Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

Application of PMBOK to a Multicultural Project in Developing Country

Ichizuru Ishimoto
Nippon Koei Co., Ltd., Japan

Hai Van Tunnel Construction Project

Design : Jan 1998 ~ July 1999
Bidding : June 1999 ~ December 2004
Construction & Procurement
: October 2000 ~ September 2005
Tunnel Open : 5 June 2005

My Responsibilities:

Period	Position
August 2000 ~ September 2001	Construction Engineer Resident Engineer (3) Quantity Surveyor
October 2001 ~ March 2002	Construction Engineer Quantity Surveyor
March 2002 ~ March 2003	Project Manager Construction Engineer Quantity Surveyor
April 2003 ~ To Date	Project Manager Construction Engineer Resident Engineer (3) Quantity Surveyor O&M Leader

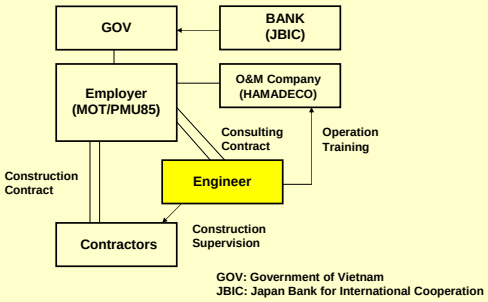
Today's Topics Are….

- **Introduction of the Project**
- **PM Practice (1): Human Resource Management**
- **PM Practice (2): Time Management**
- **PM Practice (3): Communication Management with POWEB (Project Office WEBsite)**
- **Summary: Keys to Successful PM**

- Introduction of Project
  1) Project Organizations
  2) Location of the Project
  3) Project Photos
  4) Background of the Project
  5) Project Measure Features
  6) Traffic Demand Forecast
  7) Distinct Points of the Project
  8) Project Implementation Program
  9) O&M Company Required
  10) Project Financial Report

Project Organizations

- **Introduction of Project**, Project Organizations

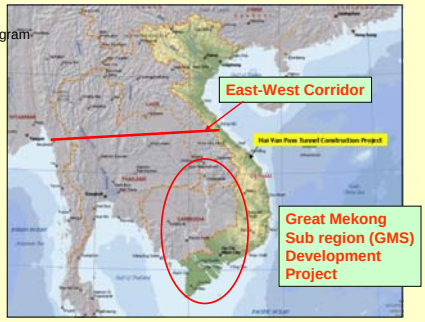


Location of the Project

- **Introduction of Project**, The Hai Van Pass, Location Map (1)

East West Corridor Program
-Vietnam
-Laos
-Thailand
-Myanmar

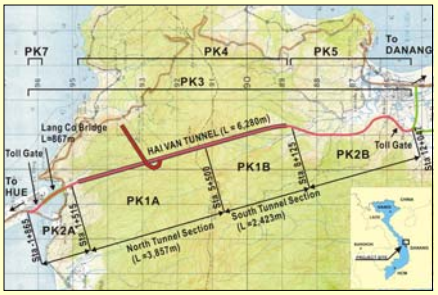
GMS Program
-Vietnam
-Laos
-Cambodia
-Thailand



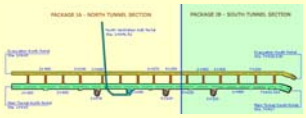
- **Introduction of Project**, The Hai Van Pass, Location Map (2)

Present Pass Road

- **Introduction of Project**, Project Location Map



- **Introduction of Project**, Project Layout



Project Photos (As of 12 June 2005)

Hai Van Bridge (North Approach)

Hai Van Bridge (North Approach)

North Portal (Hue Side)

View from North Portal (Hue Side)

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View from North Portal (Hue Side)

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Tunnel Monument and Portal (North)

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Jet Fans in Main Tunnel

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View From South Portal (Danang Side)

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South Portal (Danang Side)

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South Approach Road

Background of the Project

- **Introduction of Project**, Background of the Project

The Hai Van Pass located in coastal Central Vietnam, is the biggest traffic bottleneck on the National Highway No.1, which is the most important North-south longitudinal arterial linking the capital Hanoi with Ho Chi Minh.

The Pass rises to an elevation of 475 m for approximately 20 km with continuous small curves and steep grade. From the late 1990's, the rapid development of national economy has increased the logistic volume through the Pass, however, the heavy tracks have been forced to run slowly and fatal traffic accidents increased year by year.

In addition, the road is often blocked due to the landslide and slope failure during the rainy seasons.

Under such circumstances, the Government of Vietnam decided to construct a new highway segment with a tunnel under the Hai Van Pass by the Prime Minister's Decree in March 1994.

- **Introduction of Project**, Record of Closure and Traffic Accidents at the Path road

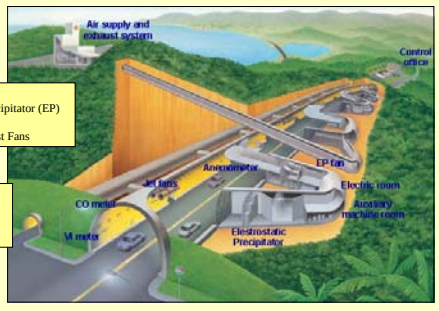
Year	Major Accident	Fatal	Injured	Road Closure
1996	14	6	20	28
1997	9	4	24	29
1998	14	10	35	33
1999	17	13	14	30
2000	32	5	57	29
2001	19	6	16	26
2002	16	4	7	53
2003	26	5	10	55
2004	31	9	16	62
Total	178	62	199	345
Ave	20	7	22	38

Project Major Features

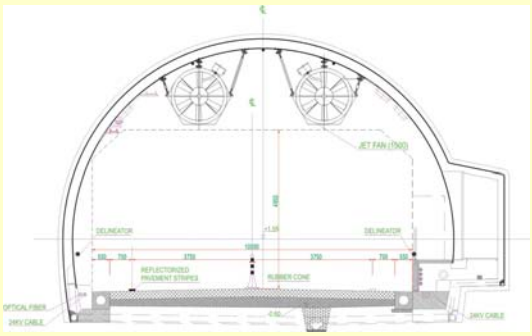
- **Introduction of Project**, Project Major Features

Ventilation Facilities
1) 3@ Electrostatic Precipitator (EP)
2) 23@ Jet Fan
3) 1@ Supply & Exhaust Fans

Ventilation Measurements
1) VI Meters
2) CO Meters
3) Anemometers



- **Introduction of Project**, Project Major Features



Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

- **Introduction of Project**, Project Major Features

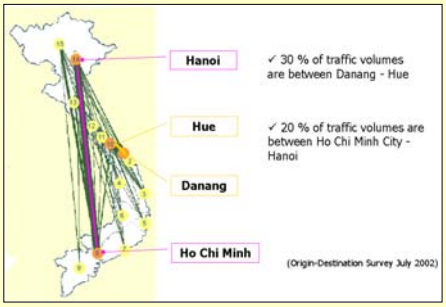
1) Project Length:	12,182m (incl. Tunnel = 6,280m, Bridges = 1,653m)
2) Traffic Lane:	2 Lanes (Stage 1, Bi-directional)
	1.25 (shoulder) +3.75 (Carriageway) +3.75+1.25, Total 10.0m wide
3) Operation System:	SCADA (Supervisory Control And Data Acquisition)
4) Tunnel Length:	6,280m (Main Tunnel, MT), 6,286m (Evacuation Tunnel, ET), 1,888m (Ventilation Adit, VA) **Total 14,454m**
5) Tunneling Method:	NATM (New Austrian Tunneling Method)
6) Cross-section:	89m2(MT), 15.5(ET), 36.2(VA)
7) Cross-Passage:	400m interval
8) Ventilation System:	Longitudinal System, 23 Jet Fans, 3 EPs, 1 VA
9) Bridge Number and Length:	8 bridges, 1,653m in total length
10) Toll Plazas:	Two plazas on both ends of project roads

Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

Traffic Demand Forecast

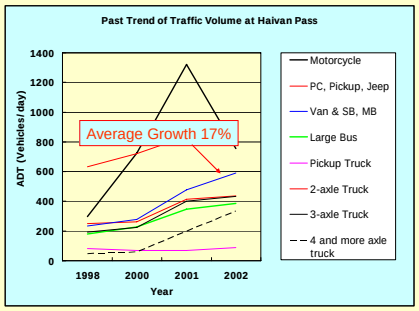
Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

- **Introduction of Project**, The Hai Van Pass, Traffic Through Hai Van Pass (1)



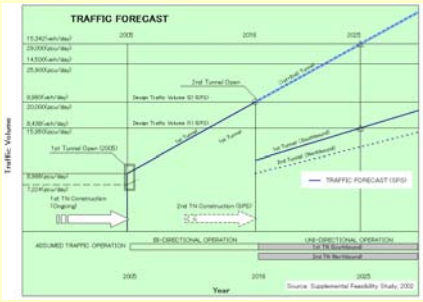
Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

- **Introduction of Project**, The Hai Van Pass, Traffic Through Hai Van Pass (2)



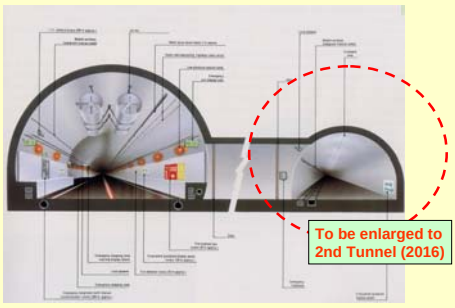
Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

- **Introduction of Project**, The Hai Van Pass, Traffic Forecast



Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

- **Introduction of Project**, 2nd Tunnel Construction



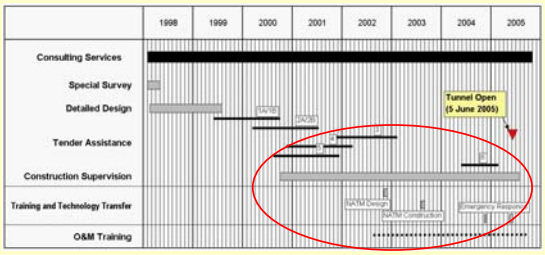
Distinct Points of the Project

- **Introduction of Project**, Distinct Points of the Project

1) **6.3km long tunnel; longest highway tunnel in Southeast Asia,**
2) **First Application of New Austrian Tunneling Method (NATM) in Vietnam,**
3) **Application of Longitudinal Ventilation System, including Electrostatic Precipitator (EP), Ventilation Adit and 23 Jet Fans,**
4) **Application of integrated overall operation control system said SCADA (Supervisory Control And Data Acquisition), and**
5) **Operation and Maintenance (O&M) Company Required.**

Project Implementation Program

- **Introduction of Project**, Implementation Program of Project



- **Introduction of Project**, Implementation Program of Project (2)

O&M Company Required

Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

- **Introduction of Project**, Operation and Maintenance Company Required

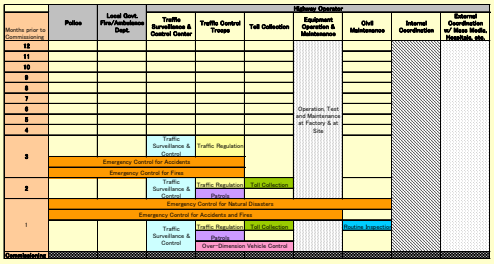
For the operation and maintenance of the first long highway tunnel in Vietnam, HAMADECO, O&M Company, was established by referring the Japanese practice.

Followings have been advised:

O&M Company (Established in April 2004)
O&M Manuals
O&M Training
Emergency Response Training
Tunnel Standard Operation Plan (SOP)

Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

- **Introduction of Project**, Operation and Maintenance Company Required (2)



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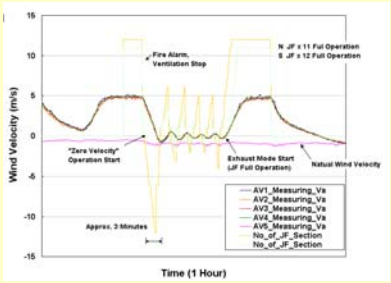
- **Overall Emergency Response Drill**

Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

- **Overall Emergency Response Drill**



Zero-Velocity Operation for Fire Fighting

Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

Project Financial Report

Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

- **Introduction of Project**, Project Scale

1) Organization Structure

Organization	Name
Financing Agency	Japan Bank for International Cooperation (JBIC) L/A No. VNIV-5, March 26, 1997, Loan Amount: JPY 5.5 billion L/A No. VNVI-5, March 30, 1999, Loan Amount: JPY 10.0 billion L/A No. VNIX-4, March 29, 2002, Loan Amount: JPY 3.359 billion Total JPY 18.859 billion
Executing Agency	Project Management Unit No. 85 (PMU85) under Ministry of Transport and Communications (MOT)
Consultant	Joint Venture of Nippon Koei Co., Ltd., Japan and Louis Berger International Inc., USA in association with Transport Engineering Design Incorporation (TEDI), Vietnam

2) Contract Packages

Contract Packages	Major Works	Sub Packages	Package Title	Contract Amount (M JPY)	
Consulting Services				1,969	Contracted
Package I	Tunnel Civil Works	Package IA	North Tunnel Section	4,696	Contracted
		Package IB	South Tunnel Section	2,864	Contracted
Package II	Road and Bridge Works	Package IIA	Lang Co Bridge Section	592	Contracted
		Package IIB	Southern Highway Section	511	Contracted
Package III	Electrical Works			2,482	Contracted
Package IV	Mechanical Works			2,810	Contracted
Package V	110/22kV Substation and 110kV Transmission Line			799	Contracted
Package VI	Procurement of Maintenance Vehicles			205	Contracted
Package VII	Infrastructure Development in the Resettlement Areas			49	Contracted
			Total	16,777	89%

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- **Introduction of Project**, Project Scale, JBIC Loan Conditions

Loan No.	VN - IV - 5	VN - VI - 5	VN - IX - 4
Date of Agreement	26-Mar-97	23-Jul-99	29-Mar-02
Agreed Loan Amount (JPY)	5.500 billion	10.000 billion	3.359 billion
Status	Closed 5.487 billion	On going	Not used yet
Interest (% / Year)	2.3%	1.7%	1.8%
Grace Period (Years)	10	10	10
Repayment Period (Years)	30	30	30
Start to Repayment	2007	2009	2012
Finish to Repayment	2036	2039	2041

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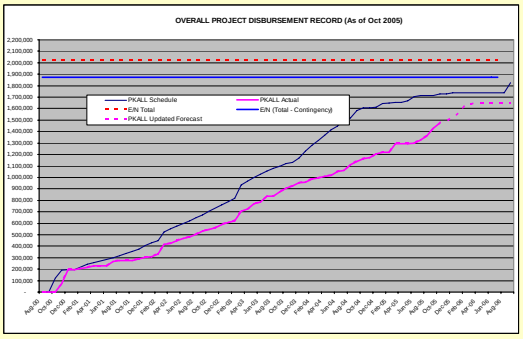
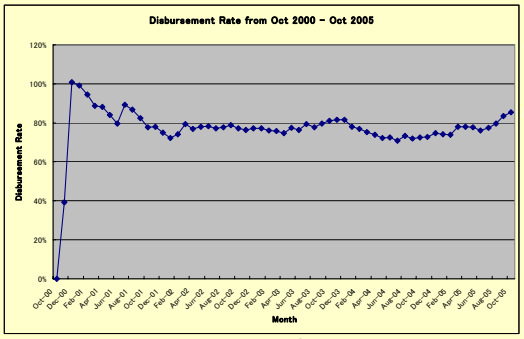
- **Introduction of Project**, Disbursement Record (As of Oct 2005)



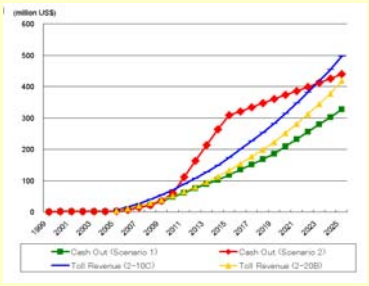
Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

- **Introduction of Project**, Disbursement Record (As of Oct 2005)



Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

- **Introduction of Project**, Project Cash Flow Analysis



Project Cash Flow Analysis (By Consultant)

Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

Works by the Contractors

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Tunnel Civil Works

Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

- **Works by the Contractors**, Tunnel Civil Works (1)

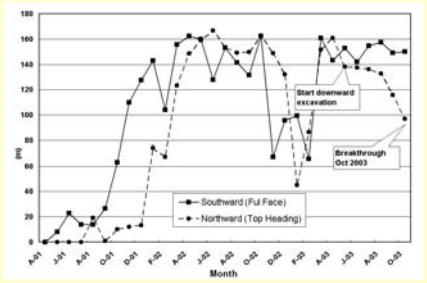
(m)

	PK1A (North)		PK1B (South)	
TYPE VI	39	1.01%	79.4	3.31%
TYPE V	36	0.94%	35.6	1.48%
TYPE IV	6	0.16%	41	1.71%
TYPE III	111.7	2.90%	170.2	7.10%
TYPE II	324.2	8.43%	753.8	31.44%
TYPE I	3328.9	86.56%	1317.825	54.96%
Subtotal	3845.8	100.00%	2397.825	100.00%
Cut & Cover	10		25.585	
TOTAL	3855.8		2423.41	

Tunnel Support Type

Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

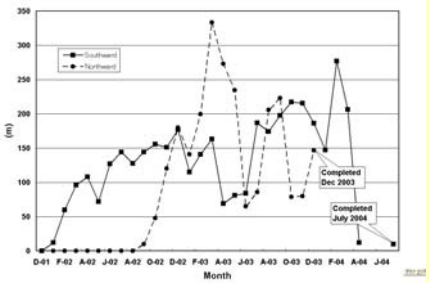
- **Works by the Contractors**, Tunnel Civil Works (2)



Tunnel Excavation Rate (Main Tunnel)

Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

- **Works by the Contractors**, Tunnel Civil Works (3)



Tunnel Concrete Lining Rate (Main Tunnel)

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- **Work Difficulties Encountered**

Water Hardship at Ventilation Tunnel

Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

- **Work Difficulties Encountered**

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Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

- **Work Difficulties Encountered**

Water Hardship at Ventilation Tunnel

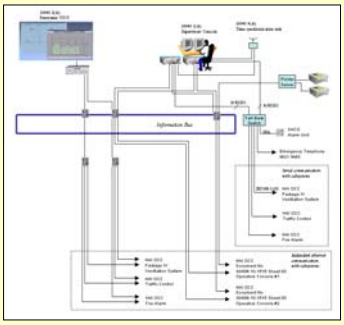
Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

Electrical Works

Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

- **Works by the Contractors**, Electrical Works, SCADA System

1) Power Distribution System
2) Tunnel Lighting System
3) Traffic Management System
4) Telecommunication System
5) Fire Detection System
6) Fire Protection System
7) CCTV System
8) Radio Rebroadcast System
9) Ventilation System



Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

- **Works by the Contractors**, Electrical Works, SCADA System

Operation Control Center

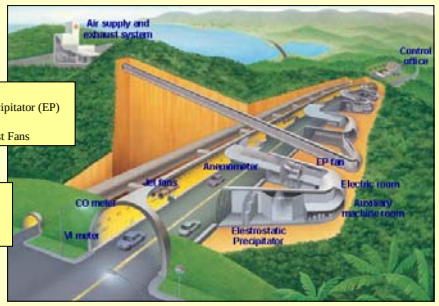
Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

Mechanical Works

- **Works by the Contractors**, Mechanical Works, Tunnel Ventilation System (1)

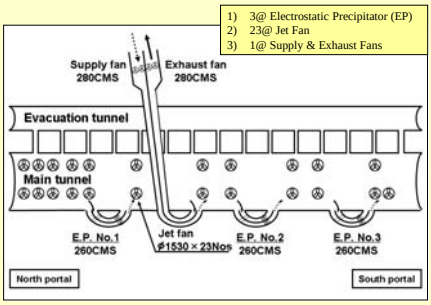
Ventilation Facilities
1) 3@ Electrostatic Precipitator (EP)
2) 23@ Jet Fan
3) 1@ Supply & Exhaust Fans

Ventilation Measurements
1) VI Meters
2) CO Meters
3) Anemometers



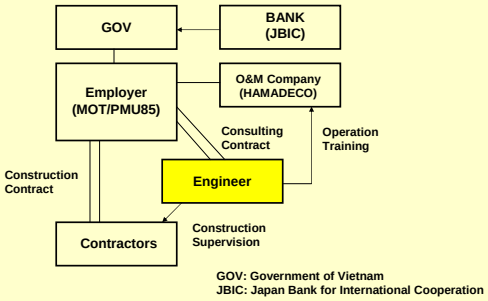
- **Works by the Contractors**, Mechanical Works, Tunnel Ventilation System (2)

1) 3@ Electrostatic Precipitator (EP)
2) 23@ Jet Fan
3) 1@ Supply & Exhaust Fans



Consulting Services

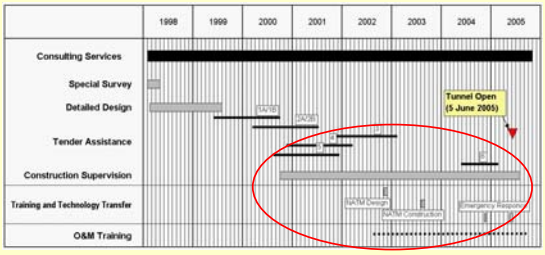
- **Introduction of Project**, Project Organizations



- Consulting Services

- **Special Survey**
- **Detailed Design**
- **Tendering Assistance**
- **Construction Supervision /Project Management**
- **Training and Technology Transfer**

- **Introduction of Project**, Implementation Program of Project



Project Management by the Consultant (Referred to PMBOK)

- FIDIC
- Project Human Resource Management
- Project Time Management
- Project Communication Management
- Summary

FIDIC

FIDIC (International Federation of Consulting Engineers) is widely used as conditions of contract for international construction contracts. http://fidic.org/

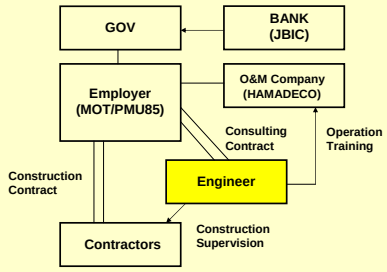
Contract Package	FIDIC Conditions of Contracts
Civil Works	Conditions of Contract for Works of Civil Engineering Construction, PART I GENERAL CONDITIONS, 4th Edition, 1987 (Red Book)
1A: Tunnel Civil Works, North Tunnel Section	
1B: Tunnel Civil Works, South Tunnel Section	
2A: Road and Bridge Works, Lang Co Bridge Section	
2B: Road and Bridge Works, Southern Highway Section	
Electrical and Mechanical Works	Conditions of Contract for Electrical and Mechanical Works, 3rd Edition, 1987 (Yellow Book)
3: Electrical Works	
4: Mechanical Works	
5: 110/22kV Substation and 110kV Transmission Line	

- Construction Supervision, General Condition of the Contract

Red Book for Civil Works

Yellow Book for Electrical and Mechanical Works

- Introduction of Project, Project Organizations



GOV: Government of Vietnam
JBIC: Japan Bank for International Cooperation

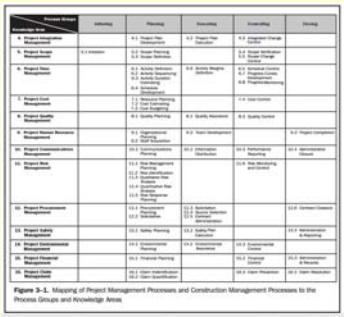
Human Resource Management

- **PM Practice (1): Human Resource Management**, Application of PMBOK, Construction Extension

The PMR has used the following PMBOKs for responsibility distribution to each team of the Consultant:

1)	*Construction Extension to A Guide to the Project Management Body of Knowledge (PMBOK® Guide) (PMI, 2003)*
2)	*A Guide to the Project Management Body of Knowledge (PMBOK® Guide) (PMI, 2000)*

- **PM Practice (1): Human Resource Management**, Application of PMBOK, Construction Extension



- **PM Practice (1): Human Resource Management**, Three Objectives for Project Management

The Project Manager (PMR) of the Consultant team is responsible for both the management of the Consultant Team and the overall project.

No.	Management Object
A	Consultant Team
B B-1 B-2	Project Overall Project Each Contract Package

- **PM Practice (1): Human Resource Management**, Three Objectives for Project Management

- **PM Practice (1): Human Resource Management**, RAM (Responsibility Assignment Matrix) for Consultant Team

Team / Knowledge Area	PMR	CT	RT	GEO	QS	OM	ADM
4. Project Integration Management	●	○					
5. Project Scope Management	●	○					
6. Project Time Management	●	○					
7. Project Cost Management	●						○
8. Project Quality Management	●	○	○	○	○	○	○
9. Project Human Resorce Management	●	○	○	○	○	○	○
10. Project Communication Management	●	○	○	○	○	○	○
11. Project Risk Management	●	○	○				
12. Project Procurment Management	●						○
13. Project Safety Management	●	○	○				
14. Project Environmental Management	●	○	○				○
15. Project Financial Management	●						○
16. Project Claim Management	●	○	○		○		

PMR: Project Manager, CT: Core Team, RT: Resident Team, GEO: Geotechnical Team
QS: Quantity Surveyor Team, OM: Operation and Maintenane Team, ADM: Administration Team

●: Primary Responsibility ○: Secondary Responsibility

- **PM Practice (1): Human Resource Management**, RAM for Overall Project and Each Contract Package

Team / Knowledge Area	Overall Project			Each Package		
	PMR	RE	Other	PMR	RE	Other
4. Project Integration Management	●	○		●	○	
5. Project Scope Management	●	○	QS	○	●	
6. Project Time Management	●	○		○	●	
7. Project Cost Management	●		QS		○	QS
8. Project Quality Management	●				●	GEO
9. Project Human Resorce Management	●	○		●	○	
10. Project Communication Management	●	○	ADM	○	●	ADM
11. Project Risk Management	●	○	QS	○	●	
12. Project Procurment Management	●		ADM	●	○	ADM
13. Project Safety Management	●	○		○	●	
14. Project Environmental Management	●	○		○	●	
15. Project Financial Management	●		QS	●	○	QS
16. Project Claim Management	●		QS	●	○	QS

PMR: Project Manager, RT: Resident Team, GEO: Geotechnical Team
QS: Quantity Surveyor Team, ADM: Administration Team

●: Primary Responsibility ○: Secondary Responsibility

Time Management

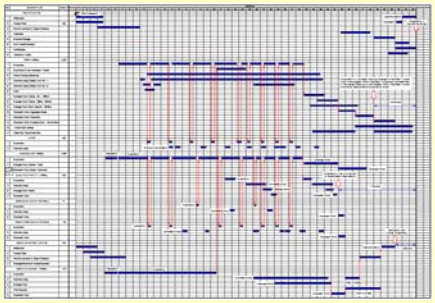
- **PM Practice (2): Time Management**, Project Milestone

No.	Milestone	Actual (Schedule)	Delay
1	Commencement of Each Contract Package	CP3 (Feb 2003), CP4 (Mar 2002)	
2	Tunnel Breakthrough	28 Oct 2003	4 months
3	Site Hand-Over from Tunnel Civil to Mechanical	Oct 2003 – Mar 2004	0.5 month
4	Site Hand-Over from Mechanical to Electrical	Nov - Dec 2004	0.5 month
5	Site Hand-Over from Tunnel Civil to Electrical	Nov 2003 – Aug 2004	0.5 month
6	Power Distribution from Electrical to Mechanical	Mar - April 2005	0.5 month
7	Commissioning of Each Facility	Apr - May 2005	0.5 month
8	Emergency Response Training	May – June 2005	0.5 month
9	**Tunnel Open**	**5 June 2005**	**0.5 month**

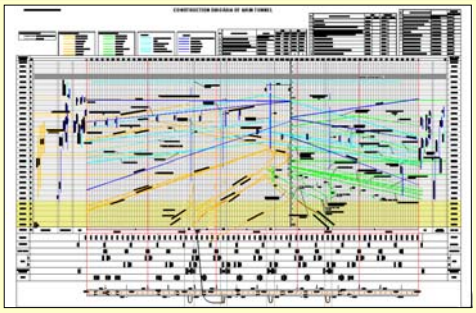
- **PM Practice (2): Time Management**, Diagram Type for Scheduling of Work Coordination

No.	Diagram Type	Tool	Work Zone Interval	Applied Period
0	Bar Chart	MS-Excel	No Work Zone	Tunnel Civil Contractors
1	Time:Chainage Program	AutoCAD	Approx. 1000 m	May 2003 – Oct 2003
2	CPM (BLP 1)	Primavera P3	Approx. 1000 m	Jun 2003 – Mar 2004
3	CPM (BLP 2)	Primavera P3	Approx. 400 m	Apr 2004 – Jan 2005
4	CPM (BLP 3) With Commissioning Schedule	Primavera P3	Approx. 400 m	Feb 2005 – To date
BLP: BaseLine Program				

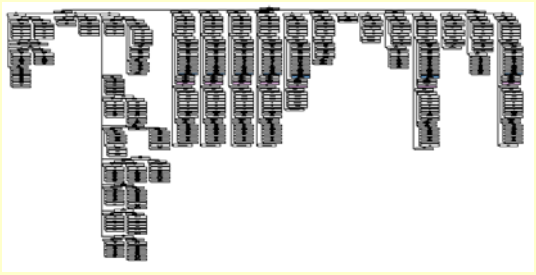
- **PM Practice (2): Time Management**, Diagram Type for Scheduling, Bar Chart



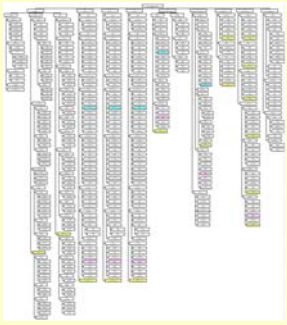
- **PM Practice (2): Time Management**, Diagram Type for Scheduling, Time: Chainage Program



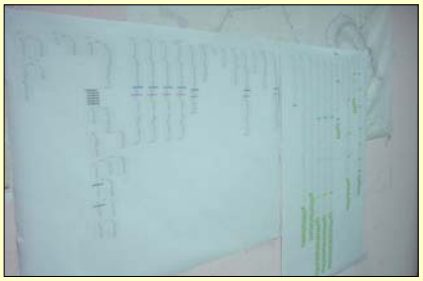
- **PM Practice (2): Time Management**, Diagram Type for Scheduling, Critical Path Method (CPM) Scheduling, WBS (1), Electrical Works



- **PM Practice (2): Time Management**, Diagram Type for Scheduling, CPM Scheduling, WBS (2), Mechanical Works



- **PM Practice (2): Time Management**, Diagram Type for Scheduling, CPM Scheduling, WBS (3)



Time Management
Monthly Tracking Report

- **PM Practice (2): Time Management**, Diagram Type for Scheduling, CPM Scheduling, Progress Tracking by Primavera P3

Monthly Activities

1) Consultant deliver CPM data of previous month to the Contractor (1~5th of each month)
2) Contractor submit CPM data (8~10th)
3) Consultant update tracking CPM (8~10th)
4) Monthly Progress Tracking Report (10th)
5) Report on weekly work coordination meeting with concerned contractors

- **PM Practice (2): Time Management**, Monthly Progress Tracking Report, Attachments: Primavera P3 Output, Detailed Progress Tracking Report

HAI VAN PASS TUNNEL PROJECT

Project Office in Danang, Vietnam
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Danang City, Vietnam
Tel.: (84-511-841824, -841825
Fax: (84-511-841826

Ref. No: PMU- 005 - 05
Date: January 10, 2005

To:
Mr. Nguyen Ngoc Canh, Project Manager, PMU85

Copy to:(Cover Only)
Mr. Nguyen Ngoc Tran, General Director, PMU85 038-834-705
PN1A, PN1B, PN3, PN4
1) RT1, 2) RT4, 3) File

SUBJECT: Submission of Progress Tracking (December 2004)

Dear Mr. Canh,

We are pleased to submit the progress tracking result based on BLP2a as of the end of December 2004. We applied Baseline Program No2 (BLP2) which has the following characters:

1) Detailed work schedule on the basis of working zone approximately 400 m intervals
2) All work linkages between related packages taken into account
3) Most probable work schedule as of 31 March 2004

1 General

During December, all electrical rooms were hand-over to PN3 from PN4. PN3 has started his installation works at all electrical rooms. Open works of NPP and SPP could not be completed because of rain.

- **PM Practice (2): Time Management**, Monthly Progress Tracking Report (2), Items Reported

1) General
2) Modification of Linkage and Duration
3) Input Data
4) Site Hand-Over Record (Between Contractors)
5) Forecasted Final Activity by BLP2a (TF=0)
6) Critical Activities by BLP2a (TF<30)
7) Energization Forecast
8) Points in January 2005

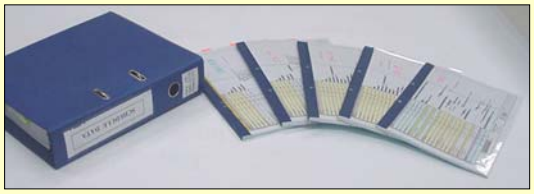
Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

- **PM Practice (2): Time Management**, Monthly Progress Tracking Report (3), Attachments: Primavera P3 Output

1) Overall progress of the project (summary)
2) Critical works (TF < 30 days)
3) Site Hand-over and Energization
4) Detailed output as of the end of December 2004.

Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

- **PM Practice (2): Time Management**, Monthly Progress Tracking Report, Attachments: Primavera P3 Output, Detailed Progress Tracking Report



Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

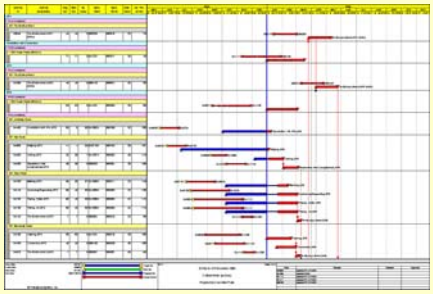
- **PM Practice (2): Time Management**, Diagram Type for Scheduling, CPM Scheduling, Progress Tracking by Primavera P3

Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

- **PM Practice (2): Time Management**, Monthly Progress Tracking Report, Attachments: Primavera P3 Output, Overall Progress

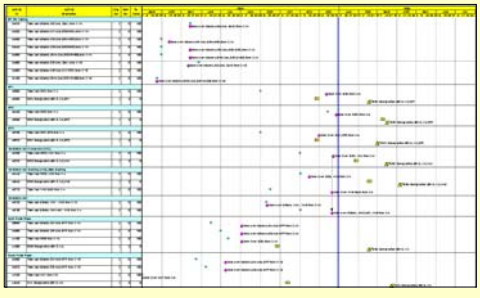
Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

- **PM Practice (2): Time Management**, Monthly Progress Tracking Report, Attachments: Primavera P3 Output, Critical Works (TF < 30 days)



Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

- **PM Practice (2): Time Management**, Monthly Progress Tracking Report, Attachments: Primavera P3 Output, Site Hand-over and Energization



Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

- **PM Practice (3): Communication Management**, POWEB, Public

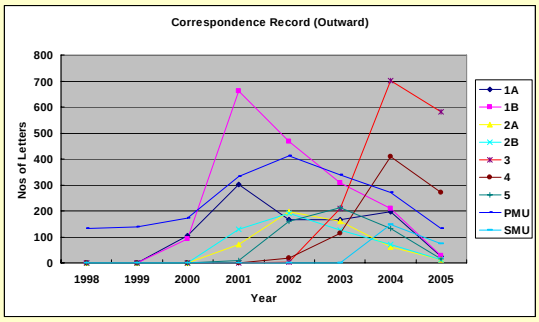
http://haivan.cadp.jp

Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

Communication Management

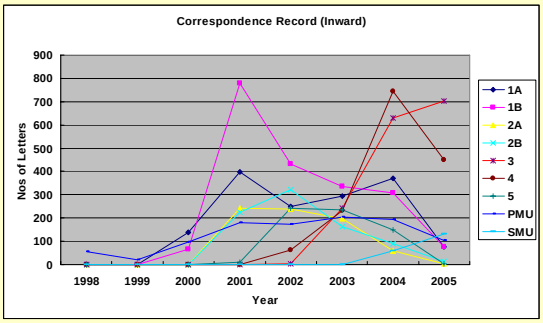
Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

- **PM Practice (3): Communication Management**, Correspondences



Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

- **PM Practice (3): Communication Management**, Correspondences



Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

- **PM Practice (3): Communication Management**, POWEB, Public

http://haivan.cadp.jp

Project Management by Consultant for Hai Van Tunnel Construction Project in Vietnam

- **PM Practice (3): Communication Management**, POWEB, Public

http://haivan-photo.cadp.jp

- **PM Practice (3): Communication Management**, POWEB, Public

http://haivan.cup.com

- **PM Practice (3): Communication Management**, POWEB, **Project-Coordination**

Summary of Project Management

- **PM Practice: Summary**

Keys to Successful Project Management

1. **Understanding of 13 PM Areas and Its Status in the Project**
2. **Communication Management with Clear Responsibility Assignment Matrix (RAM)**
3. **Time Management with Appropriate Depth of Work Breakdown Structure (WBS)**
4. **Utilization of Web, as Communication Tools, in Project Management Office (PMO)**

Tunnel Traffic Opening Ceremony On 5 June 2005

- **Tunnel Opening Ceremony (5 June 2005)**

Thank you !

Ichizuru Ishimoto
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+81-3-5276-7670