



# 3 Widening and New Construction Projects

## 1 Planning and Design Operations

### (1) Planning and Design of National Freeway Bridge Seismic Retrofit Project (The 1<sup>st</sup> priority section of Phase 2)

The earthquake hazard mitigation of highway bridges is a major issue in disaster prevention plans for sustainable development of our country. TANFB has been waging major efforts since 2002 in bridge seismic retrofit works, of which Phase 1 works were completed in 2010.

Initiated in 2010, the works for National Freeway Bridges Seismic Retrofit Phase 2 Projects (1<sup>st</sup> priority section) were carried out and will be completed in 2014. The scope of this project covers all bridges in National Freeway No. 3 Interchange Xizhi to Zhunan (1<sup>st</sup> priority section), 12 bridges in southern sections of National Freeway No.3 and 58 bridges in the National Freeway No. 1 for a total of 336 at a total construction cost of NTD 7.7 billion.



50 bridges in the National Freeway No. 1 had been seismic retrofitted. There are 278 bridges in the National Freeway No. 3 and No. 10 to be continuously designed awarded and constructed in 2012.



Scope of National Freeway Bridge Seismic Retrofit Phase 2 Project (The 1st priority section)



Diagram of Road net of National Freeway Bridges Seismic Retrofit

## (2) Planning and Design for the National Freeway No. 1, addition of Dawan Interchange

To further enlighten the traffic at Yongkang and Tainan Interchanges while meeting the traffic demand derived from associated development projects launched not long ago in the area aiming to solve the problems caused by the traffic bottlenecks on the Provincial Highway Tai No. 1 and County Road No. 182. The southbound exit ramp and northbound entrance ramp between the Yongkang (319k) and the Tainan Interchanges by National Freeway No. 1 are added to the project; to meet the growing traffic, a U-turn lane is installed to the south of the access road, known as the County Road No. 180 while widening the cross bridges and improving the access roads linking the Yongkang Arterial 3-1 Road for upgraded traffic efficiency.

The Planning and Design project was approved by Ministry of Transportation and Communication on August 26, 2011 and on July 11 2012, the Basic Designs and the budget reviews were ready. The Environmental Difference Analysis Report had been approved by EPA, Executive Yuan on September 17, 2012, followed by detailed designs and contract awarding for completion set for 2015 as scheduled. By then, traffic jam bottlenecks neighbors in Yongkang and Rende interchanges of Tainan would be eased. And a sound regional traffic road net that would provide convenient transport services.



Diagram of Dawan Interchange on National Freeway No.1



### (3) Planning and Design for the National Freeway No. 3, addition of Nanyun Interchange

Situated in the north end of Zhushan Township, travelers leaving the Zhushan Interchange may turn to the County Road 151 heading for Xitou and Shanlin River without passing through Zhushan downtown, reason why fewer visitors come to Zhushan. Accordingly, the Nantou County Government, aiming to prosper tourism in Zhushan, proposed adding an interchange at No. 250k, the National Freeway No. 3, in the south end of Zhushan Township.

The project in question deals with installing a single-point interchange at 250.1k between the Zhushan Interchange and the Douliou Interchange by National Freeway No. 3. The Provincial Highway Tai No. 3 to the south of the interchange would be used for improved services rendered to the population in Zhonghua, Nantou and Yunlin.

The feasibility study report on the project in question was approved by Ministry of Transportation and Communication on January 13, 2012. The basic design report deliberation was held on October 8, 2012, where the report was basically approved. An Environmental Difference Analysis is underway at this time for completion by 2015. Detailed designs are completed and contracts are to be awarded by following the land-acquisition timetable for the 20.5-month construction works.

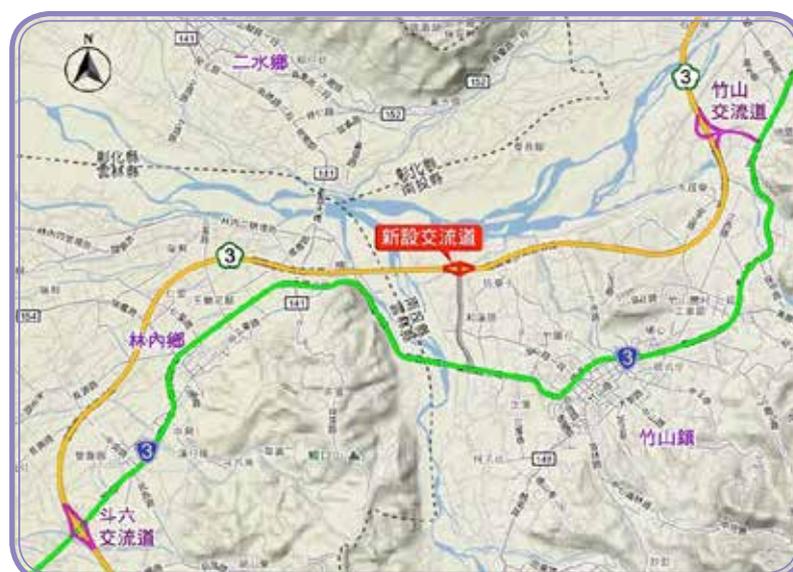


Diagram of NanYun Interchange construction on National Freeway No. 3





Diagram 1 of Gukeng Interchange Construction on National Freeway No. 3



Diagram 2 of Gukeng Interchange Construction on National Freeway No. 3

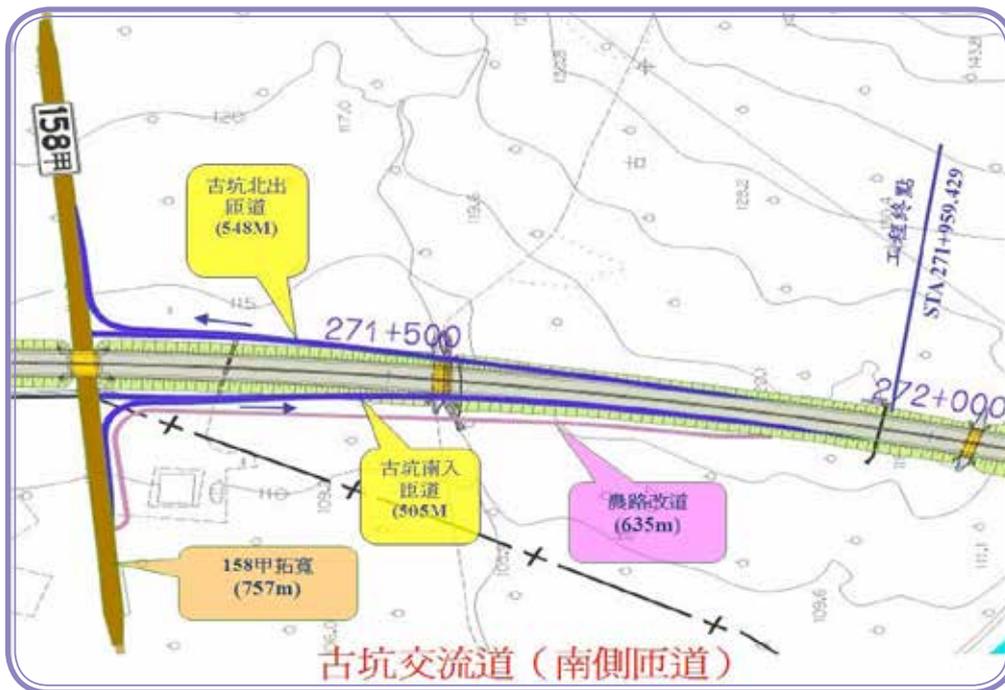


Diagram 3 of Gukeng Interchange Construction on National Freeway No. 3

### (5) Planning and Design for Jiuzheng Interchange improvement projects, the National Freeway No. 6

For the sake of sound development of Wufong in Taichung and Caotun in Nantou and building a road net for convenient transportation, the Provincial Highway Tai No. 3 is planned to be the access road while adding the eastbound and westbound exit/entrance ramps to the west of the Jiuzheng Interchange, which is available at this time for a complete interchange, which is demanded by both current and future passenger transportation for the booming tourism in Caotun. The National Freeway No. 6 would also serve the Great Taichung area.

The project report was approved by Ministry of Transportation and Communication on September 21, 2012 and the designing works are underway. The Environmental Difference Analysis was being revised per comments of the project team of EPA as of December 20, 2012.



Diagram 1 of the Jiuzheng Interchange improvement projects on the National Freeway No. 6

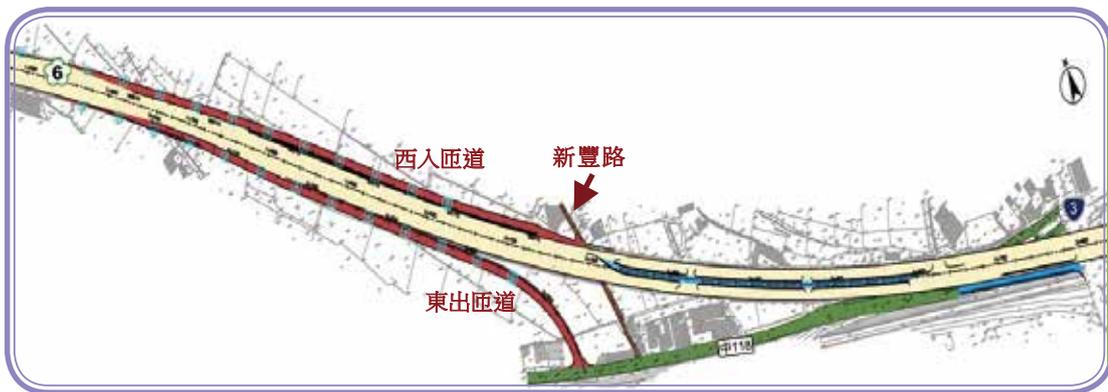


Diagram 2 of the Jiuzheng Interchange improvement projects on the National Freeway No. 6

### (6) Feasibility studies of operation for the new-built expressway from Dayuan Interchange, National Highway No. 2 to Tai No. 61 Provincial Highway

By Jiao-Lu-Zi No. 1000022922 of Ministry of Transportation and Communication of March 24, 2011, which was submitted to the Executive Yuan on February 25, 2011 by Yuan-Tai-Jiao-Zi No. 100008153, the Feasibility Study of the project was approved by Ministry of Transportation and Communication. The project would improve and integrate the traffic demands in Dayuan, Taoyuan while building a sound regional road network as part of the inner ring, central ring and outer ring of the Taoyuan Aerotropolis plan as a sound traffic

system of 8 sectors.

Starting in the west from the Linkou Dayuan sections of the West Coast Expressway Tai No. 61 (at 31.5K~35.5K) and ending to the northeast at the Shalun Oil Depot and the projected Airport Complex being bordered by Laojie Street in the southwest and the Dayuan Interchange viaduct section, National Freeway No. 2 to the east. A feasibility study is underway for the 4.1-km corridor after deducting the 0.9km-long viaduct from the 5.0km-long system. A final report review meeting was held on May 23 2012, for which visits were conducted to public offices for negotiations along with seminars with environmental groups. On the other hand, seminars on the project were held for evaluations of environmental impacts. The feasibility study has been submitted to The Executive Yuan through ministry of Transportation and Communication for reviews. The environmental impacts report was submitted to EPA, the Executive Yuan through Ministry of Transportation and Communication for reviews.



Road gallery range schematic diagram for the new-built expressway from Dayuan Interchange, National Highway No. 2 to Tai No. 61 Provincial Highway



## 2 Projects under Construction

### (1) National Freeway (Sections open to traffic) Bridge Seismic Retrofit Projects (Phase 1)

The bridge seismic retrofitting project (Phase 1) has a total budget for NT\$7,990,000,000 and aims to retain the No.1 Sun Yat-Sen Freeway a life-saving road after a major earthquake. Except for bid M12, which the contract with the contractor was terminated leaving the rest of the works to be carried out along with the project Phase 2, the rest had been completed in April 2010 ahead of schedule.

At this time, the follow-up Bid No. M12 project is underway covering from Yuanshan Bridge (23k+541) to Linkou Interchange (40k+900), including the Xizhi-Wugu Viaducts (22k+632U~33k+105U, 22k+638D~32k+877D), 39 bridges will be for reinforced in this Bid. The contractor, the Wei Sheng Construction Co., Ltd., Started the works on March 1, 2011 and completion is scheduled for February 27, 2013. As of December 31, 2012, the works were 98.89% completed.



Ongoing Bid No. M12 - Tanshui River Bridge - P4 Pier column steel plate coated by II waterproofing treatment



Ongoing Bid No. M12 - Yuanshan south ferry bridge – AC treated base of bike lane near the river side and P6~P7 flood prevention road



Ongoing Bid No. M12 - Tanshui River Bridge) - working platform demolition of P7 construction

## (2) National Freeway No. 3 Xintai-5th-Road Interchange and Nangang Interchange Improvement Projects (Bid No. B14)

The works cover the Xintai-5th-Road Interchange in the north and the Nangang Interchange in the south. The key works are the construction of the additional southbound exit and northbound entrance ramps at the Nangang Interchange, cope with the detours of the local roads, and the additional lane added to the existing exit ramps at the Xintai-5th-Road Interchange. Other works include the construction of the additional lane in both directions on the



national freeway between the 2 interchanges as well as the new Xintai-Fifth-Road lane for lower-speed vehicles.

At a total cost for NT\$333,000,000, the work is carried out by Gao Yuan Construction Co., Ltd., which started the works on July 14, 2011 and completion is scheduled on May 14, 2013. When completed, it would enlighten the traffic flow on the main access roads in Xizhi (such as the Datong Road and Xintai-5th-Road and other sections) while minimizing the impacts on traffic of the local roads caused by the access of the Hengke Road, Xizhi District and the Xintai-5th-Road Interchange to and from the National Freeway No. 3.



Bid No. B14 –New build ground anchors on original girder type slope protection for main line southbound



Bid No. B14 - Bituminous Treated Base (BTB) of Ramp L4 – Bid No. 14



Bid No. B14 – U type retaining wall construction of Ramp R1

### (3) National Freeway No. 1, Addition of Touwu Interchange Projects (Bid No. 425)

In Miaoli City, there are the Miaoli Interchange by National Freeway No. 1 in the east and the Houlong Interchange of National Freeway No. 3 in the west, linked by the Tai No. 6 Provincial Highway. The total trip measures 12kms. Travelers from northern Miaoli area Touwu and Zaociao have to take a southbound detour to get on the National Freeway No. 1. It is an unnecessary experience. Repeated complaints and assessments confirm the necessity of an additional interchange in Touwu. The work is the construction of the interchange in the form of a trumpet and the total cost would go at NT\$580,000,000. When completed, it would not only shorten the trip for people in northern Miaoli area, Houlong, Zaociao and Touwu areas going to and from the National Freeway No. 1, but also form a complete traffic road network by linking the Tai No. 72 East-West Expressway as a sound access road system for passengers arriving at the HSR Miaoli Station and the Houlong Medical Park.

The works in question started on June 12, 2011 being Resources Engineering Services Inc. the contractor and are scheduled for completion on June 12, 2013. As of December 31, 2012, all the steel-box girders are duly hoisted and the works are 75.29% completed.



Cap beam construction of P2



Steel-box girders lifting of P6-A3



Night Lifting for Steel-box girders crossing the National No. 1 Freeway

#### (4) National Freeway No. 3, Addition of Nantou Interchange Projects (Bid No. C14)

The National Freeway No. 3 passes through Caotun Township, Nantou City, Minjian Township and Zhushan Township in Nantou County. People can get on the National Freeway No. 3 through Caotun, Zhongxing, Minjian and Zhushan plus the Zhongxing Interchange. As the Zhongxing Interchange and the Minjian Interchange are both at more than 7kms from downtown Nantou City, by the links of Provincial Highway Tai No. 3. But the Provincial Highway Tai No. 3, which passes by the Nangang Industry Park, has the service level below Class E during rush hours and cannot be further widened now. Governed by the road map available now, it would be hard to see Nantou City accessible through the National Freeway No. 3 at present. The local population has been repeatedly claiming for a convenient access system that could upgrade the road system in service. Accordingly, TANFB is proposing to add an interchange in downtown Nantou City. The project in question would:

1. Build a completed road net system demanded for the area and raise the accessibility of the National Freeway No. 3 to and from downtown Nantou.
2. Alleviate the traffic congestion created by vehicles on the provincial highways or access roads entering into the Nantou Interchange.

3. Upgrade road transportation performance and, along with the newly-completed Zushi Bridge, provide rapid access to Nantou, Zhongxing Village and Caotun as a way to prosper the area both socially and economically.

The construction works for the project in question began on September 5, 2011 and are scheduled to complete on February 20, 2014. As of December 31, 2011, 46.32% of the works were completed.



Construction status of L2 Ramp PL207~PL210



Construction status of L1 Ramp PL104~PL108



R1 Ramp PR102~PR107 Construction status

### (5) Coordinated with MOEA Chiyang Lake (Kao-Ping Great Lake) to Develop Sand and Gravel Haul Road Projects (Bid No. L31)

There are sands and gravels of good quantity, and quality in Laonong River, Ligang Township, Pingtung County. The deposit of sands and gravels move out by trucks by the thousand on a daily basis from neighboring sites. They not only make huge noises, but also threaten the life of local population. To reduce the impacts and meet the growing demand born from the development projects in Gaoping Great Lakes, the Xibei gravels and sands dedicated haul road is projected for Ligang Township. The works would include the construction of access ramp linking the National Freeway No. 10 (bridge works). The Gaoping County Road No. 103-1 (road works) and improvement of the sideling-cross agricultural roads among others.

For a total cost of NT\$817,846,600, the project is contracted by Sen-Rong Construction Limited Company with the works starting on March 26, 2012 for 547 calendar days.

As of December 31, 2012 the works in question were found 39.45% completed (4.23% ahead of schedule) and are to be completed on September 23, 2013 as scheduled. When completed, the sand and gravel trucks operating

by the Laonong River in Ligang Township would be deviated to the Qishan Branch by National Freeway No. 10 as an environmental and safety solution to the local population. At the same time, it would serve as an easy access to the population in Xibei in terms of linking the National Freeway No. 3. The contractor is urged to complete the works as soon as possible, as requested by the schedule.



Bid No. L31 –Pier column and earth construction (November 14, 2012)



Bid No. L31 – Earth filling  
(September 1, 2012)



Bid No. L31 - Aerial photographs  
(October 25, 2012)



## (6) National Freeways Bridge Seismic Retrofit Projects (The 1st priority section of Phase 2)

The total cost for Phase 2 of the construction project, NT\$20,535,000,000, were approved by the Executive Yuan on November 26, 2010 and the works are to be carried out on 3 sections in priority. The 1st priority section covers the Xizhi System and the Zhunan section of National Freeway No. 3, which was to start in November 2011. At this time, Bid M31, M32 and M34 are underway after 2012 and completions are scheduled for late 2014.

The total cost for Bid M31 is set for NT\$1,515,000,000 from the Xizhi System Interchange to the Xindian Ankeng Interchange (10k+300~32k+600) of National Freeway No. 3 for a total of 69 bridges demanding construction reinforcements. Being contracted by Raito Engineering. Corporation, the works started on July 4, 2012 and would be completed on August 2, 2014 as scheduled. As of December 31, 2012, the works were completed by 2.05%.

The total cost for Bid M32 is set for NT\$683,880,000 from the Ankeng River Bridge south to Guanxi Interchange south (32k+600~79k+250) of National Freeway No. 3 and the Zhonghe Interchange access road viaducts (including the Provincial Expressway Tai No. 64 co-construction segments) for a total of 110 bridges requiring construction reinforcement. Contracted by Goangshin Construction Co., Ltd., the works started on November 1, 2012 for completion on August 27, 2014 as scheduled. As of December 31, 2012, the works were completed by: 0.35%.

The total cost for Bid M34 is set for NT\$823,200,000 passing through the Xiangshan Interchange south of National Freeway No. 3 to the Xiangshan Interchange south passing through the Provincial Highway Tai No. 13 south (79k+250~109k+900) for a total of 75 bridges demanding construction reinforcement. Contracted by Wei Sheng Construction Co., Ltd., the works started on December 27, 2012 for scheduled completion on September 12, 2014.



Bid No. L31 - Earth filling (September 1, 2012)



Bid No. M31 - Scaffold assembly of Bitan Bridge 5S~6S



Bid No. M32 - clearance erection and construction fence under Longtan viaduct



## (7) National Freeway No. 3, Addition of Liouying Interchange Projects (Bid No. D24)

The project in question covers from 321k+780~324k+270 (southbound) to 321k+445~324k+030 (northbound) of the National Freeway No. 3 and the south Access Road 110 (South Country Road 106) passes under the current viaduct of the National Freeway No. 3. A diamond-shaped interchange is to be installed on the site while the access road at 1k+555~2k+068 would become part of the project for pavement planning and resurfacing as well as traffic sign marking among other works.

For a total cost of NT\$611,990,000 and contracted by Sen-Rong Construction Limited Company, the works started on March 31, 2012 for scheduled completion in 810 calendar days.

As of December 31, 2012 the works in question totaled 35.69% in mean progress (14.95% ahead of schedule) and completion is scheduled for June 18, 2014. When completed, it would serve the Liouying Technology Industrial Park. By means of the interchange access road and through the County Road 165, neighboring towns are in short distances. TANFB urges contractor to complete the works as soon as possible, as the project is expected to be completed in the specified quality and as scheduled.



Liouying Interchange Projects -  
Construction situation of Embankment filling for ramp 1



Liouying Interchange Projects -  
Construction situation of retaining wall



Liouying Interchange Projects -  
Completion of the drain ditch structure backfill construction

### 3 Completed and Opened to Traffic

#### (1) National Freeway No. 2 Widening Projects

As a result of the ongoing growth of transportation volume in the Taoyuan International Airport and the continuous development of Taoyuan, the main line in the 20.4KM-long National Freeway No. 2 has been receiving growing load that constantly creates traffic congestions. To address the issue, TANFB proceeds to implement the National Freeway No. 2 Widening Projects by increasing the section between the Dayuan Interchange and the Airport System Interchange



from 4 lanes to 8 lanes and the traffic lanes to the east of the Airport System Interchange were widened to 6. At the same time, the interchanges were renovated and bridges seismically retrofitted along this section for a total budget of NT\$12.87 billion.

A major construction project supervised by the Executive Yuan, the project in question covers 7 bids, of which the bid of priority (Bid H21B, the section linking the Dayuan Interchange and the Daju Interchange) was completed on June 14, 2010. Bid H21C covering from the Dazhu Interchange to the Airport System Interchange was completed on April 10, 2011 and Bid H21A covering from the airport to the Dayuan Interchange was completed on August 17, 2011. Besides, Bid H31 covering the Airport System Interchange through the Nantaoyuan Interchange was completed on February 18, 2012 while Bids H42, H52 and H61 covering the Nantaoyuan Interchange east through the Yingge System Interchange were completed on April 3, April 1 and May 28, 2012 respectively creating remarkable enlightening effects for the traffic flow in rush hours.



Bid No. H31, Airport System Interchange to Nantaoyuan Interchange has been completed and opened to traffic



National Freeway No. 2 Widening Projects, Bid No. 42 has been completed and opened to traffic (1)



National Freeway No. 2 Widening Projects, Bid No. 42 has been completed and opened to traffic (2)



National Freeway No. 2 Widening Projects, Bid No. 52 has been completed and opened to traffic (1)



National Freeway No. 2 Widening Projects, Bid No. 52 has been completed and opened to traffic (2)



National Freeway No. 2 Widening Projects, Bid No. 52 has been completed and opened to traffic (3)



National Freeway No. 2 Widening Projects, Bid No. 52 has been completed and opened to traffic (4)

## (2) Access Road System Improvement Plan for Taiwan High Speed Railway Yunlin Station Area – Newly Open Douliu Access Road - National Freeway No.1, Addition of Huwei Interchange Projects (Bid No. 524)

This project is located at the National Freeway No. 1 234k+300~237k+200 and the intersection of the newly-open Douliu access road to the planned HSR Yunlin Station area. An over-cross diamond-type interchange will be added to join the access road at the HSR Yunlin Station which the Yunlin County Government is responsible for. The construction works of the access road at 3k+451~5k+068 will be part of the works in this project.

For a total cost of NT\$823,400,000 and contracted by Lien Cheng Feng Construction Co., Ltd., the works started on December 28, 2009 for 841 calendar days as scheduled and duly completed on April 16, 2012. On April 21, 2012. The works were officially inaugurated for traffic, followed by successful acceptance on November 5, 2012. The works do mean remarkable boost to the service on freeways while booming local tourism and industrial development; on the other hand, people will enjoy convenient access between the HSR Yulin Station and the freeways.



Political Deputy Minister YEH speaking in the inauguration ceremony of April 21, 2012



Ribbon-cutting in the inauguration ceremony of April 21, 2012



A full view of the Huwei Interchange after being inaugurated on May 8, 2012

### (3) National Freeway No. 1, addition of Tongluo Interchange Projects (National Freeway Bid No. 434)

As manufacturing activities have been switching to the area of high technology for more than a decade, the Hsinchu Science-Based Industrial Park is earning remarkable upgrading of its standing and importance. The Science Park Administration, prolongs the solid foundation by waging development of the 2 bases located in Tongluo and Zhunan as satellite fields to the Hsinchu Science-Based Industrial Park and use the resources available in the Science-Based Industrial Park, to materialize the pioneer program of the high-tech island

in central Taiwan. It can accelerate the development of high-tech activities in Taiwan, strengthening industrial competitiveness and eventually promoting local prosperity.

Aiming to meet the demand for future development and accessibility, the installation project for the Tongluo Base Access Road System consists of 1 main entrance each in the south and north of the base, which are known as the north access road and the south access road. The north access road will have 4 lanes linking the Tongluo outer ring road of Tai 13 Provincial Highway and, on the other side, through the new interchanges, leading to the Zhongshan Freeway (National Freeway No. 1) that will allow fast movement of both cargoes and passengers in and out of the industrial park in the future.

The project in question will allow the north access road to the Tongluo Base link the National Freeway No. 1 as a expressway to the Tongluo Base that leads to the Tongluo outer ring road as a completed traffic road net; as the north access road continues stretching eastward after crossing over the National Freeway No. 1, local traffic links the National Freeway No. 1 rapidly for transfers. The works in question started on May 6, 2010 for completion on September 14, 2012 and were open to traffic on November 21, 2012.



Current status of the Tongluo Interchange Completion (West end)



Current status of the Tongluo Interchange Completion (East end)



Opening ceremony on November 21, 2012