

# **Lotte Resort Sokcho**

**LOTTE CM DEVISION**

**2019. 03.**

# **Lotte Resort Sokcho**

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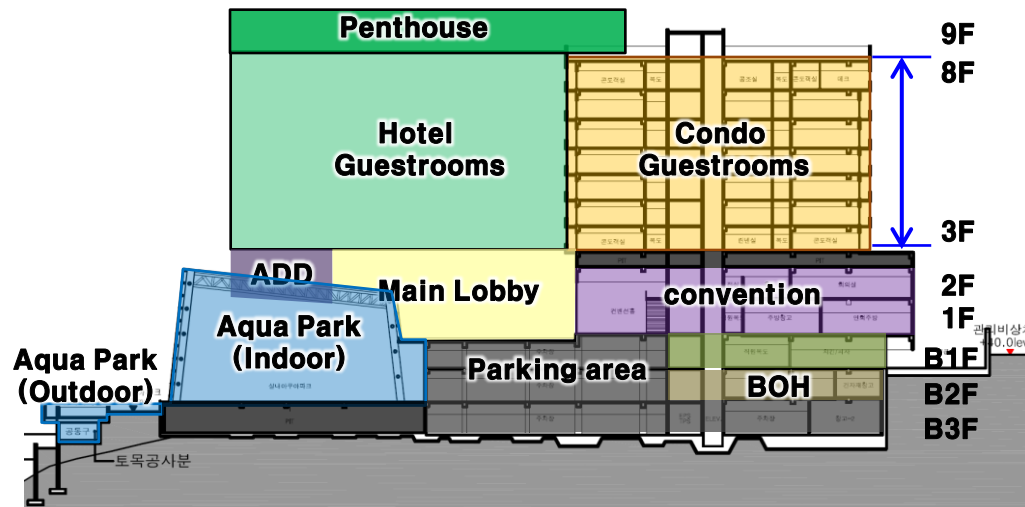
## **I. Project Outline**

## **II. CM Roles**

## **III. Best Practice**



# Project Outline



|                         |                                                    |               |
|-------------------------|----------------------------------------------------|---------------|
| PROJECT                 | LOTTE RESORT SOKCHO                                |               |
| LOCATION                | Taepodong, Sokcho, Gangwon-do                      |               |
| Duration                | 24 months ( '15.06.26 ~ '17.06.09)                 |               |
| OPEN                    | 2017. 07. 20                                       |               |
| FLOOR                   | B3F / 9F<br>(Condo 219 rooms/Hotel 173 rooms)      |               |
| Building area           | 11,426.59 M2                                       | ( 3,456 py )  |
| Land area               | 69,720.00 M2                                       | ( 21,090 py ) |
| gross area              | 95,208.53 M2                                       | ( 28,800 py ) |
| Building Coverage Ratio | 16.44%<br>(the statutory limit under 20%)          |               |
| Floor Area Ratio        | 66.74%<br>(the statutory limit under 100%)         |               |
| PARKING SPACE           | 732 cars<br>(the statutory limit over 602 cars)    |               |
| Total Cost              | Approx. 160 billion KRW<br>(5.6 M KRW/py)          |               |
| OWNER                   | Hotel LOTTE co.<br>(PM : LOTTE Asset Development ) |               |
| Design                  | NOW Architects Co.                                 |               |

# History

| Date        | Main schedule                                    | remarks                                         |
|-------------|--------------------------------------------------|-------------------------------------------------|
| 1989.       | Land Purchase of LOTTE E&C<br>(From sokcho city) |                                                 |
| 2012.       | Land Purchase of LOTTE Hotel<br>(From LOTTE E&C) |                                                 |
| 2014.12.15. | Permit of implementation plan                    |                                                 |
| 2015.04.28. | Building Permit by Sokcho city                   | 9 Floors / condo 219 rooms<br>/ Hotel 173 rooms |
| 2015.06.26. | Permit of Beginning                              |                                                 |
| 2016.12.16. | Mock-up room Show                                |                                                 |
| 2017.06.09. | (Temporary)<br>building use permission           |                                                 |
| 2017.07.20. | Grand-Open                                       | 2018.04<br>Complete of building use permission  |

**Ground-breaking ceremony 14. 12. 17**

**Start of entry road construction**

**2014.12.17**



**Underground excavation completed**

**Start of Reinforced concrete Work**

**2015.10.01**



**2015.06.26**

**Permit of Beginning**

**Completion of entry road construction**

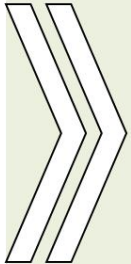
**Start of Underground excavation**



# History

**Completion of Underground Reinforced concrete Work**  
**Start of Reinforced concrete Work of building frame**  
**Start of Exterior finish work**

**2016.06.26**



**2016.12.12**

**Start of interior finish work**  
**Completion of the Indoor Pool Dome**

**Completion of Construction**

**(Temp.) Building use permission**

**2017.06.09**



# History

2017.07.20 Grand OPEN





# Design Concept

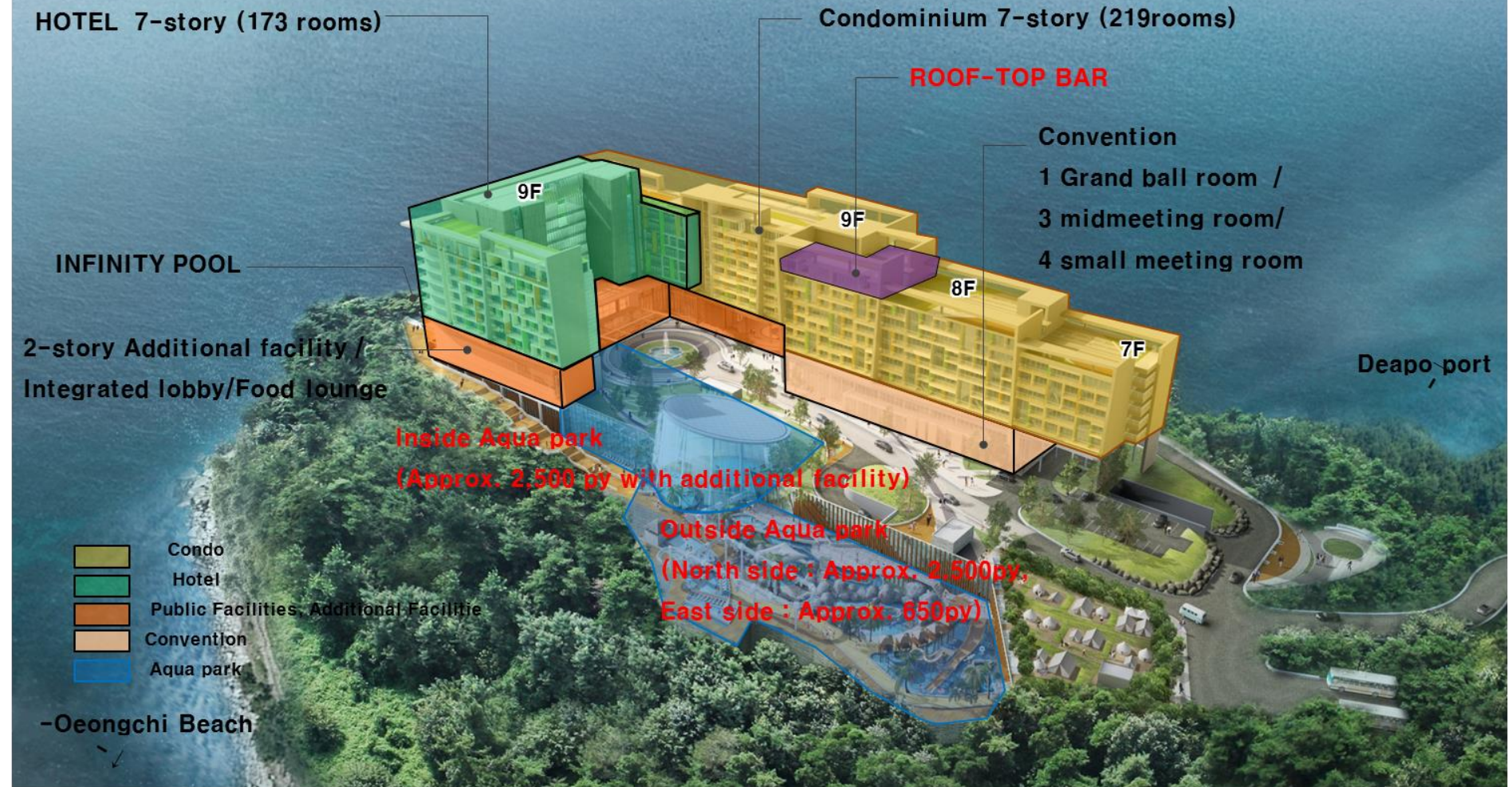
- Emphasize differentiated formability with design system that shaped Ulsan rock





# Placement and Zoning plan

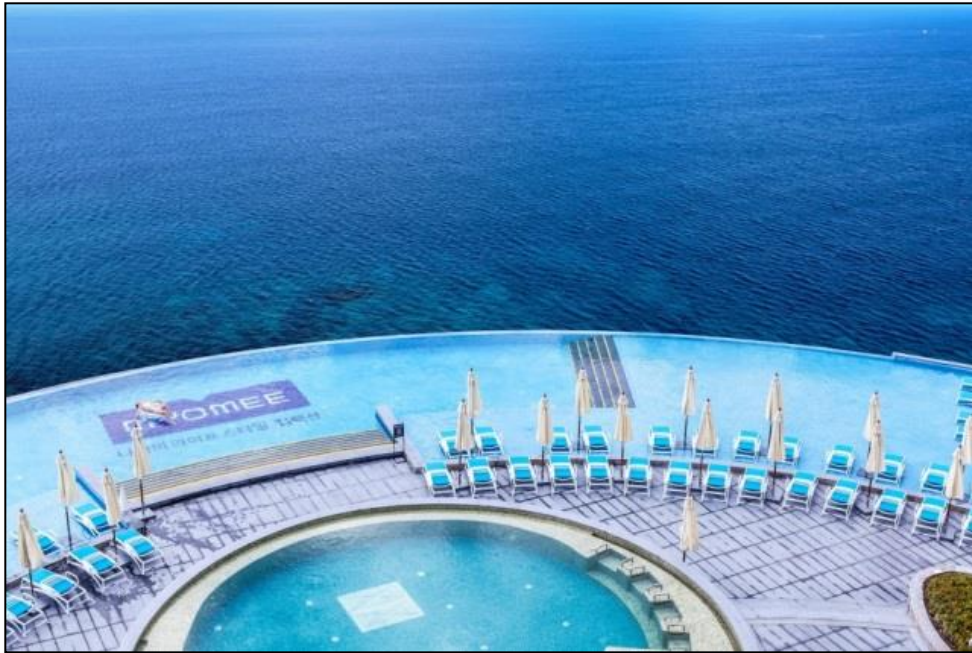
- Facility placement and zoning plan considering natural topography.
- Layout plan considering features of sea view of 3 sides





# Differentiation factor

1. The only infinity pool in the East Sea that can be used for all seasons.



2. Aqua park with different theme that can swim with the sea



# Differentiation factor

**3. Roof-Top Bar with a Mt. Seolark/  
Sokcho City/beach view**



**4. Top-Floor specialized suite room (Hotel)  
with a private terrace and pool**





# Differentiation factor

**5. A variety of photo zones and trails  
utilizing features of the sea on three sides**

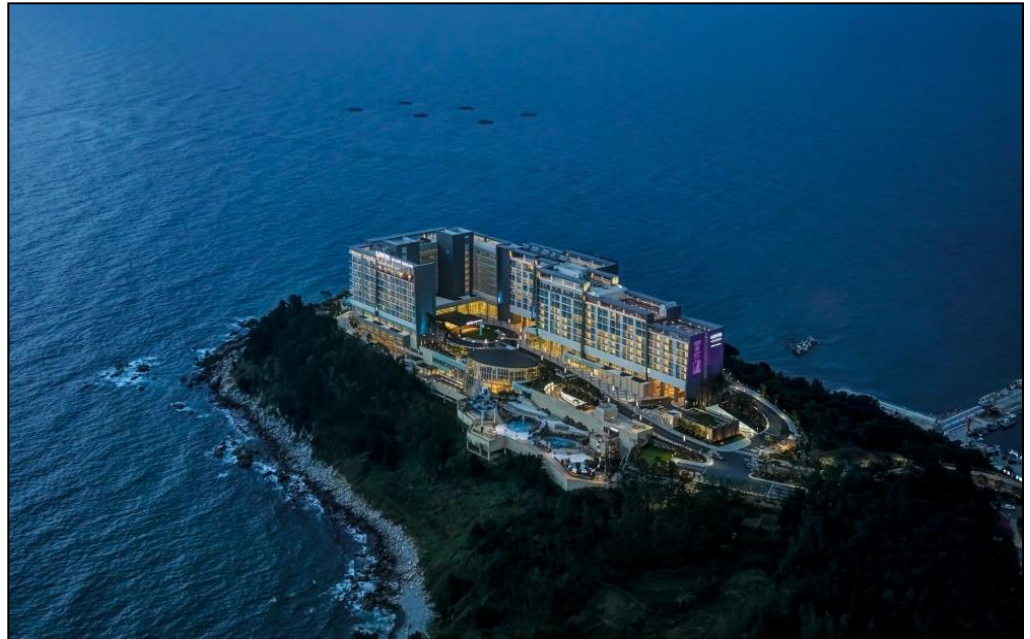


**6. Night scenery considering geographical  
features that can be perceived anywhere**





# Completion Picture



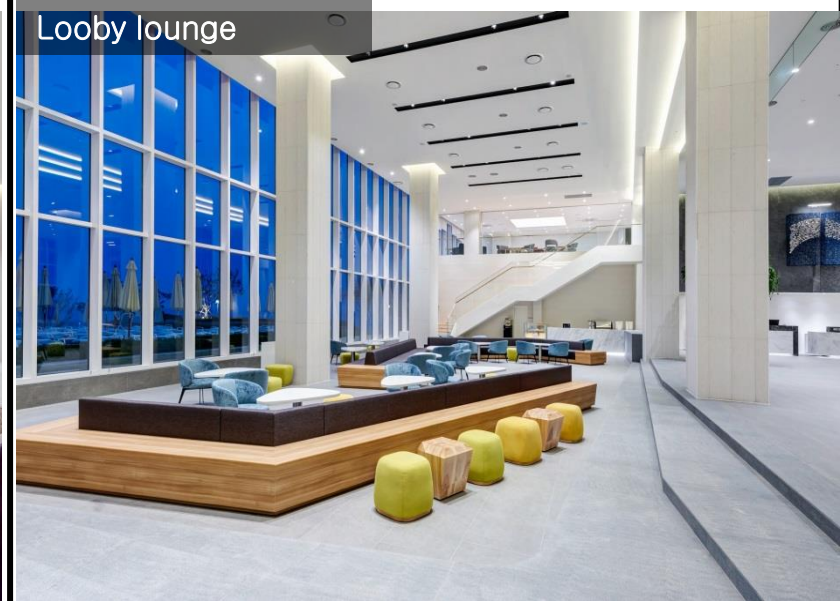


# Completion Picture

Main Looby



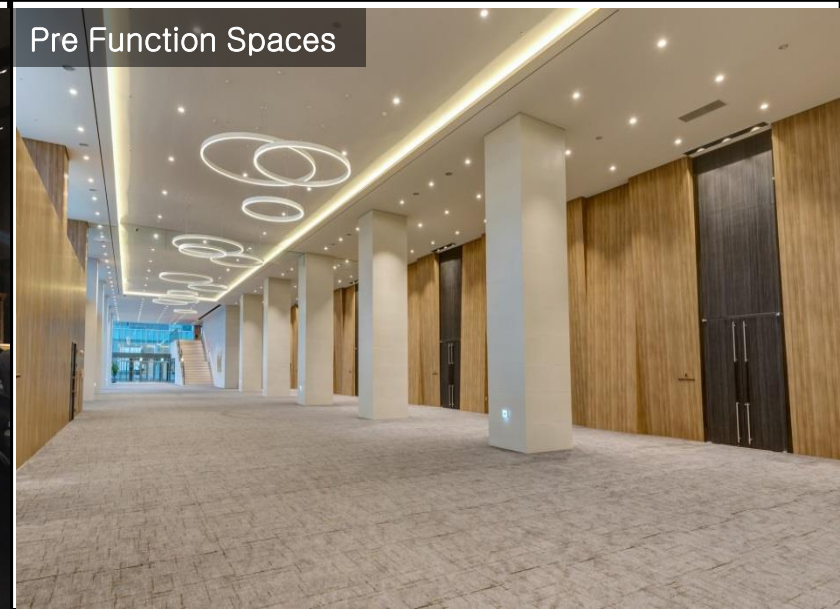
Looby lounge



Grand Ballroom



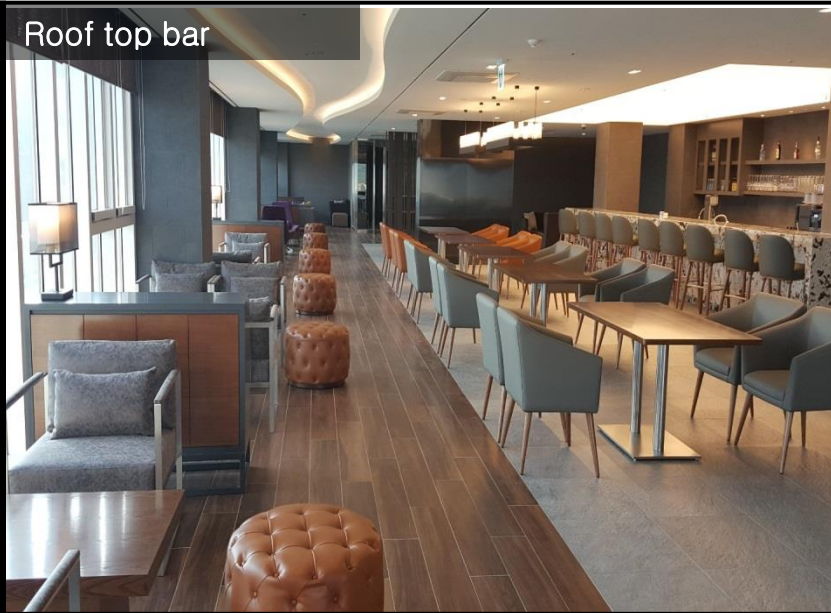
Pre Function Spaces



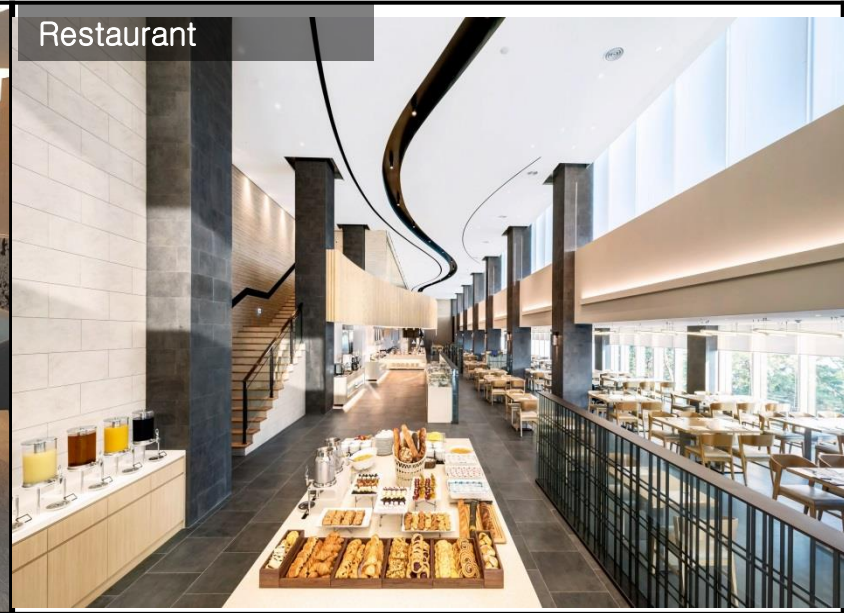


# Completion Picture

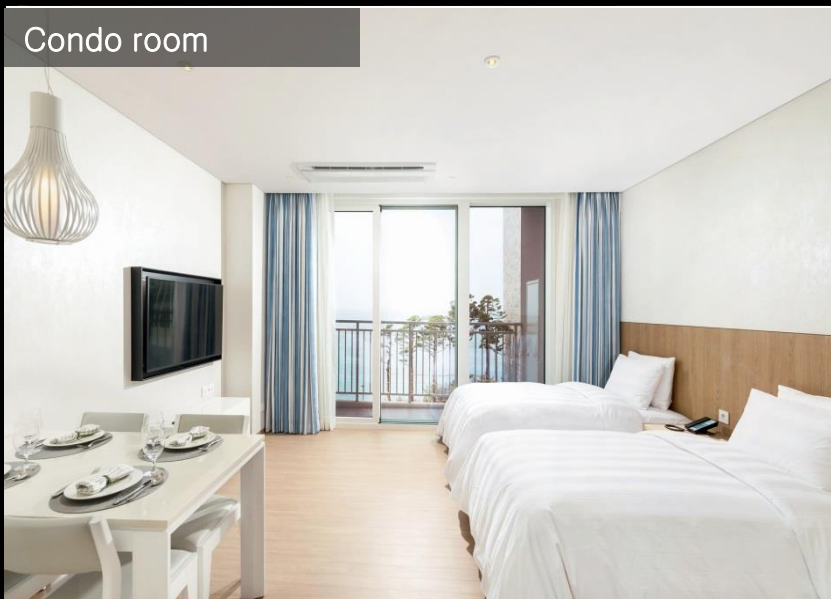
Roof top bar



Restaurant



Condo room



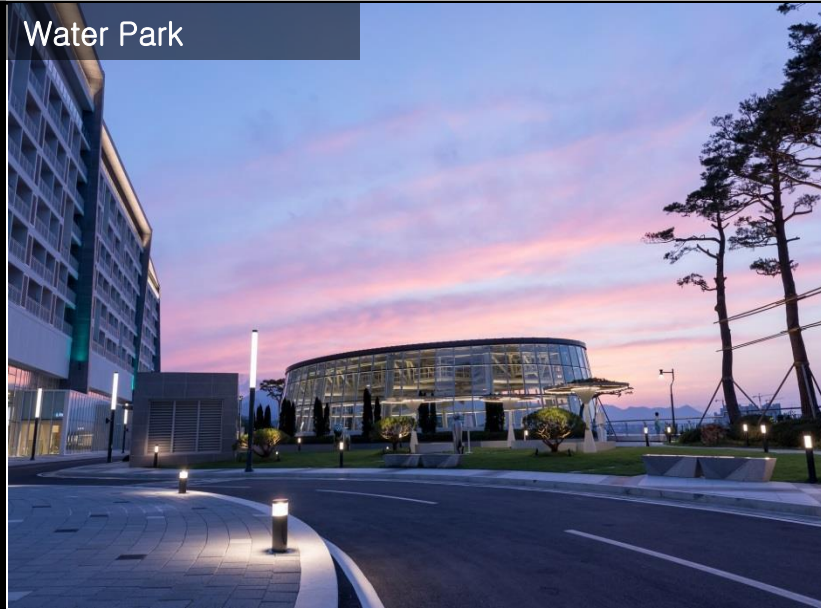
Hotel room



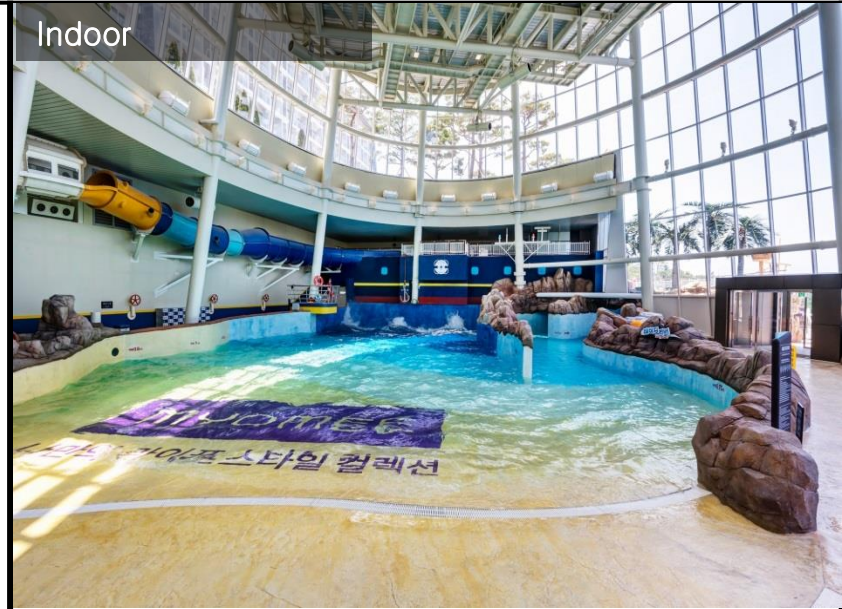


# Completion Picture

Water Park



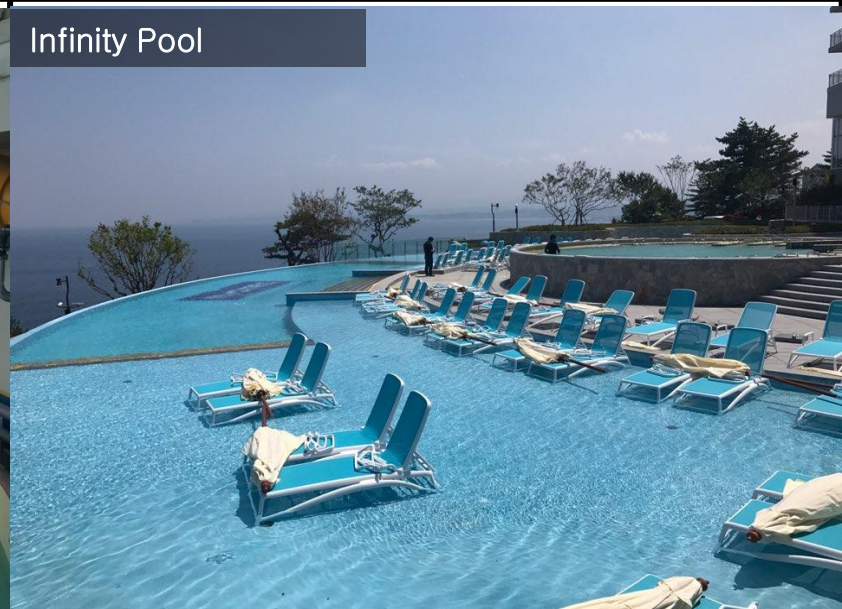
Indoor



Indoor



Infinity Pool





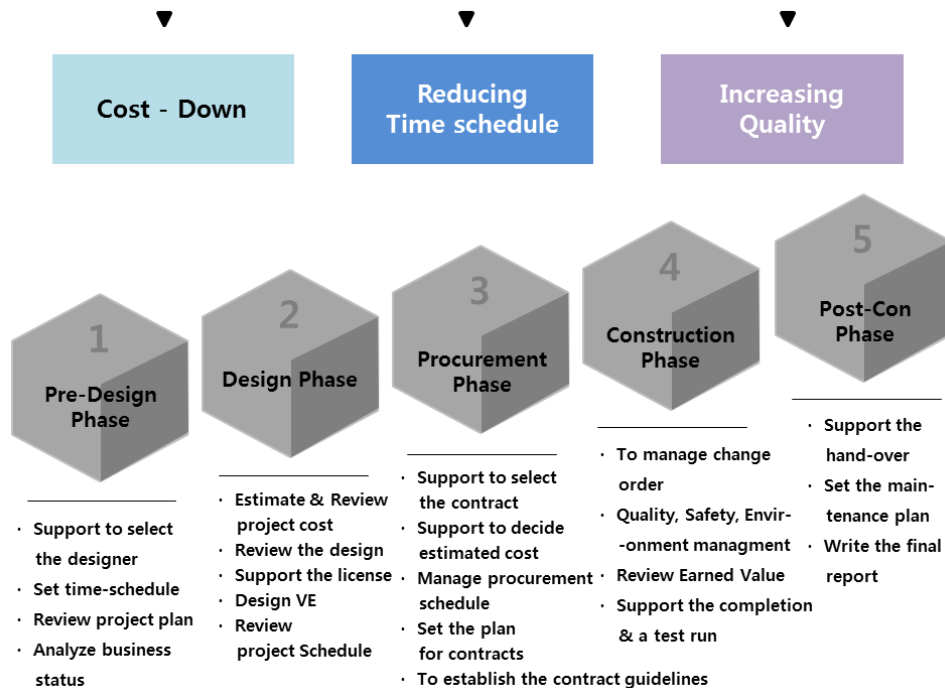
# Project Participation Company

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Client</b>        | <ul style="list-style-type: none"> <li>• LOTTE HOTEL(Funding and facility operations) / PM : LOTTE ASSET DEVELOPMENT(Developer)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                 |
| <b>C M</b>           | <ul style="list-style-type: none"> <li>• LOTTE CM DIVISION (Construction Management)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Construction</b>  | <ul style="list-style-type: none"> <li>• LOTTE CONSTRUCTION&amp;ENGINEERING(Completion of responsibility)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Supervision</b>   | <ul style="list-style-type: none"> <li>• Architecture : SUH-HAN ARCHITECTS &amp; ENGINEERS INC.</li> <li>• Civil : G.S. Engineering &amp; Construction Co., Ltd.</li> <li>• Machanic : Wuyi Architectural Supervision</li> <li>• Fire : Chun Loss Prevention &amp; Engineering Co., Ltd</li> <li>• Electricity/Communication : Yongwang E&amp;I</li> </ul>                                                                                                                                                 |
| <b>Design</b>        | <ul style="list-style-type: none"> <li>• NOW Architects</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Design Vendor</b> | <ul style="list-style-type: none"> <li>• Structure : SEN Engineering Group</li> <li>• Civil : Towoo engineering / Ohju Engineering</li> <li>• Machanic : SAM-SHIN ENGINEERS. INC.</li> <li>• Fire : Korea fire protection UBIS Co.,LTD</li> <li>• Electricity/Communication : Electrical Consultant hyeobin co.,ltd</li> <li>• Landscape : jteng</li> <li>• Water : SHINWHA AQUA CO.,LTD    • Water park : indesign</li> <li>• Interior : DOOYANG ARCHITECTURE CO.,LTD(Hotel) / INDESIGN(Condo)</li> </ul> |

## □ Business Features of LOTTE CM DIVISION

- From the project Before Service to the After Service , Use the fast track in all steps to perform the work
- Performs the overall CM business of commercial/business facilities through the keytenant(Deapartment,Mart,Cinema and etc.),Constructor, Highest perfomance in Commercial facilities, Developer belonging to our group.

### TOTAL SOLUTION SYSTEM



### ► Reduce Construction Cost

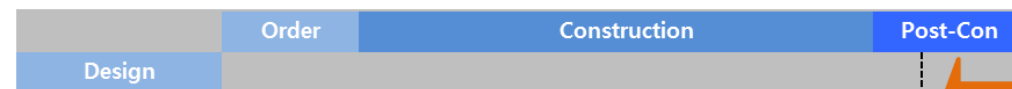
- Design Phase ; reduce cost through VE
- Construction Phase ; cost down through construction in-put cost analysis & management



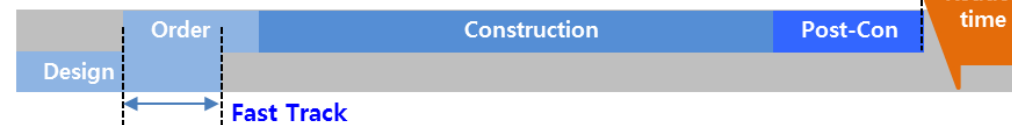
### ► Reduce the project schedule( Time management)

- Design Phase ; Reduce the design schedule through optimized design review and Fast – track through just-in-time design and the order.
- Construction Phase ; Reduce construction schedule through time management.

### Before CM application



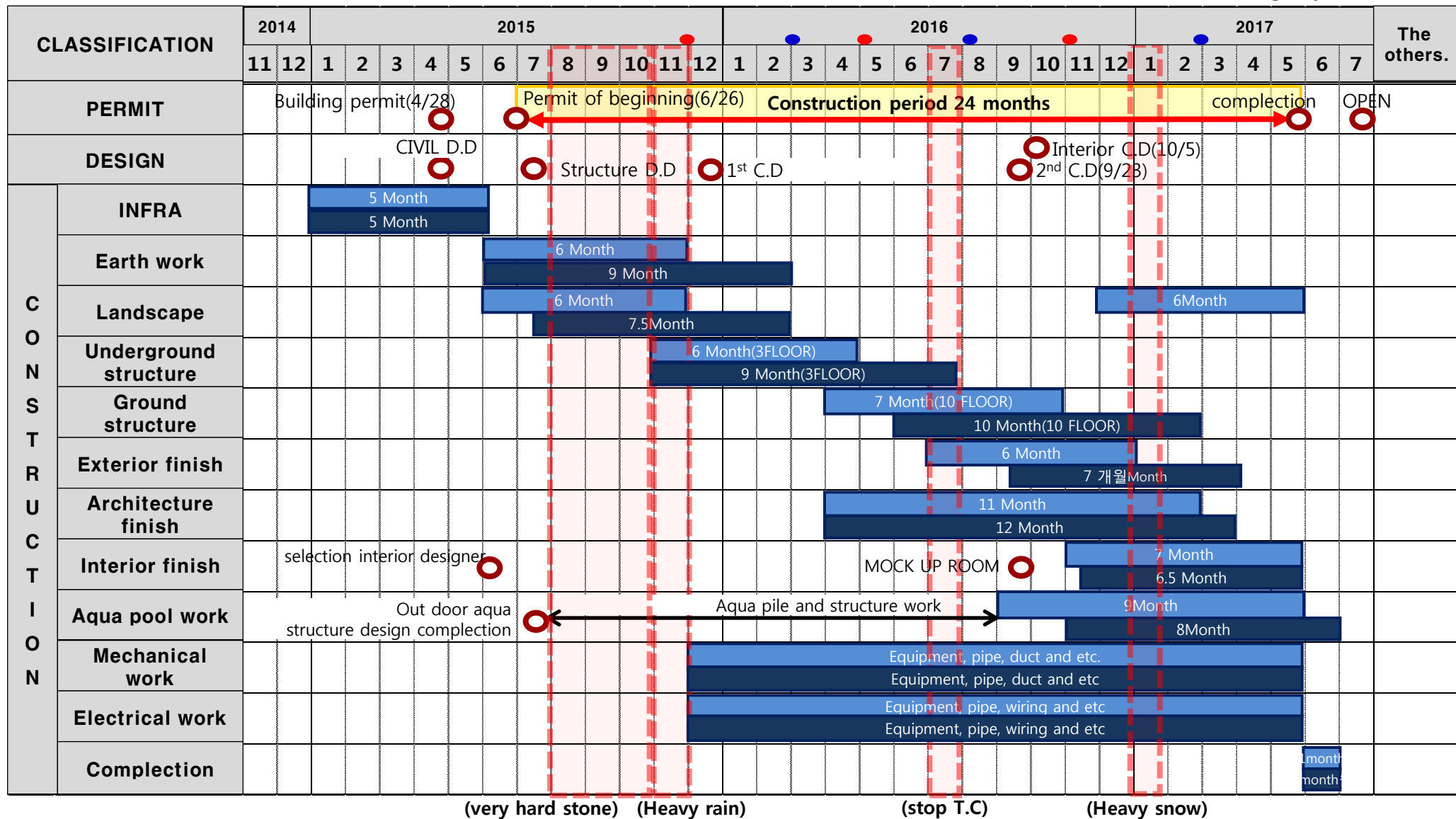
### After CM application





# Schedule

Original plan  
Changed plan



(very hard stone) (Heavy rain)

(stop T.C)

(Heavy snow)

# Construction Delay Factors\_ External factors

## (Groundbreaking permit delay)

| CLASS  | 2015 |            |                                      |   |            | 2016                                   |              |              |              |              | 2017         |              |   |   |   |   |           |  |  |           |
|--------|------|------------|--------------------------------------|---|------------|----------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|---|---|---|---|-----------|--|--|-----------|
|        | 2    | 3          | 4                                    | 5 | 6          | 3<br>quarter                           | 4<br>quarter | 1<br>quarter | 2<br>quarter | 3<br>quarter | 4<br>quarter | 1<br>quarter | 4 | 5 | 6 | 7 | 8         |  |  |           |
| Before |      | ○<br>Start | CONSTRUCTION 26Month, Dry run 2Month |   |            |                                        |              |              |              |              |              |              |   |   |   |   | ○<br>OPEN |  |  |           |
| After  |      |            |                                      |   | ○<br>Start | CONSTRUCTION 23Month, Dry run 1.5Month |              |              |              |              |              |              |   |   |   |   |           |  |  | ○<br>OPEN |



| SUN | MON | TUE | WED | THU | FRI | SAT |
|-----|-----|-----|-----|-----|-----|-----|
|     |     |     |     |     | 1   | 2   |
| 3   | 4   | 5   | 6   | 7   | 8   | 9   |
| 10  | 11  | 12  | 13  | 14  | 15  | 16  |
| 17  | 18  | 19  | 20  | 21  | 22  | 23  |
| 24  | 25  | 26  | 27  | 28  | 29  | 30  |
| 31  |     |     |     |     |     |     |

2016.07 : Tower crane was shut down 27days

| SUN         | MON        | TUE        | WED        | THU        | FRI        | SAT         |
|-------------|------------|------------|------------|------------|------------|-------------|
| 1           | 2          | 3          | 4          | 5          | 6          | 7           |
| 1 °C 14 °C  | 8 °C 17 °C | 6 °C 18 °C | 5 °C 18 °C | 9 °C 22 °C | 9 °C 14 °C | 9 °C 12 °C  |
| 8           | 9          | 10         | 11         | 12         | 13         | 14          |
| 10 °C 11 °C | 9 °C 11 °C | 8 °C 12 °C | 8 °C 11 °C | 9 °C 12 °C | 9 °C 12 °C | 10 °C 13 °C |
| 15          | 16         | 17         | 18         | 19         | 20         | 21          |
| 8 °C 19 °C  | 8 °C 14 °C | 9 °C 12 °C | 6 °C 11 °C | 6 °C 9 °C  | 5 °C 14 °C | 5 °C 12 °C  |
| 22          | 23         | 24         | 25         | 26         | 27         | 28          |
| 6 °C 10 °C  | 5 °C 8 °C  | 2 °C 6 °C  | 0 °C 5 °C  | -2 °C 4 °C | -3 °C 3 °C | -1 °C 6 °C  |
| 29          | 30         |            |            |            |            |             |

2015.11 : Due to the bad weather, the removal of the soil was delayed.



# The Strategy of Time management

Change of roof structure (RC → STEEL, overhang length adjustment(6M → 3M))

[ BEFORE ]



[ AFTER ]



- Designed RC cantilever beam with the shape of original Ulsan rock
  - ➔ Changed to steel frame construction considering construction difficulty

# The Strategy of Time management

## Exterior work change(scaffolding → gangform work)

[ BEFORE ]



[ AFTER ]



- External scaffolding plan considering various changes in face(Ulsan rock design and etc)
  - ➔ change to gang form considering period and risk of temporary(gust of wind and strong wind)
    - minimal scaffolding installation
  - ➔ external tile panel finish work, use of equipment – Thoroughly managing the schedule between the processes, such as landscaping.



# The Strategy of Time management

## Minimizing Wet work ( Brick or Block wall ) & Applying Light Weight Concrete Panel



[1py = 3.3m2]

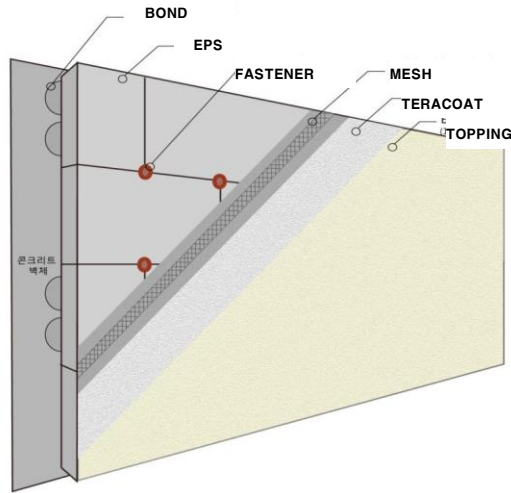
| class        | Buyeo Resort<br>(wall structure)          |        | YeongJeongdo<br>Resort ( Beam & Girder) |        |
|--------------|-------------------------------------------|--------|-----------------------------------------|--------|
|              | Quantity                                  | Per PY | Quantity                                | Per PY |
| Conc' (M3)   | 41,701                                    | 2.4    | 36,339                                  | 3.64   |
| Form (M2)    | 197,731                                   | 11.37  | 125,853                                 | 12.62  |
| Re-bar (TON) | 4,725                                     | 0.27   | 4,737                                   | 0.48   |
| class        | Jangam island castle<br>( Beam & Girder ) |        | Sokcho Resort<br>( Beam & Girder)       |        |
|              | Quantity                                  | Per PY | Quantity                                | Per PY |
| Conc' (M3)   | 107,491                                   | 2.9    | 75,922                                  | 2.64   |
| Form (M2)    | 462,501                                   | 12.48  | 300,966                                 | 10.49  |
| Re-bar (TON) | 13,448                                    | 0.36   | 8,447                                   | 0.29   |

- Applying Light Weight Concrete Panel because of aged engineer and avoiding block type wall.
- Minimizing non-bearing RC Wall because of the raising of RC cost and the needs for the reduction of construction period.

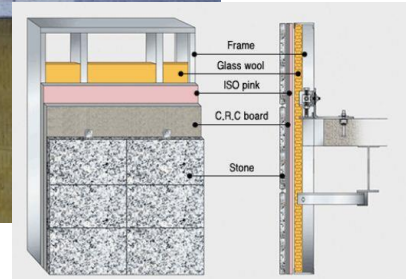
# The Strategy of Time management

## Applying for external panel system

[ before ]



[ after ]

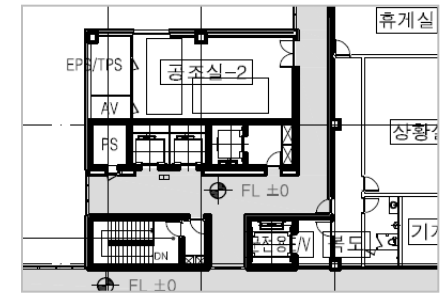
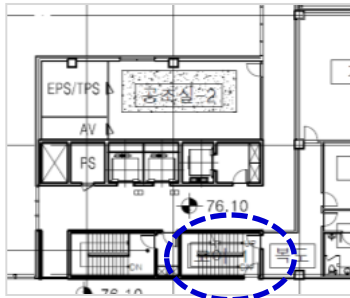
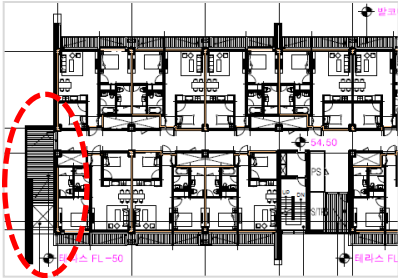
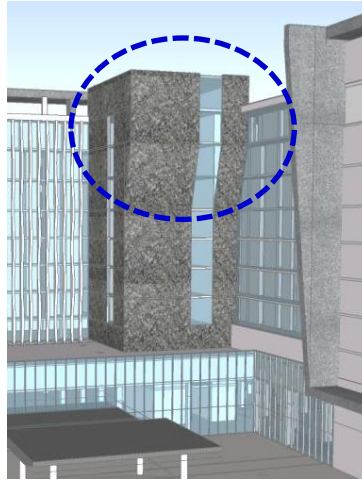


- Before : Dryvit – N/A (not applicable) : Extremely High wind pressure can blow away the wall
- After : TEC pannel system – Do not need scaffold and Shop fabrication is possible.  
( conduct mock up test for wind pressure simulation and durability )



# The Strategy of Time management

## Modifying the elevation to improve constructability



- Remove the balcony for easy application of gang form.
- Change stair to elevator to simplify the elevation line of CORE#1,#2 → simplify form work



# The Strategy of Time management

## Provision of temporary steel column and construction of upper condominium



- By applying temporary post column at banquet area, using road until main structure construction was completed.



# The Strategy of Time management

**Change rebar joint system ( coupler → gas pressure welding)**

**[ before ]**



**[ after ]**



- **Coupler type need more than 10 days for fabrication**  
: Job site → rebar factory → shop → coupler factory → Job site
- **Applying gas pressure welding, to minimize the duration – Intensive Quality management required**

# Cost management

(UNIT : KRW)

| 구 분               | Pre-estimating<br>( '15.04)                                                                                                                                                  | contract<br>( '15.08)   | 1 <sup>st</sup> change<br>( '16.12)                  | completion<br>( '17.07)                                                   | Increase and decrease<br>(complete-1 <sup>st</sup> change)                                                                                                               |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|------------------------------------------------------|---------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cost<br>(billion) | 132.0                                                                                                                                                                        | 125.0                   | 153.5                                                | 159.2                                                                     | 5.7                                                                                                                                                                      |
| Remark            | Estimating cost                                                                                                                                                              | Applying VE<br>workshop | Owner' s<br>Requirement<br>( Interior Design Change) | Change external material<br>conditions of authorization<br>Site condition |                                                                                                                                                                          |
| Cost<br>down      | <div>Pre Con Phase : 7.6 billion (5%) save<br/>(by Design review and VE Engineering)</div> <div>Construction phase : 3.3billion (2%) save<br/>( by Value Engineering )</div> |                         |                                                      |                                                                           | 1.Structural VE (rebar, conc'<br>strength, foundation system<br>review)<br>2. Review for application of<br>plain conc' at Parking area.<br>3. Review for Decoration item |



# Cost management

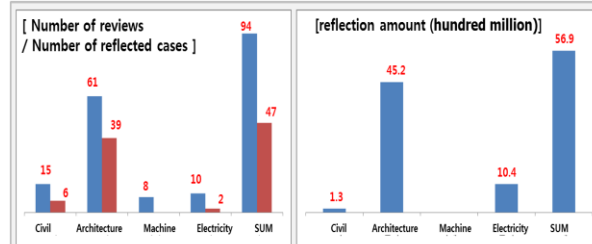
## 1. Proper cost control through similar case studies

| CLASS                    | BUYEO RESORT                                                                                                          |     | YEONGJONGDE RESORT                                                                                                                                 |     | YANGAM ISLAND CASTLE                                                                               |     | JEONSEON RESORT                                                                   |     | SOKCHO RESORT                                                                                                             |     |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------|-----|-----------------------------------------------------------------------------------|-----|---------------------------------------------------------------------------------------------------------------------------|-----|
|                          |                                      |     |                                                                   |     |                   |     |  |     |                                         |     |
| FLOOR                    | B1F, 10F(322 ROOMS)<br>3.5 STAR                                                                                       |     | B6F, 9F(201 ROOMS)<br>3 STRA                                                                                                                       |     | B3F,15F(632 ROOMS)<br>3 STAR                                                                       |     | B3F, 10F(339 ROOMS)<br>3 STAR                                                     |     | B3F, 9F(392 ROOMS)<br>4 STAR                                                                                              |     |
| LAND AREA                | 11,407 PY                                                                                                             |     | 4,411 PY                                                                                                                                           |     | 11,811 PY                                                                                          |     | 3,938 PY                                                                          |     | 21,234 PY                                                                                                                 |     |
| BUILDING AREA            | 3,755 PY                                                                                                              |     | 782 PY                                                                                                                                             |     | 2,308 PY                                                                                           |     | 949 PY                                                                            |     | 3,393 PY                                                                                                                  |     |
| GROSS AREA               | 17,393 PY                                                                                                             |     | 9,982 PY                                                                                                                                           |     | 37,064 PY                                                                                          |     | 12,448 PY                                                                         |     | 28,685 PY                                                                                                                 |     |
| PERIOD                   | '09.01 ~ '10.07 (19month)                                                                                             |     | '06.10 ~ '08.09 (24month)                                                                                                                          |     | '06.08 ~ '09.06 (35month)                                                                          |     | '07.05 ~ '09.09 (29month)                                                         |     | 15.05 ~ '17.05 (25month)                                                                                                  |     |
| TOTAL COST (BILLION KRW) | 79                                                                                                                    | 455 | 61                                                                                                                                                 | 615 | 172                                                                                                | 464 | 61                                                                                | 494 | 159                                                                                                                       | 567 |
| THE OTHERS               | • INDOOR AQUA 1,135 PY<br>• INCLCUD ATTRACTION<br>• INCLCUD KOREA<br>• TRADITIONAL CORROIDR<br>• INDIRECT COST 14.42% |     | • FLOOR : B6F, 9F<br>• COST UP : TOURIS AREA, FOREST CUT SOIL AND ROCK GROUND<br>• AQUA 2,090PY<br>• EXCEPT BANQUET FINISH<br>• INCLCUD ATTRACTION |     | • INDOOR AQUA 4,750PY<br>• OUTDOOR AQUA 3,270PU<br>• FINISH SPEC LEVEL LOW<br>• INCLCUD ATTRACTION |     | • INCLCUD SAUNA FACILITY                                                          |     | • INDOOR AQUA 3,220PY<br>• OUTDOOR AQUA 1,450PY<br>• INCLCUD INFRA ROAD<br>• INCLCUD ATTRACTION<br>• INDIRECT COST 17.74% |     |

## 3. To reduce investment costs Work Shop – considering business feasibility

| CLASS        | Number of reviews | Number of reflected cases | reflection amount (hundredmillion) | Hold count |
|--------------|-------------------|---------------------------|------------------------------------|------------|
| Civil        | 15                | 6                         | ▼ 1.3                              | 9          |
| Architecture | 61                | 39                        | ▼ 45.2                             | 22         |
| Machine      | 8                 |                           |                                    | 8          |
| Electricity  | 10                | 2                         | ▼ 10.4                             | 8          |
| SUM          | 94                | 47                        | ▼ 56.9                             | 47         |

- Hold count(parking area finish change and etc 46cases) : Application step by step after checking construction cost trends

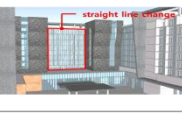


## 2. Design Pre View – design adjustment, reflects standard manual

| REVIEW CONTENTS                                                          |
|--------------------------------------------------------------------------|
| 1. Slab Construction Review : PLWOOD → DECK PLATE                        |
| 2. Review of North-Side Retaining Wall Structures : CIVIL → ARCHITECTURE |
| 3. Review of FOUNDATION Structures                                       |
| 4. Structural Material Review                                            |
| 5. External Insulation Material Review                                   |
| 6. Design Load Review                                                    |
| 7. A Study on the Application of Non-Steel Concrete to Parking Lot       |
| 8. Non-resisting RC wall review                                          |
| 9. Insulation review                                                     |
| 10. Review VE Repetitions                                                |

## 4. Design / Construction Value engineering

| REVIEW CONTENTS                                       |
|-------------------------------------------------------|
| 1. Landscape Wood Deck Change                         |
| 2. Bicycle storage, changing fences                   |
| 3. Change foundation slab steel arrangement           |
| 4. concrete strength adjustment                       |
| 5. Changing the partition on the third basement level |
| 6. Review of the Waterproofing of the Bottom          |
| 7. Delete Terrace#2                                   |
| 8. Hotel Core Elevation Change                        |

| REVIEW     | Change and height adjustment of the exterior finish of the indoor aqua                                                                                                                                                                                                                      | Reviewer                                                                                       | CM Kim Hana |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-------------|
| CONTENTS   | ORIGINAL<br>                                                                                                                                                                                              | CHANGE<br>  |             |
| COST       | ETFE(double air membrane structure), maximum height 19M<br>Reduction 9 hundred million                                                                                                                                                                                                      | roof panel + C/W, maximum height 17M<br>Constructability 1 Quality 1                           |             |
| THE OTHERS | 1. Deleting design-specific elements- No Domestic Construction Cases, Construction costs rise due to monopoly, difficult to maintain in the form of membrane structure<br>2. Change to the most common form(CW+ROOF PANEL). Reduce construction costs and ensure a certain level of quality |                                                                                                |             |
| REVIEW     | Hotel Front Curtain Wall Decorative BAR Change                                                                                                                                                                                                                                              | Reviewer                                                                                       | CM Kim Hana |
| CONTENTS   | ORIGINAL<br>                                                                                                                                                                                             | CHANGE<br> |             |
| COST       | Reflected by decorative BAR curves<br>Reduction 0.15 hundred million                                                                                                                                                                                                                        | Reflects with decorative bar straight lines<br>Constructability 1 Quality 1                    |             |
| THE OTHERS | 1. Some design changes are made to the extent that they do not affect the overall exterior elevation design                                                                                                                                                                                 |                                                                                                |             |

**LOTTE GROUP  
MISSION**

We enrich people's lives by providing  
superior products and services that  
our customers love and trust

**LOTTE**