

The future of IIA starts with our hands.



Construction Management of Incheon International Airport

March 2016

Construction Division of IIAC





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An aerial architectural rendering of the Incheon International Airport Phase III construction project. The image shows a large, modern terminal building with a distinctive, flowing, white roof structure. The terminal is surrounded by a landscaped area with green lawns, trees, and winding paths. To the left of the terminal, there is a large parking lot filled with numerous cars. Further to the left, a large tarmac area is visible with several aircraft parked at gates. In the background, the airport's runways and taxiways are visible, extending into the distance. The overall scene is presented in a realistic, high-quality rendering style.

I. Overview of Phase III Construction Project

1.1 Background to the Phase III Construction Project

I. Overview of Phase III

Explosive Growth in Demand for air travel



Major IIA facilities will not accommodate Demand before and after 2017.

Competition for the Hub Airport of Northeast Asia



Timely investment in facilities is required to lead the aviation market in the future.

PyeongChang 2018 Winter Olympics



The Project will enable successful hosting of a national event, the Olympics.

Need to Complete the Phase III Construction by 2017

1.2 IIA Construction Plan at Each Phase

I. Overview of Phase III

INCHEON INTERNATIONAL AIRPORT SITE PLAN

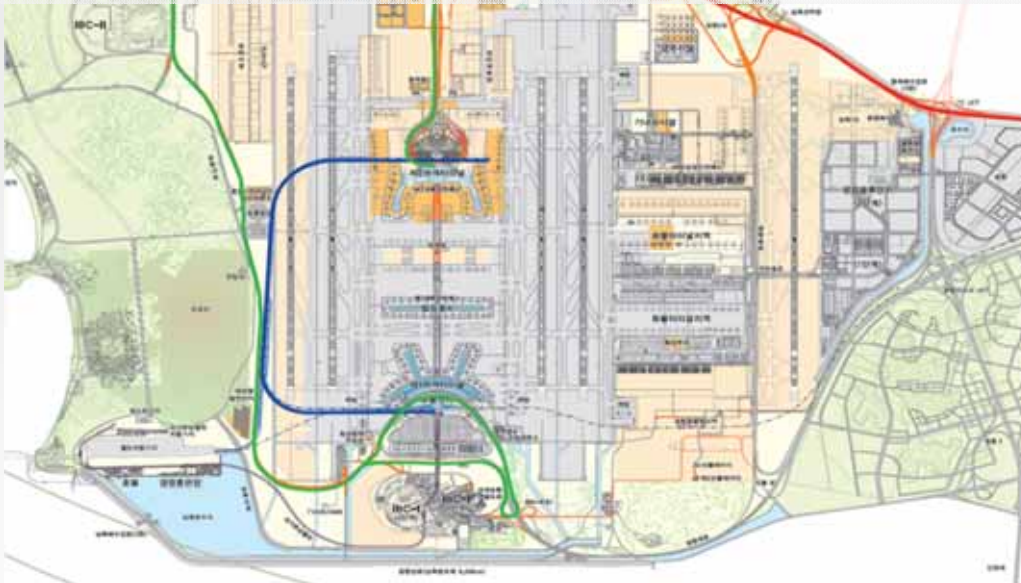


Classification		Phase I	Phase II	Phase III	Final Phase
Runway		2	1	-	5
Passenger Terminal	T1	496,000m ²	Expansion of Internal Facilities	-	496,000m ²
	T2	-	-	384,000m ²	650,000m ²
	CA	-	166,000m ²	-	166,000m ²
Capacity (Yearly)	Flights	240,000	170,000	-	740,000
	PAX	30 million	14 million	18 million	100 million
	Cargo (MT: million tons)	2.7 MT	1.8 MT	1.3 MT	10 MT
Project Cost (Project Duration)		KRW 5.6 trillion (1992~2001)	KRW 2.9 trillion (2002~2008)	KRW 4.9 trillion (2009~2017)	-

1.3 Overview of the Phase III Construction Project

I. Overview of Phase III

- A total of KRW 4.9 trillion will be injected into this project to enable phased expansion of the airport infrastructure including T2, CA and access roads/transportation between 2009 and 2017 (for 9 years).



Classification		Phase III	Remarks
Site Preparation		1,105,000m ²	
Passenger Terminal		384,000m ²	18 mil passengers
Cargo Terminal		Separate Implementation	
Passenger Apron		790,000m ²	56 stands
Cargo Apron		410,000m ²	21 stands
Landside	Railroad	6.4km	T1↔T2
	T2 Access Road	11.2km	
	T1~T2 Link Road	11.0km	

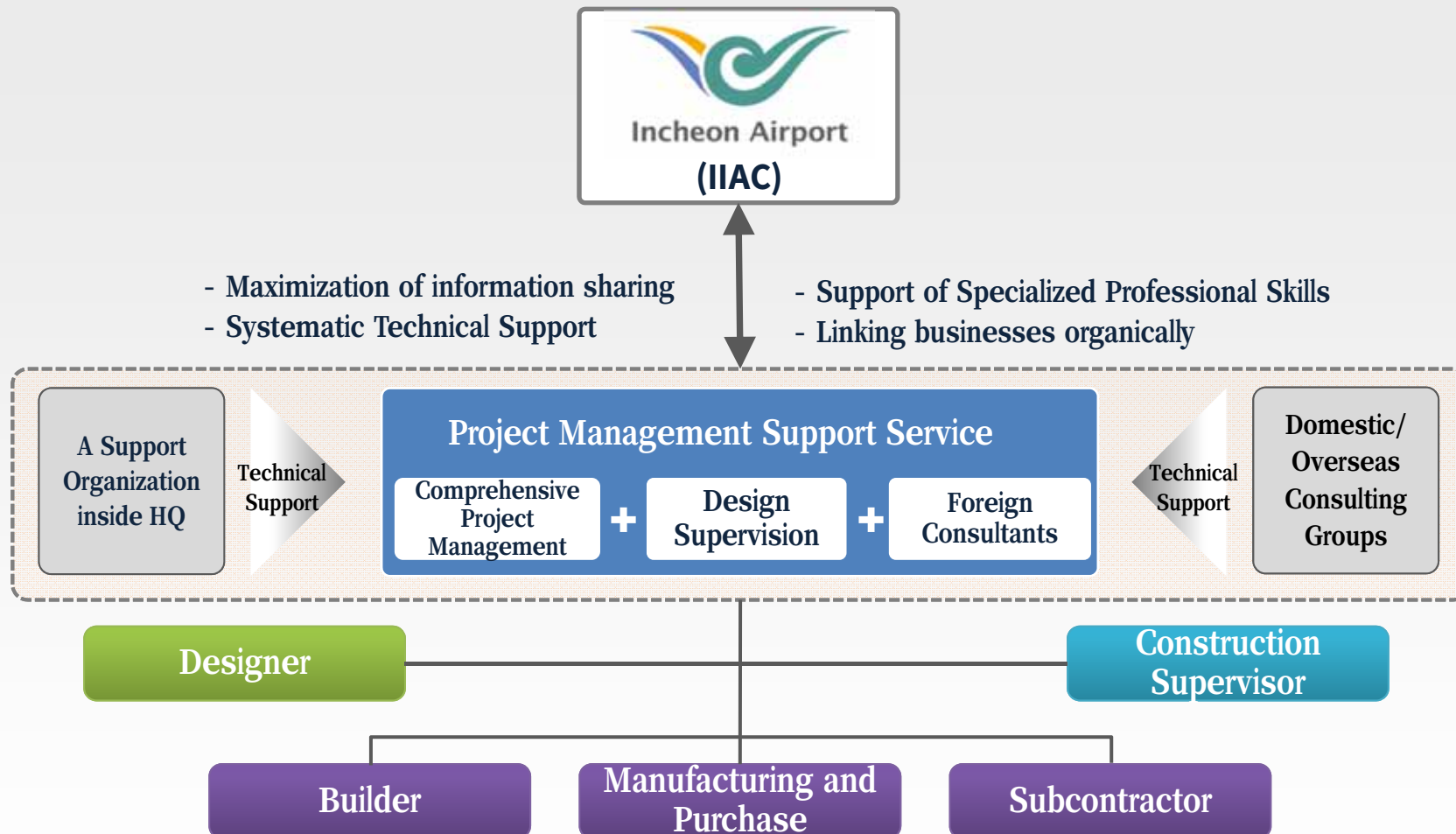


An aerial photograph of Incheon International Airport. The central focus is the modern, curved terminal building with a glass facade. Numerous commercial aircraft are parked at gates along the terminal's edge. To the left, a large cargo area is visible with several cargo planes. The foreground shows a wide, paved road and a landscaped green area with trees and walking paths. In the background, there are more airport runways and taxiways, and a hilly landscape with some greenery. The sky is overcast with soft clouds.

II. Organizational Structure of Project Management

2.1 Types of Work and System Organization of Project Management

II. Organizational structure of Project Management



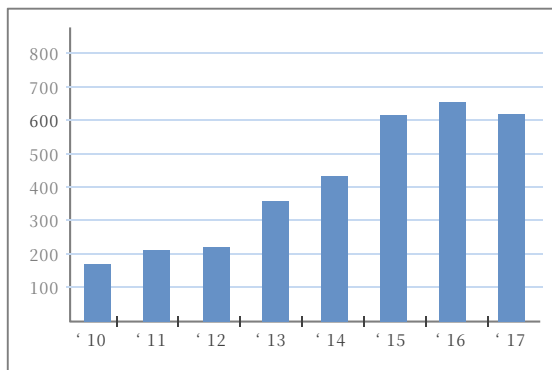
“Combination of Part of IIAC Organization and Part of Contractors’ Organization”

2.2 Operation of Project management

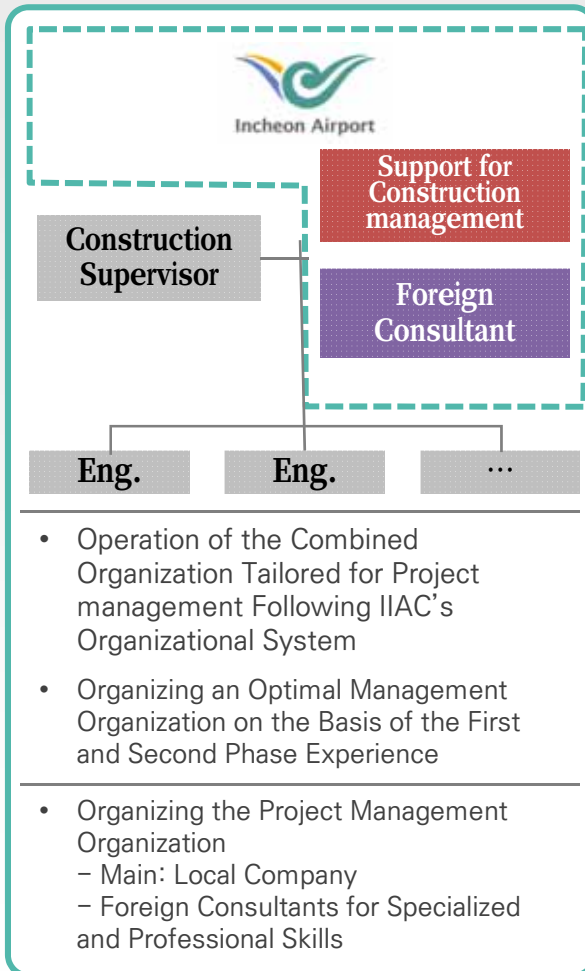
II. Organizational structure of Project Management

- **Service Period:** 2011 ~ 2017(6 years)
- **Major Work**
 - Support for Comprehensive Project Management
 - Design Supervision
 - Technical Support and Consulting for Specialized Areas of the Airport (6 Areas)
 - Construction Management

• **Manpower Input : 3,400 M/M**



- Organizing the Structure Centered on Companies with Airport Construction Experience
- Domestic Bidding
- The Participation Rate of Domestic Companies Is Increasing.
- Foreign Workers Are Mostly Consultants.



An aerial architectural rendering of the Incheon International Airport construction site. The image shows a large, curved terminal building under construction, surrounded by extensive parking lots, taxiways, and runways. Numerous aircraft are parked at gates along the terminal. The surrounding landscape includes green fields and distant hills. The Incheon Airport logo is visible in the top right corner.

III. Construction Management System

Building Comprehensive Information System by Giving Systematic Identification Number to Those that Need to Be Managed for Construction and Management such as Works, Materials and Documents.

➤ How to Structure the Numbering System

The FBS (Facility Breakdown Structure) will become a common language for structuring by reflecting characteristics of an individual business identification number.

➤ Types of the Numbering System

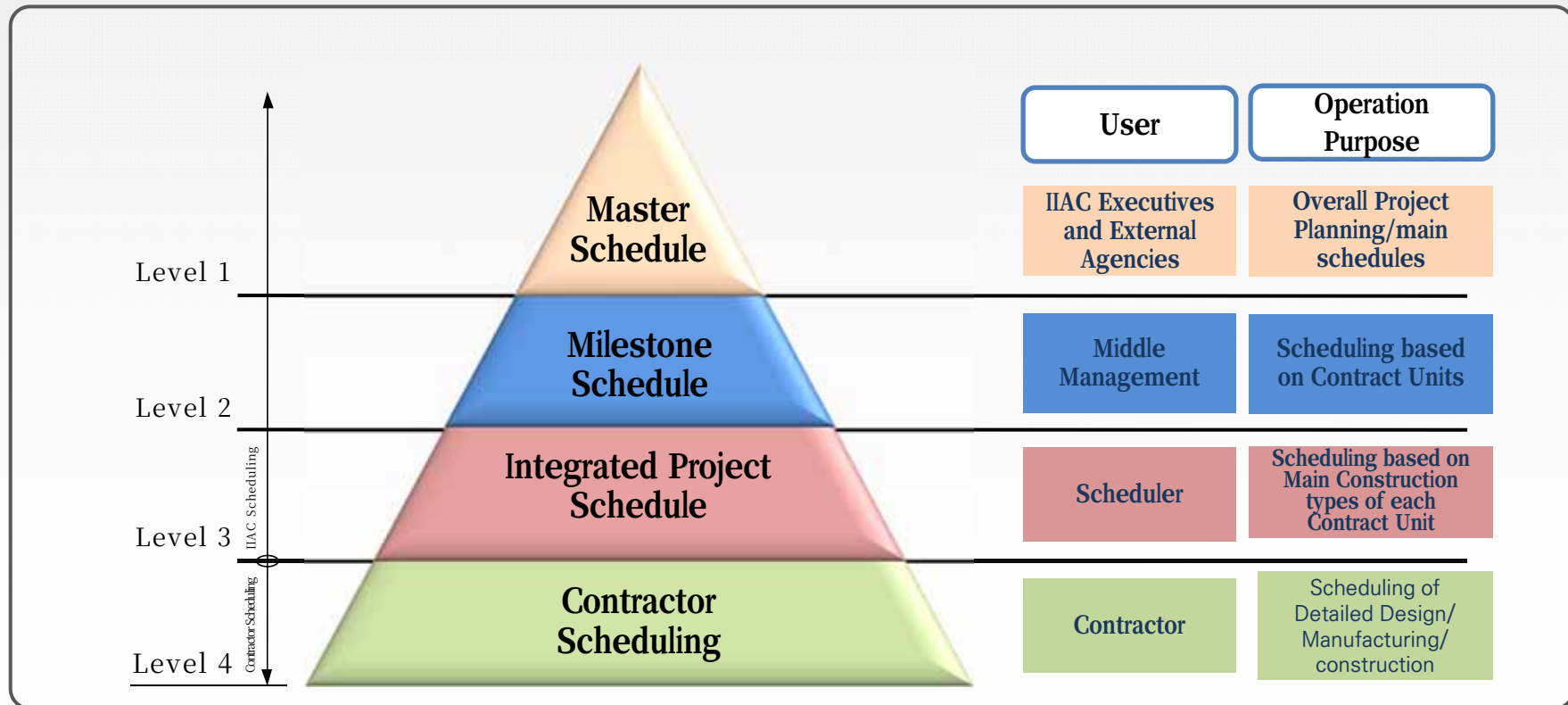
Drawing Binder and Document Numbering System (DDNS), Activity Numbering System (ANS), Material Numbering System (MNS), Special Numbering System (SNS), Contract Package Numbering System

< Classification Code >

Classification	Data-based	Progress-based	Materials-based
Based on Facilities	1,049	–	1,049
Based on Drawing by Subcategory	68	–	–
Based on Documents	268	–	–
Based on Types of Building Construction	142	142	–
Based on Materials by Subcategory	817	–	817

Scheduling System (Schedule hierarchy)

- Managing on the Basis of Project Owner 3 levels schedules (**Master, Milestone, Integrated Project Schedule**), Contractor's 2 levels Schedules (**Preliminary & Detailed Schedules**)

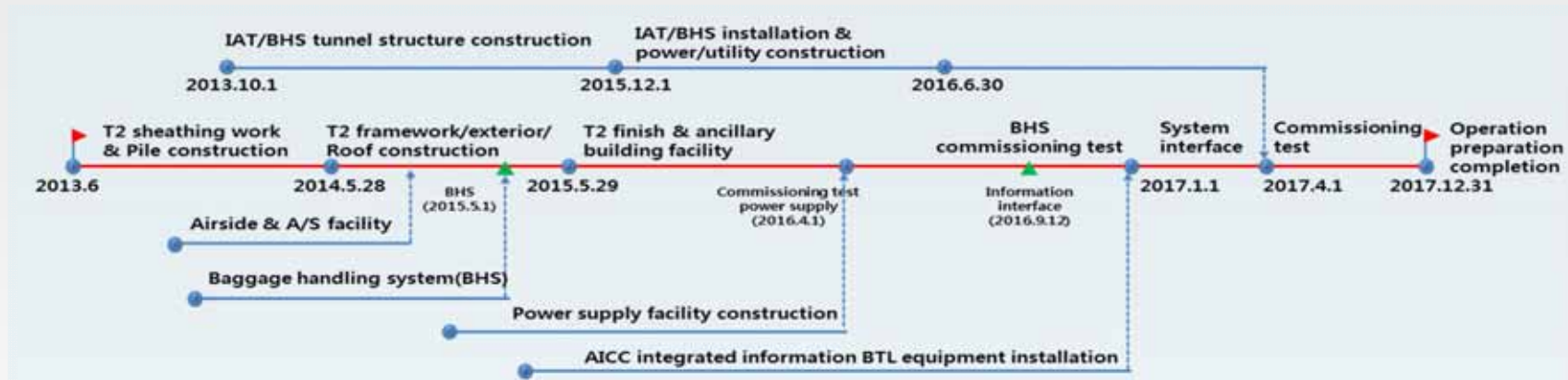


3.2 Planning & Management of Progress Schedule

III. Construction project management system

Progress Planning (Critical Path)

- Set the Goal to Complete the Project by 2017 by Establishing a Plan to Shorten the Construction Period (Designing and Building Proceed in Parallel)



Milestone Schedule

- Plan to minimize interfaces among schedules and to maximize management efficiency

Classification	Phase 1	Phase 2	Phase 3
No. of Contract Package (Total Cost)	325 (5.6 trillion)	90 (2.9 trillion)	113 (4.9 trillion)

* KRW

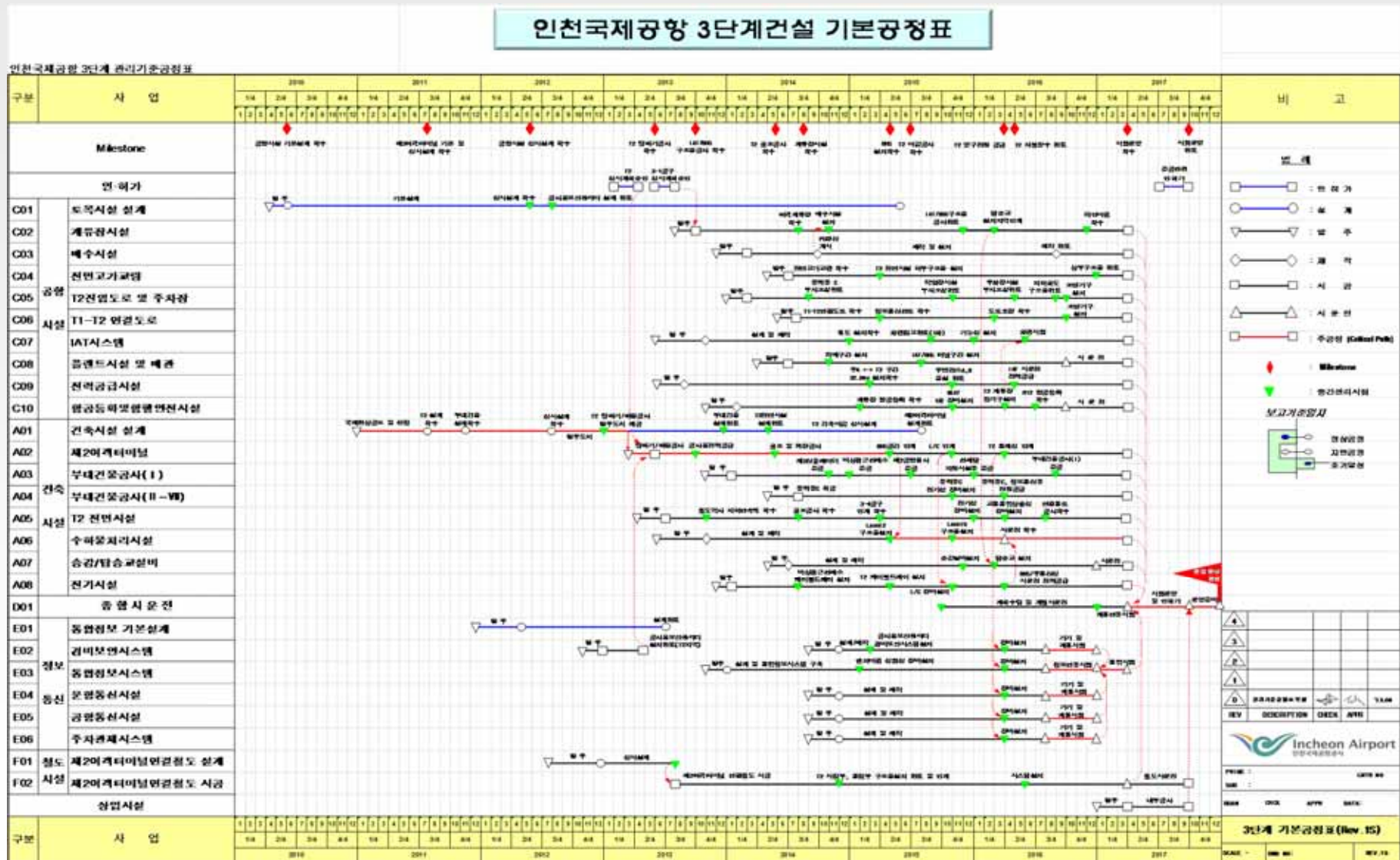
Integrated Project Schedule

- Advanced level of management (building → building/floor) enables the early detection and resolves delayed progresses.

classification	Phase 1	Phase 2	Phase 3
the number of work units	1,071	1,835	4,769
Level of Management	Buildings- types of building construction	Buildings- types of building construction	buildings-floors- types of building construction

III. Construction project management system

Master Schedule- The schedule at the top of the hierarchy indicates a critical path to implement a project



Sub Milestones : 70

Operational Structure of Schedule Management

- Primavera, the project scheduling tool will be utilized to **check delayed schedule and progress, to promote progress and to make a catch-up plan by applying monthly analysis on the progress.**

- **Review and Analysis of Progress**

- Investigation including an actual inspection will be carried out to explore pending issues and to induce actions to be taken.

Pending Issues	Actions
Construction Suspension due to bankruptcy, safety incidents, etc.	* Catch up on a delay due to the construction suspension such as that of ancillary buildings and access roads
Power Supply for Commissioning at the Right Time	* Power-Related Function Room Turnover in Time
Turnover Delays in T2 connecting bridge and BHS areas	* Minimize progress risks by implementing phased turnover

- **Running a Monthly Progress Meeting**

- **Share the pending issues with** project participants to accelerate progress.
- Encourage project participants **which show poor performance to voluntarily establish and implement measures against poor performance.**



Advanced project management that utilizes i-PMIS

- Streamline administrative works and share information of project participants by using i-PMIS.
- Reduce progress-related risks by notifying 3 months prior to main milestones (progress).
- Advance management by improving the management system of the detailed project schedule (offline → online).

* i-PMIS : Incheon airport Project Management Information System

Structure of the System

Classification	Details
Management of Work	• Management of the project numbering system and code request/approval
Actions	• management of interface, to-do list, MoM (minutes of a meeting) and meeting schedules
Management of the Project Budget	• Management of the total project budget, execution plan/performance and budget status
Schedule Management	• Management of IPS (Integrated Project Schedule), bidding scheduling, contractors' project progress and the cost schedule
Building Management	• Management of the project summary, project-related pictures and purchase of materials
Safety/Quality/Environment Management	• Management of quality control folios and quality assessment • Environmental implementation performance and Environmental Impact Assessment
Announcement /Bulletin	• Announcement, bulletin, library and Q&A

3.3 Operation of Construction Project Management Information System (i-PMIS)

III. Construction project management system

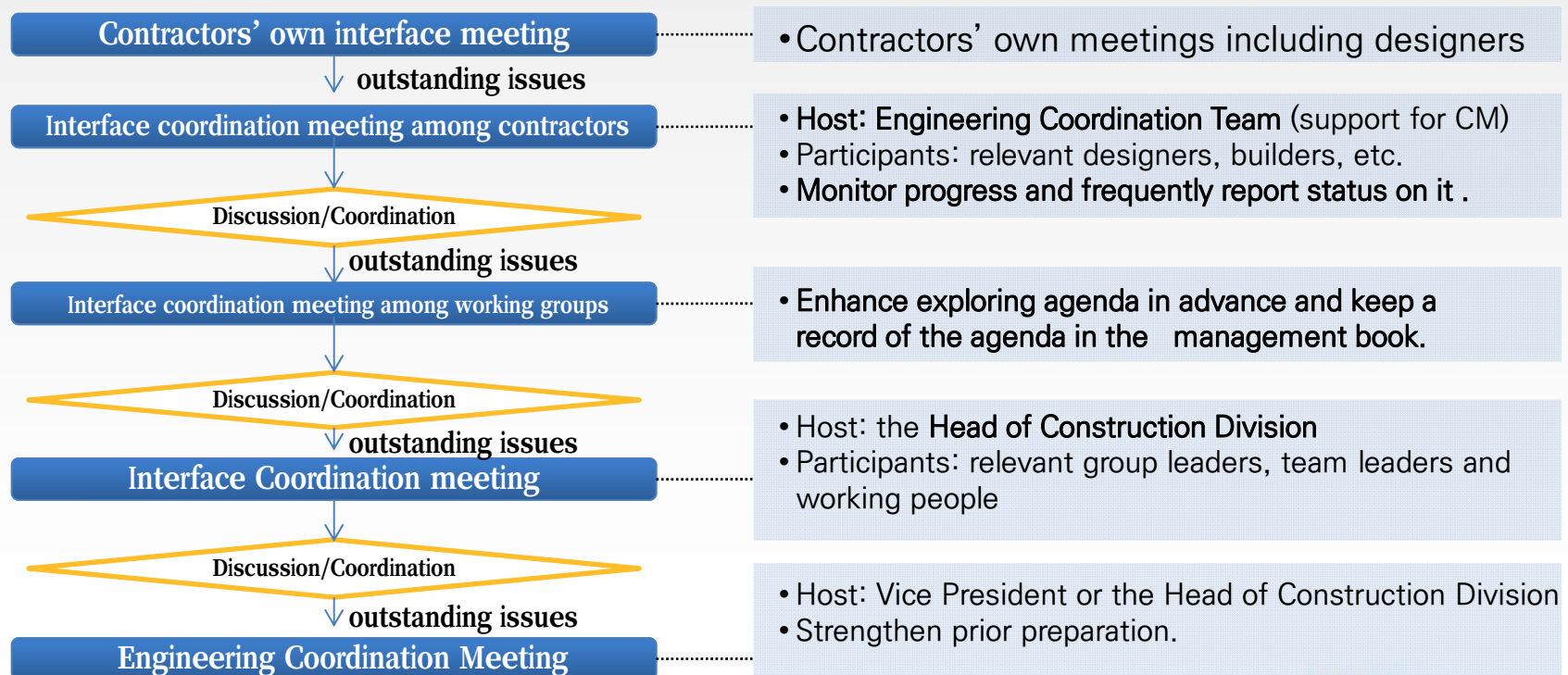
Screen Configuration of the System



Discussion and Coordination of Progress Interfaces

- Actively **discuss and coordinate to resolve** diverse progress-related interferences between leading and following businesses.
- **Explore expected interface-related issues and resolve them** through the BIM (Building Information Modeling: a 3D model-based process).

Interface Management Procedure

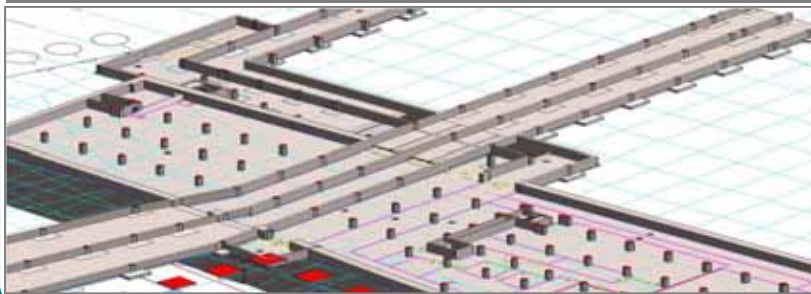


3.5 Utilizing the BIM(Building Information Modeling)

III. Construction project management system

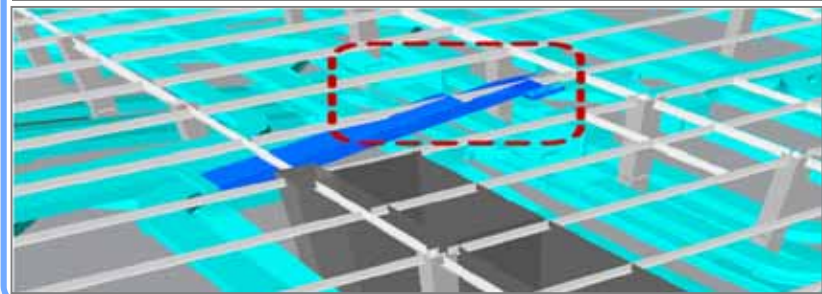
Enhance understanding of design drawings

- shorten the decision-making time
- shorten a period for construction planning
- minimize trial and error



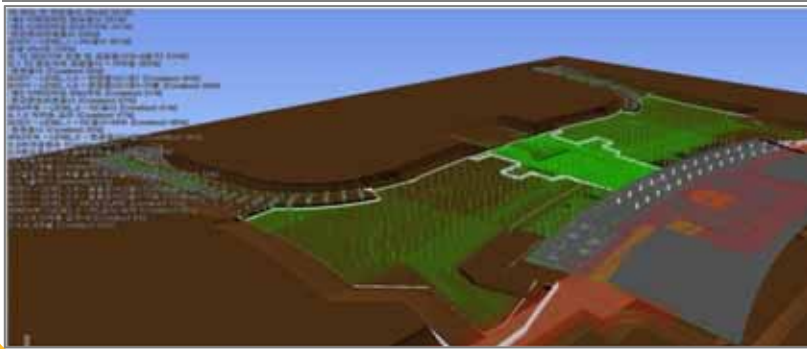
Building Interface Management

- check building-related interferences in advance
- resolve interference issues
- enhance drawing consistency



Progress Interface Management

- check progress-related interfaces according to construction sequence and minimize interferences to reduce a construction period and costs
- minimize construction work interferences



Operation and Publicity

- establish and operate a management plan following site changes at each phase
- utilize the plan to brief visitors to construction sites
- enhance the operation efficiency after completion of construction



Basic Direction of VE

Conduct a 3-day VE Workshop

implement organized and systematic design VE by executing team-based Job Planning activities for 3 days.

Participate in Operation & Maintenance

Organize a team to conduct VE, considering LCM (Life Cycle Management) by inviting experts in each field who are currently working for IIAC's operation and maintenance.

Solution to Differentiating the Implementation of VE

Manpower Pooling

- Organize VE training to nurture VE experts
- Participate in the VE conference and share the latest method.
- Host VE competition to explore VE design experts
- Encourage and promote organizational activities.

Conduct Project-Based Design VE

- Major projects conduct VE for each preliminary and detailed design.
- Each project package conducts design VE.
- Widening implementation of design VE will be done for other packages except those subject to regulations (more than KRW 10 billion).

Prevention of claims and risks in advance by **predicting potential risks and uncertainties** that can hinder the success of a construction project

➤ Stepwise claims management plan (3 Steps)

Create a checklist to prevent claims

- A checklist used by those in charge of each package before implementing the project (16 items)
- Select items that have higher priorities in terms of management through step 1 and 2 analyses

Create a database on claims cases and publish a book of those cases

- Manage documents in preparation for changed constructions and suspension of construction works
- Manage schedule and review feasibility and the work cycle of major works
- Review an initial mobilization plan/the project implementation system
- Introduce “real-name system” of subcontractors to prevent claims



IIAC Risk Monthly Letter

3.7 Claims and Risk Management

III. Construction project management system

Development of the Phase 3 Major Risk Management Guidebook

Items	Main Contents
Construction Sites in Bankruptcy	Work management guide to prevent construction delays and quality degradation when the bankruptcy occurs
Subcontracting	Business guide to prevent low price subcontracting and failure to pay contractors on time
Design Change	Work management guide on design changes including the basis for design changes, cautions, etc.
Construction Materials	Work management guide to procure materials in a timely manner, to manage quality and to enable a smooth job handover
Construction Turnover	Work management guide to enable a timely turnover of the work area between leading and following projects



Manage major materials necessary for purchase, construction and operation stages

- **Actively implement Direct Buying System for Construction Materials**
- **Establish an efficient purchase and management system**
- **Seek efficiencies for procurement** through business cooperation with the SMBA (Small and Medium Business Administration) and the PPS (Public Procurement Service)
- **Allow conditional exceptions** to purchasing SME products even when the case is an exception to Integrated Project Delivery and Direct Buying
 - IPD (Integrated Project Delivery): placement of an order for identical or similar items among building packages

SME products subject to Direct Buying : 109 items, approximately KRW 482 billion (VAT exclusive)

Classification	Group of Products	Product Names	Detailed Product Names
Items subject to Notification No. 2015-387 of the SMBA	127	314	456
Items subject to IIAC Phase III Construction Project (Rev.4)	64	86	109

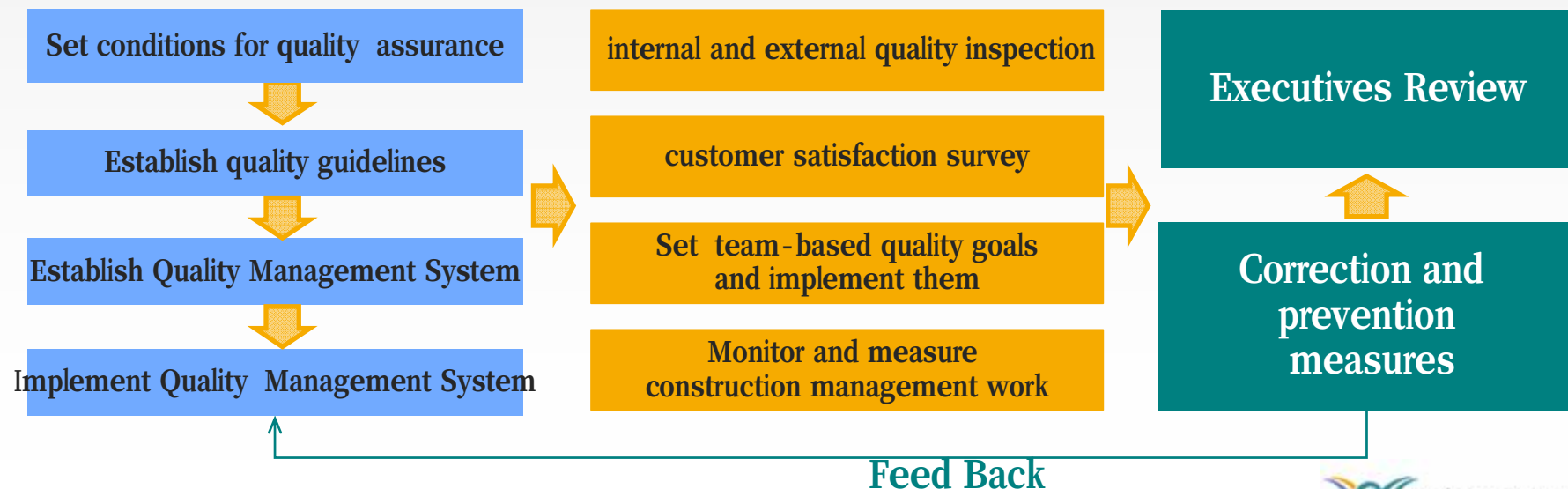
* (Exception) the number of materials that are exceptions to SMBA's Direct Buying Policy : 67 items, approximately KRW 143.2 billion

Safety Management Goals



Quality Management System

- Identify customer and stakeholder needs and reflect them
- Enhance work transparency and promote efficient operation
- Work following quality standards
- Improve and enhance quality consistently
- Maximize workers' capabilities and performance



Environmental Management System



※ Details of Agreement and Reducing Environmental Impact :
air quality, construction waste, water quality, natural environment, noise and vibration

Thank you.

