gross Vehicle Weight shall be sum total of Registered Laden Weight (RLW) of individual modules. (d) For larger combination with more than 8 axle lines, movement shall be subject to the approval from the concerned authorities.	 (1) 36 (2) 54 (3) 72 (4) 90 (5) 108 (6) 126 (7) 144	18 tonne per axle line"

[F. No. RT-11042/13/2008-MVL]

ABHAY DAMLE, Jt. Secy.

Note: The principal notification was published in the Gazette of India, Extraordinary, Part-II, Section 3, sub-section (ii) vide notification number S.O. 728(E) dated the 18th October, 1996 and last amended vide notification number S.O.41(E) dated the 7th January, 2016.

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INDIAN BRIDGE MANAGEMENT SYSTEM

Sachin Joshi

ASSET MANAGEMENT:

Asset management generally refers to a system that monitors and maintains things of value. This applies to tangible assets such as buildings, bridges, offices, factories, etc. Asset management is a of creating inventory and managing the assets in a cost effective manner.

Asset management in the engineering environment is a practice of managing public infrastructure assets to achieve the high returns by monitoring and maintaining the best possible services to end users.

CONCEPT:

Indian Bridge Management System (IBMS) is developed to create an inventory of all bridge assets on National Highways (NH) in India and apply a technical logic to manage the bridge asset during its life cycle. It generates detailed inventory data and condition ratings of assets to ensure that the dynamics of deterioration process are captured and this dynamism in the deterioration process guides the inspection and rehabilitation of bridges. The system allows the user to assign priority to maintenance activity based on the present condition of the bridge. The progressive improvement of all bridge assets is ensured over a period of time as worst bridges are first rehabilitated and then the less damaged bridges are rehabilitated.

BENEFICIARIES:

Major Stake holders in IBMS are the Government department which owns the bridge assets and general public who use the bridges. Each stake holder has benefit in short term and long term.

Government benefits by creation of database of all bridges in immediate present (6 Months for start of IBMS). This is the short term benefit and in the long term it optimizes the utility of funds available for rehabilitation/ maintenance of the bridges.

Over a period of time, the department will be able to monitor the bridges and ensure that all such bridges which are critical are rehabilitated first and then the focus of rehabilitation will shift to those bridges which show marginal distress. Once all such bridges are also repaired/ rehabilitated, then the overall efficiency of the bridges in our country will improve along with its longevity because of its timely and proper maintenance. IBMS uses the principle of "FRWD" ("First Repair the Worst Damaged") to ensure the entire bridge inventory is rendered safe. The fear of major sudden catastrophe can be reduced to large extent. This will assure prolonged utilization of assets.

General public is assured over time that all bridges are being maintained immaculately and are safe for usage. They are assured that proper protocol exists for inspection of any bridge that shows signs of distress. Dynamism of Distress is negated by timely and focused maintenance. Alternate routes can be identified in times of natural disaster or calamity to enable the public travel from point A to point B.

IBMS SYSTEM:

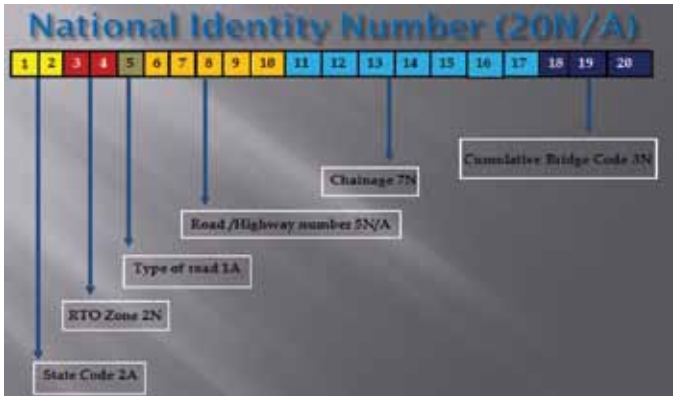
IBMS is the largest platform in the world with a database that could exceed 1,50,000 bridge structures owned by a single owner. Development of the system posed its own challenge as the system to manage such a large number of asset in a manner where the field studies could be conducted with minimum effort and in which maximum details could be collected. The bridges had to given a unique identity number which was the first step of inventory creation.

Then their precise location details in form of Latitude and Longitude had to be collected in an Auto mode using the Ground Positioning system. Once these details are collected, the engineering properties of the bridge design, material and other technical details of the bridge are being collected. These are essential components of inventory collection process. On completion of inventory data, the structural component rating is done using a 0 to 9 scale to define the status of various bridge components like Foundation, Piers, Super structure, Deck, Scour rating, wat rway adequacy, structural status and also Socio- Economic parameter which decide the importance of the bridge in relation to its contribution to daily social and economic activity of the area in its immediate vicinity.

INVENTORY DATA:

In order to ensure that all bridge inventory data captured is stored and retrieved properly, it was important to assign each bridge a unique identity number which was easy to understand and also accorded ease in data collection. Indian Highways numbers are undergoing changes and most general public is used to old highway numbering system. However IBMS is capable of converting inventory data collected as per old highway number to a Bridge Identity number which has the new highway number and also allocates the ascending chainage to bridges from starting point of the highway and a ascending number with the first bridge from start assigned number 001. The following bridge classification system was adopted in IBMS.

BRIDGE CLASSIFICATION



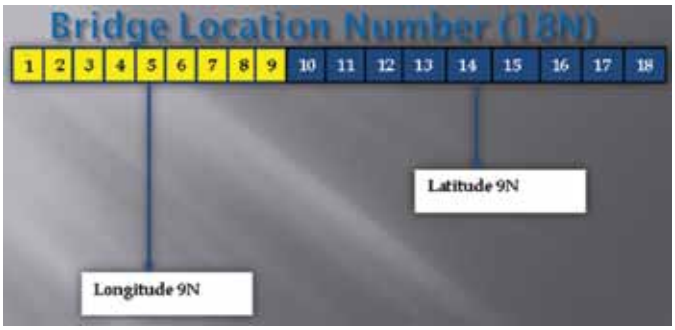
Classification of bridge is done by a series of alpha numeric number strings which is based on specific details of the bridge. There are 5 such strings used to classify the bridge. They being

National Identity number (20 A/N)
Bridge Location number (18N)
Bridge Classification number (22 A/N)
Bridge Structural Rating number (9N)
Bridge Socio- Economic rating number (6N)

NATIONAL IDENTITY NUMBER: (20A/N)

National identity number is made of specific codes namely:

State code (2A)
RTO zonal number (2N)
Type of road (1A)
Road Highway number (New) (5 A/N)
Chainage (7N)
Bridge Number (3N)



BRIDGE LOCATION NUMBER (18N)

Bridge location number is made of specific codes namely:

Longitude (9N)
Latitude (9N)

BRIDGE CLASSIFICATION NUMBER (22N/A)

Bridge classification Number is made of specific codes namely:

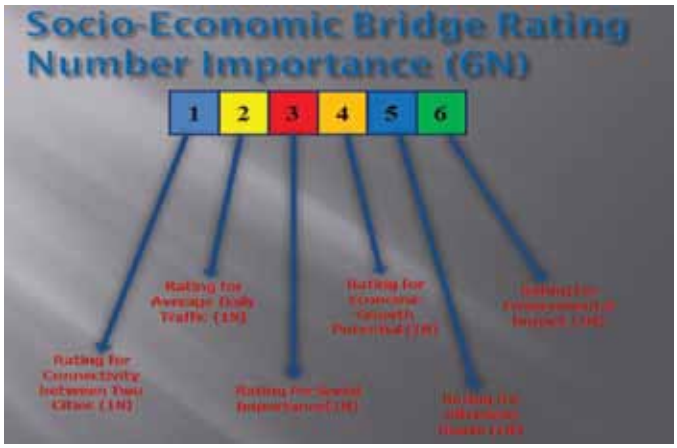
Structural form (2N)
Material of construction (1N)

Type of bridge (2A)
Loading as per IRC (2N, 1A)
Age of bridge (1N)
Traffic lane on bridge (1N)
Bridge structure crossing features (1N)
Length of bridge (6N)
Width of Carriage way (5N)

BRIDGE STRUCTURAL RATING NUMBER (9N)

Bridge Structural Rating Number is made of specific codes namely:

Rating for integral and non integral deck (1N)
Rating for superstructure (1N)
Rating for substructure (1N)
Rating for bank and channel (1N)
Rating for structural evaluation (1N)
Rating for Deck geometry (1N)
Rating for Vertical clearance (1N)
Rating for Waterway adequacy (1N)
Rating for Scour efficiency (1N)



Socio - Economic Bridge Rating Number (6N)

Socio- Economic Bridge Rating Number is made of specific codes namely:

Rating for Connectivity between two cities (1N)
Rating for Average daily traffic (1N)
Rating for Social importance (1N)
Rating for economy growth potential (1N)
Rating for alternate route (1N)
Rating for Environmental Impact (1N)

PROCESS OF INSPECTION:

Based on this inventory and ratings codes, IBMS analyses the data and indicates the bridges which need further investigation which is in-depth or detailed study using various non destructive testing (NDT) procedure. The initial inventory and rating codes generates the deterioration process prognosis which is validated by the NDT procedures. A detail remedial plan is then defined for each bridge tested; which is based on the standard specifications for Repair, Rehabilitation and Strengthening of Bridges. The objectives of this inspection and maintenance schedule are as follows:

(a) To improve operational availability of the structure.
(b) To prevent downtime and enhance the life of the structure.
(c) To avoid the accumulation of defects which manifest in the form of major defects at a later date rendering the asset unserviceable for prolonged duration.
(d) To prepare database to enable the user to detect the proper timing for carrying out maintenance.
(e) To consolidate requirements of periodical maintenance through suitable agencies/ offloading.
To achieve the above objectives, the maintenance schedule has been divided into two modules. These are: -

(a) Routine Inspection and Maintenance (RIM and RMM)
(b) Detailed Inspection and Maintenance (DIM and DMM)

The first step of inspection is the detailed visual inspection which is conducted as per various Routine Inspection Modules (RIM) . The results of the RIM decide which of the Detailed Inspection Modules (DIM) needs to be implemented. IBMS has identified as per procedure and location of inspection over 125 RIM's and 90DIM's.

The factors attended to in RIM are as under:

Aesthetics of the Structure.

Cracks, crevices, spall on the surface of the structure. Appearance of structure as regards to painting and coatings.

Loosening and widening of gap / bond in rocks. Occurrence of Geometric deformation and deflections in any element of the bridge.

Functionality of Structure.

Seepages identification and water tightness for all water retaining structures.

Delamination and porosity in the structure.

Corrosion related symptoms.

Wearing surface and riding quality for roads, corridors, passageways etc.

Corrective Activity Post Inspection.

Grouting for control of seepage/ cracks/ porosity and patching up of carbonation coating post grouting.

Refilling the gaps for proper bonding in rocks.

Local repair for correction of spalls, crevices, corrosion and local delamination as evaluated in RIM.

Local replacement of wearing coat/ surface as required.

Routine Activity for Aesthetics

Painting of structure and crack filling.

Carbonation coating over coating.

Wearing coat and surface replacement/ overcoat.

Removal of vegetation growth.

Most of the RIM / RMM activities are pre-scheduled and should be completed within specified time frame as stipulated. The activity should be succeeded with corrective measures as required.

One of the factors that can affect the stability and cause distress is exposure of structure in different conditions i.e. area, which is above splashing of water, which shall be called as "DRY ZONE". Area below splashing zone shall be called "WET ZONE". Splashing zone is an area between HHTL +0.20m and LLTL – 0.20m.

Detailed Inspection and Maintenance (DIM / DMM).

Define the activities that are required for each structure irrespective of the type of usage and are to be adhered to at specific durations in the age of the structure and relate to its strengths, integrity and structural safety as defined in the maintenance schedules of that structure. DIM involve evaluation of specific parameters of the structure that define its safety and structural efficiency during its service life. These parameter include.

Strength Parameters of the Structure.

Structural Integrity (overall and specific)
Grade of concrete
Corrosion potential in concrete/ steel matrix.
Adequacy of steel sectional area.
Vibration monitoring of structure and deflection evaluation under dynamic loading.

Balance Service Life Evaluation.

Evaluation of expected loss of service life due to corrosion.

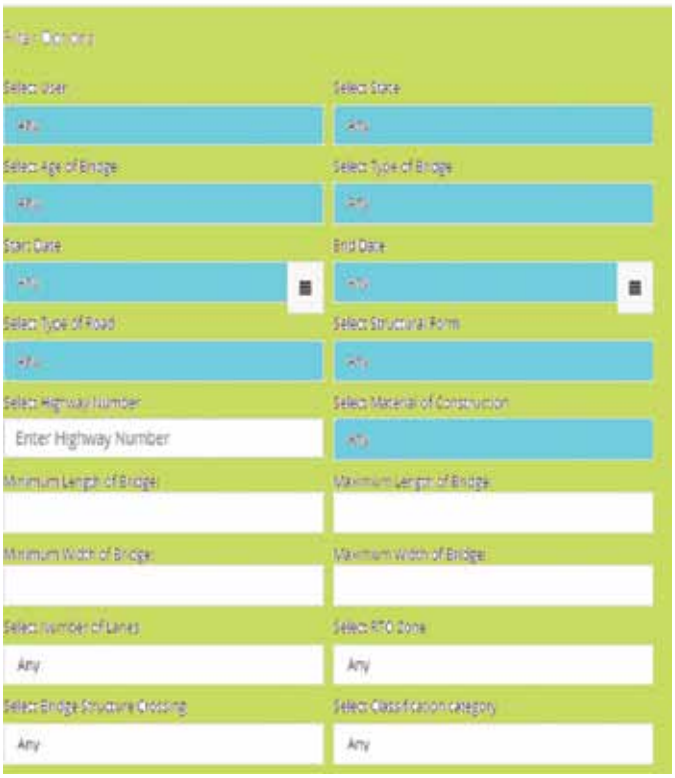
Evaluation of expected service life based on strength parameters evaluated as per RIM.

Evaluation of balance service life based on results of all parameters evaluated in RIM.

Event Triggered Inspection.

Inspection for fire damaged structure.
Inspection for structure post flooding.
Inspection for sudden undersigned impact loading.
Inspection post-local failure of structure.

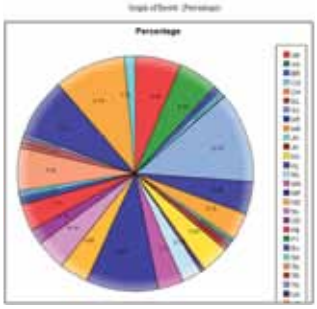
ANALYSIS OF DATA:

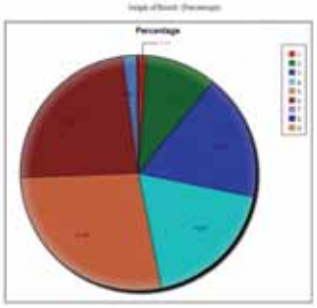


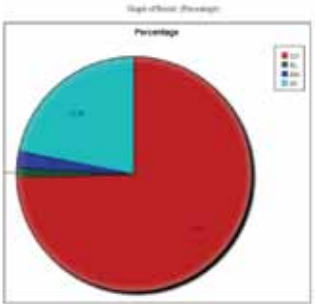
Asset Management depends hugely on the capability of the software to conduct analysis on the data to generate reports for various functional needs of the user department. IBMS being a system for National Highways is designed to provide tools to the Ministry officials to generate statistical analysis of the data to be able to answer Queries related to the same. Some of the filter options are shown below:

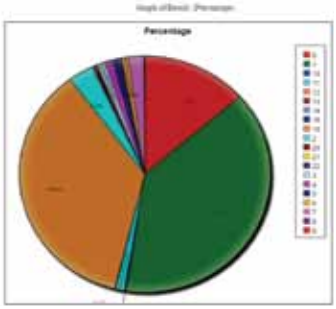
Statistical Analysis that can be done using IBMS basically enables Division of database as per following parameters is possible in IBMS

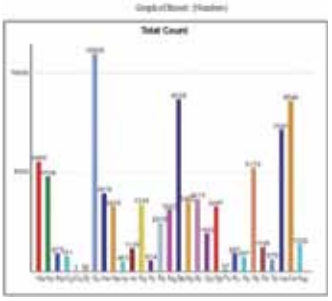
a) As per age of bridge
b) As per Daily Traffic count
c) As per type of Bridge
d) As per structural form of the bridge
e) As per material of construction
f) As per feature crossed by the bridge
g) As per present conditions by using Classification count method.
h) As per National Highway number
i) As per state, RTO district etc.

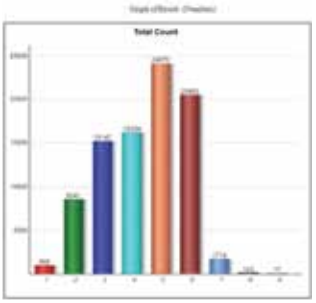

Distribution of Bridge as per states (Percent)

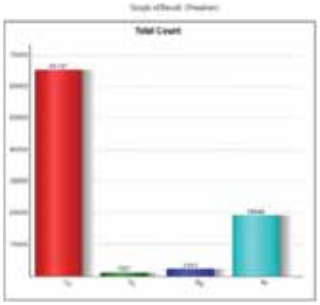

Distribution as per age of Bridge (Percentage)

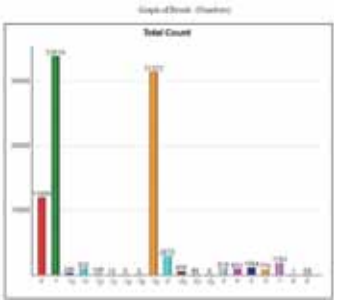

Distribution as per Type of Bridge (Percentage)


Distribution as per Structural form of Bridge (Percentage)


Distribution of Bridges as per states (Total count)


Distribution as per age of Bridge (Total count)


Distribution as per type of Bridge (Total count)


Distribution as per Structural form of Bridge (Total count)

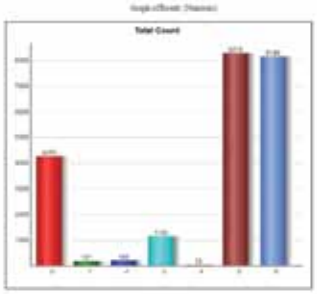
Technical Analysis of the data enables the user to define the level of deterioration in any bridge and to assign proper corrective action based on the analysis. Classification count is evaluated for each bridge post inventory and condition ratings to enable the user differentiate the bridges for further inspection, testing requirements. Based on the inspection and testing conducted, the designer is able to define and design the remedial measures that are required to be adopted to bring the bridge in safe zone. This cost of rehabilitation/ repairs/ retrofitting enables the user to then assign a priority to maintenance activity using the Priority and Ranking module of IBMS

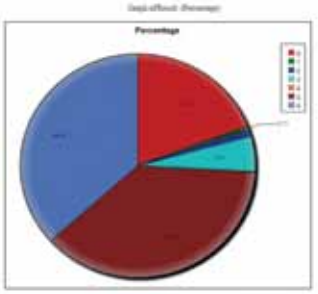
Typical analysis of data could yield results like the one given below

Table of Result

S.No.	Classification Category	Total Number
1	Immediate Inspection essential to decide if to reconstruct the bridge or rehabilitate	4250
2	Bridge to be closed for inspection and remedial action	157
3	Closure of Bridge Short term for local repairs	189
4	Immediate Inspection Required to identify distress zones and rectify	1133
5	Inspection Required to make the bridge safer	15
6	Planned Inspection to be implemented as Bridge is safe	8276
7	Bridge safe	8140

The graphical representation can be viewed as under:





PROCESS OF PRIORITY AND RANKING OF BRIDGES:

Ranking of bridges for repair is driven by a logical protocol which is based on the cost of repair, the importance of the bridge in Social and Economic scenario and the level of deterioration defined by the ratings as defined by Structural Rating number used in conjunction with the traffic on the bridge and age of bridge. The ranking module of IBMS defines a list of bridge that need to be repaired / retrofitted as per priority and can be taken up based on total fund available with the Ministry. This brings in technical and socio-economic logic to the sequence of bridges to be repaired.

Ranking and priority for bridge maintenance is based on rating evaluation done in classification stage. Priority is defined based on observations during classification stage. Priority is based on observation for the following rating numbers

a) Bridge Structural Rating Number
b) Socio- Economic Bridge Rating Number

c) Type of road
d) Loading as per IRC
e) Rating for average ADT

The Critical Weightage is termed as Cw is then used further in the ranking system. This Cw ensures that most needed bridges having severe distress are assigned highest weightage and Cw is accorded a value of 100. Similarly for non important bridges with least or no distress; Cw is accorded a least value of 10.

Once Cw is defined the second step in defining priority is to evaluate which of the bridge is most frequented and lies on important corridors with highest load rating. This factor is defined by Importance weightage Iw Once Iw this is defined, we have then to evaluate if the bridge or its critical component should be repaired/ rehabilitated or replaced. This decision is based on two factors. One is Age of bridge and the second factor is the cost of rehabilitation as compared to cost of replacement. Both these costs are compared for the same type of bridges with cost index being the same for the comparison. Also the costs are compared for per square meter of deck area.

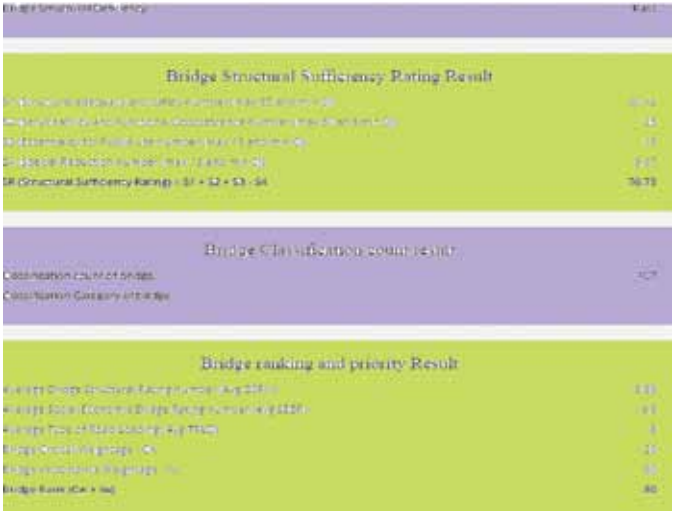
Age of bridge is compared to the cost of repair/ rehabilitation on a graph. This graph basically also determines if the bridge is to be repairs/ rehabilitated or replaced. Costs are taken as the average cost of construction of new bridge in today scenario on per square meter of bridge deck area. Similarly total cost of rehabilitation or repair is then converted to cost per square meter of deck area to be used for plotting on the graph.

All bridges to be repaired or rehabilitated or replaced in a given period of time are taken together to form a set of bridge. Ranking of the bridge is always assigned from within this set of bridges being compared. Ranking of the bridge is given by RankBrig Where RankBrig is evaluated by arranging all bridges as per their Sum of Weightages WSUM in ascending order.

WSUM = Cw + Iw.

When WSUM is highest for a bridge that Bridge is assigned the RankBrig = 1 and for a bridge which has WSUM is lowest for a bridge that Bridge is assigned the RankBrig = Last This type of ranking allows the various rating evaluation and bridge importance to be accounted for in the decision making process for deciding which bridge shall be repaired first. First Repair Worst Damage (FRWD) principle is hence used here in a modified form to account for importance of the bridge.

Various other modules like Deterioration rate, Prediction of balance life, Estimation of Life cycle cost, Optimization of funds are also part of the IBMS.



OBJECTIVES OF IBMS

a) Maintain Bridge inventory and network in an efficient manner
b) Guarantee safety of the users for specified risks.
c) Determine inspection and maintenance needs
d) Ensure level of service
e) Predict future needs of funds
f) Optimize fund utilization
g) Prioritize asset for maintenance needs
h) Predict balance service life and optimize its life cycle costs
i) Provide accurate and real time information of the asset to users and owners Conclusions

Government of India constitutes various working groups to review the growth potential and scope of work that can be done in each 5 year plan. One such group is the Working Group on Central Road Sector. They submitted a report in 2011 for their recommendation for the 12th Five year plan (2012- 2017). In that report the group makes a very strong case for implementation of Bridge Management system in a timely manner. Writing about Bridges they have stated that "A System of maintaining and updating database on bridge inventory needs to be set up for enabling timely decision making regarding formulating their maintenance strategies. In the concluding part they have stated
Quote "Roads are valuable assets and justify preservation and regular maintenance. A modest erosion of 5% due to deficiency in maintenance, the loss is much more than the amount required for its preservation.
THERE IS NO ECONOMIC SENCE IN LOSING OUR ASSETS." Unquote
Establishment of IBMS ensures that this concluding remark is upheld and implemented on National
Highways network. NH network is about 2% of the road network in our country. The way forward is to implement IBMS on all state highways and also on all Major district roads so that at best 50% of road network can be brought under the gambit of IBMS which will ensure that IBMS is Protecting Indian Bridges.

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Re-visiting IRC Codal Provisions to keep Highway Bridges safe for Overloading and for passage of OWC / ODC

Alok Bhowmick*

(*) Mr. Alok Bhowmick, Managing Director of B&S Engineering Consultants Pvt. Ltd. is an eminent structural engineer in India. He has done considerable original works in the field of bridge engineering involving modern technology. Shri Bhowmick is an active member of many professional bodies and learned societies. He is involved aggressively in the development of modern set of codes for highway transportation sector through active participation in several code committees of Indian Roads Congress and Bureau of Indian Standards (BIS). He is proactive in many professional bodies like Consulting Engineers Association of India (CEAI), Indian Roads Congress (IRC), International Association for Bridge & Structural Engineers (Indian National Group) (ING-IABSE), Indian Concrete Institute (ICI), Institution of Engineers (India) (IE(I)), Indian Geotechnical Society (IGS) and fib. He is the chairman of the editorial board of one of the oldest quarterly journal in the country (namely "The Bridge & Structural Engineer") published by ING-IABSE.

Abstract

Number of bridge failures have occurred in India due to passage of overloaded vehicles carrying loads far exceeding the legal weights permitted by Motor Vehicle Act (MVA). With the increase in demand for infrastructural growth, nuclear, hydro-electrical and thermal power plants in particular are planned in different parts of India. This has led to increased frequency of transportation of Over-Weight Consignments (OWC) carrying stator units, turbines and other Heavy Equipments from the factory/port to the project sites having Gross Vehicle Weights (GVW) ranging between 100 ton to 600 tons. These OWC's are transported using hydraulic multi-axle trailers through existing roads and bridges, which are originally designed for standard Indian Road Congress (IRC) loadings. Though there are guidelines available in IRC codes setting out conditions and check points, which must be satisfied before allowing such movement, it is observed that these conditions are hardly followed which resulted in number of failures.

Hydraulic Trailer Owners Association (HTOA) took the initiative to smoothen the process of streamlining the passage of OWC/ODC and under the guidance of MORT&H, succeeded in bringing out some improvement. However, there is still a lot, which needs to be done by all stakeholders to ensure safety of the Bridge Stock and also to ensure that the design of new bridges take into account the possibility of passage of such vehicles uninterrupted.

This paper highlights the urgent need and importance of re-visiting the present IRC codes dealing with design of new highway bridges (IRC 6) as well as guidelines for evaluation of load carrying capacity of existing bridges (IRC:SP:37) to deal with the hazard that the present situation presents before us.

1. Introduction

About five years ago, passage of OWC carrying vehicles required permits from multiple authorities (e,g. PWD/ Transport Authority/ Municipal Corporation / Railways / NHAI) to reach their destination. This entire process of selection of optimum route and getting permit from the authorities used to be extremely lengthy and time consuming. Heavy Industry segment was worst affected as transportation of an over-weight consignment from port or from factory will require 9 to 10 months to deliver over a stretch of hardly 2000 kms. The consequence of this process was rampant corruption, illegal passage of OWC's over bridges leading to frequent bridge damage and failures.

It was clear from the past records that incidents of bridge failures in India was on the steep rise during the last decade, not onlydue to passage of OWC on multi-axle

Table 1. Bridge Failures in India Due to Over Loading/OWC

Sl No.	Bridge Description	Year of Failure	Reason for failure
1	Steel Bridge, Kullu, Himachal Pradesh	June 2008	Passage of OWC on an old posted bridge, capable of taking only 30T, led to bridge collapse (Ref. Photo-1)
2	Bridge over Shetranjuy River, NH-8E Gujarat (TotalSpan 240m)	August 2009	Passage of OWC led to bridge collapse (Ref. Photo- 2)
3	Bailey Bridge collapsed in Kolkata	January 2011	The bridge of 30T capacity collapsed in New Town, Kolkata during passage of an overloaded truck (Refer Photo-3)
4	Balanced Cantilever Bridge, Madhya Pradesh	September 2011	Passage of MAHT with heavy turbine of GVW > 400 T led to collapse (Refer Photo-4)
5	Foot Over Bridge Collapse, Darjeeling	October 2012	Wooden FOB gave way under the pressure of a crowd during a Gorkha Janmukti Morcha meeting. 34 people Killed & 132 injured (Refer Photo-5)
6	Foot Over Bridge Collapse, Srinagar	August 2012	Foot bridge collapsed during a protest demonstration. 30 people injured (Refer Photo-6)
7	Steel truss Bridge, 85m span Sikkim	December 2011	During the passage of OWC carrying 100T (Refer Photo-7)

hydraulic trailers, but also due to general overloaded vehicles or overcrowded pedestrians in foot bridges. Table 1 shows records (compiled for a period between 2008- 2011) of some of these failures of bridges due to overloading or during the passage of a heavy load much larger than the design load.

In order to smoothen the process of approval by the authorities, the Hydraulic Trailer Owners Association (HTOA) took the initiative and under the guidance of MORT&H, engaged a group of experts to carry out a generic study of Bridge Superstructures of existing flock of simply supported right bridges for safety during passage of OWC. This was subsequently approved by MORTH and following the issuance of circular no. RW/NH-35072/1/2010 S&R(B) dated 24th January 2013 by Ministry of Road Transport & Highways (MORT&H), there has been significant improvement in the regulation of these OWC's, nationwide and in fast tracking the approval process.

Further, considering the increase in frequency of such loadings in Indian Bridges, the Indian Roads Congress (IRC) introduced a new clause on Special Vehicle Load in IRC:6. The special vehicle (SV) is a multi axle hydraulic trailer vehicle, i.e., prime mover with 20 axle trailer, with a GVW of 385T. The longitudinal view of the SV loading is shown in Fig. 1.

This loading is to be adopted for design of new bridges in select corridors where passage of Over Weight Consignment (OWC) carrying stator units, turbines, heavy equipment and machinery may occur occasionally. This loading represents a spectrum of special vehicles in the

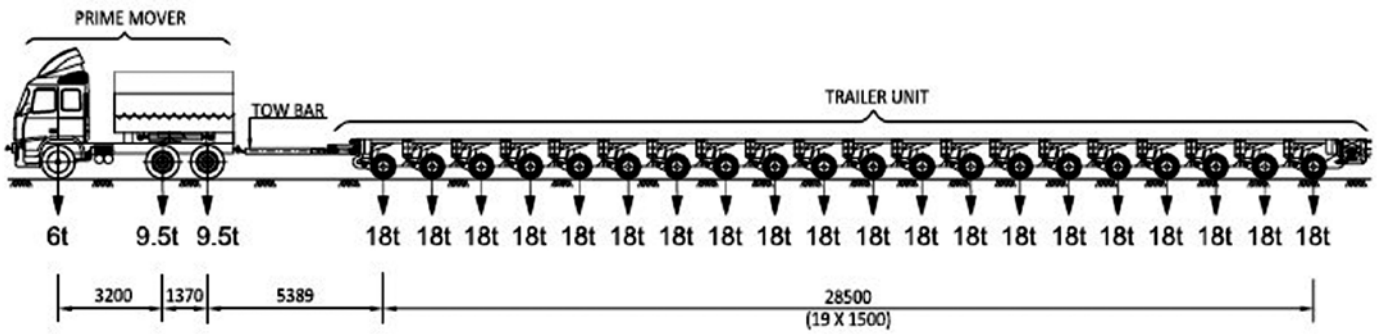

Fig. 1 : Special Vehicle in IRC 6 (Optional)

country and the Client has the option to choose whether this load need be considered for inclusion in the design or not.

With the initiative of HTOA and with the dynamism of Hon'ble Minister, RTH&S, following landmark decisions were made & executed in a time bound manner thereafter:

a) Launching of ODC portal www.morth-owc.nic.in for online grant of movement permissions without human interface in all National Highways, on January 6, 2015.

b) Award of contract for Bridge inventory of National Highways and their periodic condition survey on their adequacy for passage of Over-weight consignments over hydraulic trailers for all National Highways.

c) Amendment to CMV Rules,1989 for inclusion of MHT & Puller Tractor.

Since the issuance of circular dated 24th January 2013, the number of bridge failures due to passage of OWC on multi-axle hydraulic trailers has reduced significantly. During the last three and a half years of the issuance of this circular by MORT&H, only a single collapse has come to the notice of the author, which took place in May 2016, at Haryana (Refer Photo-8).

However the author is of the view that the MORTH circular of January 2013, the provision of the current IRC codes dealing with design of new highway bridges (IRC 6) as well as guidelines for evaluation of load carrying capacity of existing bridges (IRC:SP:37) needs a re-visit to ensure safer construction and upkeep of the bridge assets in the country.

2. Why do we need to re-visit our Codes & MoRT&H circulars, when things have improved?

Twofactors have developed over recent years that have the potential to affect the durability and safety of bridges in India, despite the positive developments stated above.

First is the accelerated demand for infrastructural development in recent past, for which the construction industry is not geared fully. There is acute shortage of skilled manpower for design, execution and supervision of the flock of bridges that are presently under construction. Though we produce about 15 lacs of graduate engineers every year, hardly 20% of them are employable. These factors have led to a general deterioration in the quality of designs and drawings produced, quality of workmanship at site of works, quality of supervision also has deteriorated, resulting in lowering of margins of safety. This fact needs to be factored into the present set of guidelines issued by MoRTH for the passage of OWC

Second is the arrival of this new set of limit state (LS) codes and withdrawal of the old codes, which were based on working stress (WS) approach. The style and philosophy of this new set of LS codes are quite different from the previous version of the WS codes : less prescriptive, more statistically based and logically more rational in approach. In the new set of codes,reliance is placed more on highly analytical methods of load assessment and sectional capacity assessment in design and which of-course results in more economical design with a lower margin of safety as compared to the design carried out by previous codes. In light of the publication of these new suite of codes, the charts published in the MoRTH circular in January 2013 have limited applicability. They are not applicable for the new bridges, designed as per the latest codes, adopting LS philosophy. The 13 number of load-safety charts given in the circular would require a re-visit. Also the IRC code on assessment of existing structures (IRC:SP 37) would require urgent review and amendment. Current provisions are not applicable for bridges designed as per LS codes.

3. What is the way forward ?

a) The applicability of this new portal "www.morth-owc.nic.in" for online grant of movement permissions without human interface, on January 6, 2015, is limited. At present this portal is only meant for passage of ODC/OWC in National Highways. National Highways constitutes only 2.5% of the total length of road network in India. Balance 97.5% of the road network need also to be covered quickly under this portal.

b) The procedural controls for passage of OWC/ ODC through approved corridor, as highlighted in the MoRT&H circular, which is available in the new portal "www.morth-owc.nic.in" requires strict implementation. The author feels that these controls are not strictly followed at ground. There is laxity, which needs to be tightened. This is in the interest of all stakeholders as it brings in credibility of effectiveness of the system.

c) The IRC code for design of new bridges should consider special purpose loading (SV) as a mandatory loading for design of all bridges. This should not be restricted to only 'select corridors as per wish of Client', as stated presently in the code. The author fully recognises the

Photo -1 : Kullu (June, 2008)

Photo - 2 : Gujarat (Aug 22, 2009)

Photo - 3 : Kolkata (January, 2011)

Photo - 4 : Madhya Pradesh (Sep 28, 2011)

Photo - 5 : Darjeeling (October, 2012)

Photo - 6 : Srinagar (August, 2012)

Photo - 7 : Sikkim (Dec 19, 2011)

Photo - 8 : Haryana (May, 2016)

fact that these loads are infrequent in nature and may come only once in a while. However due to lack of strict regulation in the country, the risks of failure due to overloading is much more in present scenario than ever before, while the additional cost for accounting of this heavy load in the original design is hardly in the range of 1% to 10%, depending upon of the lane width, span length and type of bridge.

d) IRC:SP:37 requires urgent re-visit. The provisions of clause 11 of this code pertaining to 'Guidelines for permitting Over-Dimensioned / Over-Weight vehicles' requires amendment in light of the publication of limit state codes of design.

e) Ministry of Road, Transport and Highways, Government of India has completed the procedure to put in place Indian Bridge Management System (IBMS). National Bridge Management Center (NBMC) is being set up at NOIDA within Indian Academy for Highway Engineers (IAHE). It is understood that with the help of Consultants, data will be collected from bridge sites to create an inventory of all bridges on National Highways. The classification procedure and automated essential inspection and testing system shall be generated by IBMA software, which shall activate inspection intervention through the same field consultants. Based on their testing and status report, decision making module of the IBMS shall generate a list of bridges needing rehabilitation/ strengthening intervention based on socio-economic and technical criterion. The entire process is to be repeated for three times to create sufficient data to then create and model various deterioration models and also fine tune the ranking and priority modules of IBMS. While this is a welcome step in the right direction, success of this scheme will largely upon successful implementation of this scheme.

4. Conclusion

Forensic analysis of causes of past bridge failures indicates that they occur when a number of factors attributable to failure, coincide. This is likened to a 'Swiss Cheese' in a rearranged slices: each slice has holes in it and occasionally the holes line up so that something can pass through the whole cheese (Refer Fig. 2 below).

The larger and more numerous the holes, the more likely they are to align and allow something to pass through. For the passage of OWC through existing flock of bridges, it appears that the size and number of holes in the 'swiss-cheese model' is more because :

a) Of lack of adequate provision in the current IRC code for assessment of existing bridges for passage of OWC/ODC (IRC:SP 37). The code needs urgent upgradation.

b) Of Introduction of Limit State code for design of new bridges, with which the engineering fraternity is not so familiar and in which the margin of safety is less as compared to the earlier codes.

c) Of growing lackadaisical attitude of the transport industry towards Safety of bridge assets. It is high time that industry does something to make safety as number one priority.

d) Design codes do not consider it mandatory to check safety of bridge for passage of OWC on multi-axle hydraulic trailers (special vehicles). It would require only a marginal increase in cost, in case this load is considered in the original design of bridge.

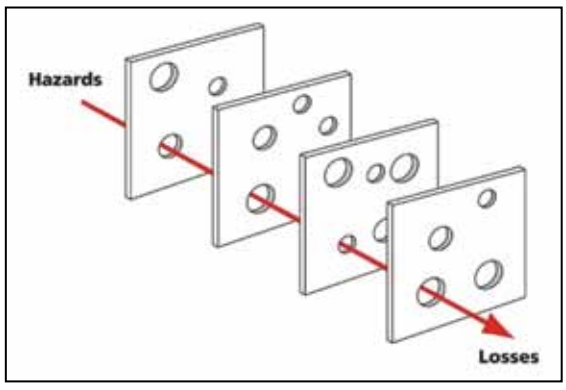

Fig. 2 :The Swiss-Cheese Model for Forensic Analysis

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भारत सरकार Government of India

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Hon'ble Prime Minister
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Hon'ble Minister of State
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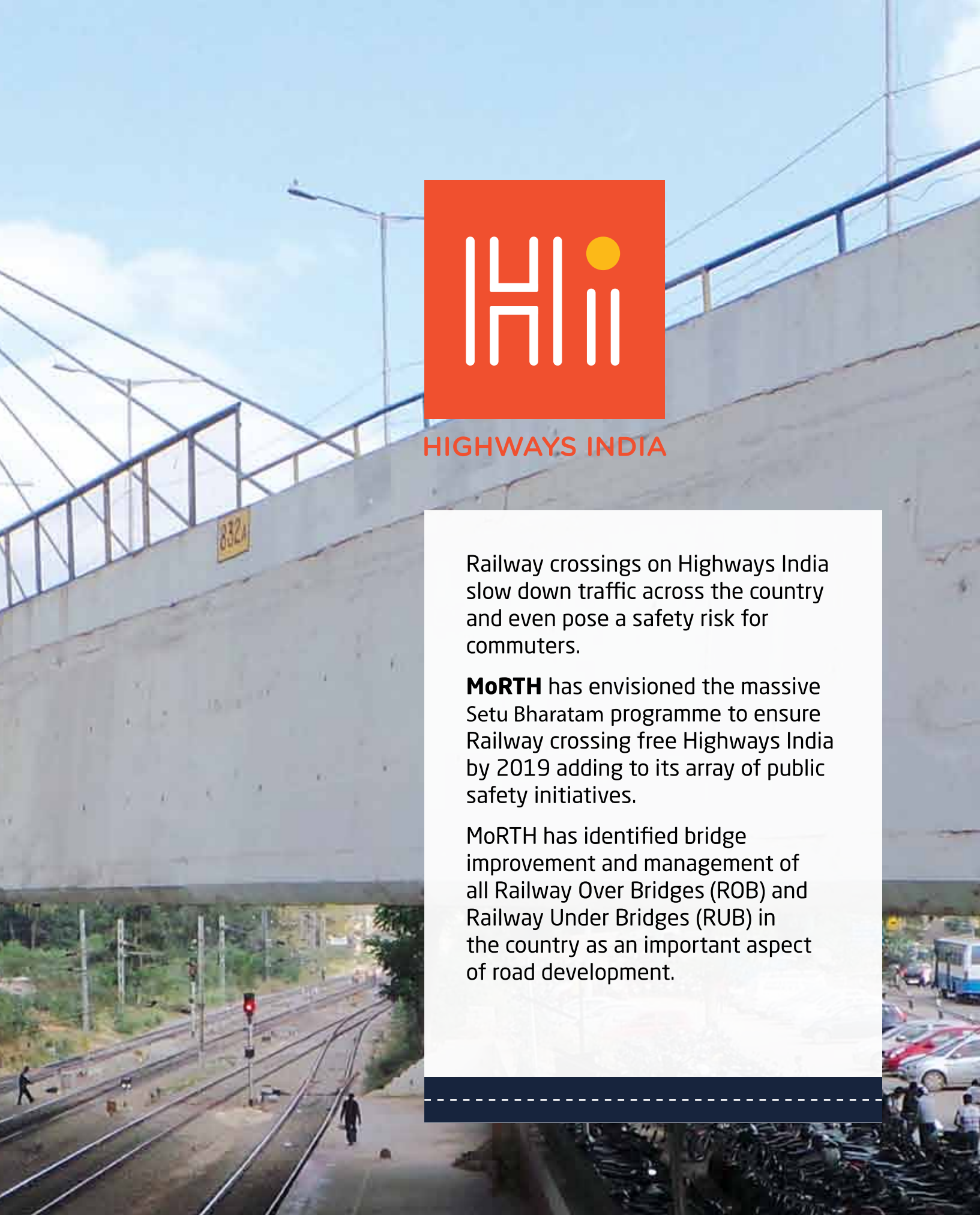
Highways without Railway crossings

THE SETU BHARATAM PROGRAMME



HIGHWAYS INDIA

Railway crossings on Highways India slow down traffic across the country and even pose a safety risk for commuters.

MoRTH has envisioned the massive Setu Bharatam programme to ensure Railway crossing free Highways India by 2019 adding to its array of public safety initiatives.

MoRTH has identified bridge improvement and management of all Railway Over Bridges (ROB) and Railway Under Bridges (RUB) in the country as an important aspect of road development.

SETU BHARATAM PROGRAMME AT A GLANCE

The Setu Bharatam Programme was launched by Sri Narendra Modi, the Hon'ble Prime Minister of India on 4th March, 2016 at Vigyan Bhavan, New Delhi.

As part of the project, 1,500 bridges of the British era will be overhauled at an estimated expenditure of Rs. 30,000 Crore. Till now, an inventory of 50,000 bridges has been prepared. The first cycle of condition survey will be completed by June this year.

Setu Bharatam aims to make all national highways free from railway level crossing by 2019 to ensure road safety.

- Replacement of all Level Crossings on National Highways by ROBs and RUB.
- These ROBs will be built across 19 States, with (the state of) Andhra Pradesh accounting for highest number (33) rail over bridges, followed by West Bengal (22) and Bihar (20 ROBs) etc.
- Replacement, widening and strengthening of weak and narrow bridges.
- 208 Level Crossings not falling under any other programme like NHDP etc. have been identified for replacement by constructing ROBs at a cost of Rs. 20,800 Crore.
- Approximately 1500 bridges shall also be improved by replacement, widening and strengthening in a phased manner at a cost of Rs. 30,000 Crore.

The works of ROBs and bridges are planned to be completed by 2019 at a total estimated cost of Rs. 50,800 Crore.

» The details of these 208 ROBs are tabulated below for which 11 consultants have been identified.

» Detailed Project Report for 76 ROBs have been received in the Ministry.

» 58 ROBs with an estimated cost of Rs. 4952.14 Crore have been sanctioned in the financial year 2015-16.

State	Number of ROBs/RUBs
Andhra Pradesh	31
Assam	12
Bihar	20
Chhattisgarh	5
Gujarat	8
Haryana	10
Himachal Pradesh	5
Jharkhand	11
Karnataka	17
Kerala	4
Madhya Pradesh	6

State	Number of ROBs/RUBs
Maharashtra	12
Odhisha	4
Punjab	10
Rajasthan	9
Tamil Nadu	9
Telangana	2
Uttarakhand	2
Uttar Pradesh	9
West Bengal	22
Total	**208**

Regarding replacement / widening / strengthening of weak and narrow bridges, we have already invited bids for appointment of consultancy for preparing Detailed Project Report.

It is targeted to award the consultancy work by the mid of June, 2016.

The cost of ROBs and bridges separately are as below

	Total Number	**Estimated Cost (Rs.)**
Construction of ROBs	208	20,800 Crore
Rehabilitation/ Replacement/ Widening of Bridges	1500	30,000 Crore
Total Estimated cost of Setu Bharatam		**50,800 Crore**

IBMS: INDIAN BRIDGE MANAGEMENT SYSTEM

The Honorable Prime Minister Shri. Narendra Modi along with Shri. Nitin Gadkari announced about **Indian Bridge Management System (IBMS)** in the Inauguration Program of "SETU BHARATAM" on 04.03.2016 at Vigyan Bhavan.

MoRTH has established **IBMS** at the Indian Academy for Highway Engineers, Noida and Uttar Pradesh with an aim to carry out condition survey including inventorization of all the bridges on National Highway System of India by using Mobile Bridge Inspection Units.

It is felt that there are approximately 1, 50,000 bridges on the National Highways of India. Eleven consultancy firms have been appointed for this purpose.

Objective of MoRTH to implement IBMS

- IBMS ensures that all Bridge Assets of our country are properly maintained and taken care of.
- The system generated information about the bridge population in the country.
- It enabled the Ministry to compile various statistical reports for bridge as per states.
- IBMS enabled Ministry to generate a database of deficient bridges
- Proper remedial measures can be initiated on all such bridges.

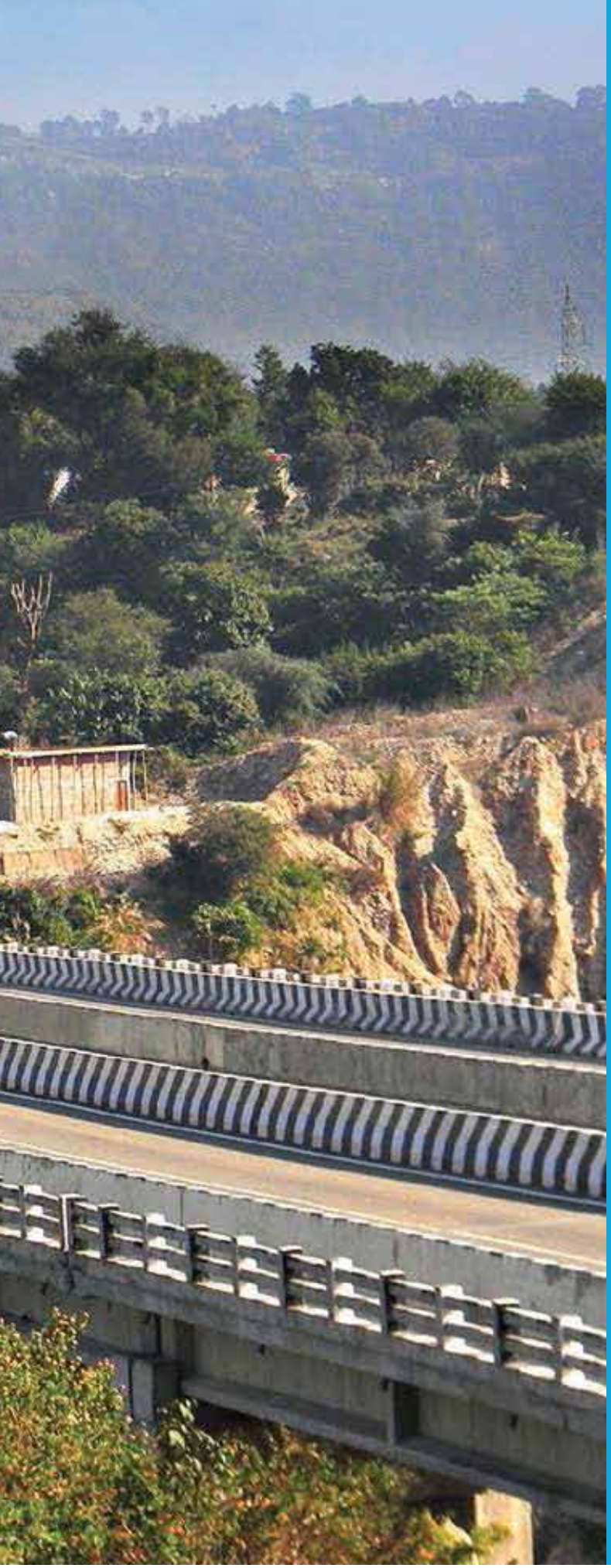
Current Status

- Inventorization of 50,000 bridge structures, about 85% has been completed.
- After completion of first cycle, this will be the largest data base in the world.
- This condition survey will also help in smoothening of movement of Over-Dimension and Over-Weight Consignments on National Highways which has been made online by MoRTH.
- IBMS will help in future management, repair and rehabilitation of the assets.

In some states like Assam, Meghalaya, Gujarat, Mizoram, Arunachal Pradesh the work of inspection of bridges has also started using MBIU.

Results of analysis of preliminary data collected

S.No.	State	Total Number
1	Arunachal Pradesh (AR)	6014
2	Assam (AS)	5253
3	Bihar (BR)	1555
4	Chhattisgarh (CG)	825
5	Chandigarh (CH)	3
6	New Delhi (DL)	35
7	Gujarat (GJ)	10915
8	Himachal Pradesh (HP)	6047
9	Haryana (HR)	3271
10	Jharkhand (JH)	578
11	Jammu & Kashmir (JK)	1154
12	Karnataka (KA)	4631
13	Kerala (KL)	516
14	Meghalaya (ML)	2424
15	Manipur (MN)	3160
16	Madhya Pradesh (MP)	8584
17	Mizoram (MZ)	3476
18	Nagaland (NL)	3613
19	Odisha (OD)	3556
20	Punjab (PB)	3587
21	Puducherry (PY)	57
22	Rajasthan (RJ)	1232
23	Sikkim (SK)	698
24	Tamil Nadu (TN)	5685
25	Tripura (TR)	1187
26	Telangana (TS)	670
27	Uttarakhand (UK)	7087
28	Uttar Pradesh (UP)	8540
29	West Bengal (WB)	1811
Total		**96164**



State-wise status of ROBs/RUBs Project are

Mahatma Gandhi Setu at Patna:

- Rehabilitation of M.G Setu after dismantling the existing Super-Structure and replacing it by Steel Truss at an estimated cost of Rs. 1755.65 Crore has been accepted by Public Investment Board (PIB).
- The proposal has been concurred by Hon'ble Minister thereafter the proposal has been forwarded to Ministry of Finance for approval.
- The tender for the work for Replacement of Superstructure of existing 5.575 Km long, 4-lane MG Setu over Ganga River on NH-19 from Km 212.72 to Km 218.295 at Patna in the State of Bihar has been invited.

Creek Bridges over Middle Strait Creek and Humphery Strait Creek

- The tender for construction of two Creek Bridges over Middle Strait Creek and Humphery Strait Creek of NH-223 in the Union Territory of Andaman Nicobar Island has been invited by Hi at an estimated cost of Rs. 262.97 Crore & Rs. 277.17 Crore respectively.
- These Bridges connect South Andaman Island to Baratang Island which is also essential for strategic importance.

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Contact Details of State Transport Commissioners

S.N.		Authority	Address	City	STD Code	Phone
1	Andhra Pradesh	The Transport Commissioner	Dr.B.R.Ambedkar Transport Bhawan,RTA Campus, Somajiguda,	Hyderabad-500082	40	23321283
2	Arunchal radesh	Secretary of Transport	"Transport Secretariat Govt. of Arunchal Pradesh"	Itanagar	360	2212457
3	Assam	"Transport Commissioner"	"Paribahan Bhawan, Jawahar Nagar, Khanapara"	Guwahati-22	361	2304110;2308525
4	Bihar	"Transport Commissioner"	"Vishwesaraiya Bhawan, Bailey Bhawan"	Patna	612	2546449
5	Chattisgarh	The Transport Commissioner	New Bus Terminal Complex, Pandari	Raipur	771	2582799/ 2582788/ 2221338
6	Goa	Secretary of Transport	"1st floor, Junta House, 18th June Road, Panaji"	GOA	832	"2225606, 2225724"
7	Gujrat	The Transport Commissioner	Block No.6, 2nd floor, Dr.Jivraj Mehta Bhawan, Old Sachivalaya	Gandhinagar	79	23251367
8	Haryana	The Transport Commissioner	30, Bays Building, Sector-17	Chandigarh	172	2784359
9	Himanchal Pradesh	The Transport Commissioner	"Directorate of Transport, Parivahan Bhawan, "	Shimla-171004	177	2803136;2808642
10	Jharkhand	The Transport Commissioner	Transport Bhawan	Ranchi	651	"2401706 9934345820"
11	Karnataka	The Transport Commissioner	"1st Floor, 'A' Block,TTMC Building, Shantinagar, Bangalore-560027"	Bangalore-560027	80	22214900
12	Kerala	The Transport Commissioner	"Motor Vehicles Department Trans Towers, Vazhuthacad,	Thiruvananthapuram	471	2333314; 8547639000
13	Madhya Pradesh	The Transport Commissioner	E7/446, Arera Colony	Bhopal	755	2424500
14	Maharasthra	The Transport Commissioner	3rd Floor, New Administrative Building, Near Dr.Ambedkar Garden, Government Colony, Bandra-East	Mumbai-400051	22	26516336
15	Meghalaya	Secretary of Transport	"Madanrting, Sawlad, Shillong - 793021"	Shillong-793021	364	2534617
16	Mizoram	Secretary of Transport	"State Trpt. Authority Mizoram Directorate Of Transport Bldg, Chaltlang Mst Transport Bldg Top Floor, Tuikual Aizawl, Aizawl H O"	Aizawl-796001	389	2318613
17	Nagaland	Secretary of Transport	"GOVERNMENT OF NAGALAND, Motor Vehicles Department, Transport Commissioner, Nagaland, Kohima-797 001"	Kohima-797001	370	2290409
18	Odisha	The Transport Commissioner	6th Floor, Rajaswa Bhawan	Cuttack-753002		
19	Rajasthan	The Transport Commissioner	"Transport Deporment Parivahan Bhawan, Sahkar Marg, Jaipur-302 005 (Rajasthan)"	Jaipur-302005	141	2740021; 5194600
20	Tamil Nadu	The Transport Commissioner	Ezhilagam, Chepauk,	Chennai	44	28588989
21	Telangana	The Transport Commissioner	Dr.B.R.Ambedkar Transport Bhawan, RTA Campus, Somajiguda,	Hyderabad-500082	40	23321282
22	Uttar Pradesh	The Transport Commissioner	Tehri Kothi, M.G.Marg	Lucknow-226001	522	2613978
23	Uttrakahnd	The Transport Commissioner	Kulhan, Sahasthradhara Road	Haridwar-248001	135	2711227
24	West Bengal	The Addl. Chief Secretary- Transport	Writer's Building	Kolkatta-700001	33	22625411

National Highway Authority of India
Project Implementation Units

S.N.	State	Location	Authority	Address	Phone
1	Andhra Pradesh	Anantapur	The Project Director, National Highway Authority of India,	House No.6-4-239, 3rd Cross, Maruthi Nagar Anantpur-515001	08554-275599
2	Andhra Pradesh	Hyderabad	The Project Director, National Highway Authority of India,	Dr. No.331/2RT, 2nd Floor, P. S. Nagar, Masab Tank, Hyderabad-500057	040-23372666
3	Andhra Pradesh	Nandyal	The Project Director, National Highway Authority of India,	D.No.25/684/150, 1st Floor, Near Indore Stadium, Padmavathi Nagar, Nandyal-518501, Kurnool District, Andhra Pradesh	08154-225089
4	Andhra Pradesh	Nellore	The Project Director, National Highway Authority of India,	Bypass Road Junction with old GNTRoad, Vedayapalem, Nellore-524004, Andhra Pradesh	0861-2307733
5	Andhra Pradesh	Nirmal	The Project Director, National Highway Authority of India,	#1-3-594, Road No. 6 Shastrynagar, Distt. Adilabad Nirmal-504106	08734-241365
6	Andhra Pradesh	Rajamundry	The Project Director, National Highway Authority of India,	D. No. 78-14-21, Shyamala Nagar Rajamundry-533103	0883-2431170
7	Andhra Pradesh	Vijayawada	The Project Director, National Highway Authority of India,	Flat No. 21, Teachers Colony, (Above SBH), Vijayawada-520008	0866-2483910
8	Andhra Pradesh	Vishakapatnam	The Project Director, National Highway Authority of India,	(GQ) NHAI Enclave, Km 2/8, Hanumanthavaka, Visakapatnam-530040	0891-2707600
9	Andhra Pradesh	Vishakapatnam	The Project Director, National Highway Authority of India,	(Port Connectivity),Sheela Nagar,BHPV (P.O.) ,Visakhapatnam-530012(A.P.)	0891-2707275
10	Assam	Bongaigaon	The Project Director, National Highway Authority of India,	Dolaigaon (Near Police Reserve) Bongaigaon-783380 Assam	03664-237493
11	Assam	Silchar	The Project Director, National Highway Authority of India,	H.No.328, 1st Floor, College Road, Ambicapatty, Silchar-788 004	03824-267213
12	Assam	Guwahati	The Project Director, National Highway Authority of India,	House No.1,1st Floor,Dilip Huzuri Path,Near Bageswari Mandir, Sorumotoria ,Dispur Guwahati-781006,Assam	0361-2233207
13	Assam	Nangaon	The Project Director, National Highway Authority of India,	Sankar Mission Road, Panigaon Ist Floor, Opposite to I.T.I. Nagaon Pin Code: 782003, Assam	03672-236701
14	Bihar	Begusarai	The Project Director, National Highway Authority of India,	At-Harpur, P.O.- Tilrath, Dist-Begusarai-851 122	06243-245144
15	Bihar	Muzaffarpur	The Project Director, National Highway Authority of India,	Sharma Sadan(3rd Floor),Opp D.A.V. School Khabra, Khabra NH-28,Muzaffarpur-843146	0621-2251934
16	Bihar	Patna	The Project Director, National Highway Authority of India,	D-63 Sri Krishna Puri, PATNA -800 001, Bihar	0612-2540184
17	Bihar	Darbhanga	The Project Director, National Highway Authority of India,	House of Mr. S.N. Mishra Diggi West, Professor's Colony Ward No. 10, Darbhanga (Bihar)-846004	06272-250194
18	Bihar	Purnia	The Project Director, National Highway Authority of India,	House of Shri. Sikkandar Singh, Sahiban Hata, Mahananda Colony, Near Janta Chowk , Purnia-85431	06454-243756
19	Bihar	Hajipur	The Project Director, National Highway Authority of India,	Sharma House, 2nd floor, Ramashish Chowk, Hajipur-844101	06224-274255
20	Bihar	Gaya	The Project Director, National Highway Authority of India,	House No. 70/244, West Jagjiwan Road,Opp.Judicila Quarters, Chanakyapuri Colony, Gaya-823001	
21	Bihar[70]/	Dhanbad	The Project Director, National Highway Authority of India,	Project Director - National Highways Authority of India, PIU Dhanbad, NHAI Complex, P.O. Bhitia, P.S. Govindpur, Distt. Dhanbad, Jharkhand	06540-283090
22	Chattisgarh	Raipur	The Project Director, National Highway Authority of India,	Project Director National Highways Authority of India House No.-A-7, VIP Estate Shankar Nagar, Raipur-492001, Chhattisgarh	0771-2282358
23	Goa	Goa	The Project Director, National Highway Authority of India,	Nr.Dr.Babasaheb Ambedkar Vocational Centre, Old Primary Health Centre, MPT, Headland, SADA, Goa-403804	0832-2521517
24	Gujarat	Gandhidham	The Project Director, National Highway Authority of India,	Z-6, Ground Floor, Near Divine Life Society Hospital (Sterling), Adipur, Dist-Kutch-370 205	0283-6260104
25	Gujarat	Ahmedabad	The Project Director, National Highway Authority of India,	Bunglow No,. 3A & 3B, Amul Building, Amrut Baug Society, Near Dena Bank, Vejalpur Road, Jivraj Park, Ahmedabad-380051	079-26821062
26	Gujarat	Rajkot	The Project Director, National Highway Authority of India,	301-303, Krishna-Con-Arch-I,Plot No.9, Nr.Kotecha Chowk, University Road, Rajkot-360007	0281-2585193

S.N.	State	Location	Authority	Address	Phone
27	Gujarat	Surat	The Project Director, National Highway Authority of India,	Laxmi Bunglow No.4, B/H. Big Bazar, Nr. S.D. Jain School, Vesu - Piplod Road, Surat-395007	0261-2221223
28	Haryana	Rohtak	The Project Director, National Highway Authority of India,	Project Director National Highways Authority of India 305 Vidyaniketan Road Ist Floor Model Town Rohtak-124001	01262-212010
29	Haryana	Ambala	The Project Director, National Highway Authority of India,	Project Director – CMU National Highways Authority of India 17L Model Town Ambala City – 134003	0171-2521361, 2520280
30	Haryana	Gurgaon	The Project Director, National Highway Authority of India,	Project Director Project Implementation Unit National Highways Authority of India, Dundahera, Delhi-Gurgoan Border Km.24 Mile Stone,NH-8,Gurgaon-122001	0124-2438056
31	Haryana	Faridabad	The Project Director, National Highway Authority of India,	6P, Sector-16A, Faridabad-121001	Telefax: 0129-2400900
32	Himanchal Pradesh	Shimla	The Project Director, National Highway Authority of India,	Kamna View Bhawan, Phase-III, Shimla-171009	0177-2673819
33	Jammu Kashmir	Srinagar	The Project Director, National Highway Authority of India,	Bashir Ahmad Parray, Opposite Jee Enn Sons, Airport Road, Parray Pora, Srinagar-190005	0194-2430728
34	Jammu Kashmir	Jammu	The Project Director, National Highway Authority of India,	Amar Villa House No.315;Sector No.1(1st floor) Channi, Himat Jammu-180015	0191-2473363
35	Jharkhand	Ranchi	The Project Director, National Highway Authority of India,	B-402, Road No. 4-C,Ashok Nagar, Ranchi-834002	0651-2245293
36	Karnataka	Dharwad	The Project Director, National Highway Authority of India,	2nd Cross, Sattur Colony Vidyagiri, Dharwad –580004	0836-2461244
37	Karnataka	Bangalore	The Project Director, National Highway Authority of India,	Survey No.13. Nagasandra Village, 14th Km. Bangalore-Tumkur Road, Hesaragatta, Bangalore - 73	080-28394383
38	Karnataka	Mangalore	The Project Director, National Highway Authority of India,	House No.7-35/10(4),Near Pumpwell,Mahaligeshwara Temple Raod,Kankanady,Mangalore-575002	0824-4254499
39	Karnataka	Chitradurga	The Project Director, National Highway Authority of India,	Project Director National Highways Authority of India Near J.M.I.T. Campus, NH-4 (Km 201) Chitradurga-577502	08194-223344
40	Karnataka	Hospet	The Project Director, National Highway Authority of India,	C-10,"Shree Nilayam" 1st Main,2nd Cross, Vivekanand Nagar, Nr.RTO office, Hospet-583203	08394-231565
41	Karnataka	Gulbarga	The Project Director, National Highway Authority of India,	Plot No. 65, Kothari Layout, Venkatesh Nagar, Gulbarga - 585103	08472 - 253756
42	Kerala	Palakkad	The Project Director, National Highway Authority of India,	No. 8/1187, Arumughan Colony,Chandranagar, Palakkad-678007	0491-2573790
43	Kerala	Kozhikode	The Project Director, National Highway Authority of India,	No. 2/2175-B, Krishna Kripa,Aishwarya Road, Civil Station(Post), Kozikhode-673020	0495-2376818
44	Kerala	Cochin	The Project Director, National Highway Authority of India,	Tharakans",1st Floor, Near ICCI Bank Kalamasseri Ernakulam, Pin No. 682 104	0484-2559416
45	Kerala	Thiruvananthapuram	The Project Director, National Highway Authority of India,	TC .29/1539/1 Rajasree, Perumthanni, Vallakadavu (Post), Thiruvananthapuram-695 008,	0471-2460924
46	Madhya Pradesh	Guna	The Project Director, National Highway Authority of India,	Plot No.1, Phulwari Colony, Near Millennium School, Guna (M.P)-473001	07542-268051
47	Madhya Pradesh	Gwalior	The Project Director, National Highway Authority of India,	House No. 13, Vivekanand Colony Saraswati Nagar University Road, Gwalior-474011 (MP)	0751-2233116
48	Madhya Pradesh	Indore	The Project Director, National Highway Authority of India,	15, Sampat Hills,Opp. Sahara City, Indore- Dewas Bypass Bicholi Mardana Indore(M.P)-452 016	0731-2901666
49	Madhya Pradesh	Sagar	The Project Director, National Highway Authority of India,	67, Shivaji Ward, Poddar Colony Sagar Madhya Pradesh-470002	07582-236412
50	Madhya Pradesh	Narsinghpur	The Project Director, National Highway Authority of India,	1st floor, Near Paras Industries Tilak Ward, BargiColony Road Narsinghpur(Madhya Pradesh) -487001	07792-230330
51	Madhya Pradesh	Shivpuri	The Project Director, National Highway Authority of India,	Narendra Nagar, Chhatri Road (Near Jain Atta Chakki), Shivpuri-473551	07492-223902
52	Madhya Pradesh	Bhopal	The Project Director, National Highway Authority of India,	Plot No. A # 43, Sakshi Bunglow, Trilanga,Shahpura, Bhopal-462039	0755-2902448
53	Madhya Pradesh	Jabalpur	The Project Director, National Highway Authority of India,	Near jain Multispecialty Dental Clinic,Plot no. 13BB, Ahimsa Chowk, Vilaynagar, Jabalpur-482002	0761-4047042

S.N.	State	Location	Authority	Address	Phone
54	Madhya Pradesh[405] / Maharashtra[13]	Chindwara	The Project Director, National Highway Authority of India,	House No-84, Beside Polythene Factory, Swarna Jayanti Nagar, Near Friends Colony, Khajri Road, Chhindwara- 480001	07162-238120
55	Maharashtra	Nashik	The Project Director, National Highway Authority of India,	"Subodh House", S. No. 911/2, Plot No. 4, Behind Toyota Showroom, Off. Mumbai Agra Highway, Nashik 422 009 (Maharashtra).	0253-2372800
56	Maharashtra	Nagpur	The Project Director, National Highway Authority of India,	Bungalow No.2, Shubankar Apartments Plot No.159, Ambazari Hill Top Area, Ram Nagar Nagpur – 440 010	0712-2249316
57	Maharashtra	Pune	The Project Director, National Highway Authority of India,	S. No. 134/1, BAIF Bhavan Campus Dr. Manibhai Desai Nagar Above Bank of India (Warje Br.) NH-4, Wajre, Pune 411052	020-25231745
58	Maharashtra	Solapur	The Project Director, National Highway Authority of India,	Plot No. 80, Old Santosh Nagar, In front of Devika Gas Agency. Jule Sholapur, -413003 (MH)	0217-2303379
59	Maharashtra	Dhule	The Project Director, National Highway Authority of India,	S. No. 10/2, Plot No.11, Mansaram Nagar, Near Circuit House, Sakri Road, Dhule-424002	02562-276276
60	Maharashtra	Amravati	The Project Director, National Highway Authority of India,	"Matruchhaya" Plot No.33, Raguvir Co-op Housing Society, Opp Bank of Maharashtra, Badnera Road, Sai Nagar, Amravati – 444 607 Tele./Fax. 0721 – 2510035	0721-2510035
61	Maharashtra	Panvel	The Project Director, National Highway Authority of India,	SURVEY NO. 63, 'D' POINT ON NH-4B,CHINCHPADA KALAMBOLI BYPASS ROAD,PANVEL - 410 206	022-65140560
62	Maharashtra	Aurangabad	The Project Director, National Highway Authority of India,	B-23, Near Kamgar Chowk, N-3, CIDCO, Aurangabad-431003	0240-2481592
63	Meghalaya	Shilong	The Project Director, National Highway Authority of India,	PWD , Easter Circle Building Top Floor, Lower Lachumiere Shillong – 793003, (Meghalaya	0364-2505177
64	Odisha	Keonjhar	The Project Director, National Highway Authority of India,	Plot No. 19/419, Badedera, Mandua, Keonjhar - 758001. Odisha	06766-253295
65	Odisha	Bhubaneswar	The Project Director, National Highway Authority of India,	1st Floor, Setu Bhawan, Nayapalli Unit-VIII, Bhubaneswar-751012	0674-2392720
66	Odisha	Berhampur	The Project Director, National Highway Authority of India,	Surya Nivas, Sales Tax Square, Engineering School Road, Berhampur-760010-Odisha	0680-2291796
67	Odisha	Sambalpur	The Project Director, National Highway Authority of India,	Bhatra,Opp. Poddar Petrol Pump, Dhanupalli, Sambalpur, Odisha 768005	0663-2546066
68	Punjab	Chandigarh	The Project Director, National Highway Authority of India,	Bay No 35-38, Ground Floor, Sector -4, Panchkula	0172-2587446
69	Punjab	Jalandhar	The Project Director, National Highway Authority of India,	135, Guru Amardas Nagar, Near Verka Milk Plant, Jalandhar Bypass Jalandhar	0181-2603642
70	Rajasthan	Kota	The Project Director, National Highway Authority of India,	A 575, Talwandi KOTA (Rajasthan)-324005	0744-2433396
71	Rajasthan	Udaipur	The Project Director, National Highway Authority of India,	10-A, New Panchwati Udaipur- 313001	0294-2428094
72	Rajasthan	Bhilwara	The Project Director, National Highway Authority of India,	Project Director, PIU, Bhilwara,6-A-1, R.C. Vyas Colony, Bhilwara-311001(Raj.)	01482-230611
73	Rajasthan	Dausa	The Project Director, National Highway Authority of India,	87,Ganga Vihar Colony,Behind Rawat Palace Hotel Dausa-303303, Rajasthan	1427224918
74	Rajasthan	Chittorgarh	The Project Director, National Highway Authority of India,	59-B, Bapu Nagar, West Road No. 5, Senthi Chittorgarh, Raj-312001	01472-246474
75	Rajasthan	Jaipur	The Project Director, National Highway Authority of India,	156, Girnar Colony, Near Laxmi Marriage Garden, Vaisali Nagar, Jaipur	0141-4026465
76	Rajasthan	Reengus	The Project Director, National Highway Authority of India,	Sangeeta Travels, Ward No. 20, Near Toll Booth, NH-11, Reengus -332404,Rajasthan	01575-224090
77	Haryana	Hisar	The Project Director, National Highway Authority of India,	H.No. S-17, Near Mezbaan Hotel, Model Town, Hisar Haryana Pin 125005	01662-248273
78	Rajasthan	Pali	The Project Director, National Highway Authority of India,	27, Tagore Nagar, Near Circuit House, Pali (Raj.)	02932-263556
79	Rajasthan	Jodhpur	The Project Director, National Highway Authority of India,	148 UMAID HERITAGE Ratanada, Jodhpur-342006 (Rajasthan)	
80	Rajasthan	Ajmer	The Project Director, National Highway Authority of India,	Plot No. 111, Grah Nirman Sahakari Samiti Ltd., Adarsh Nagar, Ajmer, Rajasthan 305001	0145-2680571
81	Tamil Nadu	Krishangiri	The Project Director, National Highway Authority of India,	Door No.259/1, Salem Main Road,Near KAKC Petrol Bunk, Krishnagiri – 635 001,	04343-234250

S.N.	State	Location	Authority	Address	Phone
82	Tamil Nadu	Karaikudi	The Project Director, National Highway Authority of India,	No.1, Second Floor, Subramaniapuram,3rd Street, Karaikudi-630002	04565-230707
83	Tamil Nadu	Tirunelveli	The Project Director, National Highway Authority of India,	Plot No.A-21, Thomas Nilayam, St. Thomas Road, Thendral Nagar, Maharaja Nagar, P.O. - Tirunelveli- 627 011,	0462-2522591
84	Tamil Nadu	Karur	The Project Director, National Highway Authority of India,	No.7 Kamadhenu Nagar, Karur-639001	04324-223670
85	Tamil Nadu	Thanjavur	The Project Director, National Highway Authority of India,	No. 54,First Floor,Natarajapuram Colony,Medical College Road, Thanjavur-613004	04362-246473
86	Tamil Nadu	Salem	The Project Director, National Highway Authority of India,	19/2B, Junction Road , Salem-636004	0427-2444275
87	Tamil Nadu	Chennai	The Project Director, National Highway Authority of India,	No. 1/54 - 28, Butt Road, St.Thomas Mount,Near Kathipara Junction, chennai-600016	044-22331795
88	Tamil Nadu	Coimbatore	The Project Director, National Highway Authority of India,	Door No.9/9A, 4th Cross Street, Kothari Layout, B.R. Nagar, (Opp. Coimbatore Stock Exchange) ,Trichy Road, Coaimbatore-641005	0422-2324734
89	Tamil Nadu		The Project Director, National Highway Authority of India,	Door No. 13, Travellers Bungalow Road, Kamaraj Nagar, 1st Street, Valliyoor - 627 117, Tirunelveli District, Tamil Nadu.	04637-222985
90	Tamil Nadu	Villupuram	The Project Director, National Highway Authority of India,	10, Govindasamy Nagar,Behind Collectorate, Villupuram-605602	04146-251247
91	Tamil Nadu	Madurai	The Project Director, National Highway Authority of India,	No.83/1, SBI First Colony extension,Near Hotel Gowri Krishna.,Byepass Road,Madurai - 625016	0452-2387750
92	Tamil Nadu	Trichy	The Project Director, National Highway Authority of India,	New No.6, Old No. 44, 1st Floor, 3rd Main Raod, Ponnagar, Tiruchirappalli-620001, Tamil Nadu	0431-2482959
93	Uttar Pradesh	Moradabad	The Project Director, National Highway Authority of India,	3-C/446, Budhi Vihar , Behind Springfield College, Delhi Road, Moradabad-244001	0591-2480070
94	Uttar Pradesh	Agra	The Project Director, National Highway Authority of India,	A-208, Kamla Nagar Agra-282005	0562-2580274
95	Uttar Pradesh	Varanasi	The Project Director, National Highway Authority of India,	S-8/108 DIG Colony, Maqbool Alam Road, Varanasi –220 001	0542-2501003
96	Uttar Pradesh	Aligarh	The Project Director, National Highway Authority of India,	C 47 and 48, Dream City, Bal Jiwan Ghutti, GT Road, Salsor, Aligarh-202001	0571-2900697
97	Uttar Pradesh	Raibareilly	The Project Director, National Highway Authority of India,	House no. 784, Vishnu Nagar, Opp Satyam Hospital, Raebareilly (UP)-229001.	0535-2702526
98	Uttar Pradesh	Allahabad	The Project Director, National Highway Authority of India,	18-C/28A, Sarojini Naidu Marg, Civil Lines, Allahabad-211001	0532-2422035
99	Uttar Pradesh	Kanpur	The Project Director, National Highway Authority of India,	53, Basant Vihar, Naubasta, Kanpur-208021	0512-2630154
100	Uttar Pradesh	Lucknow	The Project Director, National Highway Authority of India,	1/73G, Vineet Khand, Gomti Nagar Lucknow – 226 010 (UP)	0522-2726167
101	Uttar Pradesh	Gorakhpur	The Project Director, National Highway Authority of India,	No-3/40 Bahar, Cluster-3, Sahara State, Gorakhpur-273010 (U.P.)	0551-2231040
102	Uttar Pradesh	Barielly	The Project Director, National Highway Authority of India,	26, Green Park, Beesalpur Road, Bareilly-243006(UP)	0581-2523752
103	Uttar Pradesh	Meerut	The Project Director, National Highway Authority of India,	B-88, European Estate Colony, Near Best Price, Kankarkheda,	0121-2959090
104	Uttar Pradesh	Ghaziabad	The Project Director, National Highway Authority of India,	R-7/6 Raj Nagar Ghaziabad,Distt- Ghaziabad(UP)-201002	0120-2822406
105	Uttar Pradesh	Jhansi	The Project Director, National Highway Authority of India,	Jhansi House No. 214/1, K. K. Puri, Near Shiv Temple,Jhansi 248003	0510-2450967
106	Uttrakhand	Dehradun	The Project Director, National Highway Authority of India,	House No-5, Lane-4, Sector-4, Teg Bahadur Road, Dehradun	0135-2669562
107	Uttrakhand	Rudrapur	The Project Director, National Highway Authority of India,	A-35, Green Park, Kashipur Road	-
108	West Bengal	Kolkata	The Project Director, National Highway Authority of India,	" White House", 119, Park Street, Block -A, 2nd floor, Kolkata-700017	033-22268131
109	West Bengal	Siliguri	The Project Director, National Highway Authority of India,	Sevoke Road, 2½ Mile, Jyotinagar Near Don Bosco School Siliguri 734001 (WB)	0353-2540564
110	West Bengal	Krishnagar	The Project Director, National Highway Authority of India,	Vill.+P.O. - Bhatjangla, Krishnagar, Dist. - Nadia, PIN-741101 (WB)	03472-271713
111	West Bengal	Durgapur	The Project Director, National Highway Authority of India,	NHAI Complex, Sector 2(A) Bidhan Nagar, Durgapur-713212	0343-2535766
112	West Bengal	Kharagpur	The Project Director, National Highway Authority of India,	NHAI Complex, Near Chaurangi, P.O. Inda, Kharagpur - 721305	03222-227682
113	West Bengal	Malda	The Project Director, National Highway Authority of India,	UCO Bank Building 2nd Floor Mangalbari (NH-34) Mangalbari Pin-732142 Malda	03512-260630

MINISTRY OF ROAD, TRANSPORT & HIGHWAYS
REGIONAL OFFICES IN INDIA

S.N.	Location	Authority	Address	City	STD Code	Phone	Fax
1	Gandhinagar	Superintending Engineer, Department of Road Transport & Highways	Block No. 14, 4th Floor, New Sachivalaya	Gandhinagar-382010	79	23240091	23220705
2	Bhopal	Superintending Engineer, Department of Road Transport & Highways	1st Floor, D-Wing, Satpura Bhawan,	Bhopal-462004	755	2551329	2551329
3	Thiruvananthapuram	Superintending Engineer (Civil), Department of Road Transport & Highways	Public Office Building,	Thiruvananthapuram – 695033	471	2320879	2320991
4	Lucknow	Superintending Engineer (Civil), Department of Road Transport & Highways	NH Bhawan, Bio Tech Chowk, Ring Road, Vikas Nagar	Lucknow-226022	522	2322741	2321446
5	Jaipur	Superintending Engineer (Civil), Department of Road Transport & Highways	opp.D.C.M., Ajmer Road, P.O. Shyam Nagar,	Jaipur – 302019	141	2811883	2811776
6	Kolkata	Superintending Engineer (Civil), Department of Road Transport & Highways	Room No.106, Block-C (Ist Floor), Central Govt. Office Complex, C Wing DG Block,Salt Lake,	Kolkatta-700064	33	23586942	
7	Chandigarh	Superintending Engineer, Department of Road Transport & Highways	6th Floor, Kendriya Sadan, Sector-9A,	Chandigarh-160017	172	2740376	2740376
8	Bhubaneshwar	Superintending Engineer, Department of Road Transport & Highways	Plot No.184 in front of CRPF Stadium Baramunda,	Bhuvaneshwar-751003	674	2564260	2564260
9	Guwahati	Superintending Engineer(Civil), Department of Road Transport & Highways	Rajgarh Road, Chandmari	Guwahati-781003	361	2540552	2540552
10	Mumbai	Superintending Engineer, Department of Road Transport & Highways	95, New Admn. Building No.2, Ground Floor, PWD Compound, R.C.Marg, Chembur	Mumbai-400071	22	25294858	25294858
11	Patna	Superintending Engineer, Department of Road Transport & Highways	17, Aniket Cooperative Housing Society, IAS Colony,Colony, Kidwaipuri (S.K. Nagar),	Patna-800001	612	2260471	2260471
12	Bangalore	Superintending Engineer (Civil), D/o Road Transport & Highways,	PWD Office, Annexe Building, K.R. Circle,	Bangalore-560001	80	22217457	22212765
13	Dehradun	Office of Engineer Liaison Officer, C/o Chief Engineer (Level-I), D/O Road, transport & Highways	Uttaranchal PWD, Dehradun – 248001	Dehradun-248001	135	2531125	2531125
14	Hyderabad	Superintending Engineer, C/o Chief Engineer(NH) Building, D/O Road, Transport & Highways	2nd Floor, Quality Control Bldg.,Errum Manjil,	Hyderabad-500082	40	23393206	23393206
15	Chennai	Superintending Engineer, Department of Road Transport & Highways	C-1-A,Rajaji Bhawan, Besant Nagar,	Chennai-600090	44	24912115	24912115
16	Raipur	Superintending Engineer, Department of Road Transport & Highways	Pension Bada, NH campus	Raipur(Chattisgarh)-492001	771	2429786	2429786
17	Ranchi	Superintending Engineer, Department of Road Transport & Highways	New Area, Dutta Villa Road, Near TMC, Morabadi, House No.18F	Ranchi-834008	651	2403879	
18	Itanagar	Superintending Engineer, Department of Road Transport & Highways	1st Floor, Campus of CE(WZ) , NoWB,	Itanagar-791111 Arunachal Pradesh		9766321693	

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The face of on-road trucking is changing faster than ever before in India. The iconic Volvo FH, which has been the flagship and undisputed leader since last 16 years in the ODC segment, is now designed grounds up keeping driver in focus and safety at forefront and is sporting a completely new and distinct look. Built to deliver enhanced driver comfort, the rugged chassis and a strong driveline makes it an even more powerful truck engineered to pull higher loads with ease and efficiency. The new Volvo FM is also built with enhanced features having stronger chassis and powerful driveline with 10% higher horse power and torque. Its functional design makes it ideally suited for a range of applications.

To know more about the new Volvo FH & the new Volvo FM visit www.volvotrucksindia.com or write to us at vtimarketing@volvo.in

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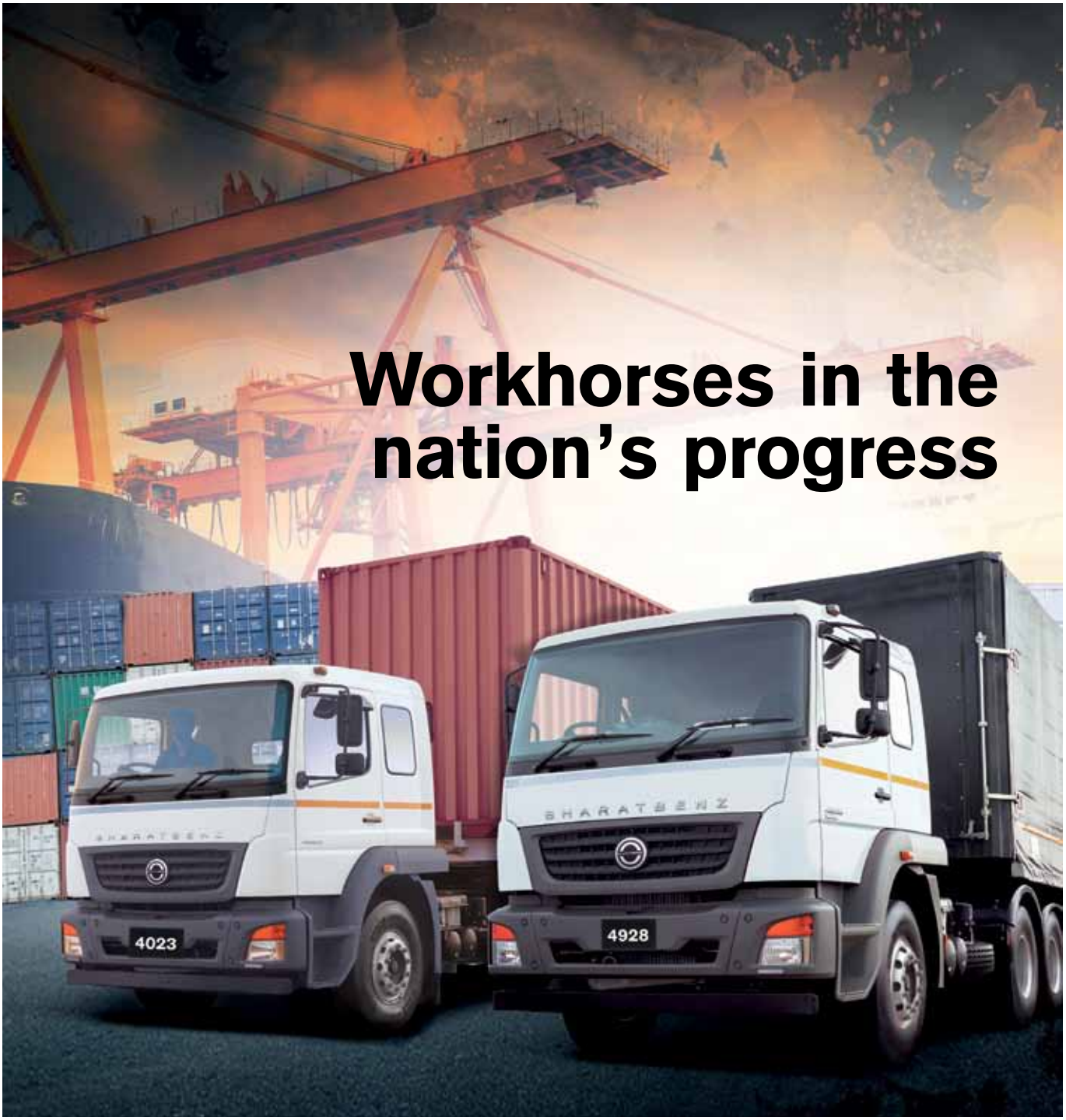

BharatBenz heavy duty trucks are designed keeping your needs in mind. Long haul trips are made easier with better mileage, faster turnaround times and more comfortable cabins. Rigorous testing over millions of kilometres ensures zero breakdowns and effortless performance on any terrain, making these trucks the true workhorses in the nation's progress.

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