

# ConsMa 2016 Case Study

## CM service for Sejeong National Research Complex

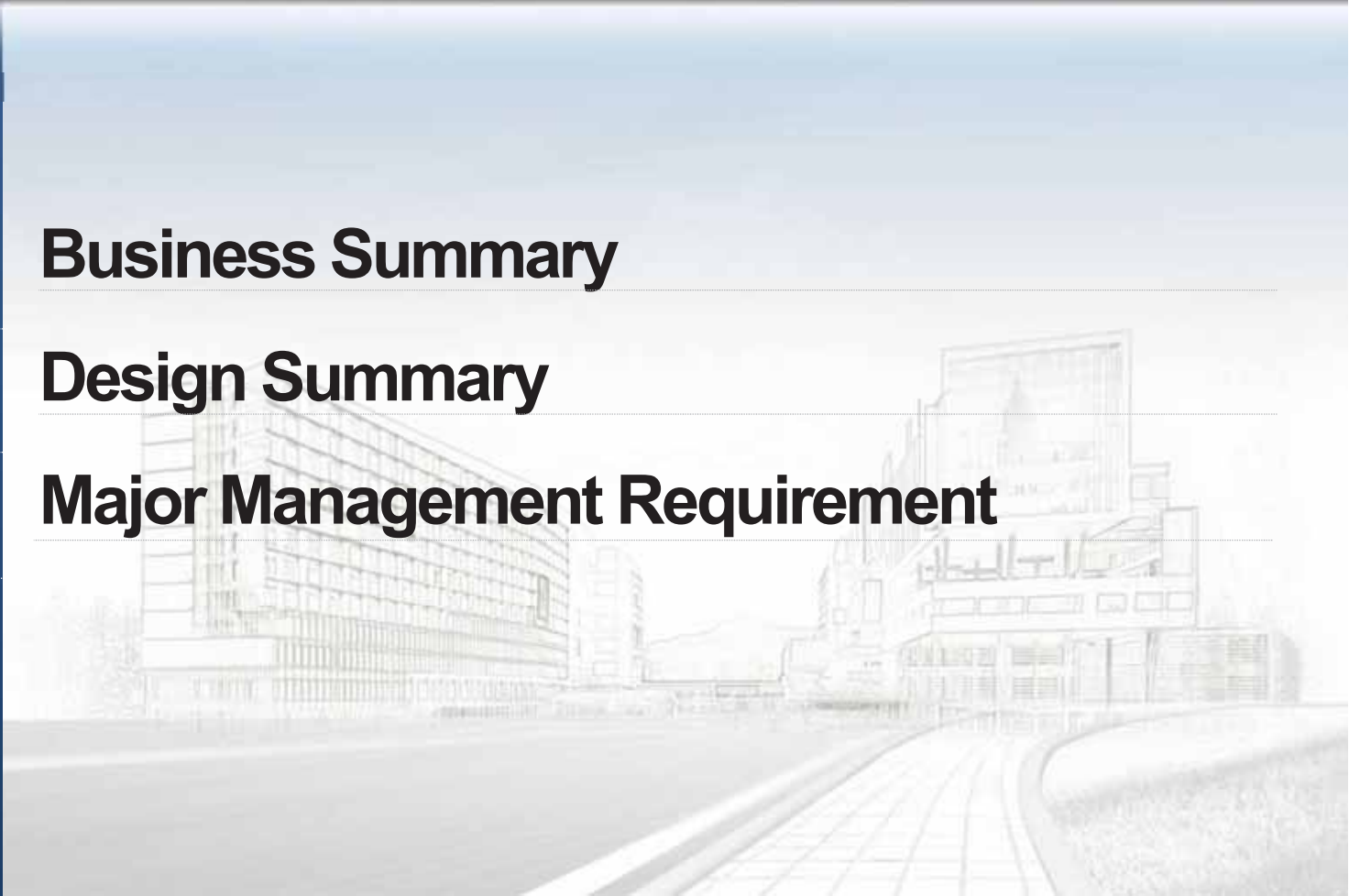
2016. 03. 14.



**heerim**  
Architects & Planners

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# Business Summary



According to Government's Multifunction Administrative City development plan, Sejeong National Research Compound development was planned to consolidate 12 out of 16 scattered government sponsored research institutes in into one complex.





## Research Support Bldg.

- 1~2 Fl. Common use facility
- 3~5 Fl. Offices(Lease)
- 6~7 Fl. National Science and Tech Research Council
- 8~9 Fl. Economics, Humanities and Social Research Council

## Science Infra Bldg.

- 1~5 Fl. Korea Traffic research Institute
- 6~8 Fl. Science & Tech. Policy Institute
- 9~12 Fl. Korea Environment Policy evaluation Institute

## Economic Policy Bldg.

- 1~4 Fl. Korea Institute of International Economic Policy
- 5, 8 Fl. Spare room
- 6~7 Fl. Korea Labor Institute
- 9~12 Fl. Industry research Institute

## Social Policy Bldg.

- 1~5 Fl. Korea Institute for Health and Social Affairs
- 6~7 Fl. Korea Youth Policy research Institute
- 8~12 Fl. Korea Vocational Education and Training Research Institute





## Sejeong National Research Compound

**Location:** Sejeong City Bangokdong  
(4-1 Living zone, Research 4-4 Block)

**Area:** 71,657.00 m<sup>2</sup>

**Bldg. Area:** 17,761.1 m<sup>2</sup>

**Gross Floor Area:** 128,728.77 m<sup>2</sup>

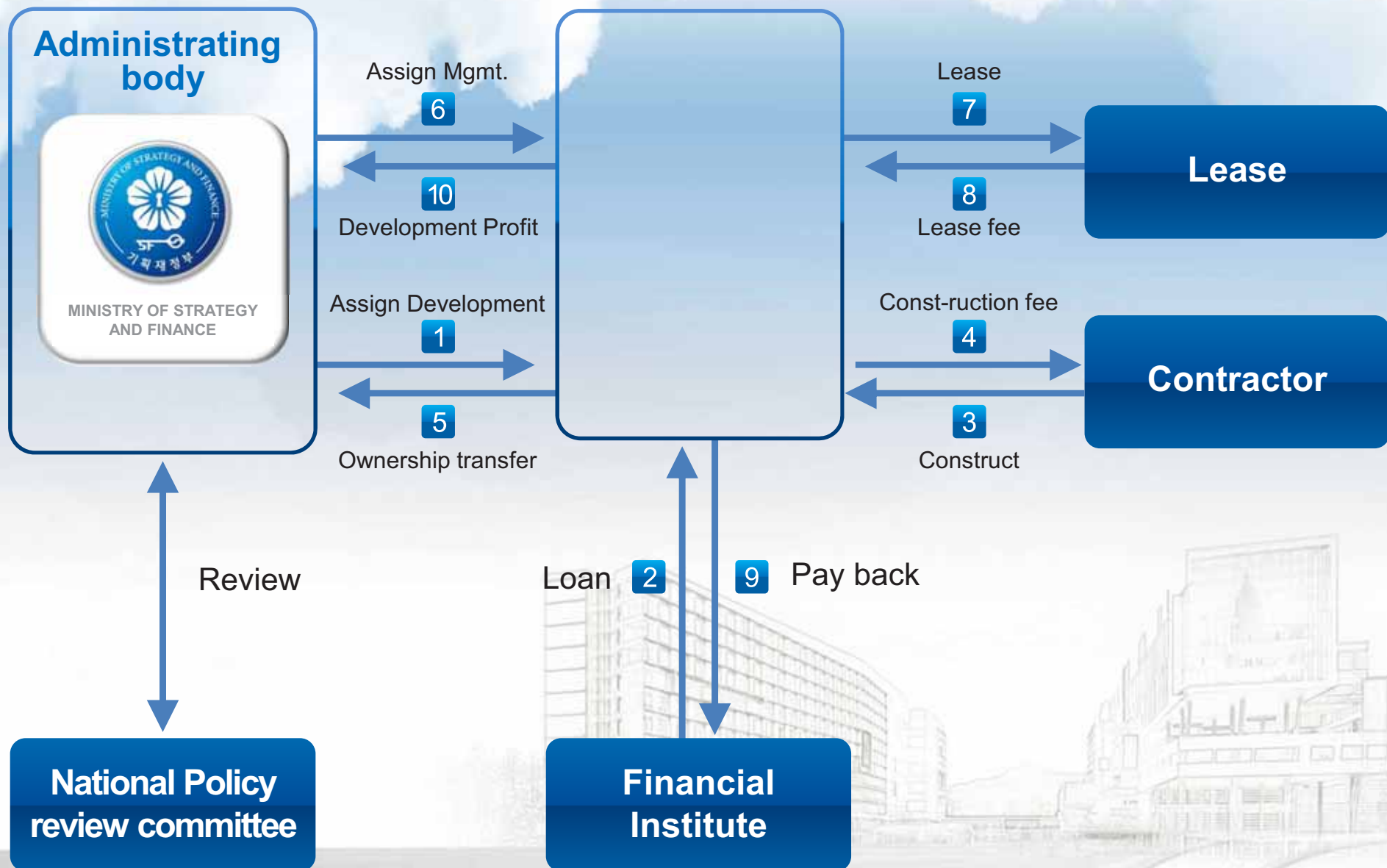
**Usage:** Education Research, Office, Neighborhood support center

**Floor Area Ratio:** 136.23%

**Floors:** 12 Fl./ B2

**Parking:** 846







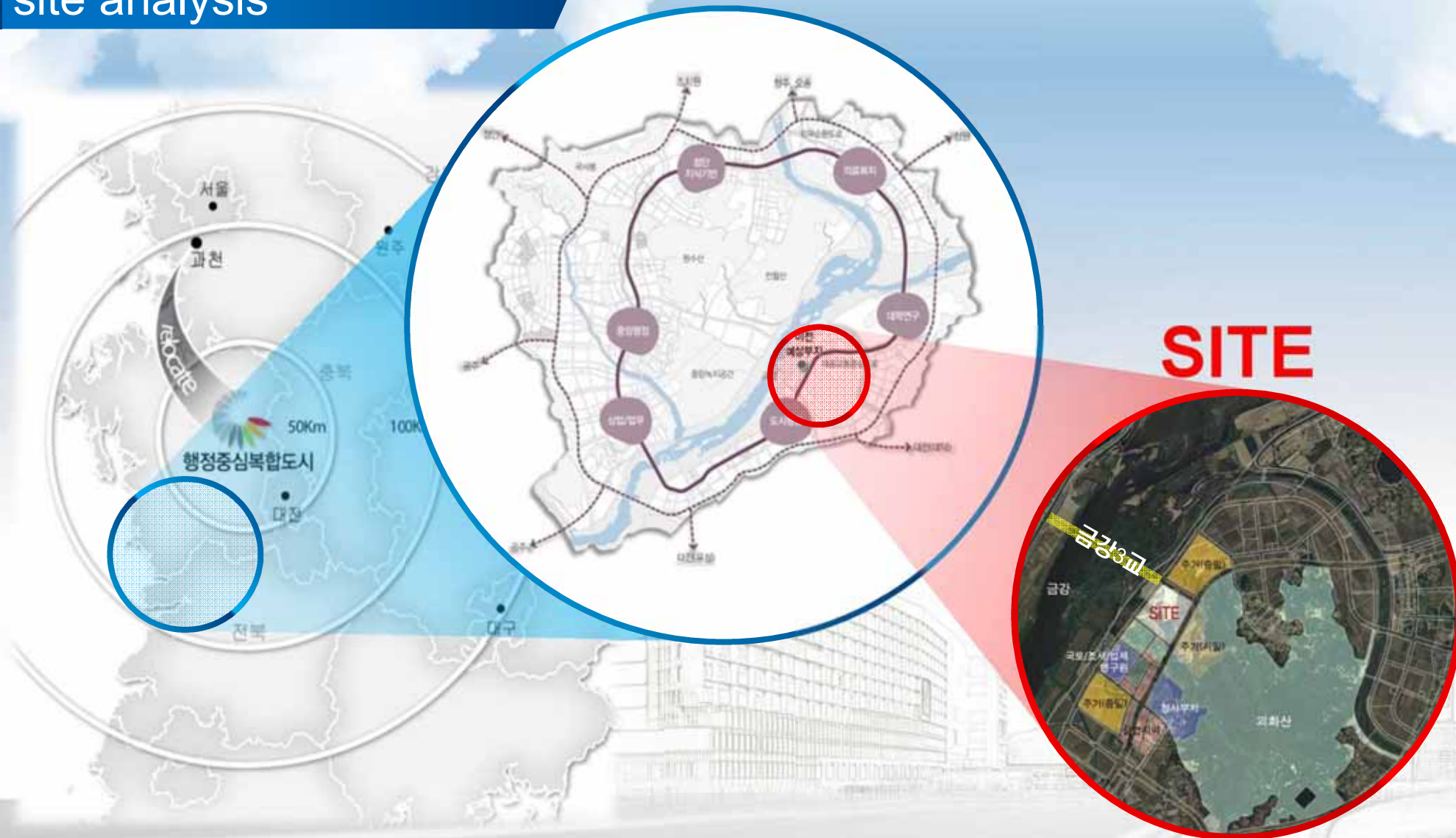


## Design Summary





## Regional and Sejeong City site analysis





# Design Summary\_ Master Plan



## Arrangement with similar views

- Obtain uniform Solar Exposure with proper distance.
- Promote smooth wind path; brining in cool air from Gum river

Within 7 deg. from true south

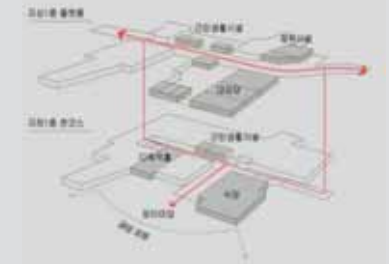


Within 42 deg. from true south

Within 45 deg. from true south

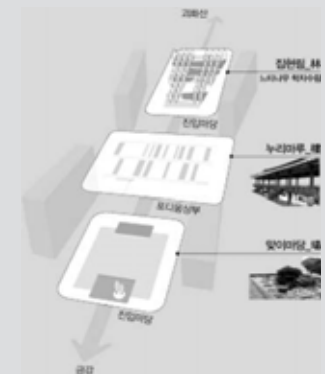
## Neighborhood amenities provided for active use of Facility

- Place Neighborhood amenities within pedestrian path
- Conte to dtribueveloping a local community engagements by connecting to welcoming courtyard



## Yard plan reflects the traditional hierarchy

- Enable cultural exchanges with residents in connection with a nearby park
- Provide retreat for researchers and community





## DESIGN STRATEGY

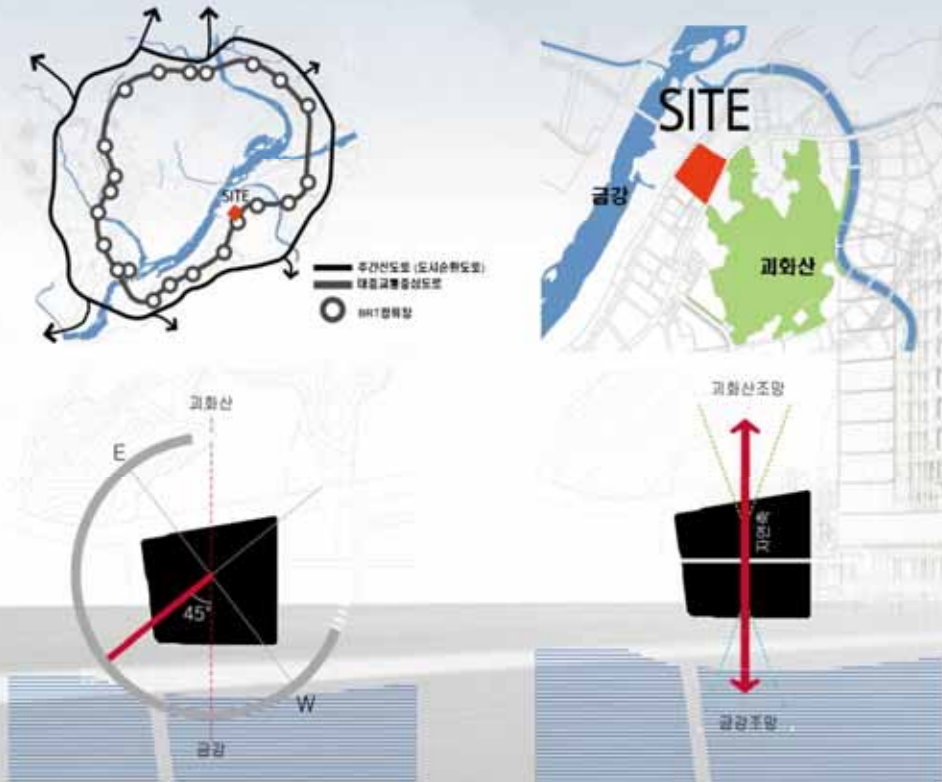
Design strategy was to plan the design process that contain 12 planned elements for 12 research institutions.

A set of two axis that conform to the city and nature was planned into two solid platforms where visitors can come to a common area of the facilities to promote greater knowledge. On top of the platform, 4 creative tubes resides where creative synergy can be promoted by interaction of 4 buildings.

## CONTEXT

The site located on urban axis of Sejeong city and Nature axis of Gum river and Gwawha Mountain with 45 degree offset from true north, receives same amount of sun exposure without restriction of building's placements.

The view is parallel direction with Kum River, the frontal placement causes ununiformed views that is not in compliance with Sejeong city's plan. However, the diagonal placement will allow unobstructed panoramic view, even of Goi Mountain. The open planning allowed proper setting for research while connecting pathways with nature's own flow.



## REQUIREMENT

세종시 도시구조 및 자연환경과 조화로운 새로운 랜드마크

기관별 독립성과 상호유기적 연계

12개 연구기관별 독립성 유지

유연하고 창조적인 연구공간 제공

## SOLUTION

### 2 AXIS 배치

세종시의 도시축과 자연축을 이어주는 '열린 배치'

### 2 PLATFORM 지층부

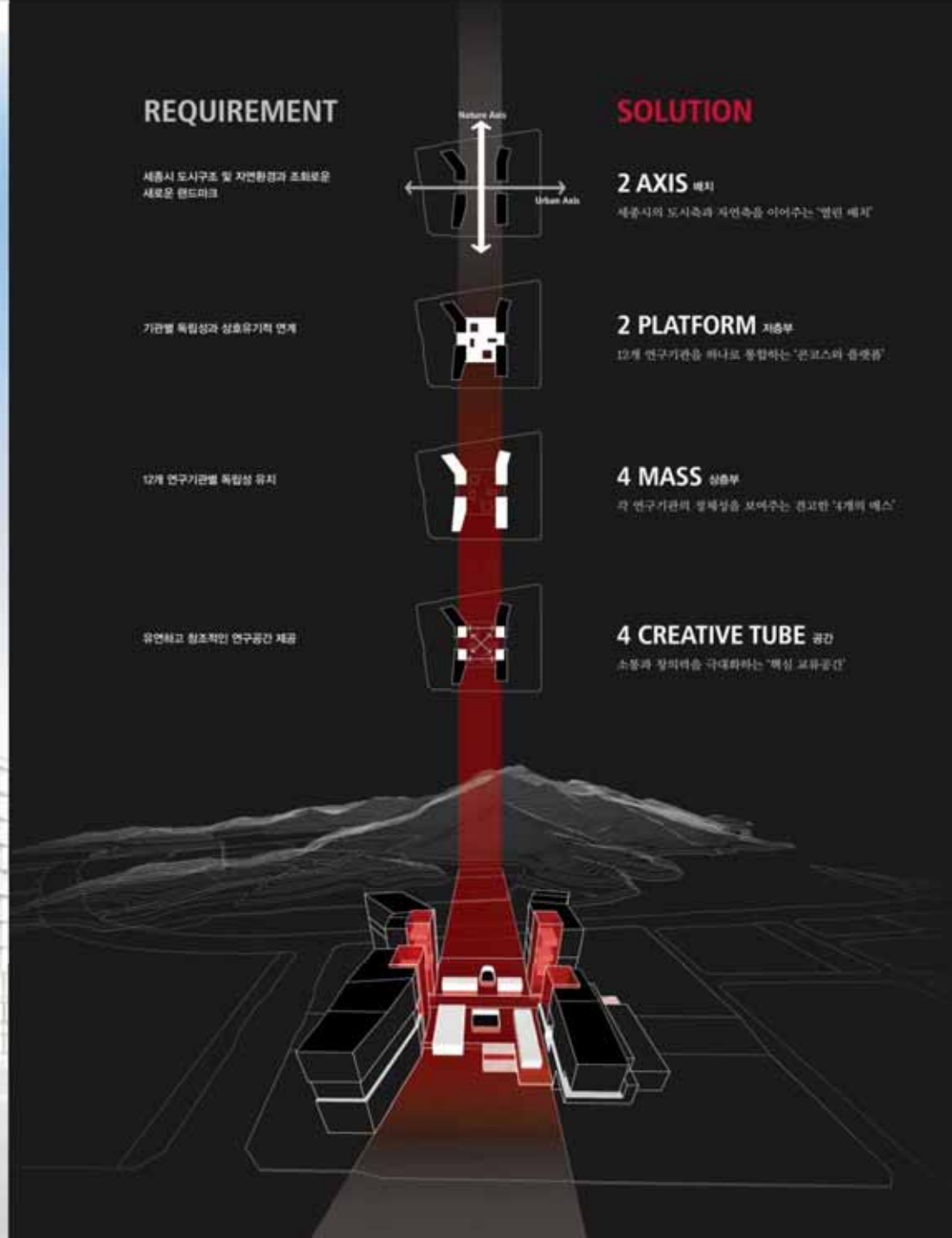
12개 연구기관을 하나로 통합하는 '콘크리트 플랫폼'

### 4 MASS 상층부

각 연구기관의 정체성을 보여주는 견고한 '4개의 벽'

### 4 CREATIVE TUBE 공간

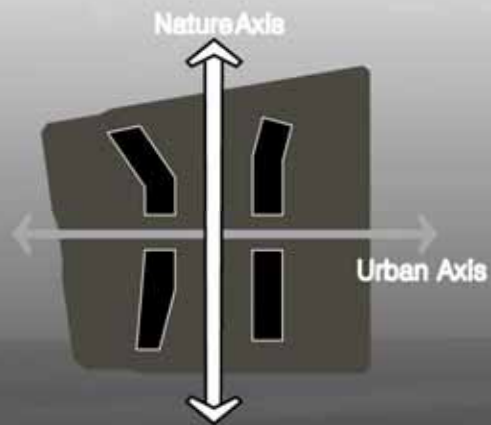
수용과 창의력을 극대화하는 '혁신 교류공간'





## 2 AXIS

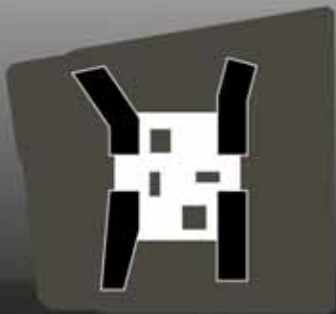
Urban Axis that follows Sejeong city's pedestrian path and Nature Axis that connects Gum River's water side and Goiwha mountain's green terrain.





## 2 PLATFORM

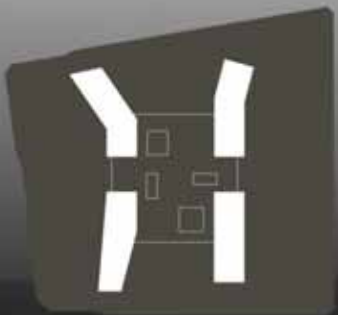
By connecting all users in urban and nature axis, B1 Platform becomes a one communication space for all 12 research institutes.





## 4 MASS

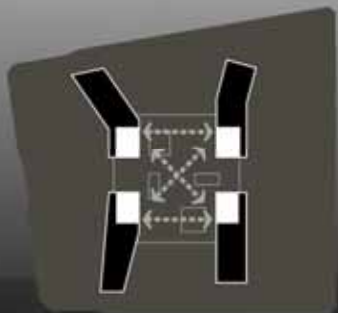
4 Masses displaying the identity of each of the research building, by architecturally considering the functional characteristics of the 12 research institutes.





## 4 CREATIVE TUBE

Creative space that is responsible for the rapture and exchanges of researchers to ensure an interactive space between 4 buildings



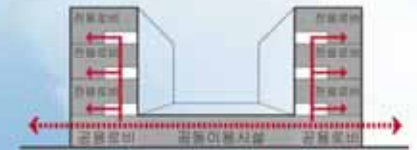


# Design Summary\_ Special Feature



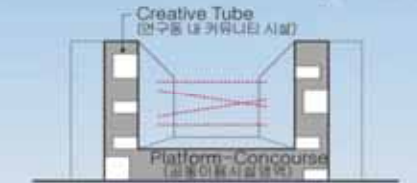
## Independent Research bldg.

Through Common area and vertical separation



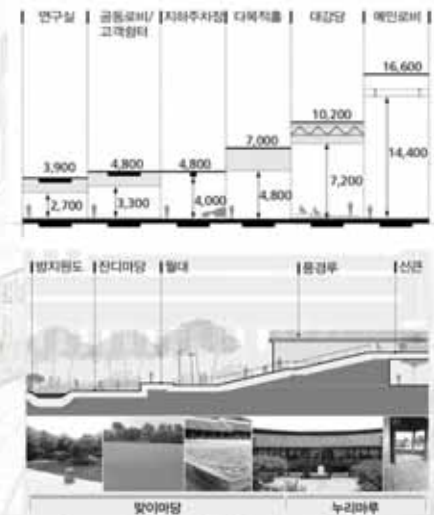
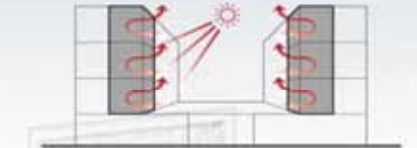
## Independent Research bldg.

Encourage synergy through common area and vertical connectivity



## Independent Research bldg.

Creative Tube with open design for max. natural light and ventilation





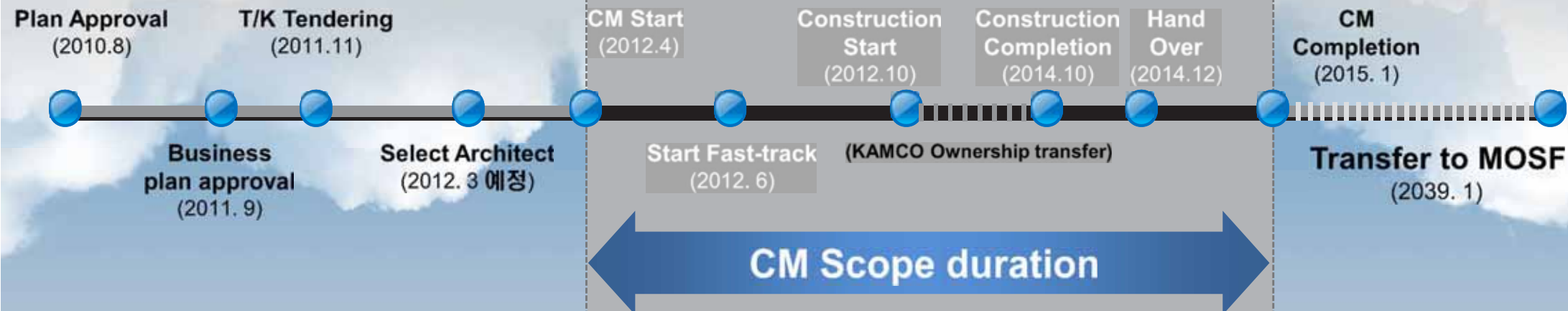


## Major Management Requirements





# Project Schedule Management



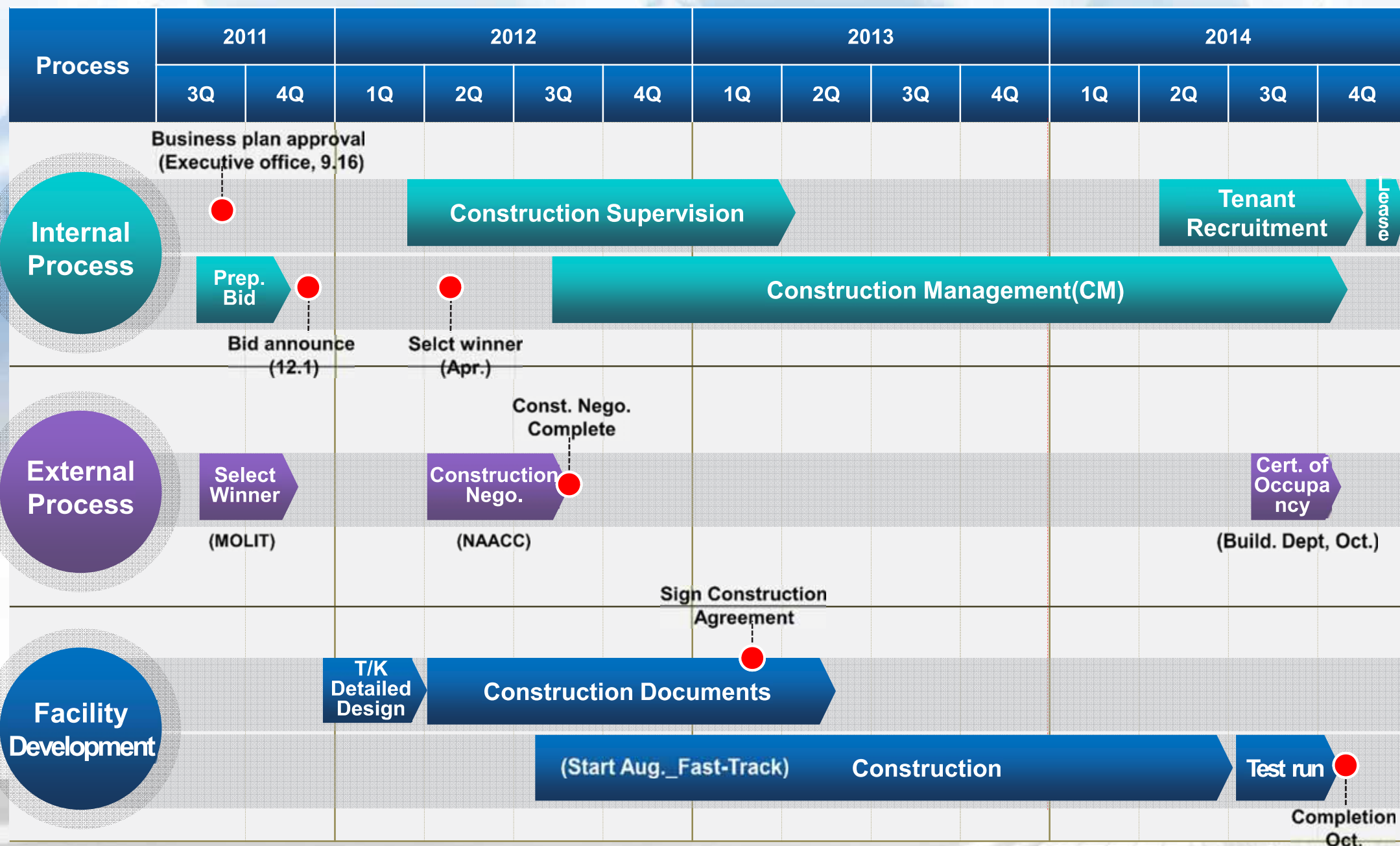


## Various Requirement by Numerous Institutes

| No | Requests                                               | Policy Research Management Support Bldg. |                          |                    | Natural Infra & Science technology policy research |                            |                              | Welfare & Human resource Research |                       |                | Economic Policy Research      |                |                     |
|----|--------------------------------------------------------|------------------------------------------|--------------------------|--------------------|----------------------------------------------------|----------------------------|------------------------------|-----------------------------------|-----------------------|----------------|-------------------------------|----------------|---------------------|
|    |                                                        | Industrial Techno-logy                   | Fundame-ntal Technolo-gy | Econ. Social study | Traffic research                                   | Science Techno-logy Policy | Env. Policy Assess. Research | Social Welfare Research           | Youth Policy Research | Job skill Dev. | Foreign Econ. Policy Research | Labor Research | Industrial Research |
| 1  | Install Conference Microphones for Common use facility | ●                                        | ●                        | ●                  | ●                                                  | ●                          | ●                            | ●                                 | ●                     | ●              | ●                             | ●              | ●                   |
| 2  | Install CCTV and AV for Childcare facility             | ●                                        | ●                        | ●                  | ●                                                  | ●                          | ●                            | ●                                 | ●                     | ●              | ●                             | ●              | ●                   |
| 3  | Security System for Elev. Hall                         | ●                                        | ●                        | ●                  | ●                                                  | ●                          | ●                            | ●                                 | ●                     | ●              | ●                             | ●              | ●                   |
| 4  | Install Conf. Rm. Microphone for all facilities        | ●                                        | ●                        |                    | ●                                                  | ●                          | ●                            | ●                                 | ●                     | ●              | ●                             | ●              | ●                   |
| 5  | Install Conf. Rm. furniture for each facilities        |                                          |                          |                    | ●                                                  | ●                          | ●                            | ●                                 | ●                     | ●              | ●                             | ●              | ●                   |
| 6  | Install Conf. Rm. Projector Screen                     | ●                                        | ●                        |                    | ●                                                  | ●                          | ●                            | ●                                 | ●                     | ●              | ●                             | ●              | ●                   |
| 7  | Config. Independ. Network for each facilities          | ●                                        | ●                        | ●                  | ●                                                  | ●                          | ●                            | ●                                 | ●                     | ●              | ●                             | ●              | ●                   |
| 8  | Install Exchanger for each facilities                  | ●                                        | ●                        | ●                  | ●                                                  | ●                          | ●                            | ●                                 | ●                     | ●              | ●                             | ●              | ●                   |
| 9  | Comm. Rm for each Exchanger                            | ●                                        | ●                        | ●                  | ●                                                  | ●                          | ●                            | ●                                 | ●                     | ●              | ●                             | ●              | ●                   |
| 10 | Change to cascading auditorium in common use area      |                                          |                          |                    | ●                                                  | ●                          | ●                            | ●                                 | ●                     | ●              | ●                             | ●              | ●                   |
| :  | :                                                      |                                          |                          |                    |                                                    |                            |                              |                                   |                       |                |                               |                |                     |
| 77 | Install Card reader in important record room           |                                          |                          |                    |                                                    |                            |                              |                                   |                       |                |                               |                | ●                   |

**77 Design Change requests occurred**

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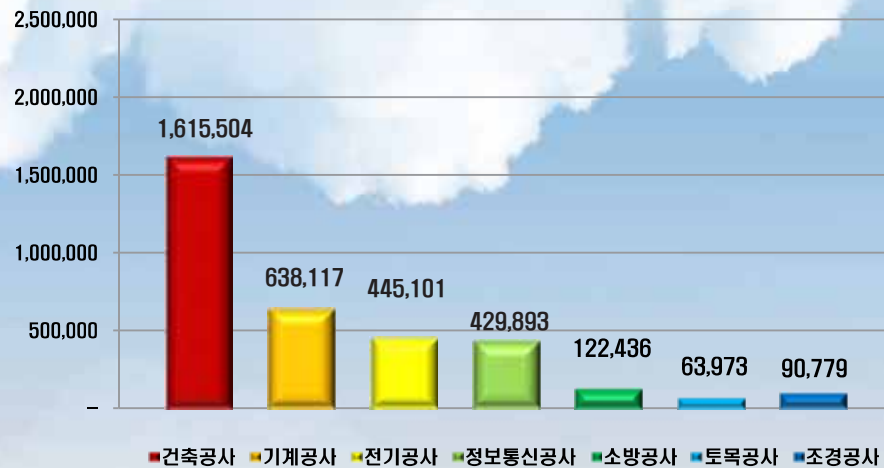




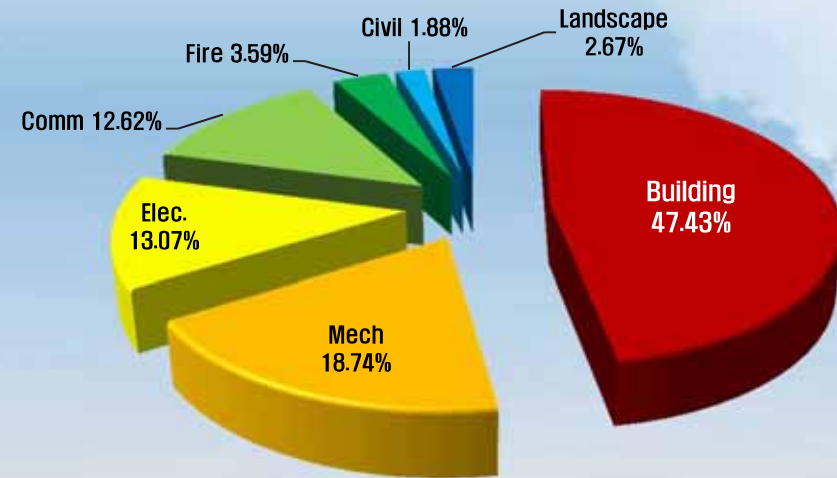
# Budget Adequacy Management

unit : ₩

## Cost per Pyung by Trade



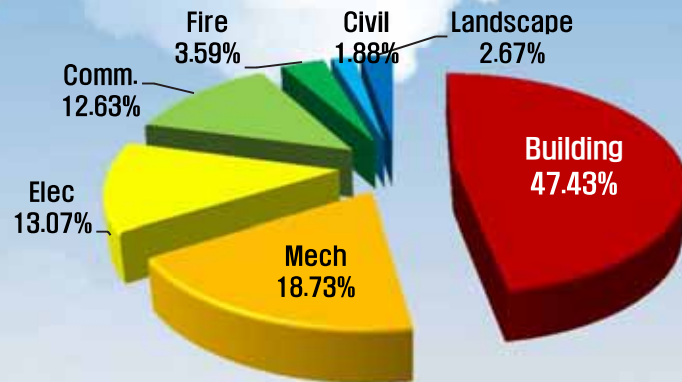
## % per Trade



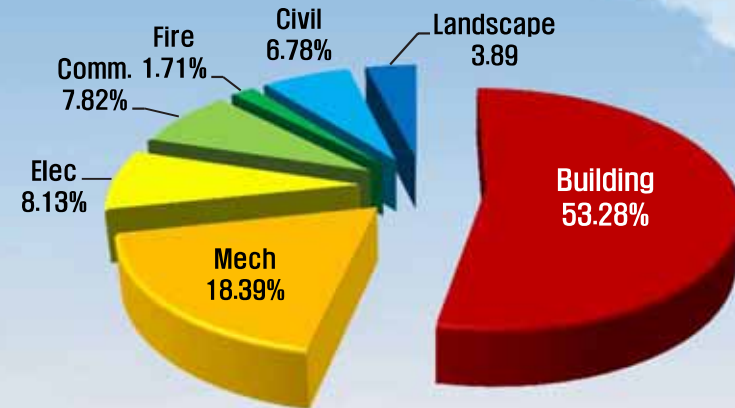
| Category          |           | Const. Cost     | Cost per Pyung | Percentage (%) |
|-------------------|-----------|-----------------|----------------|----------------|
| DIRECT COST       | Building  | 57,521,464,000  | 1,615,504      | 47.43%         |
|                   | Mech.     | 22,720,731,000  | 638,117        | 18.74%         |
|                   | Elec.     | 15,848,222,000  | 445,101        | 13.07%         |
|                   | Comm.     | 15,306,734,000  | 429,893        | 12.62%         |
|                   | Fire      | 4,359,439,000   | 122,436        | 3.59%          |
|                   | Civil     | 2,277,828,000   | 63,973         | 1.88%          |
|                   | Landscape | 3,232,274,000   | 90,779         | 2.67%          |
| Total Direct Cost |           | 121,266,692,000 | 3,405,803      | 100.00%        |
| Indirect Cost     |           | 46,073,228,983  | 1,293,971      | -              |
| Total Const. cost |           | 167,339,920,983 | 4,699,759      | -              |

## Status rate by trade

Ratio by Work Type in Leasing Office



Ratio by Work Type in Transfer Office



## Rate comparison by trade

| Categories | Leased Complex | Other Projects | Difference |
|------------|----------------|----------------|------------|
| Building   | 47.43%         | 53.28%         | -5.85%     |
| Mech       | 18.73%         | 18.39%         | 0.34%      |
| Elec       | 13.07%         | 8.13%          | 4.94%      |
| Comm.      | 12.63%         | 7.82%          | 4.81%      |
| Fire       | 3.59%          | 1.71%          | 1.88%      |
| Civil      | 1.88%          | 6.78%          | -4.90%     |
| Landscspe  | 2.67%          | 3.89%          | -1.22%     |



## Major Permit and Approval Dates

Time  
Table

|            |                                                                                                     |
|------------|-----------------------------------------------------------------------------------------------------|
| 2012.05.09 | Meeting with LH and Residential Dept.<br>of Construction Agency                                     |
| 2012.05.29 | Preliminary engagement with Resident Dept.<br>of Construction Agency regarding Architectural Review |
| 2012.06.01 | Submission of Review Application to<br>Construction Agency                                          |

2012.06.21 **Review by Construction Agency**

2012.06.29 Agreement signed for Priority Construction

2012.07.27 Apply for Architectural negotiation

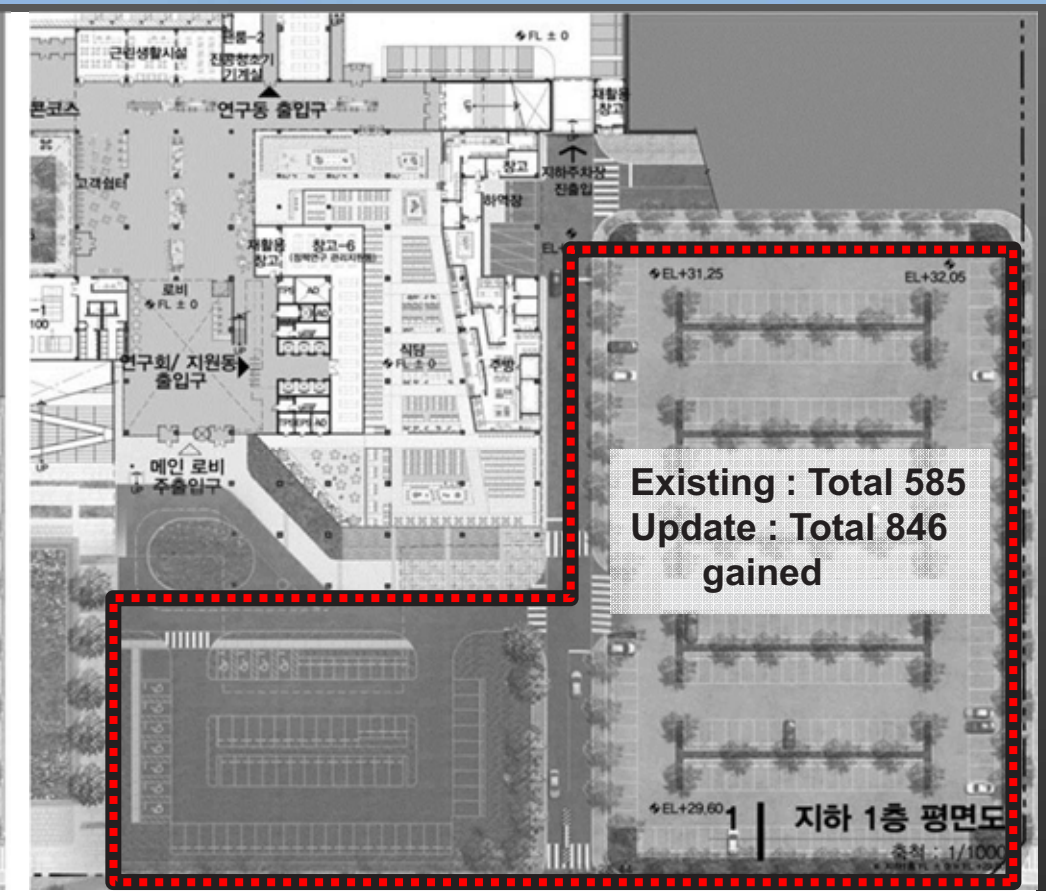
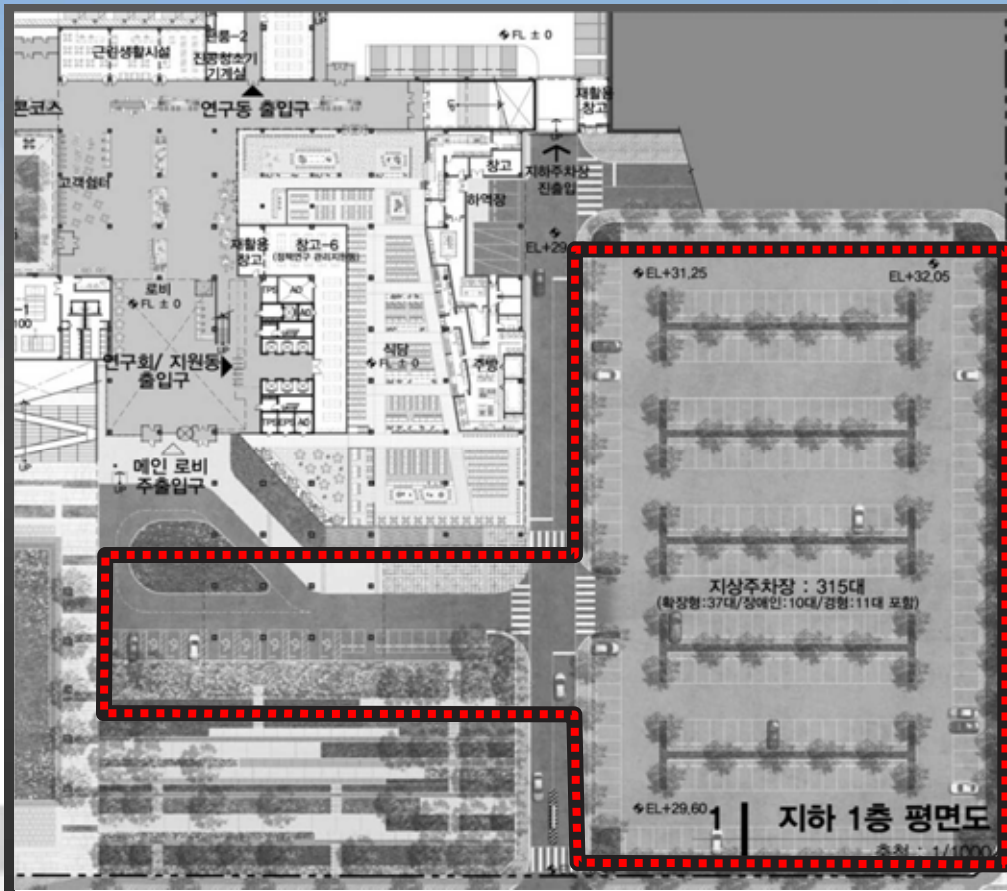
2012.08.09 **Architectural negotiation complete**

2012.12.12 Construction Document review complete

## Architectural Review Highlights (Architecture)

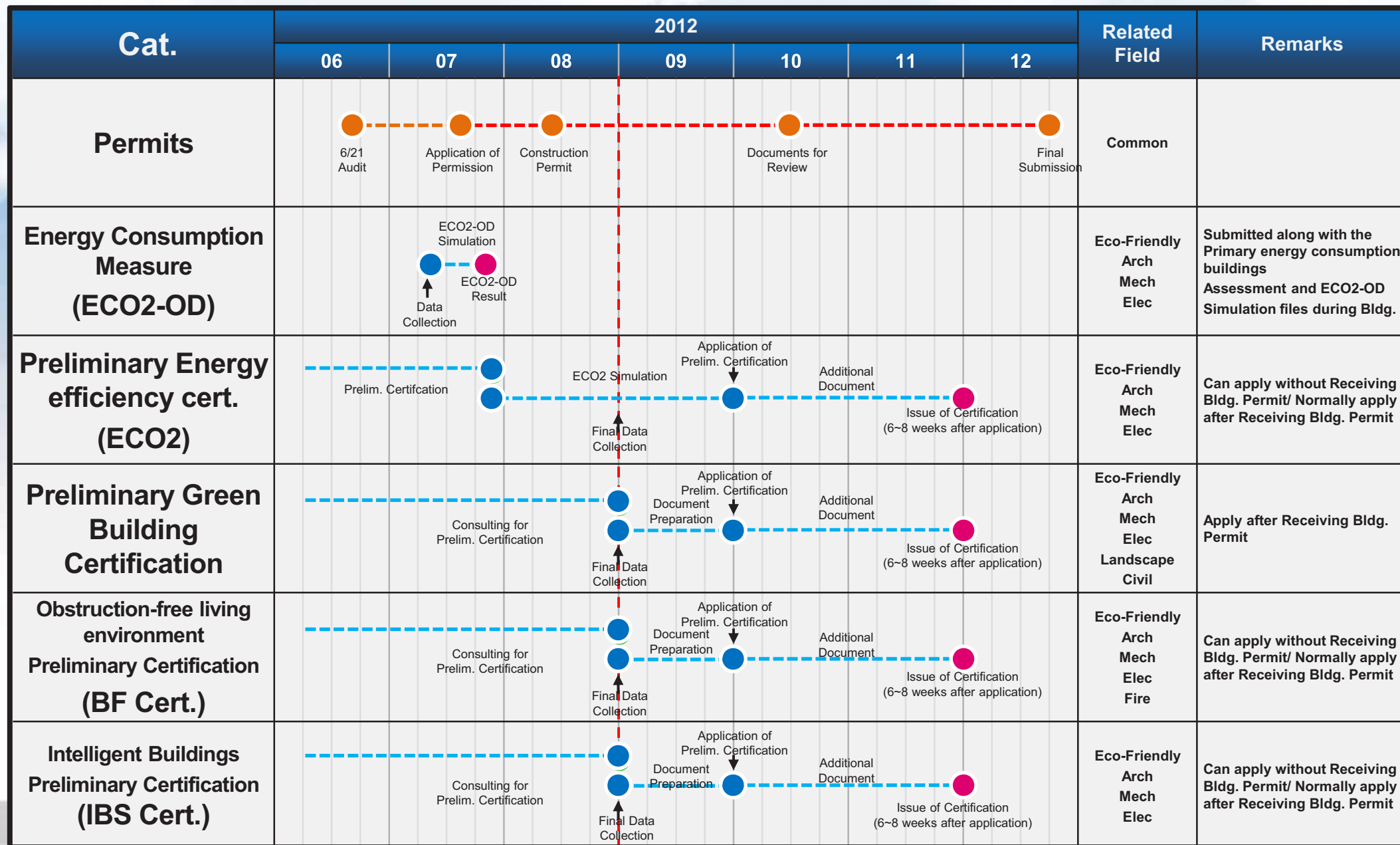
Request for Additional  
Required Parking spaces

Gained Add. 585 Spaces by increasing Policy  
Research Management bldg. Front Parking area.  
(Secured 650 / 147% req. spaces)





# Various Certifications.



# Various Certifications

- ECO2-OD : MOLIT total Energy Consumption simulation (submit simulation file when applying for permit, no legal or tender criteria)
- ECO2 : Building energy efficiency rating Simulation (Tender Instructions: Ratings 1)

| Divisions                       |                      | ECO2-OD                                                                                                                                                                                            | ECO2                                                                                                                                                                                                                                                                                                   |
|---------------------------------|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Arch                            | Exterior performance | <ul style="list-style-type: none"> <li>• SHGC rate for each parts (exterior walls, roofs, floors lowest floor, windows and doors)</li> <li>• Solar Heat-Gain coefficient (SHGC)</li> </ul>         | <ul style="list-style-type: none"> <li>• SHGC rate for each parts (exterior walls, roofs, floors lowest floor, windows and doors)</li> <li>• Solar Heat-Gain coefficient (SHGC)</li> <li>• Insulation location, type of structure</li> </ul>                                                           |
|                                 | Louver               | <ul style="list-style-type: none"> <li>• Shades type and length</li> </ul>                                                                                                                         | <ul style="list-style-type: none"> <li>• Shades type and length</li> <li>• Blind installation status, position, angle, colors etc.</li> </ul>                                                                                                                                                          |
| Mech                            | Heating system       | <ul style="list-style-type: none"> <li>• system type, capacity, efficiency, power pumps, pipe length, Fuel</li> </ul>                                                                              | <ul style="list-style-type: none"> <li>• System type,, Power Pumps, pipe length, Fuel</li> <li>• Supply / return temperature, using a refrigerant, piping pressure loss, etc.</li> </ul>                                                                                                               |
|                                 | A/C system           | <ul style="list-style-type: none"> <li>• Air conditioner Resources (Ventilation system, heating and cooling supply air temperature, air supply and exhaust air flow and fan efficiency)</li> </ul> | <ul style="list-style-type: none"> <li>• HVAC and exhaust fans Resources (Ventilation system, heating /cooling supply air temperature, air supply and exhaust air flow and fan efficiency)</li> <li>• Other data relating to heating /cooling unit (Unit installation, control system, etc)</li> </ul> |
| Elec                            | Lumen Density        | <ul style="list-style-type: none"> <li>• Average Lumen density for whole building</li> </ul>                                                                                                       | <ul style="list-style-type: none"> <li>• Lumen Density for each room</li> </ul>                                                                                                                                                                                                                        |
| Green Energy                    | Geothermal           | <ul style="list-style-type: none"> <li>• eat pump capacity, COP, power pumps</li> </ul>                                                                                                            | <ul style="list-style-type: none"> <li>• Heat pump capacity, COP, power pump (primary / secondary classification)</li> <li>• Heat exchanger and expansion tank if installed</li> </ul>                                                                                                                 |
|                                 | Solar PV             | <ul style="list-style-type: none"> <li>• Module size and type, installation angle, orientaion</li> </ul>                                                                                           | <ul style="list-style-type: none"> <li>• Module size and type, installation angle, orientation</li> </ul>                                                                                                                                                                                              |
|                                 | Solar hot water      | <ul style="list-style-type: none"> <li>• Collector type, size, orientation, power pump, heat storage tank volume</li> </ul>                                                                        | <ul style="list-style-type: none"> <li>• Collector type, size, orientation, power pump, heat storage tank volume</li> <li>• Solar System performance, pumping loss coefficient (primary / secondary classification)</li> </ul>                                                                         |
| Review of submitted Energy data |                      | <b>No standard</b><br>Submit Simulation files and related documents                                                                                                                                | <b>Below 300kWh/m<sup>2</sup>·yr (1st Rating)</b><br>score results 190.4kWh/m <sup>2</sup> ·yr<br>(1 <sup>st</sup> Rating → Satisfactory)                                                                                                                                                              |



- Green Building Certification: Evaluation (Instruction: 2nd Grade[Excellent])
- 2nd Grade[Excellent] – Over 70 Points

| Sector                              | Evaluation Items                                                                                                                                                                                                                                                                                                                                        | Self-assessment scores |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Land use & Traffic                  | <ul style="list-style-type: none"> <li>• Install Bike storage rack (87 or more) &amp; shower for bike users (1 Men/ 1 Women each)</li> </ul>                                                                                                                                                                                                            | 4.50                   |
| Energy                              | <ul style="list-style-type: none"> <li>• Achieve min. of EPI 95 points</li> <li>• Design ceiling's average lumen density to be 11W/㎡</li> <li>• Install 5 types of Energy consumption measuring meter (heating, cooling, hot water, elevator power, lighting, outlets, etc.)</li> </ul>                                                                 | 23.50                  |
| Materials and Resources Maintenance | <ul style="list-style-type: none"> <li>• 9 kinds of eco-friendly materials applied to indoor / over 9 kinds for outdoors</li> <li>• Apply at least five kinds of materials with Carbon Footprint Certification</li> <li>• Install recycle collection bins (at least 6 categories) and recycling of waste storage facilities (more than 236㎡)</li> </ul> | 19.69                  |
| Water and Pollution prevention      | <ul style="list-style-type: none"> <li>• Rainwater tank 960 ton / 10% of total water usage from Rainwater</li> <li>• Stormwater collection area to be 15% of Project site</li> </ul>                                                                                                                                                                    | 12.95                  |
| Ecological Environment              | <ul style="list-style-type: none"> <li>• Min. of 25% green area</li> <li>• min 40% of ecology area</li> </ul>                                                                                                                                                                                                                                           | 8.8                    |
| Indoor Environment                  | <ul style="list-style-type: none"> <li>• Use 80% or more of non VOC adhesive and finish materials on ceilings, walls, and floors</li> <li>• Install 10% of open/ close windows per total glazing surface</li> <li>• Install min. of 15㎡ of retreat area</li> </ul>                                                                                      | 10.98                  |

Review of submitted Environment-friendly building certification

**70 Points (Ratings 2 [Best rating])**

[Self scoring of 80.42 Ratings1 [Premium Rating] → satisfactory]

- Barrier-free environment certification: Evaluation on plan details (Bid Guidelines : Ratings 2[Best Rating])
- Ratings 2 [Best rating] – Above 80% (out of total 214 points)

| Sector                | Evaluation Items                                                                                                                                                                                                                                                                                                                                                                                          | Related Area               | Self-assessment Scores |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|------------------------|
| Parameters facilities | <ul style="list-style-type: none"> <li>• Obtain min. width of 1.2m to 1.8m for pedestrian path</li> <li>• Plan Exterior pedestrian path slope to be no more than 1/18</li> <li>• Plan pedestrian guide systems without interference of pathway</li> <li>• Install direction block for disabled from site entrance to each bldg.</li> <li>• Install Disbled Parking and obtain safe travel path</li> </ul> | Arch<br>Civil<br>Landscape | 54.5                   |
| Internal facilities   | <ul style="list-style-type: none"> <li>• Secure min. 0.8m of width for every interior doors</li> <li>• Every interior doors to have 1.2m of clearance in front and back for wheelchair access</li> <li>• Non slip materials for Corridors and stairs.(Polished granites and similar can not be specified)</li> <li>• Install standard graille block at start and end of all stairs</li> </ul>             | Arch<br>Const              | 39.9                   |
| Sanitary facilities   | <ul style="list-style-type: none"> <li>• Install each gender disabled restroom on 1st floor of each bldg.(Including Nurseries)</li> <li>• Obtain required clearance for wheel chair and grab bars on disabled toilets</li> </ul>                                                                                                                                                                          | Arch<br>Mech<br>Const      | 52.7                   |
| Information Facility  | <ul style="list-style-type: none"> <li>• Install Palpable signage at main entrance</li> </ul>                                                                                                                                                                                                                                                                                                             | Arch<br>Landscape<br>Const | 12.2                   |
| Other Facilities      | <ul style="list-style-type: none"> <li>• Provided space for the wheelchair user at the conference table and information desk</li> </ul>                                                                                                                                                                                                                                                                   | Arch<br>Const              | 15.9                   |

Review of submitted Obstruction-free living environment certification material

**Above 80% (171.2 Points) (Ratings 2[Best Grade])**  
[Self-scoring 81.87%(175.2 points) Ratings 2[Best Grade] → Satisfactory]

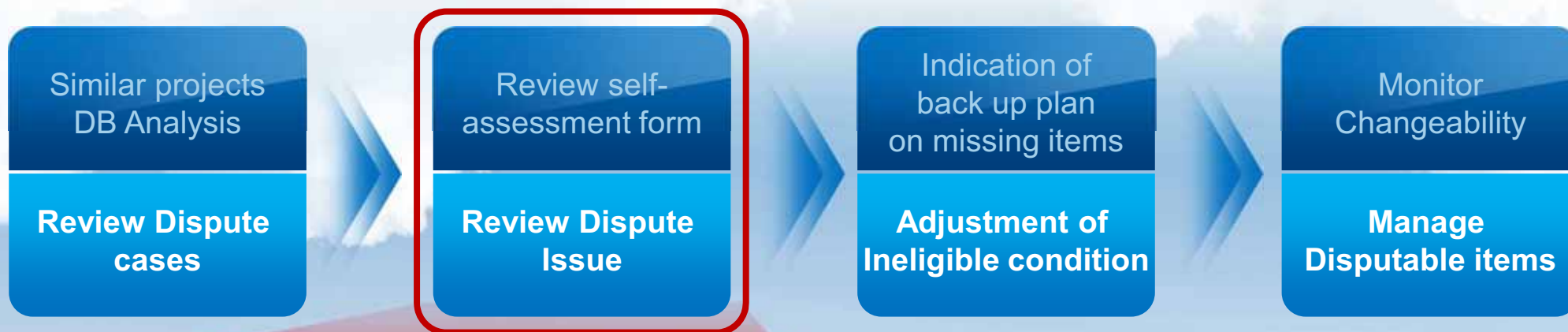


- Intelligent Building Certification: Planning Assessment (tender instructions: Rating 1)
- Rating 1 Criteria – Above 540 points (above 90% out of 600 possible points)
  - Scoring criteria: at least 85 points in each area  
(architectural, mechanical, electrical, telecommunications, systems integration, facilities management)
- ※ Unable to achieve certification if mandatory requirements are not met

| Sector                   | Mandatory requirements                                                                                                                                                                                                                                                    | Self-assessment scores |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Planning & Environment   | <ul style="list-style-type: none"> <li>• Energy saving plan at least 70 points (Grade 3 or higher building energy efficiency rating)</li> <li>• Apply min of 60% of eco-friendly material per sector (Secure delivery area and expansion area)</li> </ul>                 | 88                     |
| Mech                     | <ul style="list-style-type: none"> <li>• System Equipment, HVAC zoning, zoning, water supply proper design</li> <li>• central monitoring, automatic control, and TAB conduct of air-conditioning equipment</li> </ul>                                                     | 102                    |
| Elec                     | <ul style="list-style-type: none"> <li>• Emergency generators installed to secure ( 20% of power) and EPS rooms</li> <li>• Power equipment, lighting system, monitoring system, work area, etc.</li> </ul>                                                                | 88                     |
| Comm                     | <ul style="list-style-type: none"> <li>• High-speed telecommunications building certification class 1 acquisition</li> <li>• Install and operate network security firewall for extranet voice/ data and cable transmissions</li> </ul>                                    | 85                     |
| System integration (SI)  | <ul style="list-style-type: none"> <li>• Duplication of integrated server (the main server, the secondary server)</li> <li>• System integration and deployment scenarios, such as hardware, power, lighting, access control, CCTV, emergency management system</li> </ul> | 87                     |
| Facility Management (FM) | <ul style="list-style-type: none"> <li>• Configure facility management organization structures and systems</li> <li>• Build fundamental database Manual</li> </ul>                                                                                                        | 92                     |

Review of submitted  
Intelligent building certification material

**Above 540 Points (Rating 1)**  
[Self-Assessment score 542 Points (Rating 1 → Satisfied)]



Basic design review and countermeasure

| NO | 입찰안내서 |        | 설계계획                                 |    | 검토결과 |    | 대책 |
|----|-------|--------|--------------------------------------|----|------|----|----|
|    | 구분    | 과업내용   | 반영내용                                 | 위치 | 요구사항 | 판정 |    |
|    | 건축계획  | 4-1.1) | 사전조사의 적정성                            |    |      |    |    |
|    | 건축계획  | 4-1.2) | 건물배치, 단지계획 및 동선계획의 적정성               |    |      |    |    |
|    | 건축계획  | 4-1.3) | 평면계획(연구시설, 공동이용시설, 업무 및 근생시설 등)의 적정성 |    |      |    |    |
|    | 건축계획  | 4-1.4) | 입면 및 단면 계획의 적정성                      |    |      |    |    |
|    | 건축계획  | 4-2.5) | 에너지 절약, 친환경, 유지관리 등의 적정성             |    |      |    |    |
|    | 건축계획  | 4-2.6) | 공개공간의 설치 등 문화 및 도시환경계획의 조화 등         |    |      |    |    |

“Differences from Basic Design and Construction Documents”

“Items that are not reflected according to the review request”

“Security Plan during Construction Document phase”

**Prevent conflict by self-evaluation review**



## **Act for engaging Agreement with Government sector**

Article 91(Limits on contract price adjustment due to Design change)

### ❖ **Principle : Increase in the contract price Disclaimer**

- ✓ Design is responsibility of the Contract party
- ✓ Reduction of cost due to decrease in material applies

### ❖ **Exceptional recognition in increase**

- ✓ Reason to change caused by Owner/ Force Majeure

### ❖ **Method : Calculation based on comparing the Construction Documents (Invoice ignored)**

General Conditions of Contracts Article 21 item 5.

- ✓ Reduced Construction Cost: New Price Calculation
- ✓ Increased Construction Cost: Nego btw. Unit Price during Design Change ~ accepted Unit Price
- ✓ New Expenditure Item : Unit Price during Design Change (not bid price)

***T/K Price adjusted according to  
Legal Agreement adjustment standard***

## 건설공사 감리대가기준

### 제7조(감리원 배치기준)

- ① 책임감리 · 시공감리 및 검측감리의 총감리 원수는 별표 1에 의하여 산정한다.
- ② 발주청은 해당 공사가 다음 각 호의 어느 하나에 해당되는 경우에는 「건설기술관리법 시행규칙」 제 61조에 따른 감리원 배치계획의 감리원수를 조정 · 배치할 수 있다.

#### 3. 공사에정가격의 100분의 70미만으로 낙찰된 공사의 경우.

이 경우, 부실공사 방지를 위해 낙찰율에 따라 감리원 배치계획상의 감리원수를 기준으로 다음 각목에 따라 추가 배치되는 감리원 중 1인은 발주청이 정하는 특정분야 및 자격 및 경력을 갖춘 자로 배치하는 것을 원칙으로 한다.

가. Award rate 65%~70% : 20% additional Manpower of CM

나. 낙찰율이 60%초과 65%미만 : 30%이내 추가

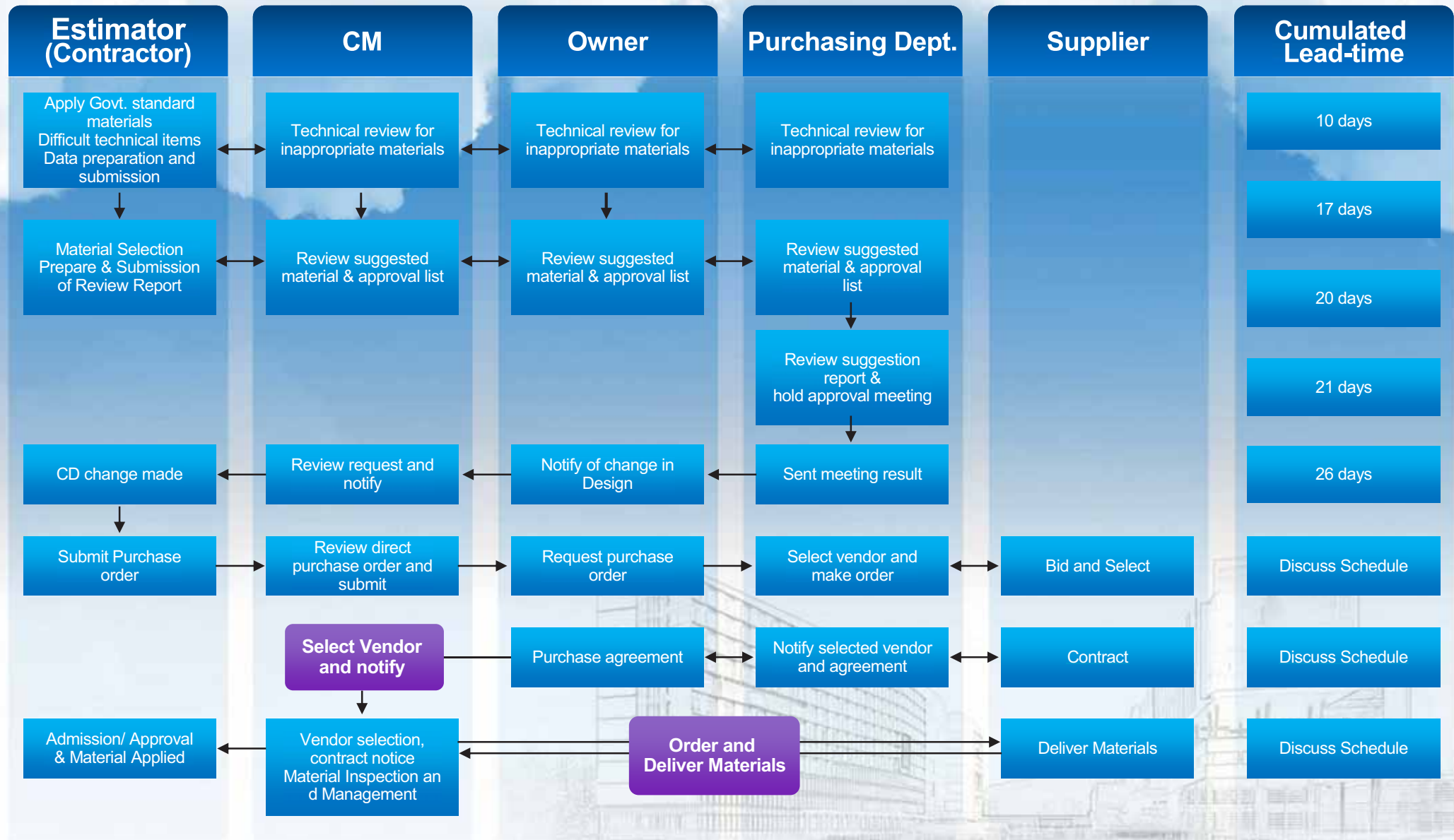
다. 낙찰율이 55%초과 60%미만 : 30%이내 추가

라. 낙찰율이 55%이하 : 50%이내 추가

**T/K Bid rate 69.9% → 20% Add. Placement of CM**



# T/K Owner Directed Material Procurement



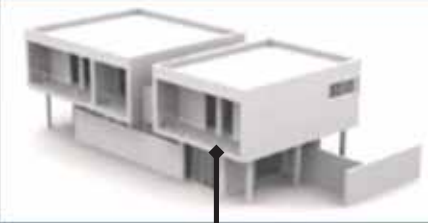
**Responsibility Matrix of all parties for clear scope**

| Category     | Direct Purchase Options                |                   | Remarks                    |
|--------------|----------------------------------------|-------------------|----------------------------|
|              | Units Number<br>(Detailed item Number) | Cost              |                            |
| Building     | 8 (8)                                  | 11,611,416        | No exception on Substitute |
| Civil        | 7 (7)                                  | 683,006           | No exception on Substitute |
| Landscape    | 4 (5)                                  | 598,753           | No exception on Substitute |
| Mech.        | 12 (21)                                | 7,590,653         | No exception on Substitute |
| Elec.        | 8 (13)                                 | 8,729,317         | No exception on Substitute |
| Comm.        | 4 (4)                                  | 1,454,634         | No exception on Substitute |
| Fire         | 3 (3)                                  | 257,578           | No exception on Substitute |
| <b>Total</b> | <b>46 (61)</b>                         | <b>30,925,357</b> |                            |



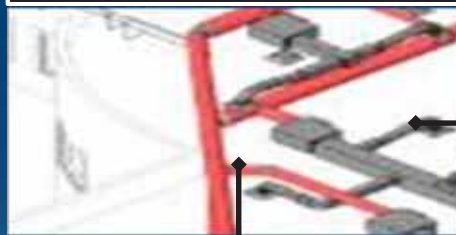
## Create Model/ Estimate

### Revit Architecture



Architecture/Structure  
Modeling

### Revit MEP



MEP Modeling

Autodesk Revit Version 2012~3

Tekla for steel production

## Model & Quality Review

### Navisworks



- Model Quality Review by Trade
- Integrated Intervention Model review
- Revit Based

### 3DS MAX



- Rendering, Create Image

**Use of BIM S/W per T/K Company's BIM Environment**

## BIM Modeling Companies

|           | 5Dwith          | CosPec        | Nawoo Mech.     | MTM          |
|-----------|-----------------|---------------|-----------------|--------------|
| Year est. | Nov. 2006       | Oct. 1991     | Sept. 1999      | Aug. 2008    |
| Revenue   | 1.4 billion Won | 9 billion Won | 2.3 billion Won | 250 mil. won |
| No. emp.  | 23              | 43            | 35              | 5            |
| BIM Staff | 20              | 9             | 12              | 5            |

## BIM Modeling Co.

|           | PIATE.inc    |
|-----------|--------------|
| Year est. | Dec. 2010    |
| Revenue   | 200 mil. won |
| No. emp.  | 7            |
| BIM Staff | 7            |

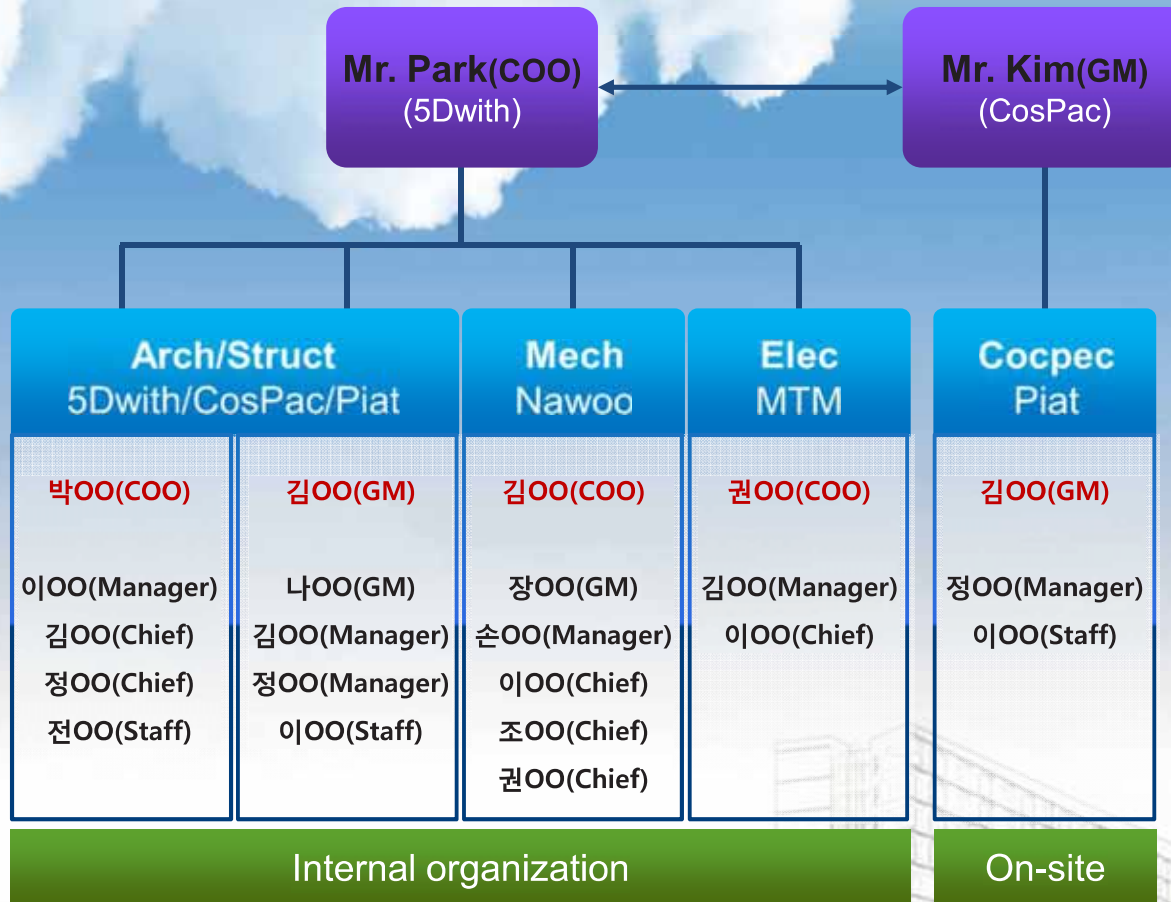
## Other Partners

|               | Korea Estimation     |
|---------------|----------------------|
| Year est.     | Dec. 1985            |
| Main Business | Estimate             |
| Remark        | Support BIM Estimate |

***Per sector BIM Experts performs  
and collaborate on Project***



# BIM Expert Task Organization

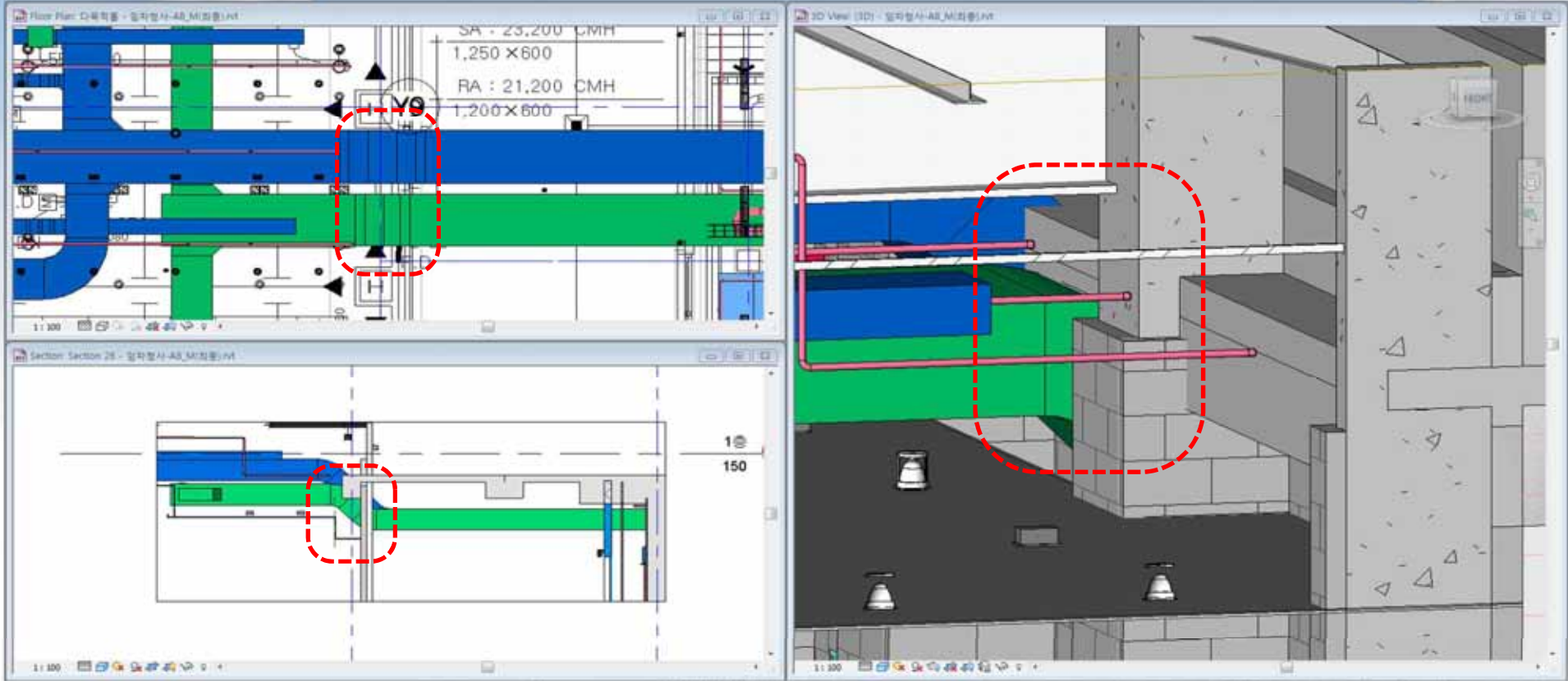


\* Red indicates non-interchangeable person in charge

| Company   | Name  | Part                              |
|-----------|-------|-----------------------------------|
| 5Dwith    | Park  | Chief Project Director            |
|           | Kim   | BIM Modeling (Arch/Struct)        |
|           | Jeon  | BIM Modeling (Arch/Struct)        |
| Cospec    | Kim   | Chief PM                          |
|           | Kim   | BIM Modeling (Arch/Struct)        |
| NawooMech | Kim   | Mech                              |
|           | Jin   | Mech PM                           |
|           | Kwon  | BIM Modeling (Mech/Fire)          |
| MTM       | Kwon  | Elec                              |
|           | Kim   | BIM Modeling/PM (Elec/Comm./Fire) |
|           | Lee   | BIM Modeling (Elec/Comm./Fire)    |
| Piat      | Na    | Modeling(Arch/Struct)             |
|           | Jeong | BIM Modeling (Arch/Struct)        |
|           | Lee   | BIM Modeling (Arch/Struct)        |

**Per sector BIM Experts performs and collaborate on Project**

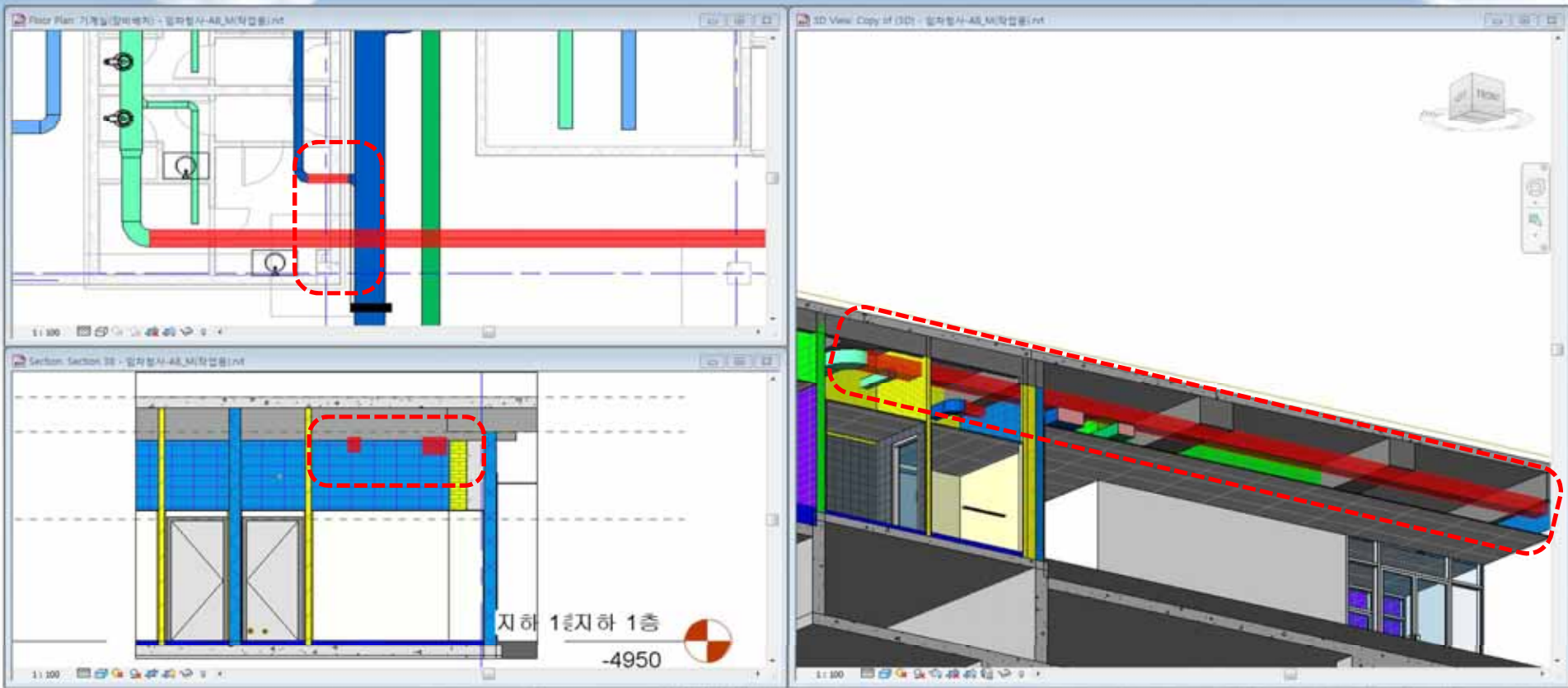
|            |                           |        |
|------------|---------------------------|--------|
| Location   | B 1                       | Remark |
| File Name  | Leased Govt. Bldg-AB_M    |        |
| Main Issue | Conflict of Duct and Beam |        |

| Category      | Conflict area                                                                       |                |                                                                |            |                                                                |
|---------------|-------------------------------------------------------------------------------------|----------------|----------------------------------------------------------------|------------|----------------------------------------------------------------|
| 2D/3D Image   |  |                |                                                                |            |                                                                |
| Review Detail | Interference of Duct and Beam                                                       | BIM Suggestion | Adjust Duct size in order to pass through the beam and ceiling | Resolution | Extra attention to Multi use hall during interior construction |



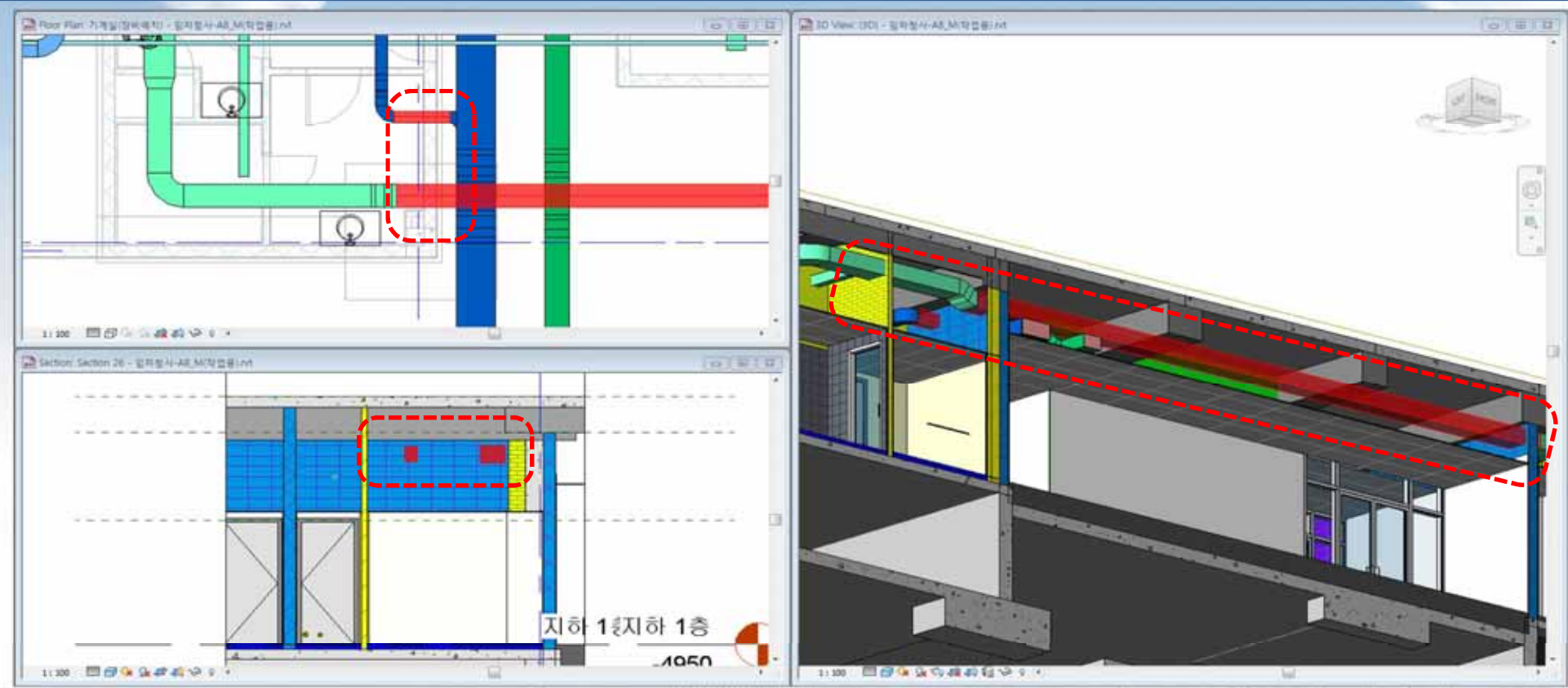
# BIM Interference Review

|            |                           |        |
|------------|---------------------------|--------|
| Location   | B 1                       | Remark |
| File Name  | Leased Govt. Bldg-AB_M    |        |
| Main Issue | Conflict of Duct and Wall |        |

| Category      | Conflict area                                                                       |                |                            |            |                    |
|---------------|-------------------------------------------------------------------------------------|----------------|----------------------------|------------|--------------------|
| 2D/3D Image   |  |                |                            |            |                    |
| Review Detail | Conflict caused by Restroom duct and Beam                                           | BIM Suggestion | Need to adjust duct height | Resolution | Adjust duct height |

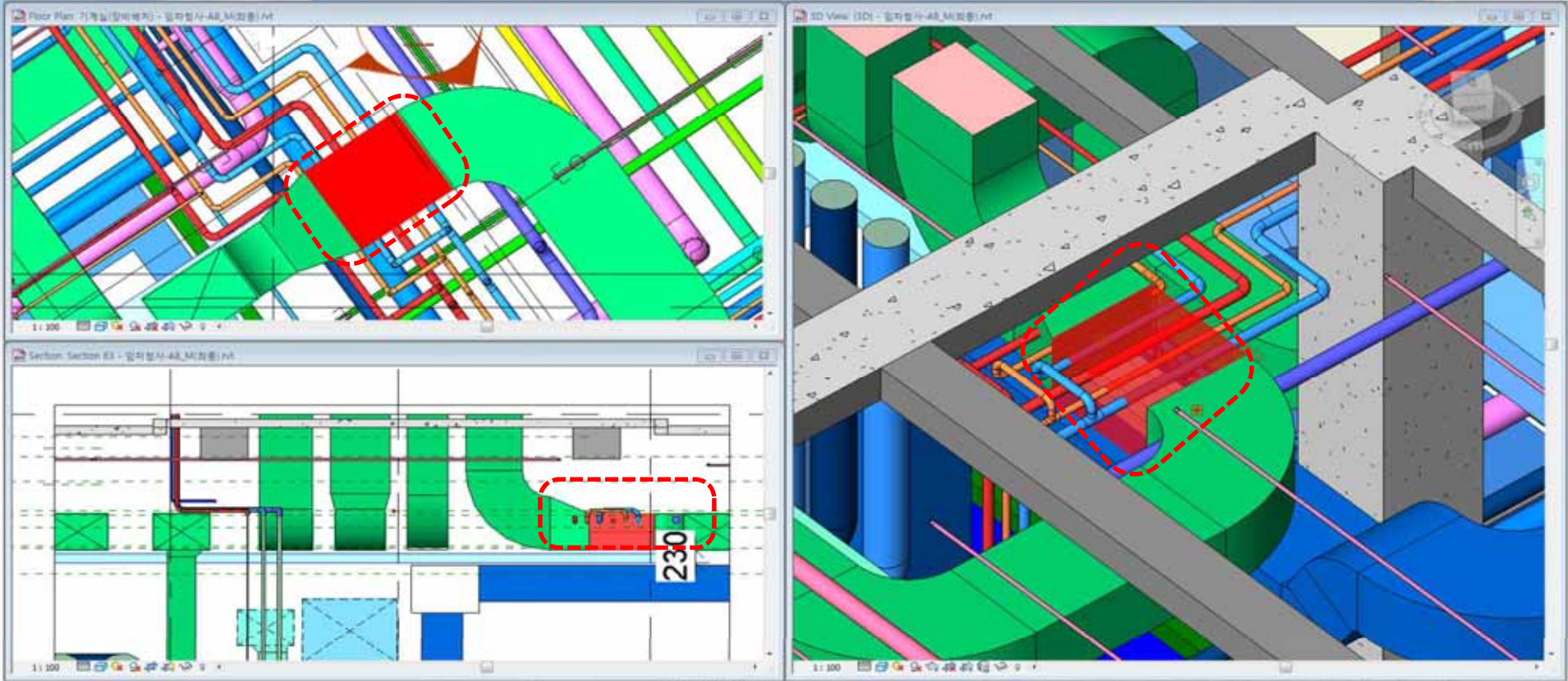
# BIM Interference Review

|            |                            |        |
|------------|----------------------------|--------|
| Location   | B 1                        | Remark |
| File Name  | Leased Govt. Bldg-AB_M     |        |
| Main Issue | Building and Duct conflict |        |

| Category      | Conflict area                                                                       |                |                            |            |                    |
|---------------|-------------------------------------------------------------------------------------|----------------|----------------------------|------------|--------------------|
| 2D/3D Image   |  |                |                            |            |                    |
| Review Detail | Conflict caused by Restroom duct location                                           | BIM Suggestion | Need to adjust duct height | Resolution | Adjust duct height |



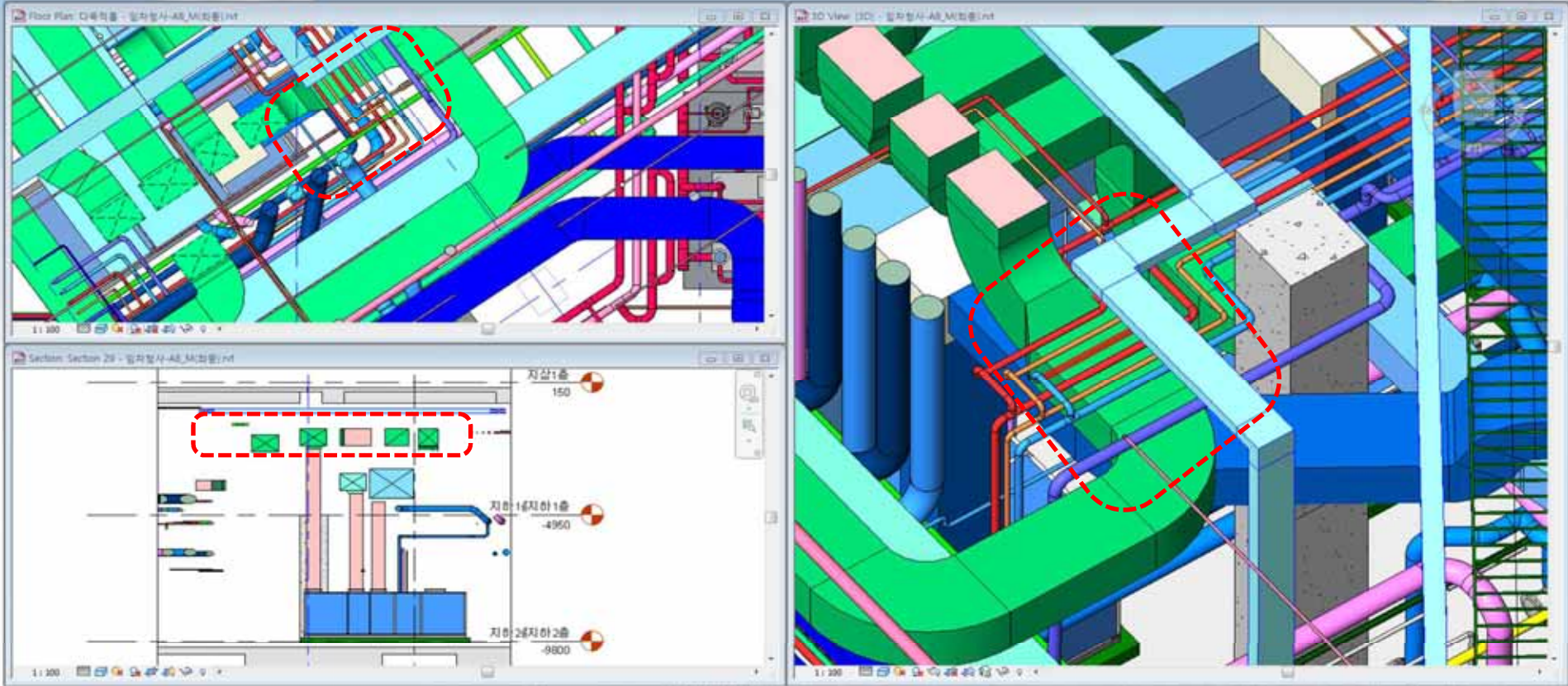
|            |                                              |        |
|------------|----------------------------------------------|--------|
| Location   | B 1 Electrical room-1                        | Remark |
| File Name  | Leased Govt. Bldg-AB_M                       |        |
| Main Issue | Conflict of Mechanical and Electrical system |        |

| Category      | Conflict area                                                                       |                |                                          |            |                             |
|---------------|-------------------------------------------------------------------------------------|----------------|------------------------------------------|------------|-----------------------------|
| 2D/3D Image   |  |                |                                          |            |                             |
| Review Detail | Conflict of Electrical tray and Duct system                                         | BIM Suggestion | Height adjustment of Tray or Duct system | Resolution | Adjust Tray and Duct Height |



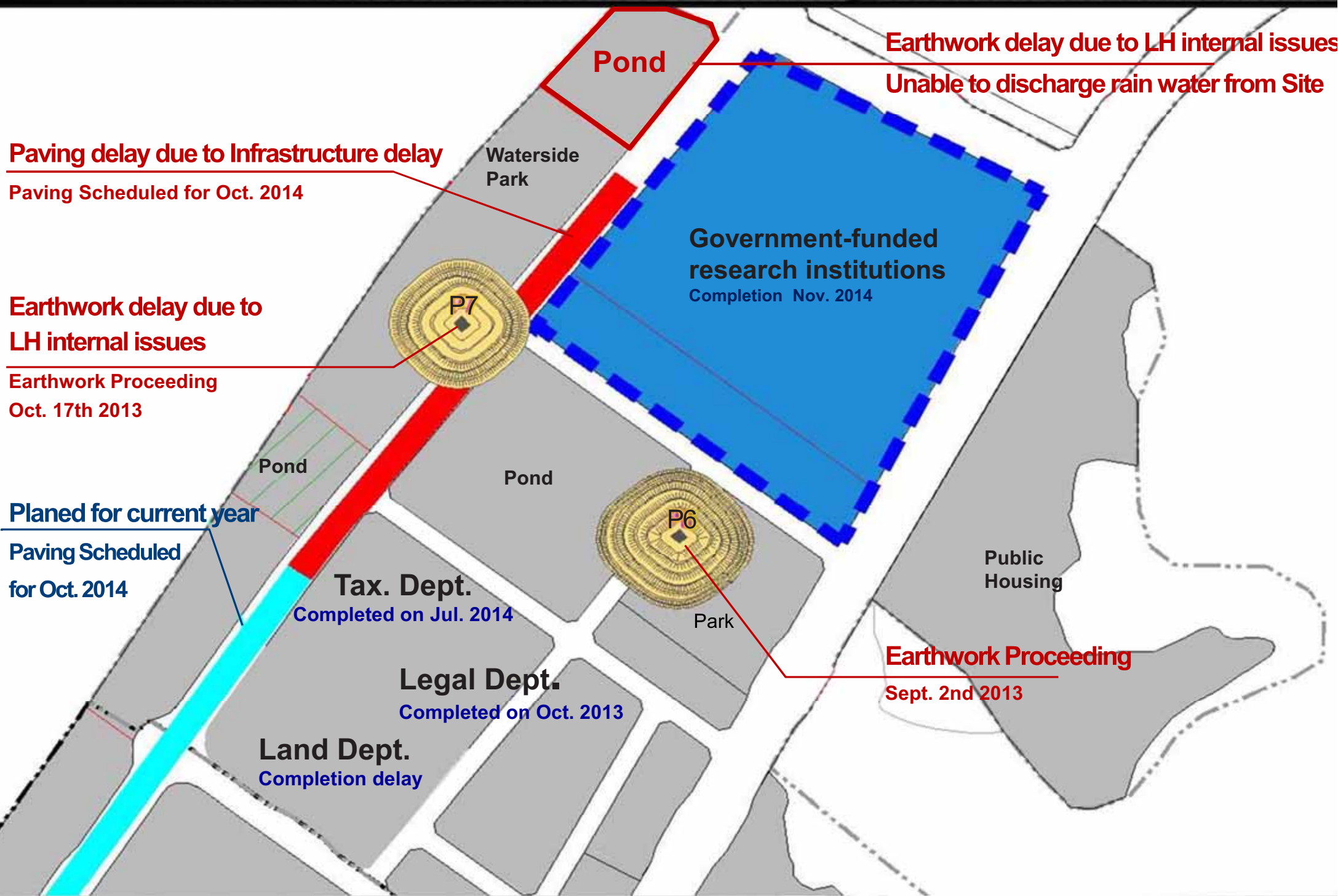
# BIM Interference Review

|            |                                              |        |
|------------|----------------------------------------------|--------|
| Location   | B 1 Electrical room-1                        | Remark |
| File Name  | Leased Govt. Bldg-AB_M                       |        |
| Main Issue | Conflict of Mechanical and Electrical system |        |

| Category      | Conflict area                                                                       |                |                                   |            |                     |
|---------------|-------------------------------------------------------------------------------------|----------------|-----------------------------------|------------|---------------------|
| 2D/3D Image   |  |                |                                   |            |                     |
| Review Detail | Conflict of Electrical tray and pipe system                                         | BIM Suggestion | Height adjustment of Tray or Pipe | Resolution | Adjust Tray or Pipe |



# Infrastructure Interference









Unclear availability of electricity,  
telecom, gas, district heating, etc.



Expected interference with exist.  
Infra. during construction

Transmission Tower  
within Project Site



Disconnection of Riverside road may  
cause difficulties in entering the site

***Interference in infrastructure system and site***

Unclear availability of electricity, telecom, gas, district heating, etc.



Pursuing detour road to prevent conflict

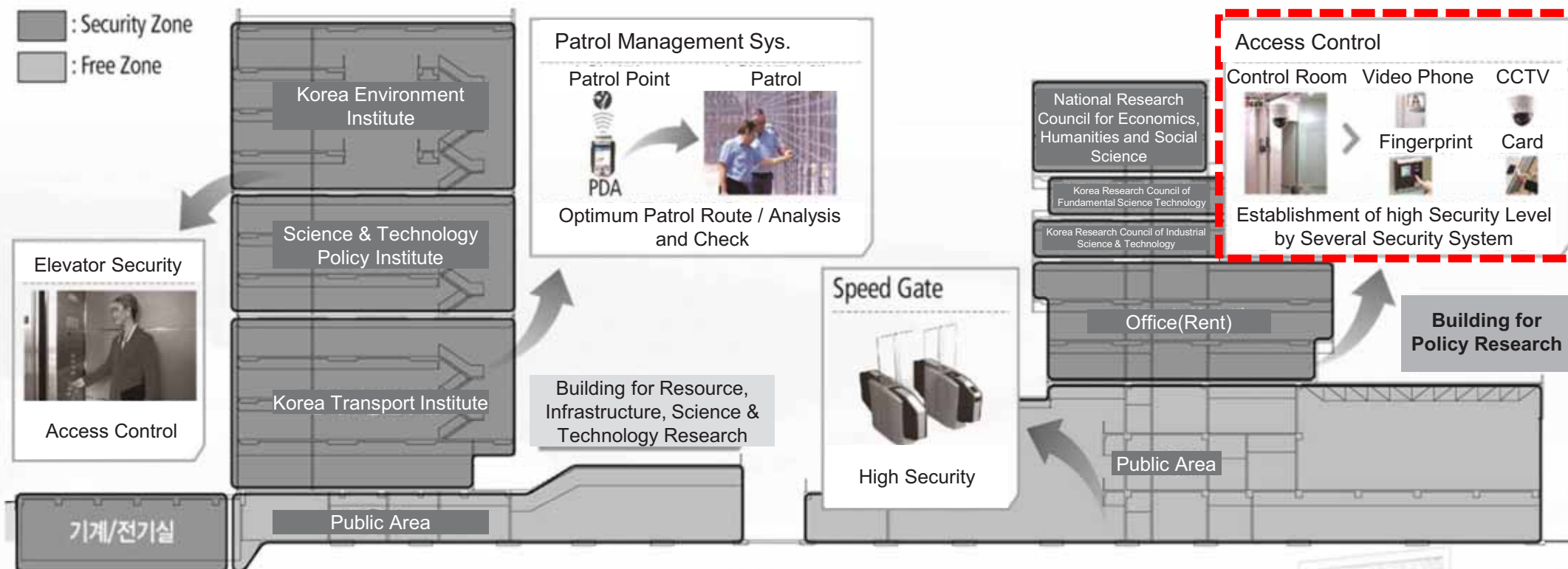
Transmission Tower within Project Site



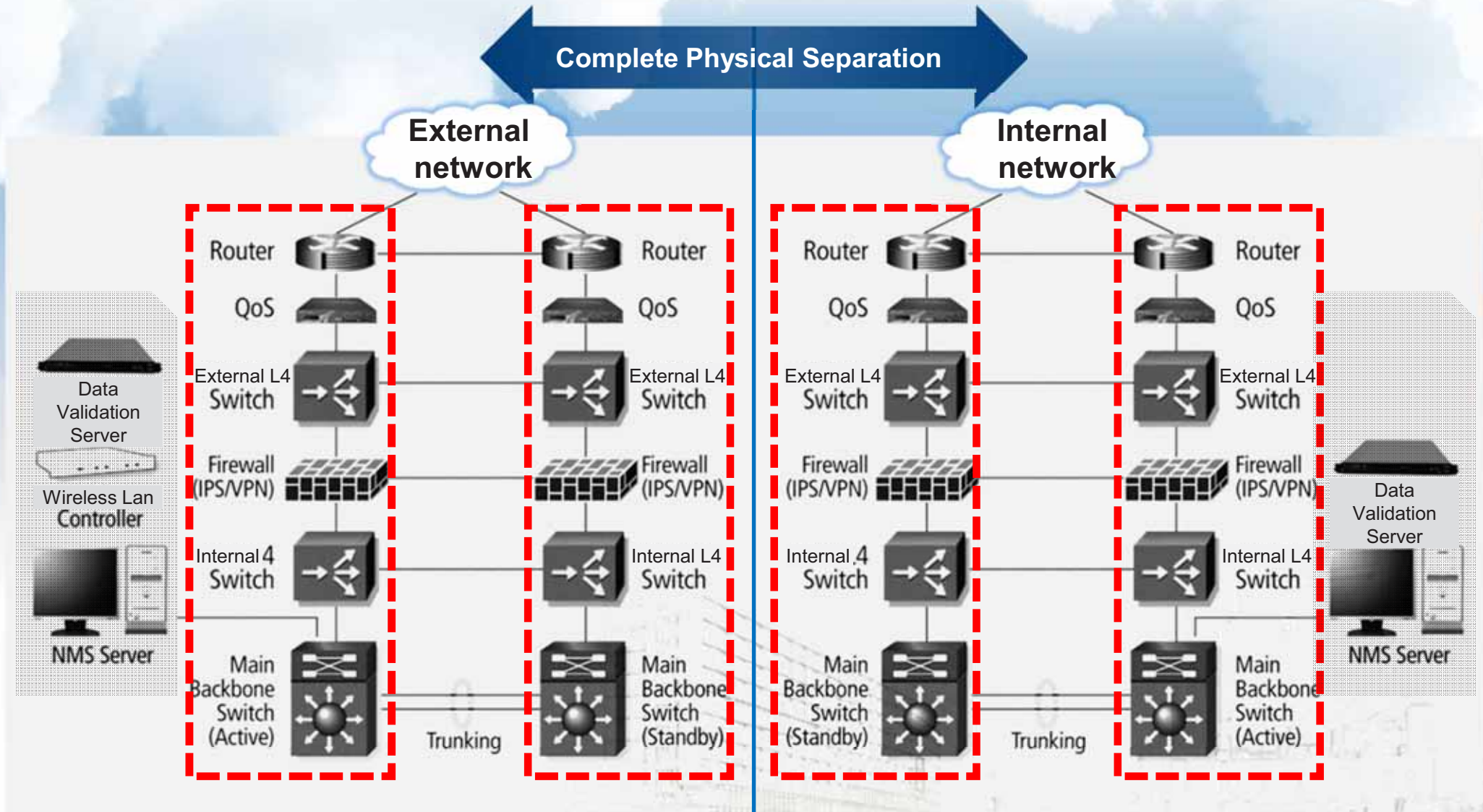
In negotiation with LH and KEPCO for solution

**Continuing Close rapport with related Organizations for early intervention and resolution**





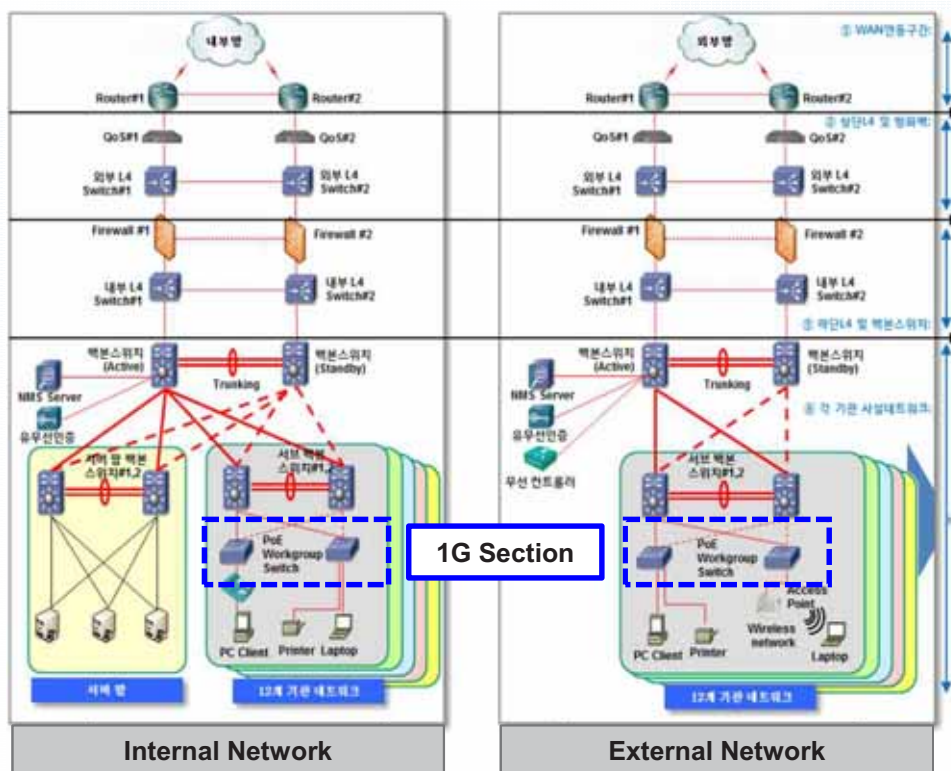
**Maximum security with 3-tier management**



## *Physical Separation of Internal and External Security Network*

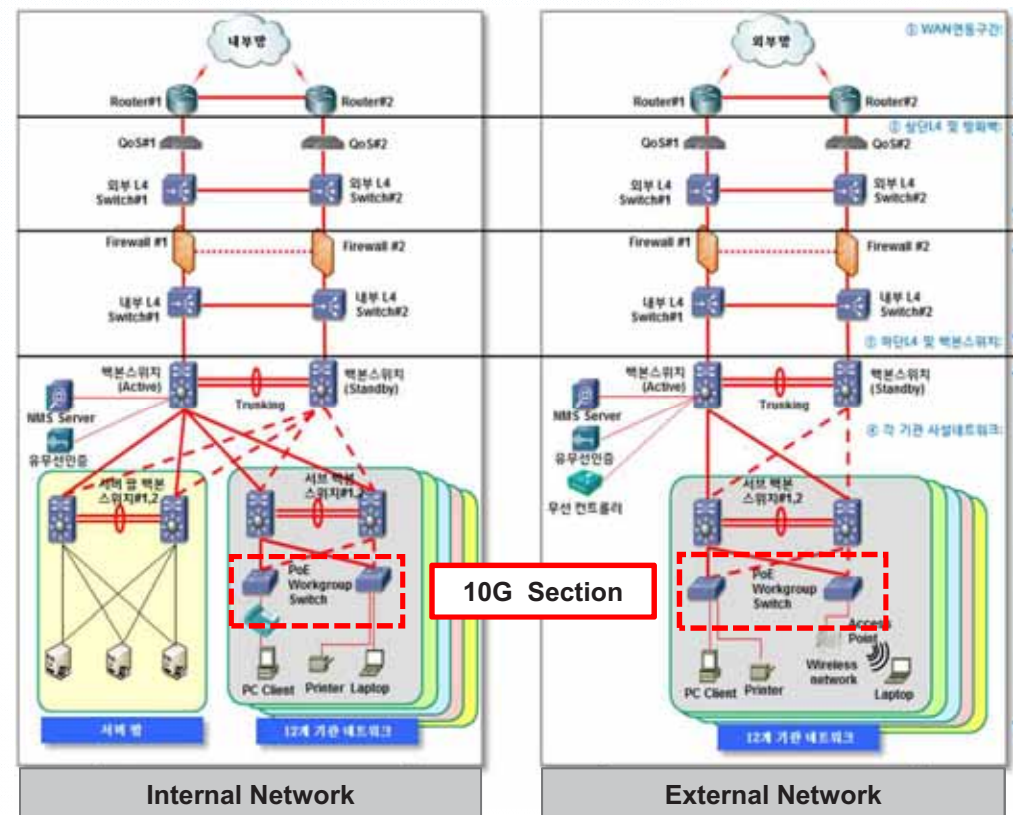


## Original Design



Configure only uplink section of main backbone and sub-backbone of each institution to 10G

## Suggested Design



Configure all of Upper router – Lower work group switch to 10G connection

**Sub Backbone 1G → 10G**

**Preventing increase of 100Mil. KRW won add. Cost**

## PROJECT OVERVIEW

### PROJECT TITLE

정부출연 연구기관 세종시 임차장

### > 사업개요



> PHOTO ZOOM

### 사업개요

위치 세종시 반곡동 736번  
공사종류 교육연구시설  
사업비 5,838,250,000원

### 용역사

발주 한국자산관리공사  
설계 정림건축  
CM/감리 (주)희림종합건축사  
사공 대우건설

### 사업일정

사업총괄 12.04.23~15.01.22  
설계용역 12.04.18~12.08.27  
사공용역 -

### Photo Gallery



[2013-05-31] 2013년 05월 현장 전경사진



### D-Day Counter

- 5 9 7

2012-04-23

2015-01-22

착공 40.58% 준공

### 공정율

기준일 :

### Progress Status



계획 79.9%

실적 78.0%

대비 97.62%

### Briefing Data

### 브리핑 자료

브리핑 관련 자료를 관리 및 뷰어할 수 있습니다.



### WebCamera

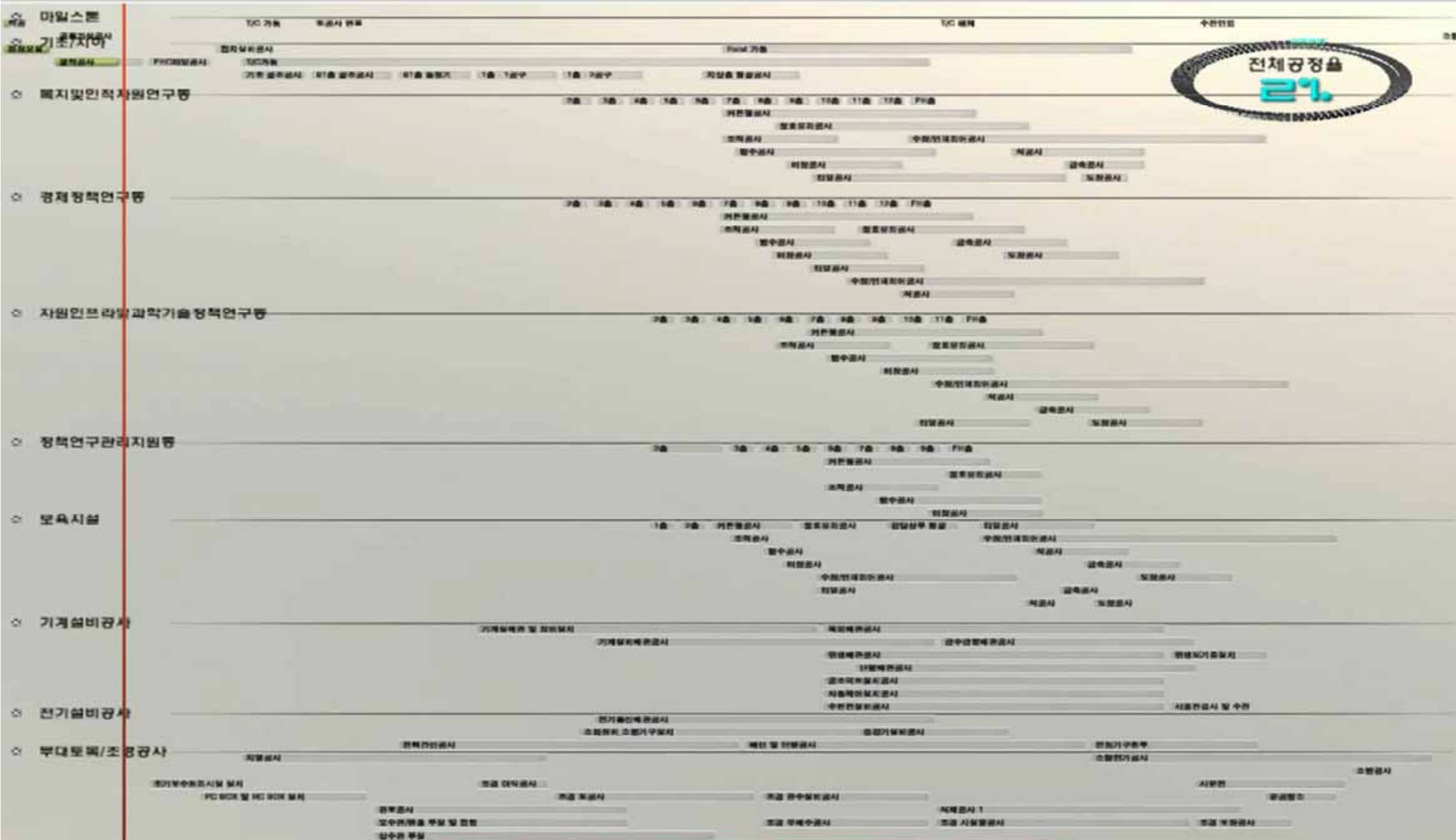
### 웹카메라

현장의 모습을 실시간 모니터링 할 수 있습니다.





# 4D Simulation







# Thank you

**heerim**  
Architects & Planners

(주)희림종합건축사사무소