

Construction Management for Hwaseung Main Stadium

2010 CM Seoul-Forum & World CM Competition

2010. 4. 30

heerim CM
Architects & Planners

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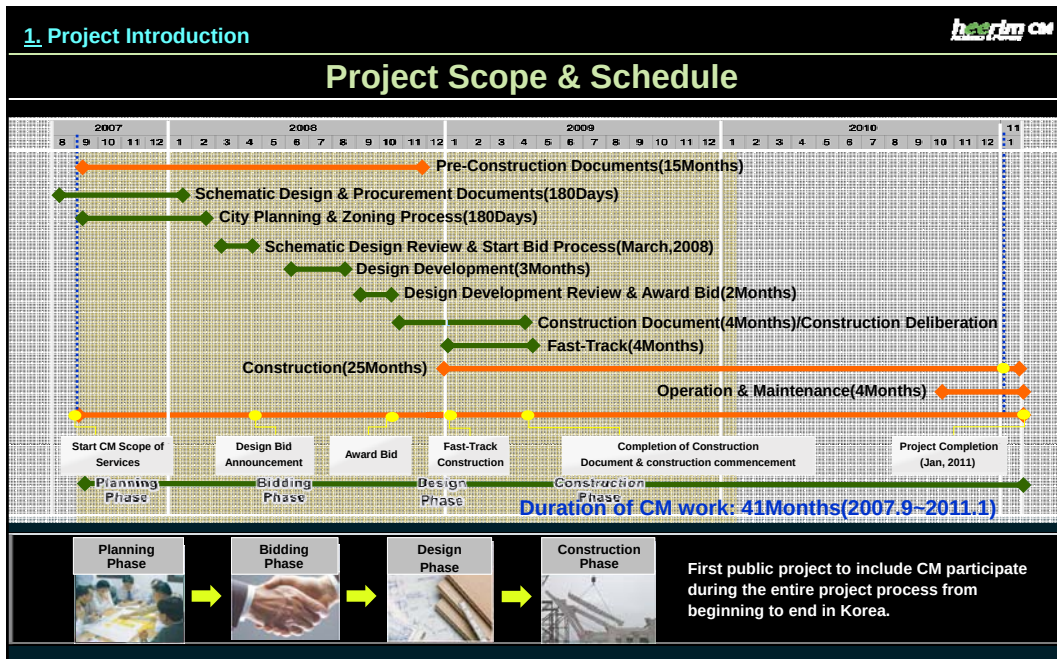


1. Project Introduction

- Project Duration: 2007. 9 – 2011. 1 (41months)
- Site Area: 285,694m² / Gross Floor Area : 80,074m²
- Main Facility(Phase 1 of the Project)
 - Main Stadium (5Floors / 35,000Seats) ; RC+PC
 - Sub Stadium (1Floor / 2,000Seats) ; RC+PC
 - Indoor Stadium (3Floors / 5,000Seats) ; RC+PC
 - Parking Spaces (1,933 Spaces)
- Total Project Budget : \$197 Million (VAT Included)

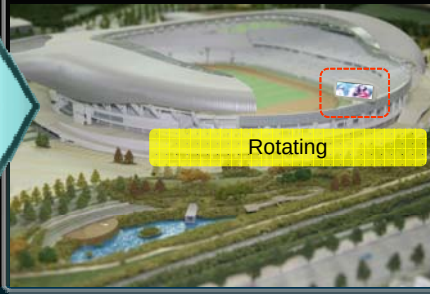
A map of South Korea with three blue circles highlighting specific regions: 'NamYang' in the west, 'Tae An' in the east, and 'HyangNam' in the south. A red dot labeled 'Site' is located in the central-eastern part of the country, between Tae An and HyangNam.

A wide-angle, aerial night photograph of the stadium complex. The main stadium has a large, illuminated, curved roof. The surrounding area includes parking lots, walkways, and other smaller structures, all brightly lit against the dark night sky.



2. Project Particularities hacrim CM

Scoreboard

Before	After
Traditional Scoreboard  Stationary	Rotating Multi-Purpose Digital Scoreboard  Rotating

Use Screen for cultural events & advertisements
Increase Profit through Multi-purpose & Revenue Sources
 Additional Cost of installation covered by Value Engineering Techniques

2. Project Particularities hacrim CM

CMshot Product Application & Development – Innovative Communication Method

 Wireless Screen Observation	 Safety Helmet
 GPS	 Practical Applications

2. Project Particularities **hacrim CM**

CMshot

2. Project Particularities **hacrim CM**

Meeting Client Needs

Economic Independence	Reduction in O&M Cost	Meet Client's Needs
CM Provides Revenue Earning Opportunities Consulting for an economically independent facility i.e.) Stadium naming rights, MD Plan	Economically Sustainable CM - Recycling Rain water to reduce Energy. - Provides cleaning purposes and cooling effects	Intelligent CM • 3D visual model submission through PMIS • RFID system in place for monitoring materials and manpower Universal Design Application • First instance for a Public Project in Korea

Providing CM service for
Maximum Client Satisfaction



3. Schedule Management 

Successful CM Implementation for Project Completion

➔ **Pre-construction documents phase is the main component of Schedule Management**
Forward Progressive Schedule Management Implementation

	Schedule Risk	Solution
Land Purchase	• Delay on the land ownership transfer because of over 50% of private ownership land	• Prompt land purchase agreement & land use consent through deliberations with urban planning facilities • Coordination: accommodate decisions on adjustment, deposition process through local land committees
Permit Process	• Delay on Preliminary scheme, City Facilities Management Plan Decisions, Transfer of cultural heritage & tomb and Various impact assessment	• PERT / CPM & Milestone scheduling for construction review & permit
Construction Review	• Disagreement with potential awardees of construction work on items pointed out by construction review committee	• Verification of Global Standard Drawings & SPEC from National Sports Promotion Corporation • Holding Conference with construction review committee, Client & Potential awardees
Status of Site	• 5meters differences between Nearby Roads and Site, Soil needed for landfill (APPX. 800,000m ³)	• It is required in the Instruction to Bidders to propose alternative solutions

CM reduced 2months during concept design phase from 15 months to 13 months.

3. Schedule Management



Design and Construction Schedule

➔ To comply with Owner's Requirement, reduce schedule through VE techniques.

	Schedule Risk	Solution
[Design VE] Prefabrication Method	• Pillars under the Deck are hidden but designed to be circular reducing constructability • Structural Quality & Safety Improvement is required i.e. Pillars on 4th Floor & Laker Beam.	  • CM provides VE solutions
[Construction VE] Effectiveness of Construction to Site	• Concern for delay on form work & Re-Bar fabrication	  • System Mold Method, Pre-fabricated Re-Bar & Loading Equipment Method

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Construction Cost Management

4. Construction Cost Management 

Prevent Miscommunication Between Contractors

➔ **Through VE, Cost Savings of 2 Mil. USD**

Design-Build	Contract Conditions stated in Bid Documents
• Overcome cost limitations through VE.	• Criteria of Contract Amount Control need to be stipulated by Design VE. • With Construction Document Phase, Resolution of the Conflict among Contractors

➔ **VE Outcome**

• Total number of VE proposals ➤ 62 • Total number of VE items applied ➤ 27	Cost Savings of 2 Mil. USD 
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4. Construction Cost Management 

Example of Solution for Construction Waste

➔ **Problem**

Current Laws	Problems During Application
• Public projects require that when Construction waste of 100 ton or more are expected, the owner has to procure the construction waste disposal separately	• Because the disposal of construction waste is not included in the construction cost, Contractors rarely make efforts to reduce the amount of construction waste disposal. • Therefore the cost for construction waste disposal often exceeds the budgeted amount.

➔ **Solution**

• CM will include in the Instruction to Bidders that each proposal must suggest a plan to reduce construction waste.	• State the guidelines in the Instruction to Bidders for construction waste disposal plan. • Fundamentally reduces the cost of construction waste disposal by reducing the amount of construction waste.
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5. Quality Management
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4D Program Solution

X-Steel Program

- 4D modeling through 3D modeling

1

Analysis of fit for fabrication & constructability

2

Analysis of fabrication and material control during construction

3

Calculations for separated and connected structural components

Effective Quality Management

5. Quality Management **hacplan CM**

CON'C Quality Information Management

Concrete Curing Program

- Real time concrete curing is measured with wireless temperature sensor.

- 1** Mass Concrete, Hot weather, Cold weather Con'c curing is measured at real time.
- 2** Provide specific calculations and data for Curing Management
- 3** Utilizing the temperature data, an automatic calculation of concrete strength is given – the form and support is removed accordingly

The diagram illustrates the system architecture for concrete curing management. It shows a 'concrete' block connected to a 'Data Logger'. The 'Data Logger' sends 'Raw Data' to an 'Interface System' (labeled 'Measured Temperature Conversion & transfer'). The 'Interface System' sends data to a 'Service System' (labeled 'Database'). The 'Service System' then provides data to 'Client System I' (labeled 'Collected information analysis & control') and 'Client System II' (labeled 'Collected information analysis & control'). Arrows indicate the flow of data between these components.

The screenshot shows the 'hacplan CM' software interface. It features a menu bar (File, Edit, Control, Sensor, Data), a toolbar, and a main window. The main window displays a 'Temperature Graph (Celsius)' with a line graph showing temperature over time. The x-axis is labeled 'Elapsed Time (days)' and ranges from 0.0 to 0.9. The y-axis is labeled 'Temperature (C)' and ranges from 10 to 40. The graph shows multiple data series, with one series highlighted in red. The interface also includes a list of sensors on the left and various control buttons on the right.

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Safety Management

6. Safety Management **hacrim CM**

Site Safety Implementation

Advanced IT Management  	Sustainable CM –Disaster Prevention Temporary pond under construction- Eco-friendly   Selected for 2009 NEMA/KBS
Safety WAR Room Operation  	Safety System for Construction Equipment  



Contract & Claim Management

7. Contract & Claim Management 

Improvement in Contract relationship

➔ **Role of CM**

Conflict Resolution Management	Designer-Contractor Stipulations
• List up primary claim issues. • Create prevention scenarios. • Check drawings & solicit expert consultation.	• Reflect conditions for compliance to schedule & contracted quality. • Create modification of contract amount. • Create appropriate waivers

Analysis of Potential Contract & Conflicts



8. Conclusion



CM Mission

- Successful completion of the Hwaseung Main Stadium.
- CM BEST Practice Policy through quality, safety, schedule and cost control.
- Our Client's needs are our priority.

