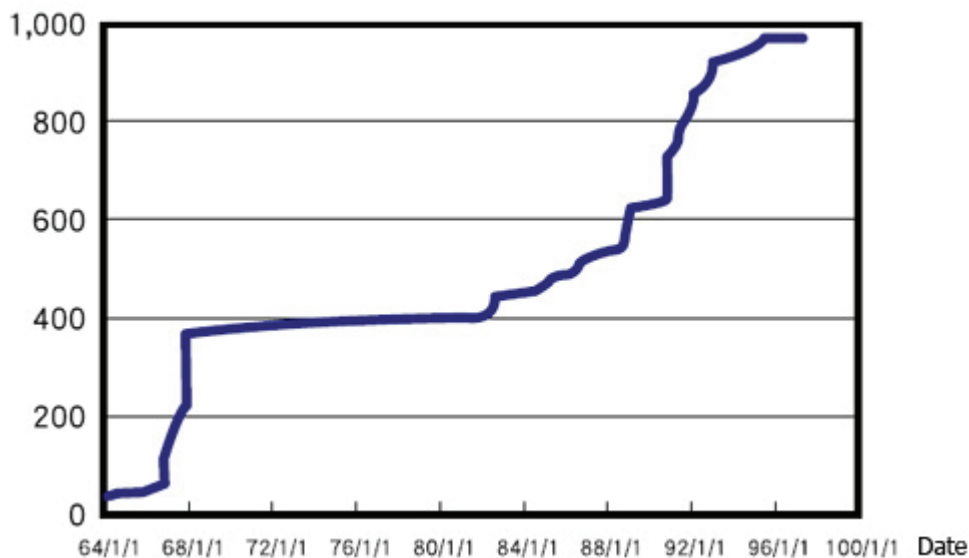


Maintenance Projects

To maintain the quality of the freeways and to ensure traffic safety, the maintenance crews routinely patrol the freeway subgrade, pavement, shoulder, as well as bridges, tunnels, drainage facilities, roadside greenery and traffic signal facilities. Scheduled maintenance works are considered according to the scheduled and actual conditions of the roads. 976 kilometres of freeway maintenance was completed in 2007.

Length of Roads Maintained(km)



In line with governmental directives of government reengineering, streamlining of workforce and increasing of managed road lengths and to introduce the concept of private sector management, contract works of similar nature are combined as well as outsourcing more non-emergency projects to contractors to reduce official procedure for the purchasing department.



Freeway maintenance works are divided into 9 categories and within it 63 items, in accordance with purchasing natures and details it is now redivided into 6 categories and 11 items. As outlined by the table below:

Categories	Description
Project purchase	Regular maintenance project
	Road signals maintenance project
Labor purchase	Regular road works
	Service area environment maintenance works
	Accident response and labor works
	Tunnel electrical facilities and control rooms maintenance

Special purchase	Traffic control facilities maintenance
	Bridges, Tunnels, culverts and buildings safety inspection
	Wastewater treatment facilities maintenance
	Service area waste incineration consigned operations
	Freeway weigh station consigned maintenances and managements



1) 2007 Main Maintenance Summary

(1) Freeway No. 1.

The project begins from Keelung in the north to Kaohsiung in the south, 372.73 kilometres in length with 59 interchanges and 1 exit ramp, 11 toll stations and 6 service areas. The whole line was completed by October 31st, 1978.

The Sijhih - Wugu elevated road section is 20.69 kilometres long, with 2 interchanges and 1 off ramp. This section was completed by October 30th, 1996.

The total length is 393.42 Kilometres.

(2) Freeway No. 2

The project begins from Taoyuan International Airport in the west to Yingge system interchange connecting to Freeway No. 3 in the east. Its total length is 20.36 Kilometres with 4 interchange. The whole line was completed by August 24th, 1997.

(3) Freeway No.3

The project begins from Jijin interchange in the north to Linbian Township of Pingtung County in the south. Its total length is 430.53 Kilometres with 59 interchanges and a exit ramp, 11 toll stations, 7 service areas and 3 rest stations. The project was completed by January 11th, 2004. Additionally connecting with Nangang interchange. Further, Nangang access road's total length is 1.4 Kilometres with 1 exit ramp. Together, their totally length is 431.93 Kilometres.

(4) Freeway No.3 A

Freeway No.3 A begins from Taipei end in the west to Shenkeng end in the north. Its total length is 5.6 Kilometres with 1 interchange. The project was completed by March 21st, 1996.

(5) Freeway No.4

Freeway No.4 begins from Cingshuei end in the west to Fengyuan end in the east. Its total length is 17.16 Kilometres with 2 interchanges. The project was completed by December 21st, 2001.

(6) Freeway No.5

Freeway No.5 connects from Freeway No.3 Nangang system interchange in the west to Suao interchange. Its total length is 54.23 Kilometres with 5 interchanges and ramp exclusively for Pinglin Traffic Control Center, a service area, a toll station. The project was completed by June 16th 2006.

(7) Freeway No.8

Freeway No.8 begins from Tainan end in the west to Sinhua end in the east. Its total

length is 15.51 Kilometres with 2 interchanges. The project was completed by August 16th, 1999.

(8) Freeway No.10

Freeway No.10 begins from Zuoyang end in the west to Cishan end in the east. Its total length is 33.78 Kilometres with 3 interchanges. The project was completed by November 14th, 1999.

(9) Provincial Highway No.2F

Provincial Highway No.2F (original outbound road of the west bank of Keelung harbor) begins from Siandong end in the north to Freeway No.3 Jijin interchange in the south. Its total length is 3.98 Kilometres with 2 ramps and 6 tunnels, built separately by Construction and Planning Agency of Ministry of Interior and Keelung Harbor Bureau.

In February and August 2000 Provincial Highway No.2F coordinated with Freeway No.3 Keelung to Sijhih section, separately open south and north bound traffic until June 1st 2003, and then officially assign to the Bureau to charge over the maintenance.

• Maintenance Kilometres Statistics

Maintainance ficility statistic

Freeway /Highway	Length (Kilometer)	Tollstation (Number)	Interchange (Number)	Service area (Nunber)	Note
Freeway NO.1	393.42	11	63	6	including The Sijhih - Wuguelevated road section 20.69Kilometres
Freeway NO.2	20.36	-	4	-	
Freeway NO.3	431.93	11	61	7	including Nangang connecting way 1.4 Kilometres with 3 reststation
Freeway NO.3A	5.60	-	1	-	
Freeway NO.4	17.16	-	2	-	
Freeway NO.5	54.23	1	6	1	
Freeway NO.8	15.51	-	2	-	
Freeway NO.10	33.78	-	3	-	
No.2 Provincially Highway F	3.98	-	2	-	
Total	975.97	23	144	14	

2) Tunnel Maintenance and Management

There are 52 tunnels situated on Freeway sections that are already opened for traffic, including 2 tunnels in Freeway No.1、4 in Freeway No.3A、30 in Freeway No.3、10 in Freeway No.5、6 in Provincial Highway No.2F, with a total length of 72.8 kilometers. Normally, each area's Traffic Control Center monitors traffic in tunnels and if any accident occurs it will report for appropriate actions to be taken. Vehicles carrying dangerous cargos are stopped from entering the tunnel (exception for applied permit holders).

Aside from the daily patrols and monthly night road cleanliness schedule, all tunnel electrical and traffic control facilities are scheduled for weekly, fortnightly, monthly seasonally or yearly routine inspections and maintenance according to the facilities characteristic, functions and safety. Each year a full test is carried out to test functionality of all equipments to ensure safety and comfort to road users.



Freeway No.5 Hsuehshan tunnel

Freeway tunnel table

Freeway No.	Tunnel	Traffic Direction	Start and End Km Mark	Length (meter)
Freeway No. 1	Thousing	Southbound	0k+020-0k+421	401
	Daya	Northbound	0k+020-0k+574	554
Freeway No. 3A	Taipei No. 1	Eastbound	2k+026-2k+826	800
		Westbound	2k+008-2k+798	790
	Taipei No. 2	Eastbound	0k+705-0k+897	192
		Westbound	0k+682-0k+893	211
	Keelung	Southbound	0k+805-2k+060	1255
		Northbound	0k+840-2k+118	1278
	Cidu	Southbound	5k+794-6k+325	530
		Northbound	5k+745-6k+300	555
	Sijhih	Southbound	8k+160-8k+826	666
		Northbound	8k+175-8k+818	643

Freeway No. 3	Fude	Southbound	18k+268-19k+994	1726
		Northbound	18k+185-19k-911	1726
	Mujha	Southbound	21k+888-23k-736	1848
		Northbound	21k+860-23k+735	1875
	Jingmei	Southbound	23k+939-24k+503	564
		Northbound	23k+919-24k+492	573
	Sindian	Southbound	27k+219-24k+404	1185
		Northbound	27k+170-24k+392	1222
	Bitan	Southbound	28k+559-29k+080	521
		Northbound	28k+541-29k+044	503
	Ankeng	Southbound	32k+626-33k+092	466
		Northbound	32k+710-33k+108	398
	Jhonghe	Southbound	34k+223-35k+095	872
		Northbound	34k+262-35k-093	831
	Puding No.1	Southbound	59k+510-60k+040	530
		Northbound	59k+510-60k+065	555
	Puding No.2	Southbound	60k+300-60k+635	335
		Northbound	60k+325-60k+660	335
	Dalin	Southbound	281k+696-281k+850	154
		Northbound	281k+696-281k+850	154
Lantan	Southbound	292k+880-294k+134	1254	
	Northbound	292k+880-294k+092	1212	
Jhongliao	Southbound	378k+780-380k+638	1858	
	Northbound	378k+780-380k+605	1825	
Freeway No. 5	Nangang	Southbound	0k+237-0k+575	456
		Northbound	0k+234-0k+572	431
	Shinding	Southbound	0k+692-3k+480	2698
		Northbound	0k+698-3k+514	2720
	Wutu	Southbound	7k+677-7k+892	215
		Northbound	7k+894-7k+645	249
	Pengshan	Southbound	9k+441-13k+302	3861
		Northbound	13k+263-9k+457	3806
Hsuehshan	Southbound	15k+263-28k+134	12871	
	Northbound	15k+180-28k+127	12947	
Provincial Highway route 2F	Jhongshiao	Southbound	0k+495-0k+913	418
	Renai	Northbound	0k+495-0k+913	418
	Sinyi	Southbound	2k+570-2k+845	275
	Heping	Northbound	2k+570-2k+770	200
	Dawulun	Southbound	3k+260-3k+662	402
	Daganlin	Northbound	3k+204-3k+662	458

Total		52 Tunnels		72,814km
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Freeway No.5 Hsuehshan tunnel north opening

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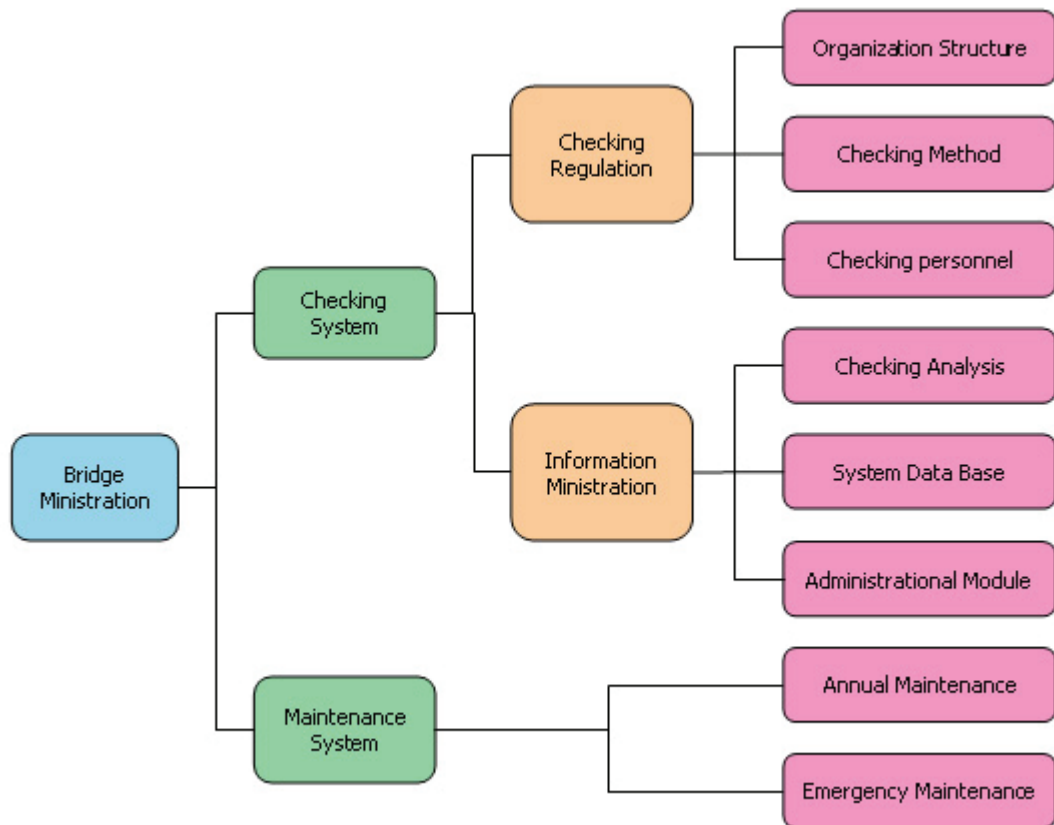
3) Bridge inspection, maintenance and management

With advances in transport development, crossing river and raised bridges are becoming more important as time goes on. It is important to routinely inspect these bridges for the need for maintenance as well as creating documentations for damages to bridges for example traffic accidents and fires and natural disasters (Earthquakes and floods). From this information, routine safety assessment and retrofits can be established.

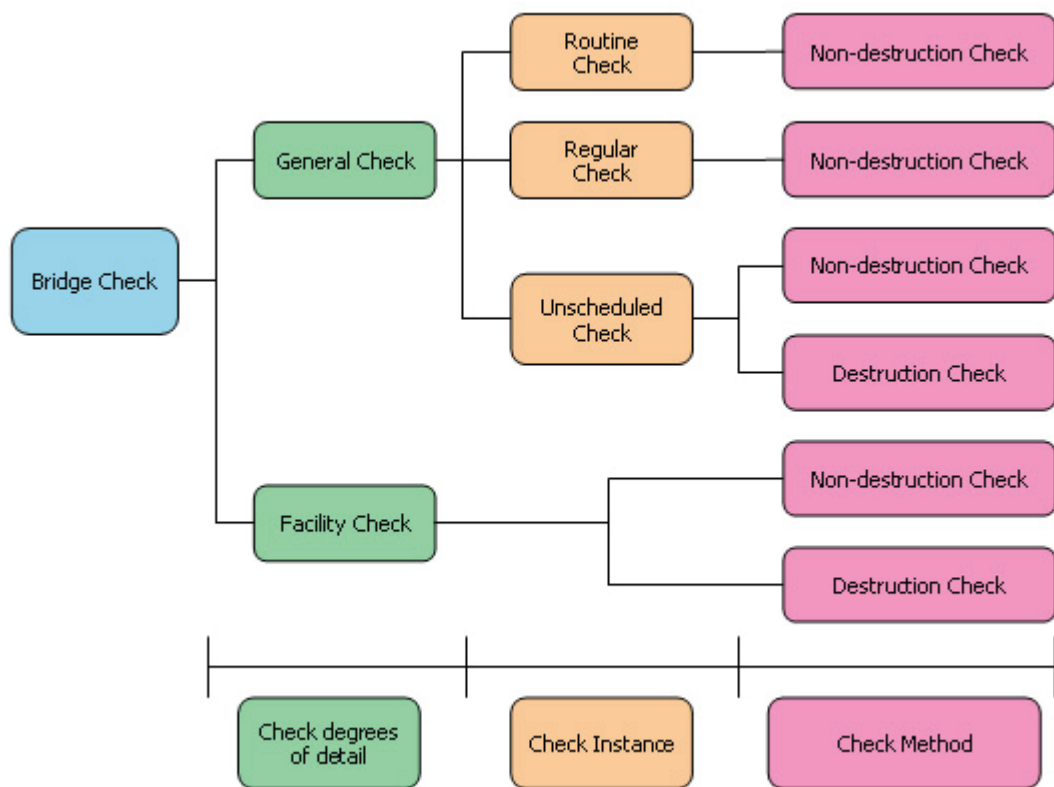
From 245 bridges on Freeway No. 1 in 1978 to 2,160 bridges today, the responsibility of the Bureau is greater than before, especially on Freeway No. 1 as the freeway has been in use for 20 years and aging is evident, further stressing the need for regular inspections.

Based on the “Guidelines on Bridge Inspection for Taiwan Area Freeway Bureau, MOTC” , each engineering office must carry out routine inspections to their assigned region as well as recording data into the Taiwan Bridge Management System for identifying needed repairs.

The bridge management system plan diagram is shown below:



Bridge Management System Plan Diagram



Freeway Bridges Inspection Categories

4) Freeway Environment

(1)Decorations and Greenery

The Bureau manages the greenery on its lands, estimated total greenery coverage to be 2,442 hectares, 348 thousand and 1.68 million shrubs. Main works on vegetation and greenery includes:

a. Roadside Cleanliness and Vegetation Maintenance

Continuing with operation methods previously, each 20-30 kilometre long section is assigned a work group (including a work vehicle, warning vehicle and 1 to 2 workers). The crew patrols and cleans up their section. To ensure work efficiency and safety, the work crews combine inside road shoulder sweep with removal of debris and lower the frequency operation. Operation requires the warning vehicle to be placed on the outer road shoulder while the crews work. In accordance with workers operation guidelines in 2008, the workers contract includes education on roadwork safety as well as traffic control equipments operation. Their work are also checked, reported and recorded for reference.

To accelerate the restoration of natural vegetation on slopes, the Bureau reduced the mowing area and trimming frequency of plants. Without influencing driver safety, the Bureau let the vegetation grow naturally, maintained their natural shape and reserve the wild plants. This not only establishes the diversity in ecological landscape, it also reduces cost for work to be done on these slopes.

b. Overall Landscape Improvement Projects: Planning, Design and Constructions

The projects are to improve the landscape of key nodes and newly take-over regions, which include:

1. Freeway No. 3 Gukeng-Linbian and Freeway No. 8, No.10 landscape improvement project

The design includes the landscape of key nodes and the improvement of slope vegetation and overpass bridge. The projects began successively from 2005, three sections was executed this year (Freeway No. 10 Yanchao-Cishan section, Freeway No. 3 Jiouru system, Jhutian system, Nanjhou, Linbian interchange and Guanmiao-Jhongliao section).

2. Freeway No. 3 Newly take-over regions of Nantou and Dajia Landscape Improvement Projects

This project includes 8 interchanges, 2 service areas, and the offices of Dajia and Nantou sections. Key direction includes evaluation newly take-over road vegetation and landscapes, selecting native plants to improve adaptation.



Ecological vegetation at Chunan Interchange and Dajia Interchange

3. Beautification of Toll Stations

Following the MOTC's plan of "Creating a New Freeway Image" . 23 toll

stations were discussed in the plan, including Yangmei, Sinshih and 13 other toll stations with suggested implement plans, given to individual station to contract and carry out.



Longtan Toll Station Improvements



Chidu Toll Station Improvements

c. Freeway No. 5 Chiang Wei-shui Monument Projects

To commemorate Yilan born Mr Chiang Wei-shui for his sacrifice and efforts to Taiwan's democratic movement, the National No. 5 Freeway is named the Chiang Wei-shui Freeway. A monument was constructed in the southern end of the Hsuehshan Tunnel by the end of November 2007.

It not only remembers Mr Chiang, it also reminds us of the difficulties in the construction of the Hsuehshan Tunnel.

The monument is an 11 Metres high octagonal pillar, symbolising Mr Chiang's foresight and leadership. Radiating patten centres on the pillar, as if the power of democracy builds up through people's strength in this world. The front is engraved the deeds of Chiang Wei-shui throughout his life and carving on the side shows the lively characters of Mr Chiang. Beginning in August 2007, the monument was completed by December with a budget of - 14.56 million NTD.



Chiang Wei-shui Monument

d. Landscape Improvement Projects along Freeway Widening Construction

To preserve our green resources and to reduce the impact of construction projects have on the vegetation, the planning of transplantation and new vegetation had been processed incorporating with the widening construction. This year's works

include:

1. Freeway No. 1 Yunlin to Kaohsiung section widening project number 530B、530C、543C、560B、560C plantation projects. The projects are contracted and in progress.
2. Freeway No. 2 widening project from Dayuan to Dajhu interchange detail design of plantation project.
3. National Freeway (Opened Section) Bridge seismic assessment and retrofit project number M13A、M15B、M15C re-plantation project.

e. Evaluation of the Adoption of National Freeway Interchanges and Slope Landscape Maintenance

There are 17 public institutes and private individuals this year participating in the contest of landscape maintenance adoption sponsored by the Bureau. In accordance with the “Guidelines on Evaluation and Rating of the Adoption of National Freeway Interchanges and Slope Landscape Maintenance” , after primary and second rating, Taoyuan County Longtan Township Office and Mr Li Ching Ching won excellence award for their participation.

The Longtan Township adopted the No. 3 Longtan Interchange to plant Chinese banyan (*Ficus microcarpa*) and shape it to the design of a 70 Metres long Lucky Dragon. Decorated with selected driftwood and lighting, the dragon symbolizes the vitality and energy of the Longtan Township. Mr Li Ching Ching adopted the northern side slope of Freeway No. 3 located from station 135k+300 to 500. By planting local native species including nectar plants and larval foodplants, the location attracted birds, butterflies, insects and multiple local fauna, improving the ecological recovery and the diversified natural landscape. Other adopted locations also reported success with characteristic landscape and awards by the Bureau for their efforts.



Mr Li Ching Ching's Adpoted location Photos

f. Prevention and Removal of Foreign Invasive Species

Invasive species such as *Mikania micrantha*, *Eupatorium odoratum* Linn and *Leucaena leucocephala* not only grows quickly, they also spread rapidly to cause a

major threat to the local flora. Thus in accordance with the Forestry Bureau's recommendation with current prevention and hacking away plans, the Bureau accelerate vegetation restoration on slopes to establish biodiversity to prevent reinvasion.

Limited by labor numbers and funding, unperiodically hacking away is conducted on *Leucaena leucocephala* growth regions. Hacking away area also includes sowing native arbor and shrub species to prevent reinvasion. Other invasive plants treatments are outlined below

1. *Mikania micrantha* :

According to the *Mikania micrantha* removal plan of the Bureau, the spread and location of the species are to be identified in the growth season in May each year, from July to September the areas are hacked away once per month and in its flowering season in October to November the remaining plants are hacked away and a review is taken to assess the effect of the works.

These studies and data are taken in January to February each year to the Endemic Species Research Institute of Council of Agriculture to assess progress of actual species spread and total removal areas to closely monitor the scale of the invasion. In 2006 the Bureau hacked away 4.95 hectares, with 9.87 hectare invasive area remained, which covering Baihe, Pingdong, Nantou regions. In 2007 the Bureau hacked away 16.58 hectares, with 8.29 hectares invasive area remained, covering Baihe, Pingdong, Nantou and Miaoli regions.

2. *Eupatorium ordoratum* Linn :

Referring to the timing of *Mikania micrantha* removal plans and assessments, the spread and location of the species are to be identified in the growth season in May to June each year, from August to October the areas are hacked away once per month and in its flowering season in December to January of next year the remaining *Eupatorium ordoratum* Linn are hacked away and a review is taken to assess the effect of the works.

In 2006 the Bureau hacked away 3.21 hectares, with 0.95 hectare invasive area remained. In 2007 the Bureau hacked away 1.17 hectares, with 1.65 hectares invasive area remained, which covering Baihe, Pingdong regions.

(2) Red Imported Fire Ants (RIFA) Control

The invasion of RIFA creates serious impacts to agricultural, ecological, and to public facilities. On the freeway they may damage Traffic signal equipments, panel boxes, cable and its connecting boxes, as well as damages to the grounds in the slopes, interchange and service areas. Worker's lives may be at risk if they stepped onto a nest. The Bureau followed the advice of the Bureau of Animal and Plant Health Inspection and Quarantine (BAPHIQ) since the first prevention meeting from May 2004. The Bureau identified 25 areas of fire ant infestation and affected regions are marked with yellow warning lines to mark the area affected and Applying sprays and poisoned baits. To educate workers and bureau personnel on RIFA control and safety, the Council of Agriculture have sent specialists to give advice on site as well as holding periodic training courses.

Through the efforts of all engineering offices, fire ant hill numbers are in reduction. 3 locations have reported no RIFA sighting within 6 months and have been removed from the identified regions list. Locations identified invasion of RIFA have been reduced to 11 locations now with total area coverage of 89.3 hectares. Cost of RIFA control in 2007 (Pesticides, workers, education and equipments) is 780 thousand NTD.

Currently the bureau has included RIFA detection into regular maintenance and patrols. Once RIFA invasion area is identified, control measures will be implemented within 1 week, in the next 2 weeks the area is inspected once a week and reported monthly to the "Plant Health Surveillance Web". The area cleaned of RIFA are still monitored and applied Pesticide regularly to prevent re-infestation. Also replanted trees and shrubs are also checked for RIFA presence to prevent spread.



5) Pavement Rehabilitation Works

Soft road pavement usually have a service time of 7 years, however with Taiwan located in the tropical regions with high moisture and temperatures, the road wears out faster and require maintenance in about 5 years. Freeway No. 1 has since 1982 began its 5-year rehabilitation plan, and in 1992 began its second rehabilitation schedule.

Each plan is broken down into sections and was completed by 1996. To maintain the quality and safety of the freeway, the budget continues to include pavement rehabilitation funds and repairs damages to the freeway. There are 31 key projects in 2007, length 1,188,429 metres, area estimated 4,682,764 metre squared and costing 781.246 million dollars NT.



6) Maintenance Funds

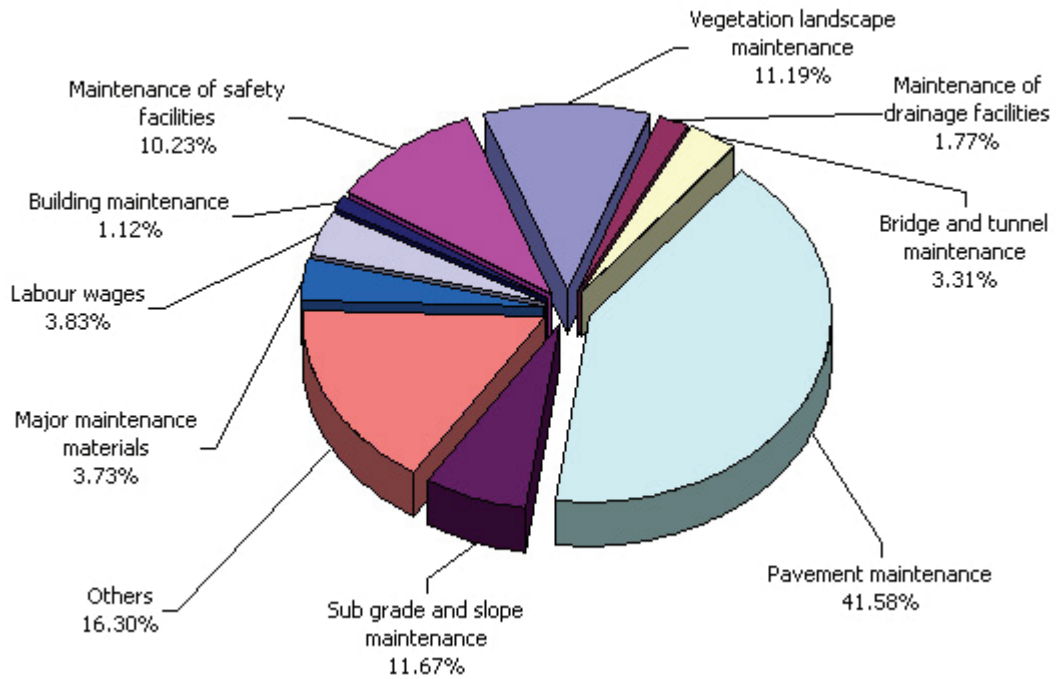
2007 Freeway Maintenance Funds Table

Unit : 1,000NTD

Item	Northern Region Eng. Office N.E.B.	Central Region Eng. Office N.E.B.	South Region Eng. Office N.E.B.	Total	Scale
Bridge Maintenance Funds	67,689	205,227	55,975	328,891	11.19%
Tunnel Maintenance Funds	37,887	0	14,000	51,887	1.77%
General Structure Maintenance Funds	49,982	39,716	7,450	97,148	3.31%
Pavement Maintenance Funds	570,496	531,006	120,272	1,221,774	41.58%
Traffic Safety Maintenance Funds	67,445	126,046	10,500	203,991	6.94%
Road Landscape Maintenance Funds	149,730	206,912	122,301	478,943	16.30%
Electrical Maintenance Funds	77,091	1,916	30,700	109,707	3.73%
Traffic Control Communication Maintenance Funds	90,896	461	21,170	112,527	3.83%

Road Property Maintenance Funds	23,376	3,994	5,500	32,870	1.12%
Others	19,533	131,427	149,658	300,618	10.23%
Total	1,154,125	1,246,705	537,526	2,938,356	100.00%

2007 Freeway Maintenance Funds Analysis Table



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