

# 悉心維護 Careful Maintenance

國道3號／斜張橋 (攝影·顏明邦)

The cable-stayed bridge on National Freeway No. 3 (by Yan Ming-bang)

坦途千里

## Driving Smoothly on Every Mile

川流不息的車潮對道路損耗在所難免，因此養護成為我們最基本的工作之一。不論是定期的保養維護，或是不定期的施工整修，每一次短暫的不便，都是為了讓道路常保平坦、行車永遠順暢。

After being opened to traffic, uninterrupted and heavy traffic makes road structure worn out unavoidably. Routine maintenance is therefore a must. Temporary inconveniences due to either routine maintenance or emergent repair can ensure long-term safe and comfortable driving on freeway.

# 路面維護

## Road Surface



路面養護最重要的是維持公路的服務品質與行車安全，高速公路是提供民眾高速行駛的道路，路面的平坦及完整度，較一般公路更須注意品質要求及維護的時效性。

目前高速公路的路面以瀝青混凝土構築的柔性路面為主，水泥混凝土鋪築的剛性路面次之。柔性路面具有較佳的行車舒適感，以及維護方便之優點；剛性路面提供較佳的承載力，適用重載車輛較多的路段。然因臺灣位於亞熱帶高溫多雨，加上重車多、車流量大，路面較容易損壞，因此不論是何種路面均需定期巡查及維護。

Road surface maintenance aims to enhance service quality, pavement structure, and traffic safety. Freeways are for high-speed driving, so the standards set for their maintenance should be much higher than those for ordinary highways.

Currently, our freeways are mostly flexible pavement. Flexible pavement, made of asphalt concrete offers smoother drive and is more easily to maintain. Rigid pavement, made of cement concrete, has greater bearing capacity and suits to sections with higher heavy vehicle traffic. Taiwan is a sub-tropical island with high temperature and much rainfall, whereas there are many heavy vehicles and heavy traffic. All these gradually damage road surface. So both flexible and rigid road pavement require constant inspections and repairs.

國道路網車流量大，路面較容易損壞，需要定期巡查及維護（國道1號／五股段）。

Due to constant heavy traffic in national freeway network, road surface is easily worn out and requires regular inspections and maintenance. (Wugu section of National Freeway No. 1)



國道1號／三重五股段

Sanchung-Wugu section of National Freeway No. 1





每日巡查是養護人員的基本工作，如遇颱風、豪雨或強震，另會進行特別檢測。養護人員會依據巡查現況訂定計畫，若發現輕微損壞，如剝離、車轍、坑洞等現象，將立刻進行緊急填補，避免毀損擴大；對於鋪面老化、平整度不佳的路段，則辦理大型整修作業，其目的在路面結構尚未損壞之前即加強養護，以延長路面的使用壽命。

大範圍的整修工作，還要考量以不影響交通為原則。於日間進行路面養護時，儘量避免在交通尖峰時間進行，或利用車流量較少的夜間來施工。為了保護用路人和施工人員的安全與權益，施工前除透過廣播電台，以及道路上的資訊可變標誌，提醒用路人施工訊息，並於施工路段設置醒目設施和改道標誌，告訴用路人將會遇到的狀況。

大範圍的整修工作常利用車流量較少的夜間來施工。

Large section repair works are usually proceeded during non-rush hours at night.



Daily inspections are routine works of maintenance staffs. In case of typhoon, heavy rain or earthquake, special inspections will be conducted. Our staffs make planning in road repair to prolong the life of freeways. If slight damages are found, emergency measures will be taken to avoid further deterioration. In case of eroded pavement or uneven surface, large-scale repairs will be undertaken.

To minimize inconvenience caused to freeway users, large-scale repair works are proceeded during non-rush hours in daytime or at late night. Before and during such operations, we will inform road users through radio; besides, through the Changeable Message Signs (CMS) along freeway, we will warn drivers about ongoing project ahead. Moreover, in each repairing section, eye-catching signboards will be erected as reminders. All measures aim to ensure the safety of both workers and freeway users.

國道3號／西湖高架路段

Xihu viaduct section of National Freeway No. 3



# 橋梁維護

## Bridges



跨越河川或架高於空中的橋梁，更需要注意結構安全。  
Bridges across rivers or viaducts are at greater damage risks need more notice on construction safety.

跨越山谷與河川的橋梁，讓原本分隔的兩地有了溝通交流的管道；位於一般路面之上的高架橋梁，則讓原本壅塞的平面道路有了疏解車流的空間。然因其跨越河川或架高於空中，比一般路面更需注意其安全性，尤其是遇到颱風、豪雨或地震等災害時，其結構安全係監測首要任務。

不論地形和氣候如何惡劣，養護人員都必須對橋梁進行安全檢測與搶修作業。從過去到現在，養護人員持續不斷地為橋梁進行定期檢測，並建立完整檔案，依據橋梁狀況作安全評估，擬訂適當的維修補強方案。不同形式的橋梁，維護方法也不盡相同，如跨距長達330公尺的斜張橋，在興建與維護的難度和經費上，就比跨距30公尺的一般橋梁高出很多。

為了提昇橋梁對抗天然災害的能力，我們更依據最新耐震標準，對所有橋梁進行評估及補強，全面提升耐震功能，並設置監測儀器，確保橋梁安全；對於位在沖刷型河川上的橋梁，除了耐震補強之外，亦透過工程方式加強防洪抗沖刷的能力。

民國67年國道1號全線通車時，設有橋梁245座，隨著路網的擴展，現已增加至2千餘座。由於維護管理的責任加重，再加上國道1號橋梁通車使用已30餘年，自然老化現象相繼浮現，透過檢測、維修及管理以延長橋梁安全壽命，成為刻不容緩的重要工作。



國道1號／頭前溪橋  
Touchian Stream Bridge on National Freeway No. 1

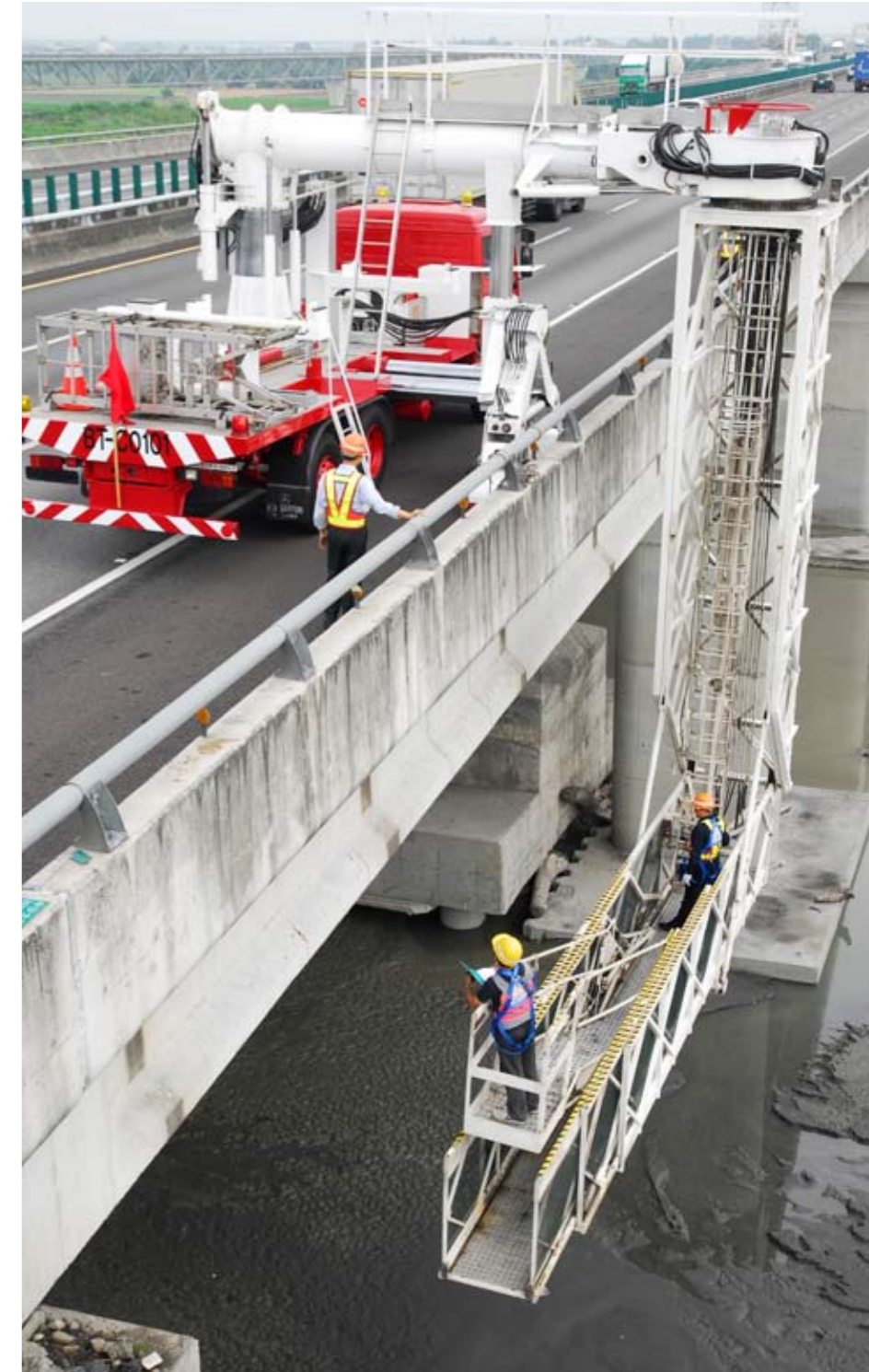
Across valleys and rivers, bridges connect two separated places. Meanwhile, viaducts paralleled to ordinary sections serve to relieve the traffic burden of congested sections. However, being exposed to environment injurious, bridges and viaducts have more risk to be damaged and therefore need more attention. Especially when natural disasters such as typhoon, heavy rain or earthquake occur, inspections of structure safety are our first priority.

No matter how bad terrain or weather is, maintenance staffs have to make inspections and emergent repairs. Year by year, they have been regularly inspecting bridge structure and setting up complete files. In case of damage, they will evaluate actual problems and come up with appropriate repair or reinforcement solutions. Different styles of bridges require different ways of maintenance. For example, a cable-stayed bridge with a main span of 330 meters certainly requires more complicated methods in construction and higher cost in maintenance than an ordinary bridge with a 30-meter span.

To enhance the capability of bridges in combating natural disasters, we constantly evaluate and reinforce all freeway bridges based on the latest earthquake-tolerant standards. The earthquake-resistibility has been enforced and seismic design code equipment installed to monitor bridge safety. To those bridges across highly eroded rivers, special measures are taken to enhance their capability to resist flooding or scouring.

When National Freeway No.1 was opened to traffic in 1978, there were 245 bridges along it. Now, with our freeway network expanding, there are over 2,000 bridges. With greater and greater workloads and the aging of those bridges along National Freeway No. 1, inspections and repairs become even more important for prolonging the life of bridges.

養護人員檢測橋梁安全。  
Our maintenance staff conduct bridge safety inspection.



## 設施維護 Facilities



為了維持道路的暢通，高速公路上有許多用路人看得見與看不見的設施，全都需要養護人員細心的維護。

交通安全設施係為導引車流、維護行車安全而設置，主要養護工作包含標誌、標線、號誌、路燈和護欄……等等。養護人員依據道路養護巡查制度，致力於各設施的完整性與一致性，並且維持其清晰、潔淨、醒目、堅固，以有效發揮指引功能。

交通控制系統是為了執行智慧化的交通管理，並提供更完善的服務所設置，由各種交通資料收集設施、處理資料的中央電腦、系統操控中樞的控制中心及提供各種行車資訊的顯示設施構成。定期檢查和養護，以及故障因應和排除，不但可以讓各個系統正常運作，也讓我們藉此掌握交通狀況，隨時採取因應措施。

因隧道大多經過地形陡峭的山嶺與偏僻地區，且具有封閉之特性，一旦發生事故可能較一般路段嚴重，所以必須對電力、通風、照明、消防、監控、交控及通訊等設施詳細檢查和維護，並依照個別設施的特性、功能、安全需求和使用情形，進行週期性的檢查。

每一個設施維護的作為，都是為了讓設施發揮正常功能，提供用路人安全的行車環境。

In order to ensure smooth traffic, we have installed many facilities along freeway. No matter visible or not, these facilities need constant and careful maintenance.

The traffic safety facilities are installed to guide traffic flow and ensure traffic safety. These include signs, markings, signals, lights, fences, etc. Our staffs make routine inspections everyday to make sure that they are coordinated well to provide consistent guidance, and that they remain visible, clean, and functional at all times.

The traffic control system is set up for carrying out intelligent transportation management and providing the best service. Our control system includes traffic data collection facilities, central computers for processing traffic data, control center for system monitoring and controlling, and display facilities for showing various traffic information. By making periodic inspections and eliminating malfunctions, we keep every system operating well and deal with any possible incident.

Tunnels usually pass through lofty ranges or remote areas, and their close environment might make an accident become more serious and then more difficult to deal with. So we need to execute more detailed inspections and maintenance on power supply, ventilation, lightening, firefighting, monitoring, traffic control and communication facilities. And we make periodic inspections based on their individual conditions, features, functions, and safety requirements.

Every action in our maintenance procedure aims to ensure all equipment can function well at all times and provide a safe freeway network.

高速公路上有許多人們不常注意到的設施，全都需要養護人員細心的維護。  
The noteless facilities along freeways, all need careful maintenance.



國道3號／西湖段  
Xihu section of National Freeway No. 3

# 景觀維護 Landscapes



美麗的路容景觀，需要經常性的保養和照顧，如果久疏整理，便會對行車安全及路面景緻造成莫大的影響。在高速公路上，路容景觀維護工作包含了路容清潔、割草與植栽養護。

除了突發的緊急狀況之外，每日的路容清潔作業，以外側路肩巡迴撿拾為主；內側車道的清掃與垃圾撿拾，則採定期施作，而且養護人員會避開交通尖峰時段，並依規定設置警示設施。因此當您看到施工警告設施時，代表前方正在進行養護工程，行車速度或許有些影響，但請發揮耐心，遵守指示小心駕駛，確保你我的安全。

為了避免路側邊坡草長影響觀瞻且易引發火災，割草作業僅針對護欄外2.5公尺範圍內辦理，距離較遠處，則任其自然生長，使萌發的小苗有成長的機會，也加速恢復山林的原貌。

植栽養護是以維持原本景觀設計的理念為目標，定期的修剪、澆水和補植，以維持景觀樣貌。而觀察生長情形、進行病蟲害防治和施肥，以及於颱風來襲前加強修剪，也是養護的重要工作。

或許您從來沒有想過，車道兩旁的繁花綠樹和乾淨整潔的道路，都是因為有著一群默默耕耘的養護英雄，才有今日的成果。



定期修剪、澆水及補植，是植栽養護的重要工作。

The vegetation works include regular pruning, watering and replanting of plants.



車道兩旁的繁花綠樹和乾淨整潔的道路。

Cleanliness and green plants along freeways look very agreeable.

Beautiful landscapes come from constant care. Lack of attention adversely affects traffic safety and freeway landscapes. Our works include roadside cleanliness, mowing, and vegetation maintenance.

Except for emergencies, daily cleaning is limited to road shoulders for safety sake. Inner lanes are cleaned only periodically. Besides, cleaning staffs will arrange warning devices by regulation and avoid working during rush hours. Therefore, whenever you see such warning devices, it means there are ongoing operations ahead. You may have to slow down, but please patiently follow instructions and drive carefully to ensure safety.

To prevent the grass on side slopes from hindering drivers' eyesight or causing fire by accident, our staffs do mowing work regularly, but mainly to grass within 2.5 meters outside barriers. Beyond that, we allow grass and trees to grow freely for accomplishing natural landscape.

Vegetation maintenance aims to keep the original concept of landscape design through pruning, watering, and replanting. Routine works also include observing the growing condition of plants, control of disease and pest, fertilization, and pruning before each typhoon comes.

Maybe it never occurs to you that flourishing plants, beautiful flowers and cleanliness along freeways are attributed to the strenuous efforts of many behind-the-scene heroes.

## 邊坡維護 Side Slopes

為了預防道路邊坡因豪大雨或颱風等天然災害沖刷，造成土石侵蝕而崩壞，我們除了加強邊坡的防護處理，以提高道路安全、延長使用壽命之外，並增設水土保持設施或擋土構造，維持路基及邊坡的穩定度。

對於大面積邊坡開挖，更以生態工法，恢復為施工前原有的地貌，讓道路建設與自然環境融合為一。而且，不論是植生型的護坡，或是擋土型的護坡，都配合四周景物和天然地形儘量採用自然材料，如果必須使用人工材料，亦以融入環境，讓人工設施與自然景物和諧共存為基本原則。

做好基本的水土保持和坡面穩定，努力將邊坡對自然環境的影響減至最低，儘量保留現存的植物，保有原本的地質形態，是我們希冀且堅持的目標。

人工設施與自然景物和諧共存，是邊坡設計的基本原則。

Our roadside slope designs aim to make artificial facilities and natural scenery coexist in harmony.



To prevent the rock erosion lead to landside caused by heavy rain or typhoon degradation, slide slope, ecological engineering is applied. This also helps enhance traffic safety and prolong the life of freeway. Meanwhile, soil conservation facilities and retaining walls have been reinforced for further stabilizing road foundation and side slopes.

In excavating large-area slopes, we also adopt ecological engineering to restore original environment, thus enabling freeway facilities and natural environment to coexist in harmony. Besides, in constructing protective slopes, natural materials are used to make them in agreement with surrounding natural environment.

Besides such basic works as maintaining soil conservation and slope stability, we do utmost to minimize any adverse affect on the surrounding environment of side slopes through preserving existing vegetation and topography.

## 協力合作

## Coordination and Cooperation



由於服務管理的路段與日俱增，所以我們積極與相關單位和民間企業合作，希望結合大家的力量，共同維護國道的安全與美觀。

在養護工程上，除了必須即刻搶修的緊急狀況外，其餘工程皆發包委外施作，藉此吸取民間企業的工作經驗，並減輕政府自行經營的成本負擔。

在土地利用上，以不妨害行車安全及橋梁結構為前提，鼓勵地方政府和團體參與邊坡、交流道及高架橋下景觀維護認養工作，或是提供學校與地方申請使用，讓社區居民協助維護，使土地資源更多元且有效運用。

為了讓用路人的更安心，不僅協調公路警察局加強執法，維持行車秩序，並制定車輛拖救服務辦法及統一收費標準，督導民間廠商辦理救援服務。

Since our freeway network has been expanding day by day, we have been working closely with related government agencies and civic organizations to maintain freeway safety and landscape.

Regarding maintenance works, except for urgent cases which require immediate repair operations, we contract most construction projects to private companies to make the best of their strengths while reduce our own management cost.

Regarding land utilization, under the condition that traffic safety and bridge structure will not be endangered, we welcome local governments and civic groups to take part in our landscape maintenance efforts on side slopes, surrounding interchanges, and under viaducts. Schools and local communities can also apply for using these areas while local people can join the maintenance works. Then it achieves a multi-scope and effective land-use.

Regarding creating a safe freeway network, we have not only coordinated the Highway Police Bureau to enhance law enforcement and maintain traffic order, but also made rules of towing services and fees for private towing companies to follow.

制訂拖救辦法和加強執法，都是為了讓路人的更安心。

We make towing regulations and strengthen enforcement so that all freeway users can be secured.

