



Government of the Republic of the Union of Myanmar
Ministry of Construction, Public Works

Current Situation of Road Networks and Bridges



Content

1. Country profile
2. Ministry and Departmental profile
3. International Linkages with Myanmar
4. Macro Plan for MOC
5. Bridges constructed in Myanmar
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Myanmar Profile



National data

Population	- 60 millions
Area	- 676,578 sq.km
Road Length	- 148690 km (2012 Mar)
No of Registered Vehicle	- 2476672 (2012 June)
Neighboring Countries-	China, Laos Thailand, Bangladesh, India

For many years known by outsiders as Burma, Myanmar if an ancient land that has existed since the prehistoric times. Now, Myanmar is a modern predominantly Buddhist Asian State where the ancient and the modern exist side by side.

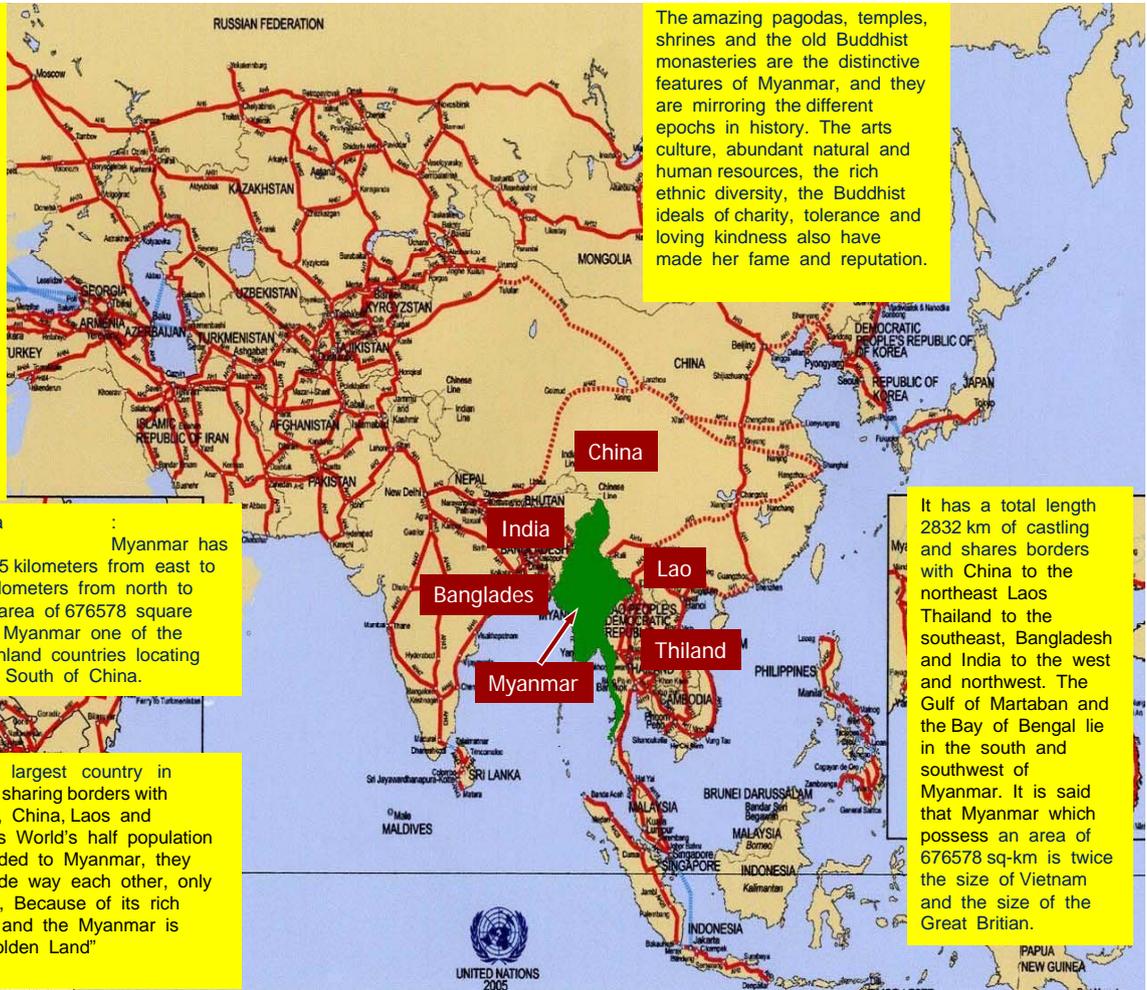
The amazing pagodas, temples, shrines and the old Buddhist monasteries are the distinctive features of Myanmar, and they are mirroring the different epochs in history. The arts culture, abundant natural and human resources, the rich ethnic diversity, the Buddhist ideals of charity, tolerance and loving kindness also have made her fame and reputation.

Geographical Data

Myanmar has an area about 925 kilometers from east to west and 2090 kilometers from north to south. A surface area of 676578 square kilometers makes Myanmar one of the largest Asian mainland countries locating east of India and South of China.

Myanmar is the largest country in South-East Asia, sharing borders with Bangladesh, India, China, Laos and Thailand, and thus World's half population is closely surrounded to Myanmar, they can get short trade way each other, only through Myanmar. Because of its rich natural resources and the Myanmar is known as the "Golden Land"

It has a total length 2832 km of castling and shares borders with China to the northeast Laos Thailand to the southeast, Bangladesh and India to the west and northwest. The Gulf of Martaban and the Bay of Bengal lie in the south and southwest of Myanmar. It is said that Myanmar which possess an area of 676578 sq-km is twice the size of Vietnam and the size of the Great Britain.



Statistical data of Vehicles & Road Length

Year	Registered Vehicles	Road Length (Km)
2001	445167	69732
2002	461692	73843
2003	476350	78266
2004	960341	90713
2005	978522	92859
2006	991566	104058
2007	1024372	111737
2008	1997358	125355
2009	2067839	127942
2010	2298677	130050
2011	2331663	142395
2012	2476672	148690

Myanmar has about 148690 Km of road networks. The length of various categories of road are as under:

- Union Highways 19503 km
- Township network road 19580 km
- Major city road and other roads 27507 km
- Village and boundary area roads 82100 km

Among these roads , under the **Ministry of Construction** is about 39083 km. (26.3%)



Total Road Mileage in the Republic of the Union of Myanmar 2012

No.	Department	Concrete Road (Km)	Bituminous Road (Km)	Gravel Road (Km)	Metalled Road (Km)	Earth Road (Km)	Donkey Road(Km)	Total (Km)
	Ministry of Construction, Public Works							
1	Expressway & Highways	611.7	11733.0	2440.8	2700.3	1973.5	44.1	19503.2
2	Regional & State Roads	49.7	5451.8	3299.6	2941.4	6497.1	1340.0	19579.5
	Sub-total	661.3	17184.8	5740.3	5641.7	8470.6	1384.0	39082.7
	Ministry of Border Areas							
3	Urban Road	6.6	4880.7	2215.5	660.8	3509.0	-	11272.6
4	Village & Border Road	120.1	4073.0	17041.5	4976.7	55888.5	-	82099.9
	Sub-total	126.7	8953.8	19257.0	5637.5	59397.5	-	93372.5
5	Yangon City Development Committee	1239.7	1747.5	12.9	454.9	472.9	-	3928.0
6	Mandalay City Development Committee	10.8	573.4	119.7	-	309.8	-	1013.8
7	Naypyitaw City Development Committee	246.1	129.3	43.0	734.9	1130.8	-	2284.1
8	Directorate of Military Engineers	393.4	61.8	605.3	166.4	6822.7	-	8049.5
9	Ministry of Electrical Power	48.3	88.5	542.1	-	280.2	-	959.2
	Total	2726.3	28739.1	26320.4	12635.4	76884.6	1384.0	148689.9

Myanmar Development Trends

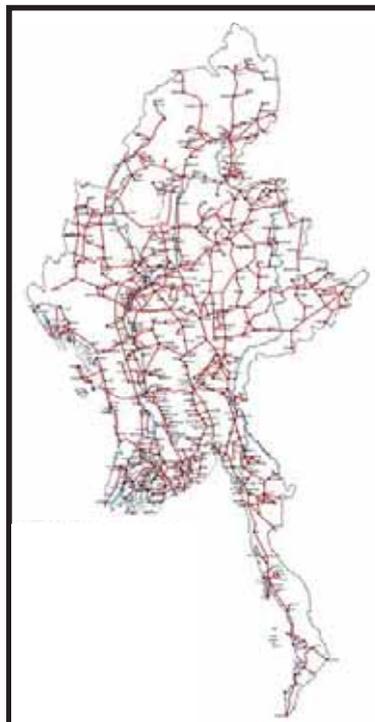
- ❖ on the new path of becoming democratic nation
- ❖ an active integration into international and regional community
- ❖ Opening doors and inviting investments as essential for development of the nation and the people
- ❖ Myanmar is planning to open up for
 - ✔ Social Infrastructure Investment
 - ✔ Physical (Technical Infrastructure)
 - ✔ Industrial Investmentssystematically utilizing its existing comparative advantages

Improvement in Road Sector

Total Road Length over the whole country

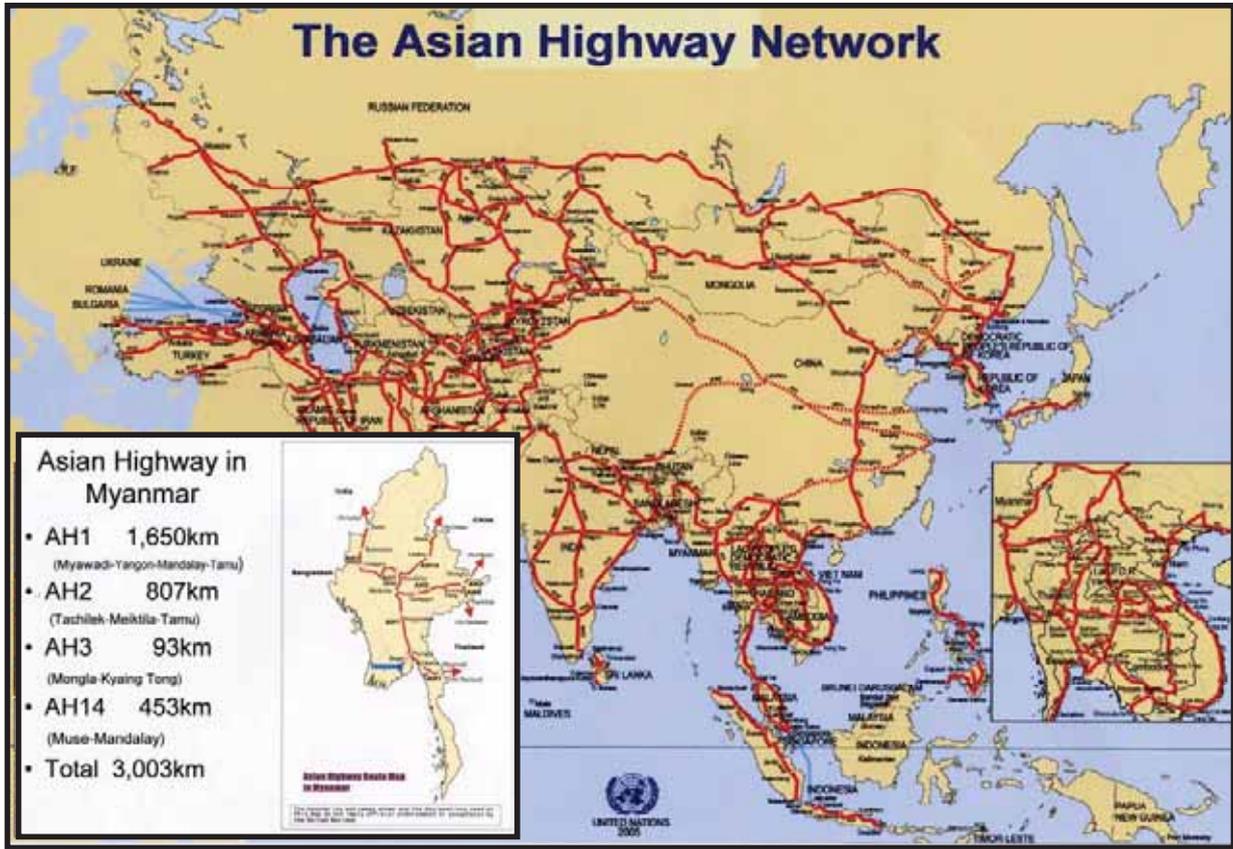
- Before the year 1988
 - 13635 miles (22725 km)
- As of March 2012
 - 92391 miles (148690 km)
- Road Length Increasement
 - 78756 miles (125965 km)

Road Networks before 1988

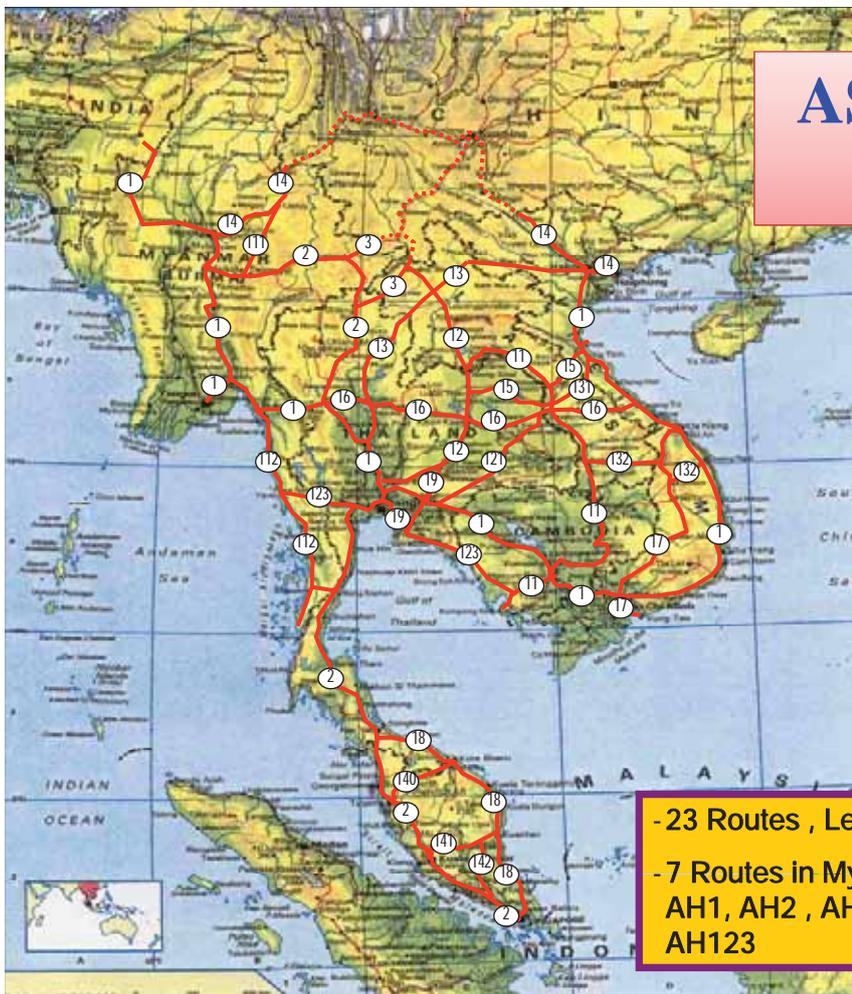


Current Road Networks





Asian Highway (32) countries - 141000 km



ASEAN Highway Route



- 23 Routes , Length 36,000 kms

- 7 Routes in Myanmar :
 AH1, AH2 , AH3 , AH14 . AH111 , AH112 , AH123

GMS Economic Corridors

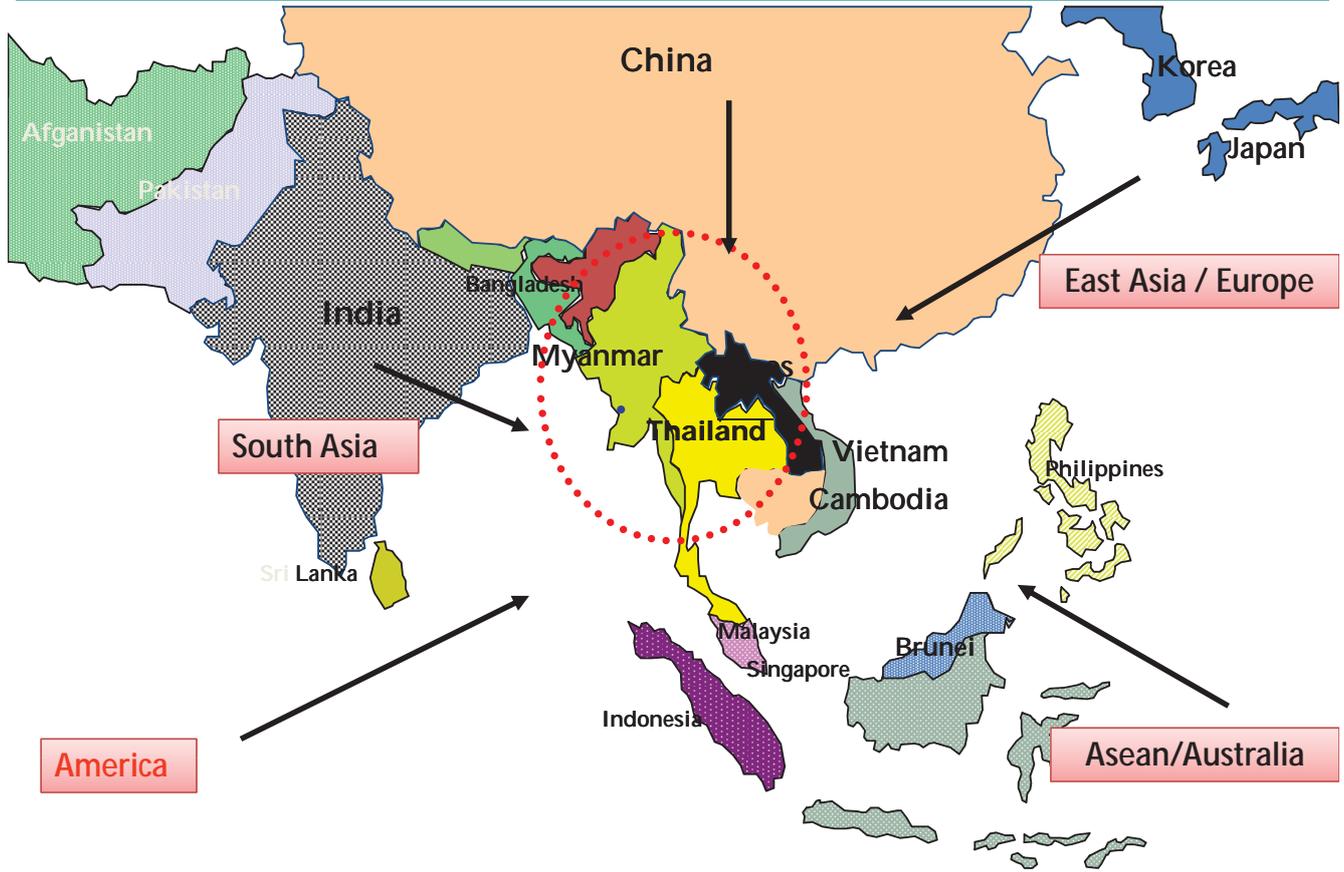


1. North-South Corridor : Kunming-Bangkok
2. East-West Corridor : Mawlamyine-Danang
3. Southern Corridor : Dawei-Quy Nhon/Vung Tau
4. Northern Corridor : Fangcheng-Tamu
5. Western Corridor : Tamu-Mawlamyine
6. Central Corridor : Kunming-Sihanoukville/Sattahip
7. Eastern Corridor : Kunming-Ho Chi Minh City
8. Southern Coastal Corridor : Bangkok-Nam Can
9. Eastern Corridor : Nanning-Bangkok/LaemChabang

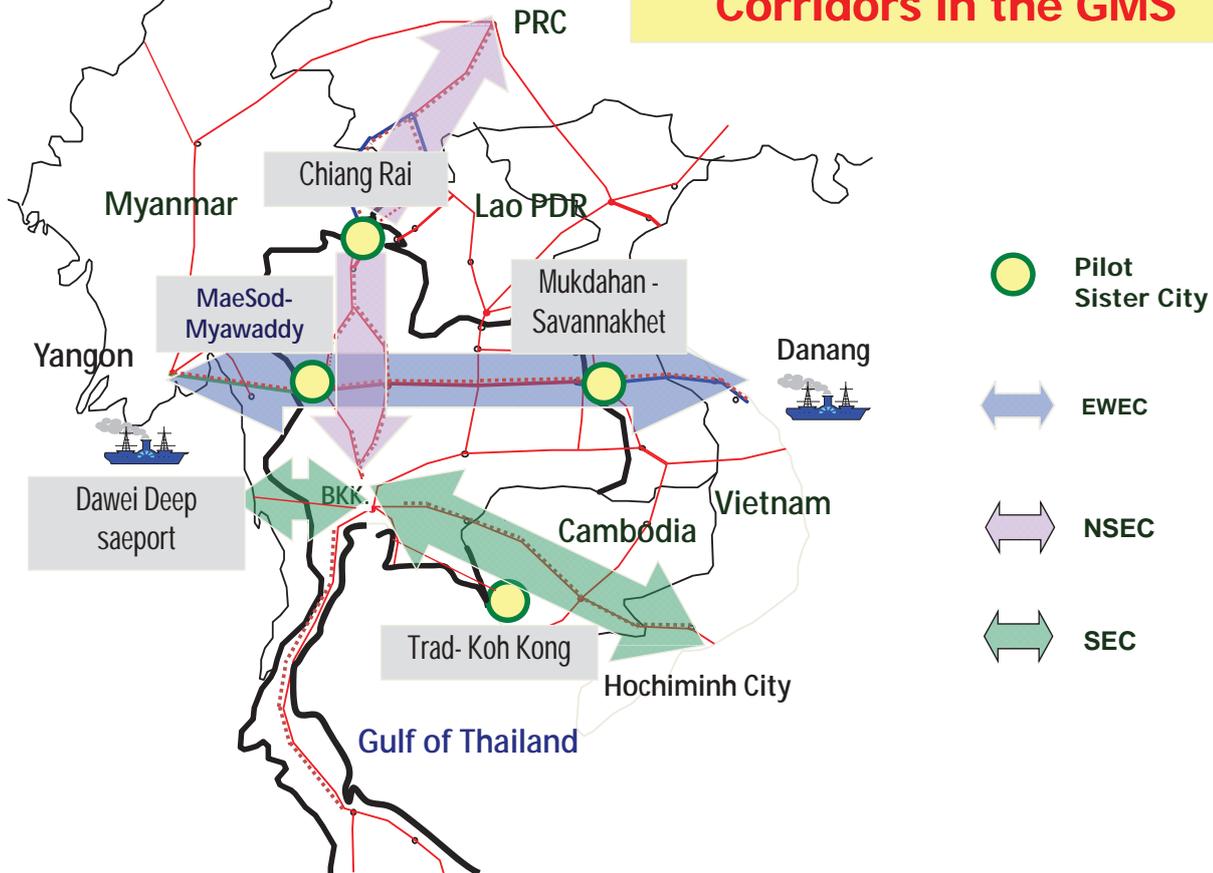
Priority Economic Corridors in the GMS

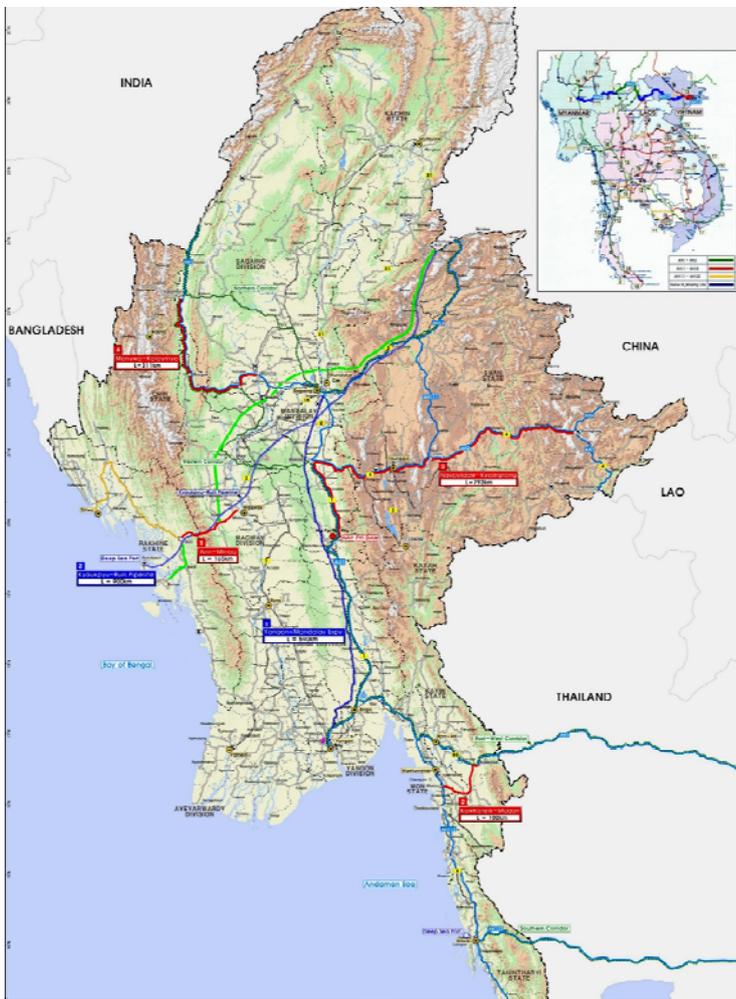


GMS Location at Heart of Asia



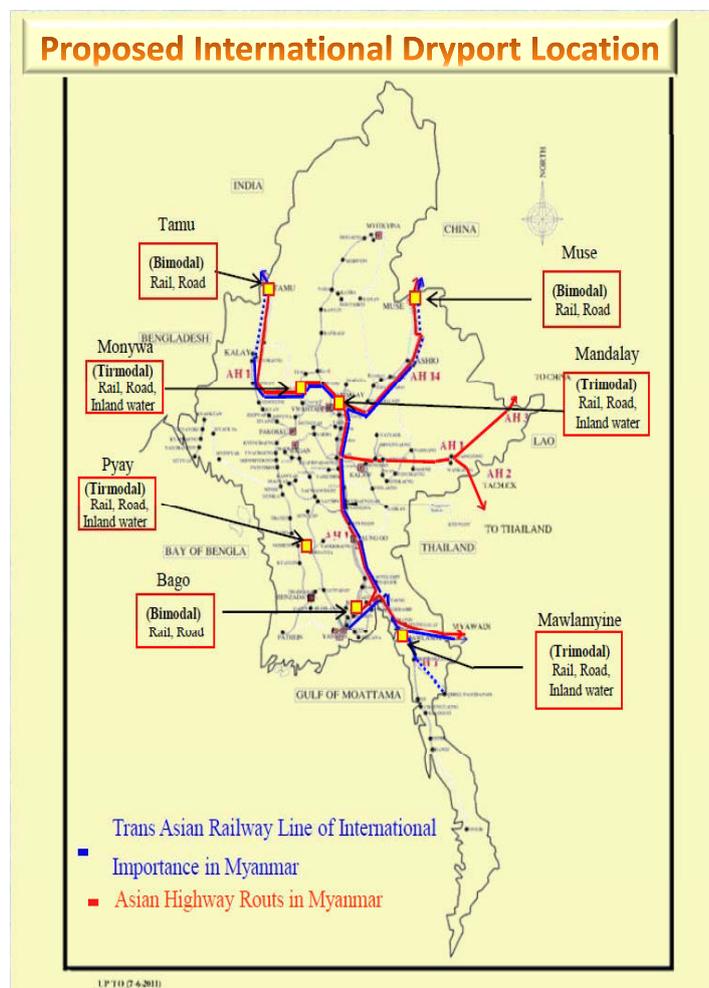
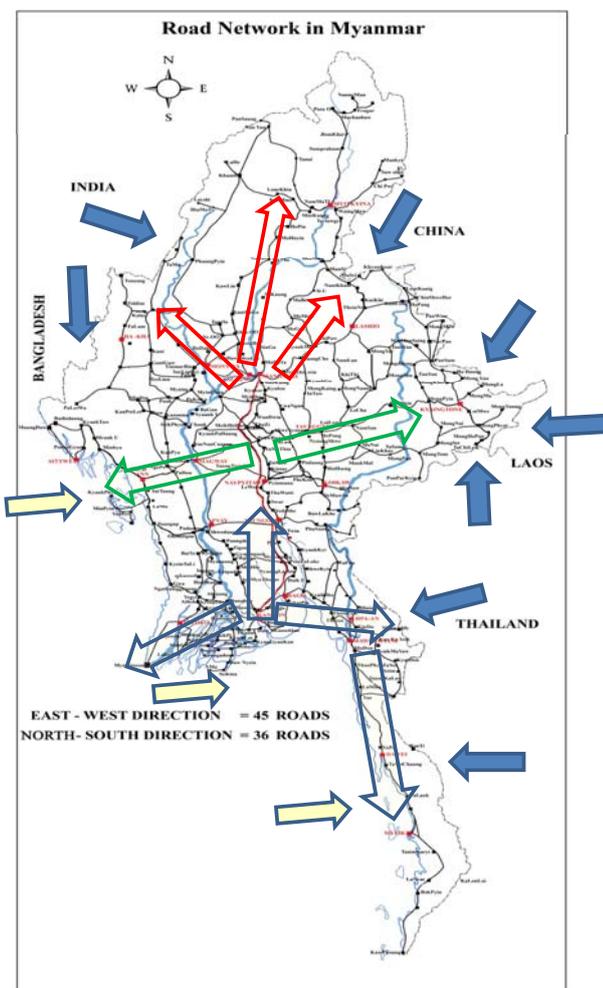
Priority Economic Corridors in the GMS





Some of the roads Links between the nodal points of Border Trade Posts at the border with neighbouring countries, such as Muse, Lwejel and Chinshwehaw with China border, Tachileik, Myawady, Kawthaung and (Myeik) Mawtaung with Thai border, Tamu and Rhi, Maridwa with India border and Maungdaw with Bangladesh border.

Geographically, Myanmar will play a key role as a Landbridge both between India and the PR China and between south Asia.





Implementation of Transport Linkages India-Myanmar-Thailand

(1360 km)

Financing Portion:

- Thailand
- India
- Myanmar + maintenance distressed bridges

Myanmar-Lao-Vietnam Trilateral East-West Corridor (from Kyaukphyu sea port to Hai Phong sea port)



	km	mile
Myanmar		
Kyaukphyu to Kyainglat Border	1340	837.5
Lao		
Border bridge to Tai Chan (Vietnam)	372	232.5
Vietnam		
Border to Hai Phong	561	350.6
Total length (estimated)	2273	1420.6

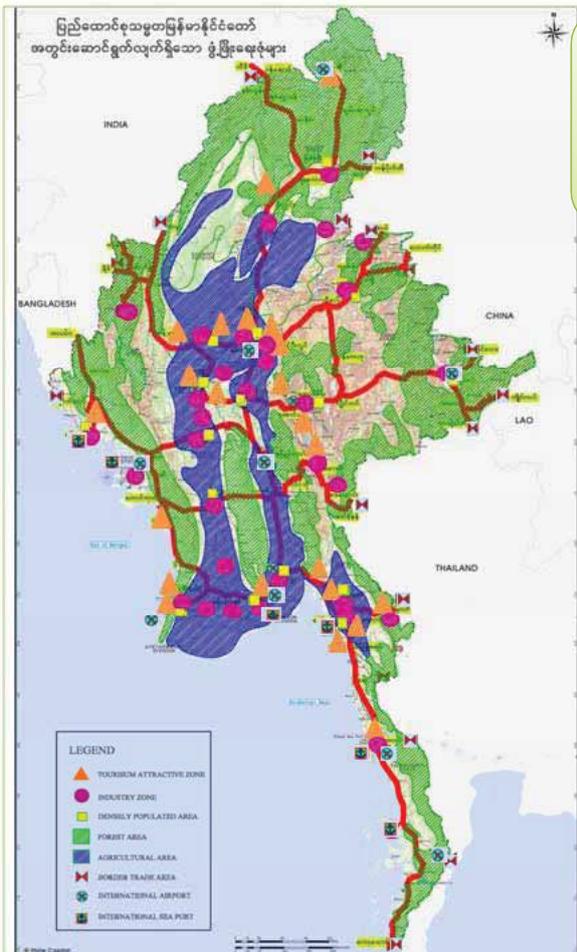
Macro Concept Plan

Total Roadway milage (5537.5)miles

1. Kawthaung – Mawlamyine – Phayagyi – Mandalay - Shwebo – Myitkyina – Putao Road (1699 miles)
2. Mandalay- Lashio- Muse Road (296 mile 2 furlongs)
3. Mandalay- Lashio- Loutkaing Road (320 mile 2 furlongs)
4. Sittway- Ann- Minbu- Magway- Naypyitaw- Taunggoo- Loikaw- Maesaenam Road (726 miles)
5. Tarcheleik- Kyaingtong-Taunggyi-Meikhtila- Pakoku-Gangaw-Kalay- Hakha Road (903 mile 4 furlongs)
6. Myawaddy- Phaen- Thaton- Bago- Yangon- Pathein Road (419 mile 4 furlongs)
7. Pathein- Gwa- Thandwe- Taunggoup- Pyi Road (342 mile 5 furlongs)
8. Monywa- Kantkaw Road (112 miles)
9. Shweli- Kyaukphyu Road (718 mile 4 furlongs)



Transport Linkage Plan between Future Development Zones and Arterial Highways



- TOURISM ATTRACTIVE ZONE
- INDUSTRY ZONE
- DENSELY POPULATED AREA
- FOREST AREA
- AGRICULTURAL AREA
- BORDER TRADE AREA
- INTERNATIONAL AIRPORT
- INTERNATIONAL SEA PORT



Ruli, China to Kyaukpyu, Myanmar Corridor

- A, Ruli to Hsipaw 240 km
- B, Namkhan to Hsipaw 182 km
- K, Hsipaw to YM ExWay 192 km
- E, YM ExWay to Padan 265 km
- D, PyinOoLwin to Padan 377 km
- K1, Padan to Kyauksauk 155 km
- K1, Padan to YM ExWay 148 km

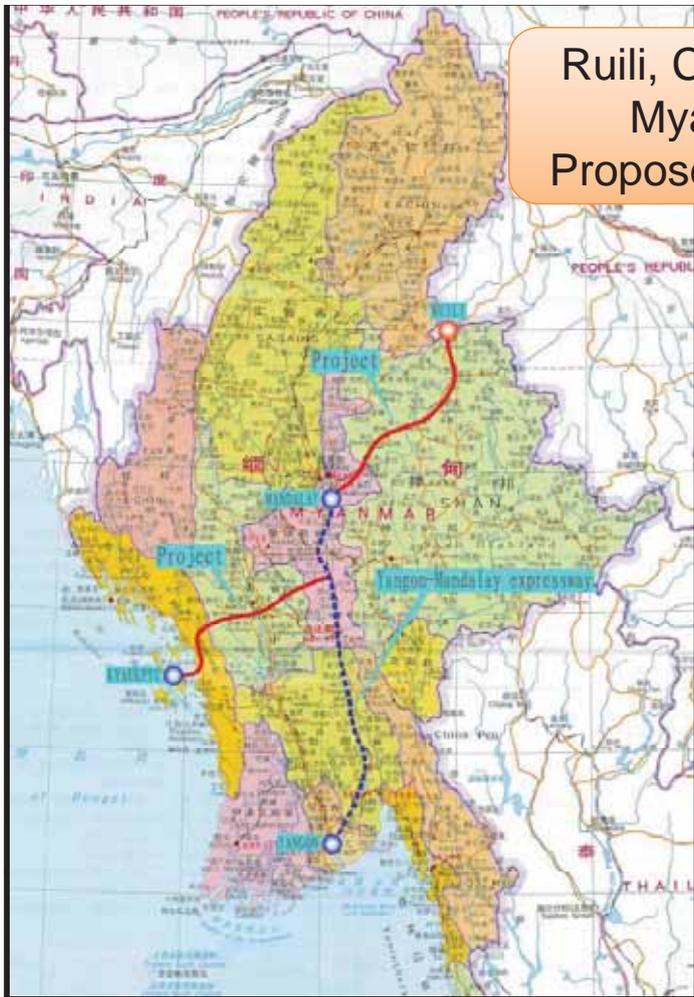
Proposed by Myanmar side

B+K+E+K1 794 km

Proposed by China side

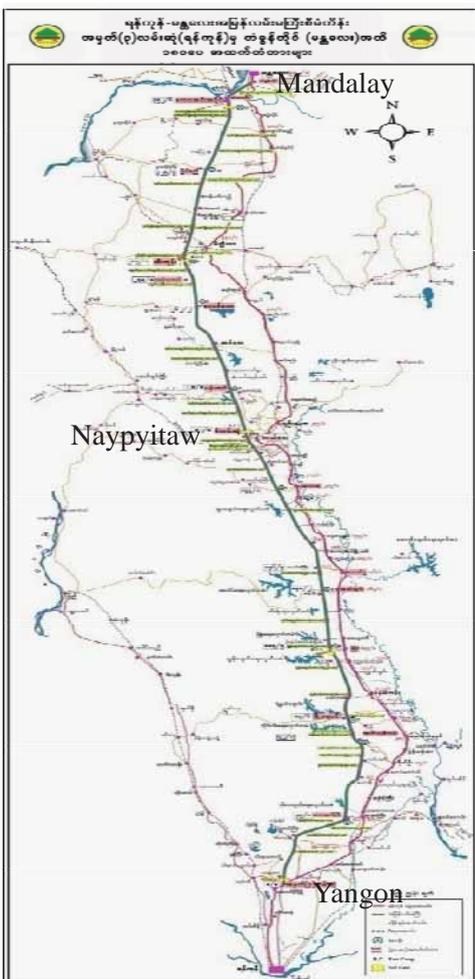
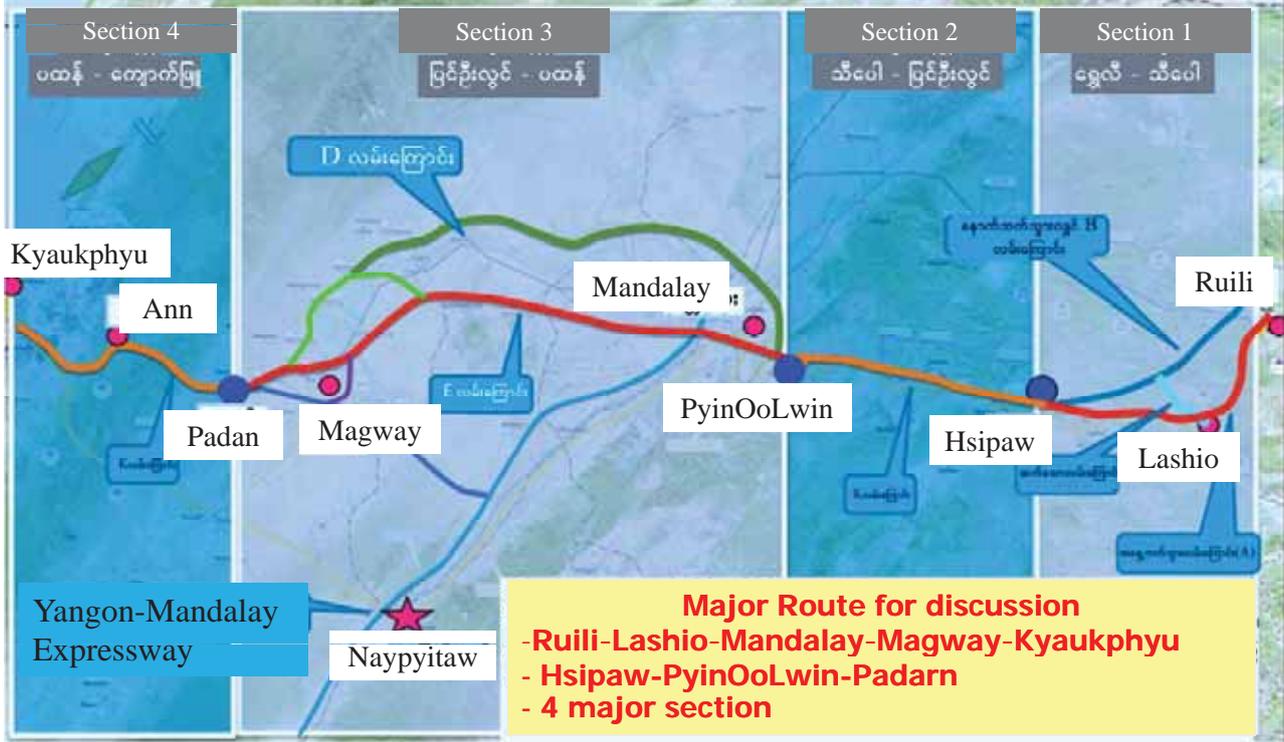
A+K+ExWay+K1 900 km

(ExWay- 165 km)



Ruli, China to Kyaukpyu, Myanmar Corridor Proposed by Chinese side

Proposed Alignment for Myanmar-China Corridor Ruili to Kyaukphyu



Yangon-Mandalay Expressway (Rigid pavement) Project Data

S.N	Particular	Construction Period	Length (km)	Opened to Public
1	Yangon - Naypyitaw	10/2005 – 3/2009	323.4	25-3-2009
2	Naypyitaw - Sakainn	7/2008 – 12/2010	241	29-12-2010
3	Sakainn – Tadaoo - Tagonedine	1/2011 – 12/2011	21.8	23-12-2011
Total Length			586.2	

Total Project Cost	1291.345 billion in kyats
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Upgrading with PR China Gov; Loan (300.0 \$MUS)

- To improve Asphalt wearing course
- To improve road safety furniture such as guardrails and barriers
- To install the Intelligent Transport System

Brief History of B.O.T Road

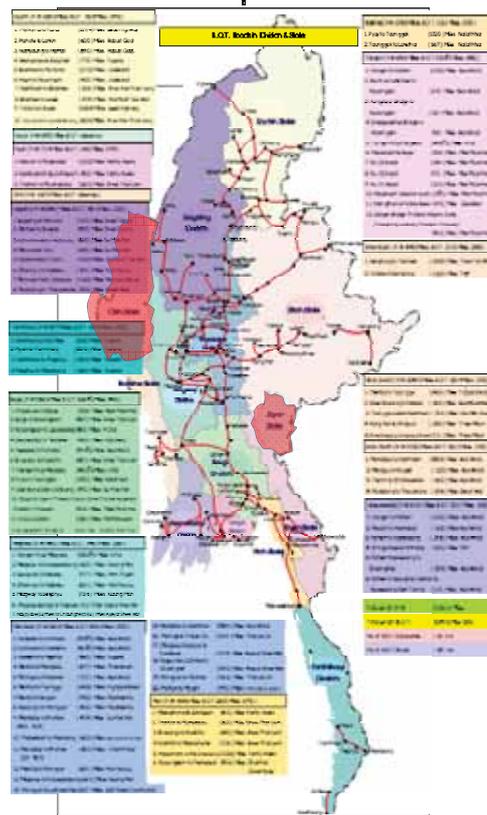
- ❑ Partnering Bodies - Public Works of Ministry of Construction and Local Private Companies Established in - 1996
- ❑ First BOT Road - Mandalay-Lashio-Nankham Road
- ❑ First Partnering Local Companies - (1) Asia World Company
(2) Diamond Palace Company



Achievements and Recent Experiences

- ❑ Quantity of local companies conducting BOT Road - 30 nos.
- ❑ Number of BOT Road - 70 nos.
- ❑ BOT Road Length - 4110 miles (6614 kilometers)
- ❑ Road Length % of PW's - 17% of Public Works Total Road
- ❑ States and Regions with BOT Road - 12 states and regions out of 14 except Kayah and Chin states due to low traffic volume

BOT Road Map



BOT Regulations for Local Companies

- ❑ Contract Period
 - 40 years (from the start of Operating Period until the end of Transfer Period)
- ❑ Upgrading of Road and related facilities
 - Road to be upgraded until bituminous road with stipulated standards within 3 years construction period depending on the traffic volume
 - Bridges along the road to be upgraded until R.C bridges of 60 ton loading bearing capacity

BOT Regulations for Local Companies

- ❑ Start BOT Toll Rate - After approval of BOT Offerer (Public Works) later Collection on attaining Final Completion Certificate
- ❑ Toll Charge for Bridge - For Bridges over 180 ft. length; along the BOT road
 - ❖ Bridges constructed by the State - Auction Rate
 - ❖ Bridges constructed by BOT Company - Rate discussed and agreed by both Parties

BOT Regulations for Local Companies

- ❑ Tax on the toll collected payable to the State by BOT Companies
 - ❖ First 3 years (3 years) - Exempted
 - ❖ 4th until 13th year (10 years) - 5 % of total toll collected
 - ❖ 14th until 23rd year (10 years) - 10% of total toll collected
 - ❖ 24th until 33rd year (10 years) - 15% of total toll collected
 - ❖ 34th until 40th year (10 years) - 20% of total toll collected
- ❑ Beyond 40 years period - the Company can extend contract for 5 years period each time until 3 times
- ❑ Performance Guarantee - the Company has to pay 1 % of the investment and which will be returned back on attaining the Completion Certificate

BOT Regulations for Some International Company

- ❑ Contract Period - 60 years (from the start of Operating Period until the end of Transfer Period)
- ❑ Upgrading of Road and related facilities
 - Road to be upgraded until bituminous road with stipulated standards within 3 years Construction Period depending on the traffic volume
 - Bridges along the road to be upgraded until R.C bridges of 75 ton loading bearing capacity

BOT Regulations for Italian Thai

- ❑ Start BOT Toll Rate - After approval of BOT Offerer (Public Works) later Collection on attaining Final Completion Certificate
- ❑ Toll Charge for Bridge - For Bridges over 180 ft. length; along the BOT road
 - ❖ Bridges constructed by the State - Auction Rate
 - ❖ Bridges constructed by BOT Company - Rate discussed and agreed by both Parties

BOT Regulations for Italian Thai

- ❑ Tax on the toll collected payable to the State by BOT Companies
 - ❖ First 3 years (3 years) - Exempted
 - ❖ From 4th until 18th year (15 years) - 10 % of total toll collected
 - ❖ From 19th until 33rd year (15 years) - 15% of total toll collected
 - ❖ From 34th until 48th year (15 years) - 20% of total toll collected
 - ❖ From 49th until 60th year (12 years) - 30% of total toll collected
- ❑ Beyond 60 years period - the Company can extend contract for 5 years period each time until 3 times
- ❑ Performance Guarantee - the Company has to pay 1 % of the investment and which will be returned back on attaining the Completion Certificate

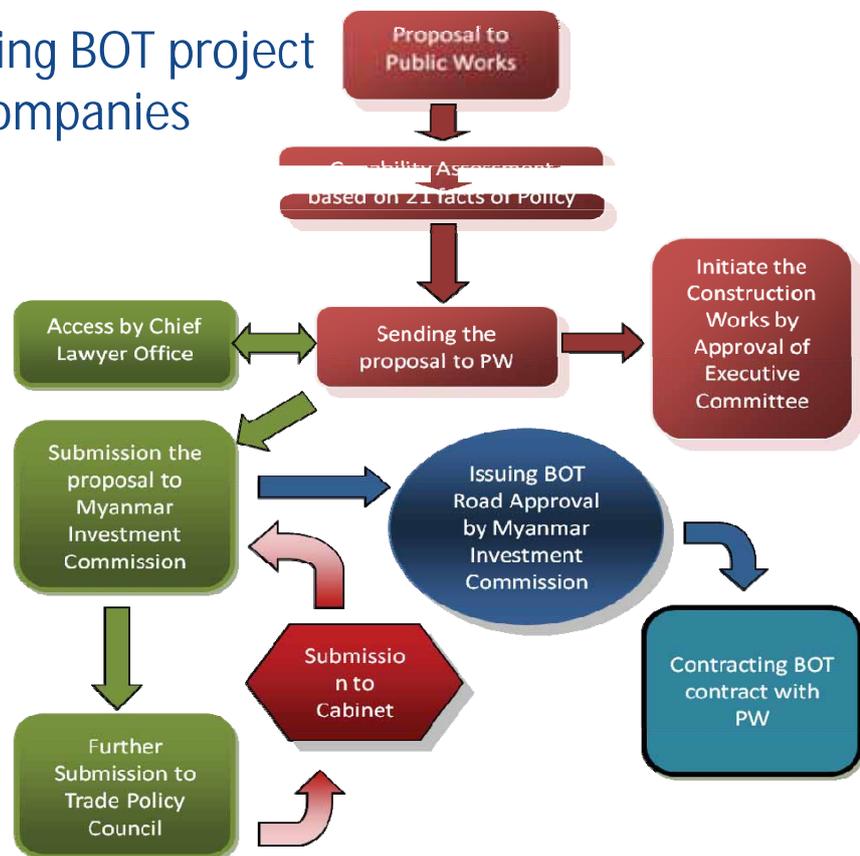
Support of Government to BOT Companies

- Exemption of tax for importing construction materials, oil, vehicle and machinery by the certification of Public Works
- Provision of construction materials, able to provide by Government at Government price rate.
- BOT Companies can loan from local banks for the fund necessary to carry out the project.

Related helpful regulations and laws

- Most BOT road projects are upgrading of existing road track. So there's very less the problem regarding land acquisition.
- There are also regulations regarding the right of way estimating the future expansion. So, these regulations help avoiding the land acquisition problems.
- For Highway regulations, "Highway Law 2000 edition, Myanmar" is used as standard law in Public Works.
- For the BOT scheme, Myanmar will adapt the Policy of ASEAN Standard of Transport System.

Process in attaining BOT project by Local Companies



Process Diagram of Attaining BOT Project

Current Situation of Bridges necessary to build and repair in Myanmar

Bridges in Myanmar

State / Division	Before 1988, 180 feet and above Length Bridges	After 1988, 180 Feet and above Length Bridges
Kachin State	27	22
Kayah State	6	2
Chin State	2	3
Sagaing Division	17	23
Magwe Division	20	30
Manadalay Division	18	18
Shan State (East)	4	4
Shan State (South)	5	8
Shan State (North)	15	8
Kayin State	8	9
Tanintharyi	8	7
Bago Division	36	24
Mon State	3	4
Rakhine State	11	37
Yangon Division	7	30
Ayeyarwady Division	11	59
Total	198	288
Grand Total	486	

Ayeyawaddy (Pakokku) Bridge



Ayeyawaddy (Pakokku) Bridge





**Ayarwaddy Bridge
(Sinkan)**

**JFE
Steel
truss**



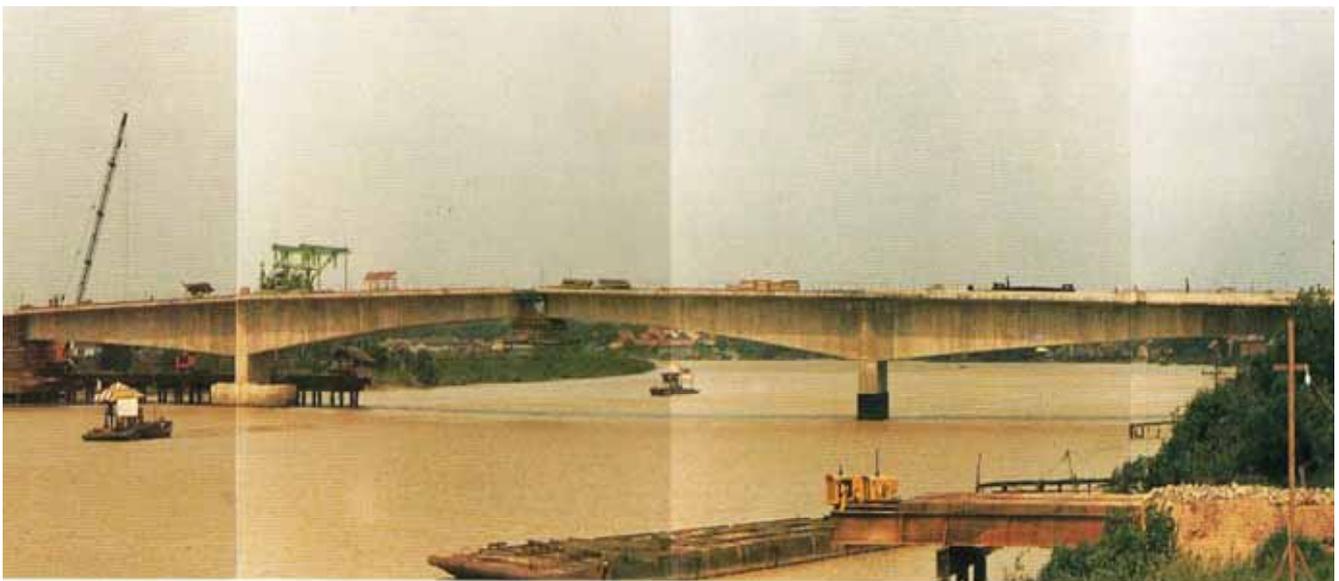
Yadanarpon Bridge

Why could we build those bridges?

BETC

(Bridge Engineering
Training Centre) Project
By JICA in last 30 years

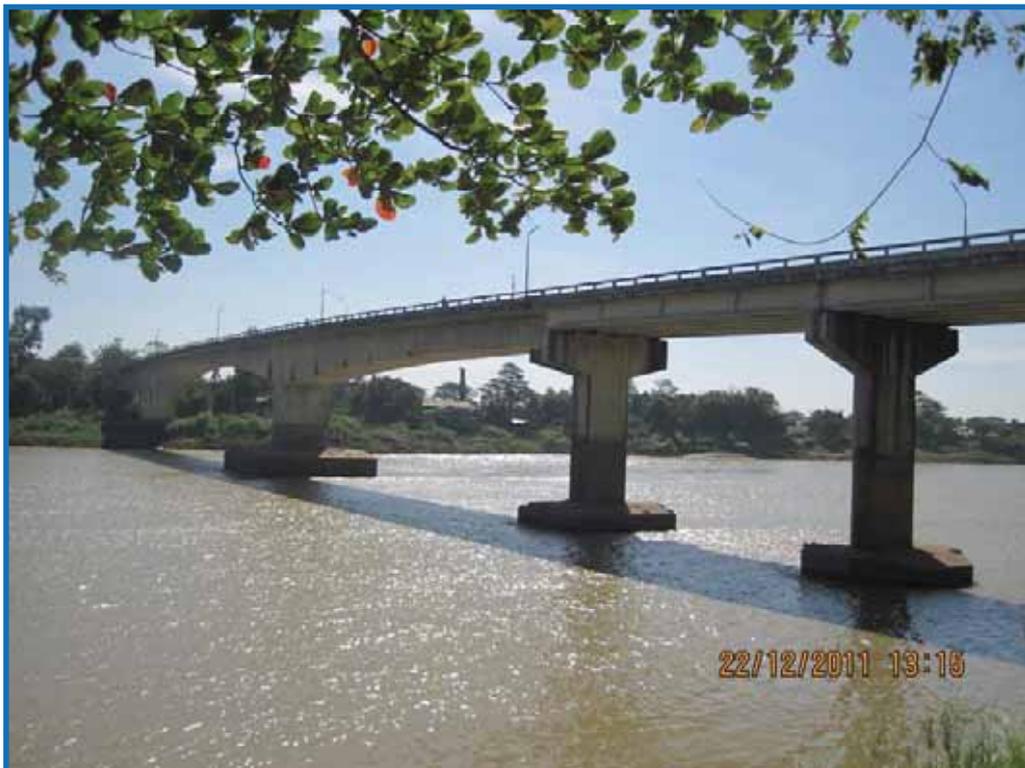
Thuwana Bridge



Thuwana Bridge



Ngawun bridge



Bridge List proposed for New Bridge Construction

S.N	Bridge name	Bridge type	Name of Road	Location	Approximated Length (m)		Approximate Estimated		Remarks
					Main Bridge	Approach Bridge	Cost (million)		
							Local cost(KS.)	F.E(US\$)	
1	Ayeyaweddy Bridge (Hinthata)	Steel Truss (Both Railway and Highway inside Truss) (Approximate truss width 14.8 m)	Hinthata Tharawall Latpantan Road	Hinthata Ayeyaweddy Division	2256	2000 x 2 for total railway 500 x 2 for total Highway Two lanes	90000	40	
2	BRIDGE Across the Yangon River	Cable stayed Tunnel 2 ways 2 lanes	Yangon-Dala Twantay- Kyawhymu Phyarpone Bokalay	Yangon City	1210 (attached Sketch)	-	20000	50	47

Bridge List proposed for New Bridge Construction (cont'd)

S.N	Bridge name	Bridge type	Name of Road	Location	Approximated Length (m)		Approximate Estimated		Remarks
					Main Bridge	Approach Bridge	Cost (million)		
							Local cost (KS.)	F.E(US\$)	
3	Hlaing River Bridge	P-C Box Girder four lanes	Kyimyindine Aye village Road	Kyimyindine Yangon city	600	300 x 2	36000	15	Similar to Thuwana Bridge
5	Wataya Bridge across Hlaing River	Suspension Bridge Two lanes	Htantapin- Mhyawbi road	Mhyawbi Yangon Division	300	200	15000	6	

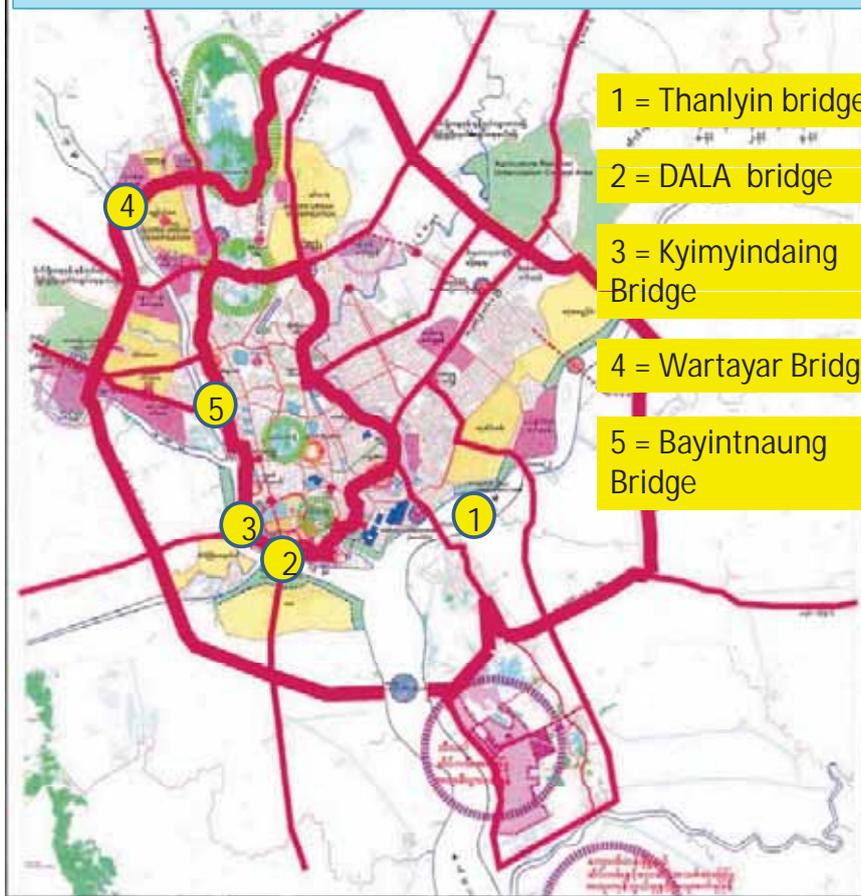
Bridge List proposed for New Bridge Construction (cont'd)

S. N	Bridge name	Bridge type	Name of Road	Location	Approximated Length (m)		Approximate Estimated		Remarks
					Main Bridge	Approach Bridge	Cost (million)		
							Local cost (KS.)	F.E(US\$)	
6	New Thaketa Bridge Project Across the Pazuntaung creek in Pazauntaung/ Dawpone township	Cable-stayed Bridge with anchor span		Pazuntaung/ Dawpone	190	-	38000	12	
		Steel Continuous Box Girder			100	50	38000	10	
		Prestress Concrete Continuous Box Girder			110	45	38000	10	
7	Gyaing (Kawkareik)	PC + RC	Kawkareik - Phaang	Kawkareik	450		4500	2	
8	ThaMouk	Steel truss Rail cum road	Dawei-Myeik	Myeik	240	110	5000	2.5	
9	DonThaMi	PC + RC	Thahton-Phaang	Thahton	215		2500	1	49

Bridge List proposed for New Bridge Construction (cont'd)

S.N	Bridge name	Bridge type	Name of Road	Location	Approximated Length (m)		Approximate Estimated		Remarks
					Main Bridge	Approach Bridge	Cost (million)		
							Local cost (KS.)	F.E(US\$)	
10	Chindwin (Kalaywa)	PC + RC	YeU-Kalaywa	Kalaywa	300	300	6000	3.0	
11	ThetKalThoung	Steel truss Rail cum road	Dawei-Myeik	Myeik	760		17250	12.0	
12	Thanlwin (ChaugSone)	Steel Truss	Mawlamyine-ChaugSone	LaPutta	600		6000	6.0	
13	ChaugNitkwa	Suspension	Mudon-Myawaddy		360		4500	4.0	
14	Thanlwin (Tarsotpha)	Suspension	MingPan-Monghta-Monghtaw		305		4000	3.5	
15	Yaw Chaug (Ye Pyar)	RC	Pathein-Monywar		1000		9800	4.0	
16	Yaw Chaug (OhnTaw)	RC	Pakokku-Pauk		760		7500	3.0	50

Yangon City Development Plan (Yangon Vision 2040)



Central Business Development and Car Parking

- Existing Central Business Development
- New Proposed Center (Kabaraye (Yayku))
- Existing Sub-Center (Hlaetan, Maynigone, Tarmway, Thinkangyun, Sanpya, e mile, Bayintnaung, Pazuntaung, North Okkalar....)
- New Proposed Sub-Center (Mindama sub-center, East Dagon, Hlaingtharyar, Shwepyithar, Mingalardon waryarlat
- New Proposed Highway Car Parking (Eastern Dagon, Thaketa)
- New Proposed Car Parking in City (Thakhimya gardem, Around Yangon Station)
- Existing Highway Car Parking To Implement

Maintenance Zone

- Maintenance of pool and green Land
- Environment Maintenance Zone around Area of Shwedagon and Sulae Pagoda
 - Limitation of Area of Building Construction and Height
 - Hluttaw Maintenance Zone
- Modified Zone to promote Tourism
 - Boutique Hotels, Restaurants and Shops
 - Hluttaw Maintenance zone

Yangon City Development Plan

Tharketa New Bridge Location



Existing Thaketa Bridge (Canada)

Constructed
in 1967 by
Colombo
plan by
Canadian

Satuated in
Pazundaung
,
Yangon

Connecte
d Yangon
and
Thilawa
Industrial
zone



Opening system of mid span for passing Big Ship under
bridge

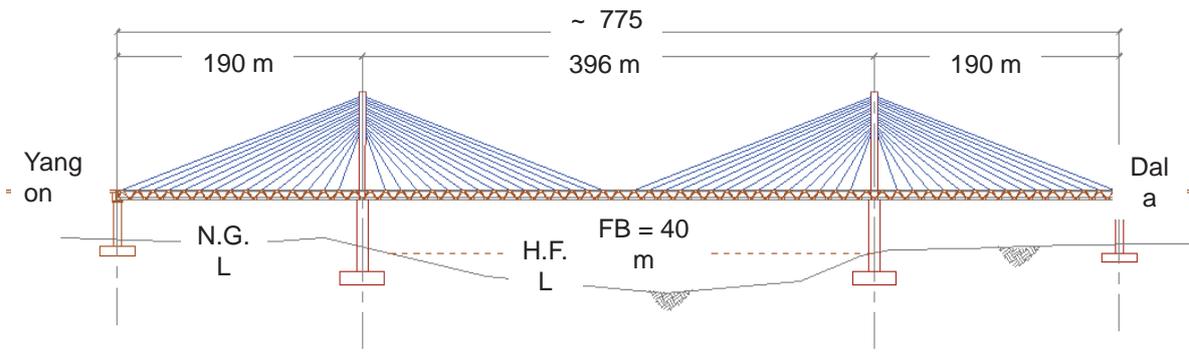


ရန်ကုန်-ခလတ်တား လှာထားတံတားတည်နေရာပြမြေပုံ



Sample from JAPAN

DALA BRIDGE



PROPOSED ELEVATION



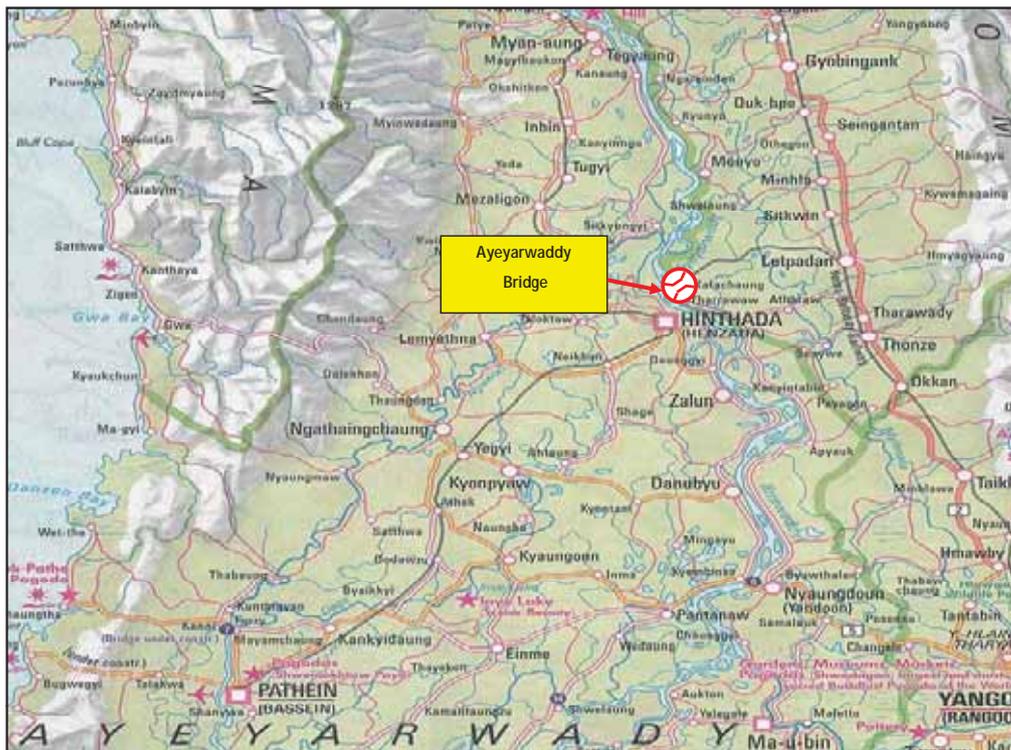
Not to be used many city area for approach span, we will refer to your Shibu loop Bridge included Rainbow bridge in Tokyo

DALA Bridge Proposal



Location Map of Ayeyarwaddy Bridge in Hinthada Township

Proposal (1)



Proposed Alignments of Ayeyarwaddy Bridge (Hinthada)



FS conducting for Hinthada Bridge



Bridge Maintenance and Management System is urgently needed for our existing bridges over 25 Years Service life

JAPAN Infrastructure partnership (JIP) team help as inspection Guideline

S.N	Team leader	No. of Experts	Visited sites	Major Finding	Remarks
1.	Dr. Fujiwara Ex-expert of BETC	(4)	Yangon, Ayeyaweddy Region	Weak points in Suspension Bridges and Steel Trusses , corrosion	Mr. Asukura arranged it in 2010
2.	Dr. Shioi Ex-expert of BETC	(5)	Rakhaing, Yangon, Ayeyaweddy	Corrosion problems due to salty water	Mr. Asukura arranged it in 2011

Corrosion on Approach Bridge Piers
in
Min Chaung Bridge



Inspection on broken concrete pieces
from pier by TEAM at Approach
Bridge Pier in Min Chaung Bridge



Approach Pier already reinforced to cross beam in
Min Chaung Bridge



Twantay bridge-

Corrosion and deflection in Main Bridge and expansion joint problem in Approach Bridge.

It was inspected by JIP members in last year.



MAUBIN BRIDGE in Ayeyawaddy region

Date of Commencement	- 1.3.1994
Date of Completion	- 10.2.1998
Total Length (ft)	- 2362
Width (ft)	- 40

At P5 fixed bearing

At P8, failure of movable bearing

Yangon →

← **Maubin**

Expansion Joints also damaged due to no bearing function

Abutment body Failure due to Earth pressure



Pathein Bridge Inspection on 29-1-2012
for repairing works progress



Tower Condition



Broken Bolts Joint in Pathein
Bridge





Bridge List proposal for Rehabilitation

S.N	Bridge name	Bridge type	Location	Year occurred	facing problems	Approximate Estimated	Remarks
						Cost (million)	
						F.E(US\$)	
1	Maubin	Steel Truss	Ayeyarwaddy	2000	Bearing & Expansion joints, Abutment wall	2	Due to earth pressure from Abutment via Approach span
2	Balaminhtin	Steel truss	Kachin	2009	Truss inclination in longitudinal direction due to Foundation scour	1	Scour could be safe but truss could not be adjusted to position till now.
3	Twantay	Steel suspension	Yangon	2005	<ul style="list-style-type: none"> •Deflection of main span deck •Expansion joint in approach span 	1.0	Could not find out the reason why it was occurred.
4	Pathein	Steel Suspension	Ayeyarwaddy	2009	<ul style="list-style-type: none"> •Deflection of main span deck •Expansion joint in approach span 	1.0	Could not find out the reason why it was occurred
5	Myaungmya	Bailey Suspension	Ayeyarwaddy	1996	<ul style="list-style-type: none"> •Tower tilt towards mid span •Corrosion in main cables 	1.0	<ul style="list-style-type: none"> • Since construction stage •After 20 years

Bridge List proposal for Rehabilitation (cont'd)

S.N	Bridge name	Bridge type	Location	Year occurred	facing problems	Approximate Estimated	Remarks
						Cost (million)	
						F.E(US\$)	
6	Gaing (Zarthabyin)	Suspension	Mon	2000	Steel deck failure	1	
7	Attrayan	Cable stayed	Mon	2009	Steel deck failure	1	
8	Maei	RC	Rakhine (Yangon-Kyaukphyu road)			1	Corrosion casued by Sea water
9	Kyaukkyipauk	Steel truss	Rakhine (Yangon-Kyaukphyu road)			1	Corrosion casued by Sea water
10	SnarePauk	Steel truss	Rakhine			1	Corrosion casued by Sea water
11	LonetawPauk	Steel truss	Rakhine			1	Corrosion casued by Sea water
12	DedokePauk	Steel truss	Rakhine			1	Corrosion casued by Sea water ₁

Bridge List proposal for Rehabilitation (cont'd)

S.N	Bridge name	Bridge type	Location	Year occurred	facing problems	Approximate Estimated	Remarks
						Cost (million)	
						F.E(US\$)	
13	ThanThaMagyi	Steel truss	Rakhine		Corrosion casued by Sea water	1	
14	ThanThaMaChay	Steel truss	Rakhine		Corrosion casued by Sea water	1	
15	ThazinTanPauk	Steel truss	Rakhine		Corrosion casued by Sea water	1	
16	Kyaukkyipauk	Steel truss	Rakhine			1	Corrosion casued by Sea water
17	Wanphite	Steel truss	Rakhine			1	Corrosion casued by Sea water
18	Minkyang	Steel truss	Rakhine			1	
19	Yanmaung	Bailey	Rakhine (Yangon- Sittwe road)			1	
20	Kisspanaddy	Steel Truss	Rakhine			1	
21	Minchaung	Steel truss	Rakhine			1	72

Upgrading of Research Labs/Training Centers/Workshop

Sr. No.	Particular	Location	Estimated cost (in million US \$)
1.	Research laboratories (Road, Bridge and Building)	Yangon	10
2.	Establishment of new research laboratories (Road, Bridge and Building)	Naypyitaw	15
3.	Training Centers	Thuwana, Ywama, Yangon Mandalay	10
4.	Upgrading Steel fabrication factory in Yangon- Thanlyin Bridge compound (Thaketa) Yangon	Yangon	10

73

Testing Instruments (Necessary to upgrade) in Road Research Laboratory



C.B.R Test



Direct Shear Test



Flash Point Test



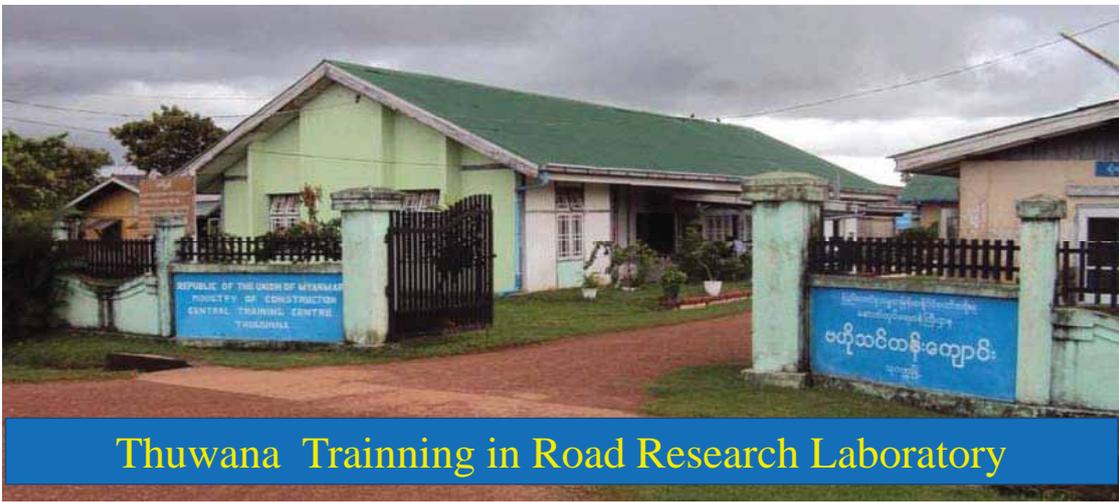
Penetration Test



Ductility Test



Abrasion Test



Thuwana Training in Road Research Laboratory



Upgrading Steel fabricationshop in Yangon- Thanlyin Bridge compound (Thaketa)Yangon



❑ Needs for Successful Development of Road Infrastructure

- Review and correct the existing ways in the stages; planning, designing, construction and maintenance, and set up new efficient ways in those stages for better efficiency than now.
- Participation from Public and Private Sectors,
- Cooperation and Investments from developed countries
- Master Plan for Road Infrastructure Development

Now, we, Public Works, open and welcome for more participation both from local and international private sectors and also asking for international aids and cooperation.

Programs jointly implemented with Japan

- ❖ Non Project Grant AID for contributing to the restoration and disaster, prevention effort for the Area and people affected by the Flood Disaster in 2011, total worth of US\$ 10 million is under preparing for tender opening in Japan, I was informed to attend us in last week.
- ❖ **Road Technology development in Ayeyarwaddy region**, with the aid of JICA-technology cooperation program , is going to start as transfer of technology using suitable road construction method for the relevant road.
- ❖ In **Rhakhine and Kayin States**, JICA is also cooperating with PW for the rehabilitation of roads and bridge.

Expectations from GOJ

- Trainings for Capacity Building
- Technical Cooperations
- Grant, Loans and Aids
- Investments on Road Infrastructure in Myanmar

Public Works' Attitude on Japan

Public Works have received Trainings, Technical Cooperations, Grants and Aids from Japan in the past periods.

Public Works hopes the strong relation with Japan which we have, to be continued and lasting forever in the future.

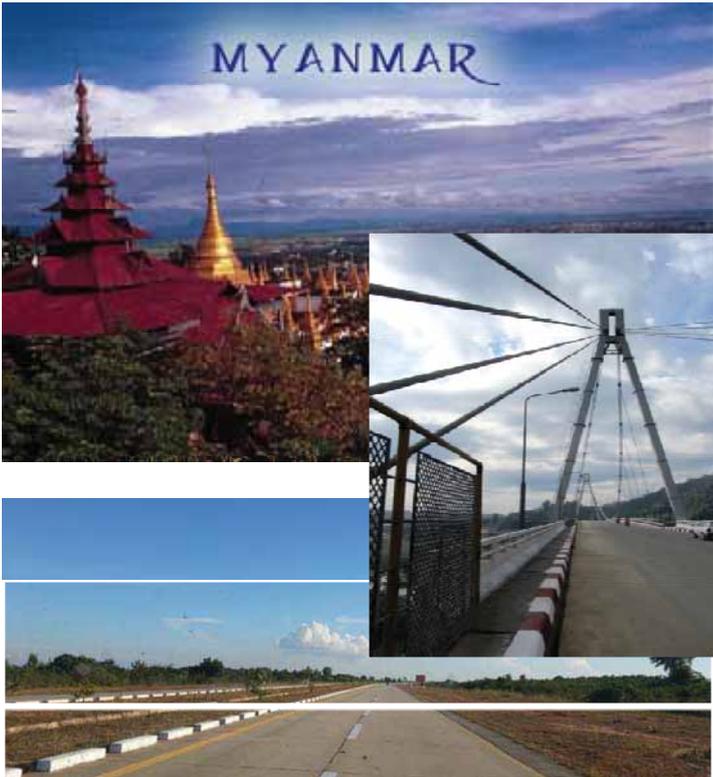
We, Public Works also expect and hope Japan to offer further assistance needed for the development of infrastructures like what Japan done in the past.

Conclusion



Public works welcome Local and Foreign developers who would like to invest in road and bridge sectors according to current BOT schemes or PPP System.

Thank you for Kind Attention



Characteristic and Advantage of Steel Cable-stayed Bridge

2013. 2. 26

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Introduction of IHI



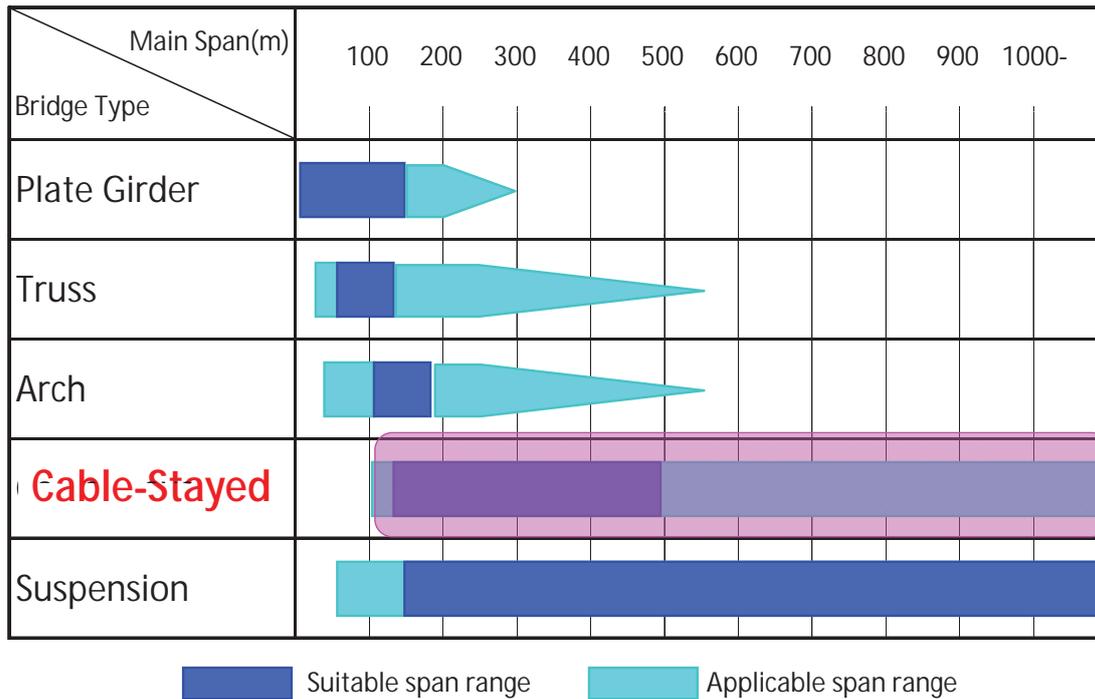
Nhat Tan Bridge in Vietnam



Characteristic and Advantage of Steel Cable-stayed Bridge

- 1) Wide Application for Navigation Clearance
- 2) Minimization of Environmental Impact and Construction Period
- 3) Reservation of Navigation Clearance
- 4) Application for Multi-Purpose Bridge
- 5) Landscape

1) Wide Application for Navigation Clearance



(Source: Japan Bridge Association, "Design Data Book")

2) Minimization of Environmental Impact and Construction Period



2) Minimization of Environmental Impact and Construction Period



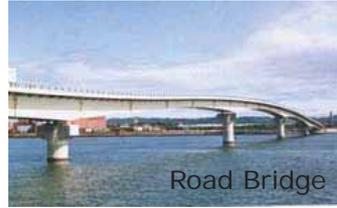
Erection of Nhat Tan Bridge in Vietnam

3) Reservation of Navigation Clearance



Erection of Binh Bridge in Vietnam

4) Application for Multi-Purpose Bridge



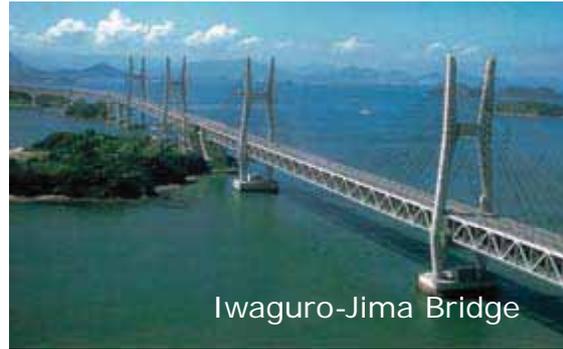
Road Bridge



Railway Bridge

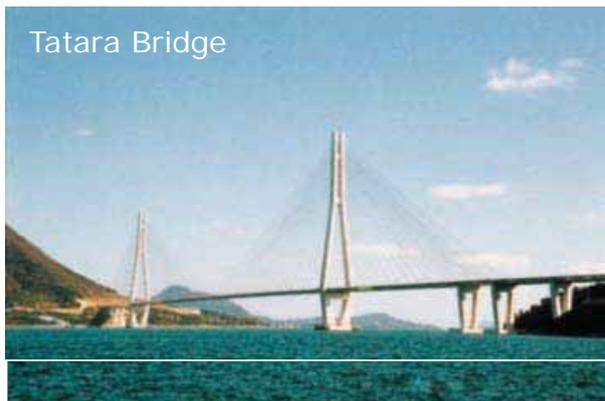


Combined

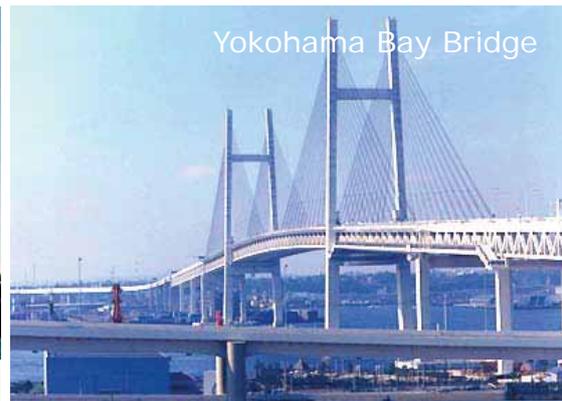


Iwaguro-Jima Bridge

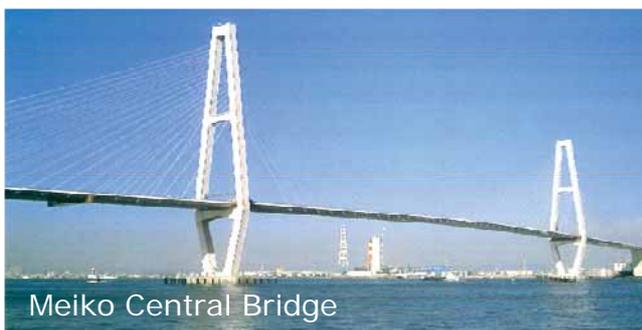
5) Landscape



Tatara Bridge



Yokohama Bay Bridge



Meiko Central Bridge



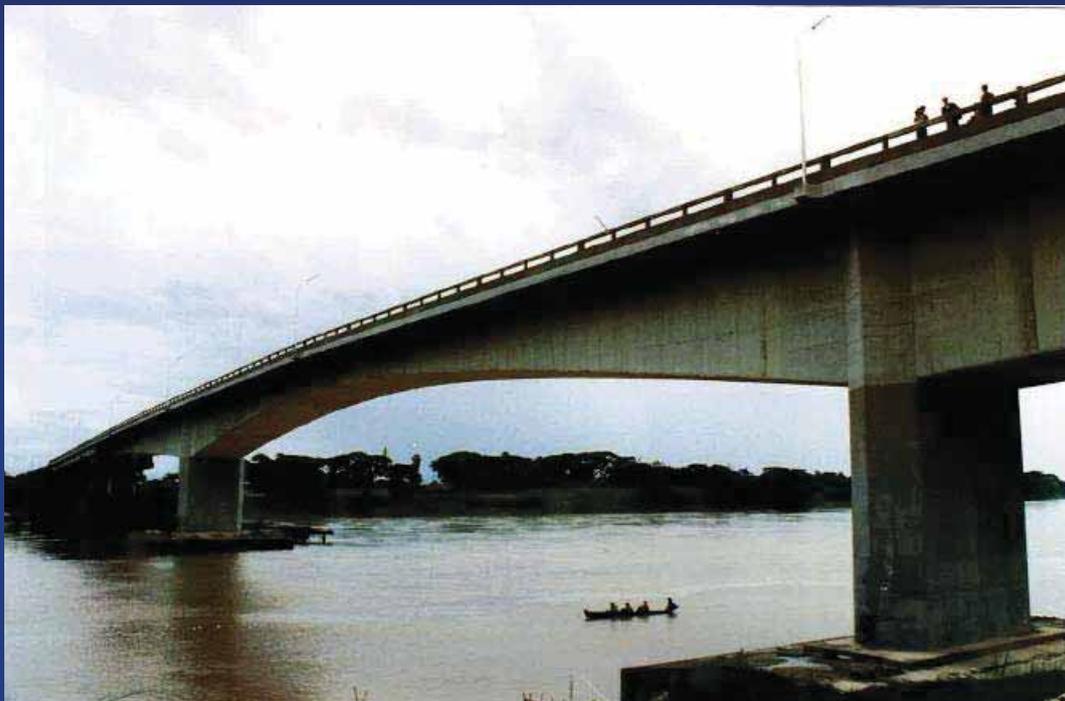
Torikai Niwaji Bridge

Hybrid Structure

26/2/2013

KAJIMA COPARATION

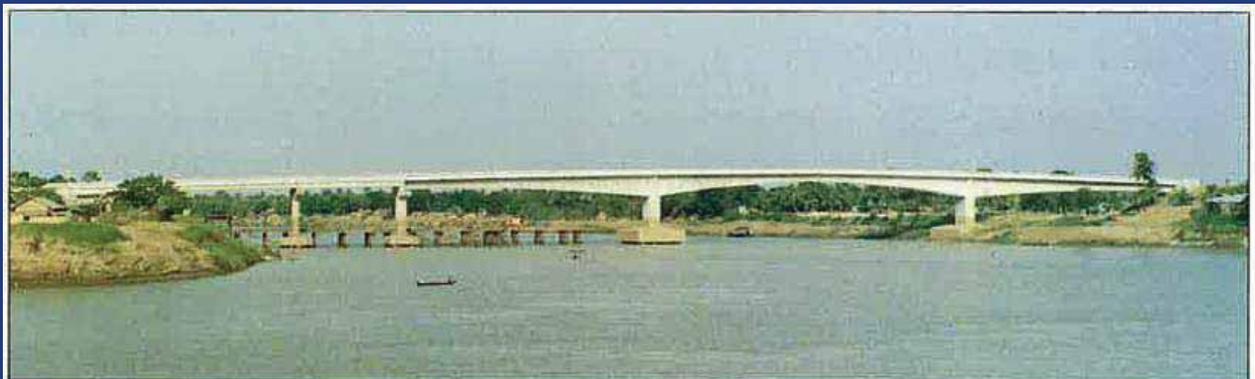
Memorial Bridge in Myanmar Ngawun Bridge



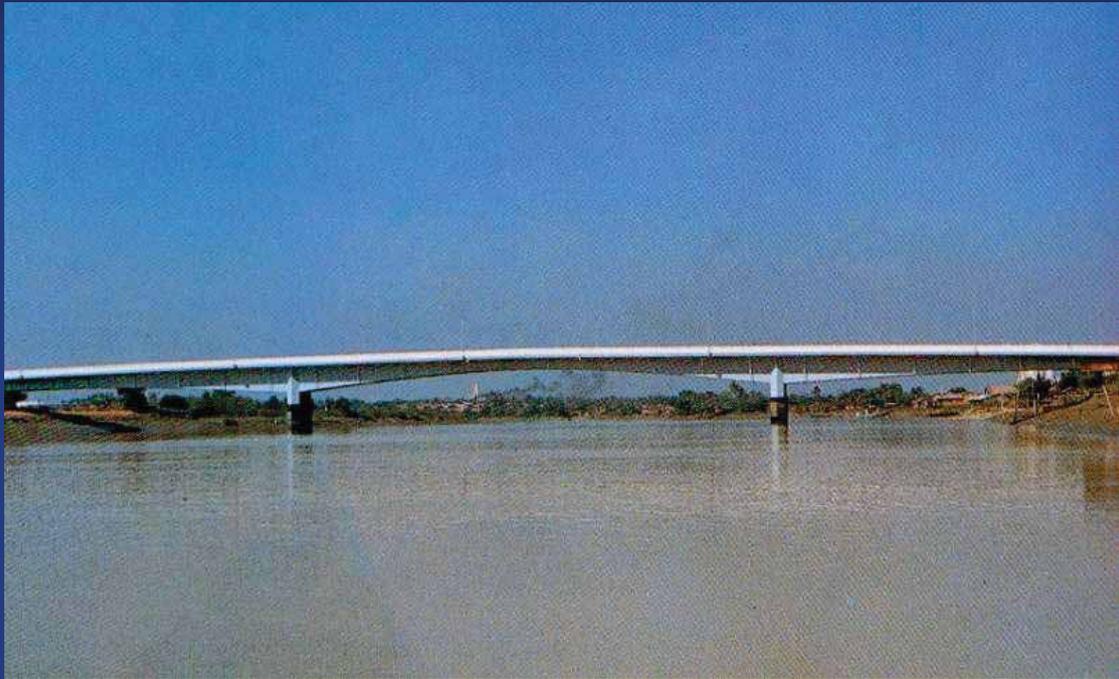
Ngawun Bridge



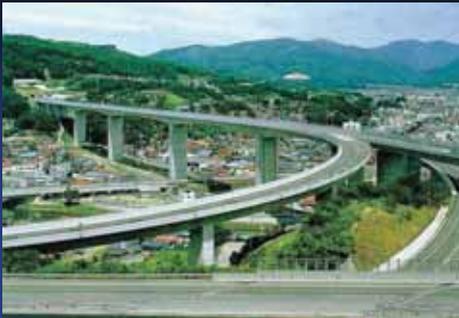
Ngawun Bridge



Thuwunna Bridge



Structural Type



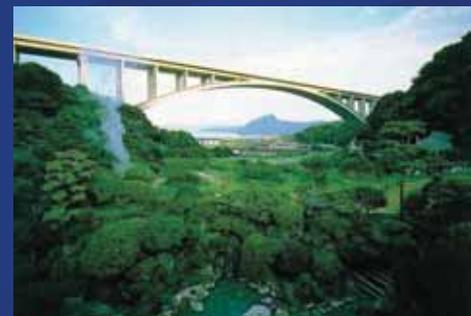
Girder Bridge



Extradosed Bridge



Cable-Stayed Bridge



Arch Bridge

Hybrid Structure

- **Composite Structure**

consisted of plural materials

- **Mixed Structure System**

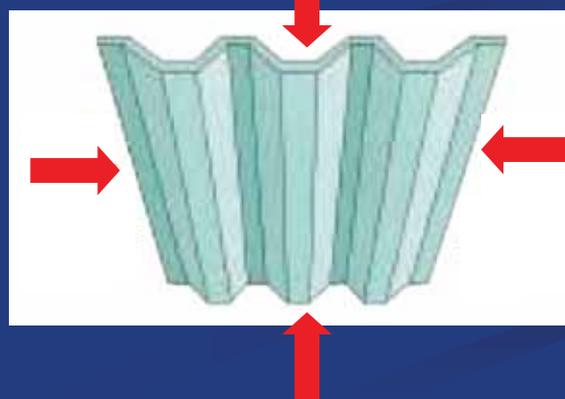
connected main elements made by different kind of materials

Composite Structure Concrete Bridges with **Corrugated Steel Webs**

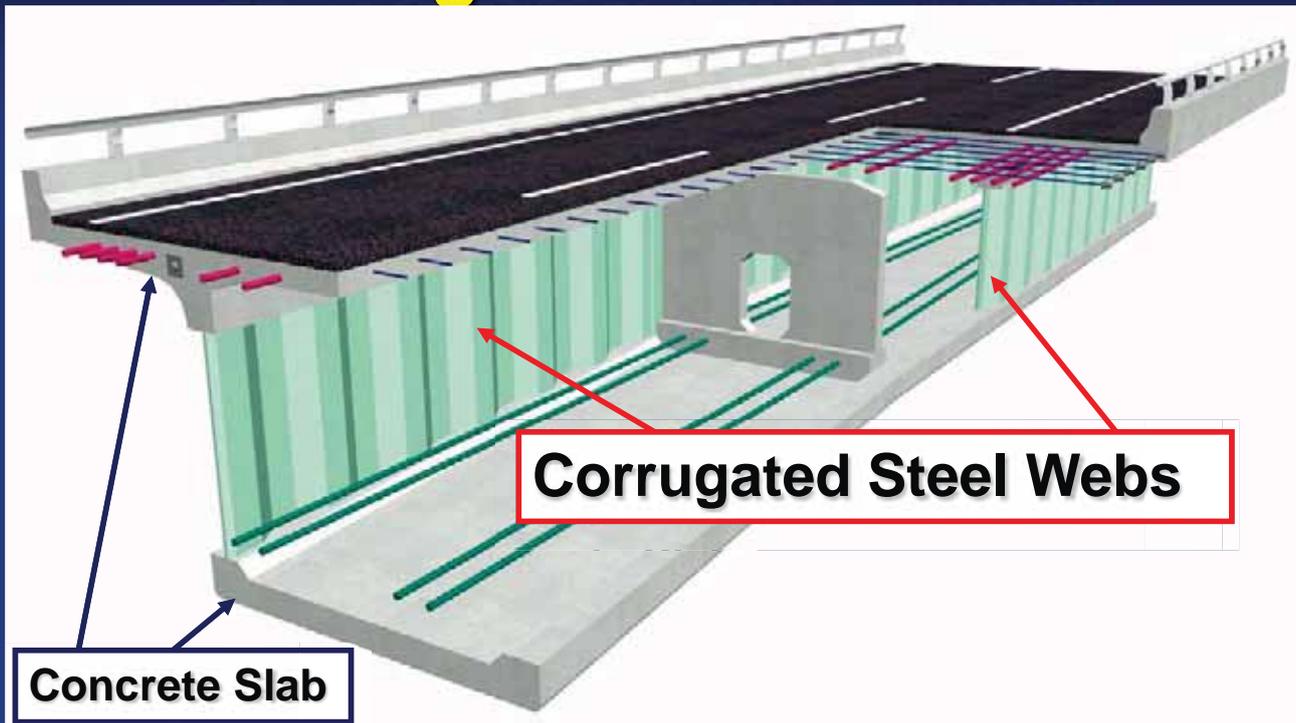
Accordion
Effect

Rigid

Flexible



Concrete Bridges with Corrugated Steel Webs



Ura-Takao Bridge



Ura-Takao Bridge

Upper Slab Portion



Bottom Slab Portion



Composite Structure Concrete Bridges with **Steel Truss**

Steel Truss



Kino-kawa Bridge



Inside View



Node



Yamakura River Bridge



Mixed Structure System Concrete Bridges with **Steel Girder**



Steel Girder

Concrete Girder

Japan-Palau Friend-Ship Bridge



Concrete pylon and Steel girder

Suez Canal Bridge



Dubai Metro



Transportation

Segment Erection

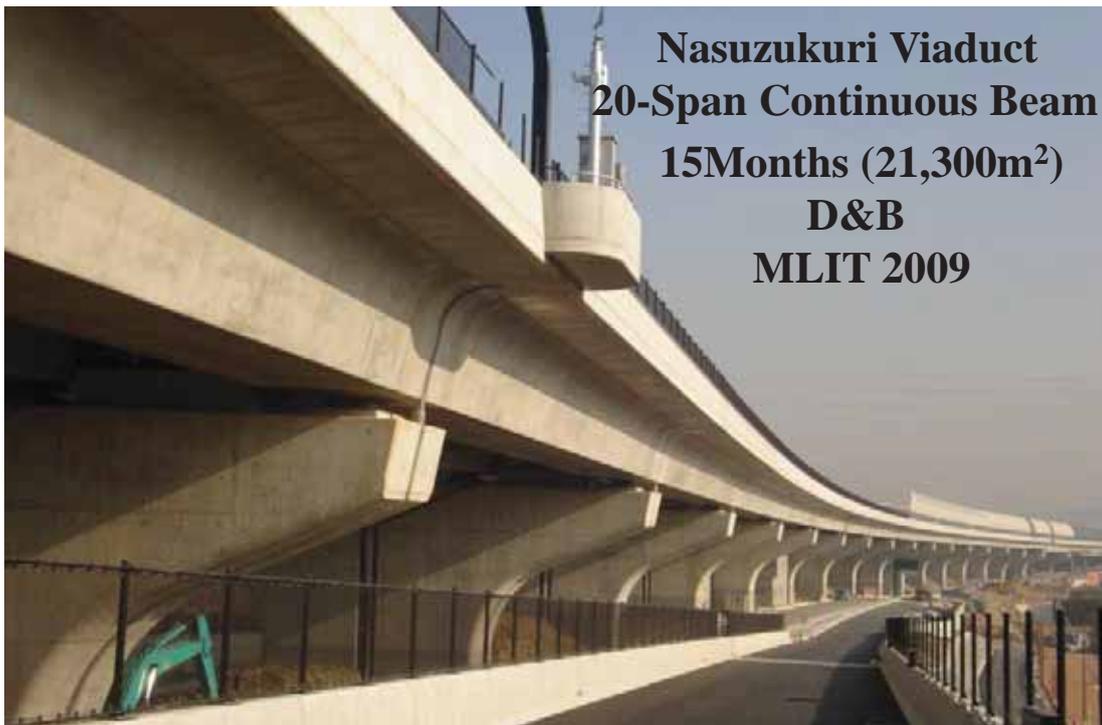




Accelerated Construction & Extradosed Bridges

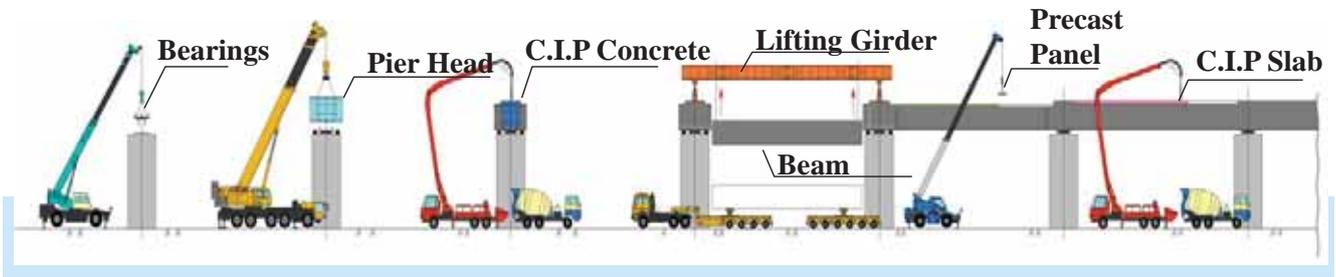
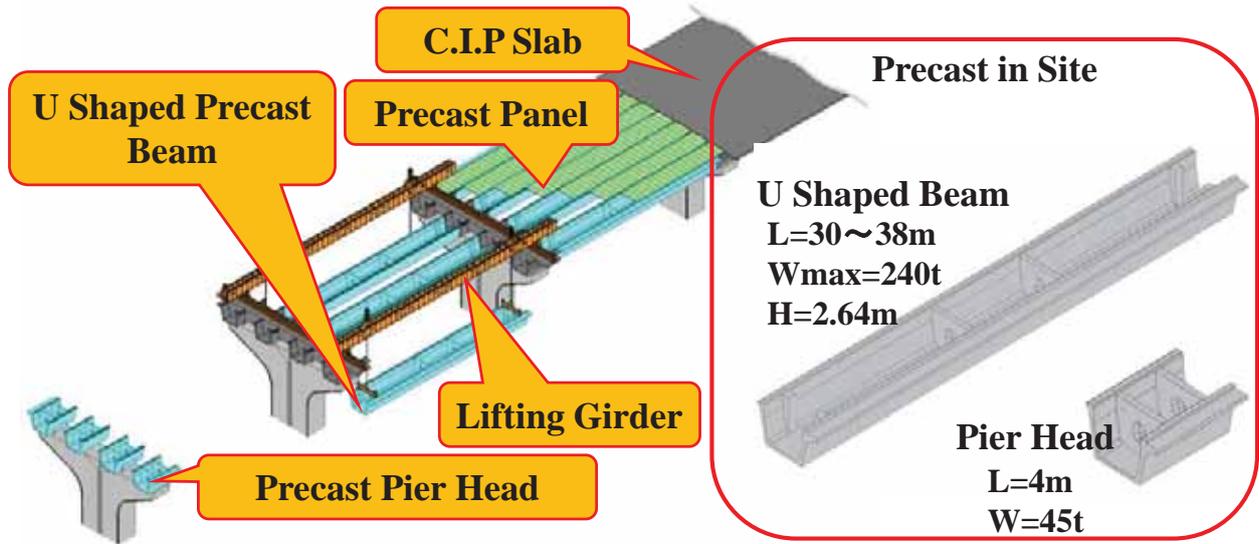
Akio Kasuga
Sumitomo Mitsui Construction

Accelerated Construction



Nasuzukuri Viaduct
20-Span Continuous Beam
15Months (21,300m²)
D&B
MLIT 2009

Lifting Method of U Shaped Beam



Erection Girder

Lifting girder can be reduced the weight up to **20% (1/5)** of Span by Span girder. → Cost Saving

Lifting Girder

Span by Span (SBS) Girder



Construction of U-shaped Beam



Fabrication



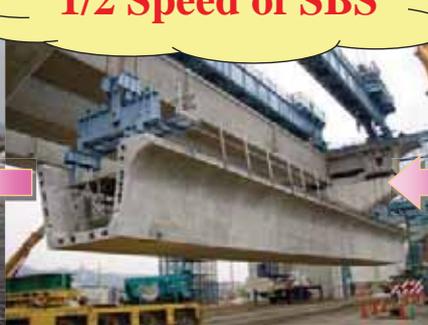
Loading



1/2 Speed of SBS



C.I.P. Concrete Slab



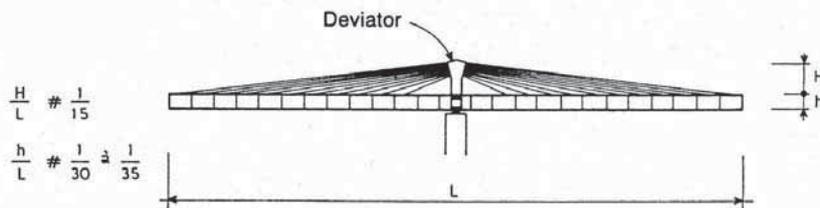
Lifting



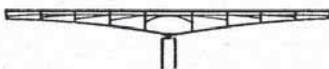
Transport



Extradosed Bridges



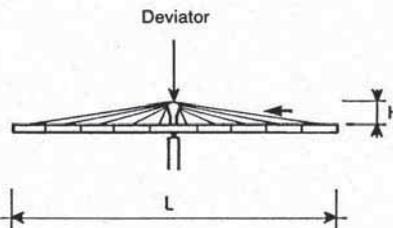
Cantilevered bridge



Internal prestress

Variable depth

Extradosed prestress bridge



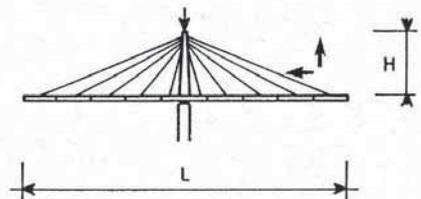
External prestress

Deviator $\frac{H}{L}$ approx $\frac{1}{15}$

Constant depth

Maximum cable stress $0.65 f_R$

Cable-stayed bridge



Cable stays

Pylon $\frac{H}{L}$ approx $\frac{1}{5}$

Constant depth

Maximum cable stress $0.40 \text{ to } 0.45 f_R$

Major Extradosed Bridges in Japan

Odawara Blueway Bridge (DB)



Tsukuhara Bridge (DB)



Shinmeisei Bridge (DB)



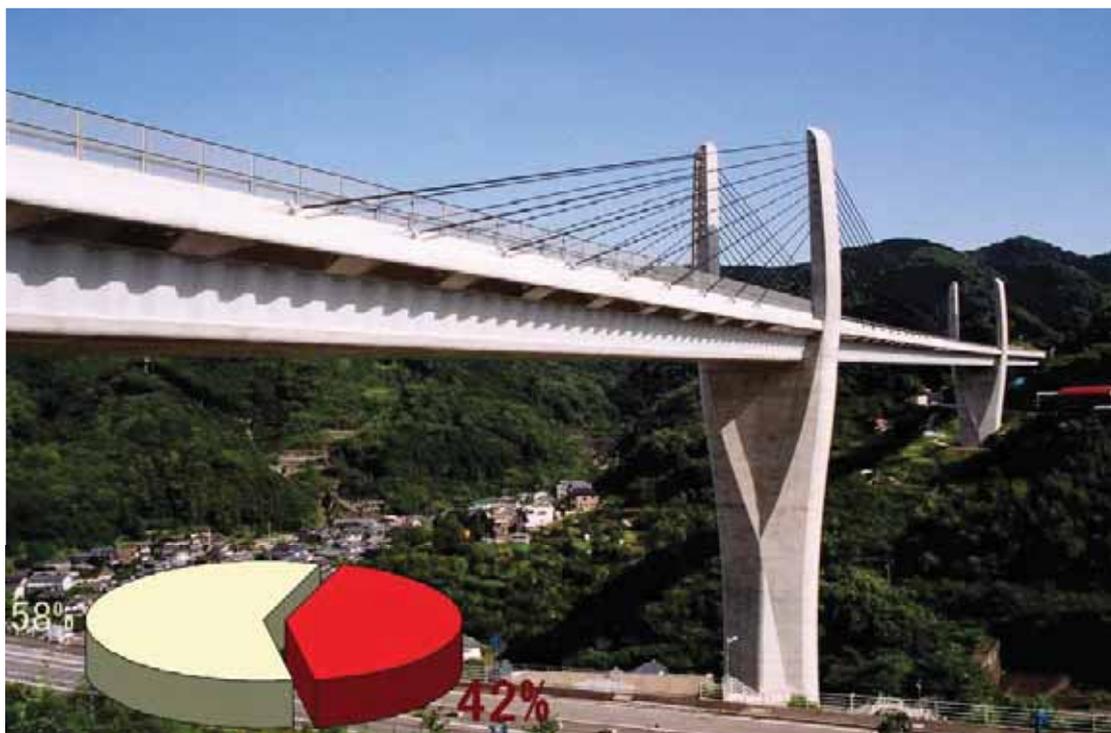
Himi Bridge (DB)



Ibi River Bridge (DB)

More than 50

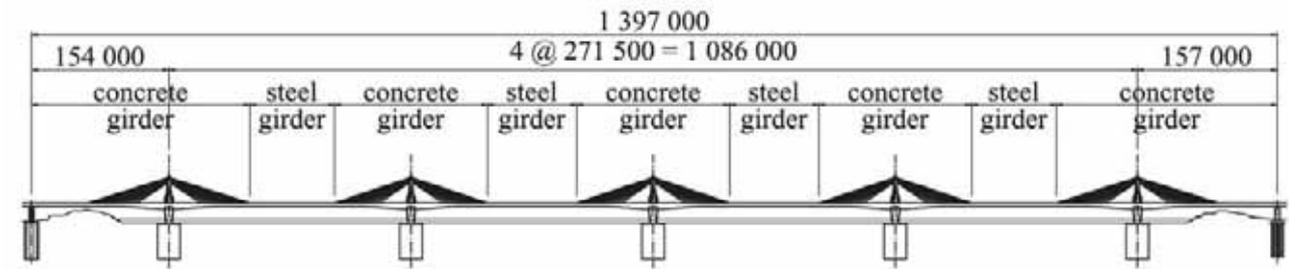
SMC's Share of Extradosed Bridges



Ibi River Bridge (2001)



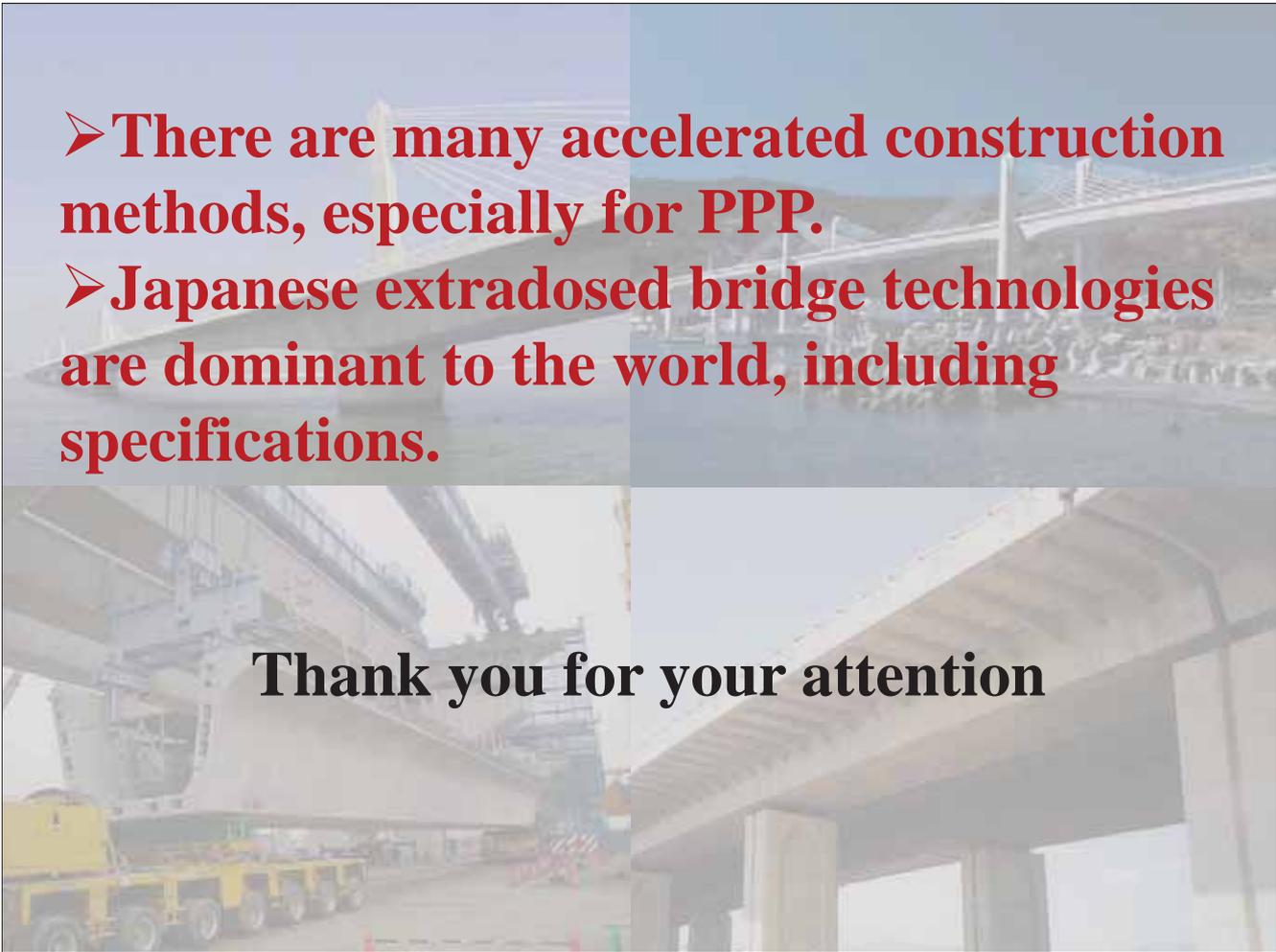
Design & Build



Chao Phraya River Crossing Bridge

1st Extradosed Bridge in Thailand
200m Span, 2014





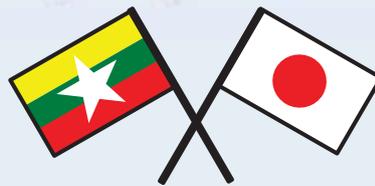
➤ **There are many accelerated construction methods, especially for PPP.**

➤ **Japanese extradosed bridge technologies are dominant to the world, including specifications.**

Thank you for your attention

Rumble Strips

An effective countermeasure for preventing roadway departure crashes



NIPPO CORPORATION

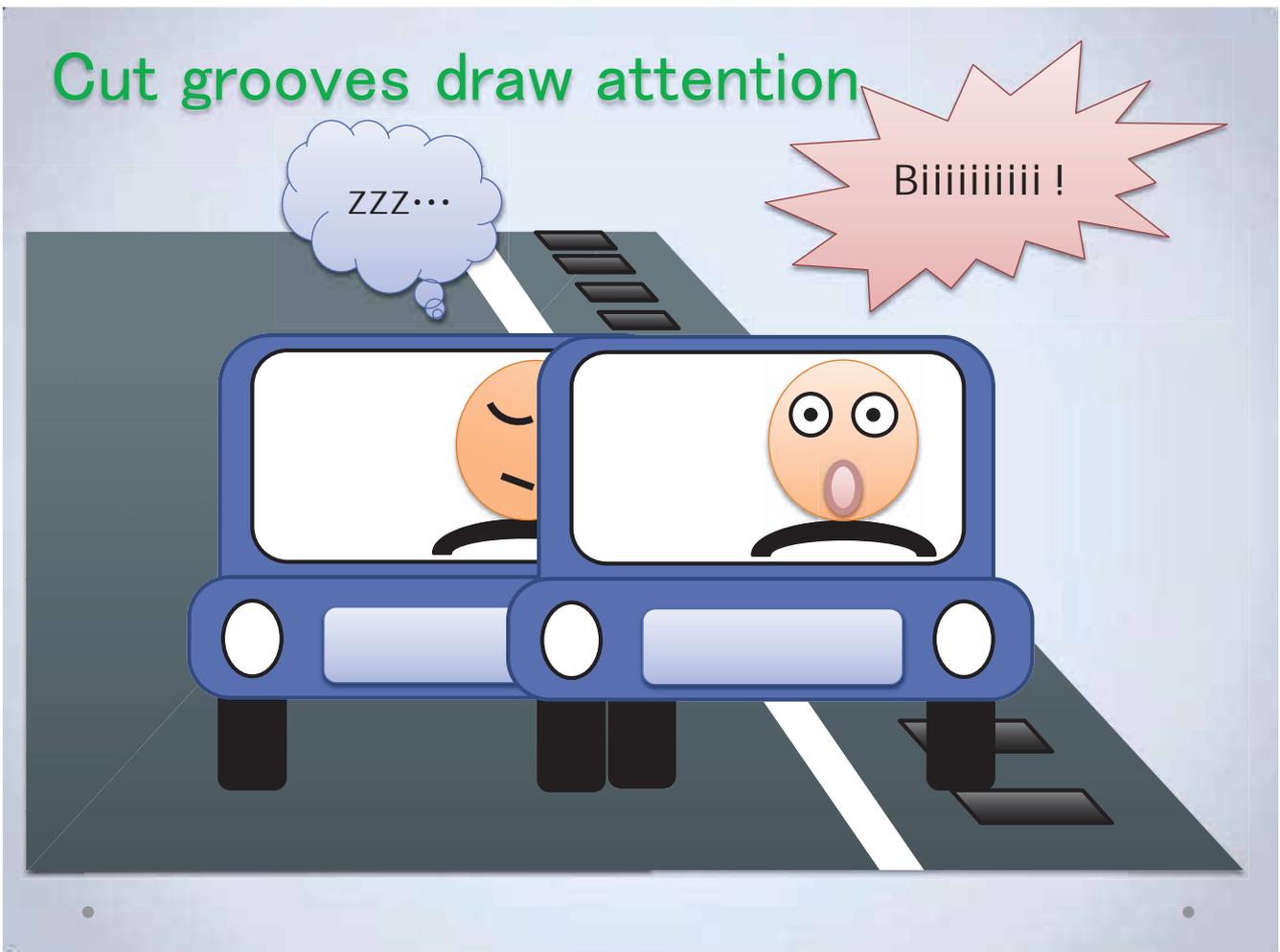
Rumble Strip (Cutting-type Alert Method)

- **Rumble strips** are grooves cut in regular intervals into the centers or shoulders of roads.
- When vehicles deviate from their lane and drive over rumble strips, the handle vibrates and there is noise in the vehicle, providing a warning to the driver.



※Rumble strips are a joint development of PWRI, CERI and NIPPO

Cut grooves draw attention



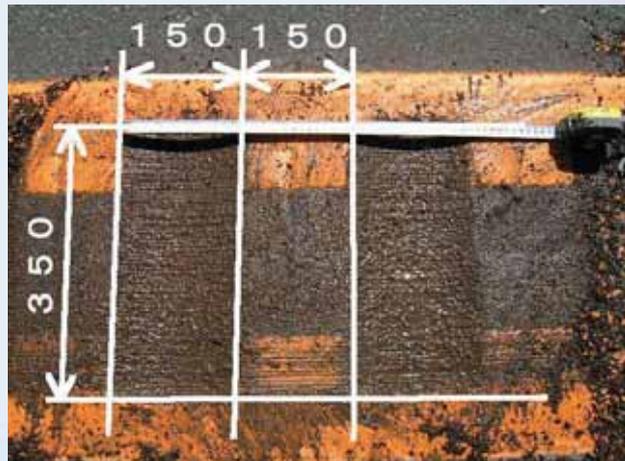
Features of Rumble Strips

◆ Features and Effects

- Highly effective warning
- Fast and easy construction
- Durable and easy to maintain

◆ Shape

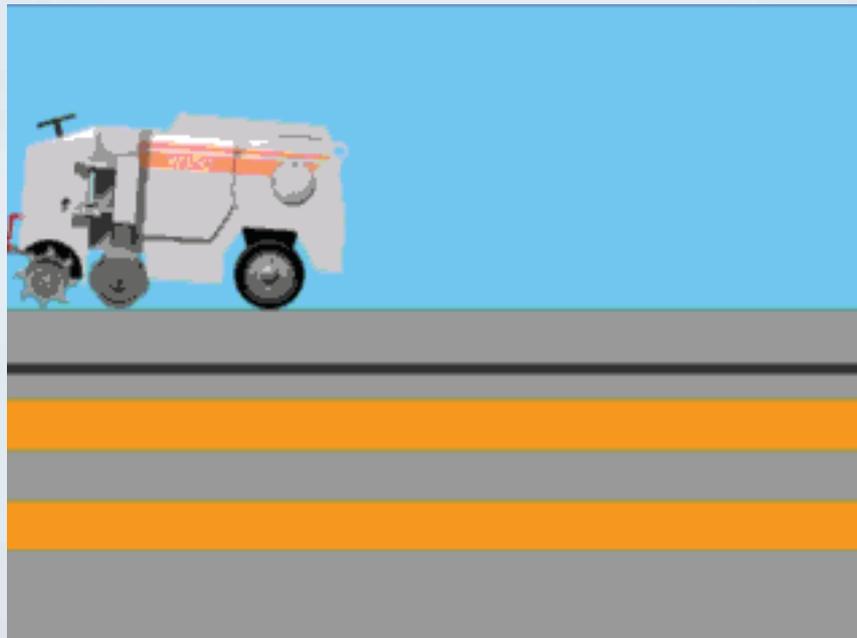
- Cut width 350mm
- Cut length 150mm
- Cut pitch 150mm
- Cut depth 12mm



Overview of construction machinery

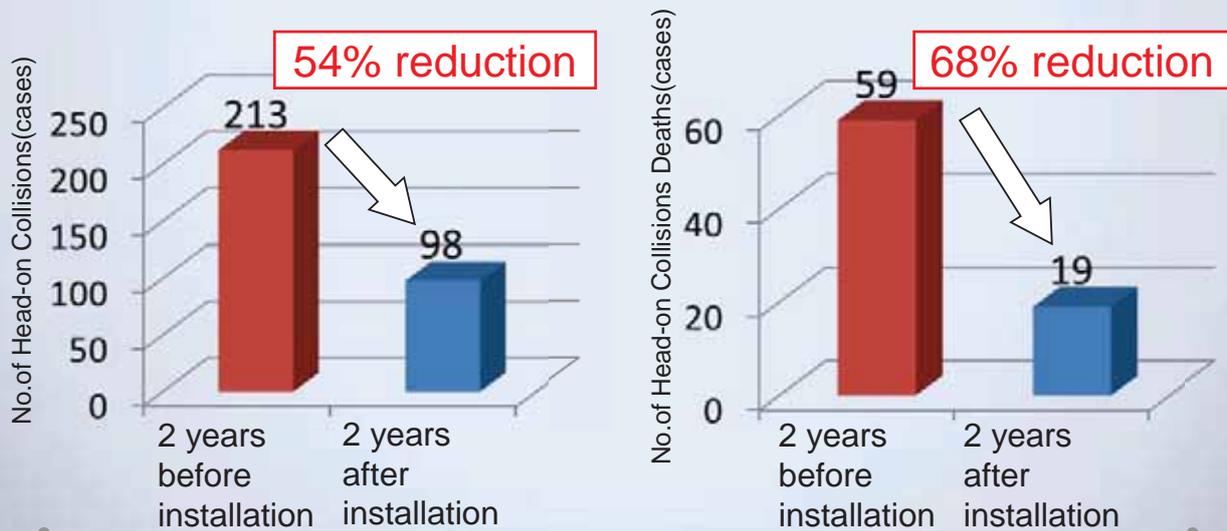


Movement of Wheel Variant Cutting Drum



Effect after Installation of Rumble Strips

- Rumble strips were installed in 43 routes over 641km in Hokkaido (national roads) between 2002 and 2007, resulting in a reduction of 54% in head-on collisions and about a 68% reduction in deaths.



※Source: CERI

Thank you for your attention.



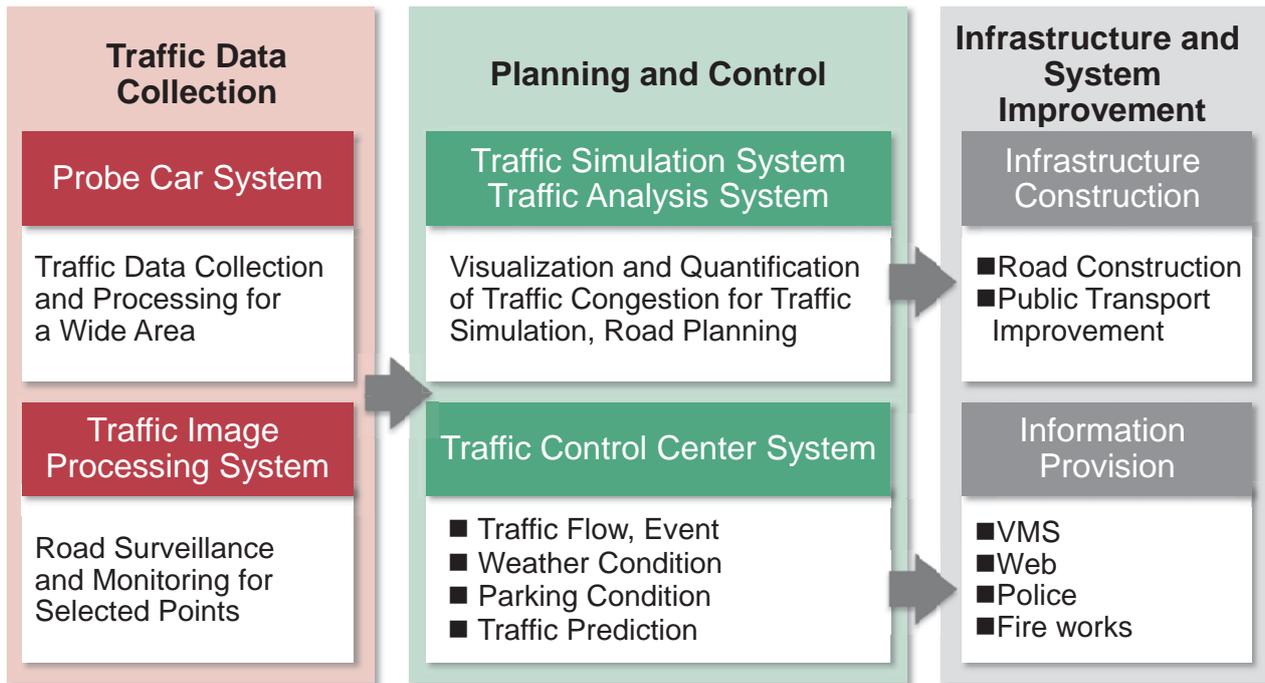
Hitachi's ITS Solution for Traffic Management

February 2013
Hitachi, Ltd.

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Contents

1. Hitachi's ITS Solution for Traffic Management
2. Probe car Traffic Information System
3. Traffic Image Processing Systems
4. Traffic Simulation System
5. Process of traffic planning and improvement



- Perceive real time traffic conditions by low investments and short term system construction.
- Utilize quantitative traffic data as a means of dynamic traffic control and efficient road planning.