Case Study on the Construction Management for Yeosu Expo 2012, Korea

Contents

PREFACE

Understanding

EXPOSITION

One-time Mega-Event

One of Big 3 World Wide Events(Olympic, Worldcup)

Time and Location decided in General Meeting of BIE

BIE (Bureau International des Exposition)

Founded by 43 countries in 1928 and currently has 167 member countries
Supported by the fee from member countries

PREFACE

Classification

	World EXPO	International EXPO
Category	• Registered EXPO	• Recognized EXPO
Period	• 5 years(or 10 years)	• Between World EXPO Events
Duration	• 6 months	• 3 months
Participants	• Countries, International & Social Organization, Enterprises	
Theme	• Common, Universal Interesting	• Specific Theme
Site Area	• Unlimited	• Within 25ha
Host City	• City to accelerate Urban /Economic reconstruction	• City to accelerate growth with hosting international events

Change of EXPO Legacy

EXPO Legacy

Early EXPO (1851~1930)

- Dignity of Host City
- Monumental Building
- Tech. / National Power

Modern EXPO (1930~1989)

- Urban Development Strategy
- Test Bed for Urban Engineering
- Construction of EXPO Complex

Contemporary EXPO (1990~)

- Universal Common Interests
- Post-use & Urban Restoration
- Marketing for Host City

Four Strategies for Successful Preparation of Yeosu EXPO

- Green EXPO
- Ubiquitous EXPO
- Design EXPO
- Culture EXPO

Brief History of Yeosu EXPO(per Government)

Decision of hosting EXPO & Location
('98.03, DaeJung Kim Government)

Prelim. FS & Confirmation of Site Location
('05 ~ '07.11, MooHyun Roh Government)

General Master Plan / Special Support Act / Organization of Committee / Opening EXPO ('08 ~ '12, MyungBak Lee Government)

Post-Use Plan('13.02~, GeunHye Park Government)

Numbers of Yeosu EXPO

Total Manpower for Construction : 230,000 Nos.

Max. Daily Manpower : 5,200 Nos.

Max. Daily Manpower for single project : 2,500 Nos.(Int'l Pavilion)

Employment Inducement Effect : 78,833 Nos.

Total Budget : 2.1 trillion KRW

(Facilities : 1.8 trillion KRW/Operation : 307 billion KRW)

Production Inducement Effect : 12 trillion KRW

Added Value : 5.7 trillion KRW

1. PROJECT DESCRIPTION

1. Project Summary and Schedule
2. CM Service

1.1 Project Summary and Schedule

Main Theme of 2012 Yeosu EXPO
"The Living Ocean and Coast"

Project Summary

- EXPO Duration : 2012. 05.12 ~ 08.12 (93 days)
- Location : Yeosu New Ports Areas, Jeolanamdo
- Site Areas : 1,740,000 m² (EXPO Site : 250,000m²)
- Number of Countries : 100 Nos.
- Number of Visitors : 8,000,000 (86,000/day)

CATEGORY	CONTENTS
Them Development	"Living Ocean & Coast" is to create Green growth through Wise Utilization and Preservation of Sea under the consideration of co-existence of Sea & human being
Strategic Target	Creating New Sea green growth(Blue Economy) in 21st century realizes the 4th jumping up in the country & the 4th wave to the all mankind
Exhibition	Imagining and featuring 'Meeting future sea and human being in 2050'

1.1 Project Summary and Schedule

1.1 Project Summary and Schedule

Facilities

CATEGORY	CONTENTS
Big-O	Purification of contaminated sea(Exhibition Facilities, Maintenance of current shoreline)
Int'l Pavilion	Exhibition space for 100 Countries (G.F.A : 132,636㎡, B1F/4F)
EXPO Town	Environment-Friendly Model / Test bed for Green Home Project / Ocean Theme Leisure Pension and High Quality Residence after EXPO
Energy Park	New renewable energy Facility / Low-carbon EXPO & Green Technology Site
Theme Pavilion	High Tech Theater(3D/4D) with subject of Birth and Evolution of Life / Crisis & Conflict among Ocean & Human Being / New Coexistence of Ocean and Human Being (G.F.A : 6,000㎡, 1,800 spectators)
Korean Pavilion	Message for Main Theme / Expression of Vision and Role of Korea (G.F.A. : 5,000㎡, 1,300 spectators)
Other Pavilions	Climate & Environment Pavilion, Marine civilization and city Pavilion, Marine industry and technology, Marine life, International organization and NGO Pavilion, Enterprise Pavilion, Local government Pavilion, Cruise terminal and etc.

1.2 CM Service

CM Scope

- Project Title: Construction Management Service for 2012 YEOSU EXPO Construction
- Owner : Organization Committee of 2012 YEOSU EXPO
- Project Summary of YEOSU EXPO 2012 Project
  - Location : Sujeong-dong, Deokchung-dong Area, Yeosu, Jeolanamdo
  - Site Area : 768,865 ㎡
  - Main Facilities : Building Works including Pavilions, Civil Works including Big-O
  - Construction Budget : 721 billion KRW (Projects for CM Service)
  - Projects for CM Service are listed in the table of next two pages.

1.2 CM Service

Projects for CM Service

Category		DURATION	AREA	Budget(million KRW)	
TOTAL				721,054	
Building Works	Theme Pavilion(incl. Exhibition)	'09~'11	6,000 ㎡	67,600	460,759
	Korean Pavilion(incl. Exhibition)	'09~'11	5,000 ㎡	32,333	
	Sub-theme Pavilion(incl. Exhibition)	'09~'11	7,500 ㎡	31,410	
	International Pavilion	'09~'11	71,700 ㎡	133,200	
	Int'l Organization /NGO Pavilion	'09~'11	2,000 ㎡	4,100	
	Enterprise Pavilion	'09~'11	6,800 ㎡	13,800	
	Local Government Pavilion	'09~'11	2,200 ㎡	10,010	
	Sky Tower	'09~'11	3,700 ㎡	16,373	
	Multi-purpose Hall	'09~'11	10,500 ㎡	18,500	
	Ocean Tower	'09~'11	1Each	37,400	
	EXPO Organization Committee Office	'09~'11	7,000 ㎡	15,881	
	Support Facilities	'09~'11		41,411	
	Commercial Facilities	'09~'11		22,234	
	Convenience Facilities	'09~'11		2,647	
	Others	'09~'11		13,860	

1.2 CM Service

Projects for CM Service

Category		DURATION	AREA	Budget(million KRW)	
TOTAL				721,054	
External Works	Landscaping	'09~'11	149,204 ㎡	55,161	260,295
	Tram	'09~'11	5,000 m	20,000	
	BIG-O	'09~'11	1Each	75,200	
	New Renewable Energy Facilities	'09~'11	1Each	18,000	
	Transit Car Park Area	'09~'11	440,400 ㎡	31,489	
	Others	'09~'11		60,445	

※ EXPO town, Aquarium, Condominium are excluded from work scope of CM service.
Design Management of PFI projects of Aquarium, Condominium are included.

1.2 CM Service

CM Service Summary

- Scope of Service : Construction Management Service in Pre-design, Design, Construction(includes Site Supervision) , Post-Construction Phases
- Service Fee : 17,389 million KRW
- Service Period : 2009. 2 ~ 2012. 5 (40 months)

2. CM SCOPE OF SERVICE

1. Scope Summary
2. Service Scope and Process
3. CM Organization
4. Main Services
5. Complexity of the Project
6. Customer Service

2.1 Scope Summary

Service Title : CM Service for 2012 Yeosu EXPO Project
Service Period : 2009.02 ~ 2012.10 (45 months)

Service Summary

1) Construction management service for Yeosu EXPO project from project inception to completion to manage time, cost, scope and quality defined by the related Acts.
   (1) Work scope of CM (Construction Technology Management Act)
   (2) Design management and design review (Construction Technology Management Act)
   (3) Site Supervision by Law (Construction Technology Management Act)
2) Management of time, cost, design, change order, progress payment, quality, safety, claim, construction information, PMIS for pre-design, design, construction, post-construction stage.
3) Design management, construction management, supporting commissioning in consideration of specialties of the project
4) Additional Services requested by Owner
5) Standard Service Scope by the Construction Management Association of Korea

2.2 Service Scope and Process

Based on Concept of Program(Multi-Projects) Management Actual Management Process by CM service of CMAA

CM Service of CMAA

5 Phases

- Pre-design Phase
- Design Phase
- Procurement Phase
- Construction Phase
- Post Construction Phase

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6 Functions

- Project Management
- Cost Management
- Time Management
- Quality Management
- Contract Management
- Safety Management

2.2 Service Scope and Process

Service by Agreement & Regulation/Instruction + Additional Service Required by the Owner

CM Process

2.3 CM Organization

2.4 Main Services

PMIS

Difficulties in Establishment of PMIS

1. • Lack of required Modules
2. • Less Understanding in Precon. Phase
3. • Big Data Process (Upload)
4. • Time Management System
5. • No System Integration with ERP system of the Owner : Low Efficiency

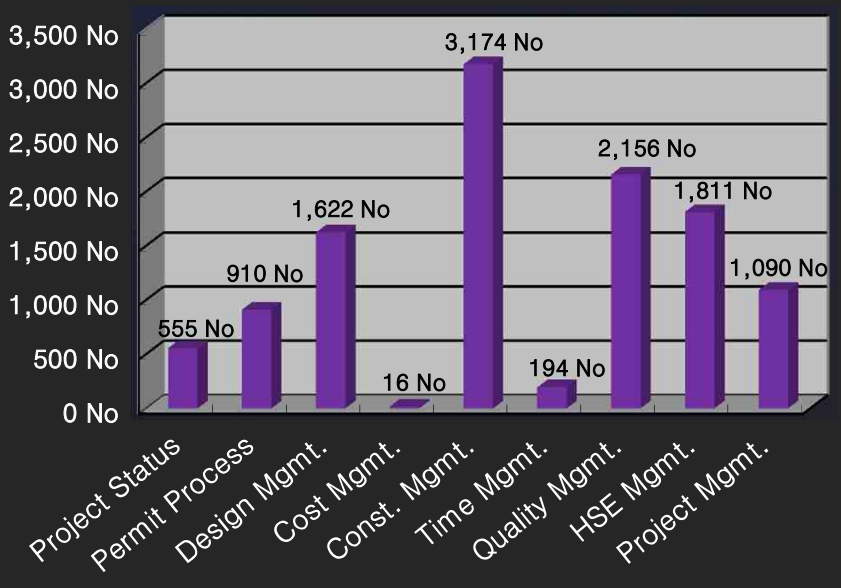
Difficulties in Operation of PMIS

1. • Hard to Change/Insert Modules → Confusion and Time Limit
2. • Indifference
3. • Partial Use(e-mail, web hard, etc)
4. • Uploading Capacity Constraint
5. • Low Efficiency
6. • Less Understanding : Double Admin. works (on-line & off-line)

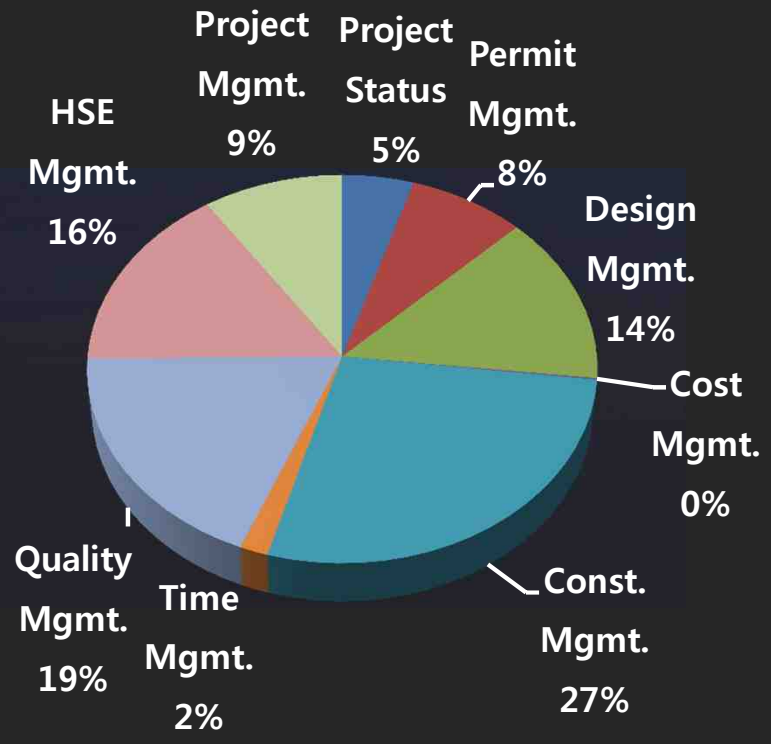
2.4 Main Services

Status of PMIS Use

No. of use per PMIS Module (No.)



Percent age(%) Ratio per PMIS Module



2.4 Main Services

Quality

- Object : Zero-Defect Design , Minimum Interface, Dust Free, Barrier Free EXPO Site
- Planning Phase : Total 250 cases of Technical Review and Detailed Plan
- Design Phase : Total 2,045 cases of Technical Review & Analysis
- Construction Phase : Construction Management for whole period (Site Supervision)

Cost

- Budget Review for each contract Package
- Optimum Delivery Method by the characteristics of each contract Package
- Value Engineering: Total 148 No.s alternative proposal and Selection of 103 No.s
  (920 million KRW of Cost Savings and 10.8 billion KRW of value upgrade)
- Savings by Cost Review (7 Exhibition Projects/ 1.48 billion KRW of savings)

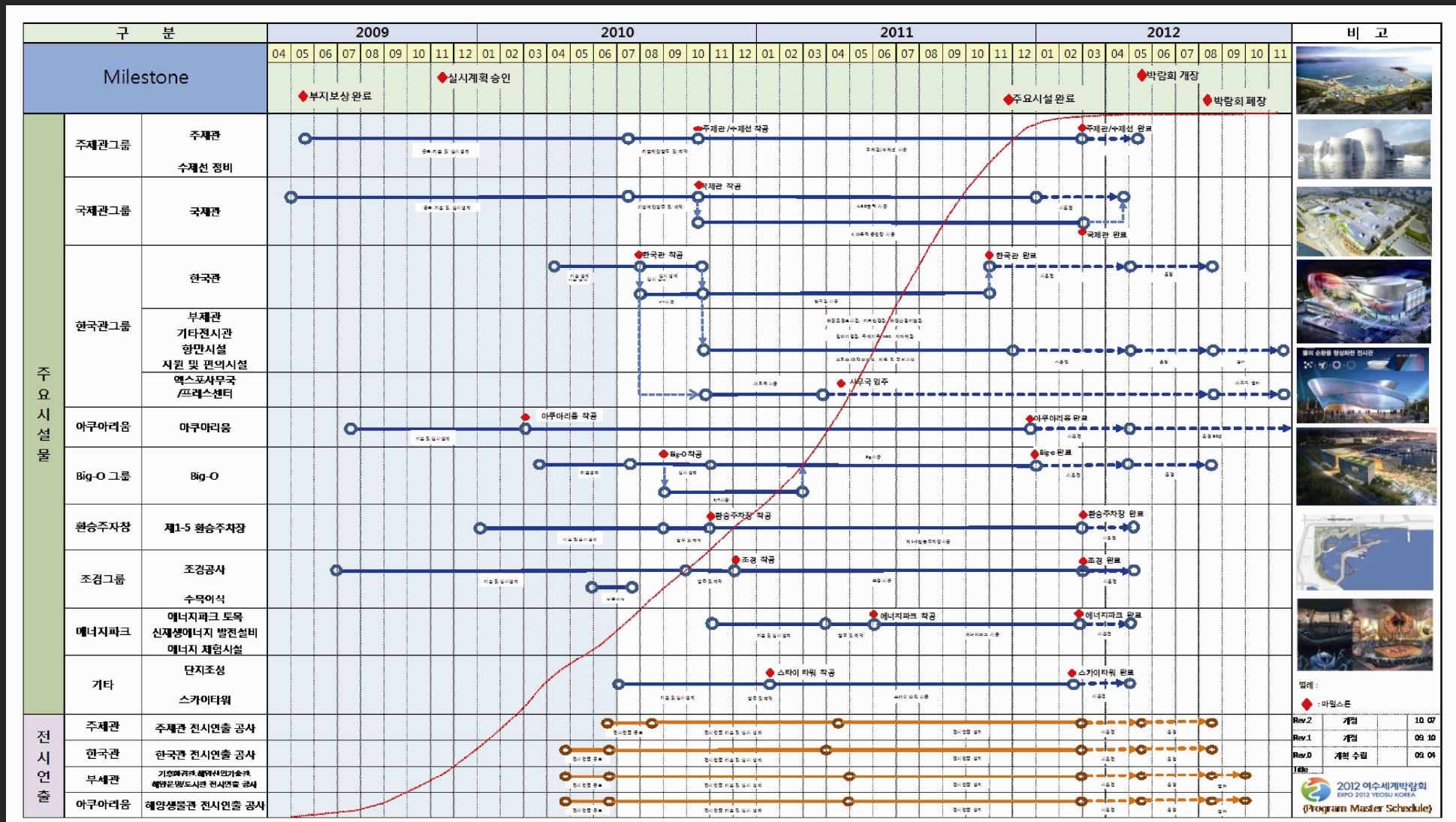
2.4 Main Services

Time

- Complicated and Various Projects / Delay in Decision Making by Stakeholders
- Selecting Qualified General Contractors / Strategy to shorten Lead Time & Lag Time
- Minimizing unnecessary time-consuming and keeping Target Date
- Site Managers Committee by CM → Proactive Action for potential problems
- Reliable Progress Assessment Index and Management Plan
- Integrated Management for the entire Projects
- Early Completion for Preparation of the EXPO opening

2.4 Main Services

Time(Master Schedule)



2.5 Complexity of the Project

Characteristic of each Item

Item	Issue
Budget	• Type, size, structure, location, on land/off seashore, permanent/temporary, post-use of each facility.
Design Selection	• Public offering of idea, design competition, design build.
Theme Embodiment	• Visitor's Experience enlargement for Theme embodiment.
Design Guideline	• Method and composition of Exhibition, international participants, concept of theme, permanent/temporary exhibition.
Design Management	• Joint venture of local/foreign Architects in Design, Joint/indipendent Design each field
Permits & Approvals	• Effect evaluation on environment, Coast utilization committee, Coast reclamation Permit, Investigation of fossils, Geotechical investigation
Traffic Control	• Transit car parks. Traffic load analysis of No.17 Road, location of stops of Airport Bus, tourism Bus, shuttle Bus.
Post Use Plan	• Main related facilities of various types

2.5 Complexity of the Project

Bidding Procedure/Project delivery Method

- Over 20 contract packages
- Consideration of project schedule
- Discussing delivery method by package
- Top priority for successful hosting of Expo

Item	Description
Designer Selection	Public offering of idea, Design Build, Design Bid Build method, Tech Proposals.
Contractor Selection	Design Build, Design Bid Build method, Tech Proposals, Lowest Bid, Negotiation by proposal and etc.

2.5 Complexity of the Project

Process of project in complex

- Diversity of Project
- Fast track in Design Build contract
- Various participants & complicated process

Item	Description
Site Development	– Removal of obstacles & existing structures. – Constructing Infrastructure on site.
Design–Bid–Build	– Finalizing/Proceeding Design – Initiation of the works.
Design–Build	– Fast track method

2.5 Complexity of the Project

Temporary Facilities

- Various participants resulting from diverse delivery method
- Different construction starting time of projects and restricted site condition
- Comprehensive review and operation of temporary facilities for the permanent work

Item	Description
Temporary Office	Briefing Room, CM office, contractor's office
Other Temporary Facilities	Site Entrance, Security Fence, Site Enclosure, Temp roads. Car washing M/C, Dust proof barrier, silt protector

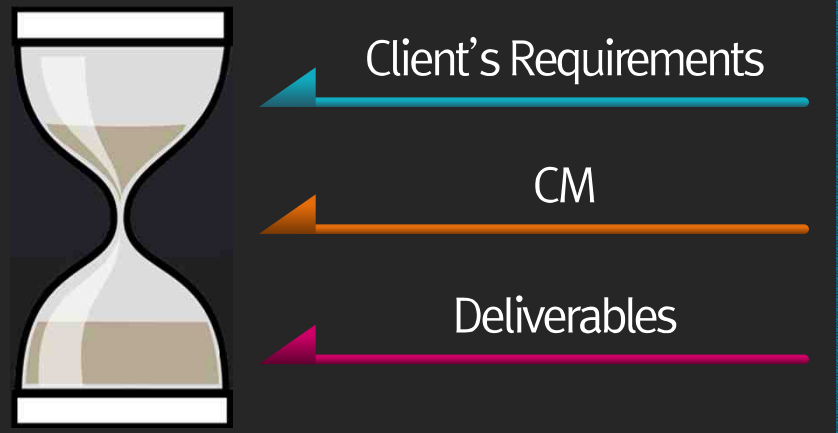
2.6 Customer Service

Coordination of various stake holders

- Expo organizing committee : Mainly composed with national & local government officers and citizens
- Design phase : 230 people form 7 divisions, 37 sections
- Expo Period: 450 people from 10 divisions, 48 sections
- Complicated decision making system : repeated inefficiency
- Clear division of duties and using effective communication tool / expert's advice / speedy settlement

Division of works

CM's Role



3. MAIN ACHIEVEMENT

1. Particular Problems and Solutions

3.1 Particular Problems and Solutions

Achievement of PM Team

Achieving Effect of partnering(Owner+CMr+Contractors)

- Saving decision making time and cost
- Pre-review of controversial issues and finalizing design: conclusions at the participant's meeting

Strengthening MP (Master Plan Group) function

- Perform decision making with performing beyond MP's function

Establishing Action Plan

- Finalize items not decided in the design phase and establish action plan

3.1 Particular Problems and Solutions

Achievement of PM Team

Coordination	• Controversial issues • Omitted items in responsibility assignment of Organizing Committee's team • Conflict issues in design phase
Action Plan	• Uncertain items in design process • Settle on the items not decided. • Establishing action plan.
Operation Period	• First stage ('10.08~'11.04): Coordination + Action Plan • Second stage('11.04~'11.07): Assessment of progress status and pressure delayed jobs

3.1 Particular Problems and Solutions

Bidding Stage

Misunderstanding of Bidding Procedure by Consultative Committee

[illegible] Needless waste of time in review of adaptability of design competition.

Delay in decision making

- Delay of Big O bidding resulted from continuous decision changes

Abuse of consultative opinion in Technical Proposal bidding

- Participants'disadvantages resulting from abuse of client's authority
- Excessive expansion of work scope

3.1 Particular Problems and Solutions

Encouraging site development project/ Comprehensive planning and management of temporary work

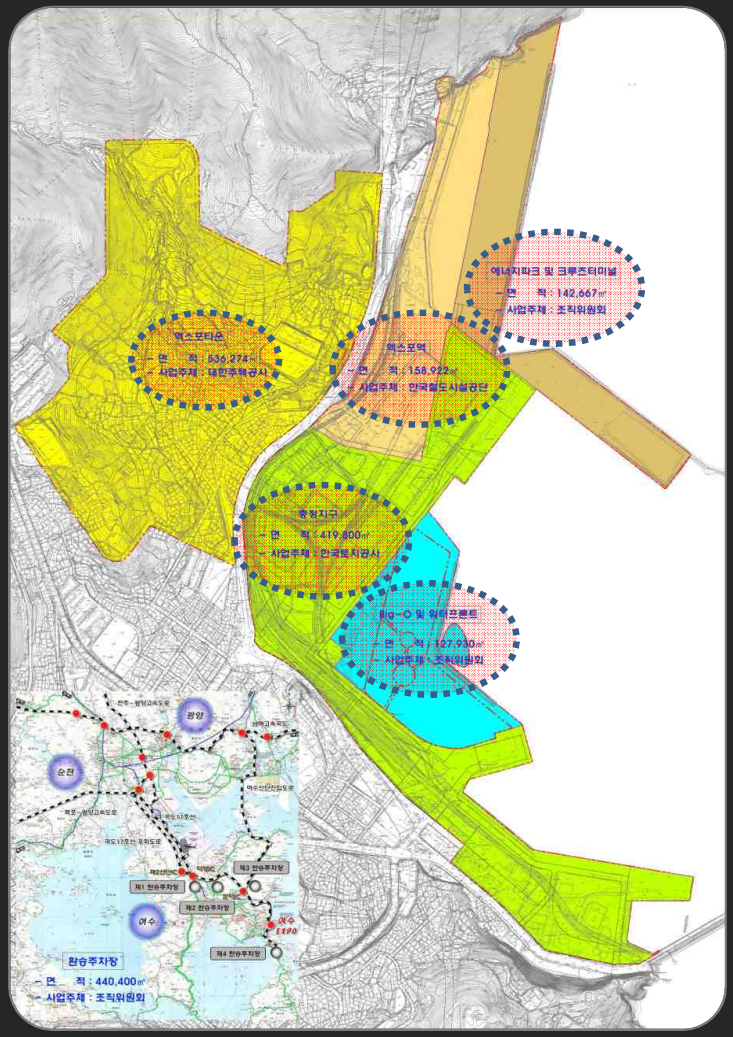
Interface Management

Interface between Site Development Project & EXPO Project

- Site landscaping works were interupted & delayed 6 months due to delayed handover of the Site until Aug. 2011.
- As the site condition did not allow any temporary roads, temporary workshop space due to coinstantaneous procedure of other works; Site Development works were inevitably interupted with other works; Building works & Site landscacping work.

3.1 Particular Problems in Solutions

Ownership per Site



Site	Owner	Area
EXPO Town	LH Corp.	536,274㎡
EXPO Station	Korea Railway Corp.	158,922㎡
Energy Park & Cruise Terminal	EXPO Organizing Committee	142,667㎡
EXPO Site	E.O.C(work by LH Corp.)	419,800㎡
Big-O & Water front	E.O.C.	127,930㎡
Transit Car Park	E.O.C.	1,570,000㎡

3.1 Particular Problems and Solutions

Interface Management

Adjusting FH of Big-O & Off Show site level

- Features of FH on & off shore site level differ by 1.802m due to tide level value in each design.

Interface between Site Dev. Works and sea shoreline Remodeling Works

- Some vacant land were left void 1.8m wide, 180m long along the perimeter of sea shoreline & landscape's site without any definite reason at the construction Phase.

Interface of the Site Development Works and the entrance of BF Car Park, Internal Pavilion.

- Adjusted FH of road Pavement at the entrance of basement Car Park of Internal Pavilion.

3.1 Particular Problems and Solutions

Interface Management

Level control between pedestrian and vehicle road of the site

- Barrier-free space: adjust curb stone under 5cm in all EXPO site

Unmatch in Infrastructure between Site delopment works and the Building works

- Water supply, sewarage lines and etc.

Interface Culture Event Facilities and the existing shoreline facility

- Floating stage for Culture Event were added on Big-O sea area in addition to the formerly formed floating stage similar in shape and features, thus duplicated investment took place in one site.

4. OTHER SPECIALTIES

1. Management of Remote & Complex Sites
2. Suggestion

4.1 How to manage remote & complex sites

Thorough planning and preparation before starting CM service

- Risk 01 — HR management Difficulty
- Risk 02 — Low Efficiency
- Risk 03 — Communication Problem

4.1 How to manage remote & complex sites

Human Resources Management Plan

- Management of multiple facility groups with various types is needed. (building purpose, contract period)
- Human Resources Allocation plan based on career of each personnel vs characteristics of projects

Site joint committee

- Discuss & control Interface by all the related participants
- Establishing partnership with the participation of all the related participants.

4.1 How to manage remote & complex sites

Temporary facility management plan

- Operation of central supervision office: confusion resulting from various types and multiple contractors.
- Administrative delays are expected if supervisor's offices are operated separately.
- An integrated mgmt of temporary facility is needed because multiple contractors are mixed in one site.

Integrated situation room (War room/briefing room)

- Realtime monitoring and maintenance of construction progress status
- Management of Expected Risks
- Maintain visual site status

4.1 How to manage remote & complex sites

Web-based Management System

- PMIS(Project Management Information System) to share real-time information.
- Web camera for real-time monitoring of work and safety activities on site.
- Remote Monitoring System for web-based real-time measurement of temporary earth retention system & pile driving.
- Video Teleconference: Improvement of communication, productivity improvement, reduction of problem solving time, reduction of IT support, reduction of CO2 emissions are expected by Video Teleconference.

Mobile-based project management system

- Fundamental change of using information and communication method
- Quick decision making and to meet diversified client's needs efficiently.
- MCMS(Mobile Construction Management System) developed by Heerim enables mobile-based real-time management from a long distance.

4.1 How to manage remote & complex sites

Periodical Joint Site Inspection:

- Interface management by regular joint inspection attended by all job site related participants.
- Thorough review and management of multiple contracts focusing on collisions, omissions and interference items between multple contracts.
- Prompt on-site mediation and settlement of conflicts between the multiple projects.
- Follow-up system by mediation meeting by the issues: tracking management of problem solving

4.1 How to manage remote & complex sites

Conclusion

Prepare suitable Human Resources Management Plan

+

Change work style Work Hard to Work Smart based on IT techology

+

Mix use of advanced and conventional management style

=

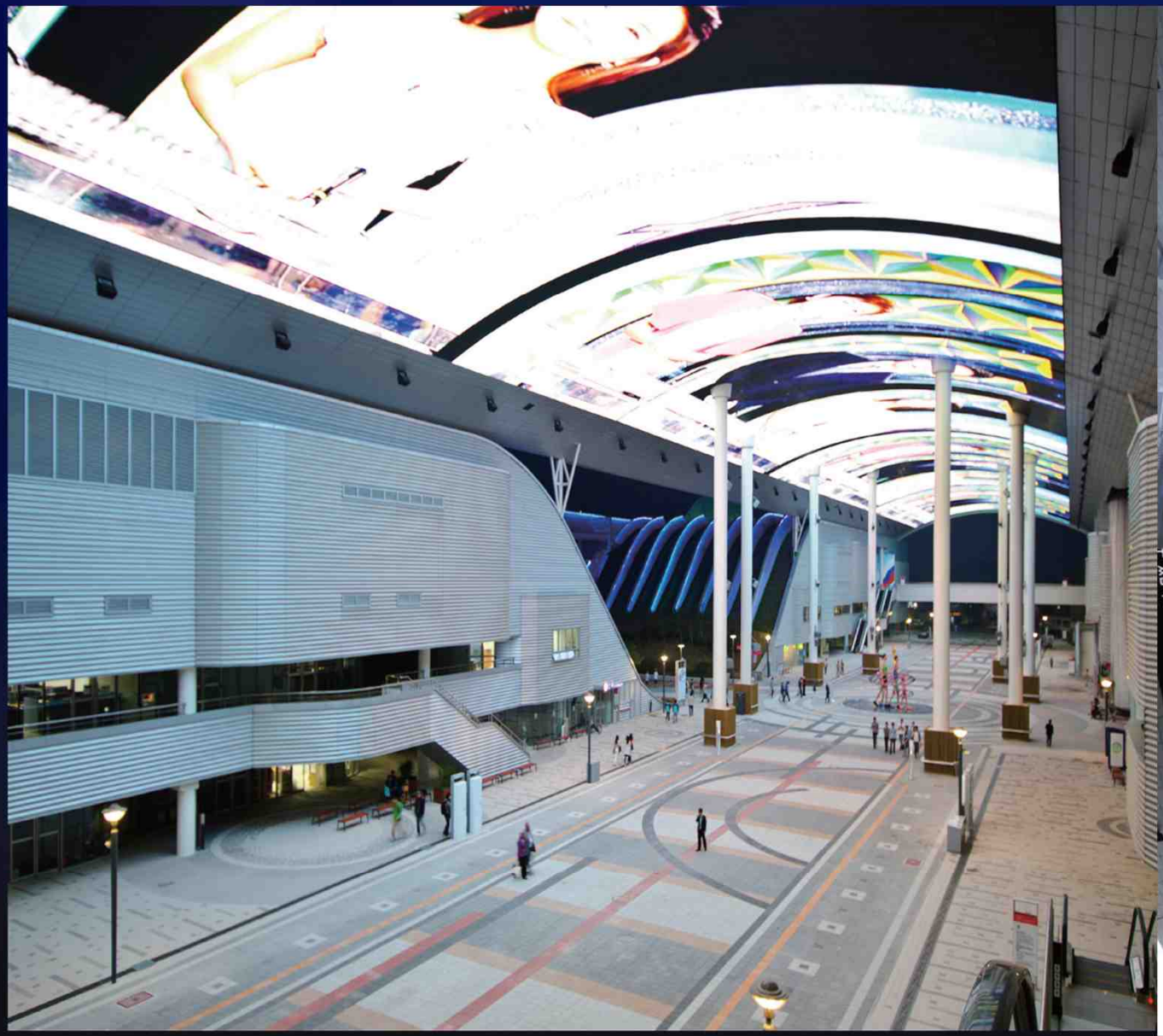
Effective management for remote & complex sites

4.2 Suggestion

How to manage Large, remote & complex sites better

Solution 01	• Partnership and leadership are necessary
Solution 02	• Systematic management of risk factors(pressure point) from the planning stage and prior education for the interested parties are necessary.
Solution 03	• Proper HR allocation planning, Building up communication management system for the quick decision making and rational division of duties.
Solution 04	• Define work scope of task clearly and establish suitable project delivery system.
Solution 05	• Stipulate application of the avanced IT and advantages of conventional management skills


EXPO HALL

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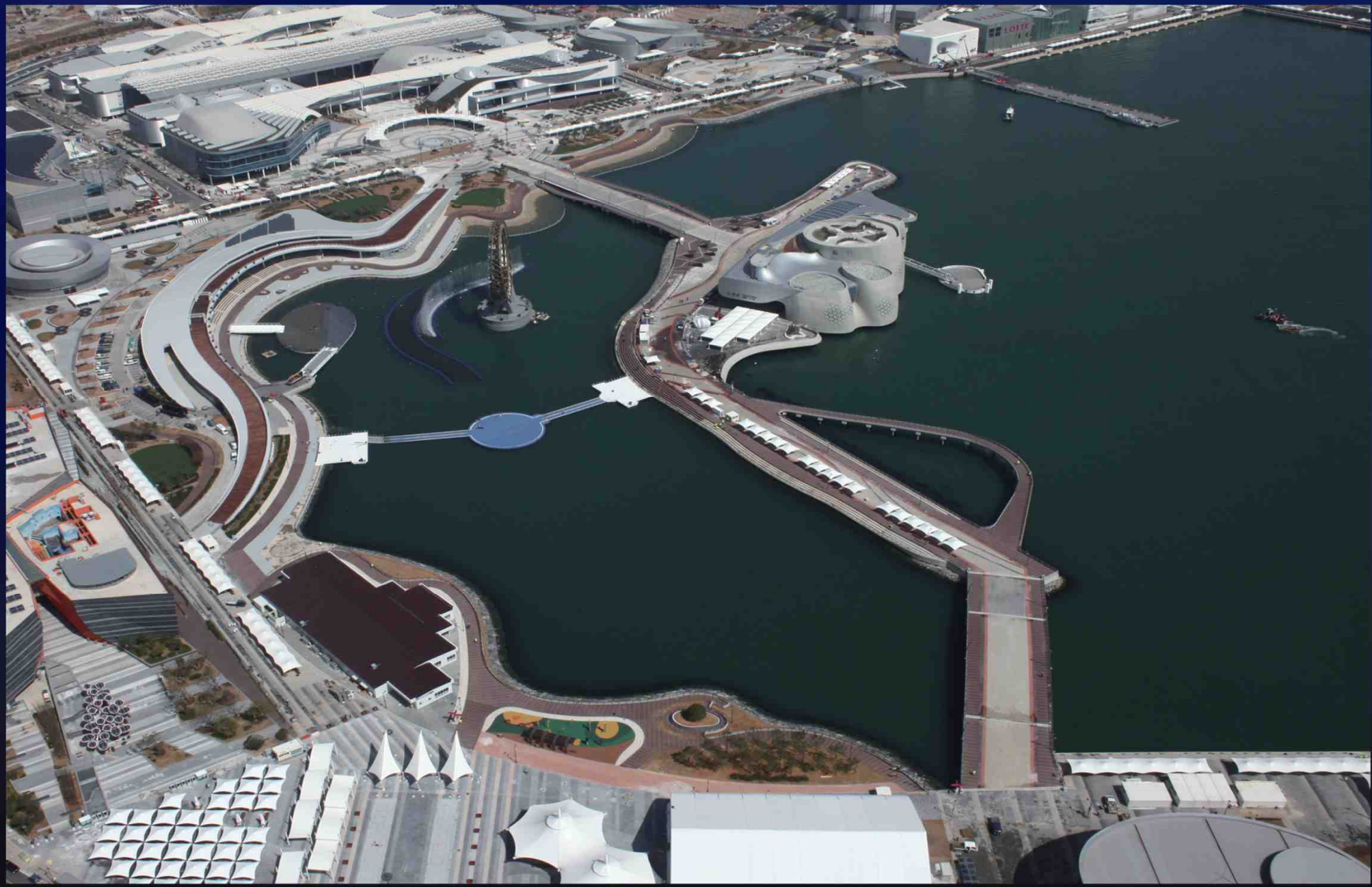
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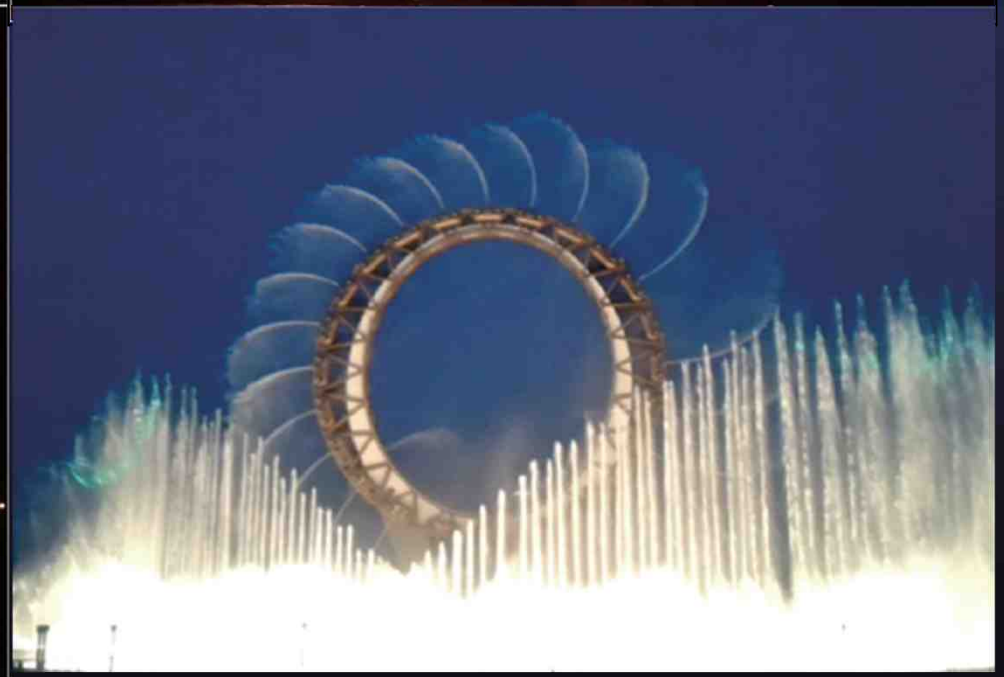

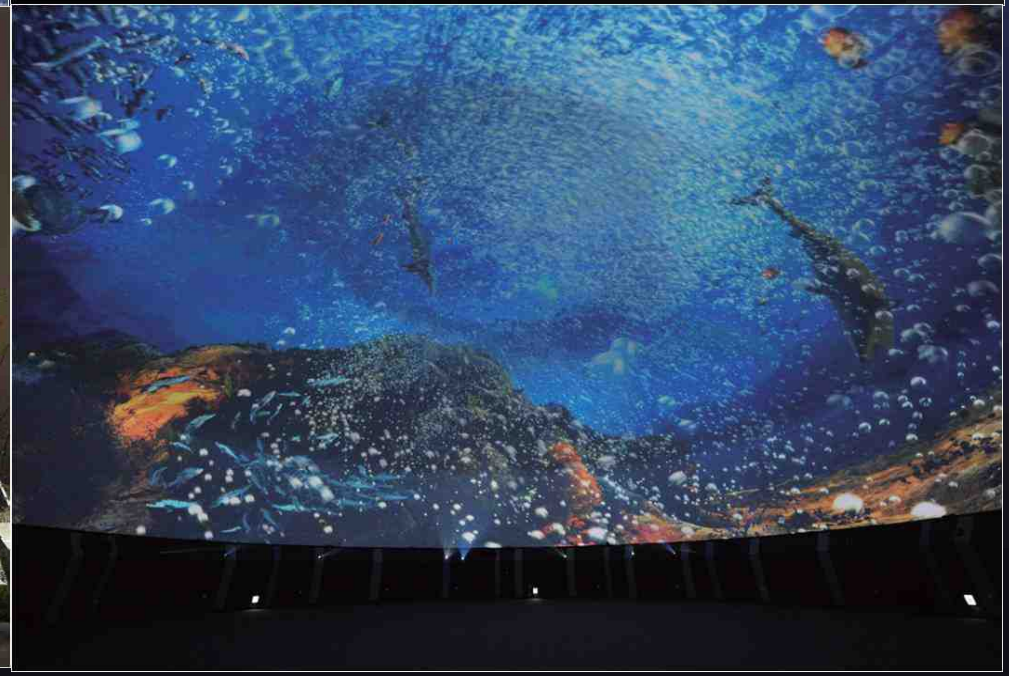

Thank you for your attention.

?QUESTIONS AND ANSWERS