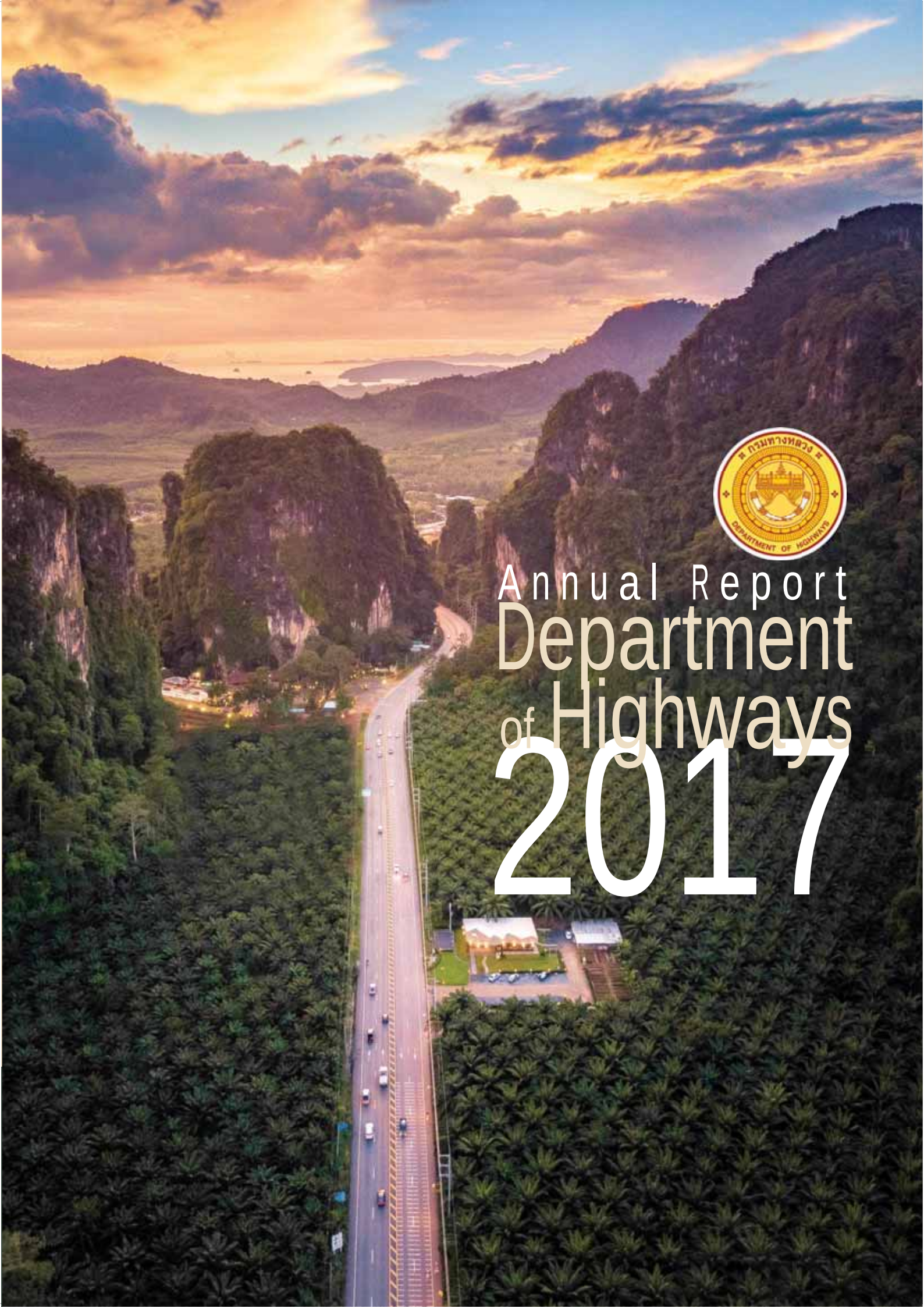


Annual Report
Department of Highways
2017





His Majesty the King's Bhumibol Adulyadej Remarks Given to the Department of Highways' Civil Servants, Officers and Staff On the Occasion of the 100th Anniversary of the Department of Highways

Transportation is one of the fundamental factors to generate the civilization of the country and to develop the quality of life. During 100 years, the Ministry of Transport has improved the transportation service of Thailand to be effectiveness and advance continually. Therefore, all party must be proud in work and enhance collaboration in all activities. This will be widely beneficial and sustainable for the country and people evermore.

Chaloem Phra Kiat Building, Siriraj Hospital
5th October 2011



His Majesty the King's Remarks

Given to Civil Servants on the Occasion of the Civil Servants' Day,

1 April 2017

Governmental work is the work which related to the benefits of country and people. Accordingly, all civil servants who perform the operating management shall truly understand the significant of duty and responsibility, then collaborate all works with effort, sacrifice and honesty by mainly consider the greatest outcome. Consequently, all function of work will go forward either achieve success which bring the prosperity to country and people sustainably.



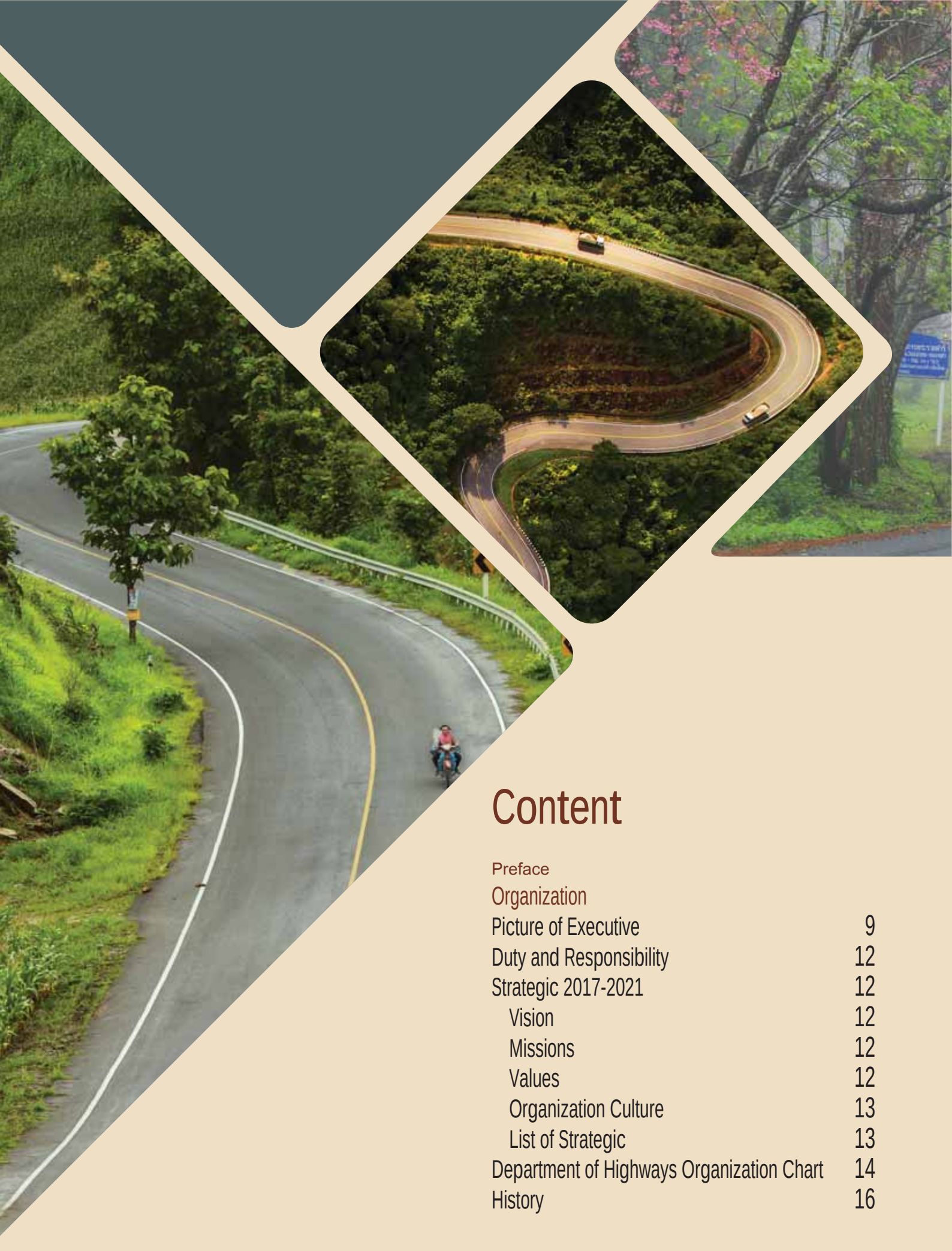
Preface

Department of Highways is a government agency under Ministry of Transport. It is responsible for constructing the highways infrastructure of the country in order to create the complete highway network throughout the country as well as to connect with other countries. Moreover, it also monitors the highways in the interest of safety, rapidity and convenience for the users in the country. Department of Highways is responsible for more than 50,000 kilometers highways through sub-units called Highways Bureau and Highway District which are more than 120 units including Highways Construction Center and Bridges Construction and Maintenance Center which totally are 9 units.

In addition, Department of Highways also values the social responsibility as facilitating highways traffic in the festive seasons, donating water for consuming in drought crisis or helping people to move things in flood, providing the convenience and safety to the highways' users who go to pay the respect to the late King Bhumibol Adulyadej as well as creating the suggested mass transit map for people who would like to travel to and participate in the royal cremation ceremony. Additionally, the Department of Highways has conducted the Safety Highways with Pleasure Vision Project which means giving well maintenance to provide the smooth highways without rough surfaces, trimming the tree along the highways, working on the landscape development of the main highways, improving the traffic control and traffic signalization to be in a good condition and clear vision either day or night times including correcting the black spot, hazardous road location, and intersections which frequently have accidents in order to provide safe, rapid, and convenient highways to the users.

Working Team
Department of Highways (DOH)





Content

Preface

Organization

Picture of Executive 9

Duty and Responsibility 12

Strategic 2017-2021 12

- Vision 12
- Missions 12
- Values 12
- Organization Culture 13
- List of Strategic 13

Department of Highways Organization Chart 14

History 16



Fact of Highways

Finance 18
Manpower (Department of Highways and Highway Police) 24
Strategic Issues 28
Distance and Quantity of people use inter-city motorway 33
Statistic of vehicle and accident 35
Statistic of bridge administration 39
Quantity of truck over weight control 45
Statistic of machine 45
Graph of Land Acquisition budget 46
Statistic of medical 47

Operation Highway Projects 2017

Planning for Highway Development 48
International Highways Development 53
Material Analysis and Inspection 60
Road Research and Development Project 65
Highway Maintenance 70
Highway Safety 73
Land Acquisition 75
Highway Vehicle Weight Control 76
The Environment and Public Involvement 77
Information Technology 81
Highway Police Division 86
Human Resource Management 89
Human Resource Development 93
The Machanical Equipment and Communication 95
Inter-City Motorway Project 98
Legal Affairs 100
Landscape Architecture Hightways Construction 101
Public Relations and Dissemination 103
Operations related to the Official Information Act B.E.2540 of the Department of Highways 105

Appendix

Highway Route Numbering System 106
Asian/ASEAN Highway Route Numbering System 109
The Standard Design for Bridge Structure 110
Thailand Highway Standard 111
Activities 112



General Prayuth Chan-ocha
Prime Minister

Minister / Deputy Minister



Mr.Arkhom Termpittayapaisith
Minister



Mr. Pairin Chuchotethavorn
Deputy Minister

Permanent Secretary / Deputy Permanent Secretary



Mr.Chartchai Tipsunave
Permanent Secretary



Mr.Peraphon Thawornsupacharoen
Deputy Permanent Secretary



Mr.Somsak Hommaung
Deputy Permanent Secretary



Mr. Krichthep Simlee
Deputy Permanent Secretary

Executive 2018



Mr.Thanin Somboon
Director General



Mr.Apisit Promasen
Deputy Director General for
Maintenance



Mr.Tawee Gasisam-ang
Deputy Director General
for Administration



Mr.Apichart Juntarasup
Deputy Director General for
Engineering



Mr.Kamon Muntom
Deputy Director General
for Operation



Mr.Sittichai Boonsaat
Chief Engineer for Planning



Mr.Pramon Sathapornnanon
Chief Engineer for Location and Design



Mr.Parinya Saengsuwan
Chief Engineer for Construction



Mr.Chatchai Chuangching
Chief Engineer for Maintenance and
Acting Chief Engineer for Research
and Development



Mr.Vanchak Chayakul
Chief Engineer for Highway Safety

Duties and Responsibilities

The Department of Highways is responsible for:

1 Enforcing highway laws and other involved laws, especially on motorways, national highways and concession highways.

2 Research and development , renovation and maintenance of the motorways, national highways and concession highways.

3 Cooperating with domestic and international organizations regarding highway issues.

4 Other duties as appointed by law, the Ministry of Transport, and the cabinet.

Strategy of Department of Highways in 2017 - 2021



Vision

"Safe and Convenient Highway System Connected to the Development of Infrastructure in Thailand"

Mission

1) To develop connectivity, accessibility and mobility of Highway System for supporting economic and social movement in country.

2) To maintain serviceability and safety standard of highway for enhancing safety service of country's transportation.

3) To develop Organization Management based on governance system.

Value

"HIGHWAYS"

"Performance Creation and Technology Integration with Appropriated Knowledge, Honesty, Work with good knowledge, Responsibility, Pay attention on service and Synergy"

(1) High performance
(2) Intelligent technology
(3) Good knowledge
(4) Honesty
(5) Work smart
(6) Accountability
(7) Year-round commitment
(8) Synergy

Culture

"D O H"

(1) Deliver Good Service to People
(2) Obligate Governance and Sustainability
(3) Hold Accountability for Interests of Nation and People



Strategy

Strategy 1 : Highway System Development

The strategies to efficiently develop the connectivity, accessibility and mobility of Highway System are as follows;

1) To develop and improve highway system in order to meet the demand of local, region and country.

2) To develop and improve highway system in order to support Special Economic Zone, tourism, boarder trading and security.

3) To enhance flow of highway system and to develop connectivity of transportation.

4) To develop and increase efficiency of Public Private Partnership, design, right of way and environmental process.

5) To develop and improve Highway standard and principle including design, construction, supervision, maintenance, safety and service.

6) To develop and support research, innovation, technology, information technology (IT), and integration of digital technology.

Strategy 2 : Service Level

The Strategies for maintaining the standard of serviceability are as follows;

1) To develop and increase efficiency of highway system maintenance.

2) To develop and increase efficiency of problem solving of disaster on highway.

3) To develop and increase efficiency of traffic weight control management for logistics and transportation.

4) To develop and increase efficiency of service.

5) To develop and increase efficiency of maintenance of landscape, shoulder, sidewalk, and local/public participation.

6) To develop and support research, innovation, technology, information technology (IT), and integration of digital technology on maintenance and other services on highway.

Strategy 3 : Safety

The strategies to improve safety of highway system are as follows;

1) To develop and increase efficiency of accident protection.

2) To develop and improve accident reduction on highway.

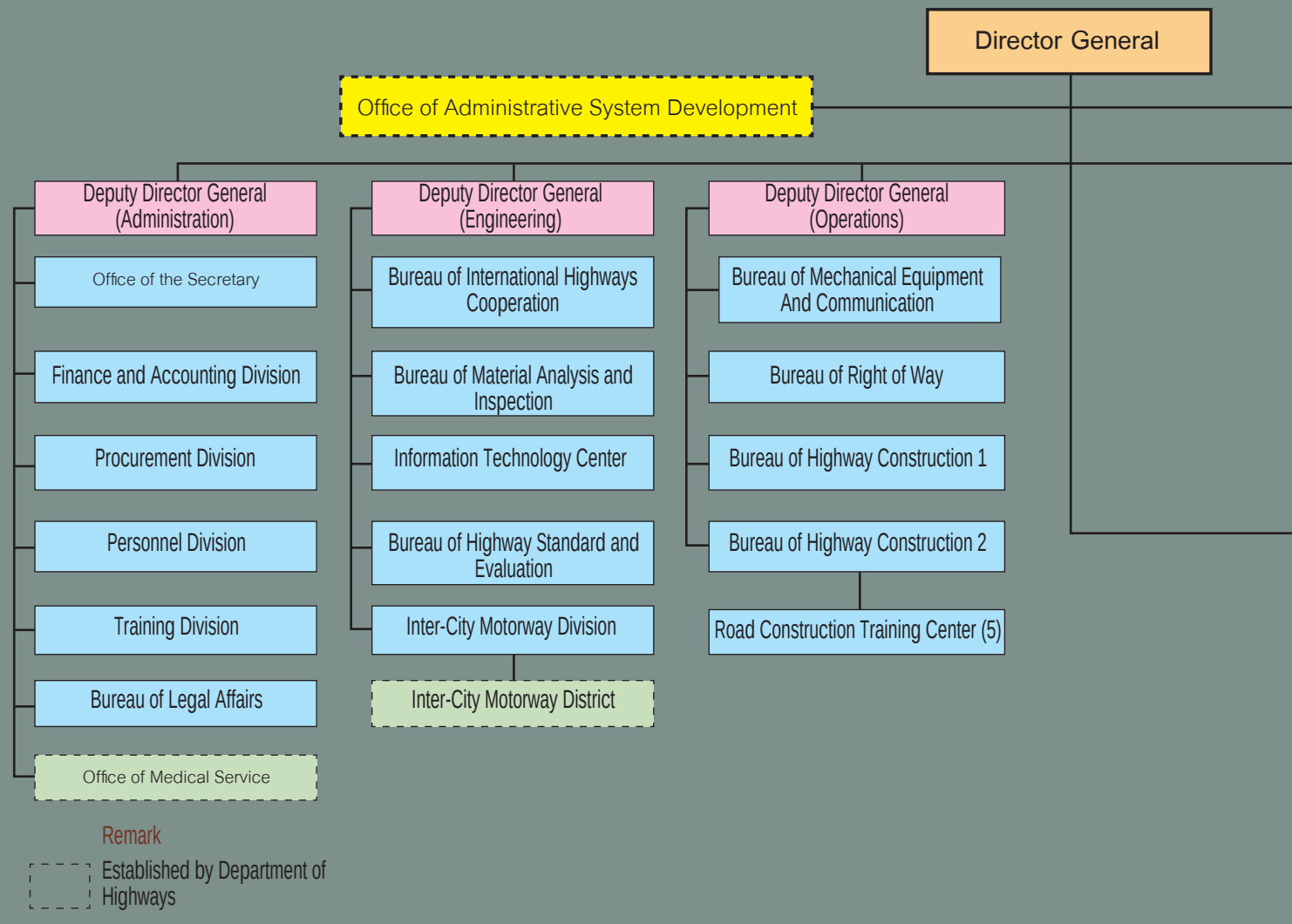
3) To develop and increase efficiency of usage and activity management on right of way, shoulder and sidewalk including using of public property.

4) To develop and support public relations (PR) and knowledge in highway safety regulations, value and discipline.

5) To develop and increase efficiency of traffic control and related system.

6) To develop and support research, innovation, technology, information technology (IT), and integration of digital technology on highway safety.

Department of Highways Organization Chart



Strategy 4: Management

The strategies to develop and support governance and sustainable organization management are as follows;

1) To develop and support strategy movement and review including planning, project and activity development.

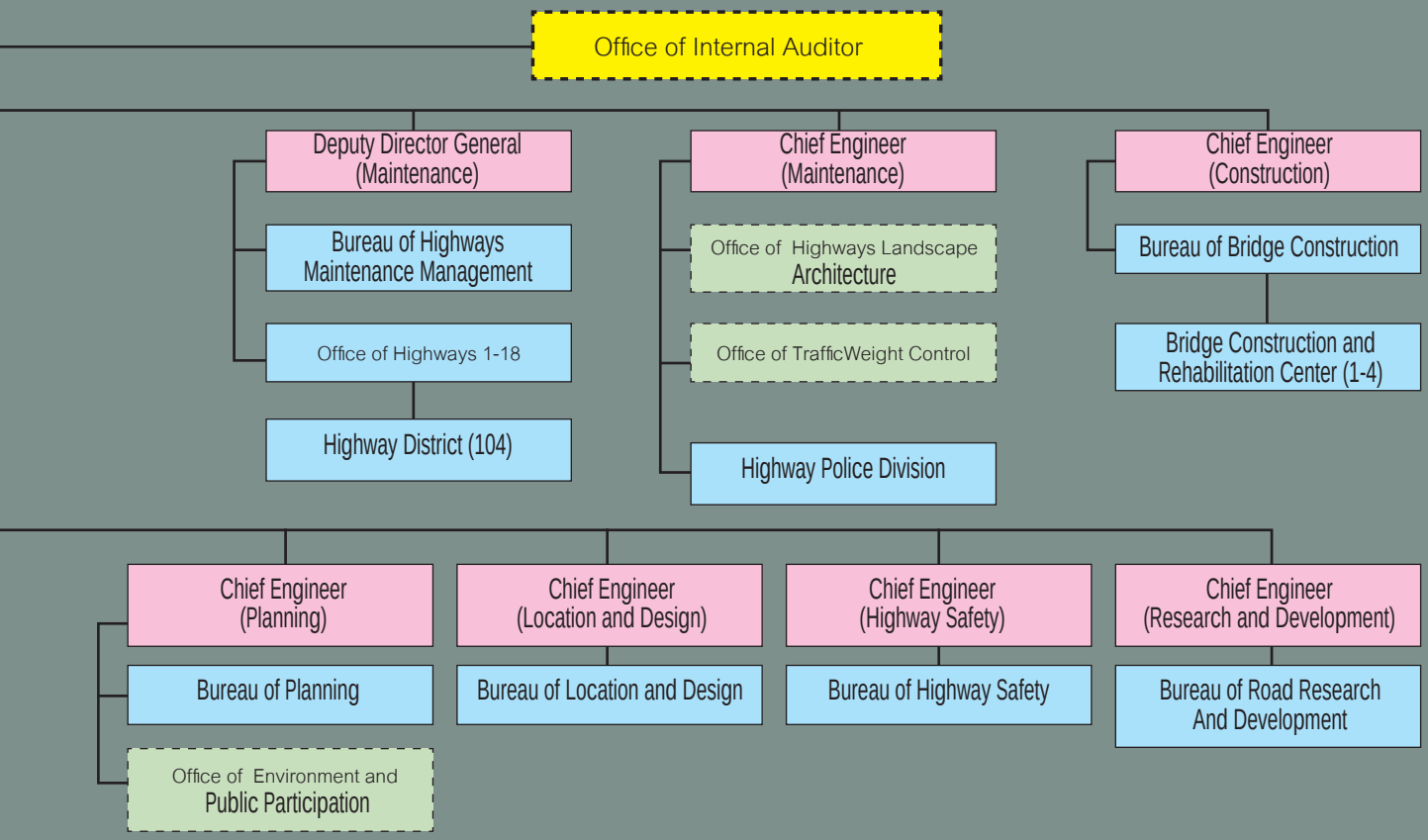
2) To develop and increase efficiency of procurement, machine management, public relations (PR) and organization operation.

3) To develop and support preparation of infrastructure and digital technology of organization.

4) To develop and support human resource management and knowledge and experience dissemination.

5) To develop and support research, innovation, and improvement and update of law, rule, regulation and practice.

6) To develop and support environmental management, local participation, claim management and administration management base on governance system.



History of the Department of Highways



The Department of Highways was established as a department on April 1, 1912. Formerly, there was only the Department of Canals, which was subjected to the Ministry of Agriculture. Until the reign of King Rama VI, a royal decree transferred the Department of Canals to the Ministry of Public Works and renamed the "Department of Highways". The Ministry of Civil Engineering itself was also renamed the "Ministry of Communication" by a decree issued in the same year regarding bureaucracy restructuring.

On September 30, 1914, the Waterways Section of the Department of Highways was transferred to The Ministry of Agriculture, and renamed the "Royal Irrigation Department". Therefore, only the Division of Roads remained under the Department of Highways which was headed by a Director-General.

On July 30, 1917, after Thailand declared war against Germany, Austria and Hungary, a royal decree was issued to merge the Department of Highways with the Department of Railways under the Ministry of Commerce and Transport which was headed by the Commander of the State Railways. The purpose was to pool the engineers at the country's disposal, as many of the foreign engineers previously employed by both departments were citizens of hostile nations and had been dismissed or interned as prisoners of war. The Chief Road Work Technician was the leader of the Department of Highways at that time.

On June 29, 1932, King Rama VII, with the consent of the People's Party, merged the Ministry of Commerce and Transport with the Ministry of Agriculture. The new agency was named the "Ministry of Agriculture and Commerce". As a result, the Department of Railways, which included the Department of Highways, became a subordinate agency of the new ministry.





On May 3, 1933, at the recommendation of the cabinet, King Rama VII passed an Establishing Ministries and Departments Act B.E. 2476. Under the act, the Ministry of Agriculture and Commerce was dissolved. And the Department of Railways, which included the Department of Highways, became a unit of Ministry of Economic Affairs instead.

On September 18, 1934, King Rama VII, at the recommendation of the House of Representatives, promulgated an act transferring the authority and responsibility regarding the construction and maintenance of highways from the Department of Highways to the Department of Municipal Public Works which was subjected to the Ministry of Interior.

On August 19, 1941, in the reign of King Rama VIII, the Division of Roads was upgraded to a department and was transferred from the Department of Municipal Public Works which was a part of the Ministry of Interior, to the Ministry of Communications, under Ministerial and Department Restructuring Act B.E.2484. Although, it was upgraded, the new department did not have its own office and was still located within the compound of the Department of Municipal Public Works at the base of Pan Fa Leelart Bridge. Then, on November 13, 1948, it was moved to Rama VI Road where the Division of Procurement of the present Department of Highways is.

On March 12, 1952, under the Ministerial and Department Restructuring Act B.E. 2495, the Department of Highways was renamed the "Department of National Highways". However, it still remained under the Ministry of Transport.

On June 24, 1955, The Department of National Highways had the opening ceremony for the office building on Sri-Ayutthya Road.

On May 4, 1963, The Department of National Highways was renamed the "Department of Highways" again and transferred to the Ministry of National Development, under the Ministerial and Department Restructuring Act B.E. 2506.

On September 29, 1972, the Department of Highways was transferred to the Ministry of Transport and it has remained there until present day. The transfer was made according to the following laws:

- The national Executive Council Announcement No.216.
- The decree divided Department of Highways , Ministry of Transport B.E.2516
- The decree divided Department of Highways , Ministry of Transport B.E.2532
- The decree divided Department of Highways , Ministry of Transport B.E.2533
- The Ministerial and Developmental Restructuring Act B.E.2534
- The decree divided Department of Highways , Ministry of Transport B.E.2537
- The decree divided Department of Highways , Ministry of Transport (No.2) B.E.2539
- The Ministerial and Developmental Restructuring Act B.E.2545
- The Ministerial division Highways Ministry of Transport B.E.2545
- The Ministerial division Highways Ministry of Transport B.E.2552
- The Ministerial division Highways Ministry of Transport B.E.2558

Fact of Highways





Finance

In fiscal year 2017, the government emphasizes on continual government administration along with strategic driven as well as urgent policies for efficiency and concrete result. By aiming at obtaining the sustainable development guideline, decreasing social inequality, expanding people opportunity to improve quality of life and increasing country's competitiveness which is leading to balanced development of the country in economy, society, culture, stability, natural resources and environment. The sufficiency economy philosophy has been applied as guidelines in resources management of the country in order to attain the greatest benefit for people concretely.

The budget allocation strategy was divided into 6 categories and operational guideline under strategy contain with 53 plans. The budget of the Department of Highways was allocated under Strategy 2 was for increasing country's competitiveness. This strategy has been driven by Plan 2.4, infrastructure-based and logistic system development plan, Plan 2.6, enhancing research and development plan, Plan 2.15, increasing country's competitiveness plan. In fiscal year 2017, the budget of the Department of Highways consisted of 4 plans, 3 outcomes and 13 projects. The total budget was 91,279.9377 million baht, more than the previous year by 13,769.9626 million baht or 15.09%. The received budget was 60.55% of the budget that the Ministry of Transport has received (150,750 million baht) or was 3.34% of the national budget (2,733,000 million baht). The budget was allocated as follows:

- Personnel budget is the expenses for workforce management such as salary, permanent wage, temporary wage and remuneration. "4,922.7806 million baht"
- Operational budget is the expenses for operation and administration such as remuneration of materials and public utility. "755.313 million baht"
- Investment budget is the expenses for investment such as permanent equipment, land, real properties, and other related expenses. "85,126.2655 million baht"
- Supporting budget is the expenses for supporting local administrative agencies, private organizations, other juristic persons, royal expenses, religion and other related expenses. "6.482 million baht"
- Other budget is the expense which could not be classified into any budget categories or the budget on which the Bureau of the Budget requires to spend. "6.482 million baht"

Disbursement

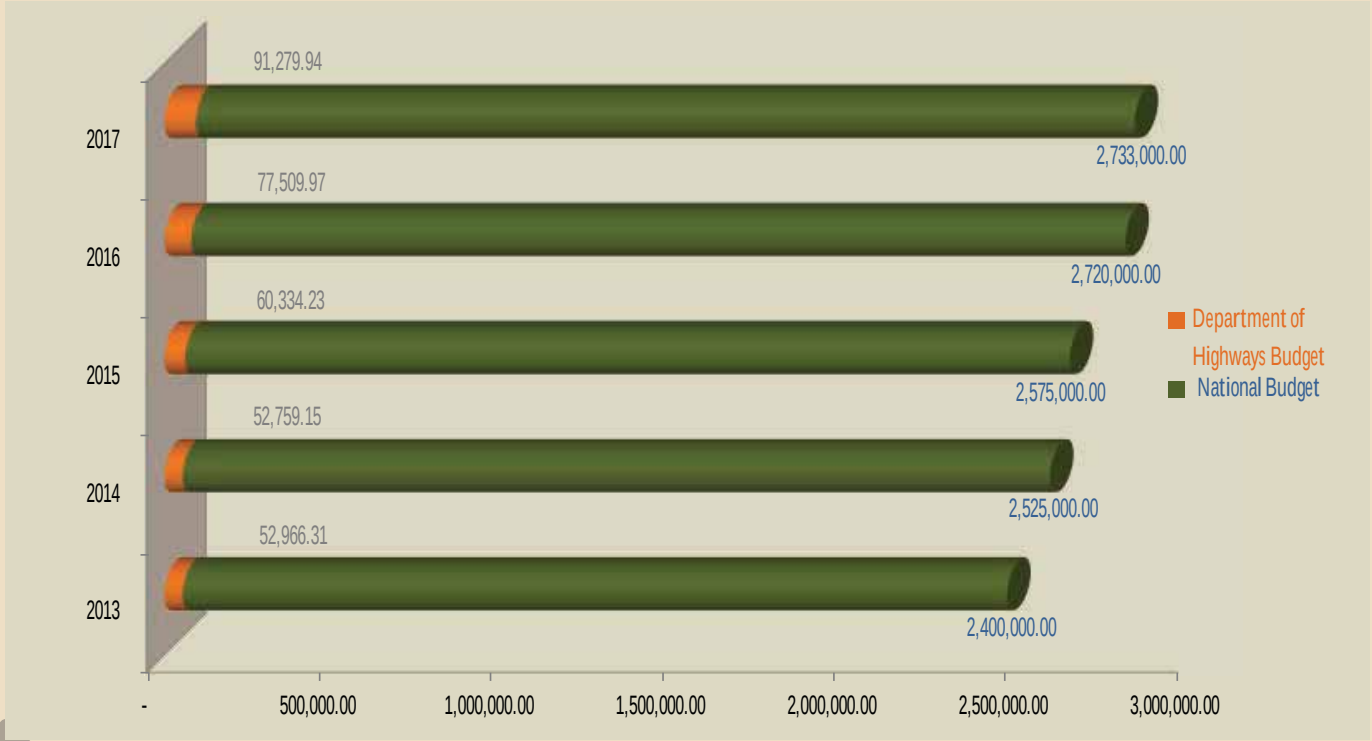
In fiscal year 2017, the government set up the measures and guidelines to accelerate the annual expenditure, not to be less than 88.00 percent of overall budget and 96.00 percent of investment budget. The Department of Highways used 92.96 percent of the investment budget and 93.32 percent of the total disbursement. The investment budget spending was higher than the government target because the management accelerated budget spending and the spending went according to the governmental disbursement plan. However, the total disbursement was lower than the target as most contracts were signed in the 2nd quarter of the fiscal year. Also, there were one-year projects which account for 50% of the budget. Such projects pay single lump sums after completion with no advanced payment. Moreover, there were delays for new route construction projects due to unavoidable geometry changes, relocation of infrastructures or railways, or objections on the construction by the public.



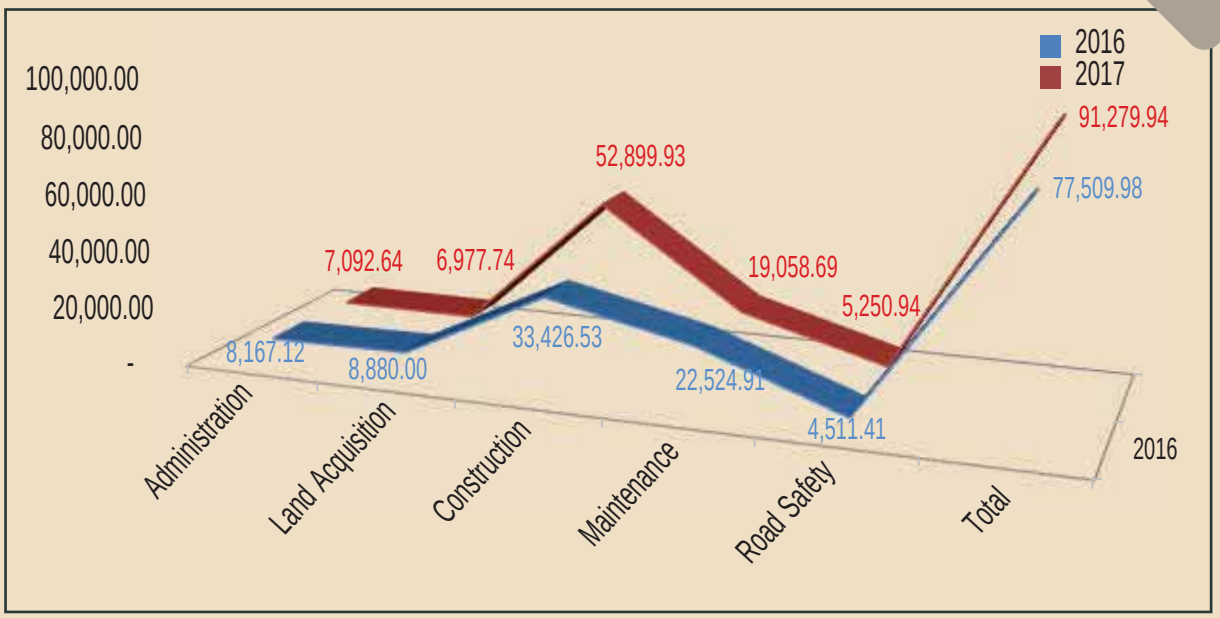
Budget Management of Fiscal Year 2017

Plan/Output/Project	Public Account after Transmitted	Actual Expenditure	Keeping for Overlapped Disbursement	Balance
1. Plan : Increasing country's competitiveness				
Output 1 Developed Highway Network	1,863,297,144.65	1,492,821,701.24	362,896,470.72	7,578,972.69
Output 2 Maintained Highway Network	17,974,181,897.53	17,744,957,053.22	225,645,072.53	3,579,771.78
Output 3 Safety Highway Network	4,221,741,557.82	4,097,628,080.85	122,705,701.28	1,407,775.69
2. Plan : Infrastructure-based and logistic system development				
Project 1 Intersection Safety Improvement Project	828,212,383.14	800,590,356.73	27,544,271.19	77,755.22
Project 2 Rehabilitation of Primary Highway Network between region	8,783,164,288.53	8,664,455,577.32	118,432,663.30	276,047.91
Project 3 Asphalt road construction for standard increase	720,065,850.42	674,955,456.64	45,032,744.75	77,649.03
Project 4 Construction of railway crossing bridges	964,959,824.00	425,142,666.90	539,817,157.10	-
Project 5 Construction of bicycle ways	265,746,420.66	259,235,214.62	6,472,780.64	38,425.40
Project 6 Construction of National Highway Network	22,647,797,325.44	20,432,185,027.40	2,191,605,280.80	24,007,017.24
Project 7 Highway network construction for supporting area-based development	3,607,263,489.45	3,399,304,403.33	205,777,468.93	2,181,617.19
Project 8 Analytical Study on suitability of private sector investment	14,707,600.00	5,012,031.00	9,695,569.00	-
Project 9 Highway development for supporting Special Economic Zone	4,701,185,784.00	3,529,709,587.35	1,170,294,818.02	1,181,378.63
Project 10 Improving Pavement Marking	190,407,723.40	181,161,332.49	9,214,356.48	32,034.43
Project 11 Problem-Solving and Restoration of highway affected by disasters	603,813,231.96	407,024,825.22	195,998,473.03	789,933.71
Project 12 Inter-City Motorway Construction	18,797,818,479.00	18,046,448,944.04	751,357,805.98	11,728.98
3. Plan : Personnel				
Personnel cost	4,983,253,900.00	4,935,529,071.41	20,422,835.71	27,301,992.88
4. Plan : Enhancing Research and Development				
Applied Research Project	65,994,700.00	52,525,022.79	13,466,137.40	3,539.81
Research and Development Project	37,752,700.00	23,808,433.40	13,944,266.60	-
Total	91,271,364,300.00	85,172,494,785.95	6,030,323,873.46	68,545,640.59

Comparison of the Department of Highways and national budgets between 2013-2017



Comparison of Department of Highways' Budget between 2016 - 2017



Department of Highways Statement of Financial Status As of 30 September 2017

Unit : Baht

	Remark	2017	2016
Assets			
Current Assets			
Cash and cash equivalent	5	3,752,111,135.11	3,299,978,178.54
Short term debtor	6	149,502,870.19	88,809,518.85
Fixed term deposit		127,146.32	513,526.49
Inventories		38,436,882.12	34,469,920.82
Advanced Expense		19,136.50	8,750.00
Total current assets		3,940,197,170.24	3,423,779,894.70
Non-current assets			
Properties, premises and equipment	7	4,719,173,559.58	4,641,906,167.14
Infrastructure assets	8	258,879,483,316.32	271,246,263,139.58
Intangible assets	9	67,250,107.80	2,021,369.86
Other non-current assets		1,193,789.37	312,750.00
Total non-current assets		263,667,100,773.07	275,890,503,426.58
Total assets		267,607,297,943.31	279,314,283,321.28

Department of Highways Statement of Financial Status As of 30 September 2017

Unit : Baht

	Remark	2017	2016
Liabilities			
Current Liabilities			
Short-term payables	10	3,072,289,713.38	6,129,738,971.20
Pending revenue		11,500,000.00	4,984,963.14
Short-term deposit	11	6,556,562,271.32	5,359,375,152.88
Total current liabilities		9,640,351,984.70	11,494,099,087.22
Non-current Liabilities			
Long-term deferred income		199,699,332.03	173,946,454.63
Long-term advanced payment received from Ministry of Finance		15,538,000.00	15,578,000.00
Total non-current liabilities		215,237,332.03	189,524,454.63
Total liabilities		9,855,589,316.73	11,683,623,541.85
Total assets - net		257,751,708,626.58	267,630,659,779.43
Net assets			
Equity		22,541,880,400.43	22,541,880,400.43
Revenue higher (lower) than accumulated expenses	13	235,209,828,226.15	245,088,779,379.00
Total net assets		257,751,708,626.58	267,630,659,779.43





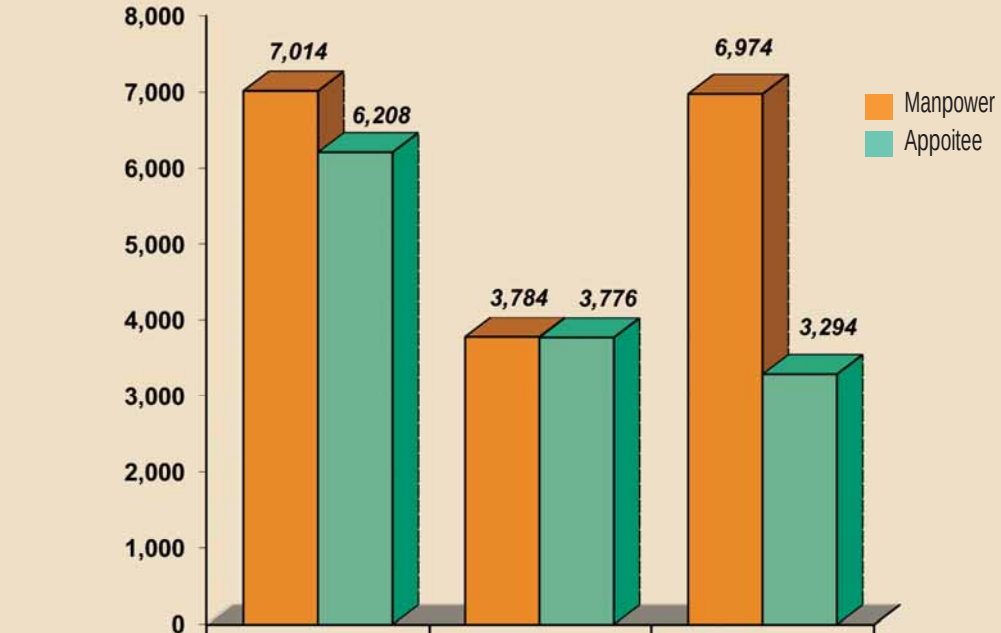
Department of Highways Statement of Financial Status
for the fiscal year ended on 30 September 2017

Unit : Baht

	Remark	2017	2016
Revenue			
National budget	14	105,340,176,577.99	88,369,670,054.56
Loan and other revenues from the government	15	1,860,948,657.03	16,448,214,212.28
Sales and services		939,460.00	12,550.00
Support and donation	16	35,642,492.87	23,278,371.09
Others	17	181,352,942.67	38,465,666.00
Total Revenue		107,419,060,130.56	104,879,640,853.93
Expense			
Human resource	18	7,856,439,205.77	7,121,022,572.21
Pension and retirement benefit	19	1,959,461,114.89	1,864,321,363.78
Remuneration	20	4,598,530.30	5,683,924.20
Supplies	21	30,654,643,746.77	47,280,369,441.99
Materials	22	655,587,879.73	192,633,548.20
Utilities	23	256,371,188.92	260,010,709.44
Depreciation and amortization	24	75,474,216,922.47	15,698,865,322.87
Others	25	45,524,575.23	79,427,016.15
Total Expense		116,906,843,164.08	72,502,333,898.84
Revenue higher than net expense		(9,487,783,033.52)	32,377,306,955.09

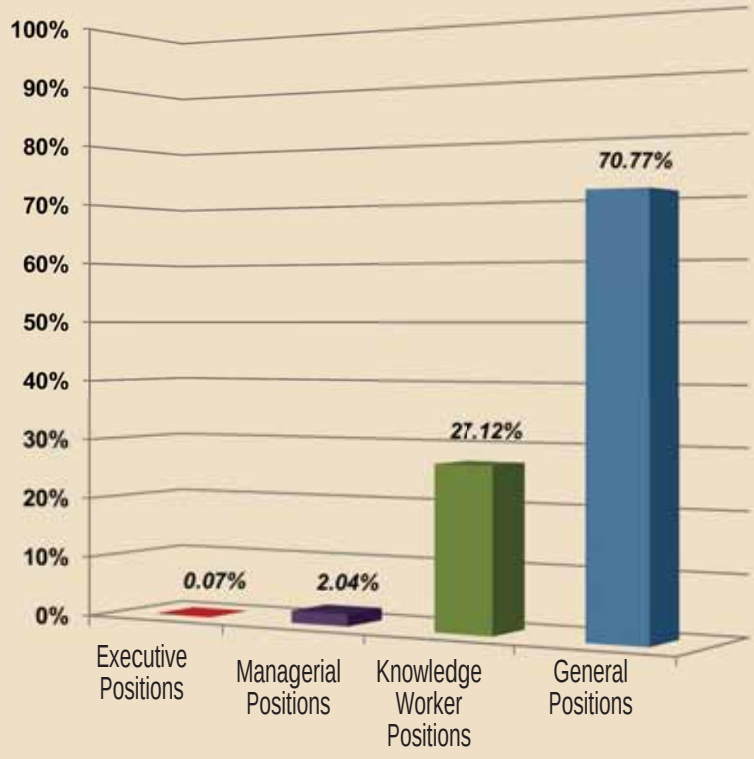
Manpower (Department of Highways and Highway Police)

Department of Highways's Manpower
Dated 30 September 2017

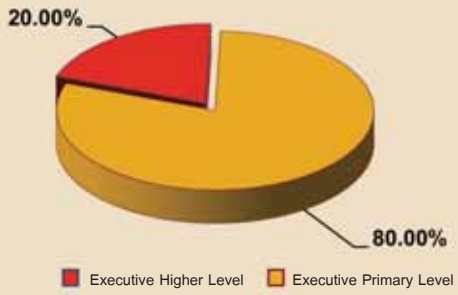


	Officials	Permanent Employee	Government Employee
Manpower	7,014	3,784	6,974
Appoitee	6,208	3,776	3,294

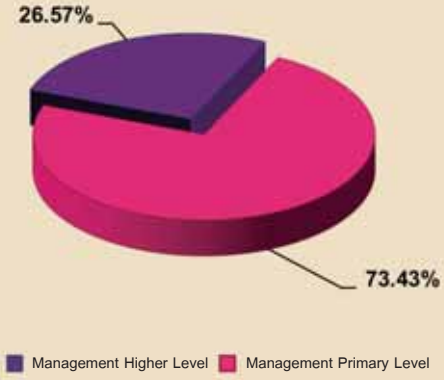
Officials' Manpower, Fiscal Year 2017
Classified by Position and Level



Executive Positions



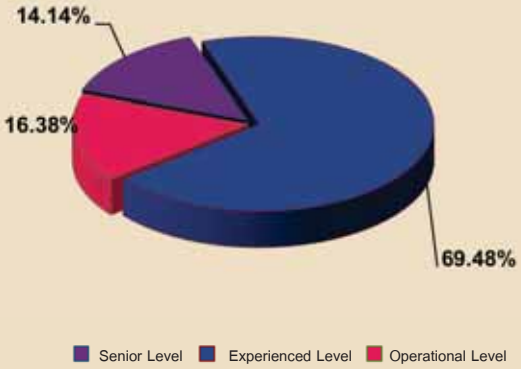
Managerial Positions



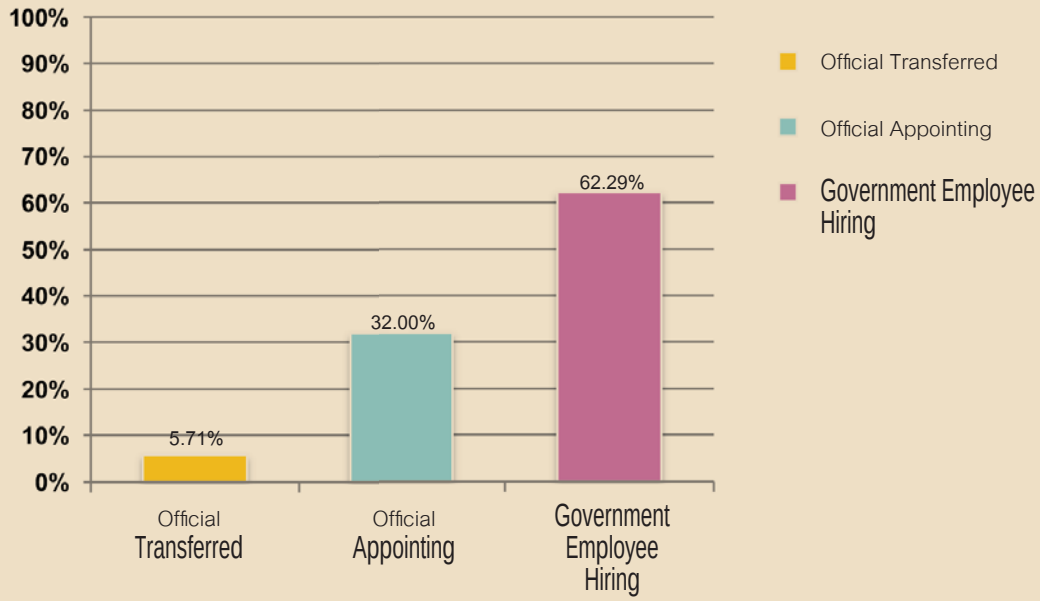
Knowledge Worker Positions



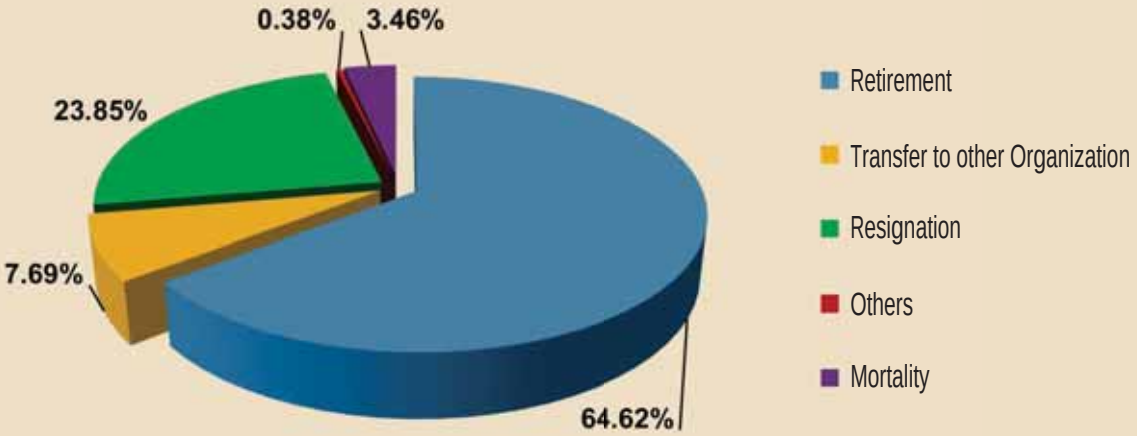
General Positions



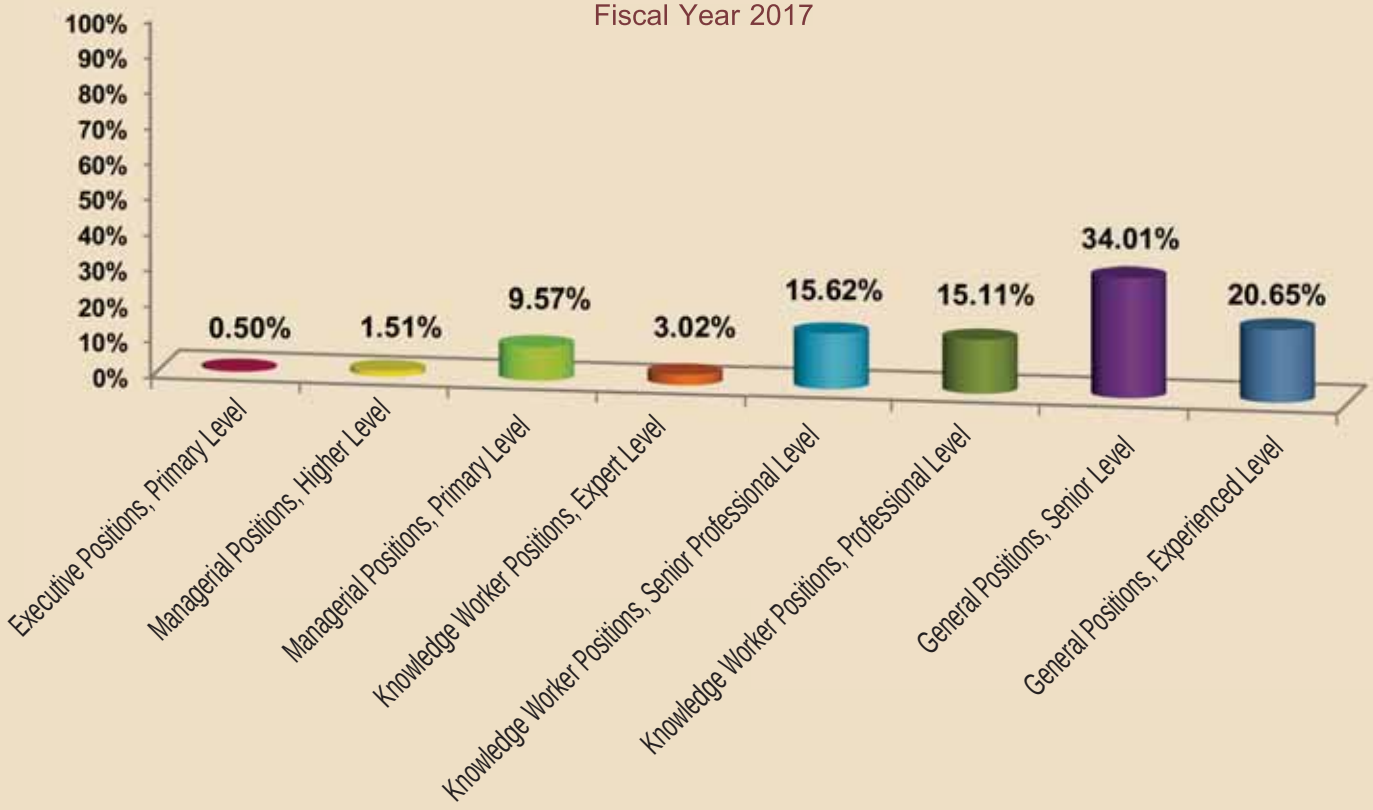
Officials and Government Employees Recruitment of the DOH Fiscal Year 2017



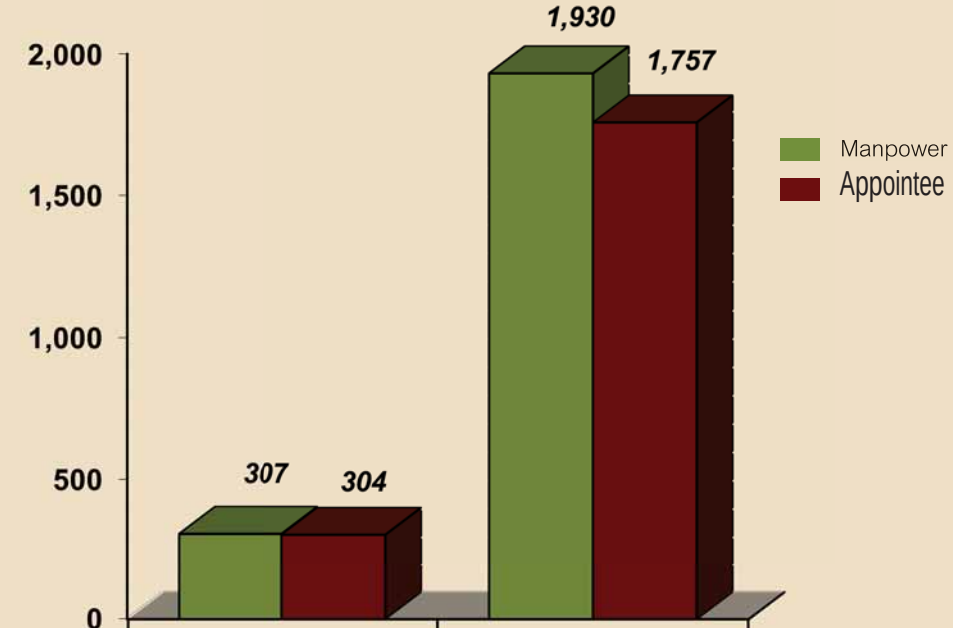
DOH's Official Loosing Rate, Fiscal Year 2017



The DOH's Official Promotion,
Fiscal Year 2017

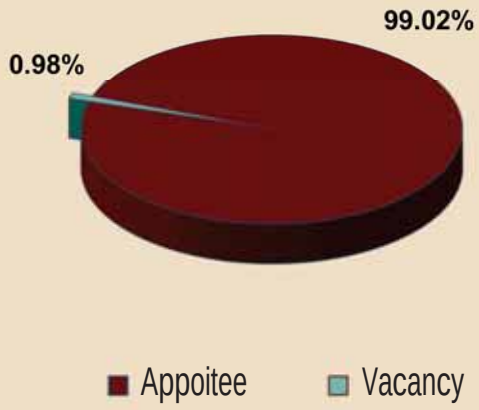


Highway Police's Manpower, Dated 30 September 2017

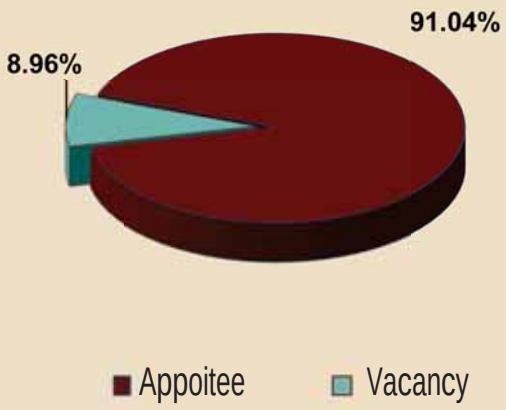


	Commissioned Officers	Non-Commissioned Officers
Manpower	307	1,930
Appoitee	304	1,757

Commissioned Officers



Non-Commissioned Officers



Strategic Issues

The Assessment of government agencies based on measuring and improving the efficiency of the performance of Administrative System of Department of Highways

The Cabinet meeting on April 5, 2016 approved the evaluation of government officials and civil servants in the responsibility of the administration, according to the order of the National Peace Corps (NCC) No. 5/2559 on measures to improve the efficiency of the service. The Office of the National Economic and Social Development Board, which was effective on February 1, 2016, and in the meeting of the Government Development Board (Public Works) No. 5/2016 on November 9, 2016, has approved the framework for evaluation of government agencies in the fiscal year 2016, which replace the issue on a certificate of official practice in the original system. The purpose is to develop the government's operating system to drive the government's mission, to solve the problems and to facilitate the people, as well as, to increase the capacity of government agencies to support the development of the country. It is also used as information to help in assessment the Pros and Cons for organiations and executives, which is an important mechanism to drive the government's mission.

The Department of Highways has improved its efficiency in fiscal year 2017. The results are as follows.

Indicators	Scoring			Work Results	Evaluation
	Feb	Jul	Sep		
Factor 1 Effectiveness on Performance as Function based (Function based)					
Level of Ministry					
1. Level of success of transport infrastructure 1.1. The success of Thailand in driving the highway network as Logistics which covers land, waterways, and by air within regions. As a result, facilitate and reduce time and cost of transportation.					
1.1.1. Inter-city Motorway: Motorway 7 Bangkok - Ban Chang at Pattaya - Map Ta Phut (Section 1-13)	36.35%	79.90 %	100 %	101.50%	Pass
1.1.2. Interstate Highway Bangpoo - Saraburi - Nakhon Ratchasima	13.21%	77.77%	100 %	108.37%	Pass
1.1.3. Highway 1209 Chiang Saen - Chiang Khong District 3	25.22%	69.86%	100%	104.30%	Pass
Level of Department of Highways					
2.The percentage of the distance on highway which has IRI more than international standard	Conducting Survey	The survey was conducted 60% of the planned route and data assessment as 83%	The survey was conducted100% of the planned route and data assessment as 83%	The survey was conducted 100% of the planned route and data assessment as 91.80%	Pass



Indicators	Scoring			Work Results	Evaluation
	Feb	Jul	Sep		
3.The percentage of road users' satisfaction	Hiring consultants	The survey was conducted 70% and the result of evaluation satisfaction as 85%	The survey was conducted 100% of project and the result of evaluation satisfaction as 85%	The survey was conducted 100% of project and the result of evaluation satisfaction as 90.61%	Pass
4. Level of success of implementing of road accident reduction	The contract has been already signed	50% complete	100% complete		
4.1.Activities to improve road traffic safety and dangerous zone on highways	The contract has been already signed	29 place	58 place	64 place	Pass
4.2.Safety Activities	The contract has been already signed	750 place	1,501 place	1,699 place	Pass
Factor 2 : Effectiveness on Performance as Strategy mission or Agenda based (Agenda based)					
1.Creating perception and awareness to people					
1.1 The percentage of implement on making perception for people	Implement as planned, during Oct 2016 – Feb 2017 as 100% complete	Implement as planned, during March-July 2017 as 100% complete	Implement as goal in the whole year 100% complete	Implement as planned between Oct 2016 - Sep 2017 which 100% complete	Pass
1.2 The percentage of responding on important issue as real time (if any)	Implementation as step 1-3 which 100% complete	Implementation as step 1-3 which 100% complete	Implementation as step 1-3 which 100% complete	Implementation as goal in the whole year	Pass
Factor 3 Performance as the main mission or integration of multi-agency operations. (Area based)					
1. The rate of deaths from road accidents per 100,000 populations	Not over 6 per 100,000 population	Not over 16.5 per 100,000 population	Not over 18 per 100,000 population	Wait for the score from the Bureau of Policy and Strategy. Office of the Permanent Secretary, Ministry of Public Health	N/A

Indicators	Scoring			Work Results	Evaluation
	Feb	Jul	Sep		
Factor 4 Efficiency in management and development innovation in system management. (Innovation base)					
1. Effectiveness of budget disbursement	45%	80%	96%	93.32%	Not Pass
2. Proposals for efficiency in management and innovation development of government agencies.	Provide suggestions on the innovative development of government agencies and report them with other indicators in the first assessment	Provide suggestions on the efficiency and innovative development of government agencies, and report them with other indicators. In the second assessment.	-	completed in July 2017	Pass
Factor 5 Have a potential to be a government agency focused on strategy development. (Potential based)					
1. Preparation and implementation of national strategic plan.	Implementation as planned until February 2017 with 100% complete	Implementation as planned until July 2017 with 100% complete	Implementation as planned until September with 100% complete		
5.1 Construction Plan					
5.1.1 The Development of Highway project to Support Special Economic Zones-Highways construction Project for Special Economic Zones					
5.1.1.1 Highway No. 3263, Sena - k.m. 36 + 626 (Ban Salee), Phra Nakhon Si Ayutthaya Province / Suphanburi Total: distance 14 k.m.	Work completion	-	-	Work completion in July 2017	Pass
5.1.1.2 Highway No. 375 Nakhon Pathom - Don Tum (k.m. 43 + 935 – k.m. 54 + 000) Nakhon Pathom Province distance of 10.065 k.m.	Work completion	-	-	Work completion in July 2017	Pass
5.1.2. National Highways Network Construction Project					
5.1.2.1 Highways construction project to link to transport system (Chanthaburi – Sa Kaeo, Section 3)	-	Work completion on 31st July 2017	-	Work completion in July 2017	Pass
5.1.2.2 Phon Phisai-Bueng Kan Project Section 1 Part 1	-	Work completion on 31st July 2017	-	Work completion in July 2017	Pass
5.1.2.3 National Highways construction Project in Sriracha - Ao Udom (including overpass into the port)	-	-	Work completion on 30th September 2017	Work has not yet been completed within 30th September 2017	Not Pass
5.1.2.4 Bridge and grade separation Projects (By pass at Nong Tako), Nakhon Sawan, Section 2 (Part 1)	-	Work completion On 31st July 2017	-	Work completion in July 2017	Pass



Indicators	Scoring			Work Results	Evaluation
	Feb	Jul	Sep		
5.1.2.5 Projects to solve traffic problem in Bangkok perimeter, and Major Cities (Overpass, Crossing Intersection Highway No. 3256 with Highway No. 3268, including bridge crossing the Samrong Canal.	-	-	Work completion on 30th September 2017	Work completion on 30th September 2017	Pass
5.1.3 Highway network reconstruction projects to contribute the regions.					
5.1.3.1 Restoration of highway network connecting the regions (Highway No. 7 (Neonpasuk company Limited) -Highway 331 (Maepee), Section 1	-	-	Work completion on 30th September 2017	Under construction (contract ends on 26th Nov. 2017)	Not Pass
5.1.3.2 Develop a highway network to address traffic problems and increase competitiveness (stimulate economy 2). (Phutthaisong - Kasetsart University, Section 2)	-	Work completion on 31st July 2017	-	Work completion in July 2017	Pass
5.1.3.3 Construction Project on Intercity Motorway (The crossroads at Romklao intersection.	-	Work completion on 31st July 2017	-	Work completion in July 2017	Pass
5.1.4 Maintenance Plan (1,155 projects)	Rehabilitation or maintenance Plan for Highway as road damage	Setting a survey plan for International Roughness Index (IRI), after doing maintenance highway (70%)	Setting a survey plan for International Roughness Index (IRI), after doing maintenance highway (100%)	Conducting survey with 100 % as planned, and work result as 91.80 %	Pass

Indicators	Scoring			Work Results	Evaluation
	Feb	Jul	Sep		
5.1.5 Safety Management Plan					
5.1.5.1 Activities to improve risk factor and dangerous areas (58 places)	Effectively, The Allocated budget should entitle the most important or urgent priority, which comply with Department of Highways' policy.	Monitoring or follow- up on Procurement process, contract execution, and budget disbursement. Progress /success (29 places)	Monitoring or follow- up on Procurement process, contract execution, and budget disbursement. Progress / success (58 places)	Proceedings as 64 places	Pass
5.1.5.2 Road Safety Activities (1,501 places)	Effectively, The Allocated budget should entitle the most important or urgent priority, which comply with Department of Highways' policy.	Monitoring or follow- up on Procurement process, contract execution, and budget disbursement. Progress /success (750 places)	Monitoring or follow- up on Procurement process, contract execution, and budget disbursement. Progress / success (1,501 places)	Proceedings as 1,699 places	Pass

The Department of Highways has carried out the evaluation of the performance of government measures in the performance of the fiscal year 2017. It appears that most indicators passed the assessment, except for.

1. Indicators that cannot be scoring as it must be waiting for assessment from the center, for instance, factor 3; indicator 1, the rate of deaths from road accidents per 100,000 populations, which needs to be waiting for evaluation sources from Bureau of Policy and Strategy Office of the Permanent Secretary, Ministry of Public Health

2. The indicators do not pass the assessment.

2.1. Factor 4: Indicator 1 Budget Disbursement Performance

2.2. Factor 5.1 Indicator 5.1 Construction Plan : Indicators 5.1.2.3 National Highways construction Project in Sriracha - Ao Udom (including overpass into the port)

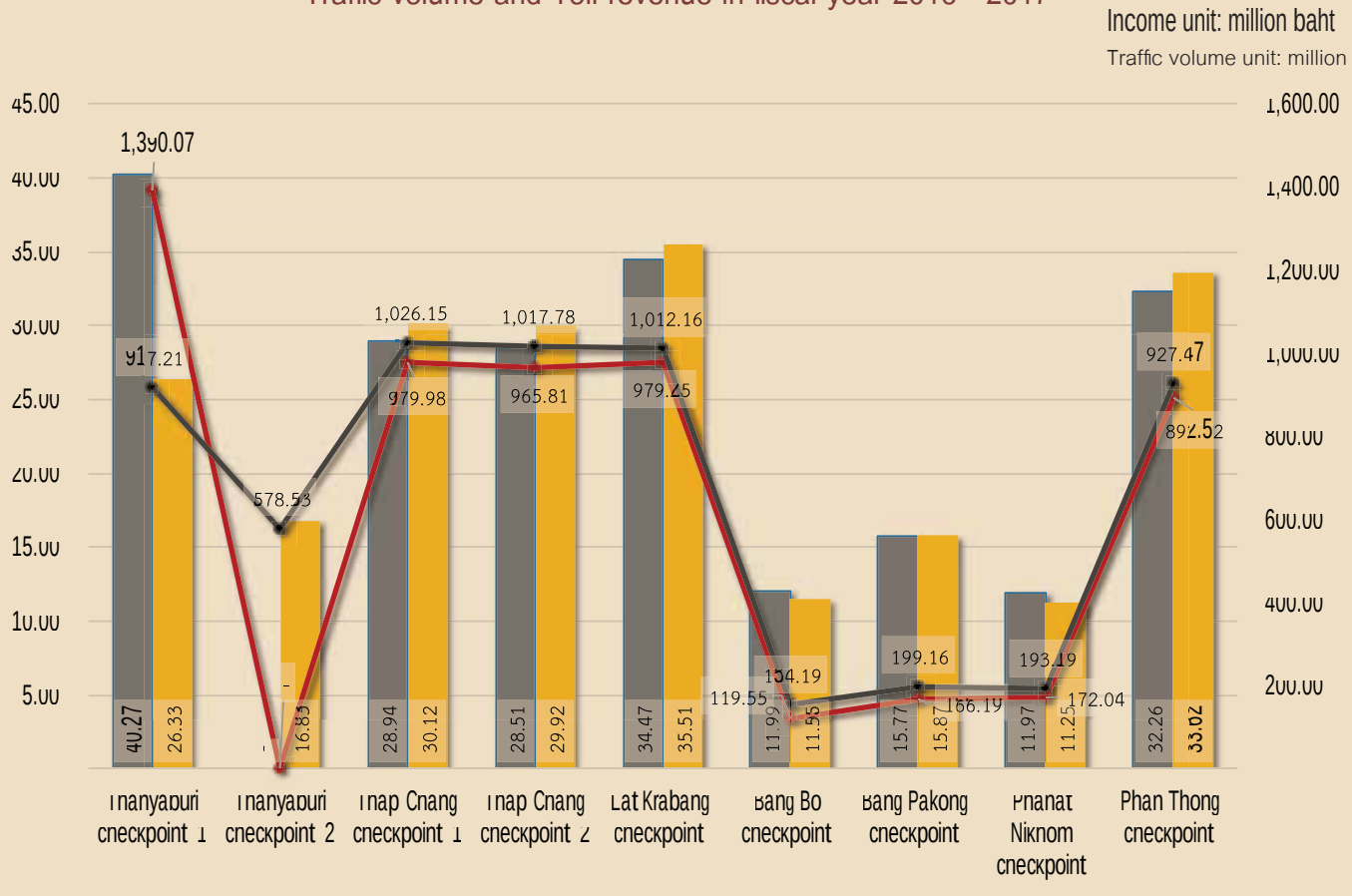
2.3 Factor 5 Indicators 5.1 Construction Plan : Indicators 5.1.3.1 Restoration of highway network connecting the regions (Highway No. 7 (Neonpasuk Company Limited) -Highway 331 (Mab eang), Section 1

Distance and Quantity of people use inter-city motorway

Distance Information of Inter-City Motorway Division, 2017

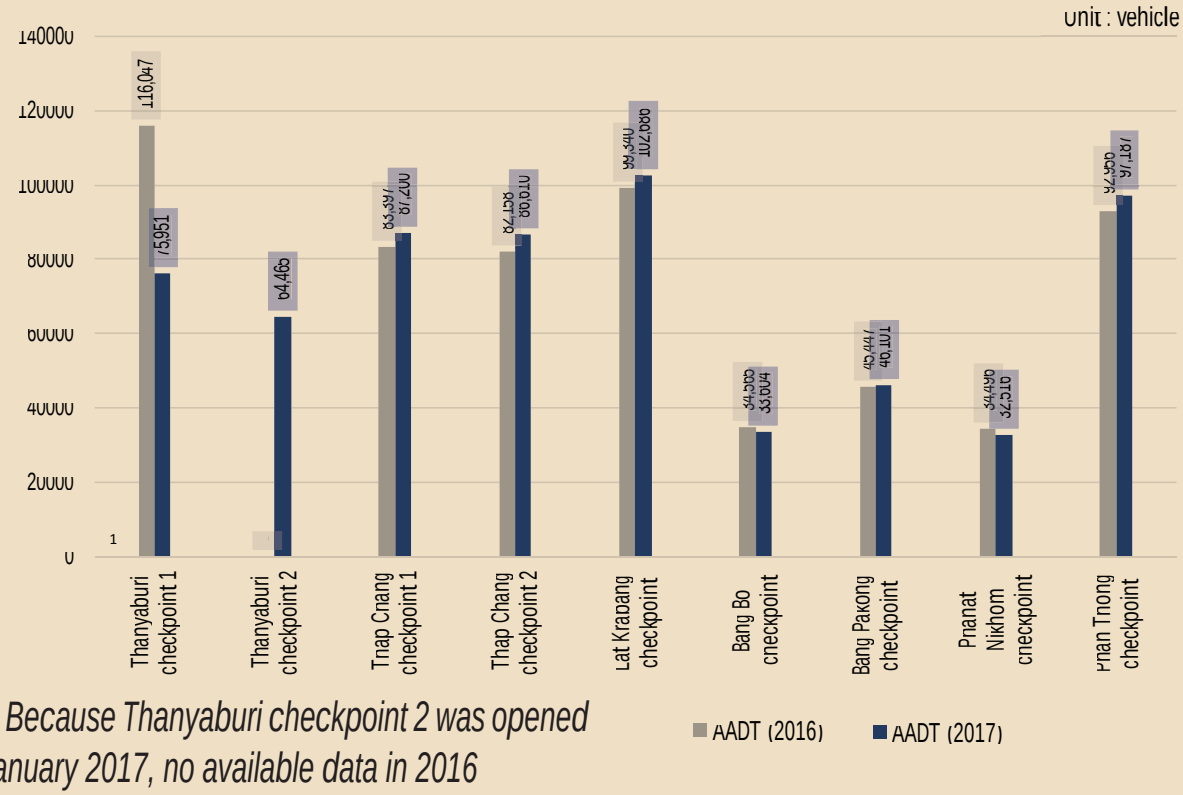
No.	Type of highway	Surface type	Starting STA.	Ending STA.	Distance (km.)	Number of lane
1	Motorway No.9				65.325	
	Section: Bang Pa In - Khlong Phraya Suren	AC	0+000	36+000	36	8
	Section: Khlong Phraya Suren - Phra Pradaeng	AC	36+000	65+325	29.325	8
2	Motorway No.7				126.377	
	Section: Thanon Srinagarindra - Bang Pakong	AC	0+000	35+000	35	8
	Section: Intersection at Romklao Bus Terminal.	AC	0+000	0+512	0.512	6
	Section: Bang Pakong - Nong Ri	AC	35+000	73+000	38	8
	Section: Nong Ri - Nong Kham	Concrete	73+000	98+644	25.644	4-8
	Section: Nong Kham - Pattaya	Concrete	98+644	125+865	27.221	6-8

Traffic volume and Toll revenue in fiscal year 2016 - 2017



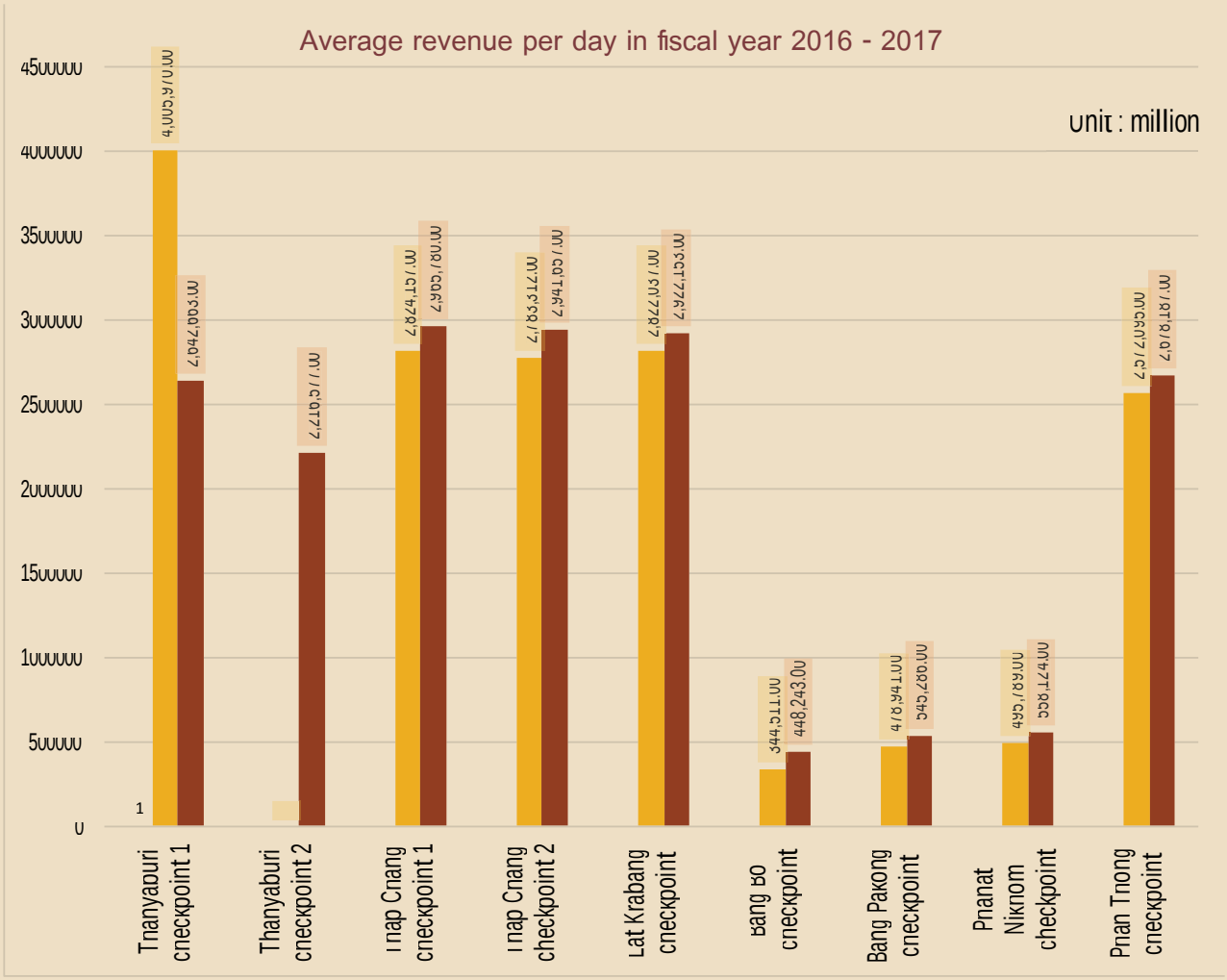
Note: - Because Thanyaburi checkpoint 2 was opened on 5th January 2017, no available data in 2016

Annual Average Daily Traffic in fiscal year 2016 - 2017



Note: - Because Thanyaburi checkpoint 2 was opened on 5th January 2017, no available data in 2016

Average revenue per day in fiscal year 2016 - 2017



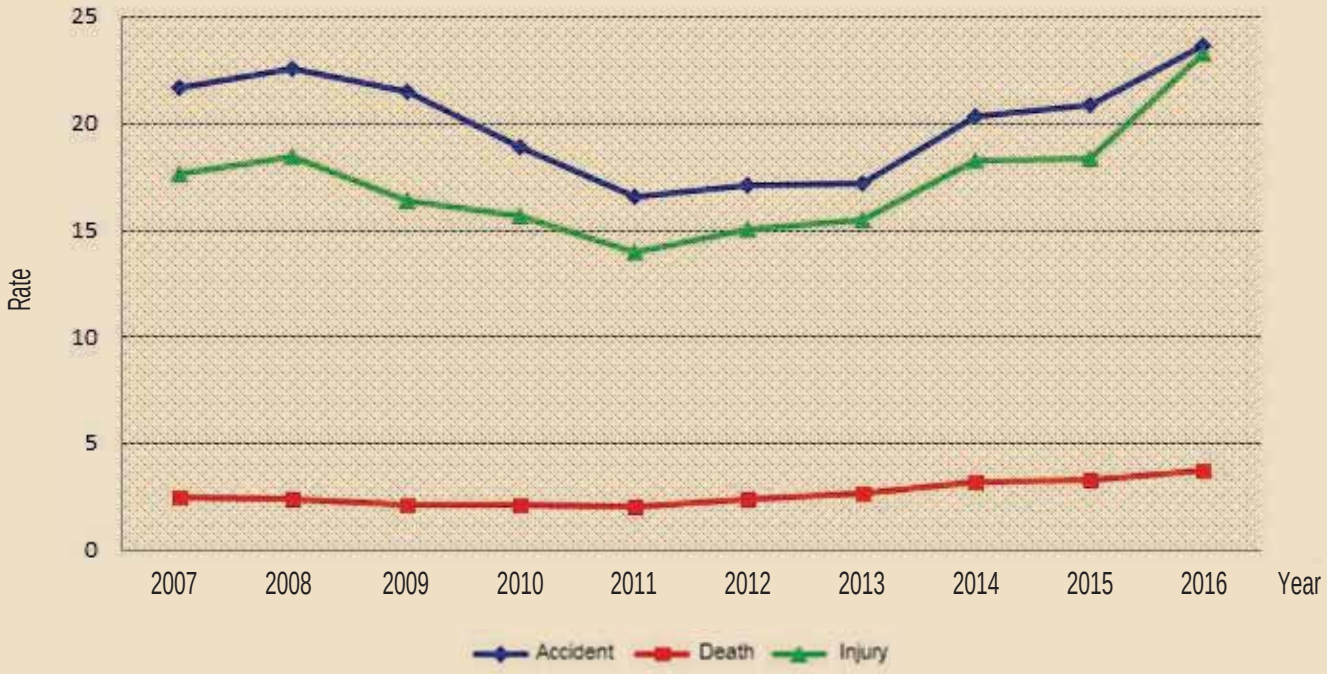
Note: - Because Thanyaburi checkpoint 2 was opened on 5th January 2017, no available data in 2016

Statistic of vehicle and accident

The road accident data

In 2016, The accidents on Thailand national highway have been recorded in the Highway Accident Information Management System (HAIMS) which is Web-based Application that can record the accident in real-time. The data show that there are 24,244 crashes occur on the highway network which makes 267,524 million baht loss in the economic system, and the primary cause of the accident is the over speed driving.

The accident rate per 100,000 population on 2007-2016

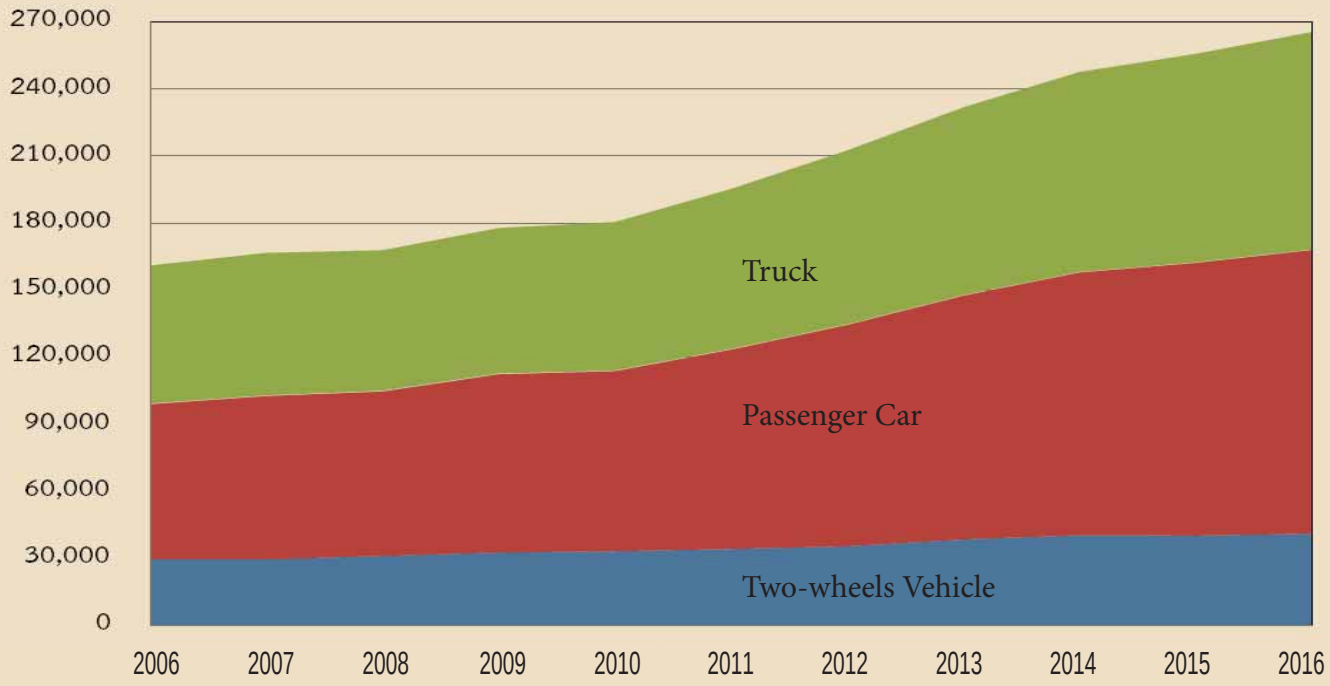


Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Accident	13,655	14,336	13,673	12,054	10,607	11,013	11,125	13,259	13,575	15,578
Deaths	1,605	1,513	1,378	1,370	1,291	1,549	1,740	2,115	2,136	2,464
Injuries	11,132	11,680	10,415	9,991	8,970	9,675	10,043	11,906	11,948	15,365

Traffic Volume

In 2016, Traffic volume on the highway network is equal 265,928.8 Million vehicles – Kilometre which is composed of 36.7% of the truck, 45.5% of passenger cars and 17.8% of two-wheel vehicles.

Traffic volume on the highway network on 2006-2016



Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Truck	٥١,٧٨٥.٤	٥٣,٧٥٦.٧	٥٣,٧٩٦.٢	٥٥,٣٣٥.١	٥٥,٥٧١.٥	٦١,٨٦٣.٢	٦٨,٥٥٨.٨	٨٤,٢٢٣.٢	٨٧,٦٧٥.٥	٧٣,٥١١.٧	٧٦,٥٢٠.٠
Passenger Car	٥٧,٤٢٨.٥	٦٣,٢٥٥.٣	٦٣,٨١١.٢	٦٧,٧٦٨.١	80,796.0	٨٧,٤١٠.٤	٧٧,٢٨٢.٤	10٧,٣١١.٤	١١٦,٨١٦.٨	١٢٢,٢٧٦.٤	١٢٦,٢١١.٢
Two-wheels Vehicle	٢٧,٦٨٦.٥	٢٧,٦٣٢.٥	٣١,١٢٨.٢	٣٢,٥٨١.٤	٣٣,٢١٧.٤	٣٤,٢٦٣.٧	٣٥,٤٦٠.٠	٣٨,٥٦٣.٨	٤٠,٤٢١.١	٤٠,٢٧٣.٠	41,0٧٢.١

Unit: Million vehicles - Kilometre

Traffic volumes on the Thailand national highways from Bangkok and the city on the central region to others regions.

To the northern region

Route	2014		2015		2016		Changing ratio	
	In	Out	In	Out	In	Out	In	Out
1	59,222	51,565	62,016	65,049	61,251	59,270	1.74	8.63
9	23,827	19,935	24,071	21,029	24,264	21,498	0.91	3.86
32	57,927	56,108	59,102	52,300	58,617	52,661	0.60	-3.05
North	46,992	42,536	48,396	46,126	48,044	44,476	1.13	2.43



To the northeastern region

Route	2014		2015		2016		Changing ratio	
	In	Out	In	Out	In	Out	In	Out
1	59,222	51,565	62,016	65,049	61,251	59,270	1.74	8.63
9	23,827	19,935	24,071	21,029	24,264	21,498	0.91	3.86
305	13,370	15,259	15,979	18,304	17,565	18,492	14.72	10.49
Northeast	32,140	28,920	34,022	34,794	34,360	33,087	3.42	7.70



To the southern region

Route	2014		2015		2016		Changing ratio	
	In	Out	In	Out	In	Out	In	Out
4	55,504	53,760	53,652	53,312	55,512	56,856	0.07	2.91
35	59,304	55,968	59,724	57,147	58,163	56,787	-0.95	0.74
338	35,095	36,502	35,418	36,121	36,472	39,327	1.95	-0.04
South	49,968	48,743	49,598	48,860	50,049	50,990	0.08	2.30



To the eastern region

Route	2014		2015		2016		Changing ratio	
	In	Out	In	Out	In	Out	In	Out
7	45,544	46,411	48,258	49,164	49,182	51,153	3.94	2.98
9	77,014	74,360	79,460	76,593	77,639	77,562	0.44	2.13
34	101,220	126,325	112,281	129,056	114,608	134,187	6.50	3.07
304	21,725	19,094	21,877	18,575	19,955	18,032	-4.04	-2.82
305	13,370	15,259	15,979	18,304	17,565	18,492	14.72	10.49
East	51,775	56,290	55,571	58,338	55,789	59,885	3.86	3.15



To the western region

Route	2014		2015		2016		Changing ratio	
	In	Out	In	Out	In	Out	In	Out
4	55,504	53,760	53,652	53,312	55,512	56,856	0.07	2.91
9	104,856	97,922	112,425	98,106	108,791	99,979	1.99	1.05
35	59,304	55,968	59,724	57,147	58,163	56,787	-0.95	0.74
338	35,095	36,502	35,418	36,121	36,472	39,327	1.95	-0.04
340	37,537	35,140	37,953	35,677	37,930	36,007	0.52	1.23
West	58,459	55,858	59,834	56,073	59,374	57,791	0.79	1.72



Statistic of bridge administration

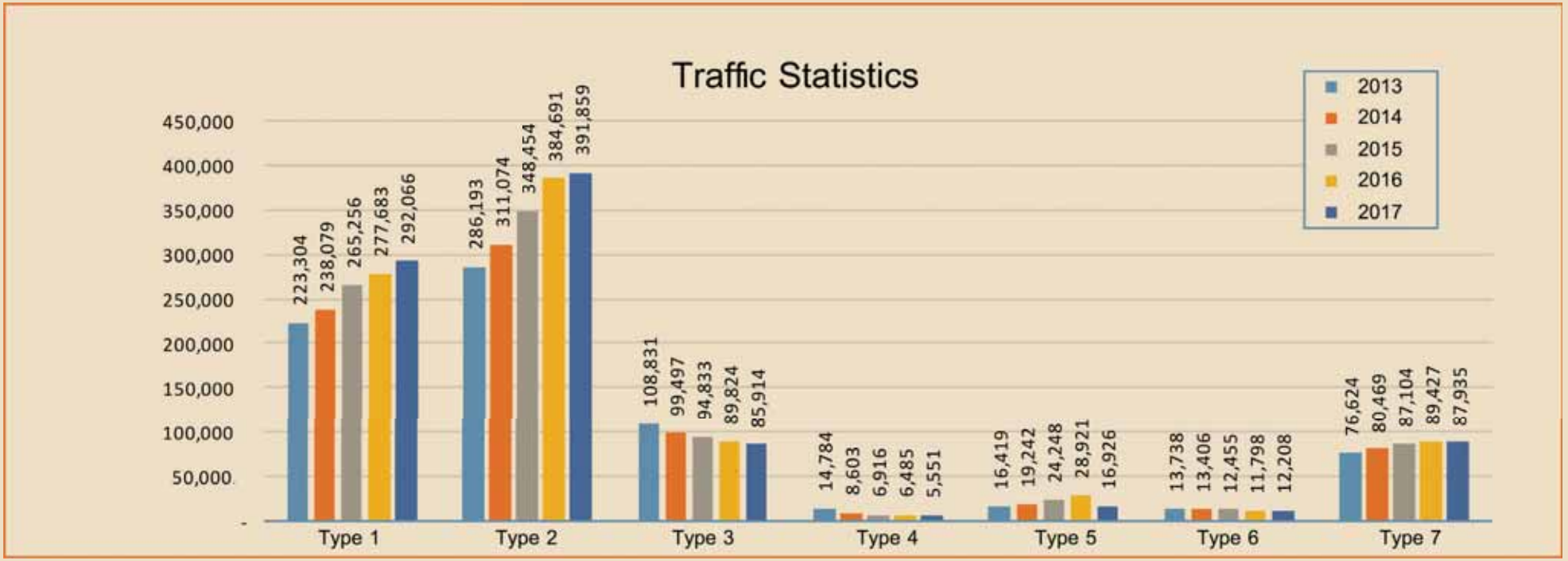
Total DOH's Bridges and Bridges Under DOH's Responsibility

Bridges under Bridge Construction and Rehabilitation Centers	Bridge Types	Total (Bridges)
Bridge Construction and Rehabilitation Center 1 (Pichit)	Slab Type	1,893
	Plank Girder	962
	I-Girder	99
	Box Girder	157
	Others	165
Bridge Construction and Rehabilitation Center 2 (Khon Kean)	Slab Type	1,984
	Plank Girder	1,208
	I-Girder	110
	Box Girder	128
	Others	387
Bridge Construction and Rehabilitation Center 3 (Patum Thani)	Slab Type	2,301
	Plank Girder	1,969
	I-Girder	369
	Box Girder	257
	Others	393
Bridge Construction and Rehabilitation Center 4 (Nakhon Si Thammarat)	Slab Type	1,972
	Plank Girder	770
	I-Girder	103
	Box Girder	145
	Others	123
Total Bridges		15,495

Remarks
1. Last inspection in 2015 (Rehabilitate plan must be revised)
2. Budget is exclude Factor F
3. Material price based on 2013
4. Exclude basement rehabilitation due to work suistability consideration

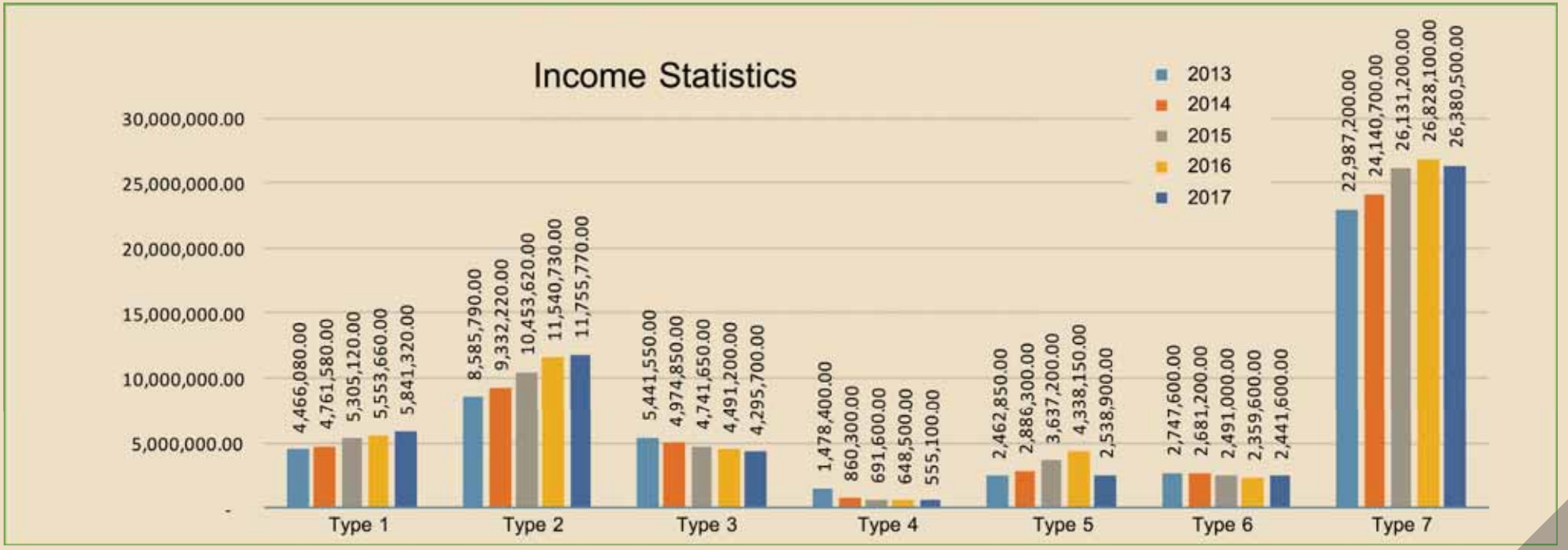
Traffic Statistics Frindship Bridge (Nong Khai-Vientiane) in fiscal year 2013 - 2017

Year/Car Types	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	Type 7	Total
2013	223,304	286,193	108,831	14,784	16,419	13,738	76,624	739,893
2014	238,079	311,074	99,497	8,603	19,242	13,406	80,469	770,370
2015	265,256	348,454	94,833	6,916	24,248	12,455	87,104	839,266
2016	277,683	384,691	89,824	6,485	28,921	11,798	89,427	888,829
2017	292,066	391,859	85,914	5,551	16,926	12,208	87,935	892,459

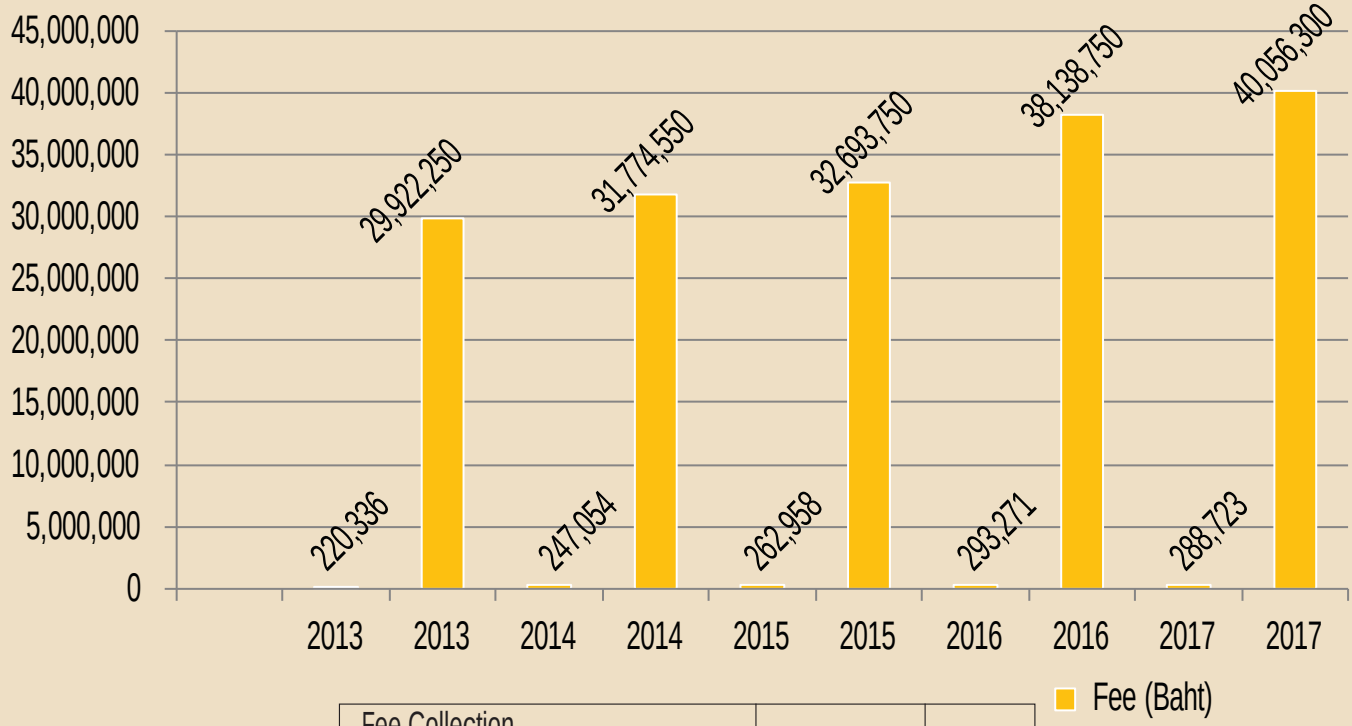


Income Statistics Frindship Bridge (Nong Khai-Vientiane) in Fiscal Year 2013 - 2017 According to Vehicle Types

Year/Car Types	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	Type 7	Total
2013	4,466,080.00	8,585,790.00	5,441,550.00	1,478,400.00	2,462,850.00	2,747,600.00	22,987,200.00	48,169,470.00
2014	4,761,580.00	9,332,220.00	4,974,850.00	860,300.00	2,886,300.00	2,681,200.00	24,140,700.00	49,637,150.00
2015	5,305,120.00	10,453,620.00	4,741,650.00	691,600.00	3,637,200.00	2,491,000.00	26,131,200.00	53,451,390.00
2016	5,553,660.00	11,540,730.00	4,491,200.00	648,500.00	4,338,150.00	2,359,600.00	26,828,100.00	55,759,940.00
2017	5,841,320.00	11,755,770.00	4,295,700.00	555,100.00	2,538,900.00	2,441,600.00	26,380,500.00	53,808,890.00

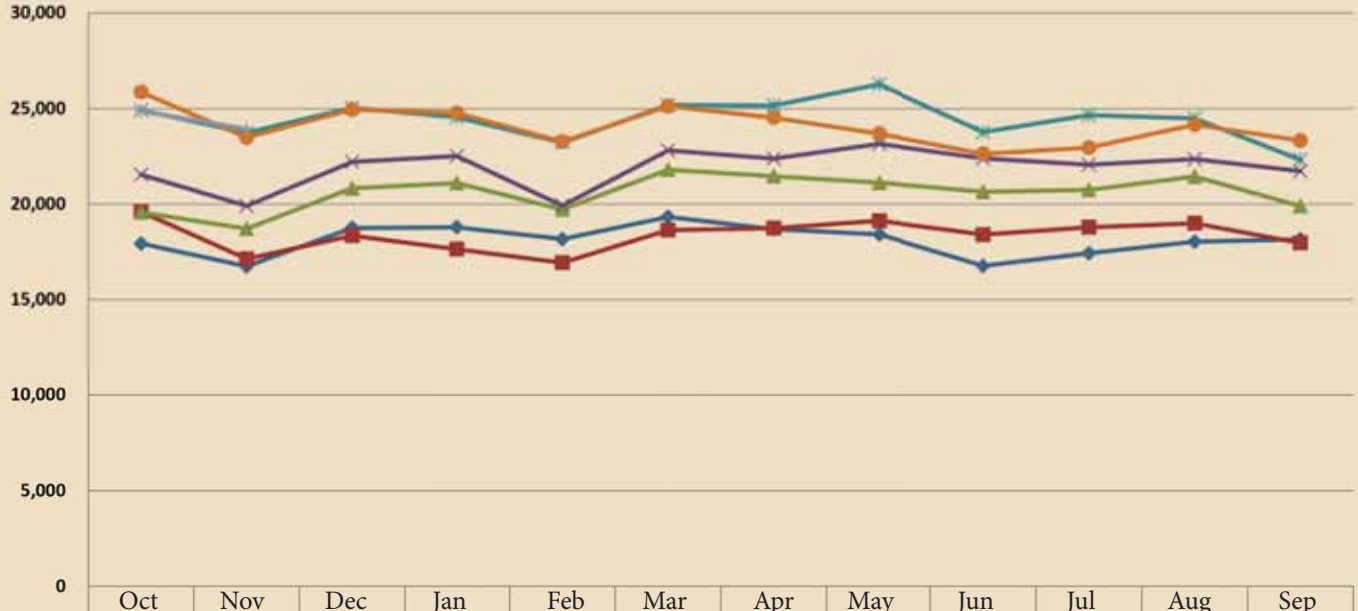


Toll Fee Collection and Traffic Statistics for Friendship Bridge 2
Fiscal Year 2013 - 2017



Fee Collection (2013 – 2017)	173,898,242	Baht
Traffic Statistics in 2013 - 2017	1,312,342	Vehicles

Traffic Statistics , The 2nd Friendship Bridge (Mukdahan - Sawannakhet)
from fiscal year 2012 - fiscal year 2018



	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2012	17,934	16,743	18,755	18,787	18,168	19,334	18,682	18,417	16,765	17,432	18,031	18,154
2013	19,600	17,141	18,349	17,648	16,929	18,640	18,740	19,131	18,405	18,790	18,999	17,964
2014	19,566	18,714	20,828	21,101	19,727	21,806	21,459	21,121	20,650	20,747	21,441	19,894
2015	21,542	19,904	22,209	22,514	19,920	22,812	22,380	23,149	22,389	22,061	22,351	21,727
2016	24,910	23,734	25,039	24,539	23,216	25,179	25,164	26,273	23,764	24,653	24,481	22,319
2017	25,865	23,484	24,945	24,767	23,268	25,119	24,525	23,689	22,628	22,954	24,154	23,325
2018	24,863	23,935										

Toll Fee collection of the 2nd Friendship Bridge (Mukdahan - Sawannakhet) from fiscal year 2012 - fiscal year 2018



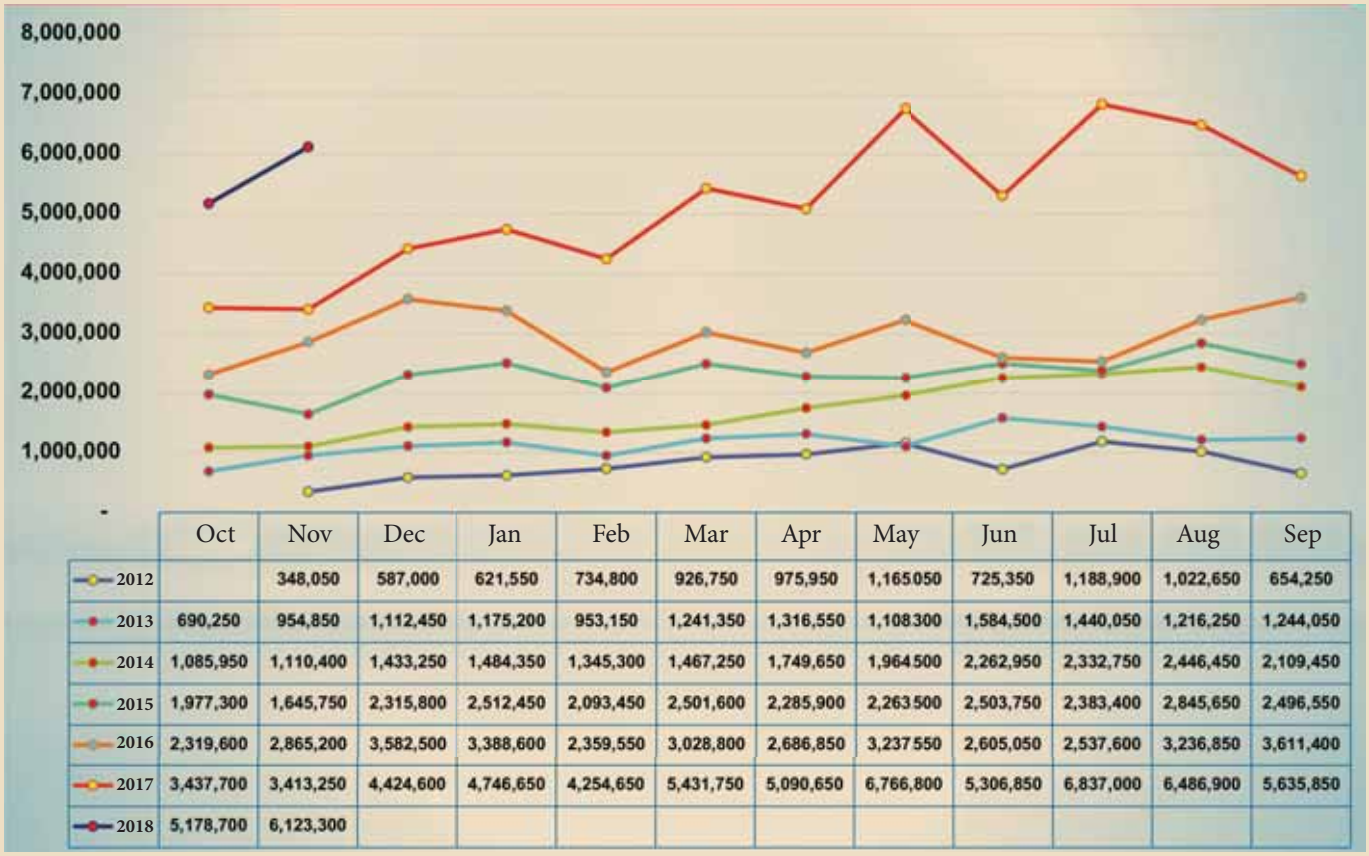
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2012	2,256,750	2,390,550	2,726,900	2,683,650	2,755,500	2,945,700	2,629,300	2,761,900	2,395,350	2,475,850	2,500,550	2,334,600
2013	2,748,900	2,497,550	2,434,150	2,500,100	2,290,750	2,626,750	2,421,700	2,774,900	2,518,200	2,404,950	2,333,700	2,370,900
2014	2,507,950	2,549,350	2,721,050	2,758,900	2,420,550	2,457,700	2,400,800	2,895,800	2,943,850	2,823,850	2,725,250	2,569,500
2015	2,771,950	2,544,450	2,890,200	2,764,350	2,334,150	2,756,350	2,610,150	3,207,000	3,113,350	2,623,200	2,559,050	2,519,550
2016	3,140,800	3,263,150	3,179,400	3,106,500	2,746,300	3,320,400	3,135,550	3,819,900	3,081,100	3,127,750	3,236,050	2,981,850
2017	3,712,900	3,469,250	3,319,650	3,358,050	3,390,950	3,746,500	3,090,100	3,340,000	3,097,450	2,978,750	3,334,450	3,218,250
2018	3,390,450	3,565,200										

Vehicle Statistics on Friendship Bridge 3 in Fiscal Year 2012 - 2018



	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2012		2,536	3,271	3,575	3,992	4,438	4,765	5,356	4,157	5,487	5,133	4,015
2013	4,548	4,936	5,923	6,198	5,671	6,398	6,648	6,176	7,499	7,104	6,546	6,357
2014	6,633	6,254	7,642	8,119	7,642	8,302	9,087	9,088	9,657	9,910	10,164	9,023
2015	9,584	8,234	10,105	10,689	9,892	11,034	10,569	10,651	10,849	11,036	12,108	10,999
2016	11,790	11,987	14,189	13,833	11,944	13,253	12,573	13,860	12,193	12,503	13,494	13,691
2017	14,305	13,342	16,182	17,017	15,332	17,942	17,024	20,315	17,349	20,770	20,006	18,173
2018	17,177	18,559										

Toll Fee Collection for Friendship Bridge 3 Nakhon Phanom - Khammuan in Fiscal Year 2012 - 2018



	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2012		348,050	587,000	621,550	734,800	926,750	975,950	1,165050	725,350	1,188,900	1,022,650	654,250
2013	690,250	954,850	1,112,450	1,175,200	953,150	1,241,350	1,316,550	1,108300	1,584,500	1,440,050	1,216,250	1,244,050
2014	1,085,950	1,110,400	1,433,250	1,484,350	1,345,300	1,467,250	1,749,650	1,964500	2,262,950	2,332,750	2,446,450	2,109,450
2015	1,977,300	1,645,750	2,315,800	2,512,450	2,093,450	2,501,600	2,285,900	2,263500	2,503,750	2,383,400	2,845,650	2,496,550
2016	2,319,600	2,865,200	3,582,500	3,388,600	2,359,550	3,028,800	2,686,850	3,237550	2,605,050	2,537,600	3,236,850	3,611,400
2017	3,437,700	3,413,250	4,424,600	4,746,650	4,254,650	5,431,750	5,090,650	6,766,800	5,306,850	6,837,000	6,486,900	5,635,850
2018	5,178,700	6,123,300										

Vehicle Statistics for Friendship Bridge 4 in Fiscal Year 2014 - 2017



Vehicle Statistics for Friendship Bridge 4 (2014 – Sep 2017)	223,437	Vehicles

Toll Fee Collection for Friendship Bridge 4 in Fiscal Year 2014 - 2017



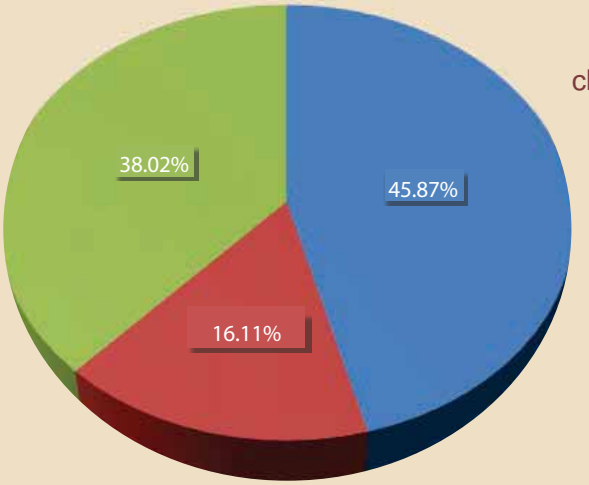
Toll Fee Collection for Friendship Bridge 4 in 2014 - 2017	70,500,300.00	Baht

Quantity of truck over weight control

The prosecution results of overloaded vehicles in 2017

Details	Amount (Person)
Total of monitoring overloaded vehicles around the country	4,454
Pending judgment	1,258
Case in process	3,196
Prosecution results	
Fine	1,695
Imprisonment	193
Both imprisonment and fine	1,308

Statistic of machine

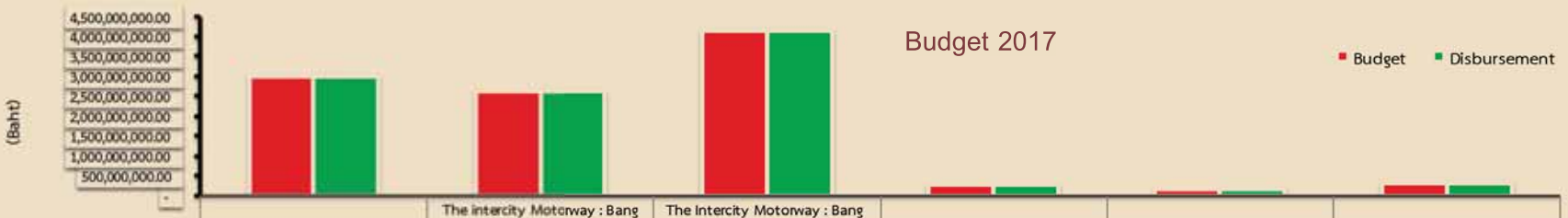


Machanines and Equipment, classified by lifetime, fiscal year 2017

- Machine and Equipment with standard lifetime
- Machine and Equipment with 1-1.5 times of standard lifetime
- Machine and Equipment with more than 1-1.5 times of standard lifetime

Graph of Land Acquisition budget

Fiscal year 2017					
Lists	Budget	Disbursement	%	Balance	%
Land acquisition costs to construct highways around the country	3,000,000,000.00	2,999,210,179.25	99.97%	789,820.75	0.03%
The intercity Motorway : Bang Pa In - Saraburi - Nakhon Ratchasima -Annual Budget 2,120,000,000 Baht - Central Budget 500,000,000 Baht	2,620,000,000.00	2,620,000,000.00	100.00%	-	0.00%
The Intercity Motorway : Bang Yai - Ban Pong - Kanchanaburi -Annual Budget 1,773,744,000 Baht -Central Budget 1,842,000,000 Baht -Transfer 516,000,000 Baht	4,131,744,000.00	4,131,744,000.00	100.00%	-	0.00%
The Intercity Motorway : Pattaya - Map Ta Phut	299,957,479.00	299,957,479.00	100.00%	-	0.00%
The highway : Amphoe Aranya Prates - Thailand/Cambodia Border	174,320,000.00	174,320,000.00	100.00%	-	0.00%
The highway : Bridge over Moei River Amphoe Mae Sot	326,863,521.00	321,739,720.90	98.43%	5,123,800.10	1.57%
Total	10,552,885,000.00	10,546,971,379.15	99.94%	5,913,620.85	0.06%



	Land acquisition costs to construct highways around the country	The intercity Motorway : Bang Pa In - Saraburi - Nakhon Ratchasima -Annual Budget 2,120,000,000 Baht - Central Budget 500,000,000 Baht	The Intercity Motorway : Bang Yai - Ban Pong - Kanchanaburi -Annual Budget 1,773,744,000 Baht -Central Budget 1,842,000,000 Baht -Transfer 516,000,000 Baht	The Intercity Motorway : Pattaya - Map Ta Phut	The highway : Amphoe Aranya Prates - Thailand/Cambodia Border	The highway : Bridge over Moei river Amphoe Mae sot
Budget	3,000,000,000.00	2,620,000,000.00	4,131,744,000.00	299,957,479.00	174,320,000.00	326,863,521.00
Disbursement	2,999,210,179.25	2,620,000,000.00	4,131,744,000.00	299,957,479.00	174,320,000.00	321,739,720.90
	99.97%	100%	100%	100%	100%	98.43%

(List)

***Disbursement 2017 Total 99.94%



Statistic of medical

Summary of clients according to welfare category

Welfare category	Number of client
Civil servant	1,139
Permanent staffs	269
Government employees	223
Temporary staff	288
Family	99
Total number	2,018

Diagnosis statistics

No.	Disease	Number of patients
1	Diabetes	81
2	Hypertension	731
3	Dyslipidemia	67
4	Flu	1,280
5	Gastritis	188
6	Rash	185
7	Conjunctivitis	72
8	Migraine/dizziness	149
9	Asking for medicine	947
10	Diarrhea	183

Operation Highway Projects 2016



Planning for Highway Development

Highway Planning is another crucial task of the Department of Highways (DOH). It comprises creation and analysis of various transportation strategies, policies, development directions, goals and highway feasibility studies. The planning process includes short and long term strategies, which serve as a selective framework of project prioritization. A strategic investment plan is mostly developed from project's feasibility studies, analyses of engineering and environmental impact, traffic demand analysis, budgeting allocation plan, loans and other sources of fund, like Public Private Partnership (PPP). The project planning is also used as a monitoring tool during the project construction and as a post-evaluation measure

after the completion of the project. The end result could emphasize planers to realize values of project implementation, as well as its problems and obstacles.

In the fiscal year B.E. 2560 (2017), the DOH has implemented highlight activities associated with highway development planning as follows:

1. The Public Private Partnership (PPP) for Operation and Maintenance of the Bang Pa In – Nakhon Ratchasima and Bang Yai – Kanchanaburi Motorways

Since the cabinet resolution on 14th July 2015, the DOH has continuously preceded the construction of the Bang Pa In – Nakhon Ratchasima and Bang Yai – Kanchanaburi Motorway Projects. Until now both projects have been under construction and planned to finish 2020.

To reduce agency's budget and management burdens, the cabinet on 8th March 2016 approved the DOH to implement the Public Private Partnership (PPP) for Operation and Maintenance of the Bang Pa In – Nakhon Ratchasima and Bang Yai – Kanchanaburi Motorways, including their rest area development. Thereafter, the DOH conducted the investment study and prepared the project appraisal reports in accordance with Private Investments in State Undertakings Act B.E. 2556 (2013). On 22nd August 2017, the appraisal reports were approved by the cabinet. By that approval PPP scheme, the private is to take responsibility for the design and construction of motorway facilities. These and the toll revenue would be felt to the DOH. The private party is about to operate and maintain the entire facilities of the project, including those constructed by the DOH and facilities developed by the private party itself with the maximum period of 30 years. In turn, the DOH will pay the availability payment to the private party for its facility construction cost, operation and maintenance. Presently, the DOH is executing the PPP selection process of both projects, according to the Section 5 of the Private Investments in State Undertakings Act B.E. 2556 (2013), with the contract singing during the end of year 2018.

2. The Public Private Partnership (PPP) for New Intercity Motorways

The motorway link: Nakhon Pathom – Cha Am and Hat Yai – Thailand/Malaysia Border are two important projects that were included into the PPP Strategic Plan 2015 – 2019 of State Enterprise Policy Office (SEPO), Ministry of Finance and the priority projects of the Ministry of Transport 2017.

For the past year, the DOH has conducted the PPP studies, which follows the procedure of the Private Investments in State Undertakings Act B.E. 2556 (2013). Presently, the DOH is about to conclude the final investment plan and submit the project proposals for their approvals.

◆ The motorway link: Nakhon Pathom – Cha Am

The motorway link: Nakhon Pathom – Cha Am is designed to meet the Motorway standard, which could potentially help reduce traffic congestion on Phetchkasem Road, the only arterial to the southern part of Thailand. After completion, it could also buttress the economic boost of the Bangkok suburb areas, Western and South regions of Thailand, and create the positive impact toward job creation, tourism industry and relating business sectors. The project is designed to be 4-lane closed motorway system with fully controlled access and approximately 109 kilometers.

◆ The motorway link: Hat Yai – Thailand/Malaysia Border

The motorway link: Hat Yai – Thailand/Malaysia Border is design to connect the Hat Yai and Sadao special economic zone to the Thailand/Malaysia border, which holds the highest border trade value of all. The project will serve as the new option of travel between Thailand and Malaysia borders to support the international trade in the areas, and create the positive impact toward job creation, tourism industry and relating business sectors. The project is designed to be 4-lane closed motorway system with fully controlled access and approximately 70 kilometer.

3. The Nakhon Ratchasima – Khon Kaen Intercity Motorway

For the past year, the DOH has initiated the Nakhon Ratchasima – Khon Kaen Intercity Motorway by starting the project Feasibility study. The project is considered as another priority among that of the Intercity Motorway Master Plan, according to the cabinet resolution on 22 April 1997. The route alignment is the extent section of the Bang Pa In – Nakhon Ratchasima Intercity Motorway, which heads toward the North-East in parallel with the National Highway No. 2 and ends at the Khon Kaen Province with a total length of 180 kilometers approximately. The project would serve as the optional arterial of the National Highway No. 2 and create the positive impact toward job creation, tourism industry and relating business sectors in the North Eastern area, with its connectivity to the Indochina region.

4. The Tak – Mae Sot Intercity Motorway

Nowadays, the Tak – Mae Sot Border, locating one special economic zone, creates more than 60 billion of border trade per annum with a yearly growth of 37 percent. However, the current national highway connecting between them has faced its difficult route alignment because of the mountainous terrain in the area. The tunnel construction, which is part of the motorway, is one sustainable resolution to punch the barrier, which in turn could accelerate the positive impact toward job creation, tourism industry and relating business sectors especially in the special economic zone. Presently, the DOH is conducting the feasibility study of the Tak – Mae Sot Border Intercity Motorways.

5. 4-lane National Highway Extension phase 1

After the completion of the 4-lane National Highway Extension phase 1 in 1996, the cabinet approved the DOH to continue the 2nd phase of the national highway extension, including 11 routes. Presently, the DOH has completed the national highway extension phase 2 for 5,247.5 kilometer, as follows.

1. Network 1: Nakhon Sawan – Phitsanulok – Denchai – Phrae – Ngao
2. Network 2: Mae Sot – Tak – Sukhothai – Phitsanulok – Lom Sak - Chum Phae - Khon Kaen – Kalasin - Mukdahan
3. Network 3: Saraburi – Phetchabun – Lom Sak - Loei
4. Network 4: Ban Hin Kong - Nakhon Nayok - Prachin Buri – Aranyaprathet – Thai/Cambodia Border
5. Network 5: Nakhon Pathom - Suphan Buri – Pa Mok – Saraburi
6. Network 6: Nakhon Sawan – Chaiyaphum – Ban Phai - Maha Sarakham - Roi Et – Yasothon - Ubon Ratchathani - Chong Meg
7. Network 7: Sattahip - Phanom Sarakham - Kabin Buri - Pak Thong Chai – Nangrong – Prasat - Ubon Ratchathani - Mukdahan
8. Network 8: Surat Thani - Nakhon Si Thammarat - Songkhla - Hat Yai
9. Network 9: Phuket – Phangnga – Krabi – Trang - Phatthalung
10. Network 10: Loei – Udon Thani - Sakon Nakhon - Nakhon Phanom
11. Network 11: Other routes, including Link: Saklek – Wangthong, Sukhothai – Sawankalok, Sikhio – Chaiyaphum, Kaeng Khro - Chum Phae, Chumphon – Ranong, Surat Thani - Phangnga

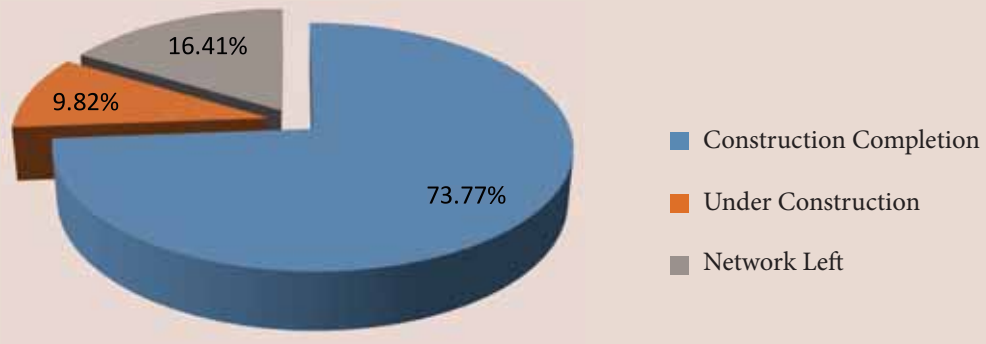
The current status of the project is as follows.

Distance: Kilometer

Network	Construction Completion	Under Construction	Network Left	Total Length
1	465.54	41.53	56.54	563.61
2	582.54	169.82	80.73	833.09
3	276.32	-	102.83	379.15
4	167.15	-	28.85	196.00
5	194.61	-	34.63	229.24
6	300.82	-	358.36	659.19
7	758.18	132.91	27.40	918.49
8	304.02	39.14	-	343.16
9	354.94	31.80	-	386.74
10	216.48	-	101.55	318.03
11	250.58	100.05	70.16	420.80
Total	3,871.18	515.25	861.05	5,247.50
Percentage	73.77	9.82	16.41	100.00

Status: October 2017

Status Diagram
(Km.)



6. The Budget Planning

For each year, the DOH has to propose the budgetary planning for highway development projects to the Bureau of the Budget (BB). In 2017, the DOH submitted the project list under the Thailand's Transportation Infrastructure Strategic Plan to the BB, namely:

6.1 Major Construction Projects

These large construction projects have followed the highway development master plan, with respect to the national development strategies. In the fiscal year 2017, the DOH has been allocated the budget to 38 new construction projects, which are consisted of:

No.	Project / Plan	Amount (Projects)	Construction Cost (Mil. Baht)	Budget received in 2016 (Mil. Baht)
1	Major highways rehabilitation	2	1,150	230
2	The rail road crossing bridges	6	1,895	379
3	The national highway development	26	23,190	4,768
3.1	National highway construction	8	5,100	1,020
3.2	Bridge and Tunnel construction	3	2,150	430
3.3	Bangkok and suburb traffic congestion improvement	2	270	54
3.4	Construction of four-lane highway widening projects	6	6,270	1,254
3.5	Highway development for multimodal transportation	3	1,800	490
3.6	International highway development	4	7,600	1,520
4	The national highway development in the special economic zones and borders	4	5,300	1,060
	Total	38	31,535	6,437

6.2 Minor Highway Improvement Projects

These highway improvement and construction projects can be completed in a short period (less than 1 year) and required less budget. These projects are to remedy and alleviate highway deterioration in some areas, such as a congestion problem in an urban area, which are spread across all regions of the country. Each activity/project has a specific aim for implementation.

The objective of Highway Improvement for Community Area is to improve highway capacity in urban areas by raising their standard levels. They could result in increased level of service, environmental impact toward communities, road safety and economic boost.

Due to the budget limitation, the nation could not implement the major highway development or rehabilitation at once. To solve this limitation problem, the DOH has executed the minor highway improvement project or Highway Efficiency Improvement Project to cover a shorter distance of highway to alleviate traffic congestion at certain spots. It requires fewer budgets and is distributed across all regions of the country to solve the upfront problem. This type of problem has been increased due to the urbanization of the rural areas, which affects the demand economic patterns.

The purpose of Construction of Interchange Bridge and tunnel projects is to improve and strengthen drainage structures including bridges, reinforced concrete square pipes, round pipes, gutters and other structures that could enhance drainage capacity in a right of way. The project also includes a restoration of drainage structures.

In the fiscal year B.E. 2560 (2017), the budget details are as followed:

NO	Project / Plan	Total Plan	
		Amount (Project)	Budget (Mil. Baht)
1	Highway Improvement for Community Area	69	1,000.00
2	Highway Efficiency Improvement	102	1,500.00
3	Construction of Interchange Bridge and tunnel	40	300.00
Total		211	2,800.00

International Highways Development

1. International Highways Cooperation

The Department of Highways (DOH) has become a prominent organization in developing safe and convenient highways that thoroughly connect Thailand and all neighboring countries in the region. DOH began to play a leading role in the development of international highways since 1997. The development of ASEAN highways is an important achievement of DOH. The important missions are the development of ASEAN Highway Networks and the establishment of road and sign design standards. At present, ASEAN highway signs were installed on every designated ASEAN highways in Thailand. In addition, DOH has been a part of the development projects of many important roads and bridges between Thailand and neighboring countries. The development of the connecting roads is under three significant sub-region economics development frameworks for instance, Greater Mekong Subregion Economic Cooperation (GMS), Ayeyawady - Chao Praya - Mekong Economic Cooperation Strategy (ACMECS), and Indonesia - Malaysia - Thailand Growth Triangle (IMT-GT). The backgrounds and accomplishments of international highways cooperation of DOH are as follows;

1.1 ASEAN Highway Project (AH)

Background

After the 2nd ASEAN Transport Ministers Meeting on the 28th February 1997, the Ministry of Transport assigned DOH to do the draft report in regulating the ASEAN Highway Network principles, and present the report to the next meeting in Cebu, Philippines. In September 1997, the meeting was agreed to the principles of ASEAN Highways development project that DOH presented and appointed Thailand to be a focal point on carry out the project. Therefore, DOH has served as a chairperson of the ASEAN Highway Working Group since then. Currently, the ASEAN Highway Network is being set up in ten member countries, totaling 23 routes with total distance of 37,000 kilometers (km.) and there are twelve routes in Thailand with total distance of 6,731 km.

The Accomplishments on ASEAN Highways Development Project

Thailand by DOH is being a chairperson of ASEAN Highway Experts Group since 1997. The main purposes are for developing the ASEAN Highway Network and establishing international transportation routes between ten member countries. As a result, DOH is ready to cooperate and execute technical works in ASEAN Highway development for example, planning the ASEAN Highway infrastructure development plan, forming the ASEAN Highway design standards, setting the installation standards of the traffic signs on ASEAN highways, including training the personnel of ASEAN member countries in according with the ASEAN Strategic Transport Plan (ASTP) or Brunei Action Plan (BAP) 2011 - 2015. From such readiness, DOH has a vision to locate ASEAN Highway Centre at DOH for the sustainable development of ASEAN Highway Network in the future.

In the ASEAN Highway cooperation framework, the Ministerial Understanding on the development of the ASEAN Highway Network project was signed in Hanoi, Vietnam in 1999. The strategic plan for the development of the ASEAN Highway Network was composed and categorized in three phases below;

Stage 1 : Year 2000

- Completed the specification of ASEAN Highway Network in each ASEAN member country.

Stage 2 : Year 2004

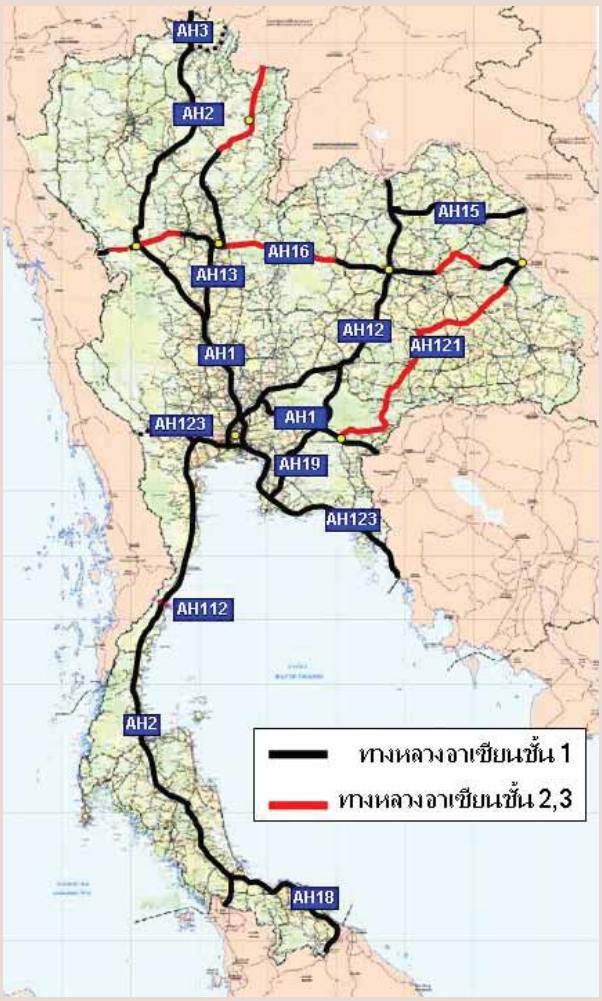
- All designated ASEAN highways in all ASEAN member countries were upgraded to, at least, Class III standard. The road signs must be installed on those routes and all of the unconnected roads should be constructed. All border points were opened.

Stage 3 : Year 2020

- The designated highways of each ASEAN countries will be upgraded to Class I standard or Primary standard, but for low-traffic and non-arterial routes will be upgraded to Class II standard.



ASEAN Highway Signs in Thailand



ASEAN Highway Network in Thailand

Details of all 12 routes of designated ASEAN Highway Network in Thailand

No.	Details	Distance (Km.)
AH1	Ban Khlong Luek (Thailand and Cambodia Border) – Aranyaprathet – Sa Kaeo – Kabin Buri – Prachinburi – Nakhon Nayok – Hin Kong – Bangkok – Ang Thong – Singburi – Chainat – Nakhon Sawan – Kamphaeng Phet – Tak – Mae Sot (Thailand and Myanmar Border)	697.4
AH2	Sadao (Thailand and Malaysia Border) – Ban Khlong Ngae – Ban Kho Hong – Ban Koo Ha – Phatthalung - Amphoe Tung Song - Amphoe Waeng Sa – Amphoe Chaiya - Amphoe Lamae – Chumphon - Amphoe Tha Sae - Amphoe Bang Saphan Noi – Prachup Khirikan - Amphoe Pran Buri – Amphoe Cha-am – Phetchaburi – Amphoe Pak Tho – Nakhon Pathom – Bangkok - Amphoe Bang Pa-in – Tak - Amphoe Thoen – Lampang - Amphoe Ngao - Phayao – Chiang Rai – Mae Sai (Thailand and Myanmar Border)	2,010.0
AH3	Amphoe Chiang Khong (Thailand and Lao PDR Border) – Ban Tha Thalat – Ban Hua Doi – Chiang Rai	114.8
AH12	The 1st Thailand – Lao PDR Friendship Bridge - Nongkhai - Udonthani – Amphoe Namphong – Khonkaen – Amphoe Ban Phai – Amphoe Phon – Nakhon Ratchasima – Amphoe Sikhio – Amphoe Muak Lek – Saraburi – Hin Kong	558.7
AH13	Huai Kon (Thailand and Lao PDR Border) – Nan – Phrae – Den Chai – Uttaradit – Phitsanulok – Sam-ngam – Nakorn Sawan	577.4
AH15	Nakhon Phanom (Thailand and Lao PDR Border) – Ban That Na Waeng (Sakon Nakhon) – Amphoe Phang Khon - Amphoe Sawang Daen Din – Udonthani	239.2
AH16	Mukdahan (Thailand and Lao PDR Border) – Amphoe Nong Sung – Amphoe Somdet – Kalasin – Yang Talat – Khonkaen – Amphoe Nam Nao – Amphoe Lom Sak – Ban Yang – Amphoe Wangthong - Phitsanulok – Sukhothai – Tak	688.5

Details of all 12 routes of designated ASEAN Highway Network in Thailand

No.	Details	Distance (Km.)
AH18	Amphoe Su-ngai Kolok (Thailand and Malaysia Border) - Amphoe Tak Bai – Narathiwat – Amphoe Saiburi - Amphoe Pha Lat – Pattani - Amphoe Nong Chik - Amphoe Thepha - Amphoe Chana – Amphoe Hat Yai	263.4
AH19	Amphoe Pak Thong Chai - Amphoe Kabin Buri - Amphoe Plaeng Yao – Laemchabang Port - Chonburi – Bangkok	391.4
AH112	Amphoe Khlong Loy - Amphoe Bang Saphan	33.1
AH121	Mukdahan – Amnat Charoen – Yasothon – Amphoe Suwannaphum – Amphoe Phayakkhaphum Phisai – Buriram – Nang Rong – Ban Som Poi - Ban Chong Ta Kho – Sa Kaeo	537.8
AH123	Ban Bo Nam Phu Ron (Thailand and Myanmar Border) – Kanchanaburi – Nakhon Pathom - Bangkok – Samutprakan – Chonburi – Laemchabang Port – Map Ta Phut Industrial Estate - Rayong - Amphoe Klaeng - Chanthaburi – Trat – Amphoe Hat Lek	619.9
	Total	6,731.5

Thailand by DOH has implemented ASEAN Highway Network project at Stage 2. The ASEAN Highway Network in Thailand consists of 12 routes: AH 1, AH 2, AH 3, AH 12, AH 13, AH 15, AH 16, AH 18, AH 19, AH 112, AH 121, and AH 123. The total length of ASEAN Highway Network in Thailand is 6,731 km. There is 5,388 km. (80%) of routes in Class I standard and in Primary Road standard and there is 1,333 km. (20%) of routes in Class 3 standard. In addition, ASEAN Highway Signs are completely installed since 2010.

Nowadays, DOH is implementing ASEAN Highway Network project at Stage 3 (Completion year is in 2020). The goal of the development in this stage is to upgrade all designated national routes to at least Class I or Primary Road standards, but for non-arterial routes, the Class II standard are acceptable. All the logistic routes across the borders are our priority. Hence, in the near future, Thailand should have policy to upgrade the ASEAN Highways to be Inter-City Motorways and link to the High-speed Rail network. This will facilitate international transportation, increase safety in transportation, and support the more effective logistics system of Thailand.

1.2 Greater Mekong Subregion Economic Cooperation (GMS)

Background

In the year 1992, Asian Development Bank (ADB) had studied the Development Master Plans of the Greater Mekong Subregion (GMS) countries: Thailand, Lao PDR, Cambodia, Vietnam, Myanmar, and Yunna and Guangxi (Southern China). All GMS countries are classified into three Economic Corridors. Although, in the year 2007, the nine Economic Corridors was established in order to cover more potential areas in the region.



Three Economic Corridors, 1992



Nine Economic Corridors, 2007

Accomplishment

From the above Economic Corridor concept, the road network in Thailand that linked to neighboring countries has been improved as the following projects;

- the construction of the 2nd Thailand-Lao PDR Friendship Bridge (Mukdahan - Savannakhet)
- the construction of the 4th Thailand-Lao PDR Friendship Bridge (Chiang Khong - Huay Xai)
- the road upgrading from Chiang Rai - Amphoe Chiang Khong, the total length is about 100 km.
- R3 road construction in Lao PDR from Huay Xai - Boten, the total length is about 225 km.
- R3 road construction in China, express way from Boten -Kunming, the total length is about 700 km.
- the highway improvement to four-lanes from Bangkok – Chachoengsao - Kabin Buri – Arunyaprathet, the total length is about 310 km.
- the two-lanes road construction from Amphoe Phanom Sarakham – Sakaeo, the total length is about 72 km. and to be widening into four-lanes road in the future
- the highway improvement from Phitsanulok – Amphoe Lom Sak (widening two-lanes into four-lanes road)
- the construction of two-lanes Asphalt road in Cambodia from Poipet – Sisophon and from Koh Kong – Srae Ambel
- the road construction in Vietnam from Moc Bai (Cambodia border) – Ho Chi Minh – Vung Tau, the total length is about 140 km.
- the construction of Hai Van Tunnel in Danang, Vietnam
- the road improvement in Myanmar from Myawwaddy - Tenasserim Hills - Kawkareik, the toal length is about 46 km.



The 4th Thailand-Lao PDR Friendship Bridge

1.3 Ayeyawady – Chao Praya – Mekong Economic Cooperation Strategy (ACMECS)

Background

In 2003, Thailand initiated an economic cooperation strategy with its neighboring countries around the the Ayeyawady, Chao Praya, and Mekong rivers (Ayeyawady – Chao Praya – Mekong Economic Cooperation Strategy: ACMECS). The member countries in ACMECS are Myanmar, Thailand, Cambodia, and Lao PDR. The objectives of this cooperation are to reduce the economic gap between the countries and increase more economic prosperity together.

Accomplishment

- the Road Project between Thailand-Myanmar-India. Thailand had improved road in Myanmar from Myawwaddy - Tenasserim Hills - Kawkareik with total length at about 46 km.
- the road improvement in Kanchanaburi, Thailand for supporting the Dawei Port Development and Dawei - Kanchanaburi route in Myanmar
- the 2nd Sai River Bridge to support Twin Economic Cities Activity (Maesai - Tachileik)
- the road construction of Huai Kon/Muang Ngeun - Pak Beng, Lao PDR, 50 km.
- the bridge construction across Heung River (Loei - Xayaboury)
- the 3rd Thailand-Lao PDR Friendship Bridge (Nakhon Phanom - Khammouane)
- the Route no. 13 Construction Project from Nua – Sangkhalok Road, Luang Prabang, Lao PDR
- the Route no. 67 Construction Project from Chong Sa-Ngam - Anlong-Veng - Siem Reap

1.4 Indonesia – Malaysia – Thailand Growth Triangle (IMT-GT)

Background

IMT-GT was established in 1993 with the joint endorsement of the three leaders. ADB provided technical assistance in the feasibility study of the framework, scope of operation, and major of collaborations. Nowadays, it has expanded to cover fourteen provinces in southern Thailand, ten provinces in Indonesia (Aceh, North Sumatra, Sumatra, South Sumatra, Rye, Rye, Riyadh, Keelbe, Bengkulu, and Boulogne), and eight states in Malaysia (Penang, Kedah, Perlis, Kelantan, Selangor, Malacca, and Negeri Sembilan). It had divided into five Economic Corridors and DOH associated with the 1st, 2nd, and 5th corridors.

Accomplishment

- the construction of the Friendship Bridge Crossing the Golok River between Buketa in Thailand and Bukit Bugna in Malaysia
- the Bridge Crossing the Golok River between Tak Bai in Thailand and Pengkalan Kubur in Kalantan Project
- the 2nd Bridge Crossing the Golok River between Su-ngai Kolok in Thailand and Rantau Panjang in Kalantan Project
- Stun – Perlis Highway Project
- Stun – Wang Prachan Road Improvement Project
- Na Thawi - Ban Prakop (Songkhla Province) Road Improvement Project
- Hat Yai – Sadao Inter-City Motorway Project



The 3rd Thailand-Lao PDR Friendship Bridge





The Friendship Bridge Crossing the Golok River between Buketa and Bukit Bugna at Amphoe Waeng, Narathiwat Province

2. The Accomplishment in International Cooperation of B.E. 2560 budget year

2.1 "Joint Management Committee Meeting No.7 on Management, Maintenance and Usage of the Friendship Bridge Crossing the Golok River between Buketa in the Kingdom of Thailand and Bukit Bugna in Malaysia" - The meeting aimed to report on status of the bridge and consider the future rehabilitation project. The Working Committees of both sides agreed that the bridge is still in a good condition. However, the cracks on the Pier no. 8 (Thai side) should be investigated regularly. Furthermore, the meeting had agreed to install or repair the traffic signs on both sides of the bridge to be shown in three languages: Thai, Malay, and English.





2.2 "Joint Management and Maintenance Committee Meeting of the Thailand – Lao PDR Friendship Bridges" - The objective of the meeting is to consider the performance of both land and the rail in the four Thailand-Lao PDR Friendship Bridges areas, to ensure that the areas can be used efficiently and can be used at the max value by abiding to the rules and regulations of both countries.

2.3 "Project Coordinating Committee (PCC) and Joint Thailand – Cambodia Project Management Committee Meeting of the New Border Bridge at Nong Ian – Stung Bot" - The purpose is to coordinate the project, consider the bridge orientation, manage the safety on the Construction Zone (CZ), and set the machinery transit point. The working group was established to explore common areas and discuss issues of the transportation from the transit point to the construction site, the import of machinery and construction equipment, the border passing of personnel, and the safety management of CZ.





3. Conclusion

The Department of Highways plays a prominent role in the development of international highways in both the Subregion and the ASEAN region. Thailand by the Department of Highways has raised its role as a recipient to be a contributor of assistance in the development of international highways. In particular, Thailand has developed routes along the ASEAN Highway Network to meet ASEAN Highway Standards and can be linked nationally. Moreover, the road development project to connect with more than 37 neighbors is also implementing. There are two responsible organizations: the Department of Highways, Ministry of Transport, who is providing free cooperation/free assistance, and the Neighboring Countries Economic Development Agency (Public Organization), Ministry of Finance, who is providing loan assistances to the neighboring countries.

All of the abovementioned cooperation frameworks can be summarized as an overview of highway development project between Thailand and neighboring countries that will link and complete highway network in sub-region and the region, as



shown in the map above. This overview represents the important role of ASEAN cooperation, the preparation of roads and connectivity. These will foster economic development, social development, and stability in the region. The Department of Highways, as an infrastructure development unit, is responsible for taking the government's policy into effective practices and causing success results.

Material Analysis and Inspection

In 2017 Materials, Analysis and Inspection accomplished 5 outstanding tasks as follow.

1. Development of the Highway Engineering Archive "Highway Materials Quality Control for Portland Cement Concrete Pavement Construction"

Background

Portland Cement Concrete Pavement can resist rutting and distribute wheel loads to the underlying soil layers. Department of Highways, therefore, designed and constructed Portland cement concrete pavement on major highways with high traffic volume. To construct Portland cement concrete pavement to meet the standards, construction procedure has to be conformed to the engineering principles and, apart from that, quality control of materials used in the construction is also a vital part to make concrete pavement comply with standards and specifications. The quality control of materials requires experiences, judgement, observation, and problem-solving that is based on engineering rules. Bureau of Materials, Analysis and Inspection conceived a concept of gathering knowledge related to quality control of materials for Portland cement concrete pavement construction to be used as a guideline for quality control of Portland cement concrete pavement construction so that the quality of concrete roads will be conform to standards.

Implementation

Bureau of Materials, Analysis and Inspection set up a working group for Knowledge Sharing Project, Community of Practice. The knowledge from various sources were complied, documented, preliminary reviewed for correctness, and shared via Community of Practice (CoP) knowledge sharing activity. The knowledge were distributed to practitioners and related persons for study and trial in actual practices. The gathered information was summarized and then amended to make the knowledge correct and precise. The Highway Materials Quality Control for Portland Cement Concrete Pavement Construction Manual contains 6 main parts including; 1. Specifications for materials used in Portland cement concrete pavement construction according to Department of Highways' Standard Drawings, 2. Highway materials quality control for Portland cement concrete pavement construction, 3. Supervision of concrete mixture design, 4. Supervision of concrete mixing plants, 5. Supervision of construction in the field, 6. Road roughness survey.





Knowledge Sharing Activity, Community of Practice (CoP) "Highway Materials Quality Control for Portland Cement Concrete Pavement Construction"

Benefits

Bureau of Materials, Analysis and Inspection has finished developing the manual which will be used as a media for knowledge transferring and coaching in materials quality control for Portland cement concrete pavement construction to staffs and practitioners so that the practices will be unambiguous and in unison.



"Highway Materials Quality Control for Portland Cement Concrete Pavement Construction"Manual

2. Specification No. DH-SP 411/2017 "Specification for Performance-Graded Asphalt Binder Using Multiple Stress Creep Recovery (MSCR) Test"

Background

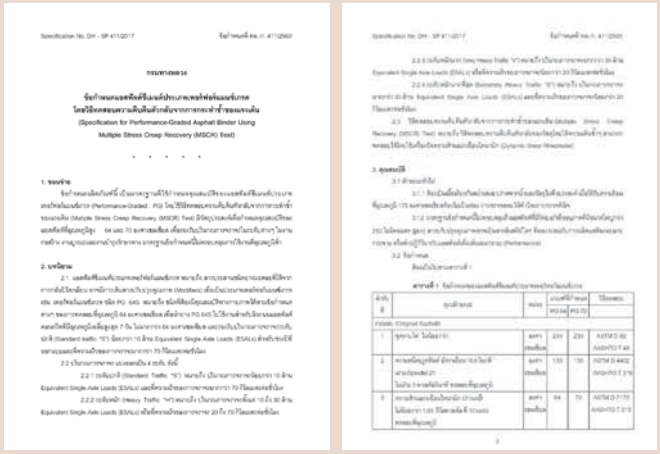
Asphalt is a hydrocarbon compound derived from petroleum distillation. Asphalt's components from various crude sources are different. Asphalt with some components such as wax is thermal susceptibility and stress susceptibility. When it is used as highway materials and subjected to repeated wheel loads, permanent deformation would occur such as rutting. When it is used as binder of pavement surface, durability would be a problem. To tackle these issues, the properties of performance grade asphalt cement were established for the first time by Strategic Highway Research Program (SHRP). Performance grade asphalt cement is specified from actual performance to categorize asphalt cement in performance grade. The properties of asphalt are defied by rheology and determined from its viscoelasticity. Performance Grade differs from Penetration Grade which controls softness at temperature of 25 °C and categorizes asphalt in Viscosity Grade which controls viscosity at various working temperatures such as 60 °C, 135 °C. Therefore, to determine the properties of asphalt cement at various test temperatures as well as determine actual performance of asphalt cement at working temperatures and traffic volume which varies from place to place, Bureau of Materials, Analysis and Inspection conceived a concept of implementing the Performance Grade Asphalt Cement in Department of Highways' highways.

Implementation

Bureau of Materials, Analysis and Inspection attempted to introduce asphalt classifying according to Performance Grading system in Department of Highways' constructions. Specification No. DH-SP 411/2017 "Specification for Performance-Graded Asphalt Binder Using Multiple Stress Creep Recovery (MSCR) Test" was developed and was approved by Department of Highways on 20 September 2017. Performance grade asphalt cement defies asphalt properties into 3 conditions including; 1. Before construction condition or original asphalt, 2. During construction condition or thin film which is tested by Rolling Thin Film Oven Test (RTFOT), 3. After construction condition which is tested by Pressurized Aging Vessel (PAV)

Benefits

Asphalt classification according to Performance Grading system would be an alternative method that improves and minimizes the drawbacks of asphalt classification according to conventional Penetration Grading system. Performance grading system can realistically defy the performance of asphalt cement at various working temperatures and traffic volumes so that highways in the responsible of Department of Highways would perform better in rutting resistance and fatigue cracking resistance.



Example of Specification No. DH-SP 411/2017 "Specification for Performance-Graded Asphalt Binder Using Multiple Stress Creep Recovery (MSCR) Test"

3. Design of Flexible Pavements with Cement Treated Base: CTB

Background

Department of Highways has constructed asphalt concrete pavements on Portland cement modified base course for more than 50 years. Many standards of Portland cement modified pavement layers were developed such as soil cement subbase, soil cement base, cement modified crushed rock base and pavement recycling. Nowadays, number of heavy vehicles is increasing but budget allocated for build and maintenance is limit. Bureau of Materials, Analysis and Inspection committed to find the approaches to enhance pavement strength with minor raise of construction cost by using Cement Treated Base: CTB

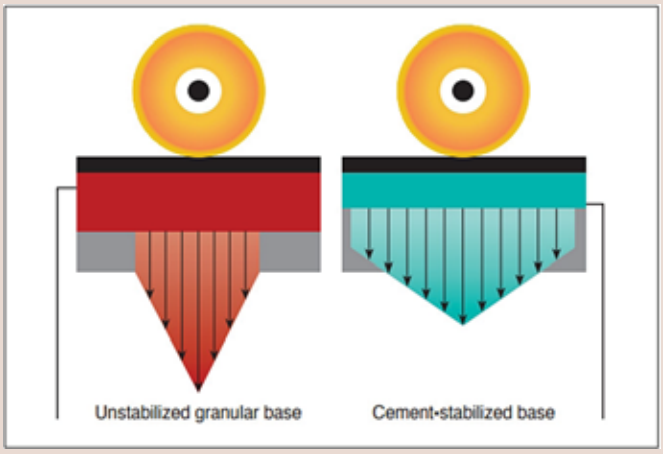
Implementation

Bureau of Materials, Analysis and Inspection developed a Special Provision and design pavement with Cement Treated Base: CTB for Highway No. 344 Section Ban Bueng District – Meeting Highway No. 331 (Nong Prue Junction) including Nong Chak Junction Overpass Construction Project. CTB layer possesses higher compressive strength and resilient modulus than soil cement base and cement modified crushed rock base courses. Moreover, it is rigid and can distribute loads to the underlying layers well resulting in pavements that can carry more heavy-vehicle traffic.

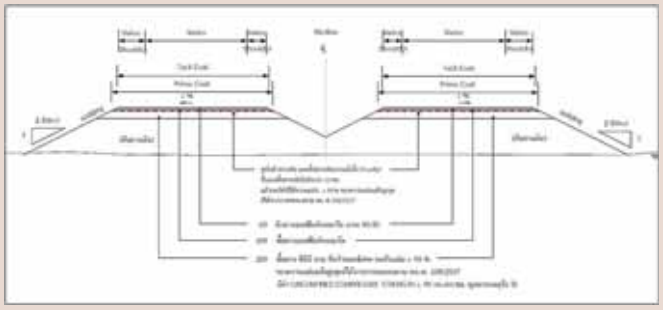
Benefits

1.To enhance pavement strength with minor raise of construction cost.

2.To increase heavy-vehicle carrying capacity of road.



Load distribution of cement modified base and aggregate base courses



Pavement Cross section Highway No. 344 Section Ban Bueng District – Meeting Highway No. 331 (Nong Prue Junction) including Nong Chak Junction Overpass Construction Project, KM 24+470 to 25+000

4. Subbase Course for Concrete Pavement in Thailand

Background

Typical Department of Highways' concrete roads consist of concrete pavement (which is usually Joint Reinforced Concrete Pavement type), sand cushion, and soil aggregate subbase. Sometimes, sand cushion is used to reduce pumping problem at joints. However, water easily washes sand away and causes voids under concrete pavement resulting in uneven load distribution and high stresses in concrete pavement so that the pavement is damaged. Bureau

of Materials, Analysis and Inspection perceives this issue. Therefore, subbases which minimize or eliminate this problem were introduced as the new options of subbases for concrete pavement in lieu of sand cushion. The materials that withstand erosion and pumping are utilized as Bound Material Subbase or, so called, Stabilized Subbase. Good results are expected on highways with heavy traffic load and volume. Concrete roads would have longer service life. The road closing due to repair work would be minimized. The stabilized subbases include; 1. Soil Cement, 2. Cement Modified Crushed Rock, 3. CTB according Special Provision for CTB Base Course, 4. Lean Concrete, 5. Asphalt Concrete.

Implementation

Bureau of Materials, Analysis and Inspection designed and recommended Bound Material Subbase or Stabilized Subbase under concrete pavements by using soil cement and asphalt concrete in Highway No. 290, Nakhon Ratchasima Ring Road Section 2 (South Side) and Highway No. 3, Si Racha–AoUdom Construction Projects respectively. Both projects are currently in construction process. The stabilized subbases are recommended in many more construction projects in fiscal year 2018.

Benefits

1. Subbase can be used as construction platform making construction easy.

2. Erosion of sand cushion under concrete pavement during construction is eliminated.

3. Pumping, which causes damages to concrete pavement at joints, is minimized.



Construction of Highway No. 3, Si Racha – AoUdom
Concrete Placement (Left), Concrete Pavement after Construction (Right)



Preparation of concrete road construction using geotextile for paving under concrete pavement

5. Seismic Refraction Survey for Material Type Verification in Roadway Excavation

Background

According to Department of Highways' standard, roadway excavation can be categorized by the ability of Caterpillar D7G machine in the Caterpillar Performance Handbook Edition 12. However, Caterpillar D7G has not been used for a while making the classification of material types in roadway excavation more difficult. The material type may be determined by considering results from many surveying methods altogether such as Boring log, Point load strength index (PLS), or by expert geologists.

Bureau of Materials, Analysis and Inspection, therefore, introduced Geophysics Methods for engineering geology survey. Geophysics methods are able to survey vast areas, easily access into many places even in slope or mountainous terrains, and less expensive than boring method. The results from geophysics survey can correlate the ability of Caterpillar D7G and seismic wave velocity in various rocks.

Implementation

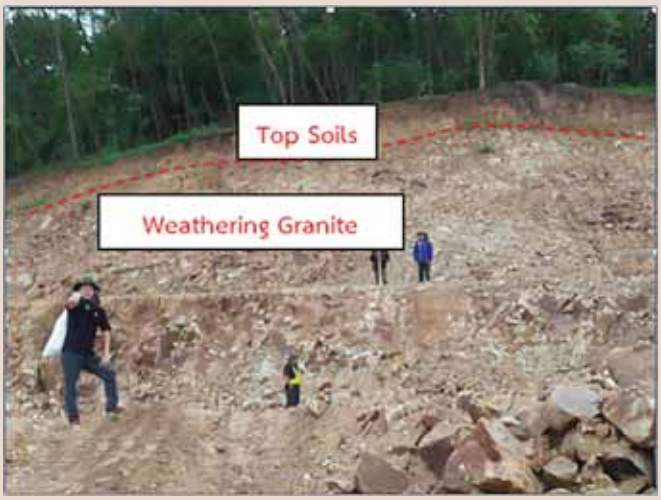
Bureau of Materials, Analysis and Inspection applied Seismic Refraction Survey, one of geophysics methods, to verify material types in Motorway No. 7 Bangkok – Ban Chang, Pattaya – Map Ta Phut Section 10 Construction Project. In roadway excavation of path SR39, which is a rock mountainous path, rock type could not be specified whether it is Hard Rock or Soft Rock. According to geological survey, rock in the area is Granite. The interpretation of results from seismic refraction survey in path SR39 shows that the velocity of seismic wave in media layers can classify materials into 3 types, which are; 1. Top soil – which can be excavated in the category of Earth Excavation, 2. Weathered Rock – which can be excavated in the category of Soft Rock Excavation, 3. Hard Rock – when considering with structural geology, excavation can be classified in 2 categories; excavation in jointed and fractured areas is considered as Soft Rock Excavation, excavation in mass rock with few fractures is considered as Hard Rock Excavation.

Benefits

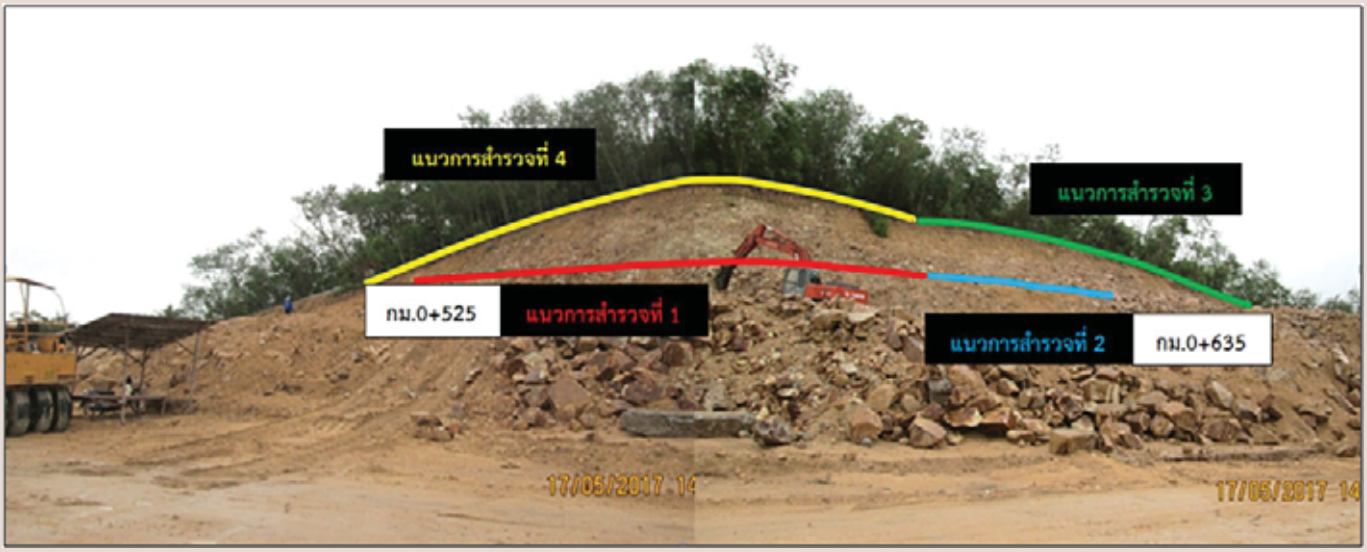
1. Roadway excavation can be classified by geophysics method which is easy, convenient and quick, able to survey in vast area and less expensive than boring.

2. Roadway excavation quantity can be estimated accurately.

3. Results from the method can be applied in slope excavation design.



Stratigraphy of surveying area which consists of top soils and weathered and heavily fractured granite



4 Survey Lines in Path SR39

Road Research and Development Project

Road research and development projects in the fiscal year 2017 have details as follow:

1. Research on Safe Speeds on National Highways for Setting Suitable Speed Limits

Bureau of Road Research and Development, has studied the passenger's speed from 380 sites in various area and road physical to analyse the 85th percentile speed, which is the speed that appropriate to use as the speed limit on highway; except highways in community area, where the Harm Minimisation principles used to prevent the violent accident in the community.

The appropriate speed limit is needed to be studied because most of the drivers drive faster than the speed limit. Road users do not pay attention to the speed limit because they often claim that the road is in good condition; driving at a speed limit results in more accidents because other users do not drive at the allowable speed limit. This ignorance of speed limit and traffic rules leads to accidents.

According to the study, keys finding are listed as follow:

- Most of the drivers drive faster than the speed limit with various speed.
- Suggested speed limits are determined by the physical characteristics of the highway as follow:
- Speed limits in school zones should be enforced base on the time of the day, such as before school time (7:00-9:00) and after school time (15:00-16:30).
- For motorways, the minimum speed limit should be used.

2. Research on Bridge and Earthquake Engineering

- Seismic Resistance Evaluation of Pre- and Post- Design Modifications of DOH's Bridges Introduction

The incident of the ground shaking on 5th May 2014 or the so-called 2014-Chiang Rai Earthquake confirms the geological evidence, which has

	ประเภทถนน / ประเภทยานพาหนะ	เขตโรงเรียน (กม/ชม)	ถนนไม่แบ่งทิศทางจราจร (กม/ชม)	ถนนแบ่งทิศทางจราจร (กม/ชม)	ถนนมีทางคู่ขนาน (กม/ชม)	มอเตอร์เวย์ (กม/ชม)
เขตชุมชน		40	60	60	90	120
			60			100
			60			80
นอกเขตชุมชน		40	90	100	100	120
			80	90	90	100
			70	80	80	80

previously been ignored by most engineers, that earthquakes of considerable magnitudes 6 to 7 Richter can occur within the country. This promptly stimulated authorised agencies to pay more attention to the safety of their assets and promoting the comprehensive review of seismic resistance design of their building structures. In response to this expected situation, The Department of Highways (DOH) has set up a team to revise the standard practices for the seismic resistance design of highway bridges in Thailand. In addition, DOH has also funded the research this project 'Seismic Resistance Evaluation of Pre- and Post- Design Modifications of DOH's Bridges with the scope of full-scale tests of multiple-column piers under reversed cyclic static loadings for both longitudinal and transverse directions and computer simulations to evaluate their seismic performance.

Work Description

Evaluation of seismic resistance of multiple-column bent piers was conducted in this study by full-scale laboratory tests, finite element analysis, and statistical analysis. Three categories of the multiple-bent pier were considered. Category 1: multiple-column bent piers designed in accordance with 1994-Standard Drawings (no consideration of seismic forces). Category 2: multiple-column bent piers designed in accordance with 2015-Standard Drawings (consideration of seismic forces stated in AASHTO 2012). Category 3: multiple-column bent piers proposed in this study. The proposed designed piers were based on the 2015-piers with some modification in order to achieve the most desirable structural behaviour under load- the so called strong column weak beam behaviour. Four to nine columns per pier were considered. In total, twenty four multiple-column bent piers were evaluated for each category.

Finite element analysis of the three categories indicated that piers in Category 2 and Category 3 had much higher seismic resistance than piers in Category 1 in both transverse and longitudinal directions. Piers in Category 2 and Category 3 had a comparable seismic resistance. Damages of piers in Category 3 occurred in the horizontal braced beam. This showed the ductile behaviour in the form of strong column weak beam. In contrary, piers in Category 2 showed the brittle behaviour. Damages occurred at joints connecting columns and horizontal braced beam. Analysis results were verified by the full-scale laboratory tests of the four-column bent pier. All tests were conducted at the Large-Scale Laboratory of Chulalongkorn University at Kangkoi, Saraburi.

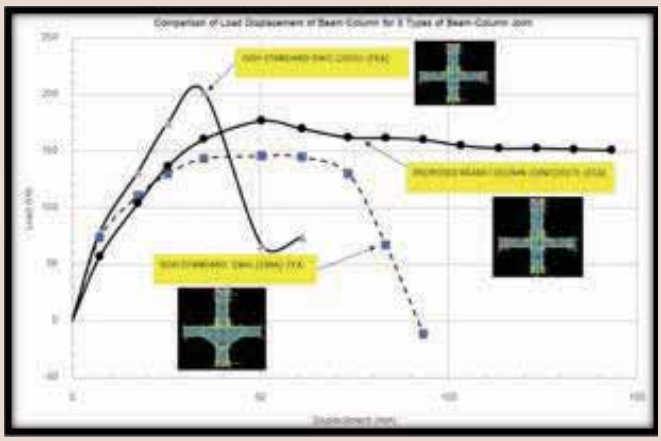
Statistical analysis in terms of fragility curves considering peak ground acceleration in Prae (high seismic hazard area) revealed that 24 piers in Category 1 had different probabilities of being damaged and collapsed. Many piers in Category 1 had probabilities of being collapsed under the scenario of 475-year return period earthquake (10% chance of being occurred in 50 years) greater than 50%. Piers were more susceptible to be damaged in longitudinal direction than in the transverse direction. All 24 piers in each of the Category 2 and the Category 3; however, were not collapsed under the scenario of 2500-year return period earthquake (AASHTO's design earthquake).

Risk of being damaged or collapsed of piers in Category 2 dramatically decreased as compared with the risk of being damaged or collapsed of piers in Category 1 whereas the construction cost of piers in Category 2 was slightly increased. This indicated that alteration of standard drawings of multiple-bent piers from 1994-drawings to 2015-drawing was sensible. In as much, the risk of being damaged or collapsed and the construction cost of piers in Category 2 and those in Category 3 were slightly different. It is therefore encouraged to construct the new multiple-column bent piers in high seismic hazard area with the proposed designed drawings as they provide the most desirable strong column weak beam behaviour.

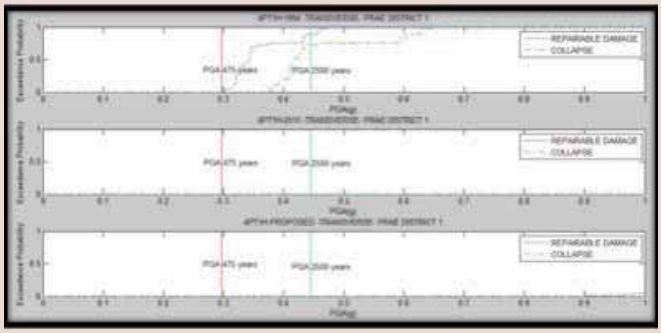
Benefits

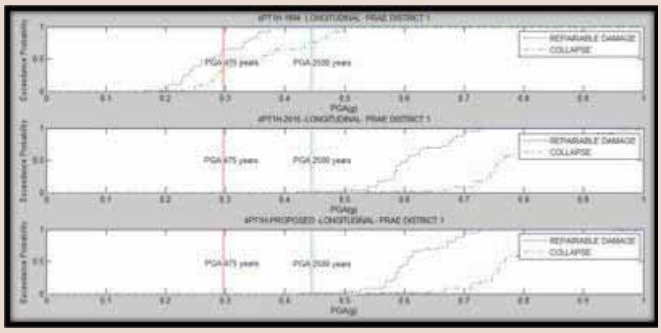
Recommendations for Bureau of Locations and Design are as follows:

1) For the construction of new multiple-column bent piers in high seismic hazard area, it is









recommended to use the proposed designed drawings. Details are fully depicted in the final report of this project.

2) For the existing multiple-column bent piers designed in accordance with the 2015 drawings, no further actions are required.

For the existing multiple-column bent piers designed in accordance with the 1994 drawings, it is recommended to strengthening the piers by the method recommended by Bureau of Road Research and Development which is presented in the final report under the project 'Seismic Retrofitting for Substructures of Short-Span Bridges (2014)'

3. Research on Highway's structure

Background

The Department of Highways uses an Asphalt Institute (AI) as a reference for design and maintenance highways, which based on analytical data from international research, e.g., AASHTO Road Test, WASHO Road Test, and the British Road Test. However, due to the different conditions of construction such as materials, traffic conditions, environment, and climate, pavement responses such as stress and strain are not consistent with the conditions of use in Thailand. Moreover, overloaded trucks damage the structure of highways and make it collapse before the designed service life. In addition, a policy of using stabilisation techniques, pavement recycling, and the usage of local materials remain a constraint to the road design, road construction, and road maintenance.

Currently, the Department of Highways does not have enough empirical data related to the response of the road structure caused by truckload, external factors, and highway performance under the conditions in Thailand. Therefore, the Bureau of Road Research and Development conducted a research to measure, track, and record the pavement response, and evaluate the data of road structures under the real conditions by installing an embedded measuring device under the highway structure. This data can be used to describe pavement models and damage mechanisms in field condition to develop a model for predicting highway performance.

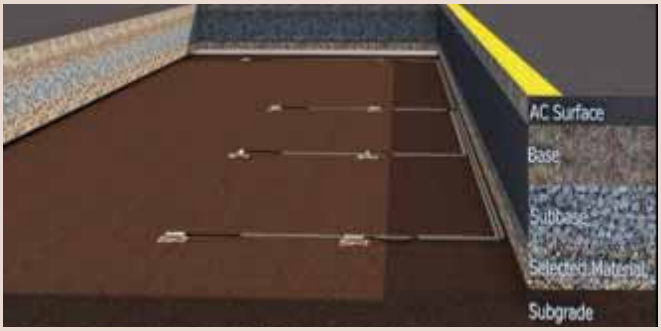
Work Description

The Embedded Instrumentation System, Cabling system, Data Logger, and Field Data Processing System to measure, track, and record the pavement response was installed on two sites: concrete highway on Highway No.4, sta.41+940, section 0201 (Nakhon Chaisri – Phra Pathom), at the Nakhon Chaisri weight monitoring station (inbound direction), Tha Tamnak, Nakhon Chaisri District, Nakhon Pathom; and asphaltic concrete highway on Highway No.4 (inbound direction), sta.88+770, section 0302 (I-Chang canal - Lum Din), Don Sai, Photharam District, Ratchaburi. The details of the installation are as follows:

- The Installation and testing of embedded measuring devices, the cable system, and the recording device in road structures:
  - Asphalt Strain Gage
  - Strain Gage
  - Pressure Cell
  - Observation Well
  - Thermocouple
  - Moisture Sensor
  - Data Logger
- Field Data Processing System:
  - Data Processing Unit: for link and process data from Data Logger
  - CCTV: for recording situations in the field
  - Video Recording and Management: for managing and record the video from CCTV
  - Database for storing and backing up field measurements
  - Outdoor Cabinet
- Power Supply System:
  - AC to DC converter
  - Uninterruptible Power Supply (UPS)
- Electrical system and communication network to support the operation of measuring instruments.
- The testing of data storage and data processing.
- The design and development of the database, for Highway Performance Monitoring, to support the integration of data from the concrete highway site and asphaltic concrete highway site. The database support an information searching and a presentation through the network for executives, researchers, and related agencies to monitor the Pavement Response, e.g., stress, strain, temperature, moisture content, traffic volume, and Axle Load Data
- A study on the development of a pavement model of asphaltic concrete highway and concrete highway, which can predict the highway performance:
  - A comparison of pavement responses, i.e., stress and strain, between the experiment and theoretical or analytical programs from at least 3 methods, such as ODEMARK METHOD, WESTERGAARD EQUATIONS, ELASTIC LAYER THEORY, and FINITE-ELEMENT METHOD.
  - A graph shows the relationship between the Pavement Response, e.g., stress and strain, with time and/or accumulated traffic volume according to usage conditions.

Benefits

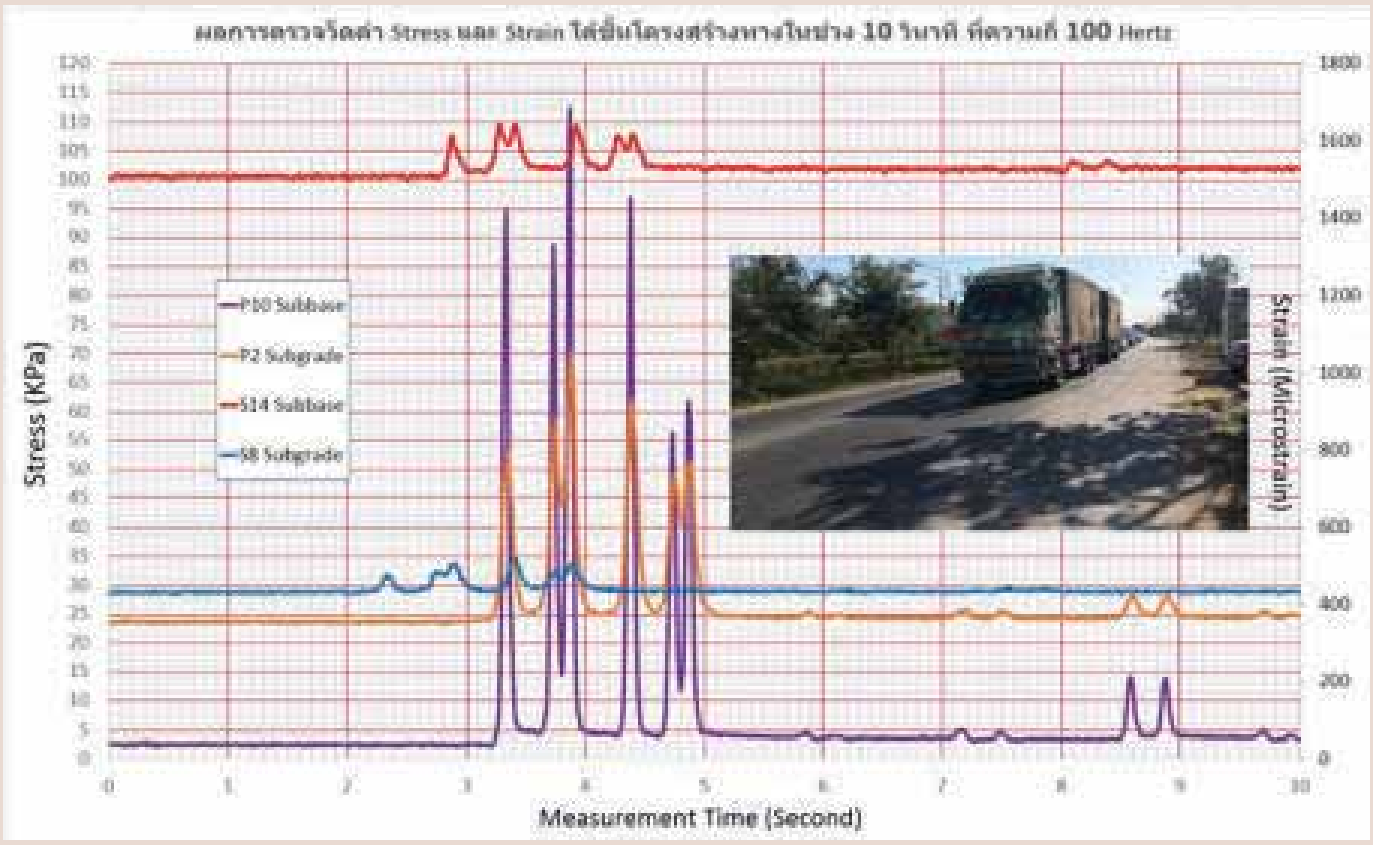
1. An empirical data of the pavement response and pavement damages caused by truck-load and other external factors under the conditions of use in Thailand.
2. Model for predicting highway performance and service life (Highway Performance Model).
3. Assumptions and conditions for the analysis of the pavement response, such as stress and strain, corresponding to the conditions of use in Thailand.










ผลการตรวจวัดค่า Stress และ Strain ใต้ชั้นโครงสร้างทางในช่วง 10 วินาที ที่ความถี่ 100 Hertz
Stress (KPa)
Strain (Microstrain)
Measurement Time (Second)
P10 Subbase
P2 Subgrade
S14 Subbase
S8 Subgrade

Highway Maintenance

Highway Maintenance

Highway maintenance is one of the most important responsibilities of the Department of Highway (DOH). Therefore, maintenance operation should be systematically planned and monitor that can increase the efficiency of maintenance operation under the limited budget. Moreover, the critical mission of the DOH is reconstruction highway after the disaster.

The flood disaster occurred in 2017. That made a significant impact on the service of the highway network in many parts of Thailand. The Department of Highway prepared the solution for this situation in 3 steps: as followed;

1. The urgent measure (short-term measure), which is bailey bridge or temporary service road, this implemented for recovery the highway service urgently in case of the network are disconnected from the flood effect such as high-level flood or the road structure collapse.





Figure 1: *Bailey Bridge are implemented to connect the road network*

2. Recovery measure, which is the stage of reconstruction all of the damaged structure to reach the standard and prevent the problem as before in the future.





Figure 2: *The example of recovery measure*

3. Preventive measure (Sustainable measure), which is the cooperation of the Department of Highway, Department of Rural Roads and Royal Irrigation Department for planning the sustainable action to prevent the problem in the future. Many schemes implemented to increase the efficiency of the drainage system such as changing the drainage system from ditch to bridge, decreasing the flow obstruction and increasing erosion protection.

Two flood disasters occurred in 2017: as followed;

1. The flood that happened in the southern region of Thailand during December 2016 to January





Figure 3: *The example of sustainable measure*

2017. This disaster affects 320 sites spreading along the south highway network and make 3 billion baht losses.





Figure 4: *Bridge collapse on route no.4 Bang Saphan – Nam Rod KM.386*

2. The Son Ca storm hit the north and northeast part of Thailand during July to August 2017. This disaster made effects on 203 sites spreading on the northern and northeastern area and make 2.6 billion baht losses.





Figure 5: *Landslide on route no.4 Khao Phab Pa - Phattalung*





Figure 6: *Damaged drainage system on route no.4194 Khuan Song San – Kra Toon*





Figure 7: *Road structure collapse on route no.41 KM.309*

Finally, the Department of Highway not only reconstruct the highway that damaged from the disaster but also plans and monitors to prevent the problem that will occur in the future.





Figure 8: *Damaged bridge because the effect of Son Ca storm*





Figure 9: *Road structure collapse*





Figure 10: *Landslide problems*



Figure 11: *Damaged drainage system*



Figure 12: *Road structure collapse*

Highway Safety

Increasing the traffic efficiency on Thailand national highway to achieve Highway 4.0

In the present, the technology development has made a significant impact on daily life, especially the internet that connected every people around the world. People can access any knowledge in anytime through an online network. This effect makes an evolution from the social and economic era Thailand 3.0, the social and economic policy that focuses on the heavy industrial, to the Thailand 4.0 era which concentrates on innovations and creativity to support the modern commercial society.

The Department of Highway, the major infrastructure organization on the highway, have to upgrade, so that supports a change in the next economic era. Increasing the traffic efficiency is one of the measures that has been chosen to achieve the objective of Highway 4.0

Smart Vehicle actuated control, and Adaptive Traffic Signal Control is selected to apply on the traffic signal controlled intersection. This technology is composed of the visual vehicle detect technology (Image Processing) and the new traffic signal control operating system that can monitor the traffic volume in real-time and can receive the remote control. There are many outstanding advantages of this system. First, this method can recalculate the traffic signal phasing that can help to improve the traffic congestion on the network. Second, this system can automatically collect the vehicle turning movement data around 24 hours which better than human counting. Moreover, this technology can link the intersection network together that can raise the efficiency of the service.

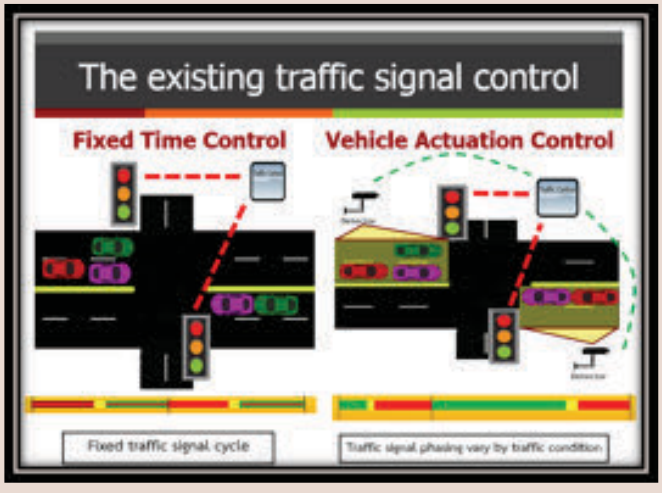


Figure 1: The existing traffic signal control

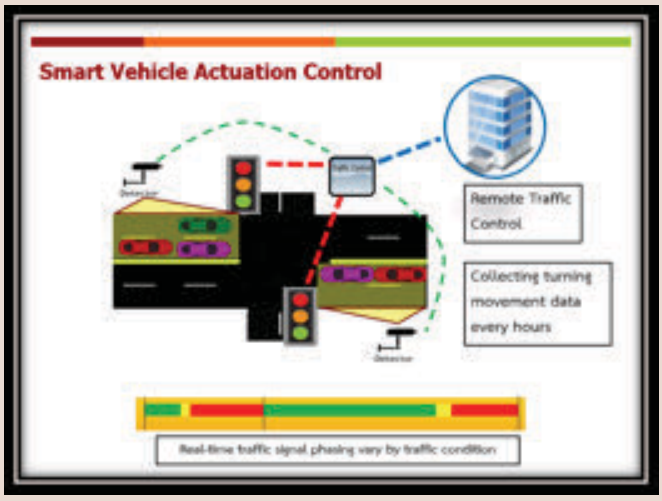


Figure 2: The Smart Vehicle Actuated Control System

This technology has been evaluated by comparing the existing technology (Fixed time) and Smart VA, Adaptive, and Area Traffic Control (ATC) on the traffic signal control intersection to evaluate the economic worthiness and environmental impact which originated from traffic congestion. The result is shown in the table 1-5 which illustrate the comparing on various variables.

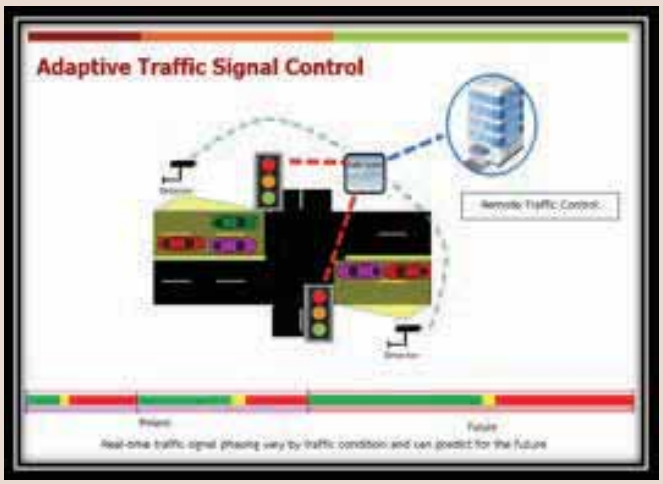


Figure 3: The Adaptive Traffic Signal Control System

Fixed Time & Area Traffic Control

Variables	Ton tam intersec.	Highway district intersec.	Hospital intersec.
Delay	Decrease 55 – 83 %	Decrease 29 – 77 %	Decrease 24 – 80 %
Queue lenght	Decrease 3 – 60 %	Decrease 13 – 40 %	Decrease 2 – 50 %
Travel time	Decrease 418 hr./weekday	Decrease 234 hr./weekday	Decrease 329 hr./weekday
Violating traffic signal per 1000 vehicles	Decrease 37 % on peak period Decrease 60 % on off-peak period	Decrease 73 % on peak period Decrease 77 % on off-peak period	Decrease 45 % on peak period Decrease 62 % on off-peak period

Table 3: Fixed Time V.S. Area Traffic Control

Fixed Time & Smart VA

Variables	Result
Delay	Decrease 9 – 24 %
Queue lenght	Decrease 2 – 30 %
Travel time	Decrease 63 hr./weekend Decrease 166 hr./weekday
Violating traffic signal per 1000 vehicles	Decrease 18 % on peak period Decrease 70 % on off-peak period

Table 1: Fixed Time V.S. Smart Vehicle Actuated Control

Economic worthiness

Type of technology	Location	Cost (Baht)	The decreasing of travel time (hr./year)	Payback period (month)
Smart VA	Lad Yai intersec.	2,629,440	50,097	10
ATSC	Northern intersec.	4,222,000	51,964	9
Area Traffic Control	Ton tam intersec.	8,637,000	152,728 85,467 119,936	5

Table 4: Economic worthiness

Fixed Time & ATSC

Variables	Result
Delay	Decrease 13 – 43 %
Queue lenght	Decrease 7 – 53 %
Travel time	Decrease 142 hr./weekend
Violating traffic signal per 1000 vehicles	Decrease 30 % on peak period Decrease 45 % on off-peak period

Table 2: Fixed Time V.S. Adaptive Traffic Signal Control

Energy Consumption

Type of technology	Location	The decreasing of travel time (hr./year)	The decreasing of fuel consumption (litre/year)	The decreasing of fuel cost (Baht/year)
Smart VA	Lad Yai intersec.	50,097	48,975	1,199,038
ATSC	Northern intersec.	51,964	50,800	1,243,723
Area Traffic Control	Ton tam intersec.	358,131	350,109	8,571,624

Table 5: Energy Consumption

Land Acquisition

Land Acquisition Project for Construction of Highway No. 130 Entry to Thai-Myanmar Second Friendship Bridge Crossing the Moei River (Mae Sot)



Background

Highway No. 130; Entry to Thai-Myanmar Second Friendship Bridge Crossing the Moei River (Mae Sot) is a new highway which is 21.4 kilometers: 4.15 kilometers in Myanmar and 17.25 kilometers in Thailand. The route is in public area, area of National Reserved Forest (Mae Lamao), classified forest, Agricultural Land Reform Office, State Property, and Special Economic Zone. If the construction is completed, this highway will be the network supporting special economic zone at Mae Sot District, Tak Province. It will also be important cross-border transport route along the East-West Economic Corridor of the Greater Mekong Subregion Economic Cooperation. At present, there are many traffic volume and they will increase in the future so this highway can decrease travel time and accident.

As mentioned above, the route of the project is in public area and area of other ownership; thus, to acquire the land for constructing the highway will affect many people. DOH wants to affect much less people and decrease the conflict of people by using proper and fair process. Land acquisition is a supportive task for taking action of construction project as planned.

Process

It is a land acquisition process of Km. 0+000 – km. 17+250 (in Thailand area) for the construction project. There are 2 tasks of land acquisition process which is as follows.

- to acquire the land which has document of right such as title deed, and certificate of utilization; N.S. 3 and N.S. 3K. The area is approximately 201.62 acres.

- to acquire the land which has no document of right is the area of national reserved forest, classified forest, Agricultural Land Reform Office, State Property, and Special Economic Zone. The area is approximately 254.19 acres.

For the land of government organization, DOH has asked the permit to use the land already. Moreover, DOH arranged the meeting to clarify about the urgent need from government policy, criteria of land valuation, and the benefit of project which people will get from such as rapid and convenient transportation and the trend of land price increasing. As a result, fewer people continued to obstruct and resist the construction and the people permitted to continue the project.

Benefit

The land acquisition project was operated as law and regulation prescribed by considering the benefit of people and country. Therefore, there was no obstruction of construction process or complaint from the people who were expropriated their land. The project completed on time as planned.

Highway Vehicle Weight Control

Nongkhai Border Weigh Station Construction Project

Background

Thailand has integrated into the Asian Economic Community (AEC) in 2015 which allow free transportation of goods within the Asian member and Thailand has been targeting to be the logistics hub of the region in the near future, however, one of the problem which may occur during the entering into Asian Economic Community is the increase in number of overweight vehicles.

In order to mitigate this problem, the Department of Highways, by the Office of Traffic Weight Control initiates the Nongkhai Border Weigh Station Construction Project to support the transportation demand in the era of Asian Economics Community, AEC.

Project Location

Project area of 13 rai 3 ngaan and 90 square wa situates on Highways route number 2 between National Housing Authority to the middle of the Nongkhai Thai-Laos friendship bridge at km 507+140 (right side) in Nongkhai province.

Project description

This project composes of the construction of weigh station at the Thai – Laos Border where there are a number of transportation of goods and products to inspect the weight of the vehicle during transportation across border in order to control the weight to be within the legal limit. The inspection systems compose of the following:

- Static Scale
- WEIGH IN MOTION (WIM)
- Image Processing
- Virtual Weigh Station

Project duration

Nongkhai Border Weigh Station construction project has commenced on the 28 July 2015 and completed on the 31 August 2017.



The Environment and Public Involvement

The Department of Highways puts emphasis on environmental safeguarding and promoting sustainable highway development. Thus our operational framework and direction are set in accordance with the Environmental Quality Enhancement and Protection Act B.E. 2535 and the Office of the Prime Minister's Office Announcement on Public Consultation, B.E. 2548 along with adhering to the Good Governance Principle for transparent, just, and verifiable conducts. The public is welcome to participate in all steps of highway development and we incorporate the public's input in our decision making process for appropriate and practical developments that address the needs of the public.

Environmentally friendly highway development

As the Department of Highways strives for environmental protection and minimizing any possible impacts to the environment and society, we conduct environmental impact assessment in order to set up environmental impact mitigation measures for highway projects that pass through conservation areas like national parks and wildlife sanctuary or aligned nearby significant sites, namely, historic sites, world heritage sites, etc. In the last year, the DOH has conducted 4 EIA studies, including:

1) EIA for the railway overpass at Highway 119 (junction toward Uttaradit km.3+161) and Highway 1040 (junction toward Highway 102 - Wang Kapee at km. 1+977), Uttaradit Province.

2) EIA for the railway overpass at Highway 226 km.62+886 (bordering Surin DOH District area) – Junction toward Utumpornpisai at km.75+971 Si Saket Province.

3) EIA for the interchange at Highway 4 and Highway 3087 (Khao Ngu Intersection) Ratchaburi Province

4) EIA for the railway overpass at the intersection of Highway 309 (Wang Noi intersection) - connecting to Phra Nakhon Si Ayutthaya Municipality road at km. 20+321, Phra Nakhon Si Ayutthaya Province.

The aim is to ensure minimal impacts throughout the project including pre-construction, construction, and operation phases, by detailing the environmental impact mitigation measures and environmental quality monitoring plans for implementation.



- *Traffic management measures to mitigate impacts to commuters:* EIA for the railway overpass at Highway 226 km.62+886 (bordering Surin DOH District area) – Junction toward Utumpornpisai at km.75+971 Si Saket Province.



- *Temporary noise barrier to mitigate construction noise pollution for nearby communities:* EIA for the railway overpass at Highway 119 (junction toward Uttaradit km.3+161) and Highway 1040 (junction toward Highway 102 - Wang Kapee at km. 1+977), Uttaradit Province

Environmental quality monitoring

DOH conducted environmental quality monitoring for highway projects covering from pre-construction phase to operation phase. Monitoring aims to check implementation and efficiency of the mitigation measures and monitoring plans. Also the aim include monitoring any change incurred by project development and recommending mitigation measures and monitoring plans. In the last year, DOH conducted 6 monitoring projects, including

1) environmental monitoring of Highway 12 Tak - Mae Sod Section 4

2) environmental monitoring of Highway 4 Chumpon - Ranong Section 4

3) environmental monitoring of Intercity Motorway Bang Pa In - Nakonratchasima

4) environmental monitoring of Intercity Motorway Bang Yai - Kanchanaburi

5) environmental monitoring of Wildlife Corridor for World Heritage Forests on Highway 304 Kabinburi - Pakthongchai (phase 2)

6) environmental monitoring of 4-lane widening Highway 304 Kabinburi - Pakthongchai (phase 2)

- *Monitoring of hard rock blasting* *environmental monitoring of 4-lane widening Highway 304 Kabinburi - Pakthongchai (phase 2)*



Installation of blasting mat for protecting fly-rock debris from blasts



Temporary road closure to prevent dangers from blast site



Clearing of blast debris from the construction site prior to resuming normal traffic

- *Monitoring of tunnel construction:* *environmental monitoring of Wildlife Corridor for World Heritage Forests on Highway 304 Kabinburi - Pakthongchai (phase 2)*



Installation of concrete tunnel walls



Struts installation for tunnel wall construction



Installation of drainage system connecting the tunnel roof drain with the highway drainage structures

- *Soil erosion monitoring:* Highway 12 Tak - Mae Sod Section 4 construction area



Construction of shotcrete for slope protection as soil erosion mitigation measure

- *Water quality monitoring:* Intercity Motorway Bang Pa In - Nakonratchasima



Installation of silt fence to protect nearby water body from the construction site

Providing opportunities for the public to participate in highway development

To promote public involvement, The Department of Highways arranges public participation activities throughout the stages of highway development. Especially during the construction stage, public participation meetings were held in compliance with the Office of The Prime Minister's Office Announcement on Public Participation B.E. 2548. Comments and concerns from the people were utilized to improve project implementation to meet the demands of the locals in 257 projects, namely:

1) Highway efficiency improvement 135 project

2) Highway improvement in community areas: 81 projects

3) New highway projects allocated with B.E.2560 fiscal budget: 41 projects

- *Highway efficiency improvement*



Highway efficiency improvement on Highway 4 section Takua Pa - Bang Sak



Highway efficiency improvement on Highway 22 section Ban Ya - Sawang Dan Din

- *Highway improvement in community areas*



Highway improvement in community area for Highway 1152 Section Phaya Meng Rai - Ta Talad



Highway improvement in community area for Highway 4 Section Ngao - Ao Keay

- *New highway projects - B.E.2560 fiscal budget*



Construction of Highway 24 section Amphoe Prasat-
Amphoe Khukhan-junction Hwy 2085



Construction of Railway Overpass Pranburi bypass
Highway 3168

Information Technology

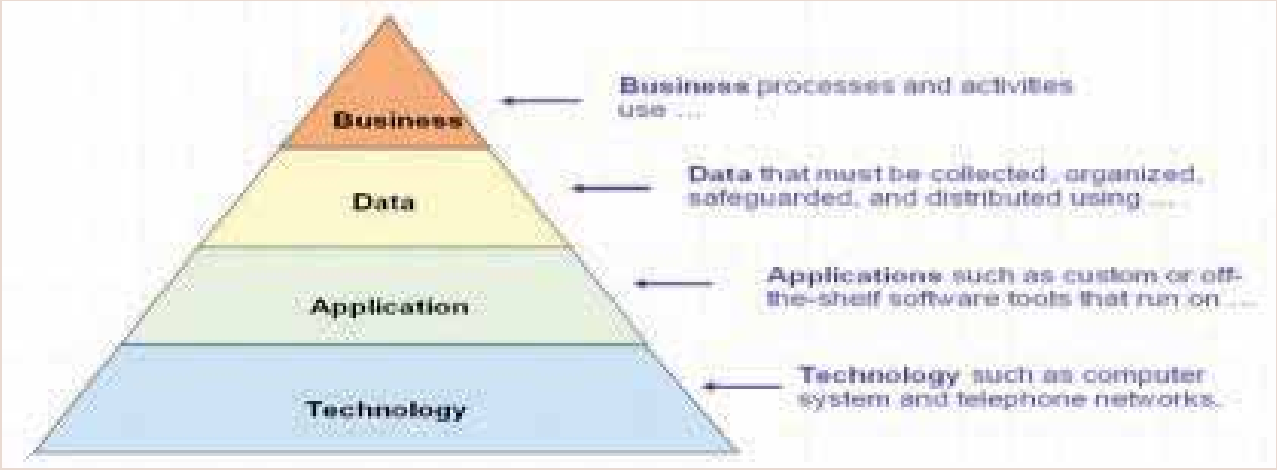
Enterprise Architecture (EA) of Department of Highways

1. The Design

Enterprise Architecture (EA) is the structure and detail of the organization, which is collected and presented in the form of picture, table, diagram, etc., and used in the organization development planning and investment planning or communication.

Presently, the government extremely emphasizes on building EA in the government sectors as from the digital development plan for economy and society of Ministry of Digital Economy and Society (formerly known as the Ministry of Information and Communication Technology) which was established on 5 April 2016 by the Re-organization of Ministry, Bureau and Department Act, B.E. 2558. It mentions the EA in the strategy no.4 that the transformation to be the digital government, the government sectors have to change the operation system by the digital technology. If there is the investment according to EA framework, the government sectors will be able to effectively share the digital sources for the utmost benefit as well as to decrease the repetition on the investment. Moreover, the strategy no.5 also mentions the development of manpower to be ready for digital economy and society, specifies that the executive have to understand and be able to plan and bring digital technology to develop the mission of the organization which in accordance with organization's EA, and be able to create the value from the data and links it to other government sectors for public's benefit.

The development and investment of Information Technology and Communication in order to change Department of Highways to be the digital organization has to consider the compatibility of policy, mission, and work process with the strategy of Information Technology and Communication. This is to ensure that the developed information system can support the operation system of Department of Highways systematically and effectively. Applying EA in Department of Highways helps supporting the operation in many parts as planning, developing work process, monitoring, driving the organization, and maintaining the operation system including systematically and effectively finds suitable system or technology to support work and can create the value of the data and connect to other government sectors for the public's benefit.



Picture 1 : Diagram of EA's composition.

Information Technology Center on behalf of Department of Highways has cooperated with Information Technology and Communication Research Center of King Mongkut's University of Technology North Bangkok to be an advisory of designing EA of Department of Highways. It consists of 4 parts according to TOGAF:

1) Business Architecture : BA

It is the policy framework and vision of the organization includes the presentation of interesting work processes.

2) Data Architecture : DA

It is the group of data which different organizations may have different views of using the data includes ER-Diagram and Data Dictionary. This architecture shows Data Location and Data Logistics, the important information of each Bureau, source of the data, and the users. The data can be applied for integrated system development planning in order to decrease the repetition of the data.

3) Application Architecture: AA

It is the component of the operation system and the connectivity of the systems of each Bureau.

4) Technology Architecture : TA

It is the infrastructure as special technical characteristic of the computer network, host computer system, client computer system, and other components.

The EA's design process of Department of Highways can be divided into 7 work groups as follow;

1) The study of present situation of Information Technology, vision, Information Technology plan as well as trend and business policy of Department of Highways.

2) The study and work on the present system together with presenting the new Business Architecture.

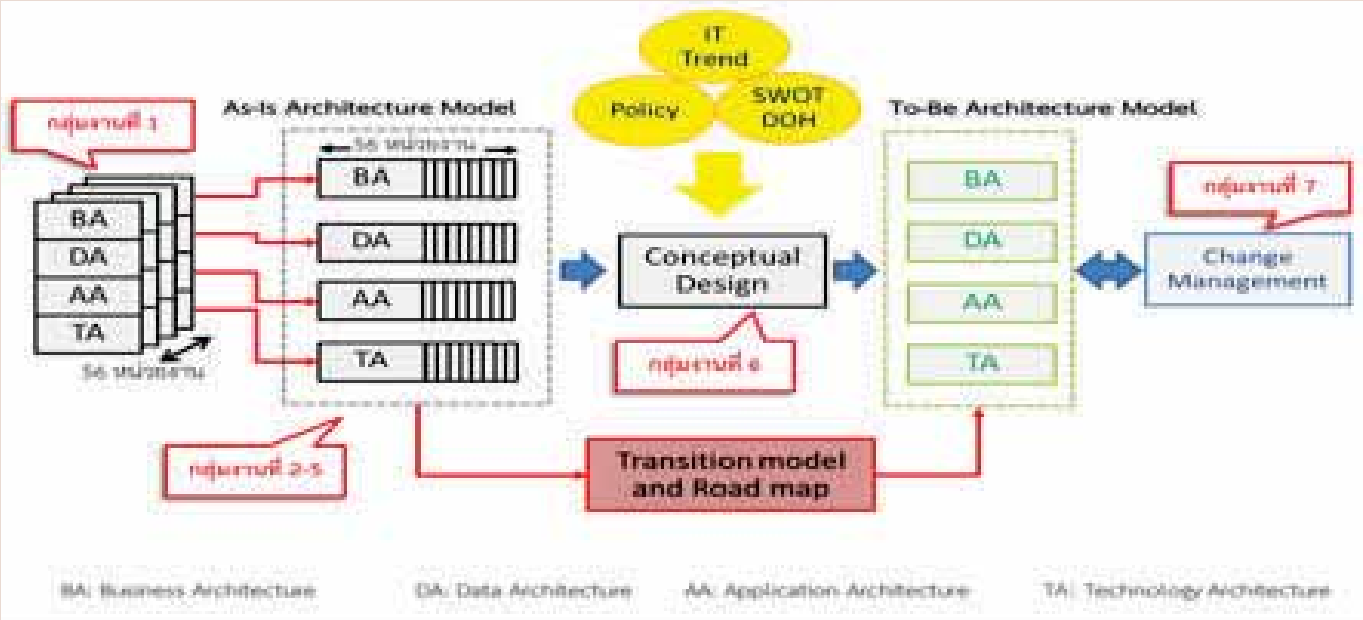
3) The study and work on Data Architecture.

4) The study and work on Application Architecture.

5) The study and work on Technology Architecture.

6) Making the Conceptual Design.

7) The study and work on Change Management.



Picture 2 : The operation process of EA design.

EA design starts from the survey and study of the present Information Technology, vision, Information Technology plan in the extent of trend and business policy of Department of Highways from the representatives of 56 units either in the headquarter and the provincial units (work group 1). The results are BA, DA, AA and TA to be analyzed for making AS-Is Architecture Model (work group 2-5). This shows the main work process, the support work process, data and its connectivity, HW/SW technology, and communication system in Department of Highways in the aspect of the top management, the middle management, and the owner of work process. The analysis from IT Trend, policy, vision of the top management, the service provider's opinion and SWOT analysis will be in consideration in making the Conceptual Design (work group 6). In addition, there is Transition Model and Road Map for making the To-Be Architecture Model which can increase the efficiency in work and public service. The 3 important issues are 1) develop the process, 2) decrease work steps and time, and 3) bring Information Technology to apply in work. However, there must be the change management (work group 7) to decrease the effect on work and the adjustment of the staff or other stakeholders in the department.

2. Moving Trend and Information System Development trend in the future.

2.1 Information system for EA

As component of EA can be changed all the time, Department of Highways should have tool to manage EA in order to be ready for change. The proper tool is Information system that specifically keeps the component of EA. Therefore, Information Technology Center has requested for EA Document Repository, which the advisory team has developed, to set up on host computer system of the department in order to manage EA of Department of Highways. EA Documentary Repository can keep the work processes, picture file of work processes, data, Data Dictionary, lists of host computer system, system equipment, system charts, building charts, and other components of each architecture which architect of the organization can add on.

2.2 Information Technology Management of Department of Highways using EA

For functional use of EA for Department of Highways, not only a thick manual on shelf, besides the Information System for managing the EA data of the department, the structure of Information technology of the department using EA is another way to help driving EA as a tool for organizational development as shown in picture 4

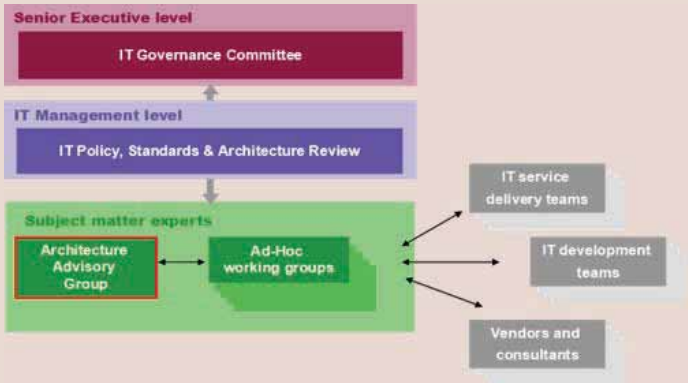
Structure of Information Technology Management using EA consists of:

1) IT Governance Committee. It consists of CIO, Director of Information Technology Center, and outside specialists in Information Technology.

2) IT Policy, Standards & Architecture Review. It consists of Chief of section and work group under



Picture 3: EA Document Repository



Picture 4: Structure of Information Technology Management using EA

Information and Technology Center. It is responsible for considering and screening policy, standards, and EA.

3) Ad-hoc Working Groups. It is the working team that specializes in specific field and particularly appointed to manage the project or change. The team member must be a specialist in order to drive the project or change.

4) Architecture Advisory Group. It is the group of people who understand the EA establishment and development.

First step to EA change management is the working group has to identify the types of the effect from change; does change effect EA or not? If so, the working group must have to evaluate that which part of EA should be developed or re-created. The situation will be analyzed in order to identify change. There are steps as shown in picture 5.

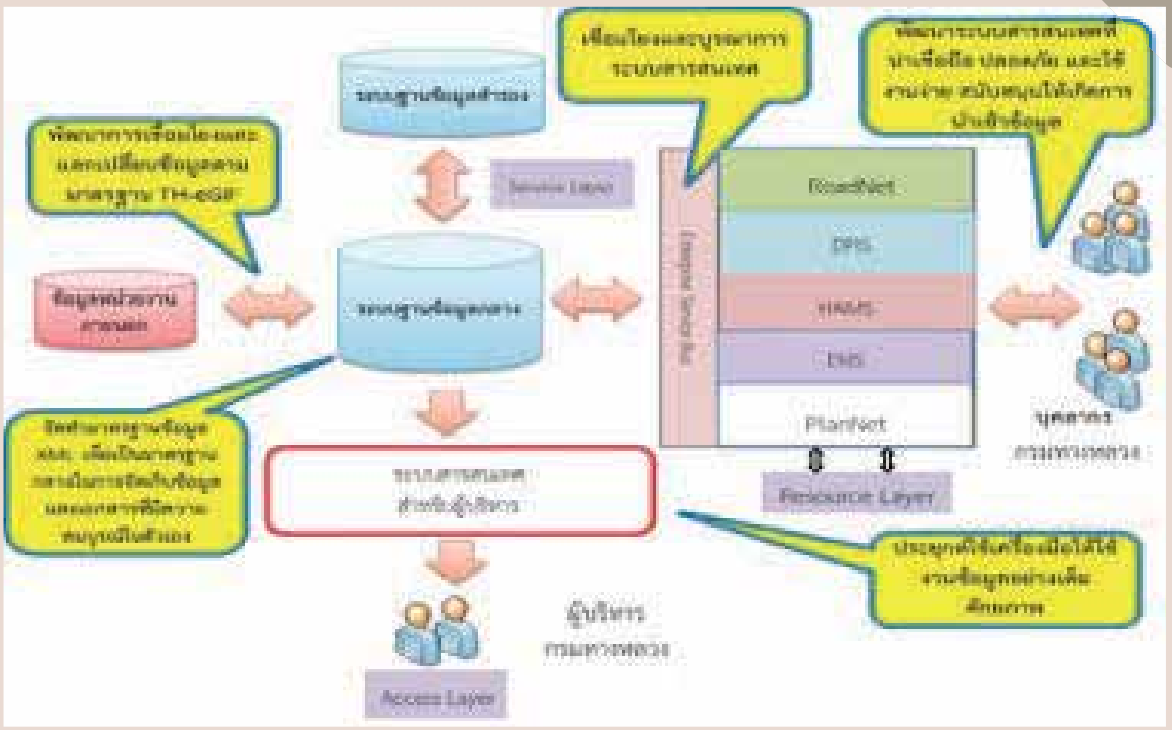
2.3 Information system development in the future

Department of Highways has to develop EA in all architectures in order to reach the goal to increase the work efficiency by develop work process, set data standard to decrease data repetition, and apply Information System or Technology in work. Information System development in the future has to refer to established data structure and develop the work process to input the data from one source in order to decrease the repetition and increase the effectiveness in work.

- TH-eGIF
- Develop the connectivity and data exchange according to TH-eGIF standard.
- Other organization data
- Central data system
- Backup data system

	Steps	Ad-hoc Working Groups works with Architecture Advisory Group	Architec-ture Advisory Group	Ad-hoc Working Groups	IT Governance Committee and IT Policy, Standards & Architecture Review
1	Identify all factors which effect to EA change				
2	Set responsibility for Ad-hoc Working Groups to evaluate the effect and assign the responsible party to develop EA				
3	Analysis the situation and set the solution for change.				
4	Evaluate the effect from the selected solution.				
5	Screen, select, and present the best solution to the executive.				
6	Review the proposal				
7	Updated EA				

Picture 5 *The steps of Situation Analysis for identify types of change.*



Picture 6: Information System and Database Development in the future.

- Set XML data standard as main standard to collect data and completed document.
- Information System for the executive.
- The executive of Department of Highways
- Link and integrate Information System
- Develop reliable, safe, and user-friendly Information System to encourage the data input
- Apply the equipment to use the data in full potential.
- Staff of Department of Highways

Information System Development in the future emphasizes on SOA which is the idea of designing the Information System in organization to be a service system. It is the system that can reuse and allow the different applications to work together on different computer language platform and technologies. Department of Highways should have central database which collects frequently used data as highway route and highway property database. They are principal data to refer in many work processes of the department. The benefit of having central database is the convenience in linking data to other organizations as well as the rapidity in processing data from various sources to present to the executive. The investment should be changed from decrease the hardware, which are the host computers, to use technology virtualization on architecture as Hyper Converge which is the host machine that better support the network expansion than the present host machine.

3. Conclusion

Department of Highways can use EA to increase the organizational efficiency in order to achieve the organizational goal together. The users can apply EA for reasonably set the digital model scheme either in short or long period. EA can decrease the work process, suitably increase the ability to reach the important service, support Open Data from Data Architecture, increase data linkage to Connected Government, private sectors, people, and support the business investment from aboard.

Highway Police Division

The Highway Police Division was established on 30th August 1960 by the resolution of the cabinet and was announced on the Royal Decree of Public Administration, Department of Police, Public Administration in the same year. The Highway Police Division has been funded by the national budget under the Department of Highways. The Royal Thai Police organization had been divided into 3 subdivisions; until 30th June 2005 the major restructuring took place. (There were several reorganizations, before then.) It was renamed the Highway Police Division following the Ministry's regulation on organization classification in the Royal Thai Police 2005. On 1st July 2009 the Royal Decree of Public Administration announced the reconstruction of the Royal Thai Police, and the Highway Police Division has been divided into 1 administrative section, 8 subdivisions and 1 royal safety divisions. Their structures and duties could be described as follows.

1. Organization structure of the Highway Police division comprises 1 administrative section, 8 subdivisions and 1 royal safety section as follows.

1.1 Administrative section has 7 major work responsibilities, including:

1) Administrative and human resource
2) Strategy planning
3) Financial work and budget allocation
4) Material, vehicle and other supportive resource management
5) Law work and legal case management
6) Information technology
7) Information center and communication

1.2 Operation section includes 8 subdivisions; each of which is under supervision of a highway police inspector. Their responsibility areas are described in the following table.

Subdivision	Responsibility Area (City/Province)	Amount of Responsibility Highways (Km.)	Amount of Service Station
Subdivision 1	Ayutthaya, PathumThani, Nonthaburi, Saraburi, NakhonNayok, Lopburi, Singburi, AngThong, NakhonSawan, Uthai Thani, Chainat, Phetchabun and Phichit	2,799	29
Subdivision 2	NakhonPathom, Suphanburi, SamutSakhon, Phetchaburi, Ratchaburi, Kanchanaburi, SamutSongkhram, Chumphon, Ranong, PrachuapKhiri Khan and SuratThani	2,195	32
Subdivision 3	Chachoengsao, SamutPrakan, Chonburi, Rayong, Chanthaburi, Trat, Prachinburi and SaKaeo	1,755.06	18
Subdivision 4	RoiEt, Kalasin, MahaSarakham, KhonKaen, UdonThani, NongKhai, Loei, NongBuaLam-phu, SakhonNakhon and NakhonPhanom	5,013	23
Subdivision 5	Tak, KamphaengPhet, Lampang, Phrae, Phitsanulok, Sukhothai, Uttaradit, Chiang Mai, Lamphun, MaeHongSon, Phayao, Chiang Rai and Nan	3,110	24
Subdivision 6	NakhonRatchasima, Buriram, Surin, SiSaket, UbonRatchathani, Amnat Charoen, Mukdahan, Yasothon and Chaiyaphum	3,629	41
Subdivision 7	Songkhla, Phattalung, NakhonSi Thammarat, Trang, Satun, Krabi, PhangNga, Phuket, Pattani, Yala and Narathiwat	2,683	21
Subdivision 8	Inter City Motorway No. 7 and 9	142	7
	Total	21,326.06	195

1.3 Royal Safety sections under supervision of a highway police superintendent.

2. Duties and Responsibility of Highway Police Division

2.1 Be responsible for the safety of the H.M. the King and Queen, Heir to the throne, the royal family, royal representatives and royal visitors.

2.2 Prevent and suppress crime throughout the country.

2.3 Enforce the code of criminal and other violation against the law on highways and motorways all over the country.

2.4 Provide social service, traffic control and management on all highways and motorways.

2.5 Apply traffic laws and regulations on all highways and motorways.

2.6 Support or coordinate with any operation from involving agencies, or as assigned.

3. Mission and Burden of Highway Police Division

3.1 Provide the safety to the H.M. the King and Queen and royal family as the highest responsibility.

3.2 Promote fringe benefits to all highway polices and their families to boost their living quality and work efficiency.

3.3 Encourage learning society, working expertise and ethic to all policemen.

3.4 Improve the information technology (IT) system to help promote travel convenience and safety, and good transport on roads. This improvement also results in the development of more efficient and modern organization management system, which in turn leads to faster and better public service.

3.5 Prevent and suppress all crime and any act against the law on highways. Monitor and maintain all assets on highways to be in a good condition.

3.6 Foster a good aspect of highway police to the public.



4. Workforce

The total manpower of the Highway Police Division is 2,061 which comprise 304 commissioned level polices and 1,757 non commissioned level polices.

5. Vehicle

The Highway Police Division owns totally 1070 vehicles.

6. Budget

The Highway Police Division was allocated 1,228,941,400 baht from the national budget under the Department of Highway's quota in the fiscal year 2017.







7. Accident Prevention, Traffic Control and Management

The Highway Police Division is responsible for traffic control and management, accident prevention and any public services on highways throughout the country. The detail could be described as follows.

7.1 Provide action plans of traffic control and management, accident prevention and any public services during festivals such as,

- Campaign to facilitate traffic, prevent and reduce accidents on highway during the New Year festival
- Campaign to prevent and reduce road accidents during Songkran festival
- Safe highway project

7.2 Provide traffic management plan during the flooding period to facilitate road users and prevent road accidents. Prevent and suppress any crime not only during the flooding period, but also after the crisis.

7.3 Monitor and arrest all traffic law violators such as overloaded cars, exceeding traffic speed and drunk driver. Protect highway properties and monitor highway deterioration to ease highway maintenance budget and improve highway network efficiency.

7.4 Facilitate traffic, provide convenience and safety to road users during festivals such as New Year and SongKran festivals. The highway police division provides service to road users by opening the call center 1193 and using the Highway Police Application called "Highway Police (Thailand) By IAppDev.com". These together would ease road users to connect with the police and get their service, when an accident takes place. The road users just select main features from the program such as highway police offices' locations and details, insurance companies' details, hospitals and car towing service, and immediately everything automatically report to the police.

8. Arrest statistics for overweight truck violations on highways

The total number of records on enforcement against overweight trucks was 2,381.

9. Arrest statistics for violations against Road Traffic Act

The total number of records on enforcement against Road Traffic Act was 1,190,987.

10. Statistic of VIPs escort

The total number of trips of VIPs escort was 1,772.

Human Resource Management

Human Resource Management has played an important role in supporting the Department of Highways missions according to achieve the goal, this is a human resource management strategic which consistently follow the Department of Highways' mission consistency. The Human Resource Management mechanism covers: reviewing and preparation of strategic plans, organizing human resource management system, improving tasks divided within the internal division and define responsibilities of each sector, workforce management, supervision of personnel information, recruiting and appointing of personnel, performance management for promotion, determining responsibilities, knowledge, abilities, skills and competencies, disciplinary inquiry, promoting morality and ethics of personnel, promoting quality of life, personnel welfare and benefits offering, building relationships among personnel, and funeral assistance including other operation following human resource management policies, exclude the human resource development. As a result, in the fiscal year of 2017, the Department of Highways has performed the following human resource management activities as followed:

1. Analyze, review, and develop the Human Resource Strategy for the Department of Highways, during 2017 - 2021 which integrates human resources management and human resources development involving projects and activities that support both management and development of the Department of Highways human resources in order to perform work effectively and support the strategic mobilization of the Department of Highways to accomplish the goals.

2. Improve knowledge worker positions determination from Senior Professional Level to Expert Level i.e. Plan and Policy Analyst, Expert Level, Management Development Group (Director, Office of Management Development)

3. Provide a field trip. "Royal Initiative Project" at Tha Yang District, Phetchaburi Province, beneath Morality and Ethics Promoting Project for the Department of Highways' personnel, on December 9th, 2016. The trip aims to promote the development of moral and ethical learning and embrace the main idea and theory under the Royal Initiative of His Majesty the King to apply for self-managing, people managing, and task-managing with the aim of getting the most for common benefit. Moreover, the Department of Highways personnel would have opportunity to acknowledge about the theories in the Royal Initiative Project and apply to their daily life, which conform to satisfaction and motivation policy of personnel of the Department of Highways.

4. Provide an exercise activity every Wednesday, according to the Secretariat of the Cabinet's letter no. 0505/422 dated 24th November 24, 2016, with the purpose of enhancing healthy habit to the Department of Highways personnel. This is also an opportunity for people to exercise or gain more physical activity. The Department of Highways organizes the activity every Wednesday during 3.30 pm - 4.30 pm.

5. Enhance the moral and ethical awareness of personnel as well as promotes prevention and suppression of corruption and misconduct in the public sector.

5.1 Driven Implementation of the action plan to promote moral, ethics and prevention of corruption and misconduct in the public sector of the Department of Highways by providing programs or activities aimed to enhance moral and ethics awareness to personnel of the Department of Highways and insist on behave, conducting and performing work under government regulations, campaigning to raise an importance of participation in anti-corruption in the Public Sector along with knowledge building and understanding of

performing work tasks based on the principles of Good Governance.

5.2 Continuing for organizing activities to enhance ethics, prevent and suppress corruption and misconduct, for example, an exhibition and publicize name list of civil servant outstanding performance of the Department of Highways in 2016, delivering sermons as well as a meditation retreat provided every Wednesday and holy days.

5.3 Provide a special lecture on enhancing knowledge and understanding of corporate governance practices by embracing the prevention of corruption and misconduct ideal as follows:

The Department of Highways has continued instilling ethics, morals, and values in workplace together with encourage personnel to behave in a sense of discipline. As a consequence, the Department of Highways have been rewarded in 2017 for its efforts to enhance development of civil servants discipline and to prevent the civil servants from misconduct. The prize has resulted in preserving progressive discipline awarded by Mr. Mr.Tawee Gasisam-ang, Deputy Director-General of Administration presented in the Ethics, Morality, and Disciplinary Day. This is an activity on the Civil Servant Code of Conduct day and Strengthening Discipline on 25th August 2017 at the Sukhum Nayapradit Auditorium, Office of the Civil Service Commission, Nonthaburi Province.

6. Prepare the Human Resource Management Instruction Manual with the purpose of acknowledgement and understanding of staffs according to perform human resource management task. There are four manuals as follows:

6.1 Human Resource Management Optimization Instruction

6.2 Civil Servant Registration and Remuneration Instruction

6.3 Recruitment, Appointing, and Salary Management Instruction (Revised edition)

6.4 Government Employees and Staffs Management Instruction

7. Analyze, review and determine guidelines or methods related to human resource management in order to increase efficiency and standard in performance.

No.	Date	Venue	Number of participants
1	24 - 25 November 2016	Chiang Mai Grandview Hotel Chiang Mai Province	192
2	15 – 16 December 2016	Fortune River View Hotel Nakhon Phanom Province	185
3	2 - 3 March 2017	Wangchan Riverview Hotel Phitsanulok	217
4	9 - 10 March 2017	Romantic Resort & Spa Nakhon Ratchasima Province	121
5	25 - 26 May 2017	Novotel Chumphon Beach Resort and Golf Chumphon Province	213
6	29 - 30 June 2017	Felix River Kwai Resort Kanchanaburi Province	295
7	1 September 2017	Golden Tulip Sovereign Hotel Bangkok	127

7.1 Civil servants selection criteria to be assigned to the General Administration Supervisor under the Office of the Highways, Highway District, Central Offices and Divisions, Bridge Construction Center and Bridge Construction Rehabilitation Center.

7.2 Authorization for Human Resource Management

The Department of Highways Executive has established an effective policy on human resource management which consequently consistency in achieving the objection of Human Resource Strategy Plan (HR Scorecard). As a result, the evaluation point in the five-dimensional of accomplishment standard framework of human resource management reached to 98.75% and the evaluation marked of personnel satisfaction for human resource management is 71.30%. In this connection, Colonel Jinda Na Songkla Foundation presented an honor plate "Outstanding Human Resource Management Award" to the Department of Highways by Mr. Thanin Somboon, Director-General of the Department of Highways on the foundation day of Colonel Jinda Na Songkhla on February 21st 2017 at the Jinda Na Songkhla Meeting room, Office of the Civil Service Commission, Nonthaburi Province.





A field trip to "Royal Initiative Project" at Tha Yang District , Phetchaburi Province





Exercise event every Wednesday





Outstanding performance of Civil Servant Award of the Department of Highways





Special lecture on Enhancing Knowledge and Understanding by embracing the Good Governance along with anti-corruption in the government sector Ideal





Awarded for preserving progressive discipline





Outstanding of Human Resources Management Award

Human Resource Development

Human Resources Development of the Department of Highways aims to provide its personnel knowledge , capability, expected skill and attitude in order to help supporting them to complete their works successfully that can make a main point summary as follow;

1. Human resources development in highway engineering

Human resources development in highway engineering consists of various courses which aim to enhance knowledge, competence and skills in highway engineering such as Primary Level Highway Engineering Course, Intermediate-level Highway Engineering Course and The Large Tree Care Course. There were 6 courses that were divided into 10 classes with 1,453 participants who were able to complete the courses. The total duration was 45 days. The budget of 5,068,334 baht was spent.

2. Administrative Human resources development

Human resources development in administration consists of various courses which aim to gain the knowledge, understanding, techniques and skills in administration such as Official Letter and Minutes Writing Course, Intermediate-level Highway Administrator Course, Supplies Course. There were 14 courses that were divided into 30 classes with 2,886 participants who were able to complete the courses. The total duration was 77 days. The budget of 5,964,667 baht was spent.

3. Human resources development for learning promotion in organization

It aims to provide knowledge and understanding of knowledge management, collaborative knowledge sharing and learning in order to support the officers such as the Resource Person of Knowledge Management Consultant Course, Promoting Learning and Changing Organization's Culture. There were 7 courses that were divided into 20 classes with 1,967 participants who were able to complete the courses. The total duration was 24 days. The budget of 2,760,170 baht was spent.

4. Human resources development for enhancing moral, ethics and quality of life

It aim to enhance moral, ethics and attitude improving for quality of life better such as The Meditation Retreat and Buddhism Course and The Enhancing qualities of life Course. There were 3 courses that were divided into 4 classes with 215 participants who were able to complete the courses. The total duration was 17 days. The budget of 799,865 baht was spent.

5. Enhancing Human Resource Development Cooperation

The Department of Highways has been sending the officers to train with the other departments in various courses such as The Transportation Administrator Course, Course for High Certificate in Public Administration and Law. In fiscal year 2017, there were 1,482 participants who were attend the courses and the budget of 829,480 baht was spent.

6. Scholarships

The Department of Highways has allocated scholarships to officers according to professional necessity of the organization. In fiscal year 2017, the amount of 6,220,700 baht of scholarships was allocated. The scholarships were allocated for officers that were divided into 18 scholarships for Master's Degree (Civil Engineering in Thailand) and 1 scholarship for Doctor's Degree. There were 7 scholarships in other supportive fields for Master's Degree (in Thailand) and 1 scholarship for Master's Degree (study aboard).

7. The Evaluation and Follow-up of Human Resources Development

In each fiscal year, the department which is responsible for human resource development will monitor the result of development in various methods. The operational methods in fiscal year 2017 were

observed by the officers at 20 internal units around country for 8 times which aimed to interview, gather information and analyse the result for making the report. The budget of 260,660 baht was spent.

8. The Human resources development requested by other units (not included in the fiscal year training plan)

Internal units of the Department of Highways request for cooperation with the Training Division in designing courses and arrange additional training, which spend the unit's budget such as Seminar of the internal unit officer, The Government Procurement and Supplies Management B.E.2560 Course, The Photography for public relations Course. There were 18 courses with 3,725 participants who were able to complete the courses.

9. The training under sale contract

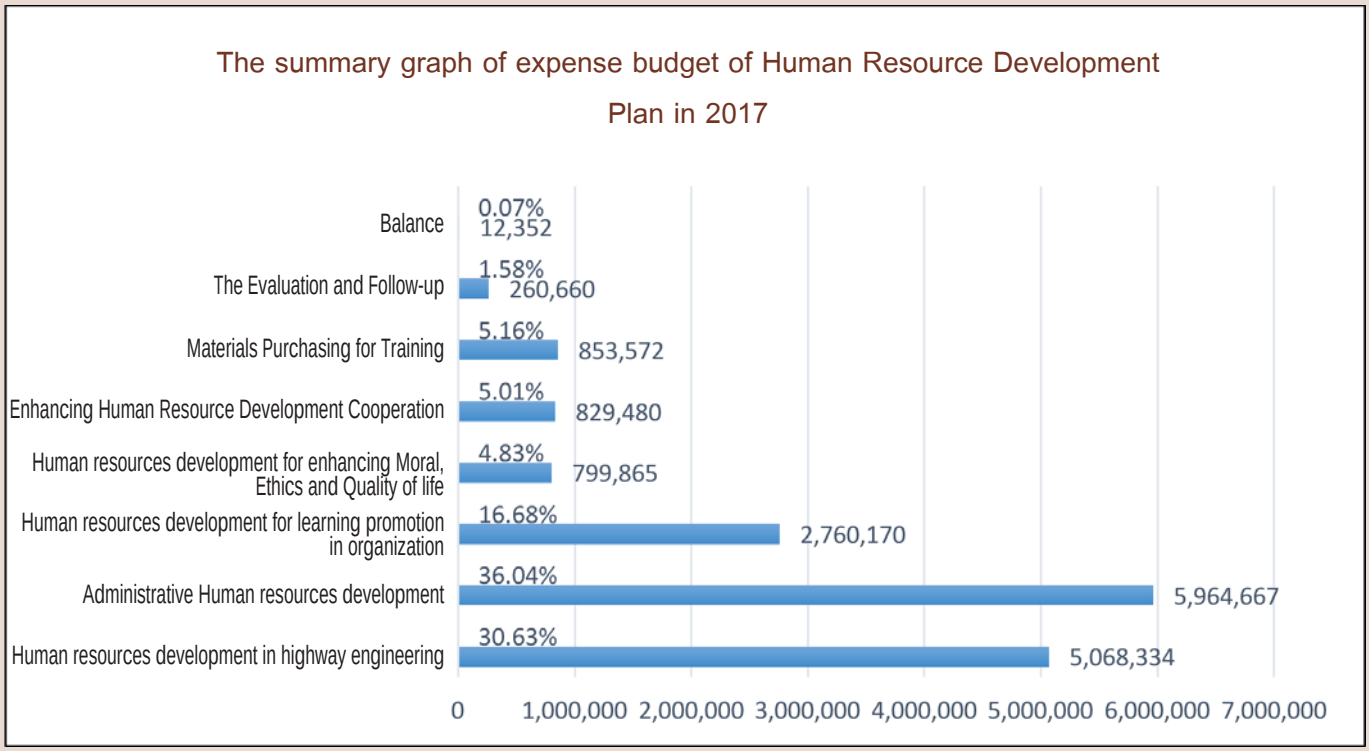
In each year, the Department of Highways will purchase in various mechanical equipment such as motor grader, backhoe loader, vibrating roller. The sale contract were enjoined to train officers who are responsible for maintain machine properly. In fiscal year 2017, there were 12 courses with 518 participants who were able to complete the courses.

10. The training under consulting service contract

The Internal units of the Department of Highways hired the project consultant on various projects such as The Department of Highway strategic plan 2017-2021, Enterprise Architecture Design, Development of Construction Project Evaluation System, Manual Traffic Signs Installation. The costs of training were paid by the consultant such as food, snack and beverage, conference room, trainer. The officers who attend the training receive reimbursement, accommodation costs, traveling Allowance from the original affiliation. In fiscal year 2017, there were 33 courses with 5,107 participants.

Human resources development of the Department of Highways, in fiscal year 2017, the budget was allocated 12,749,100 million baht and the budget of 3,800,000 baht increased during the year. The total budget was 16,549,100 baht. The budget of 16,536,748 baht was spent on training and developing human resource which was 99.07 percent. The budget balance was 12,352 baht (0.07%).

The summary graph of expense budget of Human Resource Development Plan in 2017



The Machanical Equipment and Communication

The Performance and Development Skill Machinery Usage Test Center

Department of Highways was determined the strategy to increase the effectiveness of mechanical equipment in 2 parts; 1. Prepare the equipment to be prompt, high performance, effective and worthy for usage. 2. Train the staffs to operate and control equipment to make them more knowledge, skill and experience to operate the machinery safely.

Department of Highways used free space from Utrapimuk Control Building area of Intercity Motorway and surrounding area from Bangkok Highways District to be the test site of equipment performance after repaired, the performance of new mechanical equipment or new equipment which is created by Bureau of Mechanical Equipment and Communication and develop and improve the machine for the DOH staff to use. It also used to be training center of operating and controlling the machine such as motor grader, excavator, Backhoe Loader and other machines to Department of Highways stall all over the countries. Moreover, it is the center of Skill Standard and Test Development in machinery.





Bureau of Mechanical Equipment and Communication, Department of Highways named this place “The Performance Test and Machinery Development Usage”. Location: Km.26+300 Vibhavadirangsit Road, Soi 76, Don Mueang, Bangkok



There are many operations in 2017 which are

Machinery Development

The mechanical development Department of Highways was operated by Mechanical Development Section. It is responsible for the research, development, design and manufacture of machinery and equipment that meet the specific requirements of users. It can effectively support the mission of the Department of Highways. In the fiscal year 2017, they studied, designed and manufactured 3 items of machinery and equipment.

1. 20 trailers for carrying 10 tons mechanical

Due to The Highway District have not enough trailers to carry the machinery to serve the Highway Depot and related agencies and make the services are delayed and can't respond to the demand. It can reduce the machine breakage and destroy problems while moving.

The Mechanical Equipment and Communication Bureau were created and designed the model of a trailer carrying 10 tons mechanical in the fiscal year 2017. The main designs will follow the engineer principal and related law and can carried 6-wheel trucks weighting 6 tons. Nowadays, the Highway District has trailers which carry the machines 10 tons weight at least such as Backhoe Loader, 3.5 tons of Rough Terrain Rollers, Farm Tractors, etc. After producing, the bureau tests the trailers for safety and improved the budget to produce 20 trailers in the first round.



The model of the trialer transport the machines 10 tons weight while carrying Backhoe Loader

The benefits of the trailers are they carry the machine on time, complete the mission effectively and can manage the rental of machine. Moreover, it can help the staffs use machine, be worth for investment, save the machine not damage before time and save the machine maintenance budget.







20 trailers for carrying 10 tons mechanical Use with the truck code 23 size 6 tons



2. The Model of Diesel Truck size 1.5 tons, pick-up truck

The model of Diesel Truck size 1.5 tons, pick-up truck was designed and developed to carry the equipment for small works. It composed with Diesel Truck size 1.5 tons, Hydraulic Excavator size 3.5 tons and trails size 5 tons for use in community and traffic congestion area. The machine will not block the traffic even in the limited area.

The machine sets are flexible and convenient to use. The Diesel Truck size 1.5 tons with pick up used for carrying material which can be lifted by the hydraulic system and it also used together with trailer and hydraulic excavator.





The model of Diesel Truck size 1.5 tons with pick up for carrying Hydraulic Excavator

3. The Model of conveyor to carry materials to the truck for Highway Depot

The operation of highways maintenance of Highway Depot needs to carry the materials such as 3/8 rocks, dust rocks and crushed rocks, including the process of mixing the materials with mill. In the past, they used labors with a shovel to scoop the materials and then splashed up the truck or mill. It took a lot of workers and wasted time. It is the reason to create the conveyor for effective work, save labor and time to carry the materials.



The conveyor to carry materials to the truck of Highway Depot

The conveyor of the Bureau of Mechanical Equipment and Communication is special design which has a digging arm with a bucket to gather the materials to the conveyor belt with hydraulic system. It can be controlled while working like other hydraulic excavator and the conveyor belt can be easily moved because it is mounted on the trailer.

Inter-City Motorway Project

Inter-City Motorway Project The construction project of permanent highway checkpoints on Motorway No.7, Chonburi – Pattaya section

Background of the project

Over the years, Highway No.7 (Motorway) is used as the main road for transport from east region to any other regions of the country. It links to the industrial production base, warehouses, Laem Chabang Port, railway, and airports, and also plays an important role in the industrial, export, and tourism sector of many provinces in the east region.

The Department of Highways has developed the Bangkok – Chonburi section of Highway No.7 to be a completed entrance and exit control system. Therefore, the Chonburi – Pattaya section was the last section without a completely controlled system, and the surrounding road network was not up to standard, which led to an inconvenience and a risk of accidents to travellers.

To develop the transport network to be convenient and safe to support the development of the Eastern Seaboard area, as well as to improve the quality of travelling and transport to meet the international standards, the Department of Highways, Ministry of Transport, developed the Chonburi - Pattaya section to be a closedsystem. Moreover, an Intelligent Transport System (ITS) is developed to be used in a traffic safety control system to upgrade the level of service and the management systems on the motorway.

Descriptions

The project was the construction of highway checkpoints and traffic safety control system, which covers the area of Highway No.7 from Phanat-Nikhom to Pattaya. The construction includes:

- The construction of road and control centre building in five construction sites: Baan Bung interchange, Bang Phra interchange, Nong Kham interchange, Pong, and Pattaya Interchange
- Toll collection systems:

  Manual System: users receive a Smart Card at the inbound checkpoint, then return the card and pay the toll at the outbound gate.

  Automation System or ETC: to use this system, users have to install the signal receiver on the windshield. When a car passes the checkpoint, the device at the checkpoint communicates with the car's receiver to check the card information. Then, the gate will open and collect the toll from the card. The remaining balance will be shown on the billboard.
- Traffic safety control systems:
  - CCTV Systems
  - Variable-message sign (VMS)
  - Message Sign(MS)
  - Emergency Telephone Systems
  - Intrusion Detection System (IDS)
  - Radio Communication System
  - Data Communication Network
  - Power supply for highway equipment

All communication and control systems are linked to the Fibre Optic network, having the Central Control Centre at Pattaya as a command centre to maintain users' safety all the time.

Benefits

1. To improve the highway's service quality in term of maintenance and safety.
2. To reduce the traffic jam at the checkpoint. The closed system will distribute passengers out of the system according to their destination.
3. To support the expansion of Pattaya - Map Ta Phut Motorway.
4. To ensure that the toll is collected properly and fairly (the more distance, the more toll rate).

The construction of permanent highway check points on Motorway No.7, Chonburi-Pattaya, was completed in November 2016, and provides the service in two phases. The first phase (Soft Opening) has been started on 5th January 2018, after the toll exemption of the Motorway No.7 and 9during the New Year holiday; the original toll rate has been used in this phase. Whereas, after the toll exemption during the Songkran holiday (19thApril 2018), the second phase (Grand Opening) was started and the new toll rate was used.





Legal Affairs

Intercity Motorway System Development is very significant thing to Thailand because it extremely affect to the transportation system of our country especially to promote Thailand to be the transportation hub of the region. The long-term benefits of the development are support the country. The Intercity Motorway System Development can help the transportation and logistics more speed, convenience, safety and time saving. It can encourage decentralize development to other regions and restrict the growth of Bangkok in the present time and promote Thailand to be the transportation hub in subregion apparently.

Intercity Motorway has a completely effective control gateway to support the traffic volume. The cars can travel all the time and the appearance of motorway is designed to do not make problems to the traffic on motorway. For convenient and safety reason, Department of Highways prepares the place for service at outside right of way for the user such as restaurants, convenient shop, allowing business service, restroom and gas station. The location of service areas should have more spaces and convenience for the user and not too close to disturb the traffic on motorway.

Nowadays, Department of Highways process 3 Intercity Motorway Projects: Bang Pa-In-Saraburi-Nakhon Ratchasima Intercity Motorway Project, Bang Yai - Kanchanaburi Intercity Motorway Project, and Pattaya-Map Ta Phut Intercity Motorway Project.

The shelter which is defined in "Highways" in article 4 of Highways Act (1992) and Amendment Highways Act (Version 2) (2006) Department of Highways has planned to allow private sector to invest and manage to build the shelter on Intercity Motorway which should follow the standard and pattern to be consistent with economic condition and law.

Department of Highways had an order no. B.1/109/2559 dated 18 August 2016 appointed the committee to review and improve the standard of construction and identifies the convenience for the shelter of Intercity Motorway.

The staffs compiled Department of Highways rule about the standard and pattern of shelter on motorway and other highways concession (2017) and submitted to the Director General of the Department of Highways on 7 February 2017. The Secretariat of the Cabinet was announced in 2017 in the government gazette, Announcement and General work, Vol.134, special article 46ng dated 15 February 2017.

Landscape Architecture Highways Construction

An Improvement of Landscape and Architecture design in Highway construction was conducted under the budget of fiscal year 2017. It consisted of 2 projects. They are,

1. Landscape improvement project for Highway 204 Section control 0100 Section By pass Nakorn Ratchasima city
2. Landscape improvement project for Highway 121 Section Don Kaew- Ton Payoh area KM.35+771-38+001

Landscape improvement and development in Highway construction Highway 204 Section Control 0100 Section By pass Nakorn Ratchasima city KM.0+000

Project introduction

Aesthetic improvement of Roadside landscape for the main street from Bangkok to the North East of Thailand

Project character

In the past, this public area was used to house the homeless, had lots of waste and was dangerous. There was no basic clean & safe environment. The landscape improvement is focusing on the visual comfort and low maintenance for trees. The design is intended to use simple geometric form, so that it is easy to maintain rather than the complicated shape. The lighting has been also added for safety and security for public access. As this Highway is the main gateway to the city and the passage for the Royal family, the landscape improvement will significantly help to highlight the intersection between cities and the outskirts.

Project Advantage

1. Enhance the focal point of the area and highlight the character of the district.
2. Increase the green area to relax the drivers visibility and de-stress from this beautiful landscape
3. Improve the wasteful land and dangerous area to be cleaner and safer
4. The resident and passage user can use the space for relaxing activities and exercising.















Landscape improvement and development in Highway construction Highway 121 Section Don Kaew-Ton Payom KM35+771-38+001

Project introduction

The project is developed to create the pleasant and beautiful scenery. The area in the past was used for cycling and exercising for both Thai and Foreigners. Chiang Mai international Convention Center is also located in this area, therefore the landscape improvement is necessary and important.

Project character

The 5-km cycling route requires different criteria in this landscape improvement work such as signage area in front of Chiang Mai International Convention Center, which require only small trees so that they will not block the building signage. Some areas which already have big trees will be provided with colorful flowers e.g. Bougainvillea, Ixora and an easily-maintained tree like Carmona retusa and Goldan dewdrop. Cutting and trimming unnecessary branches that obstruct the cycling route is important for user safety. Landscape enhancement at the bicycle parking lots and installation of Panda sculpture for symbolic feature and focal point (Panda is Chiangmai city Mascot). Better irrigation system was designed and planned for the area which was previously inaccessible. The watering system gets the water from canal at 700th Anniversary Chiang Mai Sports Complex Road.

Project Advantage

1. Landscape enhancement work for safety and nature aesthetic.
2. Additional Promotion for the Department of Highways.
3. Create an open space for eco tourism and exercise in the park.
4. Support the user needs and improve the better quality of life for the residence.

Public Relations and Dissemination

The Public Relations Section, the Office of the Secretary plays an important role in supporting and promoting the effectiveness of the Department of Highways (DOH) operations. Public Relations links DOH to the public by broadcasting the information of DOH, establishing good relationship among DOH sectors and the public, and promoting public cooperation via mass media.

In 2017, The Public Relations Section, the Office of the Secretary has publicized and disseminated the activities of the DOH as follows.

1. Television broadcasting

DOH has disseminated its activities through television broadcasting as "Sue Klang Tang Luang" program which is broadcasted on the National Broadcast Television (NBT) channel of the Government Public Relations Department. A two-minute documentary program is broadcasted on the National Broadcast Television (NBT) channel 11, Royal Thai Army Radio and Television Channel 5 and Modernine TV (Channel 9 MCOT HD) Thairath TV and Amarin TV.

2. Radio broadcasting

The purpose of this activity is to inform events and projects of DOH according to its missions and strategies. The program is broadcasted by the Radio Thailand, Department of Public Relations and other radio stations such as Jor Sor 100 MHz, Sor Wor Por 91 MHz, FM 91.0 MHz and FM 106.5 MHz.

3. Publications

DOH has continually disseminated its activities through daily and weekly newspapers, magazines, pamphlets, "Tang Luang Sam Pan" journals and the DOH annual report.

4. Press conferences

DOH makes statements through press conferences for many events such as the important projects of DOH in 2017.

5. Exhibitions and multimedia

Following the passing of His Majesty King Bhumibol Adulyadej, DOH has produced publications, graphic works and multimedia such as creating the Royal condolence message billboards to mourning and honoring the king, the remembrance book signing ceremony, recording the DOH volunteer activities, the King's exhibition and galleries including invited the professional photographer to be a lecturer for DOH's officers to improve their skills . All these activities were contributed through various kinds of channels such as website, Facebook, YouTube, DOH printing media and DOH information board.

6. Occasionally events

Arranged the important events such as DOH volunteers on the passing of His Majesty King Bhumibol to serve people who pay respect to His Majesty the late King. Also launched the ceremonies of motorcycle caravans, rescue and police patrol vehicles in order to provide convenience and safety during New Year and Songkran festivals.

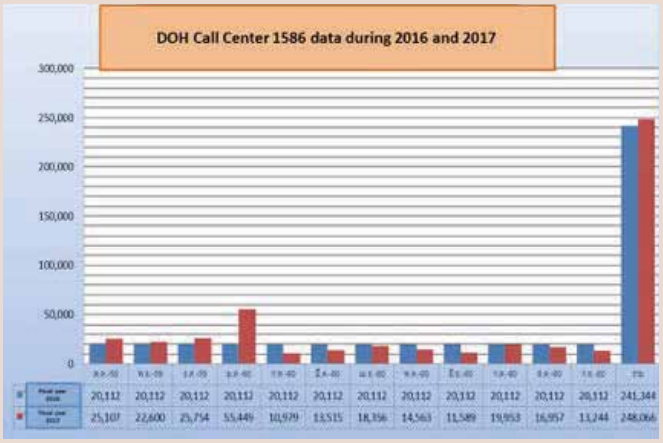
7. DOH call center 1586

The Public Relations Section, the Office of the Secretary is responsible for the 24-hour-service DOH Call Center 1586. The duty of the call center is to provide information on highway travelling and DOH operations. It also receives public complaints and other related information. In fiscal year 2017 (1 October 2016 – 30 September 2017), 248,066 calls were received compared to 264,130 calls in fiscal year 2016 (1 October 2015 – 30 September 2016). The record shown that in 2017 the complaints through DOH call center 1586 were reduced to 16,064 calls or 6.08% whish was less than the complaints in 2016. The table below displays the data of complaints through DOH call center 1586.

The five most famous enquiries were on:

1. Traffic condition in Bangkok and other provinces

2. Information on the inter-city motorways through DOH Call Center 1586 and DOH Call Center 1589 press 7



3. Information on M-Pass electronic toll through DOH Call Center 1586 press 9

4. Direction between provinces

5. Other DOH information enquiries

Since 2013, people can dial to DOH Call Center 1586 with free of charge from all telephone networks. And in every month, The Public Relations Section, the Office of the Secretary conducts a meeting to improve the service of the operators and to conclude the service outcomes, problems, and suggestions for later report to the executives.

8. Public Complaint Management

DOH complaint management aims to provide fast and correct information to the public through various public communication channels such as DOH Call Center 1586, DOH website www.doh.go.th , Government Service Call Center 1111, Bangkok Metropolitan Authority Hot Line 1555, various publications, email: (prdoh@doh.go.th), DOH Facebook page (www.facebook.com/departmentofhighway), telephone, and fax.

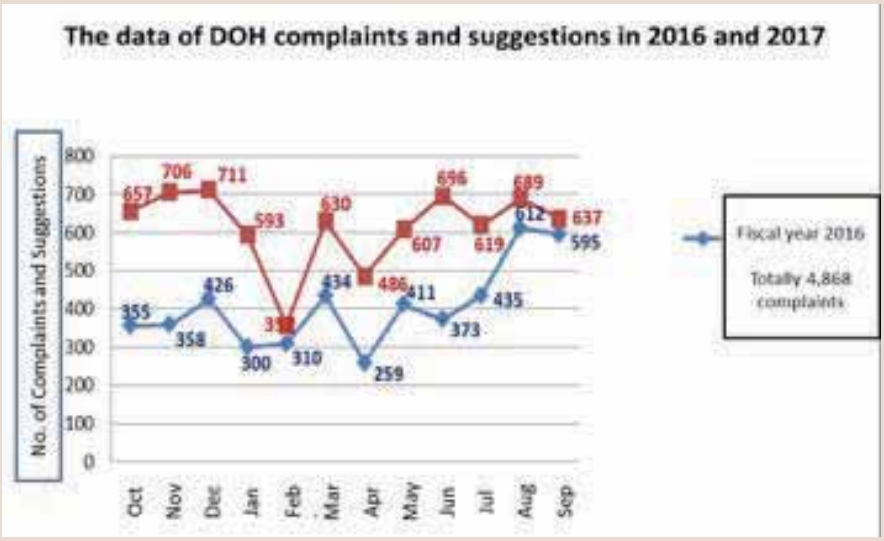
From the record in fiscal year 2017 (1st October 2016 – 30th September 2017), there were 7,728 complaints and suggestions received. The details are as follows.

There were 7,388 complaints on DOH's operation. From those complaints, 6,586 (89.15%) have been solved. The other 802 complaints (10.85%) were under the responsibility of other organizations. (Recorded in 27th December 2017.)

The table below reveals the data of complaints in 2016 and 2017,

The following conclusions were drawn from the record as

1. The five most popular channels were
   - 1.1 DOH Call Center 1586
   - 1.2 DOH website; www.doh.go.th
   - 1.3 Bangkok Metropolitan Authority Hot Line 1555
   - 1.4 Government Service Call Center 1111
   - 1.5 Media (Newspapers, Radio, TV)
2. The five most popular issues were:
   - 2.1 Faulty road lighting
   - 2.2 Other requirements
   - 2.3 Highway Exploitation
   - 2.4 Highway vehicle weight control
   - 2.5 Follow up the complaints



Operations related to the Official Information Act B.E.2540 of the Department of Highways

The Department of Highways concerns the important of the Official Information Act B.E. 2540 since it was in effect. According to Clause 9 of the act, the department prepares preliminary information for the public to access and examine the basis information as they required. There are also staffs who help and give suggestions with the information enquiry as follow,

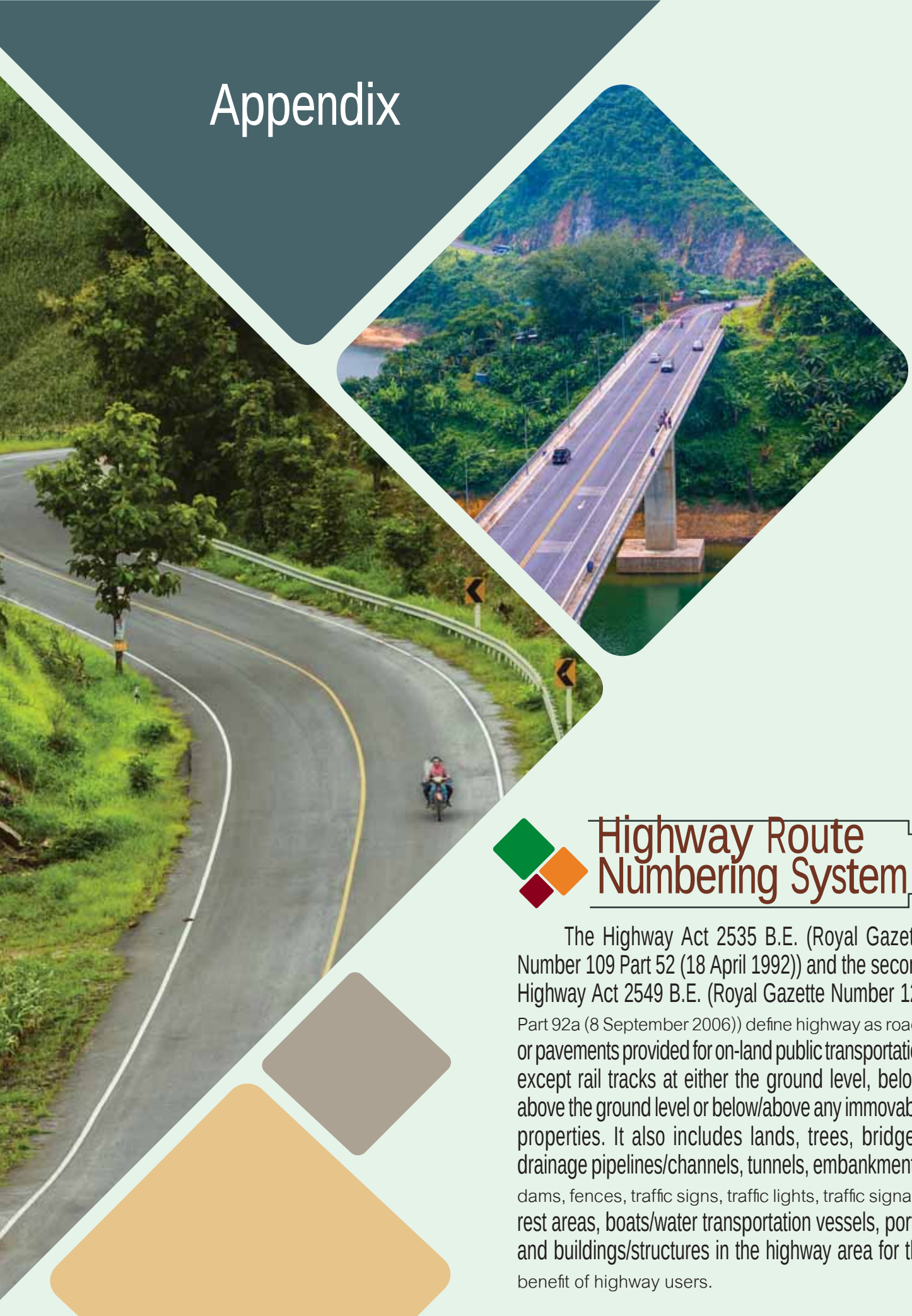
1. Verdict from considerations or pronouncements that may affect private organizations.
2. Policies and their interpretation.
3. Construction plans, projects and budgets for the current fiscal year.
4. Manuals or instructions related to government official operations.
5. Publications referred in the Royal Gazette.
6. Concession contracts, monopolistic contracts or public-private-partnership contracts.
7. Cabinet resolutions or resolutions of committees appointed by the law or cabinet resolutions including academic reports, factual reports or information used for consideration.
8. Other information from the committees such as procurement notice or results of procurement.

In fiscal year 2016, (1st October 2016 – 30th September 2017), there were 244 visitors at the Department of Highways Information Center. Most of them were citizens, officials from other organizations, retired officials of the department, and students. Examples of requested documents were map pamphlets, Department of Highways introductory pamphlets, Inter-province distance charts, 'Tangluang Sampun' magazines, and annual reports.

Moreover, to increase our service to be more efficiently and accomplish all offices to disclose the government operations according to the Prime Minister's order, the Office of the Secretary has conducted the following activities,

1. Developed the Information Center website and launched on DOH website (www.doh.go.th) which was kindly cooperated from Information Technology Center. The objective of the website is to help the DOH administration to be more effective and support public participation. Also it can help people to have more convenient and access to government information quickly as related to the Office of the Official Information Commission's evaluation. The website improvement will be finished in March 2018.
2. Conducted a project on the operation and management system for integrated dissemination by making a contraction with Faculty of Engineering, Rajamangala University of Technology Phra Nakhorn to study and analyze the approach of DOH online information distribution as the Official Information Act B.E. 2540. The project will be finished in the early of 2018.

Appendix



Highway Route Numbering System

The Highway Act 2535 B.E. (Royal Gazette Number 109 Part 52 (18 April 1992)) and the second Highway Act 2549 B.E. (Royal Gazette Number 123 Part 92a (8 September 2006)) define highway as roads or pavements provided for on-land public transportation except rail tracks at either the ground level, below/above the ground level or below/above any immovable properties. It also includes lands, trees, bridges, drainage pipelines/channels, tunnels, embankments, dams, fences, traffic signs, traffic lights, traffic signals, rest areas, boats/water transportation vessels, ports, and buildings/structures in the highway area for the benefit of highway users.

Also, according to both acts, there are five types of highways namely,

(1) Motorways
(2) National highways
(3) Rural roads
(4) Local roads
(5) Concession highways

Furthermore, both acts state that motorways, national highways, and concession highways, are under responsible of the Department of Highways.

Nowadays, only one concession highway is under the responsibility of the Department of Highways. It is the elevated Din Daeng – Don Muang toll-road above route 31.

In the early days, highways or bridges were named after famous people who made significant contributions to the respective highways or bridges such as Viphavadi-Rangsit road or Sarasin bridge. After the development of highway network system in Thailand, the use of highway route numbering system was introduced to avoid confusion and to precisely locate highways which include motorways, national highways, and concession highways. The definition of each highway number is as follows:

Highway routes starting with number 1 are highways in the northern part of Thailand.

Highway routes starting with number 2 are highways in the northeastern part of Thailand.

Highway routes starting with number 3 are highways in the central, eastern, and upper southern part of Thailand.

Highway routes starting with number 4 are highways in southern part of Thailand.

A total of four digits were adopted to name the highway routes based on the highway route numbering system. The highways were classified into 4 categories as follow:

1. Single-digit highways are major highways connecting Bangkok to other parts of Thailand including north, northeast, central, and south. Such highway was subdivided into 2 classes: (1) national highways and (2) motorways.

(1) National highways

Highway route no. 1 (Phahonyothin Road) from Bangkok to Mae Sai (border).

Highway route no. 2 (Mittraphap Road) from Saraburi to Nong Khai (border).

Highway route no. 3 (Sukhumvit Road) from Bangkok to Trad.

Highway route no. 4 (Phetkasem Road) from Bangkok to Amphoe Sa-Dao, Songkhla Province.

(2) Motorways

Motorway route no. 5: a network of motorways connecting Bangkok to the northern region. The numbers of all motorways in the network begin with number 5.

Motorway route no. 6: a network of motorways connecting between Bangkok and the northeastern region. The numbers of all motorways in the network begin with number 6.

Motorway route no. 7: a network of motorways connecting between Bangkok and the eastern region. The numbers of all motorways in the network begin with number 7.

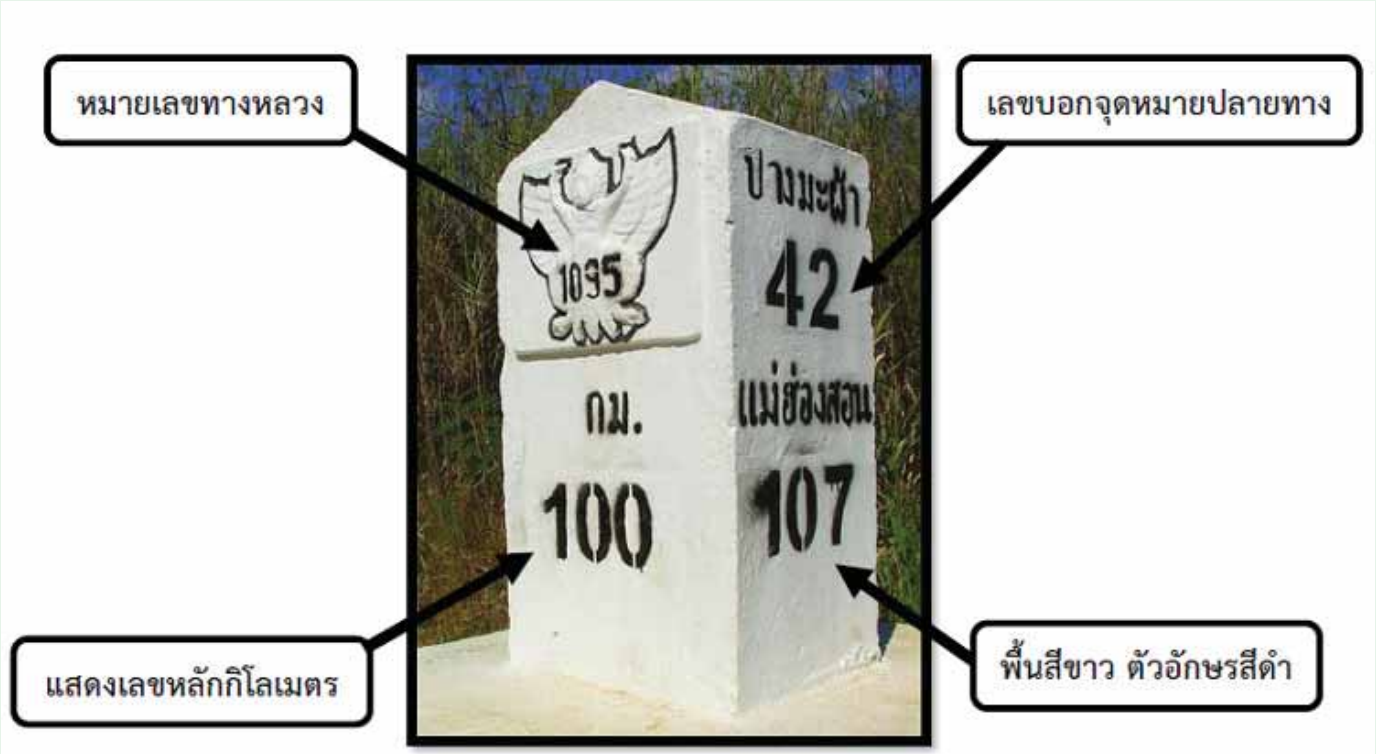
Motorway route no. 8: a network of motorways connecting between Bangkok and southern region. The numbers of all motorways in the network begin with number 8.

Motorway route no. 9: an outer bound ring road of Bangkok and those motorways around Bangkok and its vicinity. The numbers of all motorways in the network begin with number 9.

2. Two-digit highways are the primary highways in different regions. They connect single-digit highways to several provinces. For example, highway route 22 (Udon Thani – Nakhon Phanom). Highway route 33 (Suphan Buri – Aranyaprathet).

3. Three-digit highways are the secondary highways connecting single-digit and two-digit highways to an important area of a province. Such highways provide road network system within sub-regions and support the military service for the country. For instance, route 202 in the northeastern region links Chaiyaphum and Khemarat together or route no. 314 in the central region connects Bang Pakong to Chachoengsao.

4. Four-digit highways are the highways which link provinces and districts, capital cities and districts, or important areas and provinces together. For example, route 1001 in the northern region connects an intersection of highway route no. 11 (Chiangmai) to Amphor Proud or route 4006 in the southern region links an intersection of highway route no. 4 (Ratchakrut) and Lang Suan together.



Asian/ASEAN Highway Route Numbering System

1. Asian Highway Route Numbering System

The old Asian highway route numbering system used an English capital letter starting with "A" and was followed by a number , e.g. A1 or A2. Afterwards, the English capital letter has been replaced with "AH" and was followed by a number, e.g. AH1 or AH2. The new route numbering system was developed after a MOU of Asian Highway Network had been officially made among different governments on April 26th, 2004 in Shanghai during the 60th United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) meeting. Presently, there are nine Asian highway routes. They are AH1, AH2, AH3 AH13, AH15, AH16, AH18, and AH19 with a total distance of 5,457.5 kilometers.

2. ASEAN Highway Route Numbering System

The ASEAN highway network was initiated in 1997. Then, the Ministerial Understanding (MU) on the Development of ASEAN Highway Network Project had been made by the ASEAN members during the 5th ASEAN Transport Minister (ATM) meeting on September 16th,1999 in Hanoi, Vietnam. The Department of Highways represented a chair of the ASEAN highway subcommittee. According to the ASEAN highway Network's study, some Asian highways overlapped with the ASEAN highways. Therefore, it was decided that the ASEAN highway route numbering system must Conform to the Asian highway route numbering system and was later approved during the 21st ASEAN Senior Transport Officials Meeting (STOM) on May 17-18th, 2006 in Chiang Mai. Presently, there are twelve ASEAN highway routes in Thailand. Nine of them overlap with the Asian highway routes, while three of them: AH112 , AH121 and AH123, are independent.

Consequently, current Asian/ASEAN Highway Route Numbering System adopted the English capital Letter starting with "AH" and followed by a number of Asian/ASEAN highway route numbering. In Thailand, there are a total of twelve AH routes. Nine of them, having one two digits, are both Asian and ASEAN highways and have a total distance of 5,457.5 kilometers. Three of them, having three digits, are only ASEAN highways and have a total distance of 1,235 kilometers.



The Standard Design for Bridge Structure

The Department of Highways has quoted the AASHTO LRFD Bridge Design Specifications for bridge structure design as following

- A Standard Design for Bridge Structure

AASHTO 2010	AASHTOLRFD Bridge Design Specifications, 5th Edition
AASHTO 2003	Guide Specifications for Design and Construction of Segmental Concrete Bridges, 2nd Edition, with 2003 Interim Revisions
ASBI 2005	Construction Practices Handbook for Segmental Concrete Bridges

- A Standard Design for Concrete Structure

ACI318M-08	Building Code Requirements for Structural Concrete and Commentary (Appendix C. adopted)
CEB-FIP 90	Model Code 1990, Design Code
ACI SP-66	ACI Detailing Manual 2004
PCI 2004	PCI Design Handbook: Precast and Prestressed Concrete, 6th Edition

- A Standard Design for Thailand

EIT	A standard of the Engineering Institute of Thailand
MorYorPor1302-52	A Standard design for anti-earthquake buildings (Department of Public Works and Town Planning, Ministry of Interior)

Notice of Director of Motorway, Director of Department of Highways and Director of Concession Highways on the restriction of overweight vehicles pass on the motorways, highways and concession highways which caused road damage.

Thailand National Highway Standard

Classification	Special	Class 1	Class 2	Class 3	Class 4	Class 5	Urban Area	Frontage road
Average daily traffic (ADT)	> 8,000	4,000-8,000	2,000-4,000	1,000-2,000	300-1,000	< 300	-	-
Design speed (Km./hr.)								
Flat & Moderately rolling	90-110				70-90	60-80	60	70-90
Rolling	80-110				55-70	50-60	60	70-80
Mountainous	70-90				40-55	30-50	60	60-70
Maximum grade (%)								
Flat & Moderately rolling	4	4			4	4	Varies	4
Rolling	6	6			8	8	Varies	6
Mountainous	6	8			12	12	Varies	8
Recommended pavement	High			Middle - High		Aggregate	High	Middle - High
Roadway width (m.)	7.00 per direction	7.00 per direction	7.00 per direction	7.00 per direction	7.00 per direction	8.00 per direction	3.00-3.50 per lane	3.00-3.50 per lane
Shoulder width (m.)	LT 2.50-3.00 RT 1.00-1.50	2.50	2.00	1.50	1.00	-	2.50 or sidewalk	2.00 or sidewalk
Roadway width on bridge (m.)	11.00 (Min.)	12.00	11.00	11.00	11.00	11.00	Ultimate Design or Min. 11.00	
Right of way (m.)	60-80		40-60		30-40		Varies	-
Superelevation (Max.)	10%						6%	10%

Remarks : 1. Shoulder width can appropriated expand
2. A sidewalk is width 1.50 m.
3. Expand bridge in class 4, 5 may be decreased min 9.00 m.
4. Gradient is 4:1 to 6:1 except somewhere appropriated 2:1 to 3:1
5. Highway Standard class 4, 5 is not recommended to use on the national highway

Activities























Volunteer staffs to serve mourners

The Department of Highways provided volunteer staffs to serve mourners who came to pay respect to the late King Bhumibol Adulyadej at the Deva Phirom Gate of the Grand Palace from 3 to 7 November 2016, 19 to 25 February 2017 and 25 to 30 June 2017 between 10am and 6pm. The service also included handing out more than 300,000 sets of various items. Furthermore, there were 300 volunteers per day to support other tasks such as helping out in the kitchen, food distribution, moving items and collecting garbage at a visitor tent from 13 to 20 March 2017 between 3 a.m. and 9 p.m.

◆ Special volunteering works for the Royal Cremation

The executives, civil servants and all personnel of the Department of Highways joined the voluntary task force during the Royal Cremation Ceremony of the late King Bhumibol Adulyadej. The works included social service and facilitation for mourners who joined the ceremony. This took place on 25 and 26 October 2017.



























Activities

Press Tour – Motorway No. 6

Mr. Thanin Somboon, the Director General, together with the other executives of the Department of Highways took the media to visit the construction project of Motorway No. 6 Bang Pa-in – Sara Buri – Nakhon Ratchasima as a part of the Press Tour on 3 March 2017 at Km. 99 of the project in Amphoe Nong Khae, Sara Buri Province.





































Aid for flood victims

During the flood period, with all Bureaux of Highways, Highway Districts, and Highway Depots all over the country, the Department of Highways monitored for emergency situations and prepared staffs and equipments 24 hours a day. This was to provide safe transport for the citizens and aid the flood victims. Even after the flood, DOH staffs helped rebuilding the damaged areas and elevating victims' troubles. This was aimed to bring the usual day-to-day lifestyles to the people in the area as soon as possible. The Prime Minister, executives of the Ministry of Transport, and executives of the Department of Highways also visited the affected areas. During the event, they stated policies and boosted moral for the DOH staffs.

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