

# Comparison of Local Jeepney Specifications and Selected Philippine National Standards for Road Vehicles

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**Abstract:** The study focuses on characterizing jeepney vehicles based on the important aspects such as ergonomics, safety and materials used for construction. It aims to develop basic standards for jeepney vehicles to ensure safety and comfort relative to existing jeepneys. With these standards, jeepneys will be able to improve the quality and comfort of jeepney/public transportation and be more competitive with other means of transportation.

## 1. INTRODUCTION

As any world traveler knows, each Asian country offers its own unique brand of public transport. Passengers in Japan, for example, rocket down the tracks aboard sleek 170-mph Bullet Trains. In Vietnam, however, passengers move at a sedate five mph while sitting in cyclo pedicabs. Passengers in Thailand buzz about its three-wheeled tuk-tuks, while in Hong Kong they steam across the harbor on green-and-white Star Ferries. And perhaps, most famously of all, the Filipinos cruise along in style aboard chrome-plated jeepneys that literally dazzle the eye.

Jeepneys embody the history of the Philippines in the 21<sup>st</sup> century. They also stand as a testament to Filipino mechanical genius. The “jeepneys” is the Filipino version of the “jitney,” the taxi/minibus that travels along a fixed route, found in many countries. Jeepneys are commonly used in the Philippines for public and private transportation. They were originally built by modifying leftover army surplus Willys and Ford military jeeps after WWII.

Over the years, the WWII military Willys MB and Ford GPW jeep were rebuilt and modified, again and again, until they finally wore out all the original parts. Drivers began painting their olive-drab jeeps in a bright rainbow of peacetime colors designed to grab the attention of potential passengers. Drivers added metal roofs to ward off the sun and rain; they extended the rear of their vehicles in order to crowd more people aboard. An entire range of accessories followed: chrome-hood ornaments, ear-shattering

airhorns, religious icons and flashing multicolored lights. Manileños suddenly realized that an entirely new sort of vehicle had been born in their war-ravaged city.

The original jeepneys were modifications of old military vehicles. However, since the U.S. military has long since run out of surplus jeeps to give away, today’s jeepneys are quite literally manufactured from scratch. Instead, independently owned factories within the Philippines now produce modern jeepneys. (*Source: [http://www.thingsasian.com/goto\\_article/article.2348.html](http://www.thingsasian.com/goto_article/article.2348.html)*)

The Department of Trade and Industry’s Bureau of Product Standards (DTI-BPS) holds the first “Customized Road Vehicles Conference” to inform the public and the automotive sector on the latest developments in the standardization activities on customized road vehicles such as jeepneys, owner type jeeps, tricycles, filcabs, and mini buses among others. DTI-BPS Director Jesus L. Motoomull states, “The standardization of customized road vehicles is part of the government’s measures to facilitate recent global trade developments, particularly in the motor vehicle industry, which is considered as a significant contributor to the country’s economic productivity, investments and exports among others.”

“Moreover, this is a move to enhance the capabilities of local motor vehicle manufacturing firms to be globally competitive producers of customized road vehicles for local and export markets,” stresses Director Motoomull.

The BPS Subcommittee on Customized Road Vehicles (SC 28) under the Technical Committee on Road Vehicles (BPS/TC 44) has been working on the draft national standard for classifying customized road vehicles to resolve the different existing classification schemes in the country and align it with international standards.

In drafting the said standard, SC 28 based the classification of customized road vehicles on the Philippine National Standard (PNS) 1891:2006 – Classification and Definition of Power-driven Vehicles and Trailers, which is a national standard adopted from the United Nations – Economic Commission for Europe (UN-ECE) standard for classification of road vehicles. Under PNS 1891, vehicles are classified under six main categories, namely Category L for motor vehicles with less than four wheels, Category M for power-driven vehicles having at least four wheels and used for the carriage of passengers, Category N for power-driven vehicles having at least four wheels and used for the carriage of goods, Category O for trailers including semi trailers, Category T for agricultural and forestry tractors and Category G for off-road vehicles.

As defined in the draft standard, customized road vehicles are those manufactured assembled or rebuilt using brand new and/or surplus/used automotive/motorcycle parts or a combination of both, driven or used for the purpose of transporting people and/or goods. These include utility vehicles (auto calesa/jeepneys, owner type jeeps, local utility vehicles, filcabs, and Philippine Jumbo jeepneys), motorcycle engine-powered vehicles (motorcycles with carrier, tricycle and motorela), mini buses, trucks (pick-up, dropsied, flat bed, closed, stake, palletized and tanker type) and trailers (general purpose, stake, tanker, palletized, equipment).

DTI-BPS Director Jesus L. Motoomull explains, “The draft standard intends to harmonize the country’s classification of customized road vehicles with international standards to enable local producers and assemblers of customized road vehicles to gain access to the global market and export to countries worldwide.”

“Eventually, with the finalization and implementation of the said standard, which is at par with international standards, our locally-produced customized road vehicles would be comparable with other vehicles worldwide.” Director Motoomull underscores.

(Source:  
[http://business.gov.ph/BPS\\_News\\_PressReleases.php?contentID=59](http://business.gov.ph/BPS_News_PressReleases.php?contentID=59))

## 2. STATEMENT OF THE PROBLEM

It is observed that there is no specific or particular standard regarding the construction of jeepneys to ensure safety of the driver, passenger and other road users. Because of lack of proper policy, local assemblers are able to construct vehicles using low-

cost materials and even non-matching vehicle parts. The materials usually used are second-hand or popularly known as ‘surplus’. Also, power to weight ratio of jeepneys are not taken into consideration.

## 3. OBJECTIVE

The main objective of this study is to develop standards for the construction of jeepneys based on the concepts of ergonomics, safety and materials used.

## 4. SIGNIFICANCE OF THE STUDY

Though jeepneys face increasing competition from more modern sedan and minivan taxis, they remain as the backbone of public transportation in our country. Jeepneys are undoubtedly the most popular form of mass transport in the country. This is a public safety concern and calls for jeepney’s proper standards for better competitiveness. Also, these standards that will be developed will ensure safety and comfort relative to existing jeepneys.

## 5. SCOPE AND LIMITATIONS

This study will focus on the regular and jumbo jeep vehicles that are constructed by the local manufacturing companies within Mega Manila. The ergonomics, safety and materials of construction are the aspects considered in the design. The design for the standards will be compared with the International Standards Organization (ISO) and United Nations Economic Commission for Europe (UNECE). The developed standards will be voluntary for the manufacturing companies.

## 6. REVIEW OF RELATED LITERATURE

### 6.1 Introduction

Lavishly decorated with metallic reflectors, streamers, gyrating iron horses, pulsating light bulbs, cheeky nameplates and statues that flash in rhythm with the music, jeepneys are obviously more than just the Filipino substitute for intra-city buses. They symbolize the clash of Asian sensibilities with western consumerism, folk art with utilitarianism, and cold machinery with Filipino passion. More extravagant examples mix religious iconography and western hedonism into something almost beyond description. Jeepneys are themselves artifacts of twentieth-century Filipino history. (Source: CRC Staff Memos, 1995)

But not all is smooth cruising in jeepneys land nowadays. Since 1957, reports were made that jeepneys will be phase out due to problems associated with jeepneys. Many believed that this could not happen and the worst part would just be relegation to secondary routes. And as of 1980, the Board of Transportation (BOT) has reportedly stopped granting franchises so the jeepneys will be out of the

primary routes by 1984—the scheduled completion of the Light Rail Transit (LRT).  
(Source: *Observer*, 1982)

For pragmatists, jeepneys signify ingenuity. For motorists, it is infuriating. Without it, Manila’s streets would not be so clogged. Neither will millions reach their daily destinations on time. It is small enough to negotiate dirt roads where a bus cannot pass through, yet rugged enough to withstand the most rugged terrain there is. Its capacity is also very flexible, since both passengers and baggage can be made to fit (or contort) into every available space in every possible position. Such things are the jeepney’s importance in the Filipino’s daily mode of living. Despite being the chief scapegoat in a wide range of problems bedeviling city dwellers— fuel inefficiency, smoke belching, notorious drivers’ discipline – it remains the most economical means of transportation for over eight million people. (Source: *Philippines Free Press*, October 12, 1991)

### 6.2 Characterization of Jeepney Vehicle in Metro Manila

The Characterization of Jeepney Vehicle In Metro Manila study (Colos, 2005) aims to define the important aspects of a jeepneys vehicle to be able to establish standards in its assembly methods. These aspects include the specifications of the jeepneys used, frame materials and construction methods, and the overall dimension of the jeepneys vehicle.

This study only provides basic information on important aspects of jeepneys vehicle, which will serve as a database for the specification of the jeepneys for future studies and standard formulation. As of the moment, jeepneys design can be customized based on the specifications and directions of the costumer. And though the product outcome is not high in technology, it is very cheap and useful to many people.

### 6.3 Development of Standards for Low-Cost Motorized Road Vehicles in the Philippines

The Development of Standards for Low-Cost Motorized Road Vehicles in the Philippines Study (UP NCTS, 2005) concept paper tackles about the lack of proper policies and standards for the road vehicles in the Philippines. As far as LCMRVs are concerned, there is no definite policy that directly addresses the issue of vehicle standards. Policies on road safety have been established even in an ASEAN level, but in the case of locally made vehicles, there is no rule on how a jeepney or AUV should be constructed to ensure safety for the driver and other road users.

The registration procedures of the Land Transportation Office (LTO) of the Department of Transportation and Communication (DOTC), is using parameters that are too general, and sometimes are not very useful as reference. LCMRVs usually fall

under the “Utility Vehicles” classification, which covers a number of other vehicles of different configurations like jeepneys, AUVs, vans, small trucks, and commercial vehicles among others.

With the lack of standards on LCMRVs, configurations vary widely because the local assemblers are able to integrate vehicle parts on almost any vehicle assembly even if they do not match.

Proper regulations thru policies or standards can help improve the local vehicle manufacturing industry. This is where researchers and technocrats play a major role in improving the way mandates are carried out in the government.

### 6.4 International Standards Organization

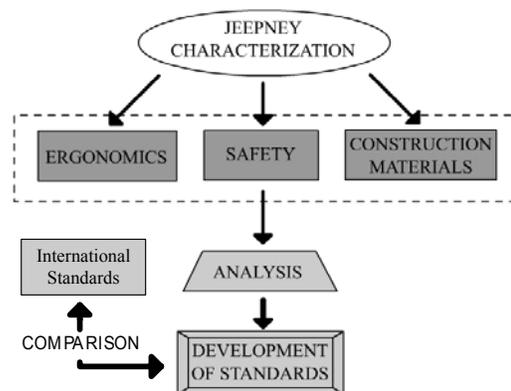
The Bureau of Product Standards’ Technical Committee on Road Vehicles (BPS/TC 44) adopts certain ISO standards for the Philippine National Standards. These comprise standards based on different aspects of the vehicles. Some of the ISO standards are the following:

DPNS ISO 14400:2005 specifies requirements for the use, and general maintenance and safety of wheels and rims, and defines their out-of-service conditions, such as cracked, worn and bent wheels. It is applicable to wheels intended for use on road vehicles as defined in ISO 3833, except mopeds and motorcycles, and including multi-piece wheels for trucks.

DPNS ISO 16833:2006 defines criteria that characterize geometrical uniformity of wheels, and describes principles of measurements of these criteria.

DPNS ISO 3911:2004 presents a vocabulary of terms related to, and systems for the designation and marking of, wheels and rims intended for use with pneumatic tires. (Source: <http://www.iso.org/>)

## 7. CONCEPTUAL FRAMEWORK



**Figure1. Conceptual Framework**

**8. METHODOLOGY**

Standards on the design of jeepneys will be developed based on ergonomics, safety and materials used for the construction. Ergonomics, also called human factors engineering, deals with the providing appropriate accommodation of the range of human dimensions and motions. This aims to achieve ease and comfort and directly affects the configuration of the vehicle.

Surveys from questionnaire and interviews will be given to the manufacturers of jeepneys within Metro Manila to know each manufacturer’s technical input or design specification in constructing jeepneys. Drivers and passengers will also be interviewed regarding the satisfaction with the existing services, configuration of the jeepneys and operational requirements. This is also done to know how passengers and drivers give importance to these said criteria. Photographs will be taken and compiled to determine existing condition.

**9. DATA GATHERED AND ANALYSIS**

Aside from the tricycles, jeepneys are considered the most prominent means of transportation on major and urban roads. Jeepney can be seen in almost every part of the country.

One of the pioneers in the manufacturing industry of jeepney is Sarao Motors Corporation. But unfortunately, this company had stopped its production since 2005. Therefore, we are not able to conduct our interview-survey in the said company.

Another pioneer in jeepney industry, and considered as the leading manufacturer, is Francisco Motor Corporation (FMC). A brief history of the company was presented next.

- 1947 – started business having a name Francisco Painting Shop
- 1951 – renamed Francisco Body Builder
- 1960 – became Francisco Motor Corporation
- 1965 – tied up with Isuzu Motors Corporation
- 1980 – production had reached 5000 units and had 2000 employees
- 1990’s – most prosperous decade
- present – production rate is 500 units per month

*(Source: Francisco Motor Corporation)*

Most of the gathered data was from FMC. They were producing different types of vehicle but the researchers were only able to obtain data of a new FMC 20-passenger jeepney.

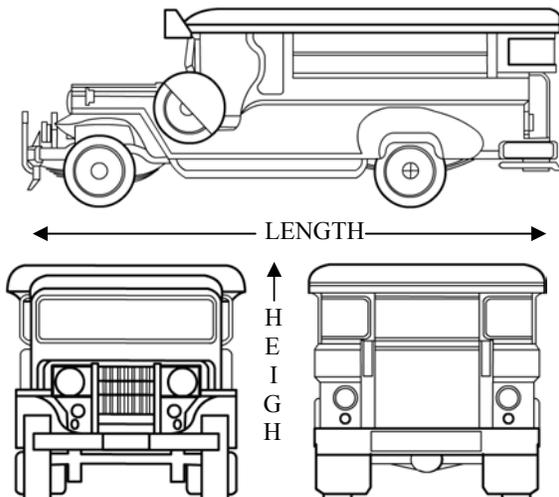
Tabulated below are the specifications of the said jeepney.

SPECIFICATION			
NAME / MODEL	FMC JEEPNEY	280D	
NUMBER OF PASSENGERS	20-Passenger Excluding Driver		
DESCRIPTION			
DIMENSIONS	Overall Length (mm)		5910
	Overall Height (mm)		2100
	Overall Width (mm)		1720
	Ground Clearance (mm)		200
	Wheel Base (mm)		3520
	Track	Front (mm)	1395
		Rear (mm)	1375
	Rear Overhang (mm)		1620
Front Overhang (mm)		770	
WEIGHT	Curb Weight (kg)		1635
	Payload (Max) (kg)		2065
	Gross Vehicle Weight (kg)		3700
ENGINE	Model		4JB1
	Displacement (li)		2.8
	Type	EURO Engine, 4 cycle, Direct Injection, Water-cooled, in-line OHV Diesel w/ Automatic Engine Stop Device	
	Bore x stroke		93 x 102
	Max. Output (ISO Gross) kW (ps)/rpm		59 (80) / 3600
	Max. Torque (ISO Gross) Nm (kg-m)/rpm		175 (17.8) / 2000
	Compression Ratio		18:2:1
	Dimension (LxWxH) (mm)		739 x 539 x 762
CLUTCH	Type	Single Dry Plate with Diaphragm Springs, Hydraulic Control	
	Type	5-Speed, Overdrive, Synchronesh on all Forward Gears, Short Lever and Remote Control	
TRANSMISSION	Model	MSB – 5S	
	Gear Ratio	1st	5.016
		2 <sup>nd</sup>	2.672
		3 <sup>rd</sup>	1.585
		4 <sup>th</sup>	1.000
		5 <sup>th</sup>	0.770
Reverse	4.783		

FUEL SYSTEM	Tank Capacity (liters)	60
SUSPENSION	Front & Rear	Semi-Elliptical Alloy Leaf Springs w/ Double Acting Telescopic Shock Absorber
BRAKES	Service Brake	Drum Type, Hydraulic Dual Circuit w/ Vacuum Assisted, Front 2-Leading, Rear Dual 2-Leading
	Parking Brake	Mechanical, Internal Expanding at Rear of Transmission, Lever Type
STEERING	Type	Power Assisted Recirculating Ball and Nut w/ Steering Lock
WHEEL & TIRE	Steel Rim	5.50F x 15
	Tire	7.00 – 15 – 12 PR
	No. of Tires	5 Including Spare Tire
	Studs	6
ELECTRICAL	Battery	12 volts – 120 AH
	Alternator	12 volts – 50 A
	Starter	12 volts – 2.0 kw
PERFORMANCE	Min. Turning Radius (m)	5.20

(Source: Francisco Motor Corporation)

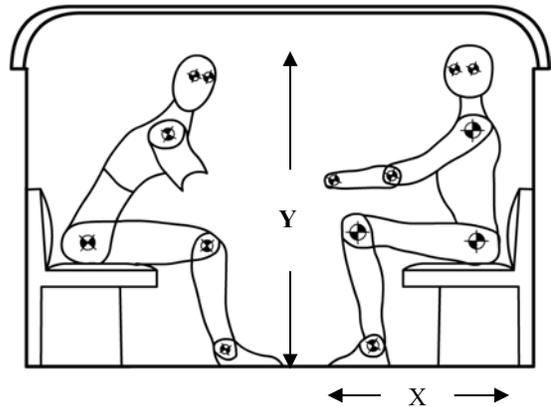
For the dimensions of the frame, length, height and width are measured directly from the jeepney sample in FMC.



Another leading manufacturer of jeepney in the country is David Motors Incorporated. Data were gathered by the NCTS group and were just passed to the researchers to be analyzed.

All data gathered were tabulated using a database.

For the anthropometrical measures, data will be adapted from the research study done by the Industrial Engineering Department and was used by the DOST-PCIERD/UP study named Standards Development for Local Motorcycle/Tricycle Sector.



Where X is the length from knee to buttocks and Y is the sum of the height from head to buttocks and height from knee to toe. Also, hip width was measured to determine the standard length of the rear seats.

For the comparison of developed basic standards, research was done from the library of the Department of Trade and Industry and also from the website of United Nations Economic Commission for Europe (UNECE) and International Organization of Legal Metrology (OIML).

From the Customized local road vehicle-classification (DPNS 2060:2007) based from PNS 1891:2006, jeepneys are classified according to category M2/N2. Vehicles under category M2 are used for the carriage of passengers, comprising more than eight seats in addition to the driver's seat, and having a maximum mass not exceeding 5 tonnes. Category N2 vehicles are used for the carriage of goods and having a maximum mass exceeding 3.5 tonnes but not exceeding 12 tonnes.

Tabulated below are some possible items/specifications of jeepneys based from Francisco Motor Corp. (FMC) and David Motors Inc. (DMI) that were identified and classified for adopting the Philippine National Standards (PNS)

ITEM / SPECS (PNS STD #)	DMI	FMC	PNS
<b>BRAKES</b>			
System (PNS/ISO-611:2005)	Hydraulic	Hydraulic	Hydraulic Pneumatic brake
<b>STEERING</b>			
Type (PNS/UNECE-79:2005)	-----	Power Assisted	Manual Power Assisted
<b>WHEEL AND TIRE</b>			
Rim Size (PNS 1110 : 1992)	15 x 5.50 F	15 x 5.50 F	15 x 5.5 JJ 16.5 x 6.00 15 x 5.50 F SDC
Tire Size (PNS 25:2003)	7.00 x 15	7.00 x 15	7.00 x 15 LT
Ply Rating (PNS 25:2003)	-----	12 PR	6; 8; 10; 12 PR
<b>LIGHTING</b>			
Rear Stop Lamp	RED	RED	RED
Turn Signal Lamp	AMBER	AMBER	AMBER
Hazard Lamp	-----	-----	AMBER
Parking Lamp - front	-----	-----	WHITE
- rear	-----	-----	RED
- side	-----	-----	AMBER
(PNS/ISO-303:2005)			

For the case of selecting the engine for a particular vehicle, load capacity is designated by the buyer on which manufacturer would select an appropriate and /or available engine in the market. While based on PNS, power to weight ratio has been set and should be applied.

## 10. CONCLUSION

The study provided the basic standards for jeepneys based on safety, construction materials and ergonomics for future studies and standard development. DTI-BPS is aiming to develop standards for jeepneys to be more competitive with other means of transportation.

Based on the comparison, most of the safety regulations practiced by the manufacturers matched up with Philippine National Standard (PNS). The study focused mainly on developing standards based on safety regulations because jeepneys, being a

customized road vehicle, may vary physically with the customer's prerogative. Thus, making it difficult or impossible to standardized jeepney based on its aesthetic aspects.

Manufacturers are considering the power to weight ratio but also consider its availability. Otherwise, the closest engine type is used.

In general, jeepneys standardization aims to ensure safety and comfort relative to existing jeepneys, and not to devastate the culture that Filipinos have grown up with.

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