

# **BRIEF HISTORY OF NATIONAL ROADS IN THE PHILIPPINES**

## **I. About DPWH**

The growth of the DPWH, as the main infrastructure arm of the country, spans even more than four centuries of colorful and significant development, starting from construction of settlement roads and "Obras Publicas" during the Spanish colonial era to the public works construction activities of the U.S. Army engineers in the Commonwealth period and eventually, the Philippine Republic.

The Department underwent various stages of development and evolution that largely depended upon the change in administration, resulting in amendments in administration policies, and reorganization in its structure and responsibilities to suit the ever-increasing needs of its stakeholders.

We have come a long way since then. Our efforts in building the physical foundation and the backbone of the country have been improved and infused with modern engineering technology, blending the inherent Filipino ingenuity and skills to meet the increasing demands of the times.

The development of the highway network in the Philippines is one of the major national programs being implemented by the government in order to support the overall socioeconomic development of the country.

After a long process of evolution, by virtue of Executive Order No. 124, dated January 30, 1987, the agency is now known as the Department of Public Works and Highways (DPWH) with six (6) bureaus, nine (9) services, seventeen (17) regional offices, one (1) Unified Project Management Office (UPMO), and one hundred eighty (180) district engineering offices committed to accelerate the process of nation building through infrastructure projects that shall be its legacy to the country.

The main societal goal of the DPWH is to contribute to the sustainable economic growth and poverty reduction and improve the country's global competitiveness through the construction and maintenance of the country's national roads, bridges and public works to provide access to major airports, seaports/RORO ports, markets, production areas, strategic tourist destinations and economic centers throughout the country.

## **II. Road Classification**

A number of laws have been passed regarding the classification of roads in the country. The first comprehensive reference to a Road Classification System is found in Republic Act No. 917, known as the Philippine Highway Act, enacted in 1953 and Executive Order (EO) No. 113, Series of 1955. EO No. 113 also laid down criteria for classification of national roads and for reclassification from local roads to national roads. This directive classified the roads into National Primary and National Secondary classes as well as delineated the so-called "national aid" provincial and city roads of sufficient importance.

In 1987, by virtue of EO No. 124, Series of 1987, Department of Public Works and Highways (DPWH), through the Secretary, was given the power to classify roads and highways and also to provide and authorize the conversion of roads and highways from one category to another.

In April 2002, a Technical Working Group (TWG) was established in connection with the New Planning Process under NRIMP-1, where the main recommendation was to transfer over 10,000 km. of national roads to the Local Government Units (LGU's) but this did not materialize.

In June 2009, a memorandum was approved by then Secretary Hermogenes E. Ebdane, Jr. relative to the Department's criteria/guidelines on road functional classification. National roads were classified in relation to its functionality to the local road network into Primary (which is further categorized into: North-South Backbone, East-West Lateral, Other Roads of Strategic Importance) and Secondary Roads.

The North-South Backbone was the main trunk line from northernmost Luzon down to Southern Mindanao interconnecting major islands while the East-West Laterals were the roads traversing the backbone and across the islands. Other Roads of Strategic Importance were direct access to important centers and areas vital for regional development and emergencies. National Secondary roads were other roads which complemented national arterial roads that provided access to other major population and production centers.

On April 14, 2014, a memorandum was issued by Secretary Rogelio L. Singson regarding the new Road Classification System as well as the Route Numbering to all primary roads that has been extended to secondary roads at present. This new Road Classification and Route Numbering System was then implemented and incorporated in the Road and Bridge Information Application (RBIA) in compliance to the said memorandum.

The classes of roads included National Roads, Provincial Roads, Municipal and City Roads, Barangay Roads, and Expressways. The table provides the criteria for each of these classes of road.

### **New Classification System**

National Primary	<ul style="list-style-type: none"> <li>• Directly connects major cities ( at least around 100,000 people) <i>Cities within metropolitan areas are not covered by the criteria</i></li> </ul>
National Secondary	<ul style="list-style-type: none"> <li>• Directly connects cities to National Primary Roads, except in metropolitan areas</li> <li>• Directly connects major ports and ferry terminals to National Primary Roads</li> <li>• Directly connects major airports to National Primary Roads</li> <li>• Directly connects tourist service centers to National Primary Roads or other National Secondary Roads</li> <li>• Directly connects cities (not included in the category of major cities)</li> <li>• Directly connects provincial capitals within the same region</li> <li>• Directly connects major National Government Infrastructure to National Primary Roads or other National Secondary Roads</li> </ul>
National Tertiary	<ul style="list-style-type: none"> <li>• Other existing roads under DPWH which perform a local function</li> </ul>
Provincial Roads	<ul style="list-style-type: none"> <li>• Connect cities and municipalities without traversing National Roads</li> <li>• Connect to National Roads to barangays through rural areas</li> <li>• Connect to major provincial government infrastructure</li> </ul>
Municipal and City Roads	<ul style="list-style-type: none"> <li>• Roads within Poblacion</li> <li>• Roads that connect to Provincial and National Roads</li> </ul>

	<ul style="list-style-type: none"> <li>Roads that provide inter-barangay connections to major Municipal and City Infrastructure without traversing Provincial Roads</li> </ul>
Barangay Roads	<ul style="list-style-type: none"> <li>Other Public Roads (officially turned over) within the barangay and not covered in the above definitions</li> </ul>
Expressways	<ul style="list-style-type: none"> <li>Highways with limited access, normally with interchanges; may include facilities for levying tolls for passage in an open or closed system.</li> </ul>

Modifications have been made to the new classification with the inclusion of the "National Tertiary" class, instead of transferring 10,000 km. of National Roads to the Local Government (city and municipality). No route numbers were assigned to Tertiary Roads as they function as local road.

### III. Route Numbering System

Along with a new Functional Classification, a Route Numbering system was created which can be easily understood by road users. Route Numbering is essential to road users in planning their itinerary. Road users will also expect that all roads of a certain classification, and of a certain numbering scheme, will have similar performance standards. A well-numbered, well-signed and well-publicized route system is also useful for road agencies and other government bodies to channel traffic into preferred routes or corridors.

The DPWH web link of the details of the road classification and numbering can be viewed at: <http://dpwh.maps.arcgis.com/apps/OnePane/basicviewer/index.html?appid=4b48284a409844fab6876aa77be8bf58> which shall also be the official source of this information.

The Route Numbering system has been devised for Expressways, Primary Roads and Secondary Roads at present. It may be expanded to the Tertiary class at a later date.

#### Route Numbering System

Classification	Numbering
National Primary	<p>Nos. N1 to N49 for the "main" routes or corridors, i.e. those connecting 3 or more cities</p> <p>Nos. N50 to N99 for other primary routes connecting two cities</p>
National Secondary	Nos. 100 to 999
Expressways	E1, E2, E3, etc

Expressways are prefixed by the letter "E" for Expressway, in order to differentiate these roads in road user's mind from other types of road. The letter "E" implies a different design and standard of road, and indicates to the public that a toll may be required. Expressways are

numbered continuously. A new number is not given simply because a different concessionaire is in charge.

Primary Roads are numbered differently according to whether they form "main" corridors, or whether they only connect two cities. Numbers N1 to N49 are used for "main" routes or corridors like those connecting three or more cities. While, numbers N50 to N99 are for other primary routes connecting two cities. This is purely for convention but it helps to differentiate the nature and function of highways.

Secondary Roads have been given 3-digit numbers. The following general principles or guidelines have been applied: (1) the first digit of the Secondary Route corresponds to the number of the Primary Road to which it connects, if any. Thus, for example, Secondary Road 102 connects to Primary Road 1 while Secondary Road 405 connects to Primary Road 4; (2) if a Secondary Route connects two Primary Routes, then the first digit of the Secondary Route corresponds to the first digit of the lowest numbered Primary Route. Thus, if a Secondary Route connects Primary Routes 3 and 4, then the first digit of the Secondary Route would be 3; (3) "Major" Secondary such as those which can easily be identified as more significant thoroughfares have been numbered in multiples of 10 (e.g. 410, 420, 430...); (4) Where possible, gaps have been left in the numbering scheme to accommodate future expansion. Thus, there may be a Route 410, 411, 412 and then the next Route may be 420, leaving a gap 413-419 for future use; (5) Most islands (apart from the larger islands of Luzon and Mindanao) have unique first and second digits. Thus, for example, Secondary roads in Bohol are numbered in the 85 series (i.e. 850, 851, 852, etc.) while Secondary roads in Siquijor are numbered in the 86 series (i.e. 860, 861, etc.) Note that, at this point, it has not been possible to apply these guidelines strictly in certain cases especially in dense parts of the network such as in National Capital Region.

It will be necessary to add new Routes in the future. Any change in classification of an individual road section should result in a new Route Number. It will also be necessary to assign route numbers to new roads, especially at the Primary and Secondary levels.

It is not possible to develop detailed procedures in numbering routes since each situation must be dealt with on a case-by-case basis. The current Route Numbers will evolve over time as network develops. Reviews shall be undertaken on a periodic six-year cycle and must be done on a holistic basis and should consider the road network in its entirety rather than in a disjointed manner.

#### **IV. ROAD CONVERSION (2009-2015)**

The initial classification system of roads in the Philippines was established by succession of laws based from the necessity during the period of their implementation. There are several Executive Orders (E.O.s) and Republic Acts (R.A) that governed the classification of roads in the Philippines.

E.O. No. 124, series of 1987, reorganizing the Department of Public Works and Highways, state among others, "***the Minister*** (now Secretary) ***of the Ministry*** (now Department) ***of Public Works and Highways shall have the power to classify roads and highways into national, regional*** (interpreted as routes of primary arterial roads), ***provincial, city, municipal, and barangay roads and highways, based on objective criteria it shall***

***adopt; provide or authorize the conversion of roads and highways from one category to another."***

Road conversion relates to funding or ownership of the road, which organization is responsible for managing and maintaining an individual road. Normally, national roads are managed by the National Government and local (Provincial, City, and Municipal) roads are managed by Local Government.

A memorandum dated June 10, 2009 adopting the DPWH Road Functional Classification Criteria and Technical Requirement was approved and signed by the Department Secretary with the Planning Service as the final recommending arm of the Department and shall inspect and evaluate the conversion of roads from one category to another.

There are three (3) ways of converting roads: the Executive, Legislative and Administrative procedures. The Department of Public Works and Highways was mandated through E.O. No. 124, series of 1987 to convert regional highways, provincial, city, municipal, barangay roads into national roads under its established Road Functional Classification Criteria and Technical standards and requirements. For Legislative Procedure the Planning Service (PS) provides only comment and information in consonance to the Department's Criteria on Road Functional Classification when requested by both Committees on Public Works, House of Representatives and the Senate. During the hearings conducted by these committees, the Director and staff from PS usually represent DPWH, if the Secretary is not available.

The local road proposed for conversion will be considered into national road by way of DPWH Administrative Procedure, as mandated under E.O. No. 124, Series of 1987. Said road should satisfy at least one of the new DPWH road functional classification criteria and should conform to the technical requirements and standards for a national road; if these conditions are satisfied, a Department Order (DO) will be issued by the DPWH Secretary converting the road." The Secretary of Public Works and Highways was given the authority to recommend roads to be declared as national roads by the President of the Republic of the Philippines.

**DPWH Requirements and Standards for a National Road:**

- 1) Endorsement from the local government concerned;
- 2) Proof of acquisition of required road right-of-way; and
- 3) The road should have at least 6-meter carriageway width, in at least gravel surfacing and in maintainable condition.

Since the Philippine road network is already mature, it is likely that there are very few cases which can actually warrant a change in classification from local to national function.

**COMPARATIVE NUMBER AND LENGTH OF CONVERTED ROADS FOR  
CY 2009 – 2015**

<b>YEAR</b>	<b>UNIT</b>	<b>TOTAL</b>	<b>RA</b>	<b>DO</b>	<b>RA/DO</b>
2009	No. of road sections	27	11	15	1
	Length (km)	499.62	300.16	194.64	4.82
2010	No. of road sections	45	40	4	1
	Length (km)	356.87	207.99	122.40	26.48
2011	No. of road sections	9	0	9	0
	Length (km)	62.64	0	62.64	0
2012	No. of road sections	9	0	9	0
	Length (km)	60.79	0	60.79	0
2013	No. of road sections	64	37	27	0
	Length (km)	541.04	435.77	105.27	0
2014	No. of road sections	24	0	24	0
	Length (km)	118.01	0	118.01	0
2015	No. of road sections	7	0	7	0
	Length (km)	52.65	0	52.65	0
<b>Grand Total</b>	<b>No. of road sections</b>	<b>185</b>	<b>88</b>	<b>95</b>	<b>2</b>
	<b>Length (km)</b>	<b>1,680.55</b>	<b>943.92</b>	<b>705.33</b>	<b>31.30</b>

The table shows the number and length of converted roads through Legislative and Administrative procedures from 2009 to 2015.

Twenty-seven (27) local road sections with a validated length of 499.62 km were converted in 2009. Eleven (11) road sections were converted through legislation and, fifteen (15) road sections through Administrative Procedure and one (1) road section using both procedures.

In 2010, forty-five (45) local road sections were converted into national roads. Four (4) of these road sections were converted through Administrative Procedure, forty (40) road sections were converted through legislation and one (1) road section by both procedures.

In 2011 and 2012, there were no converted roads through Legislative Procedure, while eighteen (18) local road sections were converted through Administrative Procedure. Majority of the local roads requested for conversion did not satisfy at least one of the established DPWH Road Functional Classification Criteria for a national road hence the number and length of converted roads for this period are fewer as compared to the previous years.

For the year 2013, sixty-four (64) local road sections with an overall length of 541.04 km were converted. Thirty seven (37) road sections with a length of 435.77 km were converted through legislation and the rest, with a total length of 105.27 km were through Administrative Procedure. This year has marked the most number of road sections that were converted due to the upsurge in the number of requests that have passed the Functional Criteria set by the Department.

In 2014, twenty-four (24) road sections having a total road length of 118.01 km were converted through Administrative Procedure, bringing the overall total length from 2009 to 2014 to 1,638.97 km for the 178 road sections that were converted for the period mentioned. All road sections converted from the year 2009 to 2014 were already included in the RBIA database.

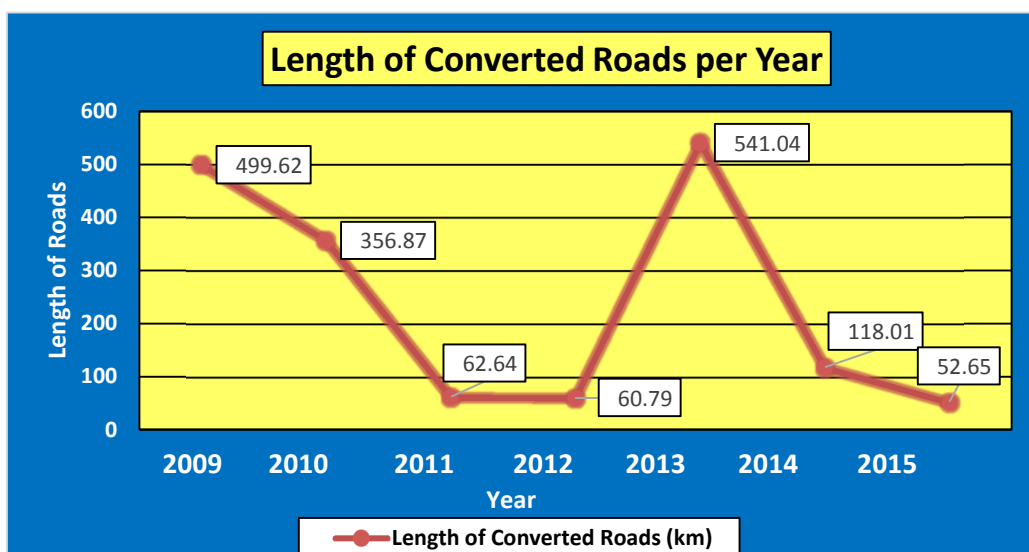
A total of seven (7) road sections were converted through the Department's Administrative Procedure in 2015, with an aggregated length of 52.65 km. This is considerably the smallest number of roads converted since the institution of EO No. 124 in 1987. This decline is mostly due to the fact that there is little scope for converting any road to National status given that all roads that perform national road network functions (i.e those of Primary or Secondary classification) have already been demarcated as such under the Road Classification System.

The Department's main focus at this point is on developing the Primary and Secondary roads to serve national road network functions. There is no basis for converting roads that largely perform local functions.

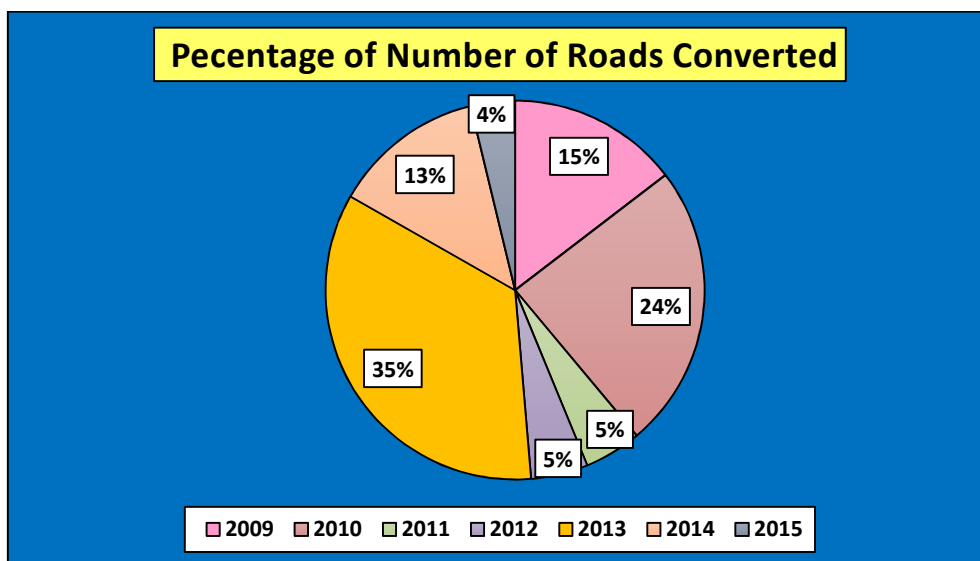
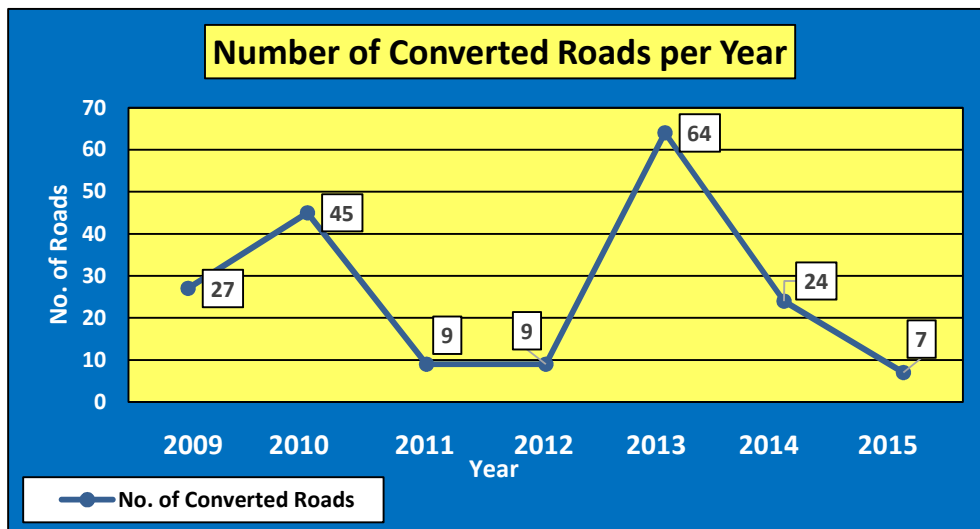
There has been a noticeable increase in the number of road sections that were converted through Republic Acts from 2009 to 2010. The growth rate for the said period is at 263.64%. However, it may also be noted that a significant decrease in the number of roads have been converted through DOs for the same period. The rate of decrease is at -46.67%.

Data show that there was a remarkable increase in the number of road sections that were converted through both procedures in 2013. However, it can be noted that there was a steady decline in the succeeding years. From a total of sixty-four (64) in 2013, down to twenty-four (24) in 2014 and the lowest of seven (7) in 2015. Accordingly, the Philippine road network is already mature, it is likely that there are very few cases which can actually warrant a change in classification from local to national function.

Presented are graphs showing the number and length of roads converted per year from CY 2009 - 2015.

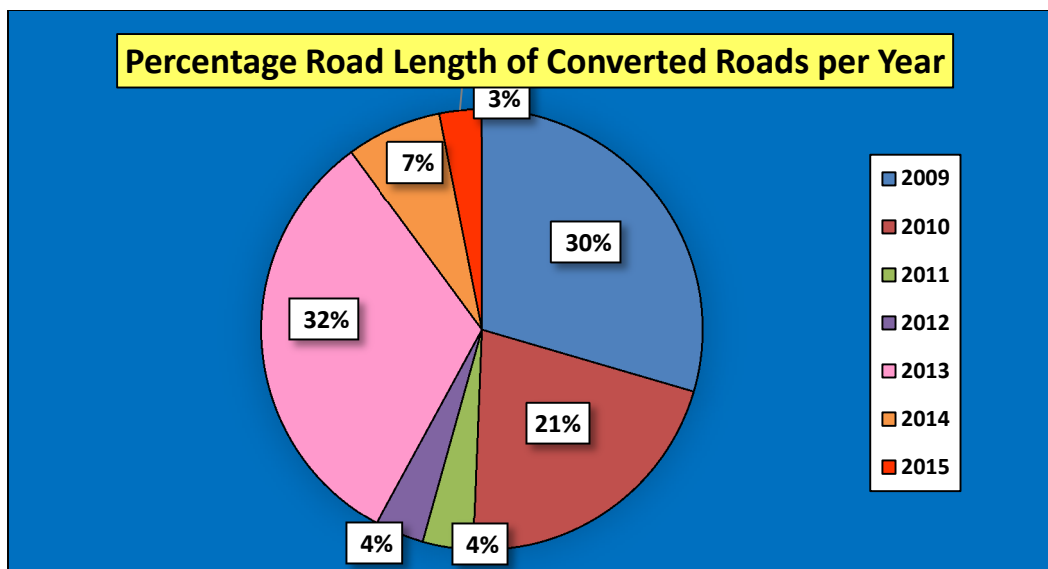


The chart below shows the annual percentage distribution of the number of roads converted in a period of seven years, from 2009 to 2015. The highest percentage distribution of converted roads is 35% which was in 2013, followed by 24% in 2010, 15% in 2009, 13% in 2014, 5% in 2011 and 2012 and the lowest is at 4% in 2015.



The next chart represents the percentage distribution of the length of converted roads from 2009-2015. In the period of seven years, 32% is the highest percentage for the year 2013, seconded by 30% in 2009, followed by 21% in 2010, 7% in 2014 and 4% in 2011 and 2012. For 2015, the percentage is at 3%.





For a more detailed list of converted national roads for CY 2015, please refer to Table 1.0.

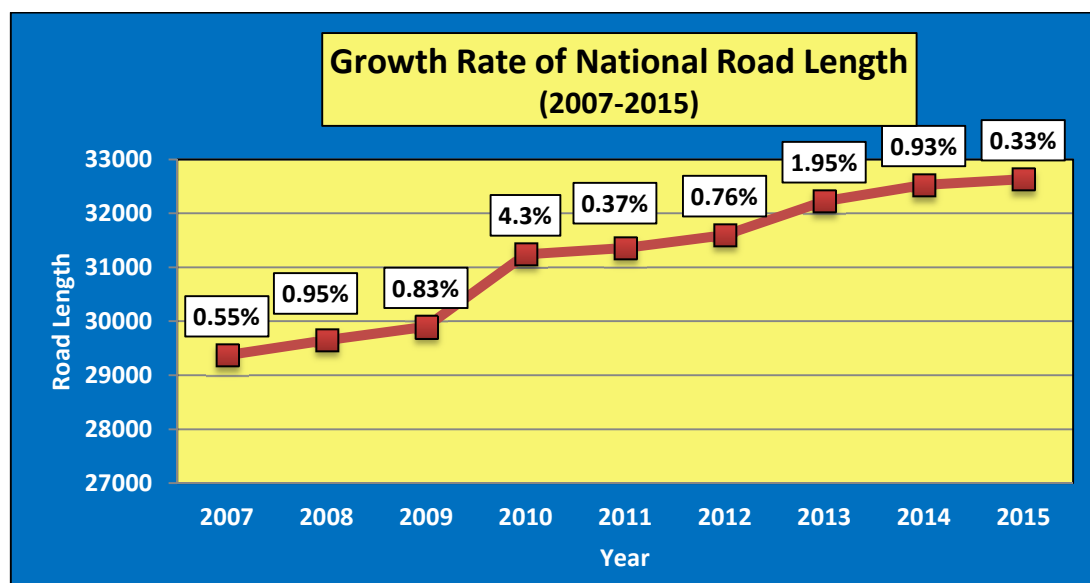
## V. Analysis of Data

### A. National Road Length per Functional Classification

Year	National Primary (km)	National Secondary (km)	National Tertiary (km)	Total	Annual Increase (km)
2007	15,588.88	13,780.82	-	29,369.70	161.44
2008	15,663.45	13,986.9	-	29,650.36	280.64
2009	15,730.56	14,167.53	-	29,898.09	247.73
2010	15,871.91	15,370.47	-	31,242.38	1,344.29
2011	15,986.72	15,372.4	-	31,359.12	116.73
2012	16,056.47	15,541.21	-	31,597.68	238.56
2013	16,078.72	16,148.22	-	32,226.93	629.25
2014	7,060.39	14,051.37	11,414.73	32,526.50	299.57
2015	7,066.74	14,118.49	11,448.14	32,633.37	106.87

The table provides a summary of the development of the Philippine National Road Network from 2007-2015. It shows the length of roads in figures based on their purpose including the total and the increase per year. With the inception of the new Functional Classification in April

2014, the length of national roads have been apportioned accordingly, hence, the inclusion of National Tertiary Roads.



The graph above gives us a clear picture of the growth rate of roads for the same period. The rates are 0.55%, 0.95%, 0.83%, 4.3%, 0.37%, 0.76%, 1.95%, 0.93% and 0.33% for 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014 and 2015, respectively. Road length has increased gradually with a remarkable surge in the year 2010. The increase was attributed to the various local roads converted into national roads, a total of forty (40) road sections through Republic Acts and four (4) road sections through the issuance of Departments Orders, results on the spot check conducted on newly rehabilitated roads, road realignment, change in congressional and district boundaries. The gap portion from K1536 + 260 to K1610 + 264, integrated through the provisions of DO No. 13 dated February 9, 2010 of the Kapalong-Talaingod-San Fernando-Valencia Road, with a length of 73.65 km under the jurisdiction of the Bukidnon 1<sup>st</sup> District Engineering Office, was the longest road section to be incorporated in the RBIA database within the said year.

For the year 2011, the Philippines had a total national road network of 31,359.12 km, an increase of 116.74 km from the previous year, which was the shortest length, added to the national road network for the past six years. The slight increase was attributed to the fact that no local roads were converted through Republic Act and only nine (9) road sections were converted through the issuance of Department Orders. Other factors that caused the change in road length were the integration of gap portions, results of spot checks on newly rehabilitated road sections, merging of road sections and the downgrading of existing national road into a local road. The Balanga Capitol Road with a length of 1.35 km was downgraded into a city road through the issuance of DO No. 44 dated August 10, 2011.

While in 2012, the national road network increased by 238.56 km with a total length of 31,597.68 km for that year. The increase was brought about by the conversion of local roads into national roads, inclusion of newly improved gap sections, completed flyover and Y-length, modified road configuration from single to dual carriageway. This year, five Department Orders were issued reclassifying various local roads into national roads with a length of 60.79

km. On the other hand, thirteen road sections with a total length of 32.66 km were temporarily deleted from the List of National Roads since they no longer function as to their purpose. These roads were either impassable due to road cut, collapsed bridges or were transferred to ARMM jurisdiction.

For the year 2013, the country had a national road length of 32,226.93 km which reflects an increase of 629.25 km. There was an increase of 22.25 km for National Primary Roads and 607.01 km for National Secondary Roads. The significant increase in the length of secondary roads was brought about by the conversion of local roads into national roads and the integration of the newly improved gap portion of the existing national roads.

In 2014, there was an increase of 299.57 km in the total road network which indicates a growth rate of 0.93% from the previous year. Whereas, there has been a 0.33% growth rate in the succeeding year at 106.87 km. The increase is due to newly improved gap sections, road sections that were subjected to validation, road inventory, and road conversion.

The year 2007 has registered a total national road length of 29,369.70 km, while the year 2015 posted 32,633.37 km, recording an increase of 11.11% in nine (9) years. As of November 2015, Region VIII has the longest length of national road with a total length of 2,529.80 km, while NCR has a total road length of 1,150.07 km which has the shortest length of national roads within the regions in the Philippines.

## **B. COMPARATIVE REGIONAL YEARLY LENGTH OF NATIONAL ROADS (2007-2015)**

The data illustrated in Table 1.2 show the increase or decrease of road length according to surface type (paved or unpaved) and functional classification in every region nationwide. These data give us a clear idea on the state of national roads in the country from 2007 to 2015. It provides information that can be used as a gauge in monitoring the progress of road surface on an annual basis, so as to assess and compare existing and previous road lengths which are utilized in effective planning and programming of road networks in the Philippines.

These data are very useful information to give support to decision makers from the government and private sector on the future plans and programs in their area of concern to spur economic development in accordance with national goals and objectives.

The trend shows that from year 2007 to 2015, there was a relative decrease in the length of unpaved roads and consequently an increase in the length of paved roads all throughout the regions in the country. This was due to road improvements that can be attributed to newly improved gap sections, road sections that were subjected to validation and road inventory and roads requested for conversion from local road to national road by different proponents through Republic Act or a Department Order evaluated by the Department in its commitment to provide total connectivity of national roads.

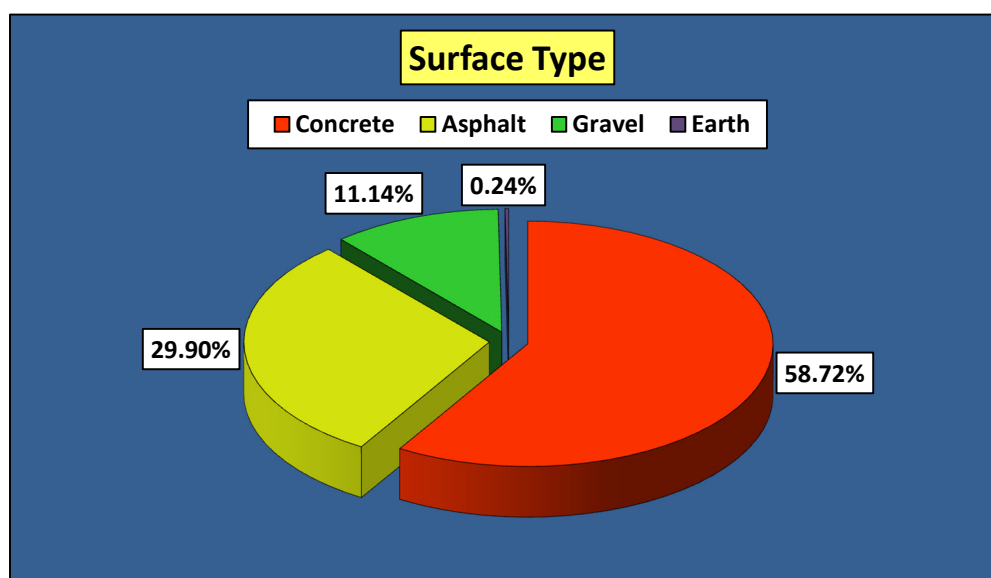
A remarkable increase in road length was recorded in 2010 in Region VII with an increase of 215.16 km. However, it can be observed that there was a considerable decrease in road length in Region IV-A in 2008. On the other hand, this has a negligible effect on the overall road

length of the country as there was still an increment of 280.65 km for that year despite the noted decrease in road length.

As a result of the inclusion of tertiary roads to the national road network, through the memorandum that was signed by the Secretary in 2014, there has been a notable decrease in the length of Primary and Secondary roads. Nevertheless, this inclusion has not affected the aggregate length of national roads since roads tagged as tertiary were merely reclassified and remain part of the road network.

### C. Length of Road and Percentage per Surface Type

Surface Type	Length (km)	Percentage
Concrete	19,162.72	58.72%
Asphalt	9,756.45	29.90%
Gravel	3,636.96	11.14%
Earth	77.24	0.24%
Total	32,633.37	100.00%



The country's national road network is predominantly concrete surfacing at 58.72% or 19,162.72 km out of the total length of 32,633.37 km. Asphalt roads which comprised 29.90% of the total road network also increased with a length of 9,756.45 km. Gravel and earth roads are now 11.14% and 0.24% or 3,636.96 km and 77.24 km, respectively.

For the year 2015, Region VIII has the longest concrete roads among the regions in the country, with a length of 1,774.19 km, while NCR has the shortest at 418 km.

**D. Length and Percentage of Paved & Unpaved Roads from 2007-2015**

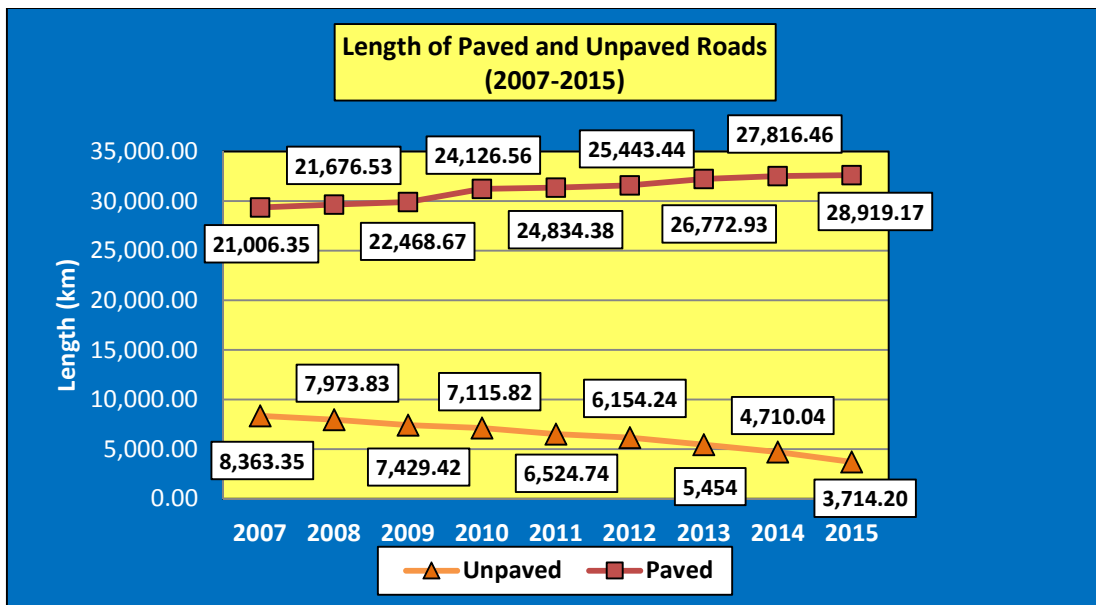
Year	PAVED		UNPAVED		Total
	Total	%	Total	%	
2007	21,006.35	<b>71.52</b>	8,363.35	<b>28.48</b>	<b>29,369.70</b>
2008	21,676.53	<b>73.11</b>	7,973.83	<b>26.89</b>	<b>29,650.36</b>
2009	22,468.67	<b>75.15</b>	7,429.42	<b>24.85</b>	<b>29,898.09</b>
2010	24,126.56	<b>77.22</b>	7,115.82	<b>22.78</b>	<b>31,242.38</b>
2011	24,834.38	<b>79.19</b>	6,524.74	<b>20.81</b>	<b>31,359.12</b>
2012	25,443.44	<b>80.52</b>	6,154.24	<b>19.48</b>	<b>31,597.68</b>
2013	26,772.93	<b>83.08</b>	5,454	<b>16.92</b>	<b>32,226.93</b>
2014	27,816.46	<b>85.52</b>	4,710.04	<b>14.48</b>	<b>32,526.50</b>
2015	28,919.17	<b>88.62</b>	3,714.20	<b>11.38</b>	<b>32,633.37</b>

**Length and Growth Rate of Paved Roads from 2007-2015**

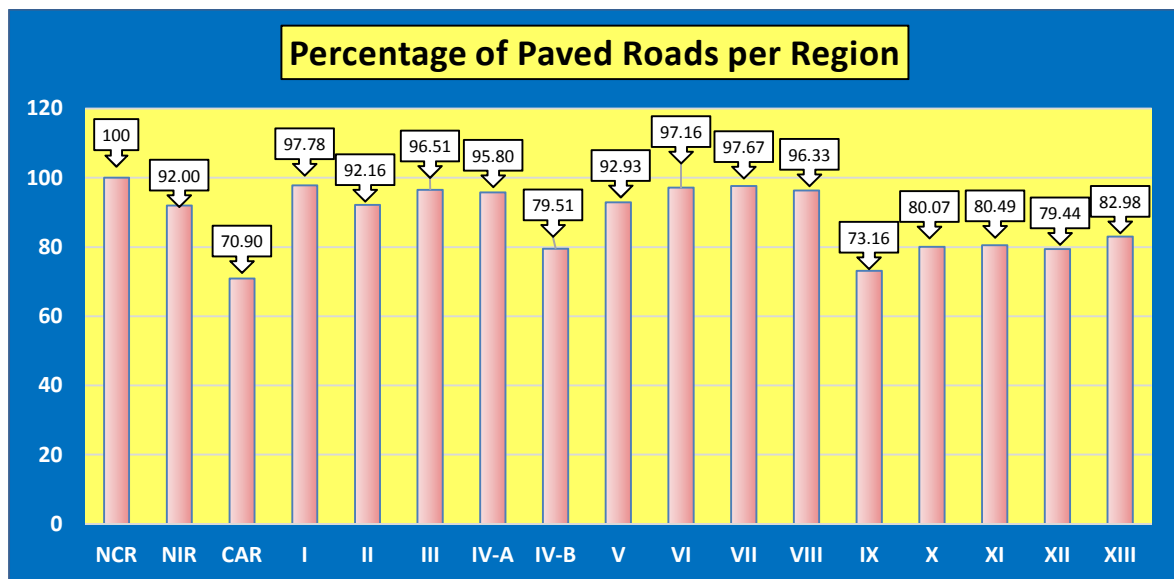
Year	Length (km)	Growth Rate
2007	21,006.35	
2008	21,676.53	3.19%
2009	22,468.67	3.65%
2010	24,126.56	7.38%
2011	24,834.38	2.93%
2012	25,443.44	2.45%
2013	26,772.93	5.23%
2014	27,816.46	3.90%
2015	28,919.17	3.96%

Paved roads in the Philippines steadily increased in the past nine (9) years. The table and graph show the growth of paved roads in the Philippine national road network from 2007-2015. The paved roads from the given period have an annual growth rate of 3.19%, 3.65%, 7.38%, 2.93%, 2.45%, 5.23%, 3.90% and 3.96% respectively.

The Department has aimed at paving 100% or 31,242 km of the national road network in 2016 from a baseline of 80.9% in 2010 or 25,281 km of paved roads. Through implementation of right projects, the target outcome has already accomplished 88.62% or 28,919.17 km of paved roads with the present (2015) road network of 32,633.37 km.



The graph (length of paved and unpaved roads) shows a noticeable increase in paved roads and decrease in unpaved roads in the country. The line graph shows the yearly increase of paved road and the yearly decrease of unpaved roads from 2007 to 2015. For the past nine (9) years, there has been an increase of 7,912.82 km of paved roads in the Philippines and consequently, a decrease by 4,649.15 km of unpaved roads. For the year 2015, out of 32,633.37 km of total of national roads, 88.62% is paved and 11.38% is still unpaved.

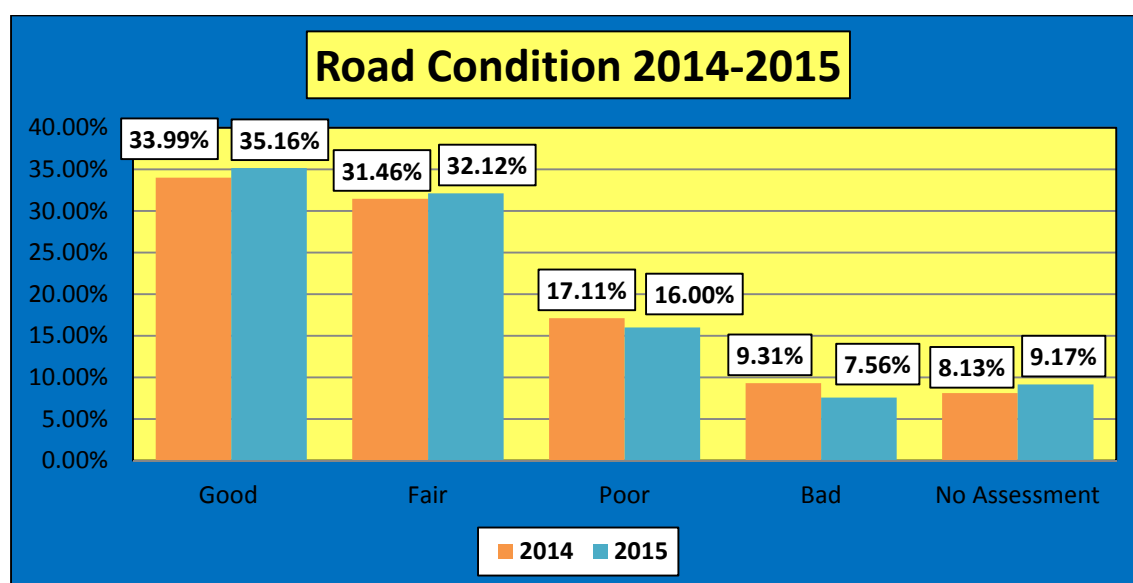


Based on the total national road network, National Capital Region (NCR) has reached the maximum target of 100% with an aggregate length of 1,1150.07 km which is the highest among the seventeen (17) regions that are under the management and supervision of the Department. Conversely, Cordillera Autonomous Region (CAR) has the lowest percentage of paved roads at 70.90% with a total length of 1,521.39 km.

Among the three (3) major island groups, Mindanao has the smallest percentage of paved roads. However, this situation is currently being addressed through various projects that are being undertaken by DPWH. In Cagayan de Oro City alone, the 2015 budget allocation includes

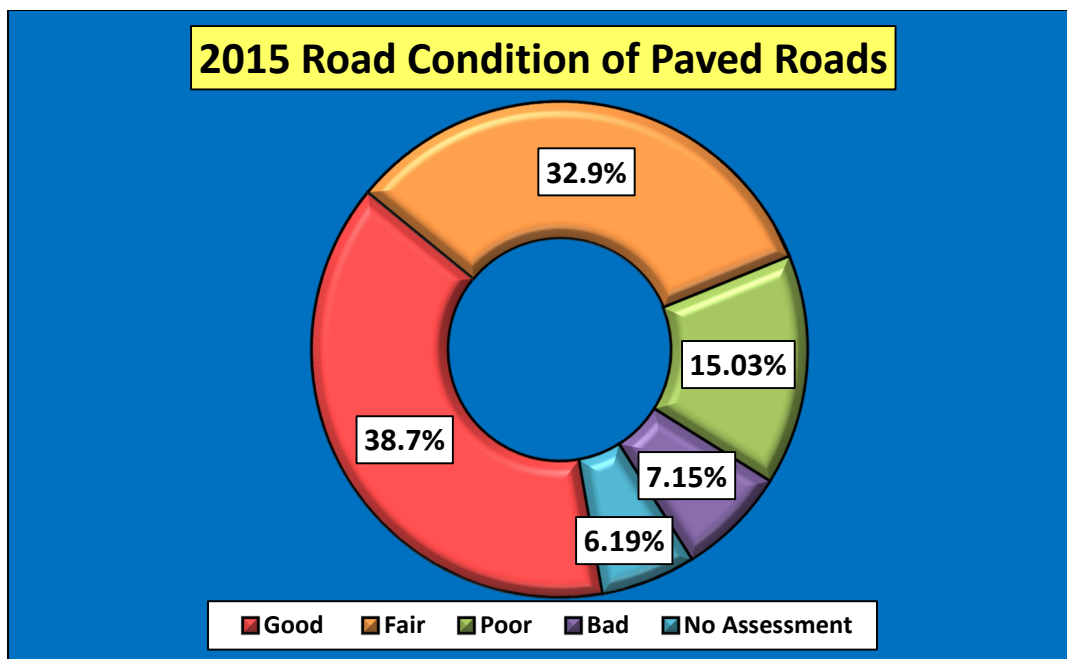
24 road concreting/rehabilitation projects, 14 building projects, eight (8) flood control and drainage projects, six (6) road widening projects, four (4) improvement of off-carriageway projects, four (4) bridge projects, two (2) coastal road projects, one (1) diversion road project, and one (1) bypass road project. Add to that the P230 million worth of road upgrading project currently implemented by the DPWH Regional Office XII at Magpet, North Cotabato wherein two (2) road projects along Magpet- Nowa- Doruluman – Greenfield Road will actualize the paving of a total of 10.798 kilometers of gravelled national secondary road. One is the upgrading of the 3.68km road in Barangay Basak and another in Barangay Badiangon paving a 7.16km road. These are just some of the many measures that the Department is undertaking to ensure that its goal of increased mobility and total connectivity is realized.

## E. Road Condition



The graph provides a comparison of the assessed road condition of the country in 2014 as that of 2015. The Visual Road Condition (RoCond) survey is a yearly activity wherein the condition of the road is being assessed manually. The gathered data is being utilized as one of the components in running the HDM-4 analysis and for prioritization of projects. Assessors must have to hike the stretch of roads in order to visualize all the defects and come-up with an accurate assessment to maintain the sustainability and viability of the collected data. The road condition is assessed as "Good", "Fair", "Poor" or "Bad". Good and fair road conditions are subjected to routine maintenance while poor conditions are due for rehabilitation and those with bad conditions are recommended for total reconstruction. However, there are some road sections that were not assessed due to the following factors: these roads are either under construction, committed for construction and bridges and/or segments with lengths below the 50-meter gauging length.

For the year 2015, record shows that out of the 32,633.37 km total length of national road, 35.16 % is in good condition, 32.12 % in fair condition, 16.00 % in poor condition, 7.56% in bad condition while 9.17 % of the total road network were not assessed.



As shown in the chart, for the year 2015, the percentage of good and fair condition at 38.72% and 32.91% of paved roads are higher as compared to the percentage inclusive of unpaved roads at 35.16% and 32.12%, respectively. Whereas, poor condition of the whole national road network at 16.00% is higher than that of paved roads at 15.03%. While, the bad condition for paved roads is 7.15% which is slightly lower than the whole network at 7.56%. (Please refer to the graph found in page 13 for details.)

The following Visual Condition Index (VCI) value determines the condition of the segment assessed:

ROAD CONDITION	CONDITION RATING
>70 - 100	Good
>40 - 70	Fair
>20 - 40	Poor
1 - 20	Bad

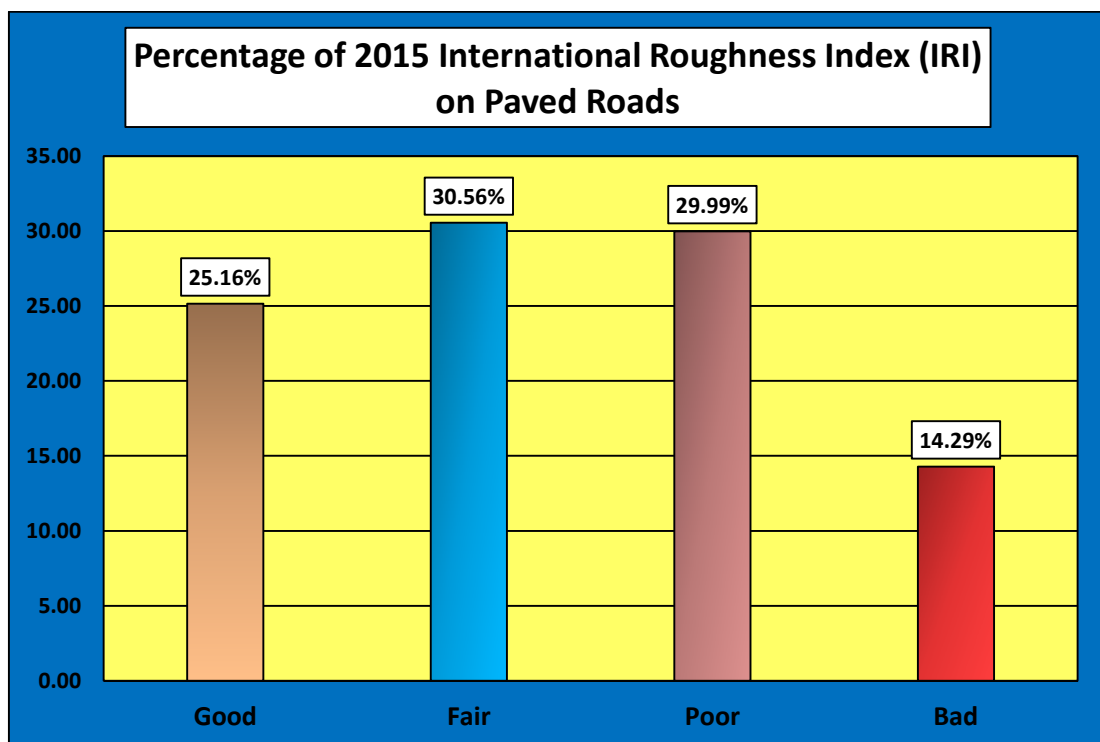
## F. International Roughness Index (IRI)

Roughness data is one of the key parameters for the operation of the Pavement Management System (PMS) using the HDM-4 software. PMS is used for long-term, medium-term and annual planning and programming purposes. Likewise, information on roughness is a vital data set in reporting network performance under the Department’s Performance Governance System (PGS), which is aligned with the administration’s initiative of coming up with strategic and performance management tools that would allow government agencies to be assessed objectively, in order to foster transparency and accountability in the different tiers of the organization.

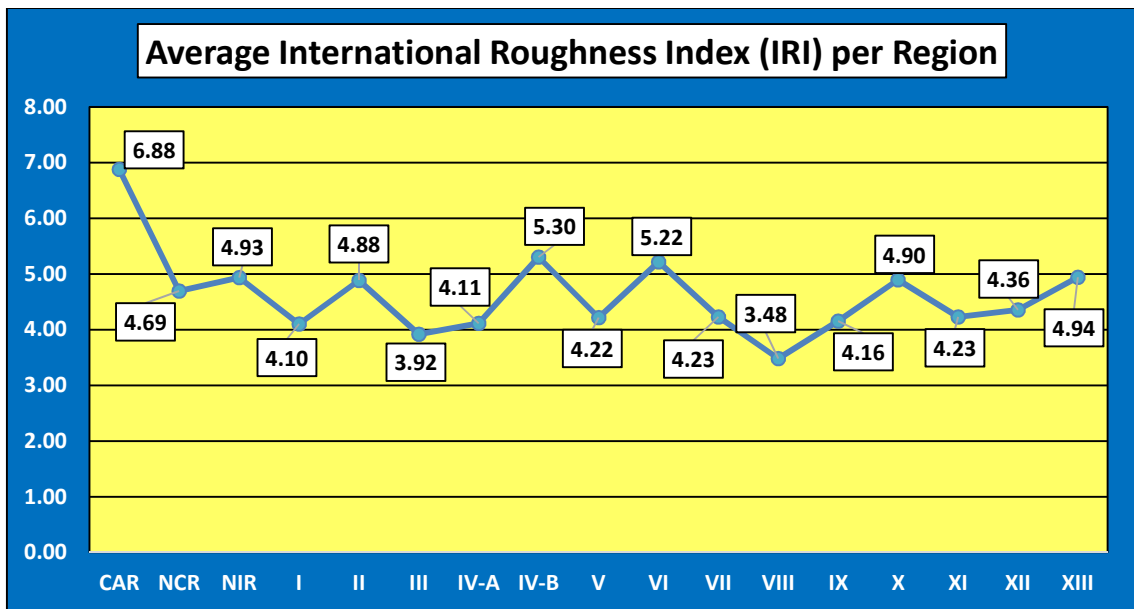


Reduced roughness is a key driver of economic benefit and therefore is crucial to the operation of the PMS. In order to address this matter, a nationwide roughness survey of the paved road network was outsourced under the World Bank funded G-02 project, conducted in two (2) different phases, original contract and supplemental contract, from 22 June 2012 to 02 February 2014. The aforementioned contracts contained 12,201 km and 7,612 km of network, respectively; which is 19,813 km in total, in addition to around 6,000 km of paved roads that have undergone roughness survey through the International Road Assessment Program (iRAP) Phase 1 and 2 undertaken with other partner agencies, to assess road safety in the Philippines; for a grand total of 25,812 km of IRI data of paved roads.

Under the National Road Roughness Index Program (NRRIP), which was authorized to commence on 03 June 2015, and will be conducted on a three (3) yearly cycle, national paved roads will be surveyed to facilitate the planning process and monitor network performance in accordance with the PGS on the most important roads. The Department shall focus on the roughness data on Primary and Secondary roads only, not on Tertiary; for 7,049 km and 6,933 km of the aforementioned roads, respectively with an aggregate length of 13,982 km.



As shown in the chart, out of the national roads with roughness data; 25% is in good condition, 31% in fair condition, 30% in poor condition, and 14% is in bad condition. Segments of the roads with an average IRI of 1-3 are in "good" condition, >3-5 in "fair" condition, >5-7 in "poor" condition and >7 in "bad" condition.



Shown in the graph is the summary of Average IRI per Region. It shows that Region VIII has the smoothest road surface, having an average IRI of 3.48. Out of the 558.85 km of surveyed roads in the said region, 37% are in Good condition, 31% are in Fair condition, 22% are in Poor condition and 10% in Bad condition. This can be attributed to the number of newly constructed roads in the region. On the other hand, CAR registered the poorest average condition, having an IRI of 6.88. Out of the 940.61 km of surveyed paved roads, 2% are in Good condition, 10% are in Fair condition, 42% fall under the category of Poor and 45% are in Bad condition. The unsatisfactory roughness condition of the roads in CAR is attributed to its mountainous terrains that are prone to landslides and soil erosions. It is also difficult to control the surface runoff during rains which cause road damages.

## G. Road Density

A well-developed road transport sector, most especially in developing countries, is assumed to fuel up the growth process through a variety of activities of the development endeavors of a nation. Among these, creation of market access opportunities for agricultural products is the most crucial.

Road transport facilities play a significant role in both the production and consumption decisions of every household in their day-to-day activities. Besides, road transport facilities are essential for expanding education, health service provision, trade furtherance – both within the country and the export market, and better public as well as private service provisions, including banking and insurance services, to the poor and marginalized rural dweller. Likewise, roads serve as key infrastructural units, which provide linkages to other modes of transportation like railways, shipping, and air network. Hence, it is imperative that we consider all the factors necessary in coming up with the optimum plan to improve road infrastructure, one of which is road density.

Road density pertains to the ratio of the length of the country's total road network to the country's land area. The road network includes all roads in the country: motorways, highways,

main or national roads, secondary or regional roads, and other urban and rural roads. It is considered as an appropriate index of human activity and land-use intensity.

<b>NATIONAL ROAD DENSITY CY 2004-2015</b>												
<b>Region</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
CAR	9.66	8.80	9.51	9.50	9.53	9.67	9.85	9.97	10.32	11.02	11.14	11.25
NCR	146.10	159.56	166.13	166.54	175.39	175.82	179.73	180.82	180.97	184.15	185.16	185.63
NIR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.32
I	13.20	12.36	12.36	12.37	12.37	12.36	12.50	12.68	12.67	12.77	12.83	12.84
II	6.80	6.20	6.27	6.25	6.28	6.33	6.39	6.40	6.56	6.33	6.41	6.40
III	9.35	7.96	9.20	9.23	9.42	9.85	10.33	10.32	10.31	10.70	10.70	10.70
IV-A	14.13	15.73	14.48	14.25	14.11	14.12	14.60	14.60	14.75	14.85	15.13	15.13
IV-B	7.48	6.81	7.38	7.38	7.51	7.52	7.62	7.63	7.63	7.72	7.76	7.76
V	12.38	11.98	12.11	12.10	12.35	12.37	12.74	12.75	12.75	12.94	12.94	12.96
VI	14.31	13.96	13.96	13.85	13.85	13.85	14.08	14.17	14.16	14.39	14.46	14.97
VII	11.93	12.03	12.80	12.82	12.80	12.93	14.28	14.28	14.28	14.45	14.49	16.62
VIII	10.14	9.96	10.04	10.20	10.20	10.20	10.43	10.51	10.55	10.81	10.90	10.89
IX	6.23	5.63	7.10	7.15	7.15	7.15	8.10	8.20	8.49	9.27	9.59	9.73
X	8.00	7.48	7.95	8.21	8.37	8.38	9.26	9.26	9.27	9.28	9.40	9.58
XI	7.24	7.05	7.09	7.11	7.11	7.30	8.12	8.10	8.17	8.14	8.16	8.24
XII	6.21	5.67	5.80	5.79	6.14	6.27	6.74	6.75	6.78	6.68	6.76	6.76
XIII	6.41	6.32	6.32	6.32	6.31	6.37	6.68	6.69	6.82	7.00	7.17	7.20
<b>Nationwide</b>	<b>9.52</b>	<b>9.14</b>	<b>9.46</b>	<b>9.48</b>	<b>9.57</b>	<b>9.65</b>	<b>10.09</b>	<b>10.13</b>	<b>10.21</b>	<b>10.36</b>	<b>10.46</b>	<b>10.49</b>

The table above provides a rundown of the road density of the country in the regional and national level for the year 2004-2015. It encompasses the national primary, secondary and tertiary roads; with the exclusion, however, of local roads.

There is an evident steady increase in road density in the past ten-year period, beginning 2006 to the current year. However, there is a noticeable decrease from 2004 to 2005 due to the implementation of the RBIA wherein all national roads were subjected to centerline survey using Global Positioning System (GPS). Portions of the road that were found to be inaccessible and/or abandoned were excluded in the list.

In terms of road density, for the current year, the National Capital Region (NCR) has 185.63 kilometers of roads per square kilometer of land area whereas Central Visayas, the region with the second highest road density, has only 16.62 kilometers per square kilometer. Cagayan Valley has the lowest road density per square kilometer at 6.40. Higher income local government units are better able to provide the road network needed in the local areas. Overall, the Philippines' road density is 10.49 kilometers per square kilometers.