Government of Nepal

Ministry of Physical Infrastructure and Transport

Department of Transport Management

NEPAL INDIA REGIONAL TRADE AND TRANSPORT PROJECT (NIRTTP)

SUB-PROJECT OFFICE

Road Transport Safety and Axle Load Control Study in Nepal

Part B: Axle Load Control

TASK-B2

FREIGHT FLOW PATTERN AND LOCATION OF AXLE LOAD CONTROL STATIONS

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ACRONYMS AND DISAMBIGUATION

ALC-MIS	: Axle Load Control- Management Information System
AH	: Arniko Highway
BIMSTEC	: Bay of Bengal Initiative for Multi Sectoral Economic Cooperation
BPH	: B. P. Highway (Banepa Sindhuli Bardibas Road)
CIAA	: Commission for Abuse of Authority
DoR	: Department of Roads
DoTM	: Department of Transport Management
ENPTO	: Federation of Nepal Petroleum Transport Operators
EWH	: East West Highway
FTTEN	: Federation of Truck Transport Entrepreneurs Nepal
GDP	: Gross Domestic Product
GIS	: Geographical Information System
HMIS	: Highway Management Information System
ICD	: Inland Container Depot
ICT	: Information and Communication Technology
Id	: Identity
KH	: Koshi Highway
MH	: Mechi Hghway
MKR	: Mirchaiya Katari Road
MNH	: Muglin Narayanghat Highway
NEFFA	: Nepal Freight Forwarders Association
NSH	: Nepalgunj Surkhet Highway
PBH	: Pokhara Baglung Road
PH	: Prithvi Highway
RSDP	: Road Sector Development Project
SAFTA	: South Asian Free Trade Area
SH	: Sidhhartha Highway
SEZ	:Special Economic Zone
SRN	: Strategic Road Network
STEP	: Sub-regional Transport Enhancement Project
TAR	: Tibet Autonomous Region
TRP	: Tribhuwan Raj Path

EXECUTIVE SUMMARY

Vehicle overloading is a global problem regardless of scale of severity. In most of the cases, the vehicle overloading is caused by freight vehicle, i.e. trucks and trippers. Therefore, freight flow analysis is very much important in taking overloading control intervention such as installation of weighbridges and route permitting. Department of Transport Management (DoTM) is a responsible agency for vehicle overloading control in Nepal. However, no weighbridges are installed and operated by DoTM at present. Private sector has installed some weighbridge for their internal usage such weighing transported freight to share the freight transportation job among the truck operators. Therefore, it is a high time to plan and install weighbridges based on the technical study.

The main objective of this task is to analyze the freight flow pattern in strategic road network, identify the location of weighbridge stations and analyze the possibility of utilizing existing weighbridges operated by private sector for vehicle overloading control under the framework of DoTM's management.

The Study Team collected relevant primary and secondary data from the concerned agencies. Main data used for this analysis are; trade data, road network data, axle load survey data and traffic volume data. The Study Team has conducted axle load survey data from three strategic location of strategic road network. The collected data were analyzed in MS-Excel and GIS to understand the freight flow pattern. Similarly, some representative weighbridge stations which are operated by private sectors were also visited to grasp the operational condition and analyzing the possibility of using them for vehicle overloading control. A number of criteria are set to identify the location of weighbridges along the strategic road network. The identified weighbridge station locations are prioritized for installation because phase-wise installation is necessary not only from the view point of affordability but also the practicality and effectiveness.

Freight flow analysis revels that the highest number of freight traffic was recorded at Nagdhunga, a gateway to enter the Kathmandu valley. The second highest freight volume was recorded at Pathlaiya (east), a major location passing cross border traffic. Similar, the third highest freight volume was recorded at Mugling. Therefore, it can be concluded that Kathmandu – Birgunj corridor is the main freight corridor in Nepal. Regarding severity of vehicle overloading, it is found that the number of trucks that are overloaded, among the present surveyed stations; Hetauda recorded the highest percentage 51% and 77% for two axle and multi axle trucks respectively. Similarly, past data revealed that Aptari had the highest percentage of overloaded trucks; 61% and 89% for two axle and multi axle trucks respectively.

The numbers of location of weighbridges are identified based on the various policies set during the study. The proposed weighbridges are categorized into three classes. A total of twenty-one (21) weighbridge stations are categorized as high priority weighbridges. Among the high priority weighbridge locations, Pathaliaya (Parsa), Rampur (Chitwan) and Naubishe/Khanikhola (Dhading) are recommended for installation as soon as possible.

At present the Federation of Truck Transport Entrepreneurs Nepal (FTTEN) is operating fifteen (15) weighbridges in major freight routes. These weighbridges can measure only Gross Vehicle Weight (GVW). The measured data at weighbridges are stored in central transportation database. Therefore, though there are some concerns such as compatibility of existing weighbridges, location and physical facilities available, financial sustainability and willingness of the private sector, private sector has already proven that they are capable for operating weighbridges. Furthermore, operation of weighbridge requires specialist of different disciplines, involvement of private sector in weighbridge operation would be more effective. Therefore, if DoTM opt for involving private sector in overloading control, the existing weighbridges might require some modification to meet with the DoTM's requirement such as specification of weighbridges and axle load management information system.

मुख्य सन्क्षेप

समस्याको गम्भीरतामा फरक फरक भएता पनि विश्वभर सवारीहरुमा हुने अत्यधिक भार पनि एक समस्या रहेको छ। धेरै जसो अवस्थामा ट्रक एवं ट्रिपरहरु जस्ता मालवाहक सवारीहरुले अत्यधिक भार गर्ने गरेको पाइएको छ। तसर्थ विध्यमान सामानहरुको धुवानिको तथ्याङ्क बाटो ईजाजत एवं उपयुक्त स्थानहरुमा तौलपूल अथवा धर्मकाँटा (Weighbridge) स्थापना गरी अत्यधिक सवारी भारलाई नियन्त्रण गर्ने निकाय श्री यातायात व्यवस्था विभाग हो। यद्यपी हालसम्म यस विभागले कुनै ठाउँमा पनि तौलपूल स्थापना अथवा संचालन गरेको छैन। यस सन्दर्भमा निजि क्षेत्रले भने ढुवानी सामानको तथ्याङ्क आन्तरिक रुपमा ट्रक व्यवसायीहरु विच आदानप्रदान गर्ने अभिप्रायले नेपालको केहि स्थानहरुमा तौलपूलहरु स्थापना गरी संचालनमा ल्याएका छन्। तसर्थ वैज्ञानिक रुपमा व्यवस्थीत ढंगले तौलपूलको स्थापना योजनावद्ध रुपमा गर्न तडकारो रहेको छ।

यो कार्यको मुख्य उद्देश्य देशमा सामरिक सडक संजाल ढुवानी सामानहरुको आवतावतको तथ्याङ्कलाई विश्लेषण गर्नु, देशमा तौलपुलहरु समेतलाई सवारी भार नियन्त्रण गर्न अधिकतम प्रयोग यातायात व्यवस्था विभागको व्यवस्थापनमा गर्न संभाव्यता अध्ययन गर्ने रहेको छ।

अध्ययन टोलीले यस कार्यको लागि प्रत्यक्ष एवं अन्य आयोजना श्रोतहरुको संम्वन्धिमा व्यापार सडक संजाल, एक्सल (सवारीको धुर) को भार सर्भेक्षण विवरण एवं सवारी घनत्व (Traffic Volume) को विवरण संकलन गरिएको थियो। यस सन्दर्भमा सामरिक सडक संजालको तीन स्थानहरुमा एक्सल (सवारीको धुर) भार सर्भेक्षण गरेको थियो।

देशमा अवस्थित राजमार्ग एवं सहायक मार्गहरुको सडक संजाललाई सामरिक सडक संजाल मानिन्छ। यो सडक विभागको मातहातमा रहेको छ। तौलपूलहरुको लागि उपयुक्त स्थानहरुको पहिचान अध्ययनको सिलसिलामा निर्धारण गरिएको विभिन्न नीतीको आधारमा तय गरिएको छ। प्रस्तावित तौलपूलहरुलाई तीन समुहमा विभाजन गरिएको छ। यस सिलसिलामा एक्काइस (२१) वटा तौपूलहरुलाई उच्च प्राथमिकताको सुचिमा समावेश गरिएको छ। यो समुह मध्ये पथलैया (पर्सा) राम नगर (चितवन) र नौबिसे–खानीखोला (धादिङ्ग) मा तौलपूलको स्थापना जति सक्दो चाडो गर्न सिफासिश गरिएको छ।

हाल ट्रक यातायात व्यवसायी महासंघले देशको पन्ध्र (१५) वटा स्थानहरुमा तौलपूल संचालन गरेका छन्। यो तौलपूलहरुले ती सवारीको कुल भार (GROSS VEHICLE WEIGHT अथवा (GVW) मात्र मापन गर्न सक्छ। यी तौलपूलमा मापन गरिएको विवरणहरु महासंघको केन्द्रिय यातायात तथ्याङ्क प्रणालीमा सुरक्षित राखिन्छ। तसर्थ निजि क्षेत्रवाट संचालित यो तौलपूल कतिको उपयोगी, आर्थिक रुपले दिगो, स्थान उपयुक्त एवं निजि क्षेत्र यातायात व्यवस्थाको व्यवस्थापनमा भारमापनका लागि कतिको इच्छुक रहने, आदि बारे केहि चिन्ता रहेको छ। यद्यपी निजि क्षेत्रले स्वयम तौलपूल संचालन गर्न सक्ने क्षमता देखाइसकेका छन्। साथै तौलपूलको संचालन गर्दा विभिन्न विधाको विशेषज्ञहरु आवश्यक पर्ने हुनाले पनि तौलपूलको संचालनमा निजि क्षेत्रको सहकार्य गर्न अझ धेरै प्रभावकारी हुन्छ। तसर्थ निजि क्षेत्रको संलग्नतामा यातायात व्यवस्था विभागले अत्याधिक भार नियन्त्रण गर्न चाहेमा विभागको आवश्यकता अनुसार गर्न गराउन निजि क्षेत्र द्वारा संचालित तौलपूलहरुमा केहि संशोधन, भौतिक संरचना अभिवृद्धि गर्नु पर्ने देखिन्छ। (जस्तै तौलपूलको स्पेशिफिकेसन एवं व्यवस्थापन प्रणाली आदि)।

CHAPTER 1 INTRODUCTION

1.1 BACKGROUND

For the control of axle loads on a road it is a primary interest that what volume of freight along the moving routes is being carried out by a particular section of a road. Secondly, it is also equally important to have information about the volume and type of freight vehicles plying on the road. It is basic criteria that the axles of all freight vehicles are weighed for the purposes of controlling the axle loads on the vehicles. For this a number of weighing bridges will be necessary along the freight moving route. In fact, there are already some weighing stations scattered throughout the country, which are to be best utilized for the foreseeable future. However, the existing weighbridge stations and their existing capacities and physical facilities may not be sufficient and other additional weighbridge stations are to be established at places wherever necessary. For the prioritization and optimization of existing weighbridges and finding the necessity of new weighing stations a comprehensive study and analysis of freight flow and freight carrying traffic was necessary. Prioritization of installations of new weighing stations is to be matched with the availability of budget and severity of the overloading problems. This report has emphasized on these vital issues and efforts are made to advise the client in this respect.

1.2 SCOPE AND OBJECTIVE

The main purpose of analysis of freight flow pattern is to depict the overloading tendencies on the freight vehicles. Presently, almost all freight vehicles are run by private entrepreneurs and they are associated in the Federation of Truck Transport Entrepreneurs Nepal (FTTEN). The individual truck owner usually employs a driver and the driver is the sole in charge of the truck while on the road. As there is no owner's presence on the road the driver has the tendency of overloading for some extra income, thereby there are most chances of overloading. For lack of proper monitoring of the overloading the practice or rather tendency of overloading is continuing which is detrimental to the road pavement as well as early wear and tear of the vehicles. The vehicle overloading causes the following main adverse impacts:

- Early deterioration of pavement which has economic loss to the country,
- Wear and tear and early aging of vehicle which causes direct financial loss to the owner,
- Adverse environmental effect by creating fumes, by the vehicles due to premature ageing of vehicles, which is detrimental to the public health and
- Road traffic accidents due to overloading of vehicles whereby causing loss of life and property;
- Overloading causes reduction in speed and creates traffic congestion making difficult for free traffic flow etc.

By the proper analysis of the freight flow, the overloading sources could be properly identified and thus the practice of overloading could be minimized if not totally curbed.

1.3 DEFINITION

Axle: The common axis of rotation of one or more wheels, whether power driven or freely rotating, and whether in one or more segments and regardless of the number of wheels carried thereon.

Axle Load: The axle load of a wheeled vehicle is the total weight felt by the roadway for all wheels connected to a given axle. Viewed another way, it is the fraction of total vehicle weight resting on a given axle. Axle load is an important design consideration in the engineering of roadways and railways, as both are designed to tolerate a maximum weight-per-axle (axle load); exceeding the maximum rated axle load will cause damage to the roadway or rail tracks.

Cross Border Freight: The freight which crosses the border of the adjacent countries either on the same freight vehicle or transferred to another freight vehicle. The freight vehicle might be truck, railway, ship, aircraft, etc.

Equivalent Standard Axle Load (ESAL): Most commonly accepted indicator to equate damage from wheel loads of various magnitudes and repetitions to damage from an equivalent number of "standard" axle loads, one of which is a 8.2 tones (18,000 pound) single axle (the equivalent standard axle or EAS).

Freight: The goods which are transported by vehicle through a route.

Freight Flow: Movement of freight by keeping it on the freight vehicle.

Freight Forwarder : The agency which provides services of transporting freight including all logistics required for delivering the freight in the specified destination.

Gross Weight: The weight of a vehicle and /or vehicle combination without load plus the weight of any load thereon.

Gross Vehicle Weight: It is the total weight of the vehicle (including pay load) as specified by the manufacturer

Overload: An axle load, a load from a group of axles, or gross vehicle mass on a vehicle that exceeds the prescribed legal limits for the vehicle or for any particular part of public roads.

Payload: It is the carrying capacity of the vehicle. It is the difference between the gross vehicle weight (GVW) and unladen vehicle weight.

Truck: A motor vehicle designed, used or maintained primarily for the transportation of goods.

Traffic Volume: Number of vehicles of different categories plying on the road and it depends on duration of counting.

Weighbridge: A mechanical device or facility designed and installed to weigh a vehicle and its laden mass.

1.4 STRUCTURE OF THE REPORT

This report consists of four (4) chapters followed by two (2) appendices. Details of each chapter and appendices are shown below.

Chapter 1: This chapter provides background of the analysis, scope and objectives of the analysis, and structure of the report.

Chapter 2: This chapter provides a detailed about the present status of the freight flow pattern in strategic road network of Nepal. It includes overall freight trade in Nepal, source of data, method of analysis and result of analysis followed by conclusions on freight flow pattern.

Chapter 3: This chapter provides the inventory of existing weighbridges, their operational conditions and identification of strategic locations of axle load control stations in strategic road network.

Chapter 4: This chapter provides information about present involvement of private sector in operating weighbridges and possibility analysis in using privately owned weighbridges in controlling of vehicle overloading followed by conclusions and recommendations.

Chapter 5: This chapter provides the overall conclusions and recommendations of the Task B-2.

Appendix - 1: Traffic Count of One Day at Naubishe, Gaidakot and Hetauda.

Appendix - 2: Cost Estimate and Specification of Weighbridge

1. Cost estimate of a typical fixed Weighbridge
2. Specifications
3. Cost of Portable Weighing Cell
4. Specifications of Portable Weighing Cell

CHAPTER 2 FREIGHT FLOW PATTERN

2.1 FREIGHT TRADE

2.1.1 Domestic Freight Trade

In view of improving the trade performances of the country, Government of Nepal has brought out a number of policy and strategic measures during the last decade. These among others, include the membership to the multilateral trading systems and the two regional trade agreements namely, SAFTA and BIMSTEC, improvement of the transit services and border infrastructures, development of Special Economic Zones (SEZ) in some strategic locations, enhancement of market access with the conclusion of the bilateral trade treaties. Besides, the Government of Nepal has brought out the new Trade Policy-2009 and the Nepal Trade Integration Strategy-2010 that largely aims at enhancing the supply side capacity of Nepalese trade. The current three year plan (2013-16) of the government has also accorded trade as the priority sector for advancing the economic growth and equity. All these efforts are supposed to correct the recurring wider trade deficit over the past several years.

Table 2.1 Nepalese Trade Last Five Years

(NRS in thousands)

Direction	FY 2008/9	% Total	FY 2009/10	% Total	FY 2010/11	% Total	FY 2011/12	% Total	FY 2012/13	% Total
Exports										
India	43,574,482	64	39,902,811	65	42,868,108	66	50,933,222	69	51,788,460	67
# China P.R.	2,151,783	3	1,008,696	2	746,023	1	985,693	1	2,176,749	3
Others	22,870,587	33	20,038,096	33	20,948,313	32	22,170,145	30	23,385,501	30
Total	**68,596,852**	**100**	**60,949,603**	**100**	**64,562,444**	**100**	**74,089,060**	**100**	**77,350,709**	**100**
Imports										
India	165,119,002	57	214,261,109	57	259,162,277	65	321,346,419	65	397,957,920	66
# China P.R.	34,465,791	12	39,218,203	10	45,635,962	11	52,924,945	11	68,304,882	11
Others	91,416,151	31	122,126,558	33	92,737,703	23	123,889,710	25	134,944,722	22
Total	**291,000,944**	**100**	**375,605,870**	**100**	**397,535,942**	**100**	**498,161,074**	**100**	**601,207,525**	**100**
Trade Deficit										
India	121,544,520		174,358,298		216,294,169		270,413,197		346,169,460	
# China P.R.	32,314,008		38,209,507		44,889,939		51,939,252		66,128,133	
Others	68,545,564		102,088,462		71,789,390		101,719,565		111,559,222	
Total	**222,404,092**		**314,656,267**		**332,973,498**		**424,072,014**		**523,856,815**	

Source: Trade and Export Promotion Centre, Nepal

2.1.2 Foreign Trade (Cross-Border Trade)

The total foreign trade commodity traffic has been divided into four categories as follows:

i. Third country imports
ii. Third country exports
iii. Bilateral imports from India
iv. Bilateral exports to India

By all account, Birgunj has remained a major border crossing in international trade of Nepal as the two customs (Birgunj customs and Birgunj ICD) occupy 49 percent of value of trade and also contribute the highest percentage (approximately 60%) of the annual customs revenue to the Government of Nepal. **Table 2.2** depicts the volume of trade through Birgunj border crossing in relation to total international trade of Nepal.

Table 2.2 Trade through Birgunj-Raxaul Border Crossing during the Last five Years

(Values in million NRs)

Year	2009		2010		2011		2012		2013*	
	Total	Via Birgunj	Total	Via Birgunj	Total	Via Birgunj	Total	Via Birgunj	Total	Via Birgunj
Export	64,695	17,426	63,959	17,134	67,709	17,045	76,205	21,530	17,806	5,346
Import	339,615	159,689	374,480	206,223	441,966	232,356	555,474	289,858	147,945	76,151
Total	404,310	177,115	438,439	223,357	509,675	249,401	631,679	311,388	165,751	81,497
Total in Percentage		44		51		49		49		49

** up to March 2013* *Source: Trade and Export Promotion Centre, Nepal*

India and Tibet Autonomous Region (TAR) of the People's Republic of China are the traditional trading partners of Nepal from time immemorial. However, the trade with India was very much dominant due to comparatively easy access and similar socio-economic conditions. The share of India in the international trade of Nepal between 1950 and 1970 was around 95 percent which showed a gradual decline in favor of third countries till the trend was reversed during the latter half of 90s. India occupied 20 percent share of Nepalese export and the third country export were 80 percent of the total during 1994-95. The scenario was changed due to the revision in the bilateral treaty of trade in 1996 that allowed the duty free access to all Nepalese products except the three items of Tobacco, Alcohol and Perfumes. The decision on Nepalese origin of the export products were to be decided by the Nepalese authorities since the treaty did not specify any specific rules of origin criteria. As a result of the enforcement of this agreement, the Nepalese export to India grew eight fold during the period of 1996-2002, until the provisions of the treaty were revised during the renewal of the trade treaty in 2002.

There was a brake in the acceleration of Nepalese export to India after 2002 that has exhibited only the simple increment in export but a significant import from India. Similarly, some of the major export commodities to the third countries like readymade garments, woolen carpets, and Pashmina have shown substantial decrease in export due to eroding competitiveness of Nepalese products. The inflow of remittances up to 25 percent of GDP during the past decade has fuelled

the import of consumable goods while the export performances has remained poor due to outflow of a large number of productive human resources outside the country. This has resulted in unsustainable growth of trade deficit that demands for affirmative and appropriate trade policy interventions from the government.

2.2 FREIGHT CHARACTERISTICS

2.2.1 Type

Major freight in Nepal includes construction materials, foods, machineries, petroleum products, woods, textiles, animal and meat product and papers. Freight generated within Nepal and coming from beyond Nepalese borders are mainly carrying through land transport.

2.2.2 Cross-Border Freight

Cross border freights carrying through land transport are mainly entering / existing from the following borders;

i. Kodari (China Border)
ii. Bhairawa (India Border)
iii. Kakarbhitta (India Border)
iv. Krishnagar (India Border)
v. Biratnagar (India Border)
vi. Rupaidiha –Nepalgunj (India Border)
vii. Birgunj (India Border)

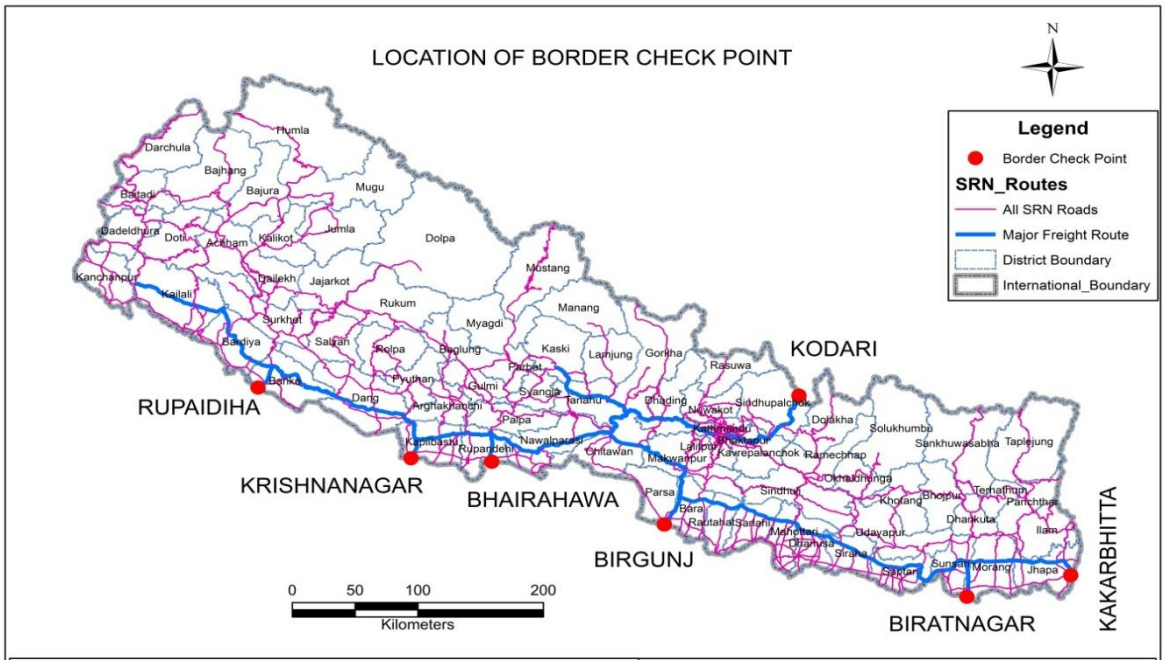


Figure 2.1 International Cross Border Check Point

2.2.3 Freight Forwarder

Freight forwarders are the important facilitator of export and import trade in Nepal. It plays an important role in expanding trade by procuring efficient and economic modes of transportation and trade facilitation techniques. There are approximately 125 freight forwarders in Nepal which are officially registered in Nepal Freight Forwarders Association (NEFFA), an umbrella organization of Nepalese Freight Forwarders which was established in 1998.

2.2.4 Mode of Transportation

The majority of freights are transported through the means of land transport i.e. trucks and containers. All the truck operators are united under the umbrella of Federation of Truck Transport Entrepreneurs of Nepal (FTTEN) which was established in 1982. Similarly, all petroleum products are carrying by tankers registered with the Federation of Nepal Petroleum Transport Operators (FNTPO). The FTTEN and FNPTO are the major transporter of freight in Nepal.

2.3 DATA SOURCE AND DATA COLLECTION

The main source of data are axle load survey data collected under this study, the statistics compiled by the Trade Export Promotion Centre, the custom data, traffic volume data (2012) of various roads and axle load survey data conducted and compiled by various road projects implemented under Department of Roads (DoR). These data managed by the below mentioned agencies were collected and used for the freight flow analysis.

Table 2.3 Freight Flow Data

SN	Data Type	Source
1	Axle Load Survey Data (2015); Dharke, Gaindakot, Hetauda	The Study Team
2	Domestic and Foreign Trade related Custom Data (2013)	Trade Promotion Centre, Nepal
3	Traffic Counting Data (2012) of SRN	HMIS, DoR
4	Axle Load Survey Data (Narayanghat – Mugling Section), 2010	Road Sector Development Project II (RSDP II), DoR
5	Road Network Data	HIMIS, DoR

2.4 ANALYSIS TOOLS AND METHOD

Freight related data were mainly analyzed using various tools available in MS-Excel and Geographic Information System (GIS). Data were analyzed in MS-Excel to derive various statistics and presentation of data in charts and tables. Data received from various sources were sub-grouped, processed and finally presented in the form of charts and tables. In utilizing traffic

volume data for freight flow analysis, multi axle truck, heavy truck and light truck are defined as freight vehicles and necessary analysis were done accordingly.

Road network and traffic volume data were inputted in GIS and analyzed to visualize the distribution of traffic flow, identify pattern of freight flow, identify the major trade corridors and present the in various maps.

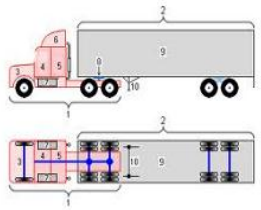
2.5 RESULTS OF ANALYSIS

2.5.1 Traffic Volume Data

(1) Vehicle Classification

Vehicles are classified into fifteen (15) categories. **Table 2.4** shows the vehicle types used in the traffic count survey in all counting stations.

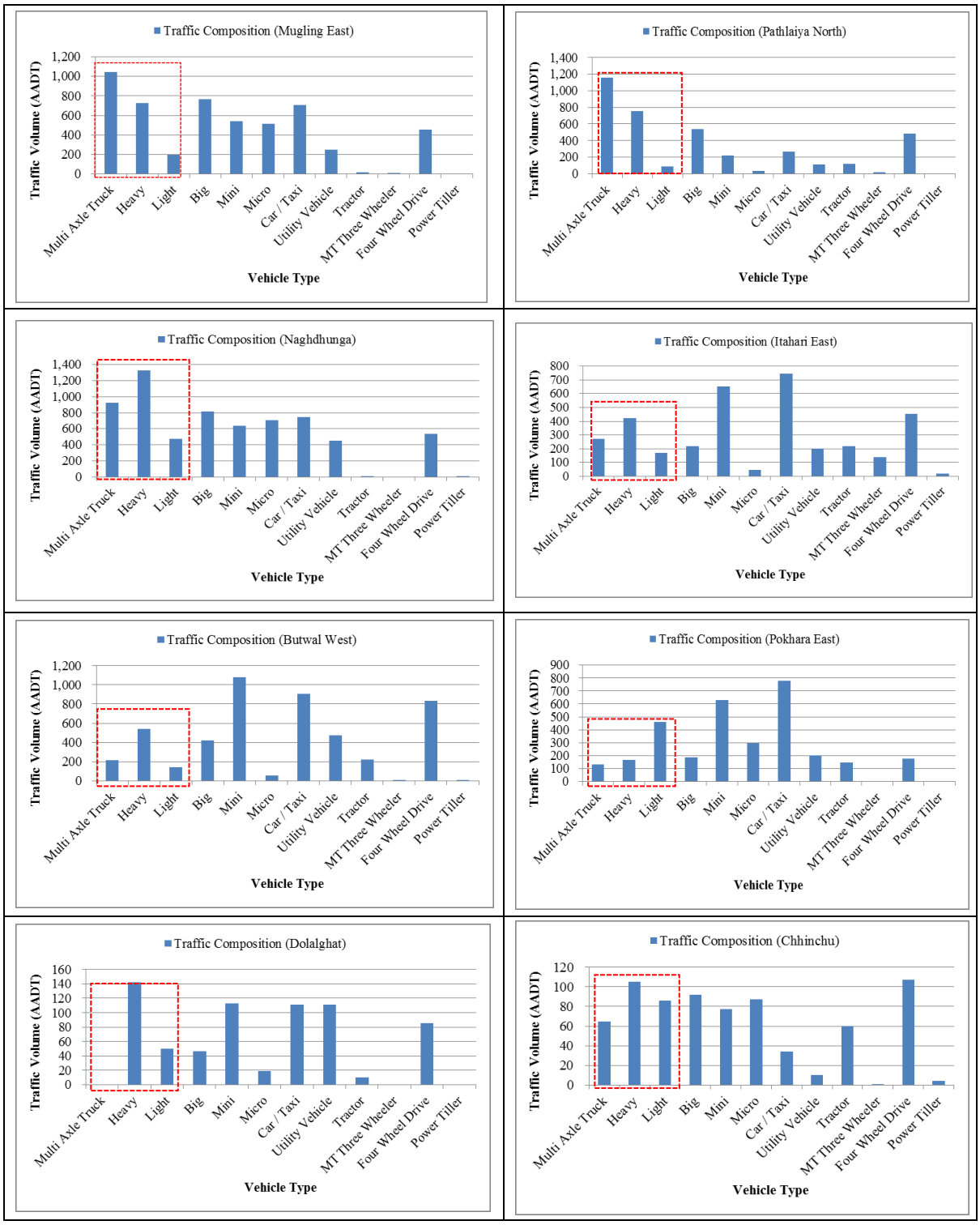
Table 2.4 Vehicle Classification

Vehicle Type	Vehicle Characteristics	Typical Vehicle
Multi-Axle Truck	Standard / heavy trucks, trailers/articulated. (≥3 axles)	
Heavy Truck	Standard / heavy trucks, trailers/articulated. (2 axles)	
Mini Truck	Mid-sized trucks with single rear-axle (usually 4-wheeled,<8 tons GVW)	
Standard Bus	Buses having seating capacity of 35-50 seats	
Mini-bus	Medium size buses having seating capacity of 20-35 seats.	

Vehicle Type	Vehicle Characteristics	Typical Vehicle
Micro-bus	Small buses and vans having seating capacity of 10-15 seats.	
Car	Passenger car taxis and vans (≤ 5 seats).	
Utility Vehicles	Pickups or 4-wheeled vehicles with single/twin cabin and load compartment (open/hooded), Light freight vehicles	
Tractor	Farm tractors	
Four Wheel Drive	Vehicles strictly having four wheel gears (seating approximately 10) such as Mitsubishi Pajero, Prado etc.	
Three Wheeler	Electrical or gasoline/LPG fuelled 3-wheeled vehicles (excluding power tillers, farm tractors)	
Power Tiller	Motorised four wheel vehicles used for carrying goods and mainly driven by hands and not steering.	
Motorcycle	Motorised two wheelers such as scooters and motorcycles	
Bullock/Hand cart	Bullock, horse or manually driven vehicles (Non-motorised)	
Rickshaws	Non-motorised cycle rickshaws	

(2) Traffic Composition

The composition of various types of vehicles on various routes is shown in **Figure 2.2**. Multi axle truck, heavy truck and light truck are regarded as the freight traffic.



Source: Traffic Survey Data, 2012, HMIS, DOR

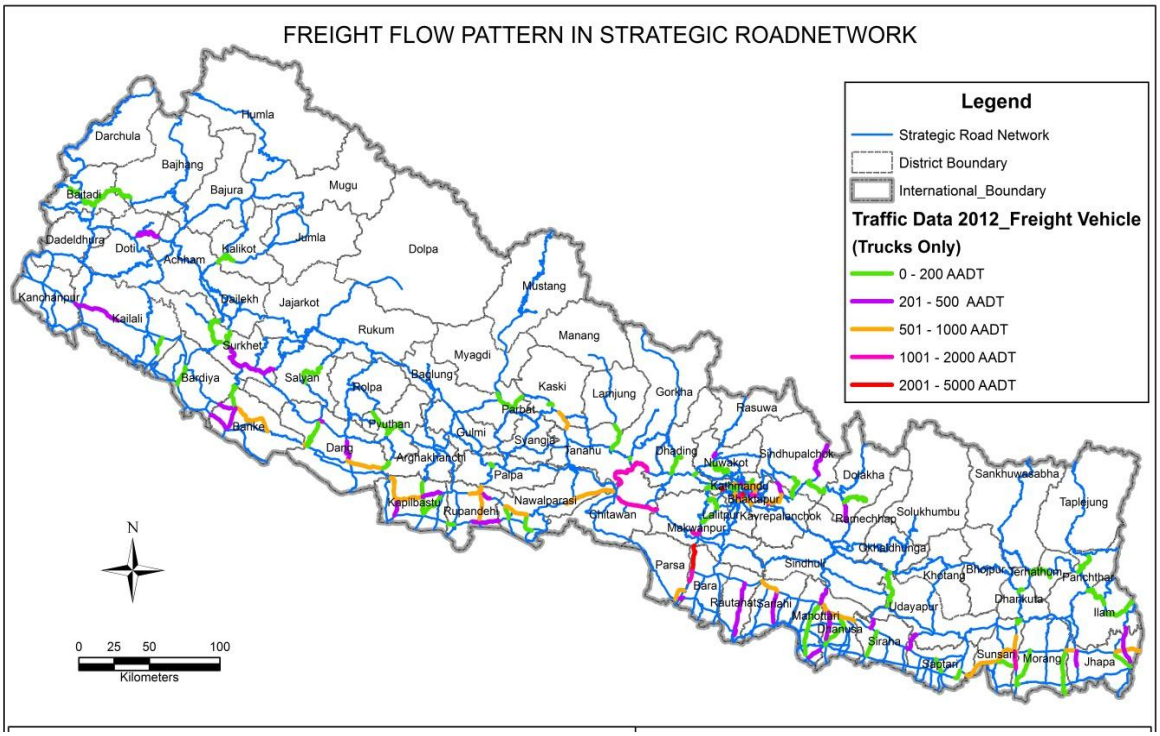
Figure 2.2 Traffic Composition at Selected Road Section (excl. Motor Cycle)

The above chart characterized that various routes have different characteristics of the various types of vehicles. The heavier the percentages of heavy freight vehicles in a particular route, there will be greater chances of overloading. In the recent years, numbers of twelve (12) tires trucks with one (1) lifted axle are increasing significantly. The lifted axle applies hydraulically when the load on ordinary axles exceeds the permissible limit. With the provision of lifted axle in a truck, the extent of damage on road pavement and structures can significantly reduce because load will be distributed in more numbers of tires when lifted axle is came into effect. **Figure 2.3** shows such type of lifted axle multi axle truck.

Figure 2.3 Lifted Axle Multi Axle Truck

2.5.2 Freight Traffic Volume

Trucks of different types, namely multi axle trucks, heavy and light trucks are categorized as freight vehicle because they are commonly used vehicles for carrying freight on the road. Traffic volume data of 2012 analysis reveals that the highest volume of freight traffic was recorded at Nagdhunga traffic counting station, a gateway to enter the Kathmandu valley (except Taudhaha located in Kathmandu valley). The second highest freight traffic was recorded at Pathlaiya (East), a major location passing cross border traffic. The third highest freight traffic was recorded at Mugling (East), bounding to the Kathmandu. Therefore, the analysis reveals that Kathmandu – Birgunj corridor has the highest freight traffic volume among the strategic road network of Nepal. Freight traffic pattern / distribution in SRN is shown in **Figure 2.4**.



Source: Statistics of Strategic Road Network SSRN 2011/12 and Department of Road (Traffic Data)

Figure 2.4 Distribution of Freight Traffic (Truck Only) in SRN (Consultant's Presentation in GIS)

The top ten highest freight carrying routes based on the analysis of traffic volume data of 2012 of the strategic road network of Nepal are shown in **Table 2.5**.

Table 2.5 Top Ten Freight Carrying Road Sections

Rank	Highway Code	Road Section	Freight Volume (AADT)	Remarks
1st	H0214	Naghdhunga	2,740	TRP
2nd	H0129	Pathlaiya North	2,002	TRP
3rd	H0404	Mugling (East)	1,962	MNH
4th	H0503	Mugling (South)	1,925	PH
5th	H0204	Pathlaiya (South)	1,913	TRP
6th	H0132	Hetauda (West)	1,844	EWH
7th	H0134	Narayanghat (East)	1,759	EWH
8th	F07301	Bharatpur Bypass Road	1307	Bypass Road
9th	H0803	Itahari (South)	1,275	KH
10th	H0311	Panchkhal Police-Chowki	992	AH

Source: DoR Traffic Data

The freight traffic volume on National Highways and Feeder Roads are presented in **Figure 2.5** and **Figure 2.6** respectively. The analysis of freight flow pattern on strategic road network reveals that the flow of freight is high from southern belt of Nepal to the north (up to middle hills) and along east-west highways where industrial corridors are located.

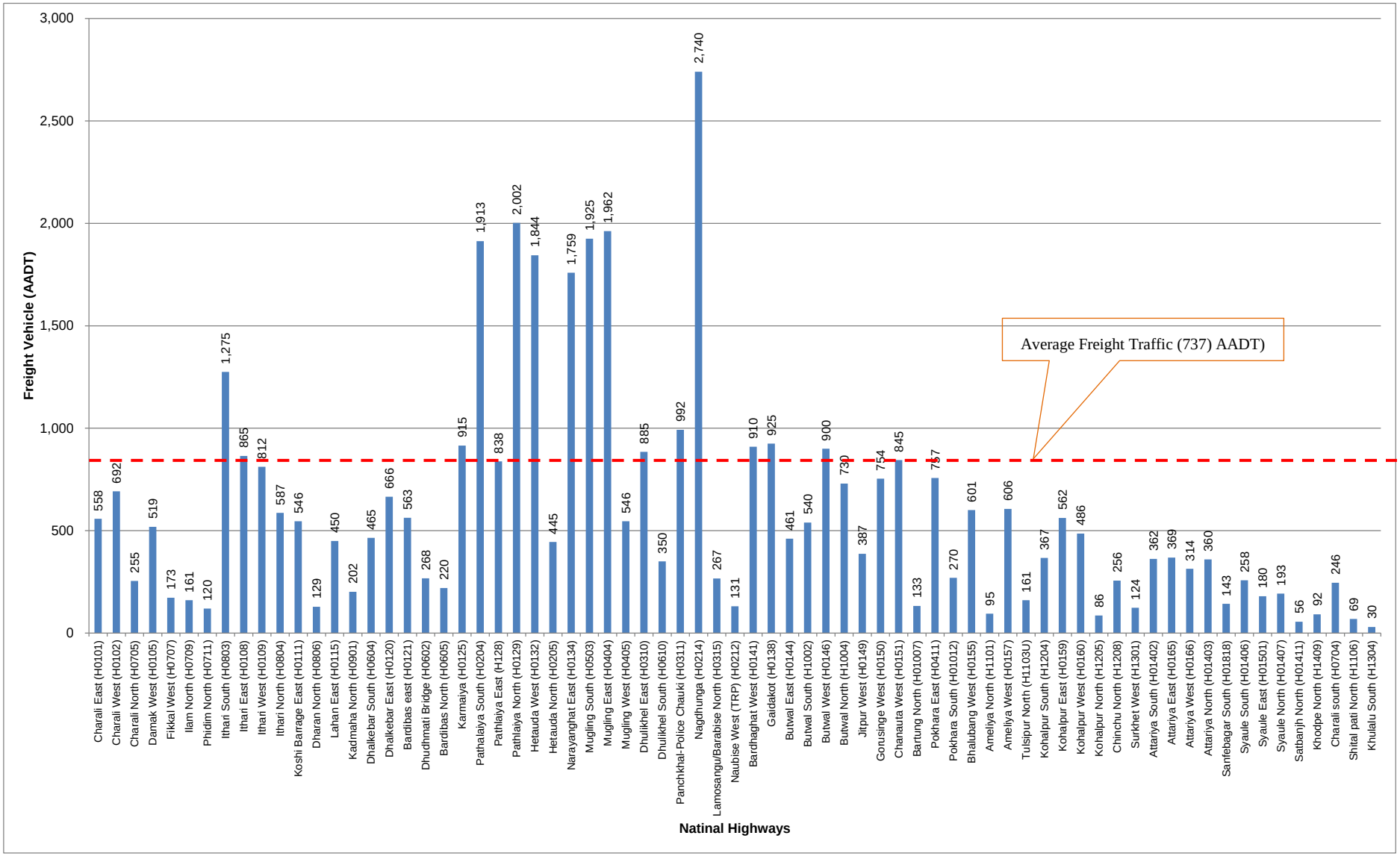


Figure 2.5 Freight Flow (Freight Vehicle) Pattern in National Highways

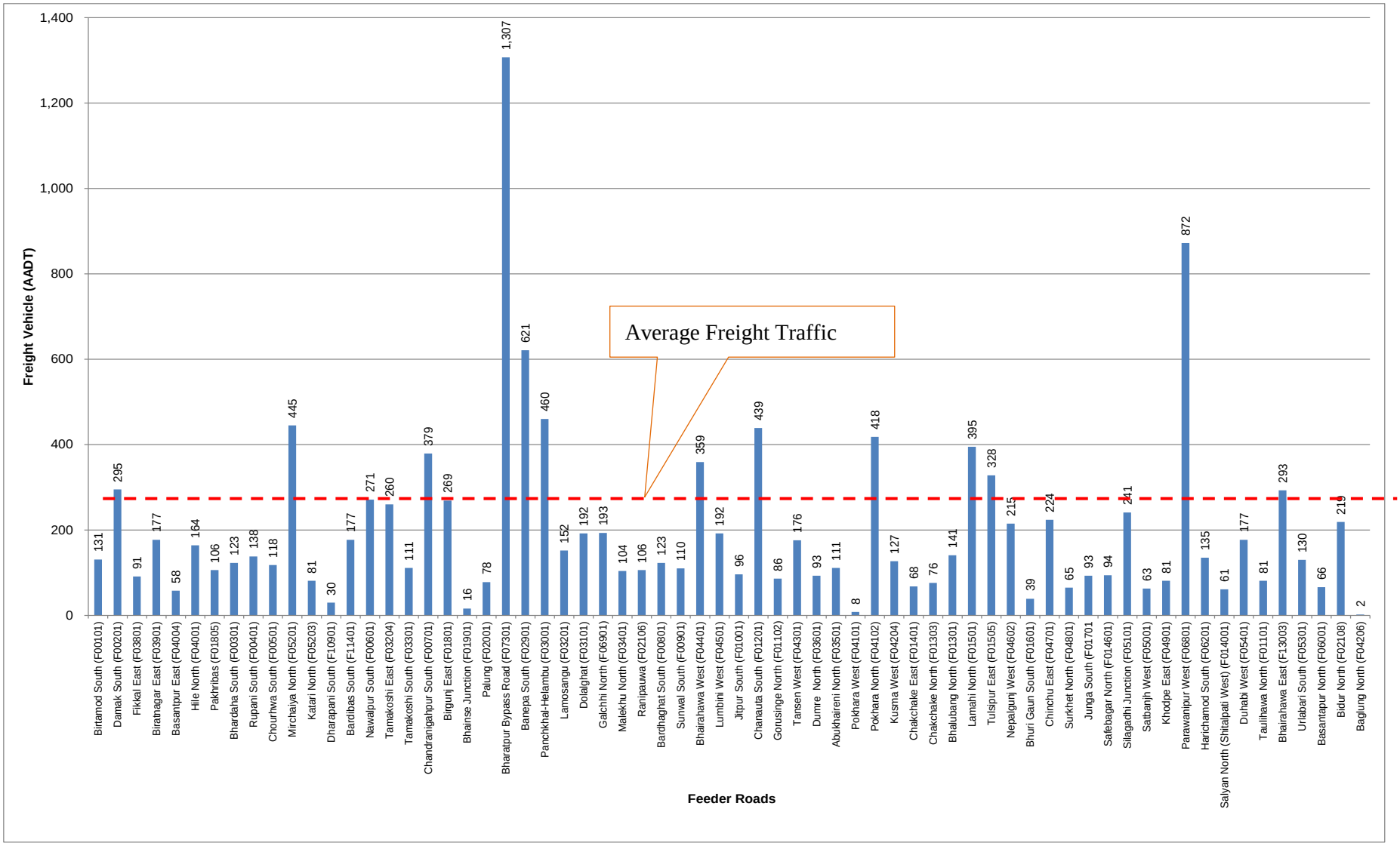
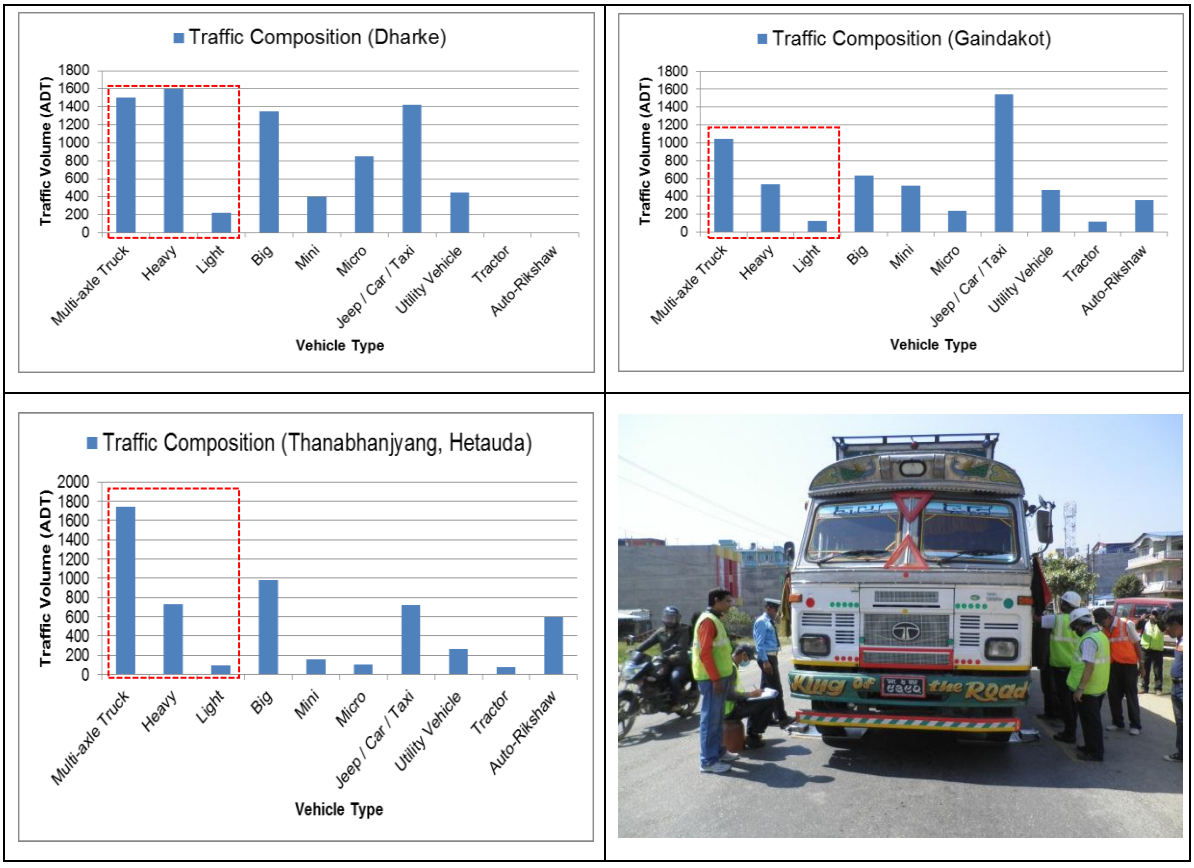


Figure 2.6 Freight Flow (Freight Vehicle) Pattern in Feeder Road Network

2.5.3 Freight Traffic and Freight Weight at Axle Load Survey Stations (2015)

(1) Traffic Composition

The composition of major types of vehicles recorded at axle load survey stations, which were carried out on 10th, 11th and 12th, March, 2015 at Dharke, Gaindakot and Hetauda respectively is shown in Figure 2.7. Multi axle truck, heavy truck and light truck are considered as the freight traffic. The highest number (1,744 ADT) of multi axle truck was recorded at Hetauda station. However, the highest number (1,601 ADT) of heavy truck was recorded at Dharke station. Therefore, it can be concluded that multi axles and semi-trailer trucks are suitable in plain terrain because both road radii and gradients are relatively favorable for multi axle trucks and semi-trailers in plain terrain in Nepalese topography.



Source:The Study Team, Axle Load Survey, March 10 - 15, 2015

Figure 2.7 Traffic Composition at Axle Load Survey Stations (excl. Motorcycle)

2.5.4 Freight Weight and Permissible Gross Vehicle Weight (GVW) Limit

The percentage of overloading vehicle and overloaded mass are important in setting appropriate polices for mitigation of overloading. The result of analysis of axle load survey data of some selected locations is shown in **Table 2.6**.

Table 2.6 Freight Weight and Vehicle Overloading in Selected Locations

SN	Particulars	Heavy Truck		Multi Axle Truck		Remarks
		Average	Max.	Average	Max.	
Dharke (Naubishe) Station: Prithvi Highway						
1.	Gross Vehicle Weight (MT)	17.41	20.3	32.44	35.5	Survey Date: 2015.3.9 Source: The Study Team
2.	Legal Load Limit (MT)	16.2		25		
3.	% of Overloading Trucks	39		66		
4.	Freight Weight (MT)	8.38	11	21.21	24.27	
5.	Overloaded Weight (MT)	1.21	4.1	7.44	10.5	
6.	% of Overload	**7.46**	**25.3**	**4.16**	**42**	
Gaindakot (Nawalparasi) Station: East-West Highway						
1.	Gross Vehicle Weight (MT)	16.43	19.5	28.12	33.9	Survey Date: 2015.3.9 Source: The Study Team
2.	Legal Load Limit (MT)	16.2		25		
3.	% of Overloading Trucks	50		62		
4.	Freight Weight (MT)	7.4	10.47	16.89	22.67	
5.	Overloaded Weight (MT)	0.23	3.3	3.12	8.9	
6.	% of Overload	**1.43**	**20**	**12.48**	**35.6**	
Thanabhanjyang (Hetauda) Station: East-West Highway						
1.	Gross Vehicle Weight (MT)	16.58	21.6	29.61	37.2	Survey Date: 2015.3.9 Source: The Study Team
2.	Legal Load Limit (MT)	16.2		25		
3.	% of Overloading Trucks	51		77		
4.	Freight Weight (MT)	2.45	12.57	18.31	25.97	
5.	Overloaded Weight (MT)	0.38	5.4	4.61	12.2	
6.	% of Overload	**2.3**	**33.75**	**18.44**	**48.8**	
Aaptari (Narayanghat) Station: Narayanghat – Mugling Highway						
1.	Gross Vehicle Weight (MT)	16.28	23.80	29.85	51.9	Source: Axle Load Survey Data 2010, RSDP II
2.	Legal Load Limit (MT)	16.2		25		
3.	% of Overloading Trucks	51/83 (61%)		101/113 (89%)		
4.	Freight Weight (MT)	11.58	19.10	23.14	45.4	
5.	Overloaded Weight (MT)	2.15	7.6	5.9	26.90	
6.	% of Overload	**12.76**	**46.91**	**22.09**	**107.6**	

2.5.5 Major Freight Route

The major trade corridors of Nepal are shown in Figure 2.8. Since most of the industrial zones and inland container depots (ICD) are located in southern belt of the country, the major trade corridors for both domestic and cross border trade are expanded east to west in the southern belt and some feeder trade corridors linking to the Capital city Kathmandu, regional headquarters and trade route to China.

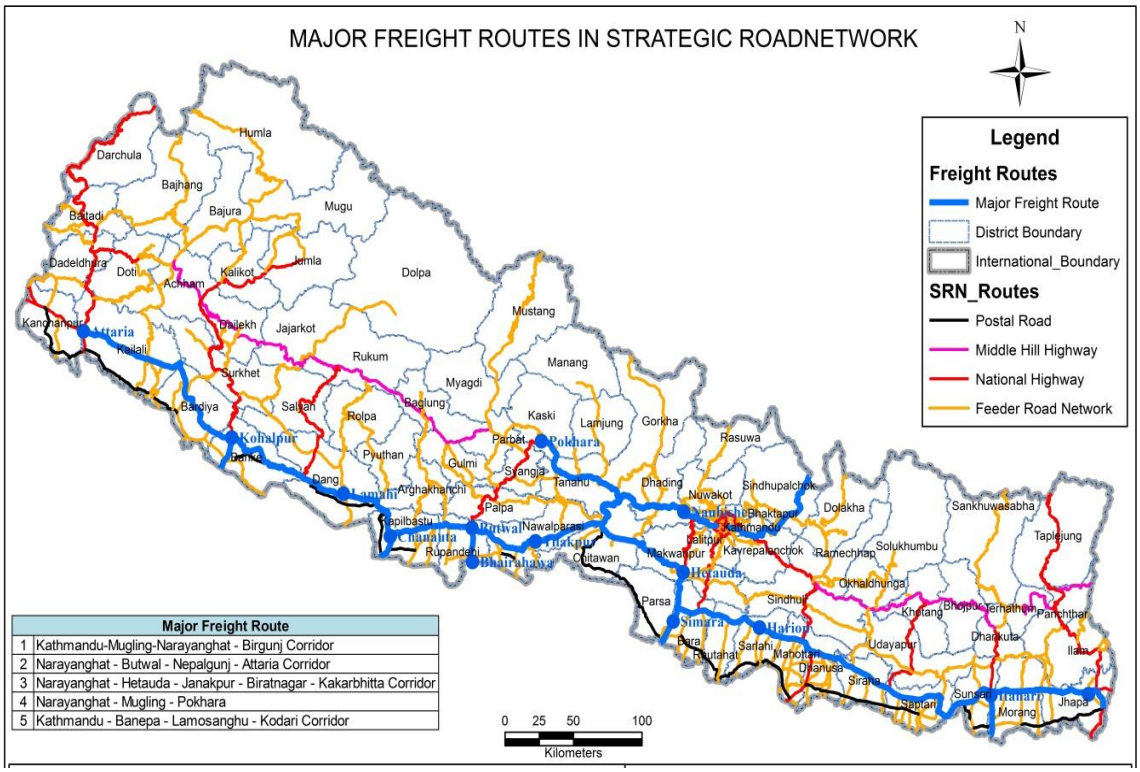
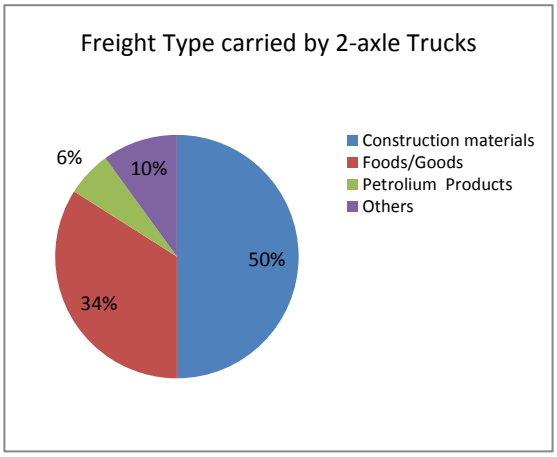
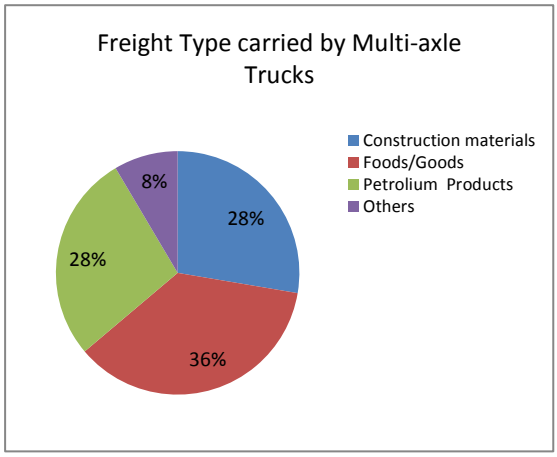


Figure 2.8 Major Freight Routes

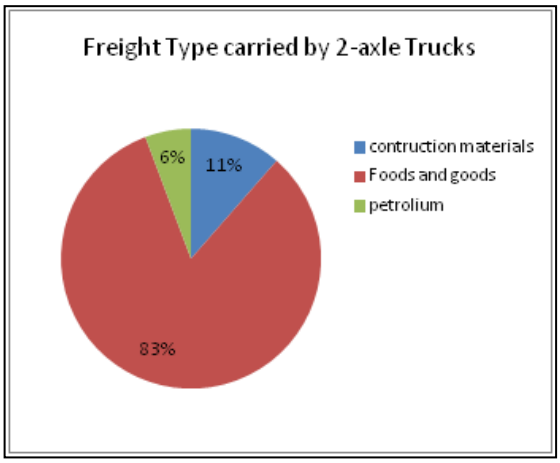
2.5.6 Major Freight Type

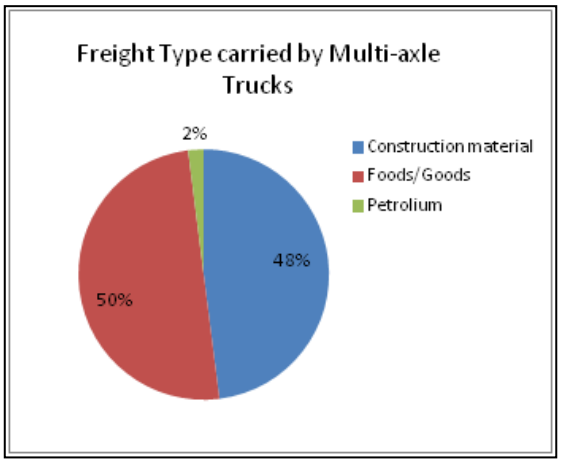
Major freight types recorded at axle load survey stations are shown in **Figure 2.9**. The analysis reveals that the number of construction material carrying trucks is the biggest number among other freight carrying trucks.



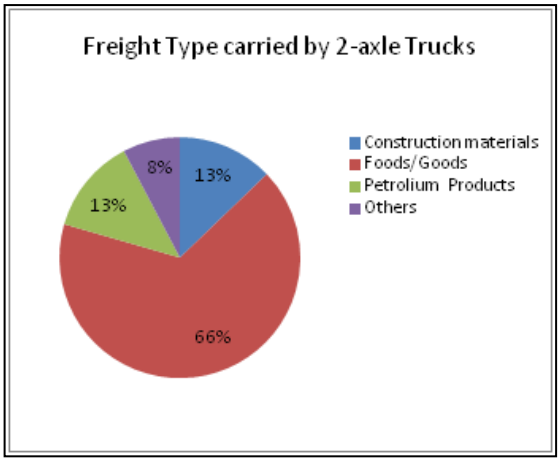


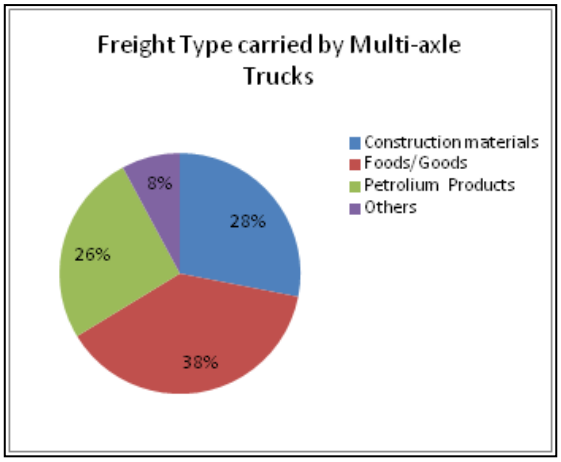
A. Dharke (Naubishe) Station: Prithvi Highway



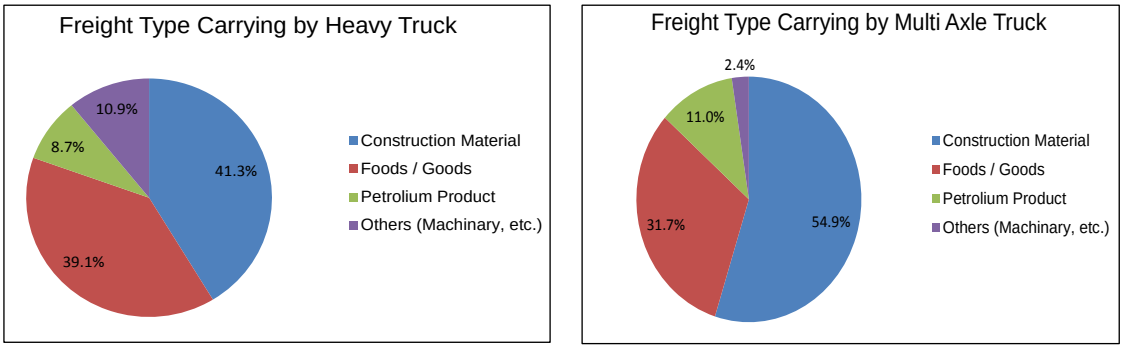


B. Gaindakot (Nawalparasi) Station: East-West Highway





C. Thanabhanjyang (Hetauda) Station: East-West Highway



D. Aaptari (Narayanghat) Station: Narayanghat – Mugling Highway

Source: Axle Load Survey Data 2010, RSDP II, Axle Load Survey Station: Aaptari, Chitwan

Figure 2.9 Freight Type Carrying by Freight Vehicle in Narayanghat – Mugling Section

2.6 CONCLUSIONS

From the past results as well as from the present axle load survey it was revealed that substantially high percentage of vehicles is overloaded.

Considering the loads on trucks, among the present surveyed stations; Hetauda station recorded the highest overloading percentage; 33.75% and 48.8% for two axle and multi axle trucks respectively. From the past data Aptari (Ramnagar) had recorded highest percentage of overloading 46.91% and 107.6% for two axle and multi axle trucks respectively.

Considering the number of trucks that are overloaded, among the present surveyed stations; Hetauda recorded the highest percentage 51% and 77% for two axle and multi axle trucks respectively. Similarly, past data revealed that Aptari had the highest percentage of overloaded trucks; 61% and 89% for two axle and multi axle trucks respectively.

Among the present surveyed stations Dharke, recorded that the tipper trucks carrying the construction materials like sand and aggregates from the Trishuli river catchment were found to be mostly overloaded.

CHAPTER 3 IDENTIFICATION OF LOCATION OF AXLE LOAD CONTROL STATION

3.1 EXISTING WEIGHBRIDGE STATIONS

Axle load control being the one of the two major themes of the present study, axle load control mechanism presently existing in the country forms the departure point of the present study on axle load control. In this respect, a comprehensive assessment on the existing weighbridge stations, requirement of additional such stations and mechanism of running such stations is highlighted in this chapter.

3.1.1 Weighbridge Inventory

At present there are quite a number of weighbridge stations across the country which is installed for commercial purpose. Department of Roads has few weighbridges; however, none of them are operational at the moment. It is presumed that there is significant number of weighbridges installed by private sector in the premises of their compound for their internal purpose (i.e. loading of goods on the trucks). The exact number of such weighbridges are not recorded anywhere. The existing commercially operated weighbridge stations are shown in **Table 3.1** and **Figure 3.1.**

Table 3.1 Existing Weighbridge Stations

S.N.	Station	Location		
		Highway	Zone	District
1	Kathmandu, Naikap	H02	Kathmandu	Kathmandu
2	Naubise	H04	Dhading	Dhading
3	Hetauda	H01	Makwanpur	Makwanpur
4	Harivan	H01	Sarlahi	Sarlahi
5	Itahari	H01	Sunsari	Sunsari
6	Birtamod	H01	Jhapa	Jhapa
7	Simara	H01	Bara	Bara
8	Butwal	H01	Rupandehi	Rupandehi
9	Tilakpur	H01	Nawalparashi	Nawalparasi
10	Lamahi	H01	Dang	Dang
11	Chandrauta	H01	Kapilvastu	Kapilbastu
12	Kohalpur	H01	Banke	Banke
13	Atariya	H01	Kailali	Kailali
14	Pokhara	H04	Gandaki	Kaski
15	Bhairahawa	H10	Lumbini	Rupandehi

Source: FTTEN

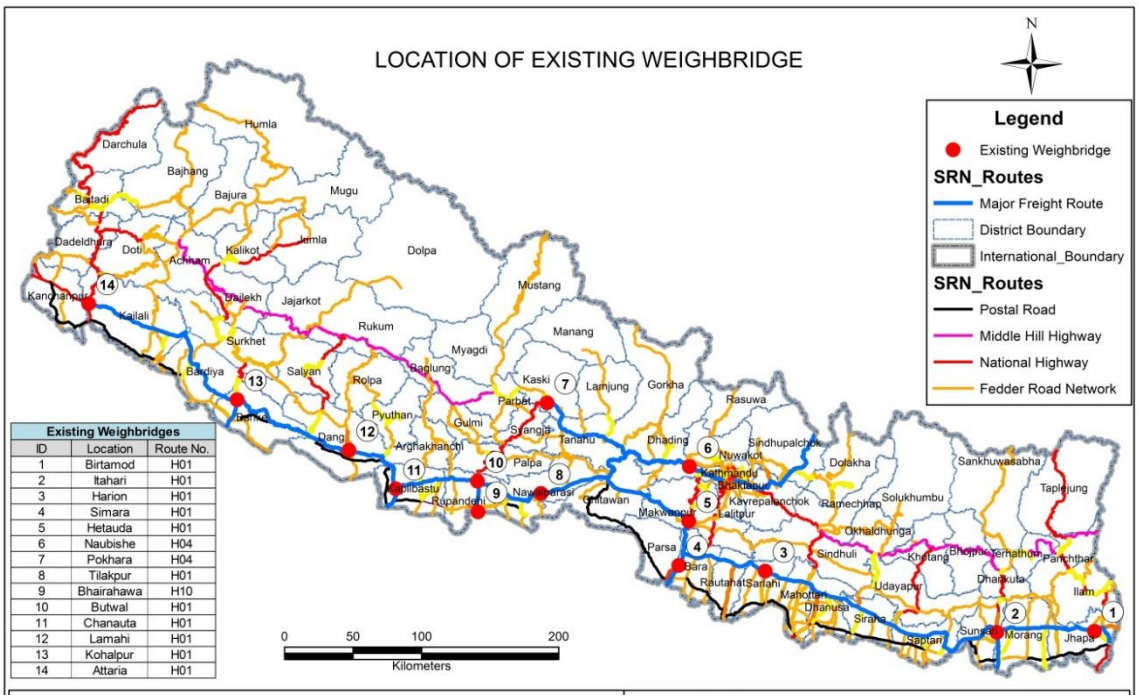


Figure 3.1 Location of Existing Weighbridges (Commercial)

3.1.2 Operational Status and Data Sharing

Existing weighbridges presented in **Table 3.1** are operated by the Federation of Truck Transport Entrepreneurs Nepal (FTTEN). However, these weighbridges can weigh only the gross vehicle weight (GVW). The capacity of each weighbridge varies not only in terms of size of truck scale, weighing capacity, number of load cells but also the available physical facilities.

The purpose of establishment of these weighbridges is not for controlling of vehicle overloading to prevent from the damage of the road pavement and structure. These weighbridges are solely installed for controlling and sharing the freight transportation among the truck owners. The fee of each weighing varies from NRs 25 to NRs 100. Data collected from the weighbridges are preserved by FTTEN and not shared with DoTM and DoR.

In addition to weighing trucks, FTTEN has installed real-time truck tracking system and transportation database. The system provides the detailed information of individual truck including truck owner, freight weight, freight type, freight origin, freight destination, and location with date and time. The system windows and database details are shown in

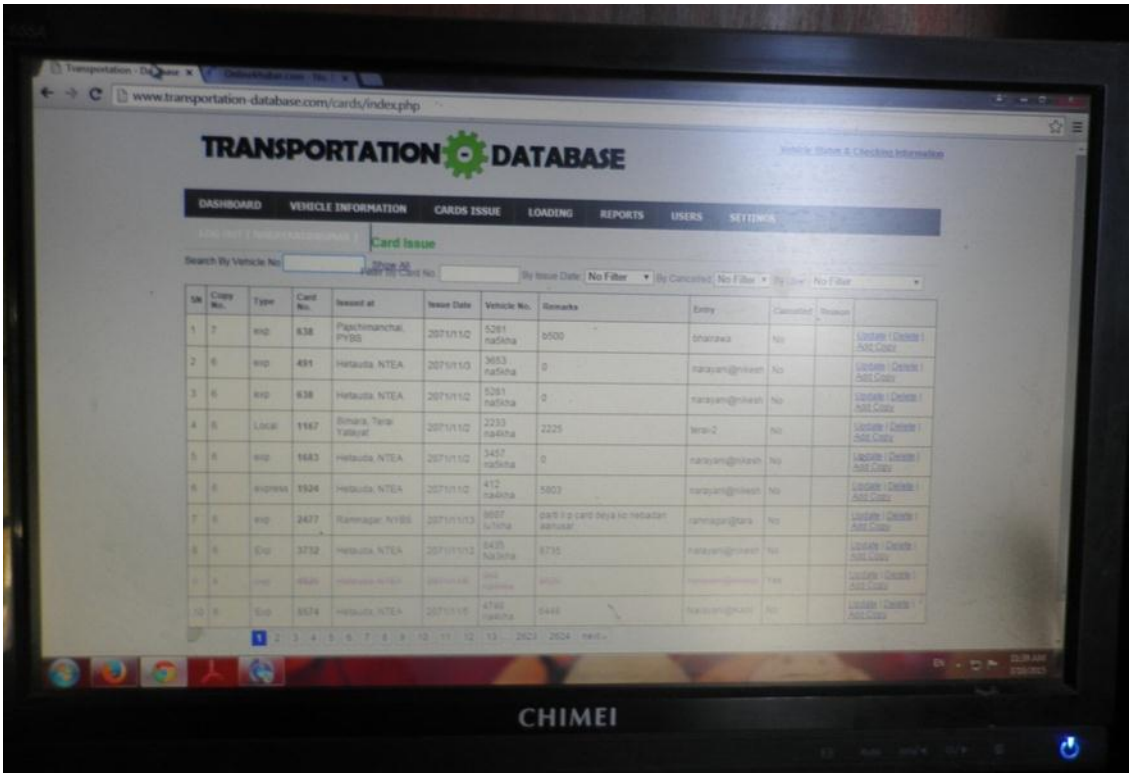


Figure 3.3 Truck Tracking Database System

and . The FTTEN is planning to use ICT based smart card for each truck for effective and efficient operation and management of the freight / truck transportation business.

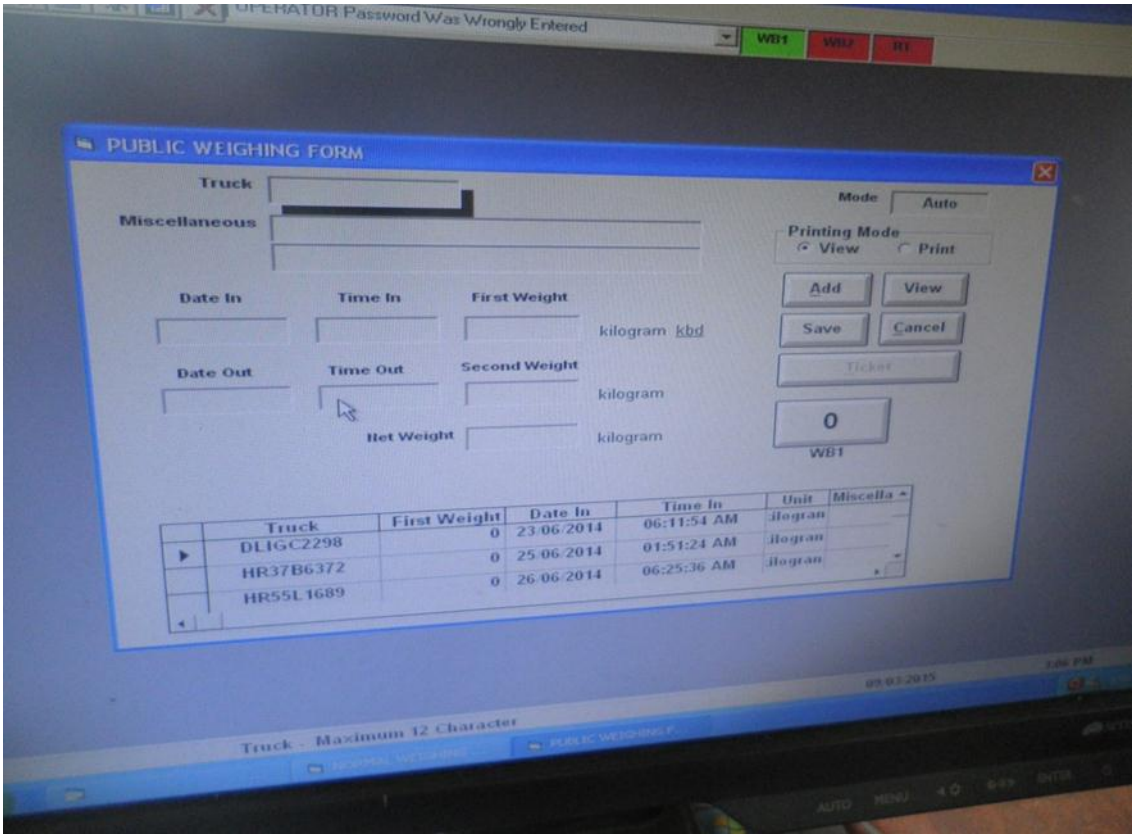


Figure 3.2 System Windows of Truck Weighing System

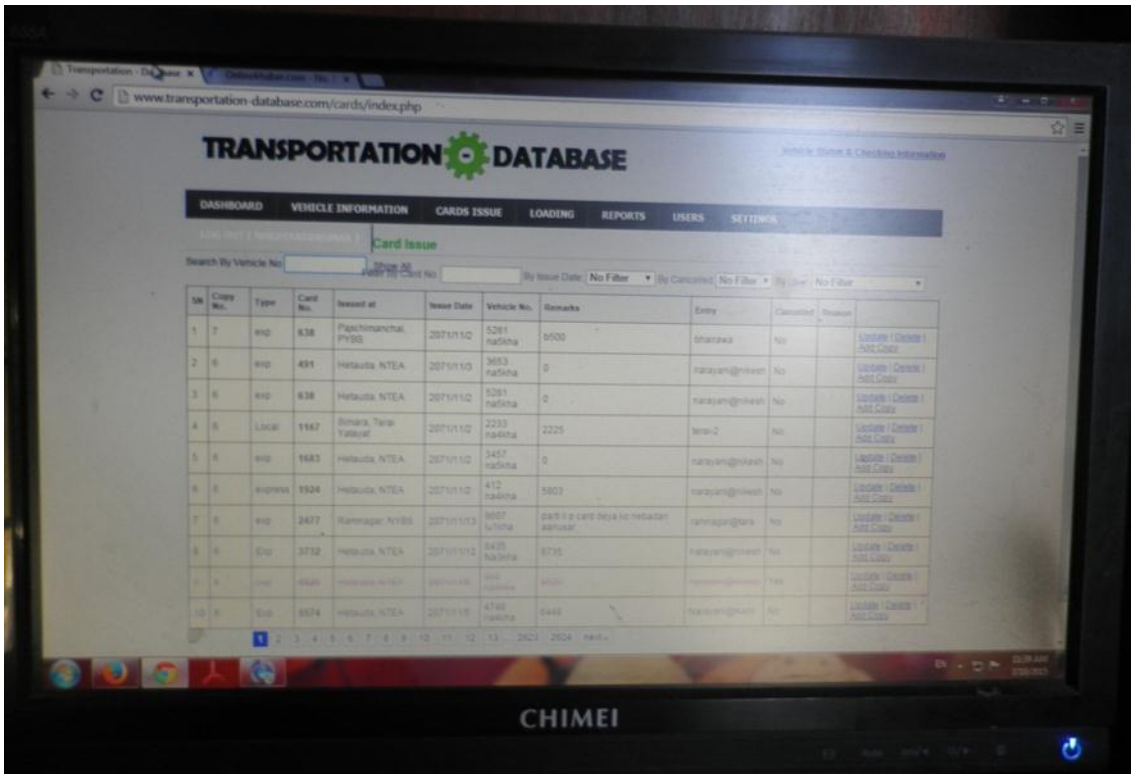


Figure 3.3 Truck Tracking Database System

3.1.3 Need for Additional Weighbridges

Although there are a number of weighbridges operational under FTTEN, additional weighbridges will be necessary for the following reasons.

- There are not sufficient weighbridge stations to control the overload tendency throughout the country;
- Present axle load survey revealed that there is tendency to overload the freight vehicles and there is tenancy for compromising the overloads by the weighbridges operated by the FTTEN; and
- The cross-border overloading control is not effective.

Additionally, there can be tendency of avoiding the fixed weighbridges by the overloaded vehicles in between the weighing stations. To avoid this, portable types of weighing machines for checking the overloading in spot are to be necessary and hence a number of such portable types of weighing machines are to be procured by the DoTM for enforcement purpose.

3.2 PLANNING OF WEIGHBRIDGE STATION

3.2.1 Basic Policy for Identification Location of Weighbridge Station

The location of weighbridge stations is strategically important in controlling vehicle overloading. The following policies are set in identifying and recommending the location of weighbridge stations.

(1) Overloading Control at Custom Check Point

In a hearing with FTTEN, the severity of overloading is much higher in freight vehicles entering from India (i.e. cross-border traffic). Therefore, attention shall be given to control cross border freight vehicles. Any freight vehicle entering to Nepalese territory shall be weighed before the custom check point and custom officials shall allow the cross border freight vehicles which are carrying permissible gross vehicle weight / axle load only. Therefore, in order to control overloaded truck at the border, weighbridge stations shall be located before the custom check point located in various parts of the country.

(2) Overloading Control at Origin

Overloading control at freight origin is one the most effective and efficient measures in controlling vehicle overloading. If vehicle overloading is controlled at the origin, there is very low possibility of a vehicle to be overloaded on the way to the destination because all trucks can be tracked in all weighbridges. In a meeting with truck owners, they also suggested to control the vehicle overloading once they depart from the origin with permissible limit. It is also complained that driver do load the additional weight on his / her truck for additional income. The following facilities/ area are considered as the origin of the freight.

(3) Inland Clearance / Container Clearance Depot (ICD)

At present there are four ICDs in operation, namely in Birgunj, Biratnagar, Bhairahawa and Kakarbhiitta at the Entry point of Nepal near Indian Boarder for fright coming to Nepal from India. A new dry port is under construction at Larcha near Tatopani Customs, while another one has been planned in Rasuwa near the international border with China, for the freight coming to Nepal from China.

(4) Industrial Zone

Government of Nepal has identified and defined major industrial area, industrial estate, and special economic zone for economic and industrial development of the country by attracting foreign and national investors to invest and establish industrial and business units.

(i) Major Industrial Area / Corridor

The following corridor and area are defined as major industrial corridor and area in Nepal. Among them some corridors are developed remarkably and the others are still under development though they are declared industrial corridor several years ago.

Table 3.2 Industrial Corridor / Area in Nepal

1.	Nepalgunj – Kohalpur Industrial Corridor	5.	Birgunj – Siamara Corridor
2.	Butwal - Bhairahawa Industrial Corridor	6.	Janakpur Area
3.	Sunwal – Gaidakot Industrial Corridor	7.	Biratnagar – Itahari Industrial Corridor
4.	Hetauda – Bharatpur Corridor	8.	Kathmandu Valley

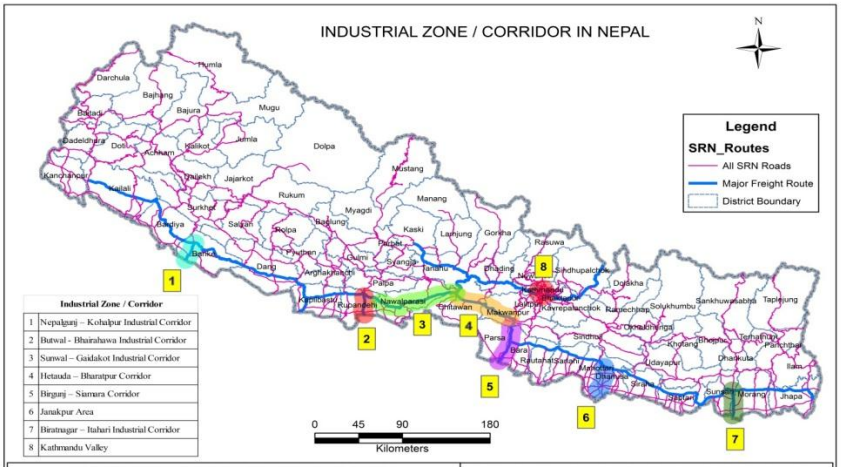


Figure 3.4 Industrial Corridors in Nepal

(ii) Industrial Estate

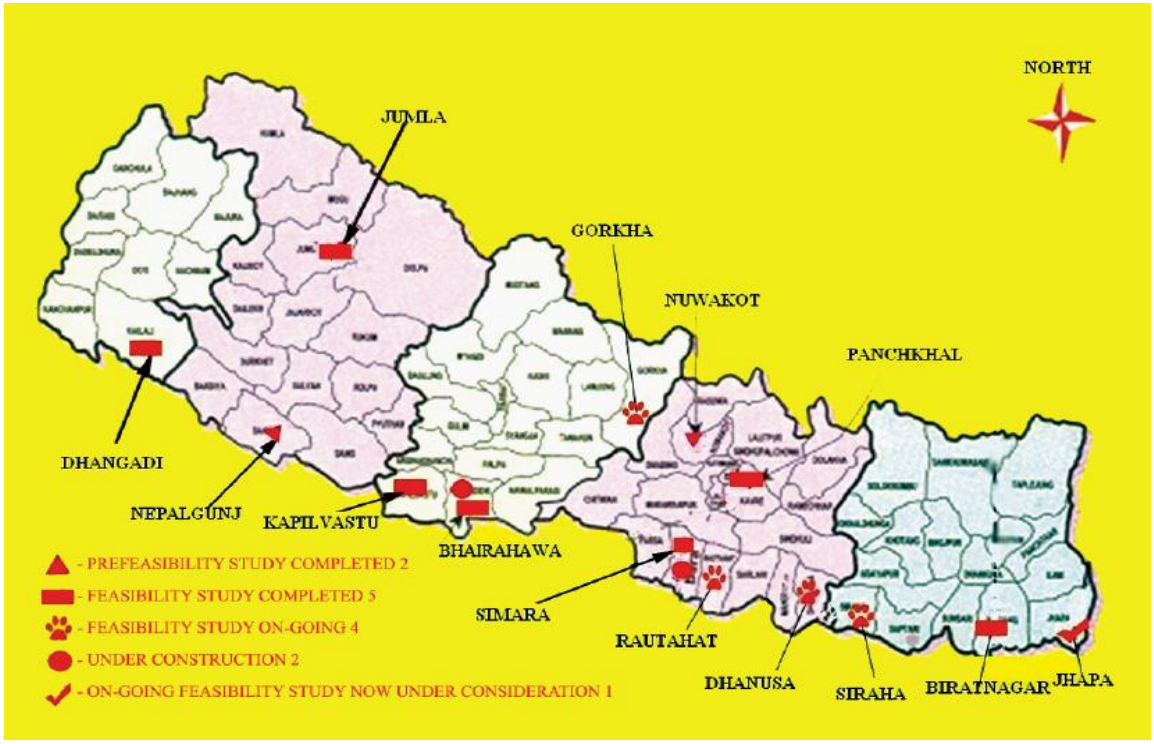
The industrial estates established by the Government of Nepal are shown in **Table 3.3**.

Table 3.3 Industrial Estates in Nepal

1.	Dharan Industrial Estate	7.	Bhaktapur Industrial Estate
2.	Dhankuta Industrial Estate	8.	Pokhara Industrial Estate
3.	Gajendra Narayan Industrial Estate	9.	Butwal Industrial Estate
4.	Hetauda Industrial Estate	10.	Nepalgunj Industrial Estate
5.	Balaju Industrial Estate	11.	Birendranagar Industrial Estate
6.	Patan Industrial Estate		

(iii) Special Economic Zone (SEZ)

Special Economic Zone (SEZ) is the advanced concept of export processing zone and also called the "Free Trade Zones" which includes export processing zones, special trade zones, tourism entertainment zones, information technology parks, banking, etc. SEZ planned by the Government of Nepal is shown in **Figure 3.5**.



Source: Special Economic Zone Development Committee, Ministry of Industry, Nepal

Figure 3.5 Special Economic Zones (SEZ)

(iv) Mega Projects

Mega projects such as hydro-electric projects and other infrastructure construction projects are the potential areas for the origin of vehicle overloading particularly during the construction stage because the projects will transport both machineries and construction materials. Therefore, weighbridge shall be installed at entry point of the main road to prevent road pavement and road structures from the possible damage. However, weighbridge in such area might be temporary if

vehicle overloading is expected only during the construction stage. If overloading cannot be avoided because of type of freight characteristics, diversion road or special permission is required.

(5) Overloading Control at Major Transit Point of Road Class

Since pavement and road structures designed according to the road class, vehicle load shall be controlled accordingly. Therefore, weighbridge should be installed by taking account of financial capability of the enforcing agencies. If there will not be major constraints, it is recommended to install weighbridge at major transit points of road class also.

(6) Overloading Control at Critical Road Structure (i.e. Bridges)

Road structures, particularly long span bridges, are very much sensitive with regard to the vehicle overloading. The impact of damaging effect of bridge is much bigger than the damage of road pavement. Therefore, weighbridges should be installed ahead of the critical bridges. The capacity of bridges should be assessed either by design document or by carrying out bridge load test.

(7) Minimize the Distance from the Overloading Origin to the Nearest Weighbridge

In order to minimize the damaging effect on the road, weighbridge should be installed in certain interval particularly when there are chances of vehicle overloading between the nearest two weighbridge stations. Vehicle overloading is envisaged from the vicinity of the industrial zone and mega project sites despite the installation of weighbridge in those area because overloading might be made either after crossing the weighbridges or from the industrial area which is not covered by the weighbridge of that particular area.

(8) Adoption of Recommendation of Previous Studies and Instructions from the State Organization

Apart from the existing commercial weighbridge stations, DoR under its Sub-regional Transport Enhancement Project (STEP) has proposed a number of additional weighbridge stations as presented in **Table 3.4**.

Table 3.4 Proposed Additional Weighbridge Stations

S. N.	Weighbridge Station Location	Highway Code	Remarks
1	Ramnagar	H05	MNH
2	Naubise/Khanikhola	H04	TRP
3	Birgunj	H02	TRP
4	Bhairahawa (Bypass)	H10	SH
5	Nepalgunj	H12	NSH

Similarly, the Commission for Investigation of Abuse of Authority (CIAA) has proposed the following weighbridge stations as presented in **Table 3.5**.

Table 3.5 Proposed Additional Weighbridge Stations by CIAA

S.N.	Weighbridge Station Location	Highway Code	Remarks
1	Itahari	H01	EWH
2	Pathalaiya	H01	TRP
3	Butwal	H01	EWH
4	Attaria	H01	EWH
5	Nepalgunj	H12	NSH
6	Ramnagar	H05	MNH
7	Naubise/Khanikhola	H02	TRP
8	Nagdhunga	H02	TRP
9	Dhulikhel	H03	AH

3.2.2 List of Proposed Weighbridge Locations and Installation Priority

Locations of weighbridges are identified based on the policies as stated in **Section 3.2.1**, possibility of using existing commercial weighbridges, recommendation made by previous studies and mandatory instruction from the state organizations.

Based on the analysis of freight flow pattern, highest freight traffic has been observed along the Birgunj – Kathmandu corridor. It is due to the imported industrial freight from India and other countries. Beside this, freight traffic component from the East-West Highway also comes to this corridor at Pathlaiya from the east and Narayangarh from the west. Moreover, transportation of construction materials from the Trishuli river catchment to Kathmandu makes higher freight volume at Nagdhunga. Kathmandu- Birgunj corridor has several industrial establishments which are potential clusters for the generation of freight traffic. Hence, vehicle overloading is very often observed throughout this link. Based on this scenario, this corridor should get the first priority for the establishment of weighbridge station for overloading control.

(1) High Priority Weighbridges

Although, a number of weighbridges are needed to be established throughout the major freight flowing routes in the country, the establishment of such weighing stations may have to be prioritized on the basis of considerations of the constraints like budgetary provisions, lack of enough trained manpower, other required physical facilities, severity of road damage, and tracking the maximum number of freight vehicles coming from different routes corridors. On this basis, the following locations should get the utmost priority.

The installation priority has been set in a phase-wise manner on the basis of severity and scale of overloading at present time. **Table 3.6** shows the installation priority of weighbridges in the first phase in SRN.

Table 3.6 Installation Priority of Weighbridges in the First Phase

Location	Justification	Remarks
1. Pathalaiya (Parsa)	To control vehicle overloading at origin	
2. Ramnagar (Chitwan)	To control vehicle overloading both coming from Narayanghat–Birgunj Industrial Corridor and Narayanghat–Bhairawa Industrial Corridor	Proposed weighbridge station
3. Naubise/Khanikhola (Dhading)	To control both trucks coming via Mugling and trucks carrying construction materials from Naubishe–Galchhi and Tribhuwan Rajpath area	FTTEN has already established the weighbridge station

Similarly, to control the cross-border overloading freight vehicles such weighbridge stations are to be established at each of the entry point near the international border including the Inland Container Depots (ICD's). The cross border and other stations are to be established in the second phase as prioritized given in the following **Table 3-7.** The cross border stations should get first priority in this phase and other should be followed as prioritized below.

Table 3.7 Installation Priority of Weighbridges in the Second Phase

Priority	Road Name	Location	Remarks
1	Parwanipur- ICD Road	Birgunj	ICD
2	Bhairahawa – Butwal Road	Bhairahawa	ICD
3	Biratnagar-Jogbani Road	Biratnagar (Jogbani)	ICD
4	East- West Highway	Kakarbhitta	ICD
5	Kodari - Lamosanghu	Kodari / Tatopani	Cross-Border
6	Butwal - Narayanghat	Butwal	EWH
7	Biratnagar - Itahari	Itahari	KH
8	Nepalgunj – Kohalpur	Nepalgunj	NSH
9	Butwal - Krishnanagar	Chanauta	EWH
10	Kohalpur - Dhangadi	Attariya	EWH
11	Araniko - Highway	Dhulikhel	AH
12	Butwal – Tansen	Shiddababa	SH
13	Mugling – Pokhara	Abukhaireni	PH
14	Dharan - Dhankuta	Dharan	KH
15	Mirchaiya- Katari	Mirchaiya	MKR
16	Pokhara - Baglung	Pokhara	PBR
17	Bardibas - Sindhuli	Bardibas	BPH
18	Charali - Ilam	Charali	MH

(2) Long List of Weighbridge with Weighbridge Class

Depending upon the loading pattern and features of the road links the Study Team proposes the three category of the axle load control station. This classification of the axle load control station depends on the location on the SRN.

1) Class First Axle load control station (Class first Weighbridge)

The main features of this class of stations are as:

- High weighing capacity weighbridge;
- It has to be established in coordination with Department of Customs (DoCs) within the premises of ICD;
- It should have enough space for loading or unloading equipment and space with permanent shed;
- It may be established or operated as an annex to the ICD;
- It should work as the coordination center among government agencies such as DoR, DoTM, Traffic Police, DOCs, NITDB, ICD operator and transport entrepreneurs etc.

2) Class Second Axle load control station (Class Second Weighbridge)

These axle load control stations are established to control the freight flow from industrial corridor and are generally established at the junctions along E-W Highway. Basic features of this class are as:

- High weighing capacity weighbridge
- Loading and unloading equipment with ground space;
- It should have coordinated operational team of DoTM, DoR, Traffic Police and transport operator;
- It may be established within the Right of Way (RoW) of Highway;
- The operation may be done with the involvement of private parties as: service contract, lease, Build Own Operate and Transfer (BOOT) and other form of public private partnership.

3) Class Third Axle load control station (Class Third Weighbridge)

This class of axle load control stations are established along the low volume National Highway or the Feeder Roads. Basic features of this category are listed as:

- Medium or Low weighing capacity weighbridge;
- Loading or unloading ground with moderate space loading and unloading equipment is optional;
- Operation of such stations may be given on lease, service contract or other form of PPP.

Based on the importance and traffic volume to be controlled, these weighbridge stations are recommended to locate at the following sections of SRN.

Table 3-7 Recommended Axle Load Control Stations along SRN

Class First Weighbridges	Class Second Weighbridges	Class Third Weighbridges
1. Mahendranagar	1. Attaria	1. Shyule
2. Nepalgunj	2. Kohalpur	2. Khodle
3. Belhiya	3. Amelia	3. Satbanjh
4. Birgunj	4. Bhalubang	4. Chinchu
5. Jaleshwar	5. Gorusinge	5. Surkhet
6. Bahrabise	6. Butwal (Butwal – Tansen)	6. Tulsipur
7. Chautara	7. Narayanghat	7. Kathmandu (F021)
8. Kakarbhitta	8. Pathlaiya	8. Shyanja
9. Biratnagar	9. Mirchaiya	9. Pokhara (F042)
10 Butwal (Butwal-Narayanghat)	10. Kadmaha	10. Mirchiya /Katari
	11. Munglin (Kurintar)	11. Bhaise
	12. Naubise	12. Dumre
	13. Dhulikhel/Panchkhal*	13. Fikkal
	14. Ambukhaireni	14. Hile
	15. Bardibas	
	16. Damak	
	17. Dharan	
	18. Inaruwa	
	19. Charali	

Axle load control stations are illustrated on the schematic diagram of SRN in **Figure 3-6**, **Figure 3-7 and Figure 3-8**.

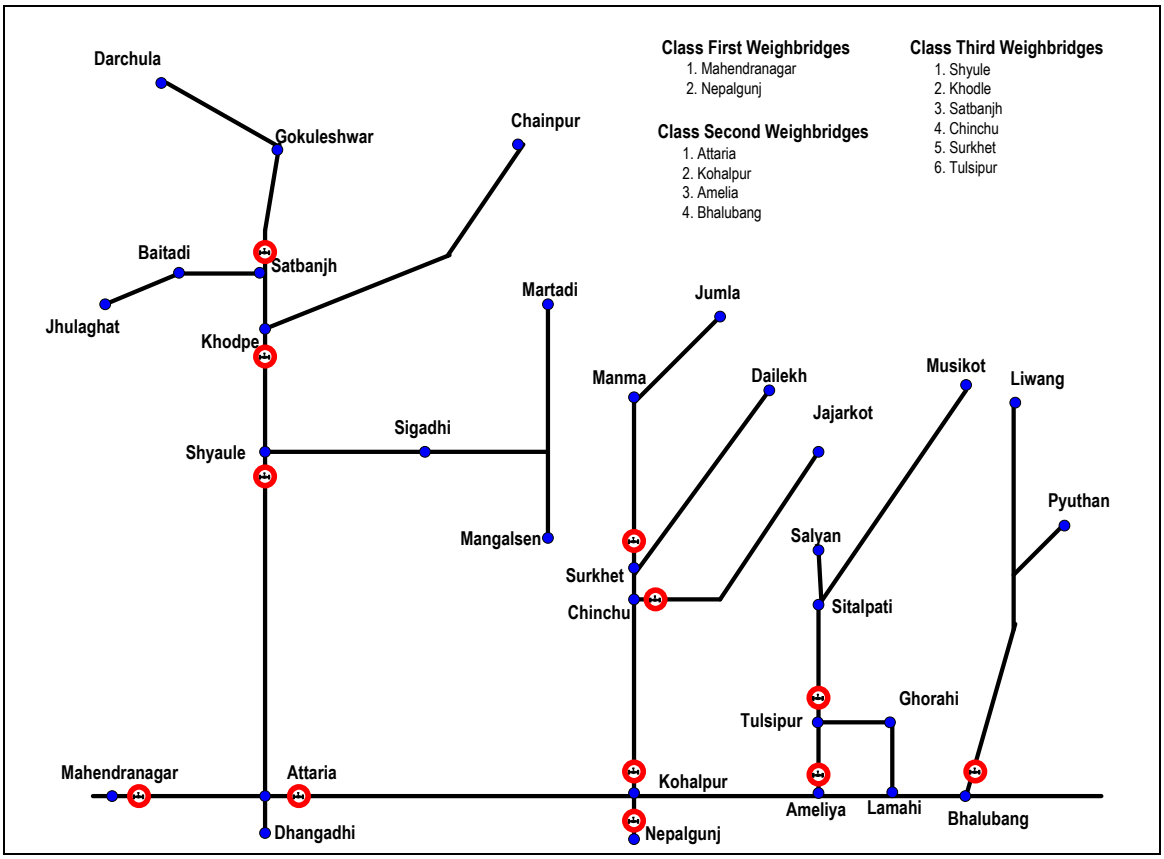


Figure 3-6 Proposed Axle Load Control Stations in Far and Mid Western Region

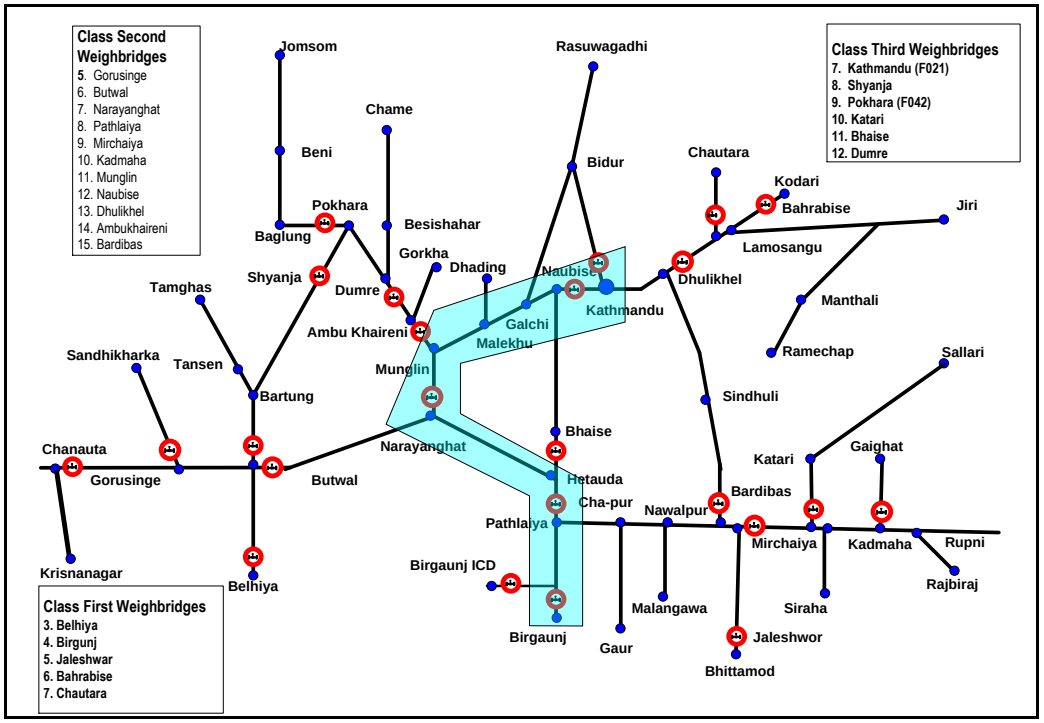


Figure 3-7 Proposed Axle Load Control Stations in Central and Western Region

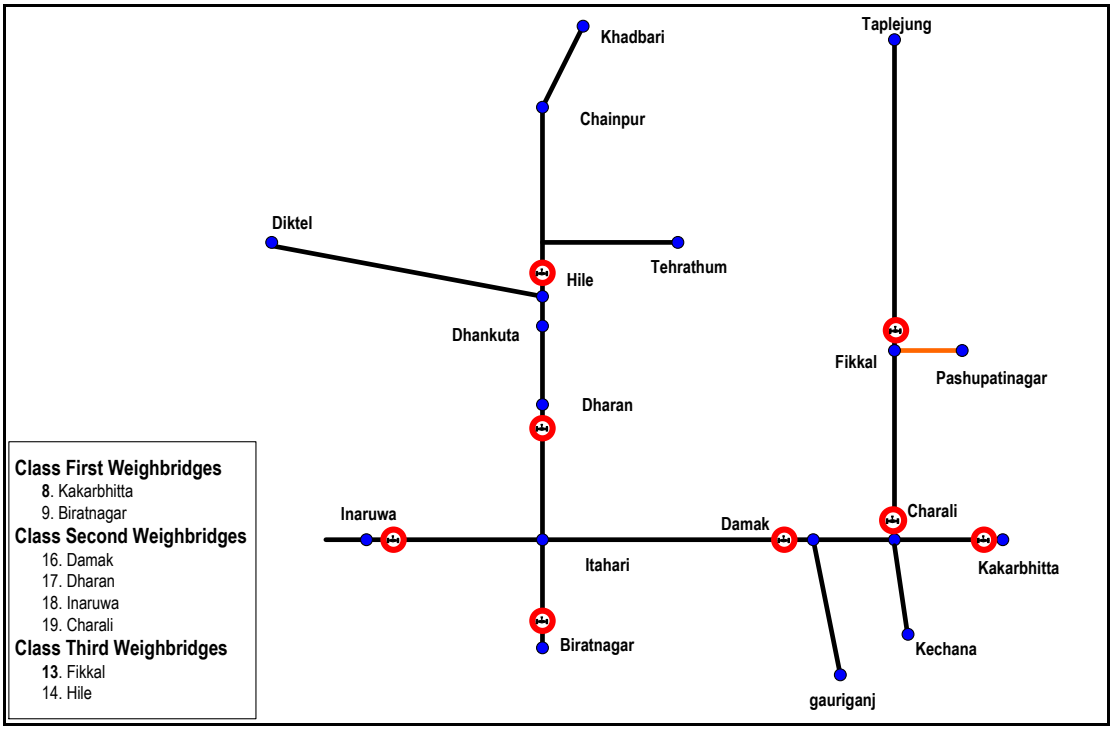


Figure 3-8 Proposed Axle Load Control Stations in Eastern Region

3.2.3 Institutional Arrangement for Weighbridge Operation

Weighbridge stations which are operational at present are run by private sector. The Federation of Nepal Truck and Tanker Transport Entrepreneurs Association (FTTEN) and their local subsidiaries located throughout the country. The prevailing regulatory provision also allows to the federation to run the weighbridges on behalf of Department of Transport Management until the other provisions are made. The federation is moving far ahead than the government because the federation is maintaining the truck operation database which can be accessed through the internet if user has user ID and password of the system. The database provides required information such as vehicle owner, date and time, location, freight weight and freight type.

Furthermore, the Federation is planning to provide smart card to each individual truck running under their association and such card would provide the owner the necessary information of loading condition as well as whereabouts of the vehicle as soon as it enters the weighing stations located throughout the country. In fact, if such a system is introduced the overloading would be immediately identified and necessary measure would be taken then and there.

Discussion with the Federation revealed that they have been running these weighbridges by taking nominal charges. They also informed that they are very much willing to co-operate in the endeavor of putting the axle load limits and enforcing it. Similar discussion with the representatives of the Transport Labor Trade unions was held and they were also not opposed to enforcing the overload control.

There are different specialist disciplines required in the area of weighbridge management, operations, and maintenance. Most of these specialist disciplines are not core functions of the

typical transport department. Therefore, there is much room for increasing efficiency by procuring private sector participation in these areas. While there are several instances of successful vehicle overload control programs involving the private sector in some countries, problems, and constraints remain with regard to the involvement of the private sector in overload control in others. The various modalities of involvement of private sector are described under Task B-5 of this Study.

3.2.4 Typical Design Layout of a Weighbridge

A typical design layout of a weighbridge is shown in the following Figure 3.6. The actual size of the weighbridge station depends on the various factors such as: the length and breadth of a weighbridge, requirement of other facilities as office room, weight record cabin, rest room and toilet facilities, parking lot, storing spaces for the off loaded goods and other facilities required for enforcing agencies like traffic police etc. This is also dependent upon the available land for establishing the station.

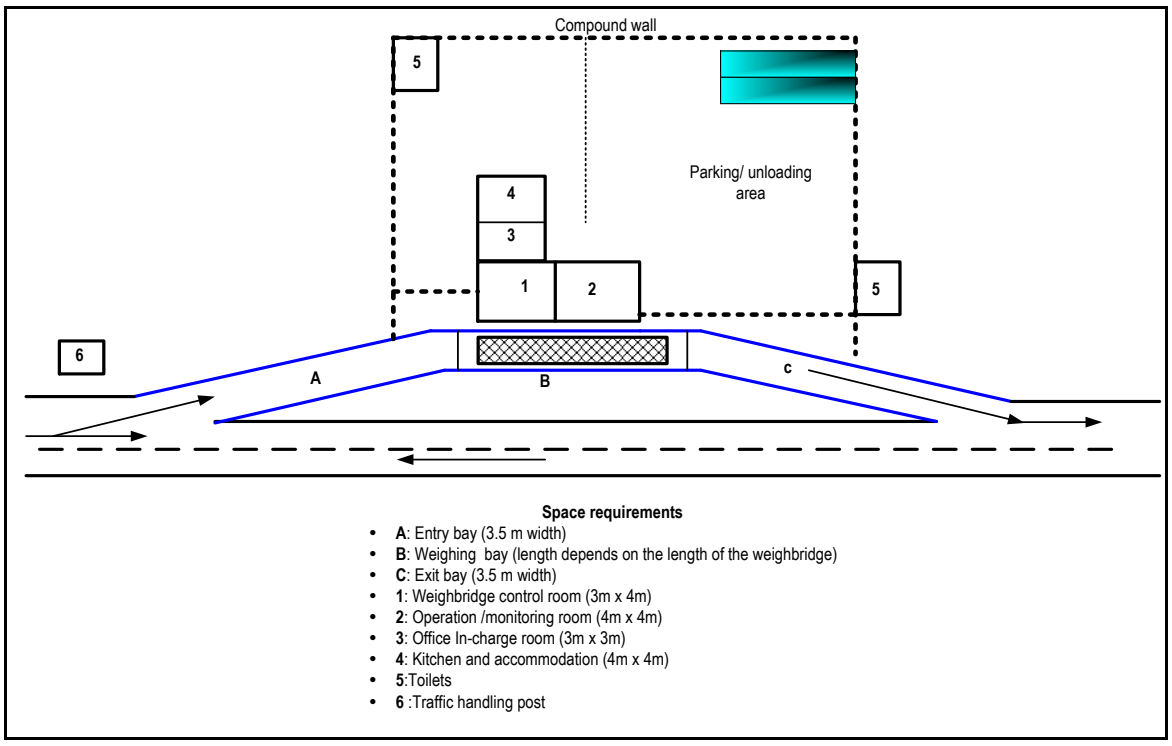


Figure 3.6 Schematic Diagram of a Typical Weighbridge Station

3.3 INSTITUTIONAL ARRANGEMENT FOR CONTROLLING OVERLOAD

A strong institutional set-up is a pre-condition for the effective implementation of overloading control. As DoTM is the sole agency for its implementation. Necessary trained manpower, supported by required logistics such as office space, furniture, computer with necessary software back-up is to be given due attention. Once, DoTM is well equipped with above, new weighbridges at the required places are to be set-up. Similarly, the Traffic Police should have

strong support for enforcement of the axle load control. Other stakeholders like Department of Roads, DOLIDAR, FTTEN and labour unions of transport sector in particular and the general public in general should have also necessary coordination in its effective implementation. If DoTM opt to involve private sector for vehicle overloading control, necessary regulatory provisions shall be in place in advance. DoTM shall have the proper monitoring system of the weighbridges operated by private sector. For making aware of the benefits of overload control DoTM should run a mass based awareness program.

3.4 CONCLUSIONS AND RECOMMENDATIONS

1. It was informed during the meeting with the DoTM by the World Bank Representative that they are willing to finance for some weighbridges in the near future probably starting in the next fiscal year and as such it seems there will be no major hurdles in establishing the weighbridges in a phase wise manner in priority basis.
2. As far as mega projects are concerned, there should be an inbuilt system for the establishment of weighbridges in the project itself and so is the case of SEZ.
3. A detailed cost estimate together with its specifications of a typical fixed weighbridge station has been given in the Appendix: 2 (1) and (2) of this report.
4. Specifications and cost of some of the portable weighing cells has been included in Appendix: 2 (3) and (4).

CHAPTER 4 PRIVATE SECTOR INVOLVEMENT IN AXLE LOAD CONTROL

4.1 CURRENT STATUS OF INVOLVEMENT OF PRIVATE SECTOR

The existing weighbridge stations are shown in **Table 3.1**. These weighbridges are run invariably by the Federation of Nepal Truck and Tanker Transport Entrepreneurs Association and their local subsidiaries located throughout the country. Discussion with the Federation revealed that they have been running these weighbridges by taking charges ranges between NRs 25 -100. The FTTEN is not receiving any financial support from the government. Moreover, FTTEN is also assisting the Traffic Police as well as the DOTM local office for establishing their offices near the weighbridge stations and supply of logistics. They also informed that they are very much willing to co-operate in the endeavor of putting the axle load limits and enforcing it.

As for legal status of the weighbridges installed and operated by FTTEN, there is no regulatory hurdle in operating such stations. However, it is envisaged that if private sector other than FTTEN is involved in weighbridge operation, FTTEN might object to the operation of such weighbridges.

4.2 POSSIBILITY ANALYSIS OF USING PRIVATELY OWNED WEIGHBRIDGES FOR AXLE LOAD CONTROL

In order to assess the possibility of using privately owned weighbridges for axle load control, both interview survey with weighbridge operators, interview with facility supplier and questionnaire survey at field level were carried out. An interview survey was conducted at FTTEN head office, Balkhu. Similarly, questionnaire survey was conducted by visiting three weighbridge stations located at Naubishe, Hetauda and Pathlaiya. The possibilities of using existing weighbridges which are installed and operated by the private sector (i.e. FTTEN) has to be considered from the following aspects as discussed below.

4.2.1 Compatibility of the Existing Weighbridges

The existing weighbridges were not installed for controlling of vehicle overloading but to proportionately distributing the freight among the truck operators. Therefore, existing weighbridges has facility of measuring only the gross vehicle weight and the software does not calculate overloading fines based on the overloaded weight. Also, weighbridge operator does not collect the overloading fines. Overloading fines are being collected only by traffic police and officials of DoTM. However, neither traffic police nor official of DoTM were present at weighbridges when field visit was made by the Study Team. However, in a discussion with the supplier of these weighbridges, they have informed that modification of truck scale to measure

individual axle load and software updating to make compatible with the Axle Load Control Management Information System (ALC-MIS) is possible.

4.2.2 Location and Physical Facilities

All the existing weighbridges are located within the right of way of the road. However, physical facilities required for using them for 24-hours operation are not sufficient. The physical facilities such as office building, parking space, offloading yard, toilet, etc. are not properly constructed. However, land acquisition for construction of such facilities is somehow can be managed within the vicinity of the weighbridges. Therefore, the existing weighbridges can be used with some additional civil works.

4.2.3 Willingness of the Private Sector

During discussion with the FTTEN at their head office Balkhu, it is informed by the FTTEN that they are very much willing to operate weighbridges and cooperate in the endeavor of putting the axle load limits and enforcing it. FTTEN requested to set up traffic police post and DoTM local offices in the premises of weighbridge because their presence will greatly help in operating weighbridges and overloading control

4.2.4 Financial Sustainability

It is a fact that overload control on its own income (i.e. weighing fee and overloading fine collection) will never be financially self-sufficient because establishment of weighbridge is for discouraging the overloading which eventually minimizes the collection of overloading fines. Weighbridge operation needs 2-3 shifts and staff of various disciplines such as mechanical, information technology, traffic police, security, account, administrative and maintenance and management. Therefore, additional responsibilities such as traffic data collection, road safety inspection, and driver license inspection further do not make the operator financially self-sustained, and hence DoTM has to give it a thought and should support financially.

4.3 RISKS

The following risks are envisaged in involving the private sector in vehicle overloading control.

1. Financial sustainability and effectiveness of weighbridge operation Since current regulatory provision in involving private sector in vehicle overloading control allows operating weighbridges only by the FTTEN, the effectiveness of controlling the vehicle overloading by FTTEN might be in risk because allowing vehicle overloading might be more beneficial than fining them from the financial point view. Weighbridge operation by FTTEN might be biased since expected violators and controllers are eventually the same entity.

2. Objection from other private sector Since current regulatory provision in involving private sector in vehicle overloading control allows operating weighbridges only by the FTTEN, other private might object when FTTEN is given solely to operate weighbridges throughout the nation. It might be considered as the syndicate in the weighbridge operation. However, this provision can be scrapped either through negotiation or through new directive issued by the DoTM.

4.4 CONCLUSIONS AND RECOMMENDATIONS

There are different specialist disciplines required in the area of weighbridge management, operations, and maintenance. Most of these specialist disciplines are not core functions of the typical transport department. However, the possibility using same weighbridges and operation system shall be thoroughly reviewed. At present, FTTEN is operating weighbridges for their own purpose. The truck tracking system which is now operational in their weighbridge stations are seems quite effective to track the track at the real time. Further, FTTEN is planning to introduce smart card system for effective management and monitoring of their trucks. Therefore, it can be concluded that Nepalese private sector are capable for operating weighbridges. In order to control vehicle overloading from the entire country, the Government of Nepal and private sector should work together. The role of governmental body should be more focus on setting policies and monitoring whereas private sector should focus on operation of weighbridge in accordance of government policy and regulations.

CHAPTER 5 CONCLUSIONS AND RECOMMENDATIONS

The Study Team reached in to the following conclusions and recommendations based on reviewing of primary and secondary data;

1. The freight flow analysis revealed that Nagdhunga counting station has recorded the highest volume of freight vehicles. The second and third freight carrying vehicles were recorded in Pathalaiya north and Muglin east respectively. The rank-wise fright flow stations up to 10th rank have been given in **Table 2.5**.

2. Private sector participation in controlling the excess axle load would be very much effective due to the fact almost all freight vehicles are owned by the private entrepreneurs. In fact at present all of the weighbridge stations are operated by the private sector through the Federation. It seems that this practice would continue for the years to come. However, running of weighbridges by some private entrepreneurs outside the federation seems to be not feasible at present. This is because the weighbridges run through the Federation take nominal charges (NRs 25) and this nominal charge would not be attractive for running a weighbridge.

3. Despite the weighbridges operated at several locations throughout the country mainly on the National Highways by FTTEN, axle load survey data of the past and that the axle load survey carried out under this study revealed that high percentage of freight vehicles are overloaded. These weighbridges run by FTTEN are not very effective in controlling the overloading practice.

4. In the absence of attraction of private sector other than the FTTEN for running independent weighbridges, DoTM is required to take initiative to establish their own weighbridges and operate these by involving the enforcement agencies effectively can curb the practice of overloading of freight vehicles.

5. The stakeholders like FTTEN and Transport Labor Trade Unions in separate meetings conducted by the consultant agreed in principle that the overloading of vehicles is to be discouraged, and as such there should be no objections from these entities if DoTM establishes some of the weighbridges in its own.

References:

1. Axle Load Survey Data (Narayangarh – Mugling Section) (2010), Road Sector Development Project II, Department of Roads.
2. Domestic and Foreign Trade related Custom Data (2013),Trade and Export Promotion Center Nepal
3. Road Network Data (2011), Highway Management Information System, Department of Roads.
4. Traffic Count Data of SRN (2012), Highway Management Information System, Department of Roads.
5. Statistics of Strategic Road Network SSRN 2011/12, Department of Roads, Ministry of Physical Infrastructure and Transport

APPENDIX - 1: TRAFFIC COUNT OF 1 DAY AT DHARKE, GAIDAKOT AND HETAUDA

Traffic Count Survey (24 Hours)

Date:- 2071-11-25

Road Number Or Name :- Preethibi Highway

Loction & Place Name :-Dharke

Diretion:- Dhrke To Kathmandu

DAY SHIFT DATE 2071-11-25

Time	Heavy Truck 3 & More Axle	Heavy Truck 2 Axle	Mini Truck	Large Bus	Mini Bus	Microbus	Jeep ,car,van	Utility Vehicle	Trector	Autoricshaw	Motorcycle	PowerTiler
0600-0630	5	28	3	9	2	3	18	2			14	
0630-0700	3	10	2	5	1	4	12	3			25	
0700-0730	5	5		9	5	9	7	11			7	
0730-0800	4	15	1	8	6	24	23	6			18	
0800-0830	7	19	4	18	12	30	32	13			46	
0830-0900	14	23	7	44	18	28	31	17			54	
0900-0930	16	29	6	32	22	45	62	13			55	
0930-1000	7	13		6	23	26	42	13			48	
1000-1030	8	14	3	10	10	19	26	14			36	
1030-1100	6	9	4	11	14	18	23	11			32	
1100-1130	23	13	3	27	8	24	20	10			22	
1130-1200	19	22	4	8	9	20	18	11			30	
1200-1230	37	46	8	14	10	25	34	15			46	
1230-1300	22	20	6	4	6	26	18	5			39	
1300-1330	15	17	3	5	7	13	14	10			21	
1330-1400	14	12	3	10	6	12	25	9			18	
1400-1430	15	18	2	6	3	12	7	3			27	
1430-1500	31	18	6	8	5	18	34	14			30	
1500-1530	26	24	4	10	2	16	20	5			25	
1530-1600	38	24	1	11	4	17	24	6			14	
1600-1630	37	24	5	22	5	22	25	13			20	
1630-1700	24	20		14	4	14	22	3			19	
1700-1730	24	29	3	16	3	10	15	2			27	
1730-1800	25	25	6	15	2	12	15	4			26	

				NIGHT SHIFT DATE 2071-11-25								
1800-1830	18	15	2	27	5	3	4	1			5	
1830-1900	26	10	3	33	7	1	2	3			8	
1900-1930	14	19	3	37	5	4	3	6			2	
1930-2000	18	19	2	37	3	2	6	3			7	
2000-2030	8	20	3	45	2		15	6			8	
2030-2100	16	19	3	63		4	21	10			10	
2100-2130	15	16		47	4	2	14				10	
2130-2200	22	25	5	43	9		5	2			2	
2200-2230	18	28	9	10	1		5	1			2	
2230-2300	16	13	3	1			4	2				
2300-2330	17	11		3			3	1			7	
2330-0000	7	4		2								
0000-0030	5	7			1		1	1			1	
0030-0100	7	8				1	1					
0100-0130	6	4				1	2					
0130-0200	4	5					6					
0200-0230	3	8					8	1				
0230-0300	1	5	1				1					
0300-0330		3	1				3	2				
0330-0400	7	8					1	1			1	
0400-0430	4	7					4	3			1	
0430-0500	4	6					7	3			1	
0500-0530	9	12		2			13	7			7	
0530-0600	4	15	4	2			9				11	

Traffic Count Survey (24 Hours)

Date:- 2071-11-26

Road Number Or Name :- Preethibi Highway

Loction & Place Name :-Dharke

Diretion:- Kathmandu To Dharke DAY SHIFT DATE 2071-11-26

Time	Heavy Truck 3 & More Axle	Heavy Truck 2 Axle	Mini Truck	Large Bus	Mini Bus	Microbus	Jeep ,car,van	Utility Vehicle	Trector	Autoricshaw	Motorcycle	PowerTiler
0600-0630	22	20	5	56	2	1	3	2			3	
0630-0700	32	20	2	34	1		7	1			1	
0700-0730	33	19	4	36	9	5	6	3			9	
0730-0800	16	9	2	9	1	4	6	1			8	
0800-0830	35	32		6	2	13	12	3			27	
0830-0900	24	40	11	2	3	5	19	6			28	
0900-0930	27	33	4	9	1	19	21	6			25	
0930-1000	16	28	3	4	3	20	15	3			14	
1000-1030	20	28	2	1	4	16	19	10			22	
1030-1100	15	29	6	6	5	29	21	3			30	
1100-1130	23	27	4	6	4	13	17	3			23	
1130-1200	39	41	5	5	7	20	28	6			30	
1200-1230	30	41	2	2	3	15	18	6			28	
1230-1300	11	18	2	8	9	14	18	2			11	
1300-1330	5	16	1	14	8	8	30	3			30	
1330-1400	8	26		18	8	17	13	2			24	
1400-1430	5	21	1	7	7	21	21	4			37	
1430-1500	11	18	2	14	14	22	26	9			38	
1500-1530	6	20	3	10	5	24	24	5			32	
1530-1600	7	21	3	11	5	15	31	4			23	
1600-1630	11	15	5	5	3	15	17	6			28	
1630-1700	6	14	1	2	4	18	23	7			26	
1700-1730	10	20	1	5	11	21	23	4			40	
1730-1800	12	18	2	3	8	15	23	3			35	

				NIGHT SHIFT 2071-11-26								
1800-1830	22	12	2	4	6	6	16	3			15	
1830-1900	18	13	3	1	3	2	11				7	
1900-1930	23	13	3	4	5	4	13	1			17	
1930-2000	13	16	1	3	3	3	17	2			8	
2000-2030	9	3	1	4	4		25	2			8	
2030-2100	9	10	2	2	2	3	22	1			4	
2100-2130	9	5	1	3	3	1	20				4	
2130-2200	16	5	4	5	3		10	5			3	
2200-2230	5	20	1	1	2		20				1	
2230-2300	10	10		8	1	3	15	4			2	
2300-2330	14	8			2	3	12	4				
2330-0000	10	3			1	4	6	9			3	
0000-0030	13	3					10	2				
0030-0100	13	3		4	1	1	4	3			4	
0100-0130	21	8		2	1		12	2				
0130-0200	20	8	4	1			11	4			1	
0200-0230	22	11		2	3	3	14	1				
0230-0300	19	12		13	1	1	6	4				
0300-0330	19	19	1	26	3	2	7	11				
0330-0400	19	11	2	53	1		5	8			1	
0400-0430	24	24	1	78	3		7	4			1	
0430-0500	28	16		80	1	1	3	5			3	
0500-0530	24	12	2	61	1		3	1			3	
0530-0600	23	18	1	48		2	7	2			5	

Traffic Count Survey (24 Hours)

Date:- 2071-11-26

Road Number Or Name :-Mahendra Highway

Loction & Place Name :-Gaidakot

Diretion:- Narayanghat To Butwal

DAY SHIFT DATE 2071-11-27

Time	Heavy Truck 3 & More Axle	Heavy Truck 2 Axle	Mini Truck	Large Bus	Mini Bus	Microbus	Jeep ,car,van	Utility Vehicle	Trector	Autoricshaw	Motorcycle
0600-0630	6	11	1	1	4		4	5	3	4	28
0630-0700	13	6	4	2	7		7	11	2	7	54
0700-0730	15	5	1	3	4		15	4	6	8	65
0730-0800	8	8	2	5	5	1	16	3	1	8	98
0800-0830	15	9	1	3	5		18	3		6	84
0830-0900	17	8	4	5	10	3	28	6		5	112
0900-0930	16	8	1	6	6	2	14	3	1	8	98
0930-1000	14	6	2	3	9	2	15	10		5	59
1000-1030	9	12	2	7	10		22	11	2	8	128
1030-1100	13	2	2	7	12	5	35	7	3	10	130
1100-1130	6	10	9	3	8	4	17	20	3	10	118
1130-1200	11	6	2	5	6	4	16	10	1	7	112
1200-1230	11	9	4	4	10	1	25	7	2	10	73
1230-1300	5	8	3	2	13	6	45	8		7	119
1300-1330	13	7	5	7	17	9	28	5		9	97
1330-1400	5	4	4	2	15	8	33	8		7	85
1400-1430	7	6	3	4	16	6	30	6	2	5	82
1430-1500	5	7		4	17	9	46	8	2	8	98
1500-1530	15	5	2	5	11	4	32	2	5	6	90
1530-1600	9	4	1	3	12	1	31	7	3	9	89
1600-1630	12	4	2	5	10	3	23	7	3	3	95
1630-1700	26	7	4	2	11	7	32	6	3	3	114
1700-1730	21	8	2	2	7	3	28	7	1	2	97
1730-1800	15	7	4	1	7	7	22	3		4	70

				NIGHT SHIFT DATE 2071-11-26							
1800-1830	6	8	2	10	8	8	38	7	1	6	162
1830-1900	16	4	1	7	5	4	37	16	2	10	170
1900-1930	15	4		13	8	7	42	5	1	7	158
1930-2000	21	3	2	10	2	5	32	5		3	120
2000-2030	19		1	14	2		20	5	1		54
2030-2100	7	7	2	6		1	14	2		1	34
2100-2130	12	6	1	11		3	8	4		1	36
2130-2200	4	4		12	1		8	4			15
2200-2230	6	2		11		2	15	1			13
2230-2300	3	2	2	8		1	6				2
2300-2330	5	2		7			6	1			5
2330-0000	15	4	2	12		1	10	1			9
0000-0030	13	2		16			5	2			1
0030-0100	8	3	1	12			2				
0100-0130	2			12			4				
0130-0200	7	1		15			4	1			2
0200-0230	9			12			3				
0230-0300	4	1		2			1	1			2
0300-0330	4	2		4			2				
0330-0400	10	6		1			1	1		1	
0400-0430	6	5	1	3			3	1			1
0430-0500	4	6		3			2	3		1	4
0500-0530	11	4		4	1	1	4	1			10
0530-0600	14	11		5	3	1	3	3		3	15

Traffic Count Survey (24 Hours)

Date:- 2071-11-26

Road Number Or Name :-Mahendra Highway

Loction & Place Name :-Gaidakot

Diretion:- Butwal To Narayanghat DAY SHIFT DATE 2071-11-27

Time	Heavy Truck 3 & More Axle	Heavy Truck 2 Axle	Mini Truck	Large Bus	Mini Bus	Microbus	Jeep ,car,van	Utility Vehicle	Trector	Autoricshaw	Motorcycle
0600-0630	13	6		3	5	5	2	3	1	4	25
0630-0700	21	4	1	2	4	2	14	2	1	5	58
0700-0730	18	12	1	4	5	4	13	3	2	6	65
0730-0800	10	6		6	8	2	18	9	3	8	81
0800-0830	10	5		4	7	5	17	8	3	8	110
0830-0900	4	5	2	5	9	3	20	10	1	6	147
0900-0930	6	9		7	14	6	27	6	1	7	98
0930-1000	5	5	1	13	14	4	12	12	2	7	67
1000-1030	4	5	1	11	12		17	8		6	106
1030-1100	5		1	7	5	6	18	5	3	6	134
1100-1130	9	7		9	11	4	20	13	4	3	128
1130-1200	7	11	2	3	10	10	26	12		7	104
1200-1230	6	4	1	7	10	3	20	4	1	5	75
1230-1300	9	14		5	15	9	22	3	5	8	58
1300-1330	11	4	2	2	13	8	28	6	5	7	94
1330-1400	6	4	2	3	14	3	23	6	7	7	85
1400-1430	16	13		7	12	4	27	8	2	4	68
1430-1500	8	6		10	13	3	19	6	3	5	74
1500-1530	4	7	1	3	8	2	29	7	2	4	70
1530-1600	6	9	1	5	13	9	21	5	3	8	43
1600-1630	12	8	1	9	9	2	17	7	2	3	73
1630-1700	10	8		6	7	1	15	4	6	3	51
1700-1730	9	4	1	4	5	2	7	3	1	2	58
1730-1800	7	6	3	2	4	4	18	6	2	1	51

				NIGHT SHIFT 2071-11-26							
1800-1830	18	15	5	9	7	1	25	12	3	8	68
1830-1900	19	7	2	2	11	1	23	9	2	10	59
1900-1930	23	13	1	2	6		24	6		9	40
1930-2000	15	11		6	2		29	8		4	50
2000-2030	14	7	2	2	3	1	33	5			48
2030-2100	9	6	1	3		1	21	2		1	21
2100-2130	23	7	1	4			6	6			24
2130-2200	10	3		1			3	2			9
2200-2230	24	7		8			5	2			5
2230-2300	16	5	1	6			6	2			4
2300-2330	17	8	2	11	1		11	5			7
2330-0000	17	5	3	19	1		9	1	2		3
0000-0030	8	2		12			10	3	1		2
0030-0100	14			10			4				
0100-0130	16	2		14			4				3
0130-0200	6	5	1	12			2	3			1
0200-0230	5	1	1	5	1		3				2
0230-0300	7			17			4				3
0300-0330	10	2		17	.		3	1			
0330-0400	6	4		10			1	4			3
0400-0430	8	1	1	6							2
0430-0500	15	2	1	5		4	5	3			4
0500-0530	6	5		6	1	2	5	1			4
0530-0600	15	6		10	1	5	3	7		3	28

Traffic Count Survey (24 Hours)

Date:- 2071-11-27

Road Number Or Name :-Mahendra Highway

Loction & Place Name :-Hetauda

Diretion:- Chitwan To Hetauda

DAY SHIFT DATE 2071-11-28

Time	Heavy Truck 3 & More Axle	Heavy Truck 2 Axle	Mini Truck	Large Bus	Mini Bus	Microbus	Jeep ,car,van	Utility Vehicle	Trector	Autoricshaw	Motorcycle	PowerTiler
0600-0630	30	16	1	2	1	1	7	2	1	7	15	
0630-0700	42	17		3	2	1	6	1		6	24	
0700-0730	49	16	1	8	2	2	9	4	2	5	28	
0730-0800	67	18		3	2	2	9	1	5	11	40	
0800-0830	48	23	2	1	3	3	13	4		7	47	
0830-0900	41	15		6	6	2	6	2	1	6	28	
0900-0930	34	31	1	3	4	1	12	2	5	7	46	
0930-1000	30	16		3	6	2	5	1		8	71	
1000-1030	11	10	1	1	4	1	8	3	1	12	69	
1030-1100	5	4	1	4		4	12	2	4	15	64	
1100-1130	7	4	2	8	5	1	13	4	1	19	55	
1130-1200	18	12	1	12	7	1	15	5	2	12	48	
1200-1230	29	13	1	6	1	3	7	5		10	42	
1230-1300	16	11		3	5	1	10	2	1	11	34	
1300-1330	10	9	2	4	1	1	4	4	1	15	37	
1330-1400	21	5	2	2	3	2	12	2	3	13	48	
1400-1430	12	8	1	4	5		15	3	2	10	29	
1430-1500	22	4		4	7		18			10	37	
1500-1530	10	5	1	5		2	9	5	1	6	49	
1530-1600	16	7	1	1	9		9	5		10	48	
1600-1630	6	5	2	4	5	3	11	2		15	36	
1630-1700	18	6		3	7	3	11	5	4	17	35	
1700-1730	15	5	1	2	1	3	9	6	3	5	49	
1730-1800	19	8		4	3	3	13	5	1	13	39	

				NIGHT SHIFT DATE 2071-11-27								
1800-1830	17	9	2	1	2	3	5	11			29	
1830-1900	12	8	3	2	2	3	7	5		8	23	
1900-1930	24	4		3	2	2	9	4		4	25	
1930-2000	20	5	1	1	2		10	5		2	18	
2000-2030	13	4	2	4	1		9	5			9	
2030-2100	18	2	2	1	2		3	1			9	
2100-2130	10	1	2	7			11	3		1	8	
2130-2200	12		7	9	1		11	2			4	
2200-2230	7	3	1	20			7	1			7	
2230-2300	11	3		11				1				
2300-2330	8		1	23			1					
2330-0000	6	4		33			1					
0000-0030	9			24							1	
0030-0100	5			19								
0100-0130	5			21								
0130-0200	5	1		35			2	2			1	
0200-0230	6	3	2	43			2	2				
0230-0300	6			53			1	1				
0300-0330	7	2		33			2					
0330-0400	3	9		28			1					
0400-0430	7	4		10	1		2				1	
0430-0500	18	10		3		1	2	2			3	
0500-0530	17	9	2	3			3	3	2		3	
0530-0600	15	14		2		5	9	3		11	14	

Traffic Count Survey (24 Hours)

Date:- 2071-11-27

Road Number Or Name :-Mahendra Highway

Loction & Place Name :-Hetauda

Diretion:- Hetauda To Chitwan DAY SHIFT DATE 2071-11-28

Time	Heavy Truck 3 & More Axle	Heavy Truck 2 Axle	Mini Truck	Large Bus	Mini Bus	Microbus	Jeep ,car,van	Utility Vehicle	Trector	Autoricshaw	Motorcycle	PowerTiler
0600-0630	16	8		1	1	3	3	1	2	4	12	
0630-0700	20	9		2	2		6	4	4	8	21	
0700-0730	24	10		3	4	1	7	4	1	11	25	
0730-0800	12	10			5		9	6	3	9	36	
0800-0830	17	15		5	2	1	13	1	2	8	35	
0830-0900	9	15	1	2	3	2	12	6	2	11	27	
0900-0930	17	9	1	11	2	2	8	5	2	9	36	
0930-1000	17	5		14		1	10	5	2	16	40	
1000-1030	18	12	1	2	4	3	10	3	1	17	62	
1030-1100	12			6	3	1	8	3	1	23	58	
1100-1130	16	4		7	3		9	6	1	9	38	
1130-1200	18	10	1	7			15	3		13	47	
1200-1230	7	8	2	9		3	11			9	49	
1230-1300	17	6	3	3	3	2	13			14	41	
1300-1330	15	5	2	6	1	2	14	4		11	52	
1330-1400	19	8		11	1	3	12	3	3	8	50	
1400-1430	24	12		8	1	2	16	3	2	14	49	
1430-1500	15	3	1	9	1	1	20	8	1	11	70	
1500-1530	13	4		7	1	1	20	3	3	12	31	
1530-1600	24	11		11		1	11	2		12	35	
1600-1630	19	7	1	3	4		11	2	4	13	37	
1630-1700	24	11	3	4	3	3	12	6	4	19	36	
1700-1730	14	8	1	1	2	2	4	4	2	11	43	
1730-1800	20	6	1	4	2	2	14	3		14	59	

				NIGHT SHIFT 2071-11-27								
1800-1830	28	9	3	7	4	2	12	8		8	34	
1830-1900	25	6		4		1	6	6		6	37	
1900-1930	39	11	1	4	1	2	12	5		2	36	
1930-2000	28	11	1	1	2		9	3		5	24	
2000-2030	34	20	4	1	2		13	5		1	24	
2030-2100	22	7	1	2			7	7			25	
2100-2130	29	6	4	11			11	2			25	
2130-2200	17	3	1	12			4	1			5	
2200-2230	46	7	5	55	1		10	3			10	
2230-2300	19	8		30				3			7	
2300-2330	28	8	2	56			4	2			2	
2330-0000	22	9	4	24	1		4	1			4	
0000-0030	25		3	18			2				2	
0030-0100	18	1	1	44			1	1			1	
0100-0130	11	1		33				1			3	
0130-0200	5	2		22			1				1	
0200-0230	10	2	1	20			1	1			1	
0230-0300	6	5		9			3					
0300-0330	5	11					1	1		1		
0330-0400	10	7								1		
0400-0430	20	9		1		1	1				2	
0430-0500	20	17					1	2			1	
0500-0530	14	10		2			4	4		6	4	
0530-0600	19	3	1	2		1	3	1			4	

APPENDIX - 2: COST AND SPECIFICATION OF WEIGHBRIDGE

A2.1 FIXED WEIGHBRIDGE

A2.1.1 Product Details and Technical Cooperation

The following two types fixed weighbridges are considered.

1. Avery Weigh-Tronix Truck Scales E12-J2: (INDIA)

A. Features of Weighbridge

Feature	Benefits
Gross Capacity	Capacity: 30-100 tons
Platform Lengths	Platform Length: 7-18m
Platform Width	3 and 3.5 m
Dual/Triple Axle Rating	44/50t DTA for 50/60t capacity, 65t TTA for 100t capacity
Module Size	3m or 3.5m wide
Full Electronic Design	Yes
Factory Assembled	Minimizes install cost and maintains consistency
Mounting	Pit or Surface Mountable
Height	405mm
Weighbridge Design	Provided steel deck design for maximum strength
Material of Construction	Parallel flange beams and chequered plate
Corrosion Protection	Blasted for roughness, primer and epoxy painting
Load cell Performance	Analog load cells with 20m cable or digital load cells with 25m integrated cable
Load cell Design	Stainless steel, heat treated ,quenched and tempered
Load cell Capacity	23/30/45t depending upon capacity and platform size with 150% safety overload factor
Junction Box	M. S. for indoor use or polymer for outdoor
Load cell Protection	Internally fitted surge arrestors gauges are sealed against moisture and corrosion

Options and Accessories: Weight Management Software, Remote Display, Printer, Hazardous Area System and Unmanned Weighing System.

B. Model of Weighbridge

Model	Platform L X W(m)	Module (Nos.)	Load cells (Nos.)	Gross Capacity
E12-J207A	7X3		4	30tX5kg
E12-J212A	9X3		6	50tX10kg 60tX10kg
E12-J216A	12X3 16X3	2 3	6 8	60tX10kg 60tX10kg 80tX20kg 100tX20kg
E12-J218A	18X3	1	8	60tX10kg 80tX20kg
E12-J218AW	18X3.5	2	8	100tX20kg

2. Avery Weigh-Tronix Truck Scales ZM305-BMI: (INDIA)

A. Features of Weighbridge

Feature	Benefits
Gross Capacity	Capacity: 40-100 tons
Platform Lengths	Platform Length: 6-24m
Platform Width	3 m
Dual/Triple Axle Rating	As given in the table below
Module Size	4.5m to 9m long
Full Electronic Design	Yes
Factory Assembled	Minimizes install cost and maintains consistency
Mounting	Pit or Surface Mountable
Height	355mm
Weighbridge Design	Provided sandwich steel deck design for maximum strength
Material of Construction	Parallel flange beams and chequered plate
Corrosion Protection	Blasted for roughness, primer and epoxy painting
Load cell Performance	Analog load cells with 20m cable with 20m integrated cable
Load cell Design	Stainless steel, heat treated ,quenched and tempered
Load cell Capacity	22.5/45t depending upon capacity and platform size with 150% safety overload factor
Junction Box	M. S. or stainless steel fitted inside weigh cabin
Load cell Protection	Internally fitted surge arrestors gauges are sealed against moisture and corrosion

B. Model of Weighbridge

Model	Platform L X W(m)	Module (Nos.)	Load cells (Nos.)	DTA LOAD	Gross Capacity
ZM305-BMI06A	6X3	1	4	32	40tX10kg
ZM305-BMI08A	8X3	1	4	32	40tX10kg
ZM305-BMI09A	9X3	2	6	30	50/60tX10kg
ZM305-BMI10A	10X3	2	6	36	50/60tX10kg
ZM305-BMI12A	12X3	2	6	36	80/1000tX20kg
ZM305-BMI14A	14X3	2	8	36	50/60tX10kg
ZM305-BMI16A	16X3	2	6	32	50/60tX10kg
		3	8	36	80/100tX10kg
ZM305-BMI18A	18X3	2	6	32	50/60tX20kg
		3	8	36	80/100tX20kg
ZM305-BMI24A	24X3	4	10	36	80/100tX20kg

A2.1.2 TECHNICAL SPECIFICATION FOR WEIGH BRIDGE

1. General

1.1 This specification covers the minimum technical requirements to be met by the Vendor for the design, fabrication, shop inspection, testing, site supervision of construction, testing and commissioning of Weigh Bridges.

1.2 This specification compliments the Data Sheets, which forms part of the Tender Document, in which the operating conditions and other requirements are listed in detail.

1.3 Compliance with this specification shall not relieve the Vendor from meeting the requirements of the ultimate user or his nominated representative when stipulated in the Tender Document.

2. Codes, Regulation and Standards

2.1 Weighbridges shall conform in design, materials and performance, except where otherwise specified, with the current issue of the following, prevailing on the effective date of the Order and as amended by this specification.

- Indian Standard IS-1436 (1991): Weighbridges – Specification
- IS-9281 Part 1 of 4 (1979) : Specification for Electronic Weighing System

Weighbridges shall conform to the local Indian Standards for Weights and Measures. Stamping by the statutory authorities shall be the responsibility of the vendor.

2.2 Compliance with this specification shall not relieve vendor of the responsibility to supply equipment suited to meet the specified service conditions and applicable regulations.

3. Service Conditions

Equipment shall be suitable for operation in conditions as specified in the Attachments to the Tender Document.

4. Vendor's Experience Qualifications

4.1 Weighbridges shall be selected from the vendor's established range of Weighbridges.

4.2 Prototypes shall not be offered by the vendor. Weighbridges shall only be purchased from vendors, who can demonstrate successful operation of at least two similar units for a minimum of two years in comparable service in a similar climatic region which must be performing satisfactorily.

5. Precedence

5.1 In the event of conflict, actual or implied, among documents relating to an enquiry or order, the following order of precedence shall govern:-

- Purchaser's Data Sheets and Drawings
- Tender document

- This Specification
- Other Specifications and Standards referenced in this specification and the Tender Document.
- Indian Statutory and Local Regulations Other National and International Standards

5.2 The vendor shall bring to purchaser's attention any conflict identified by him among the order documents.

5.3 The vendor shall define all deviations from the order documents.

6. **Descriptions**

6.1 Weighbridges shall be supplied to record the tare weight of road vehicles entering the loading stations and to record the gross weight on exit.

6.2 The loading stations shall have one no of weighbridge (for both in and out).

6.3 The weighbridge shall have a weighbridge Room located near it to control vehicle movements and to manage the associated export documentation. The Weighbridge Room shall be equipped with terminal and printer connected to TAS server. The weighbridge Room shall issue weighing tickets to the drivers, approved by the Weights and Measures Ministry.

6.4 Weighbridge terminals, monitors, PC's and printers shall be integrated seamlessly into a single system that shall transmit information to the purchaser's remote Terminal Automation System (TAS). The TAS will process the data for checking against the metering and tank gauging systems and produce reports and detailed delivery invoices and statements.

7. **Scope of Supply**

7.1 The vendor shall supply bi-directional Weighbridges which are complete in all respects. They shall include, but not be limited to, the following:

- Low profile weighbridge platforms with load cell systems.
- A digital weight indicator for weighbridge, desk top type.
- A ticket printer for weighbridge, desk top type.
- The personal computer for weighbridge, desk top type.
- Interface port to transmit information to TAS.
- Redundancy in interface with TAS
- Interconnecting cables (armoured), fittings and junction boxes between load cells and terminal box in the weighbridge Room.
- Interconnecting cable between terminal box in weighbridge Room and indicator/keyboard/printer.
- Lightning protection.
- Std. 20 kg weights for 25 % capacity of weigh bridge with W & M stamping for calibration purpose.
- Earthing system.
- Painting.
- Nameplates and tagging.
- Foundation bolts.

- Testing, inspection and certification.
- Weights and measures for calibration.
- Packing.
- Documentation as required
- Commissioning spares (itemized list required).
- Site supervision for construction, installation at site, testing and commissioning.
- Spares as per OEM for Warranty Period and 5 years CAMC.
- Dimensional details drawing giving foundation base requirement including loading details

8. **Exclusion**

The following shall be excluded from the vendor's Scope of Supply:

- All foundations, paving, pits, site drainage and site surveys.
- Weighbridge Room and desks.
- Supply of utilities.
- Card reader.

9. **Technical Requirement**

9.1 Type of Weighbridge

9.1.1 All weighbridges shall be surface mounted type.

9.1.2 Weighbridges shall be fitted with tyre curb upstands on each side of the platform.

9.1.3 The weighing system shall be by compression type load cells.

9.1.4 Load cells shall be certified to class IP68.

9.1.5 The vendor shall state the over-loading rating - without damage.

9.2 Construction

9.2.1 All weighbridges shall be of steel platform construction.

9.2.2 Bump restrictors shall be supplied to suppress excessive longitudinal movement.

9.2.3 The weighbridge shall operate as follows:

- When a steady weight indication is displayed by the indicator, the printer shall print the date, time, consecutive number, code and the weight of the load on the weighbridge.
- When the vehicle returns for tare or gross weighing, it shall be identified and the data recorded at the first weighing shall be re-presented to the operator. The system shall recognize this operation as a second weighing, either automatically or by the operator pressing "Second Print" button.
- The printer shall then print the first and second weights and the calculated net weight, together with the identifying data.

9.3 Digital Indicator

9.3.1 The weigh system shall be connected to microprocessor based, programmable type, solid-state digitising equipment to provide an in-line indication of weight. It shall be linked to a tabulating machine for printing the weights against various other data. Auto-zero facility shall be provided.

9.3.2 The indicator shall be a compact, self contained console, suitable for desk-top mounting and with facilities for interfacing with other modules or data process equipment if required.

9.3.3 The relevant figures shall be clearly displayed in 20 mm high numerals.

9.3.4 Zero balancing, to compensate for spillage etc. on the weighbridge, shall be provided instantly and automatically by pressing a "ZERO BALANCE" push button. Coloured indicators shall be provided to show when the system is off zero.

9.3.5 The denomination shall be as stated on the data sheet. If dual indication is specified, the change from metric to imperial shall be by a push button on the console. An enunciator shall be automatically illuminated, displaying the chosen denomination.

9.3.6 Self Diagnostic features shall be included in the system. Provision of Alarm indication/audible for the Failure of the Weighing System and also the provision of volt-free contact to give a remote fault in case of any fault in the system. Provision of Security features for Calibration, Data Entry, etc. against any unauthorized adjustments

9.3.7 Electronic Weigh Bridge with Digital Indicator having Ethernet redundant connectivity for interfacing with Terminal Automation System (TAS) and/or JDE for exchange of weight data with weigh bridge PC. In case of problem with assigned weigh bridge PC same shall be able to operate from other PC.

9.3.8 One point 110 V AC +1 %, 50 +1% Hz UPS supply will be provided. Weigh Bridge/TAS vendor to distribute further within their system.

9.4 Print-Out Unit

9.4.1 The following shall be the minimum information printed by the print-out unit. The information shall be printed in bold black characters of 3 mm minimum height:

- Date
- Consecutive number
- Code
- Weights in kilogram's: 1st weight, 2nd weight, computed net weight.
- Shipping location and code
- Receiving location and code
- Contractor name and code
- Truck number

- Time-In and Time-Out

9.4.2 Standard ticket sizes shall be provided i.e. A5; one third of A4, or one quarter of A4. The tickets shall be carbonless and on cards with 5 flimsies. The ticket size shall be agreed with the purchaser at the contract placement period.

9.4.3 A Keyboard shall be provided with the Print-Out Unit capable of making entry modifications and controlling Digital Indicator. The Keyboard shall be a full 'Qwerty' type with membrane key cover.

9.5 Cabling

9.5.1 The vendor shall supply the appropriate cables between the load cells and the weigh house equipment. If a terminal box is required in the weigh house between the load cell cable and the indicator system cabling, then this shall also be included in the vendor's supply.

9.5.2 The vendor shall state the maximum cable lengths that are suitable for efficient operation of the equipment.

9.6 Nameplates

9.6.1 A stainless steel nameplate shall be supplied affixed in a conspicuous position. The following data shall be included as a minimum.

- Item Number.
- Order Number.
- Date of Order.
- Manufacturer's name/address.
- Manufacturer's model number and type.
- Manufacturer's serial number.
- Rated Duty.
- Measuring & Set Range.

9.7 Documentation

The bidder shall provide the Purchaser with the following information as a minimum along with the offer as well after the award of contract. These documents shall include, but not be limited to the following:

(a) Completed data sheets, which are attached with this specification, with supplier data added.

(b) A detailed scope of supply that fully describes the equipment offered.

(c) General arrangement drawings with dimensions, make, and type selected.

(d) Foundation load data

(e) List of clientele for similar installations in last 5 years.

(f) List of interface signals with Purchaser's control system as applicable

(g) List of start up / commissioning spares and 2-years operational spares.

(h) Complete list of special tools (if required)

(i) All utility consumptions such as power requirement.

10. **Inspection and Testing:**

10.1 The vendor shall allow access to the purchaser's inspectors at anytime during fabrication, assembly and testing.

10.2 The approval or release of equipment for shipment, by an inspector or representative of the purchaser will not relieve the vendor of any responsibility of his guarantees and warrantees.

10.3 Certain items and units may be required to be shop tested. These items and the type of tests required will be defined in the Tender Document.

10.4 The vendor shall supply appropriate certification for materials, components and works tests, as specified in the Tender Document.

10.5 Onsite testing and calibration, including supply and transportation of test weights for calibration, shall be provided by vendor.

10.6 Each weighbridge shall be subject to load test, functional test and performance test. The test results shall be repetitive within acceptable limits.

SCOPE OF THIRD PARTY INSPECTION:

The Third Party Agency should carry out the following Inspection as per the specifications:

I) Review and certify the Material Test Reports

II) Functional test of Load Cells and computer System with interconnectivity

III) Visual checks

IV) Dimensional Checks

V) Painting of Platform and structures

VI) Despatch clearance

A2.1.3 Cost Estimate

Cost Estimation of the 80 T Capacity fixed type Road Weighbridge. Cost of Civil work is not included because it is dependent of physical facilities to be designed. Supply, Install, Testing & Commissioning of Weighbridge; Construction roadway lay by with Pit and service building.

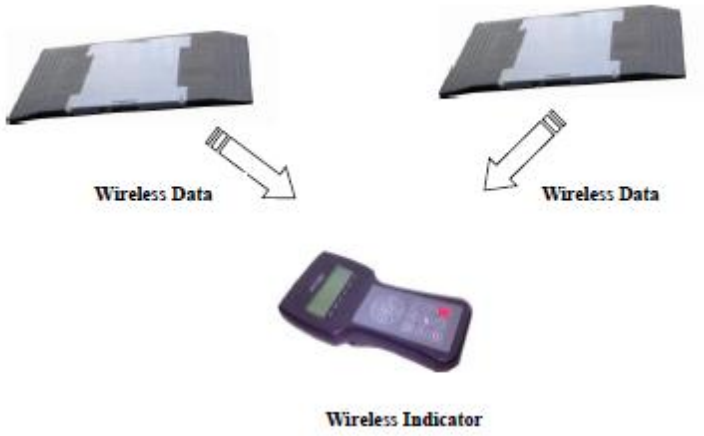
Tentative Cost Estimate (Excluding the cost of Land Acquisition)									
S/N	Description	No	L (m)	B (m)	H (m)	Quantity	Unit	Rate (NRS)	Amount (NRS)
A	**Equipment & Accessories**								
1	80 T Capacity Electronic digital Road weighbridge, accessories & consumables including Load cells/scale indicator with printing facility programming (as per specification provided) all complete.	1				1	No.	2,500,000	2,500,000.00
2	Desk top branded computer with LCD monitor with UPS	1				1	No.	100,000	100,000.00
3	Software programming for data recording /processing etc.	1				1	Job	60,000	60,000.00
	Sub Total of Equipment Supply (A)								2,660,000.00
B	**Trainings**								
	Training programmes for the operation concerns as required 5 days for 11 persons, all expenses	55				55	person heads	300,000	300,000.00
	Sub Total of Training (B)								**300,000.00**
	Sub-Total of (A)+(B)								**2,960,000.00**
C	**Civil Works (as per Client's requirement and Design):**								
1	Construction of Roadway Lay-by with paved (Base, Sub-base, Black top/conc. Block paving) carriageway all complete access to weighbridge (earthwork may vary according to site condition)	1	**	**	**	**	***	***	****
2	Construction of Pit Foundation and support structures for Weighbridge (18m*3m) (as per the drawing provided by the weighbridge supplier)	1	**	**	***	***	***	***	****
3	Construction of weighbridge service buildings in cement mortar stone/brick masonry with roof slab including electrical & sanitary fittings (as per the drawing):								
a	Office/ Accommodation/	1	**	**	**	**	**	****	*****
b	Weigh Bridge Control room	1	**	**	**	**	**	****	*****
c	Toilet	1	**	**	**	**	**	****	*****
d	Compound Wall / Fencing	1	**	**	**	**	**	****	*****
e	Parking and Offloading Yard	1	**	**	**	**	**	****	*****
f	Store / Offloading yard	1	**	**	**	**	**	****	*****
g	Utilities (Water Supply, Sanitation, Telephone, Electricity, Telephone, etc.)	1	**	**	**	**	**	****	*****
h	Staff Canteen	1	**	**	**	**	**	****	*****
	Sub Total of civil works (C)								
D	**Provisional Sum**								
							Total of A+B+C+D		******
							Contingency 5%		******
							VAT 13%		******
							Grand Total /unit		******

A2.2 PORTABLE WEIGHBRIDGE

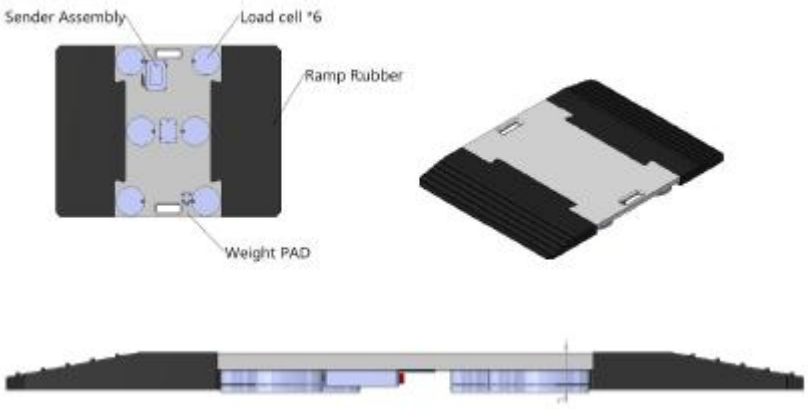
The technical details, specification and cost estimate is prepared based on the quotation received from the Ningbo Yaheng Electronic Technology Co.,Ltd, China.

A2.2.1 Product Overview, Model, Technical Specification, etc.

(1) Portable Weighing Pads



(2) Products Specification:



HY-L16W Wireless Portable Weighing Pads

Features:

- Light in weight, and convenient transportation.
- Integral flat plate construction, high frequency in dynamic response, and high precision.
- Applied special treatment, offering high protection class that are suitable for all kinds of environments.
- Adopted special material in aero-industry, with good anti-over loading ability.
- Assembled with rubber handles, avoided destroying of the handles.

- Mounted with connector and protection block, easy for changing of cables.
- Completed with dovetail approach, offering tight connection of the approach and the scale.
- Easy for loading on/off of the vehicles.

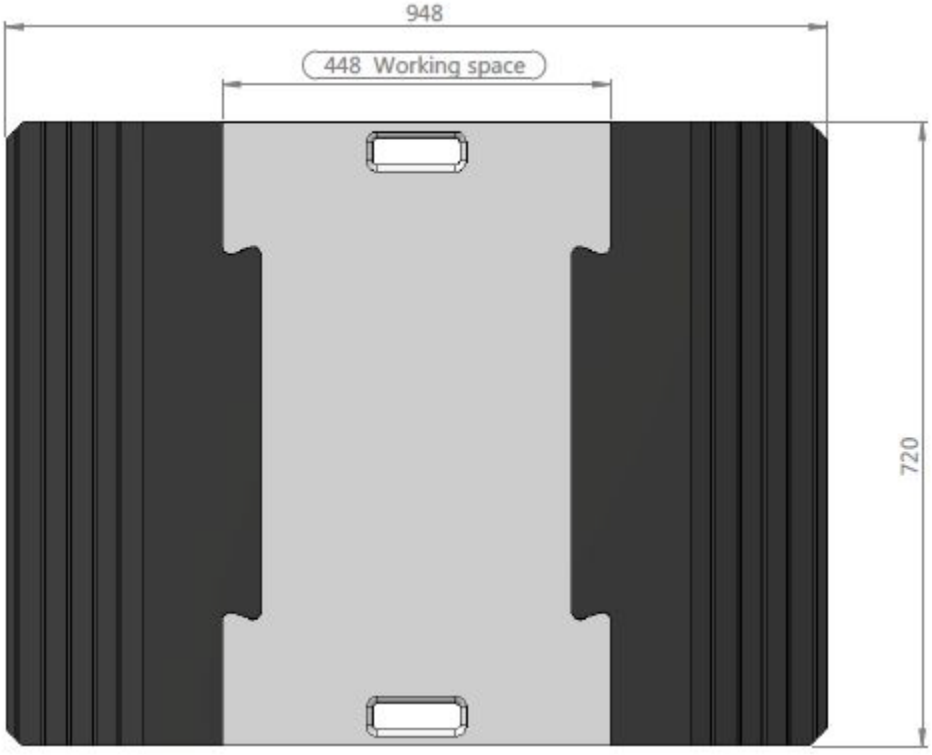
Applications:

- Load control and weighing for the vehicles.
- Measuring the weight and bary center of aeroplane.
- Measuring weight for special purpose.

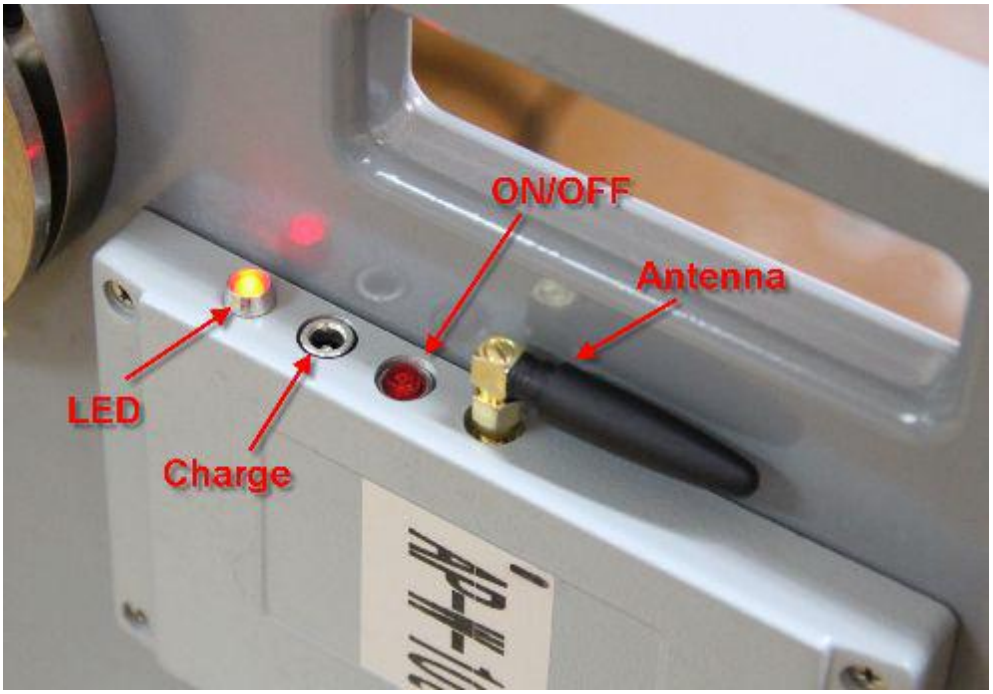
Specification:

Wireless Frequency:	434MHz
Wireless Distance:	<50m（default antenna）, <300m(Strengthen type antenna)
A/D Conversion Rate:	≥50times/seconds
Operating Temp. Range:	-20～+80℃
Operating Humidity:	≤85%RH under 20℃
Battery Life:	0.01%F.S
Non-Linearity:	0.01%F.S
Stable Time:	≤5 seconds
Citation:	GB/T7551-1997/ OIML R60

Outline Dimension (mm):



Operation Notice:



HY280

Wireless Handheld Indicator

Work Principle:

The load cell's out–put signal is digital, parameter adjustment and temperature compensation will be finished in internal. Though 434MHz wireless module to launch after reasonable.

Handheld receive load cell output and its internal battery power consumption values then show them on the LCD display, and handheld through RS232 output to computer or large-screen display.

Product Characteristics:

- Display: LCD 192*64 with backlighting , 6 bit show weight value
- Hold on the peak value, can contact with computer or large-screen display by RS232
- Unit：kg, lb, t

Technical Parameter：

Wireless Frequency:	434MHz
Wireless Distance:	Min：200m（default）
A/D Conversion Rate:	≥50times/seconds
Operating Temp. Range:	-20～+80℃
Operating Humidity:	≤85%RH under 20℃
Battery Life:	≥50 hours
Non-Linearity:	0.01%F.S
Stable Time:	≤5 seconds
Citation:	GB/T7551-1997/ OIML R60

Notice: Do not use the wireless load cell in explosive and unsafe place. The wireless range will be effective when in different weather, the load cell with the indicator in different place, orientation or obstruct from. For charge : according to Li-ion battery. Do not excess discharge.

HY680

Wireless Desk Indicator

Features

- Waterproof and shockproof housing;
- Wireless two-way data transmission;
- The whole moderate size, easy to carry;
- With backlight display, clearly visible at night;
- Built-in mini printer, weighing results can be classified printout;
- Can store up to 200 weighing records are subject to greater demand for scalable;
- Can choose to set a variety of units of measurement;
- Digital filtering speed, range and stable time can be set;
- Set an accurate internal clock and calendar;
- Large-capacity battery-powered;
- Key completely switch electrical circuit design, no external power switch;
- Auto power off, turn the meter off power automatically when the scale body is still up to half an hour;
- The instrument and supporting wireless sender and the sensor through a wireless data interconnection constitute a complete set of wireless weighing system.

Important Technical Parameters

(1) Division value: 1/2/5/10/20/50 optional
(2) Accuracy class: Complies with OIML III scales standard
(3) Power supply: maintenance-free lead-acid battery capacity: 6V/4AH
(4) Power charger adapter: DC7.4V 1000mA
(5) Radio Frequency: 430MHZ to 470MHZ, can be set to multi-frequency, external removable antenna
(6) Data Communication Interface: wireless communication or USB2.0 baud rate, 1200/2400/4800/9600 optional
(7) The instrument battery charging time continuous working time: 50 hours
(8) Instrument battery charging once the standby time: 100 hours
(9) Wireless transmission distance: not less than 200 meters(Open areas)
(10) Storage temperature: -25 to 55 ° C
(11) Humidity: ≤ 85% RH
(12) Size: 280 * 250 * 100mm

A2.2.2 Cost of Portable Weighbridge

Total cost will be US $ 4000 + customs duty at Kathmandu as per manufacturer quotation.