



MIDAS SQUARE 공학 기술강연

# Lotte World Tower Construction Technology

이병구 | LOTTE E&C

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- Use of building
- Panorama View



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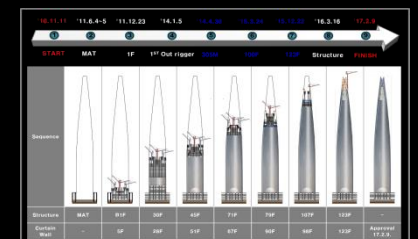
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# Profile

## Marina Bay Sands



## Lotte World Tower



## Busan Lotte Tower



- **Managing Director**
- **Lotte E&C**
- **P.E. Architectural Structures**
- **High-rise Building (247F / 1,103.5m)**
  - . Marina Bay Sands (57F/206m)
  - . Lotte World Tower (123F/555m)
  - . Busan Lotte Tower (67F/342.5m)

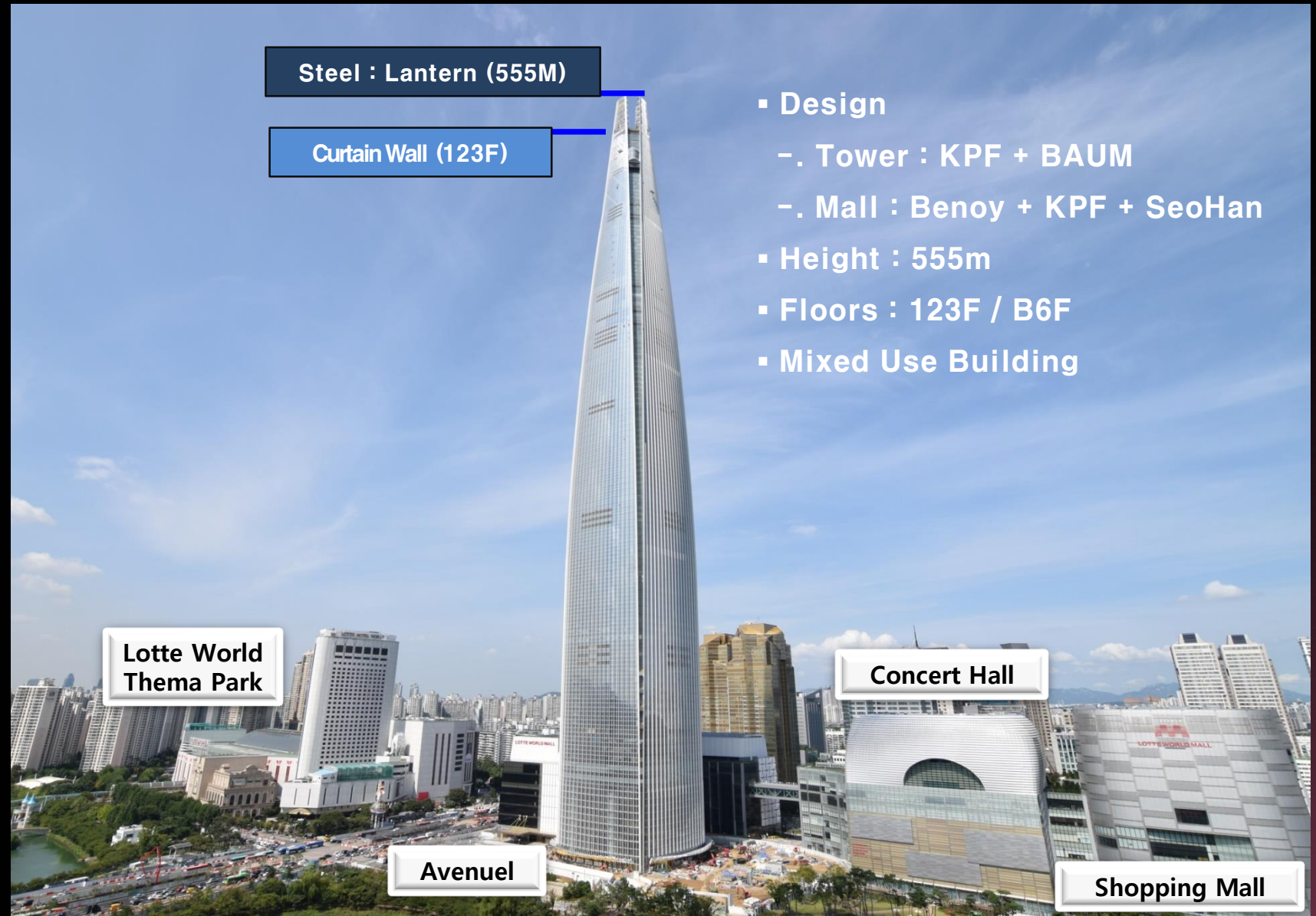


# 1

## Introduction

- Summary
- Use of building
- Panorama View

# Summary



# Use of Building

SEOUL SKY (117~123F)



Observation Deck  
7 floors  
Private Office  
7 floors

SIGNIEL (76~101F)



Hotel  
24 floors

SIGNIEL RESIDENCE (42~71F)



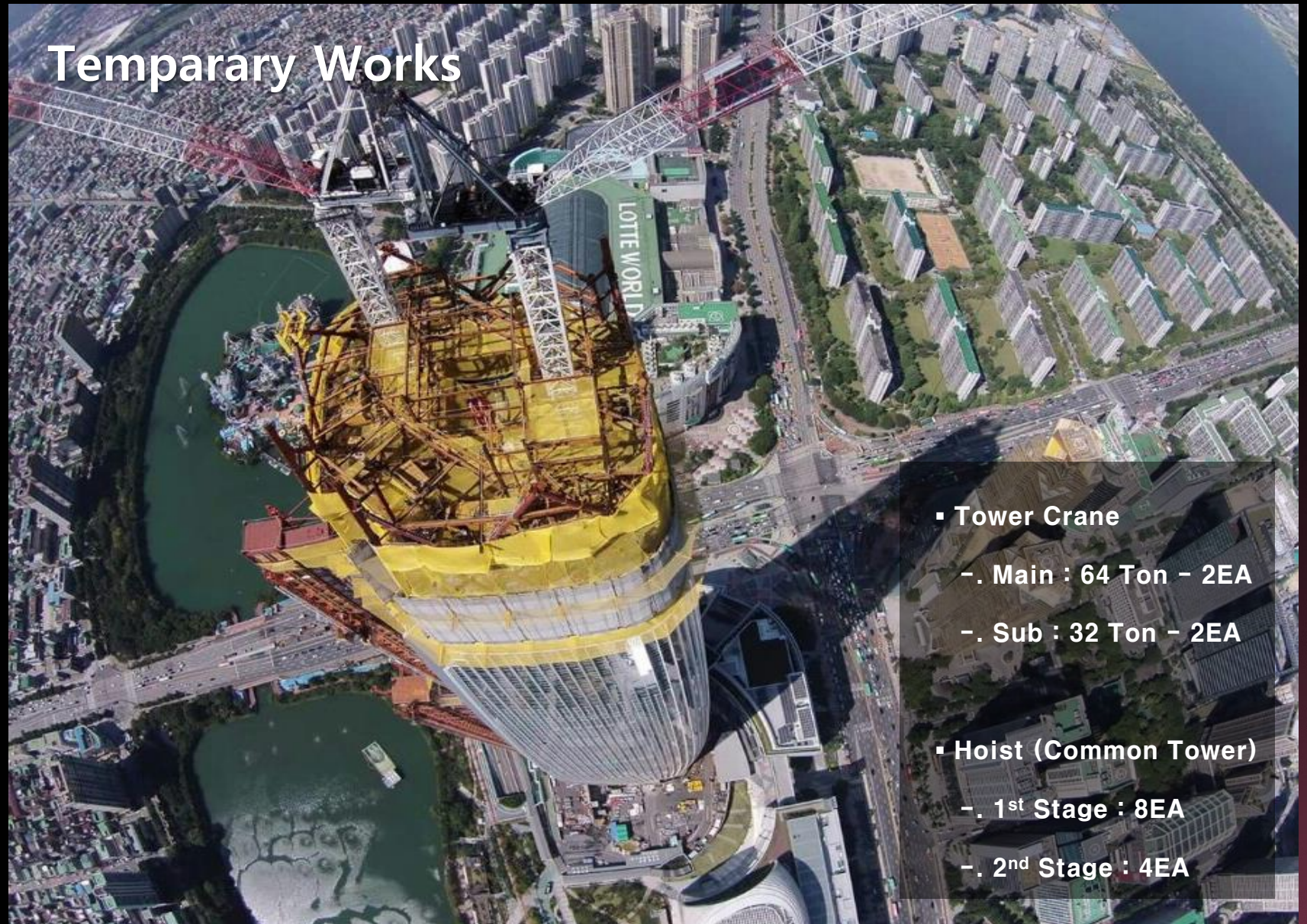
Residence  
28 floors

PRIME OFFICE / CONVENTION (1~38F)



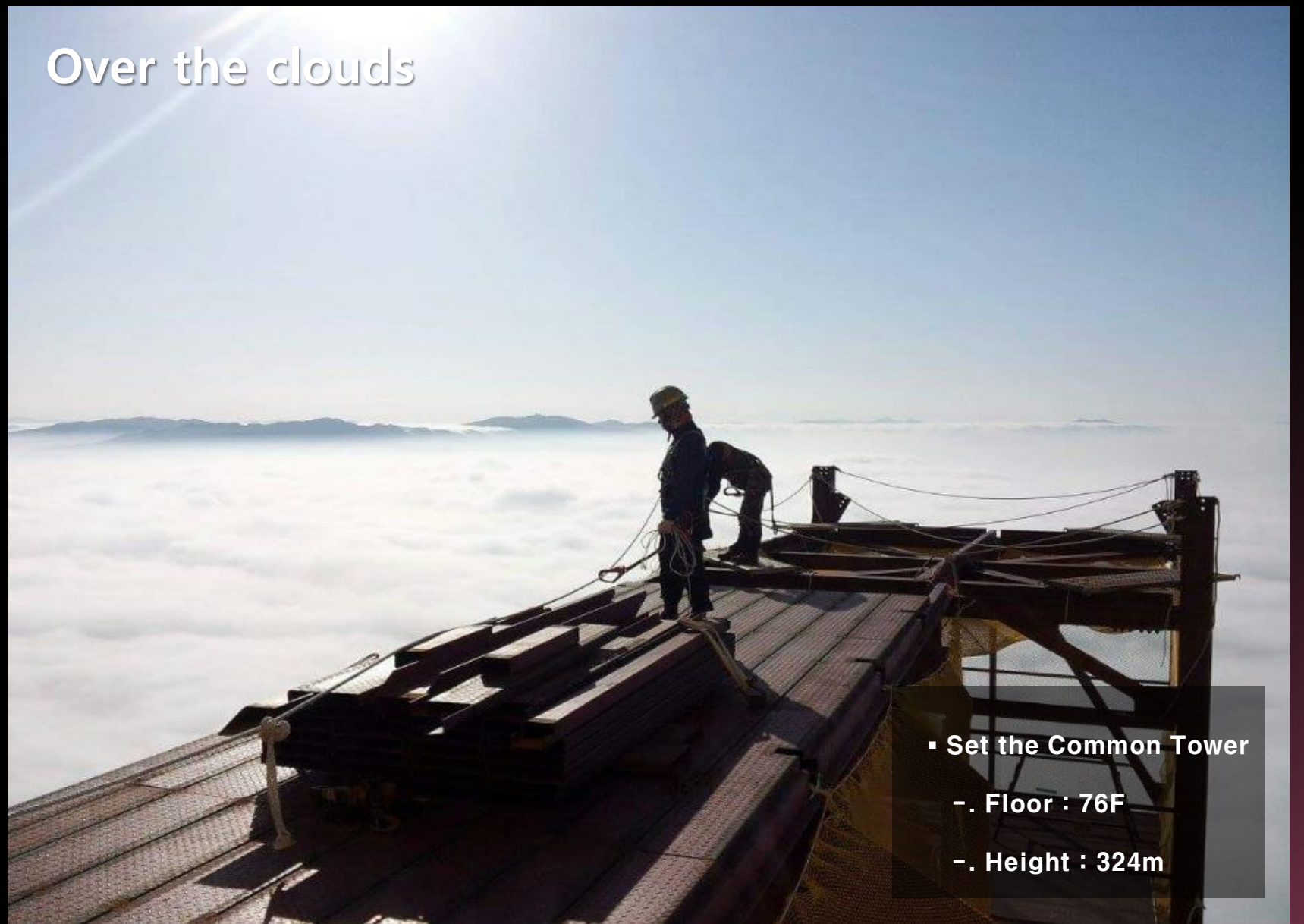
Prime Office  
24 floors  
Retail  
14 floors

# Panorama View



# Panorama View

Over the clouds

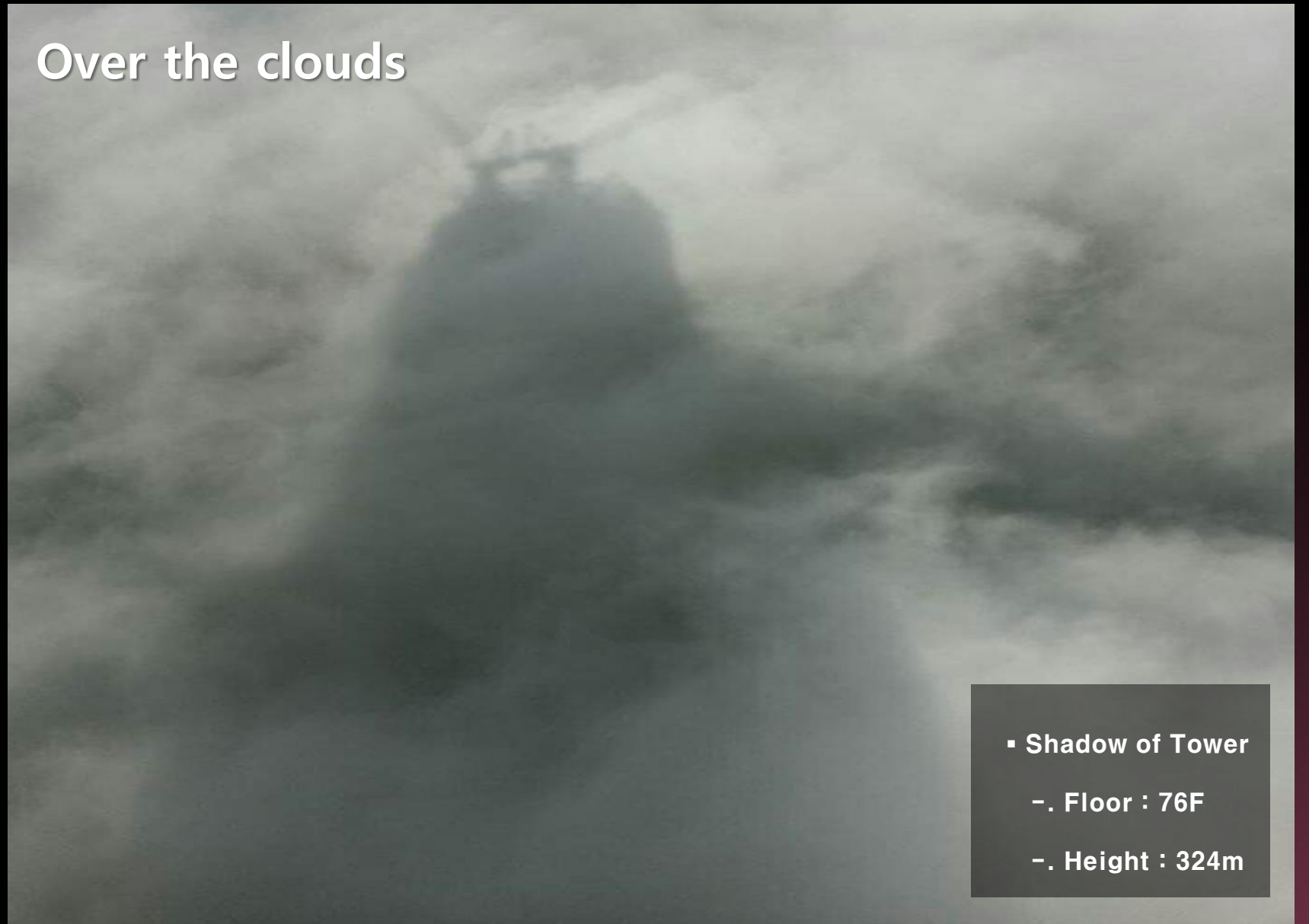


- Set the Common Tower
  - . Floor : 76F
  - . Height : 324m



# Panorama View

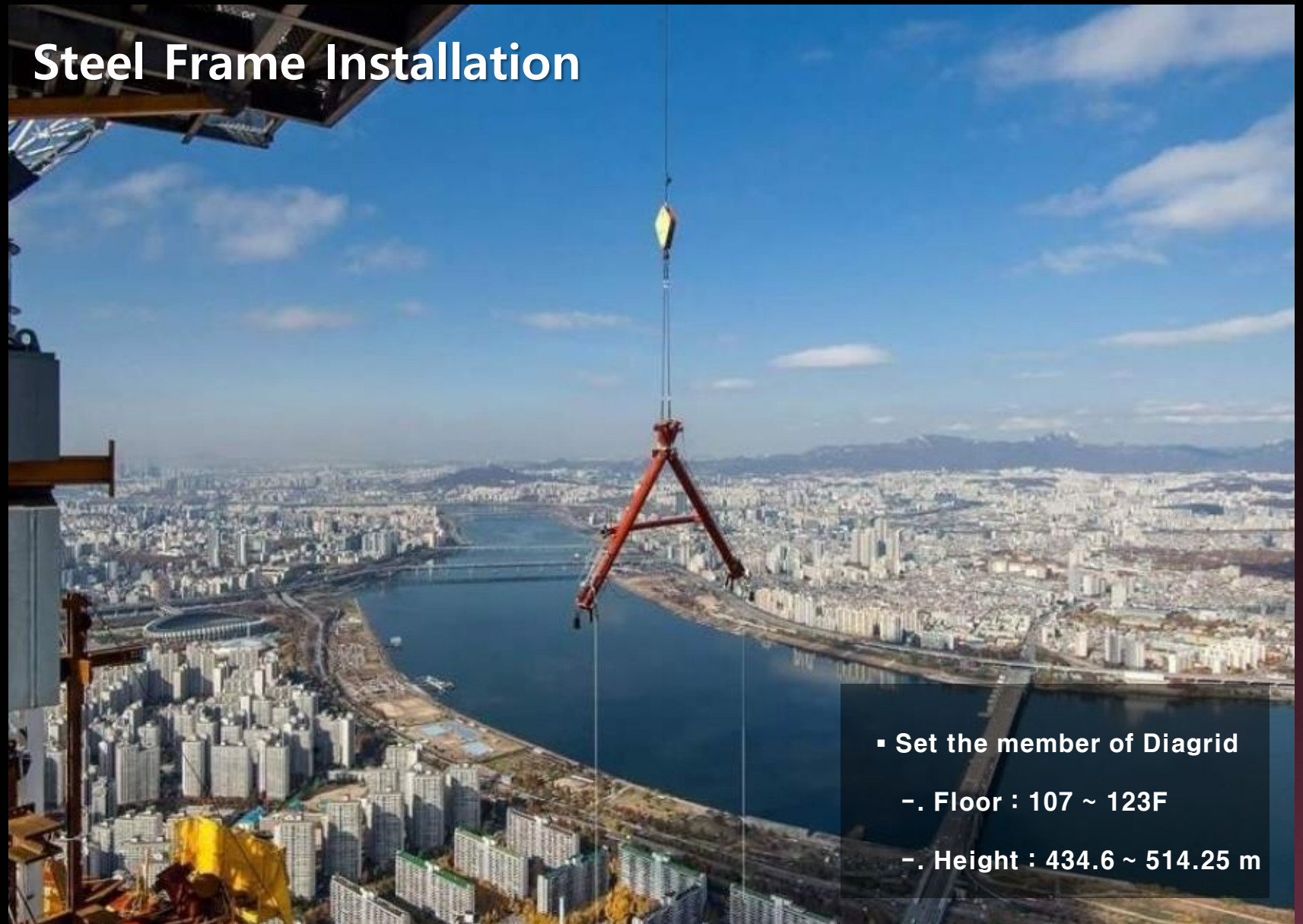
Over the clouds



- Shadow of Tower
- . Floor : 76F
- . Height : 324m

# Panorama View

## Steel Frame Installation



- Set the member of Diagrid
  - . Floor : 107 ~ 123F
  - . Height : 434.6 ~ 514.25 m

# Panorama View

## Han River View



▪ From the SIGNIEL  
- . Floor : 100F  
- . Height : 413.65 m

# Panorama View

## Fireworks



# 2.

## Progress

- Schematic Plan
- History of Design
- Monument moments

# Schematic Plan



National, Fun Place, Indoor



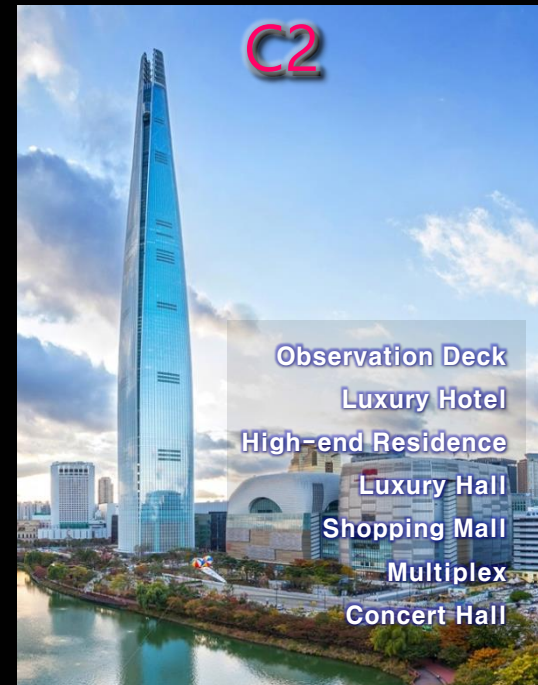
Sustainability, Lifestyle S/C



Prestige Residence



- Site Area : 128,200 m<sup>2</sup> (38,800 PY)
- Total Ground Area : 599,300 m<sup>2</sup> (181,300 PY)
- Floors : B4F ~ 32F



- Site Area : 87,100 m<sup>2</sup> (26,300 PY)
- Total Ground Area : 817,400 m<sup>2</sup> (247,300 PY)
- Floors : B6F ~ 123F

Observation Deck  
Luxury Hotel  
High-end Residence  
Luxury Hall  
Shopping Mall  
Multiplex  
Concert Hall



- Site Area : 22,100 m<sup>2</sup> (6,700 PY)
- Total Ground Area : 243,400 m<sup>2</sup> (73,600 PY)
- Floors : B7F ~ 37F

Apartment House  
Officetel  
Office  
Retail

# History of Design



- **22 Master Plan Changes in 24 Years**

- Overseas : 11 Companies

(Okuno / RTKL / KPF / HOK / Kurokawa / SOM / Destefano / Forster / Cesar Pelli)

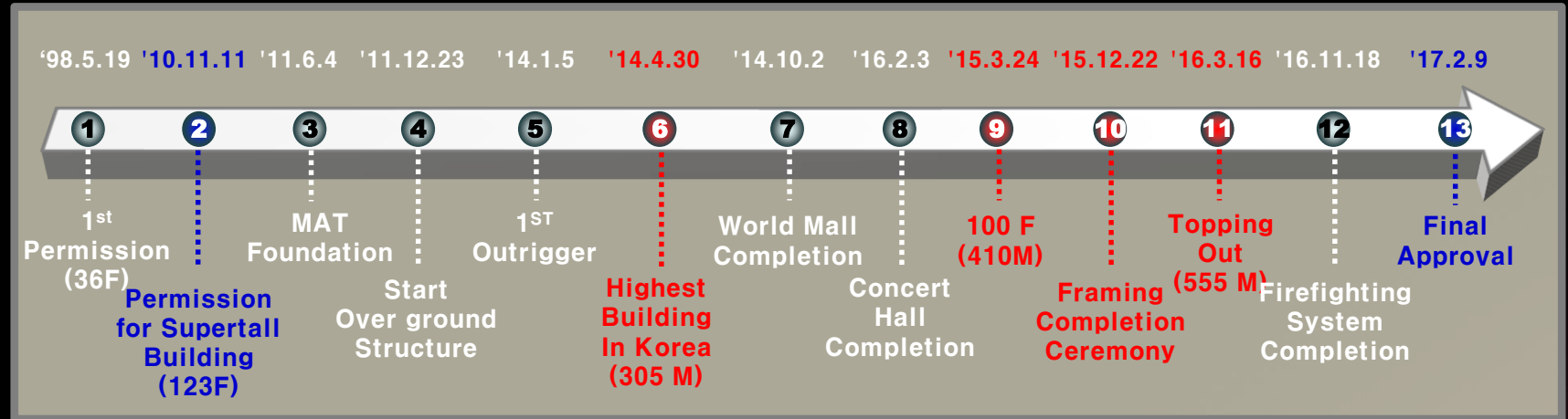
- Domestic : 5 Companies

(Seo Han / Il Geun / DA / SAMWOO / HEOREAM )

- **Final Design Competition (Year 2008) → Final Selection of KPF Plan**

# Key History

## Key History



## Key History Photo





**3.**

## **Construction Record**

**-. Documentary Video**

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# Documentary Video

Presenting the world with a new standard  
for super skyscraper technology



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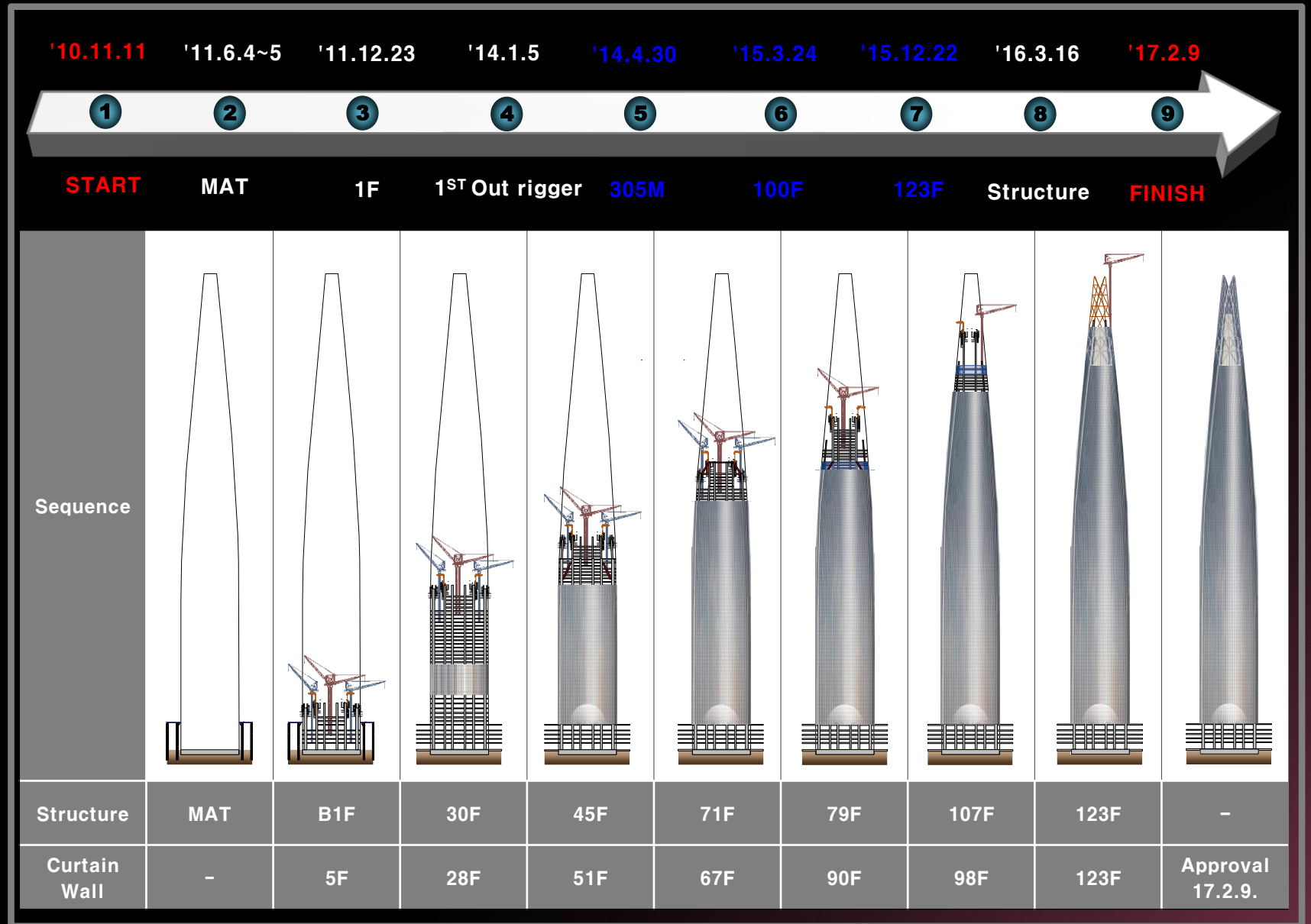
Technology For Safety

# 4

## Construction

- Sequences
- World Record
- Site Record

# Construction Sequences



# World Record

## Steel Diagrid Method – World Top 1<sup>st</sup>

[ 107F(435m) ~ Lantern(555m) ]

\* Top 2<sup>nd</sup> : IFC (438.6m, Guangzhou / China)



# World Record

D/D E/V operation distances [496m (B2F~121F)] – World Top 1<sup>st</sup>  
D/D E/V transportation speed [600m/min] – World Top 1<sup>st</sup>  
Sky Deck location level [478m (118F)] – World Top 1<sup>st</sup>



# World Record

## 64 Ton Tower Crane Installation & Dismantlation – World Top 1<sup>st</sup> [ Main : 64Ton & Sub : 32Ton ]

- Construction Period : 2016.04.08.~ 08.03. (115 days)



# World Record

## MAT Foundation continuous placing – World Top 2<sup>nd</sup>

[ Low Heat Concrete / 31,203m<sup>3</sup> ]

\* Top 1<sup>st</sup> : Shanghai Tower (61,000m<sup>3</sup>, Shanghai / China)



- MAT Size : 71.7m X 71.7m x 6.5m

- Remicon Truck : 5,300 EA

- Re-bar : SHD 51mm

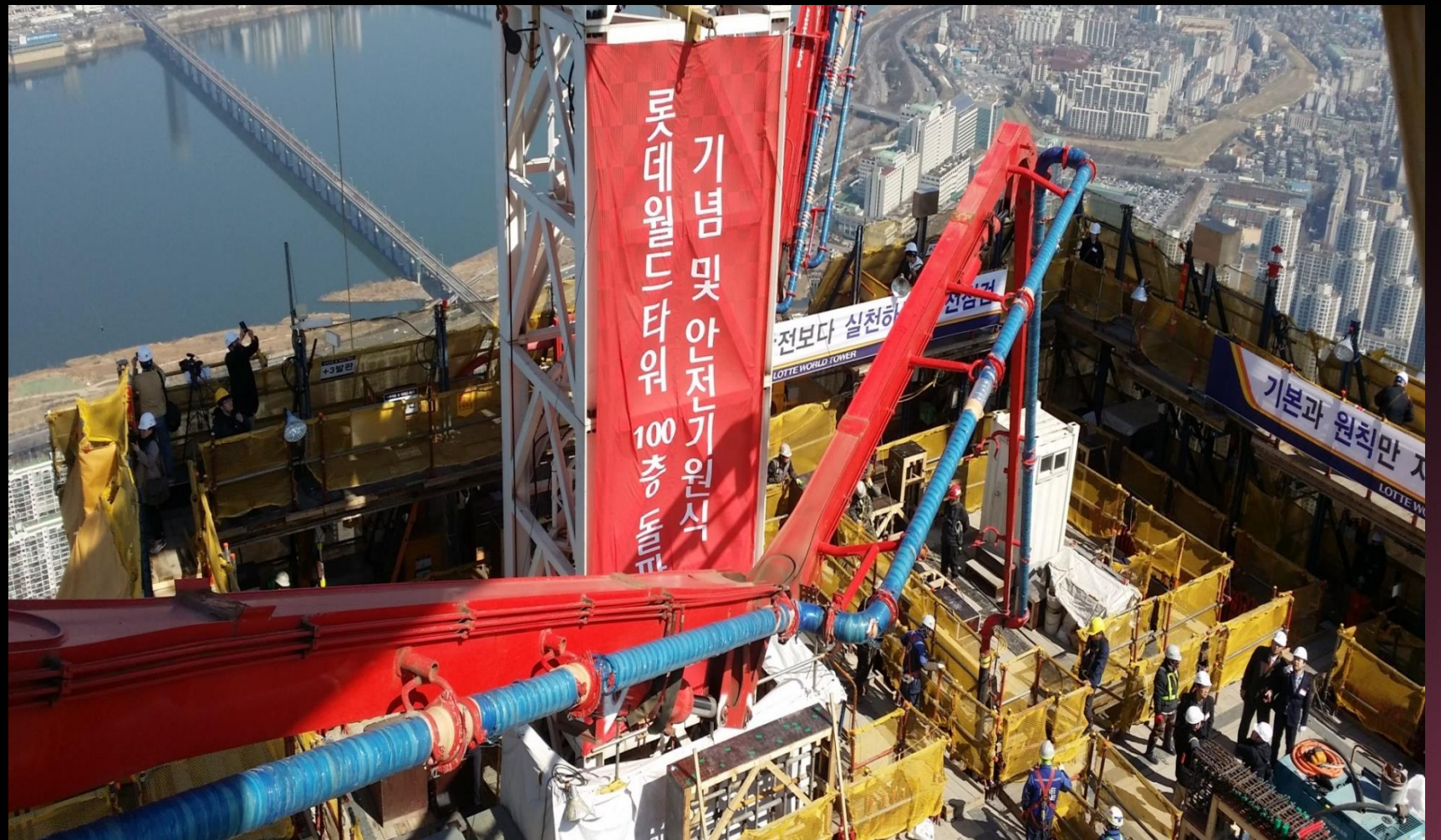


# World Record

## HPC Direct Pumping – World Top 5<sup>th</sup>

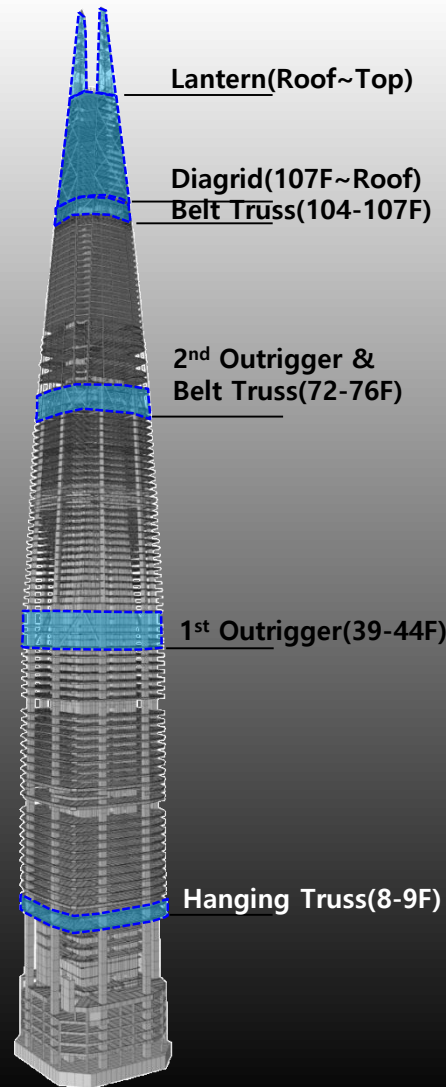
[ 123F (514.25m) ]

\* Top 1<sup>st</sup> : Burj Khalifa (602m, Dubai / UAE)

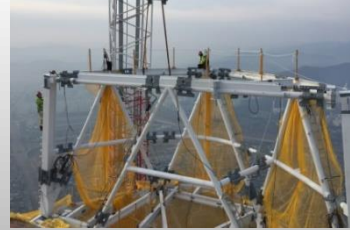


# Construction Technology (Steel Structure)

## Steel Structure System



### ▶ Lantern Structure



### ▶ Belt Truss Structure



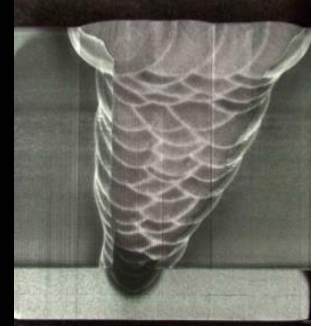
### ▶ Outrigger Structure



### ▶ Hanging Truss Structure

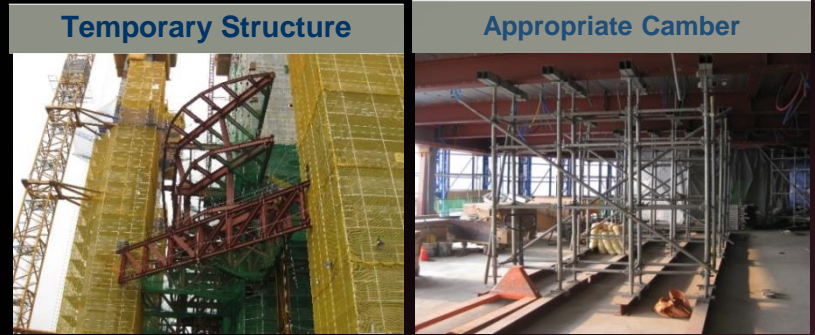


## Welding Technology

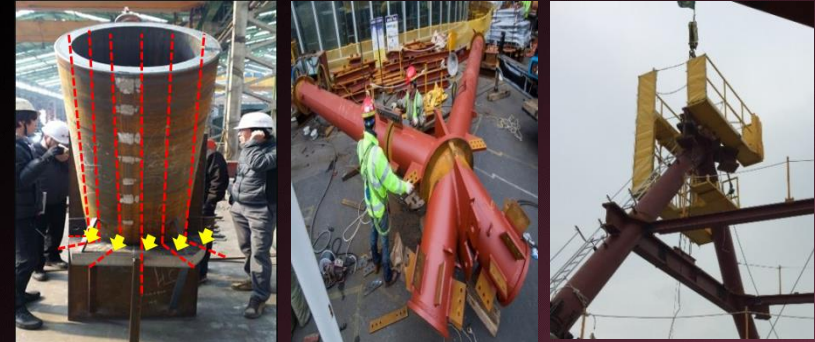


<b>Steel</b>	▪ Max. 120mm
<b>Grade of Steel</b>	▪ HSA800
<b>Warm Up</b>	▪ Preheating Pad
<b>Pro-cedure</b>	▪ WPS

## Temporary Works



## Steel Pipe Production & Installation



# Construction Technology (RC Structure)

## ACS System



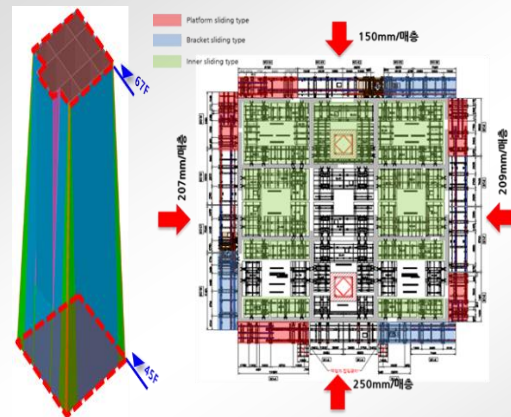
ITEM	Doka SKE100
Perm.Load	100KN
Pouring Height	3.0m~6.0m
Climbing Speed	1m/5min
Angle of Inclination	± 15°
Lifting Device	Hydraulic Jack

## Re-bar Pre-assembly



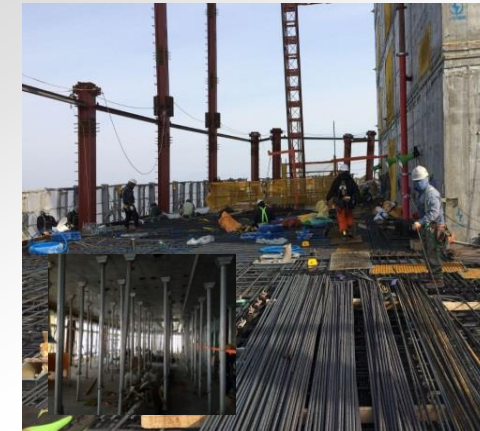
- Core Wall & Mega Column
- 4-Day Cycle
- Ground Assembly
- Special Device

## Inclined Core Wall



- Residence Zone (42F~70F)
- Max. 7°
- Core Ratio : Constant

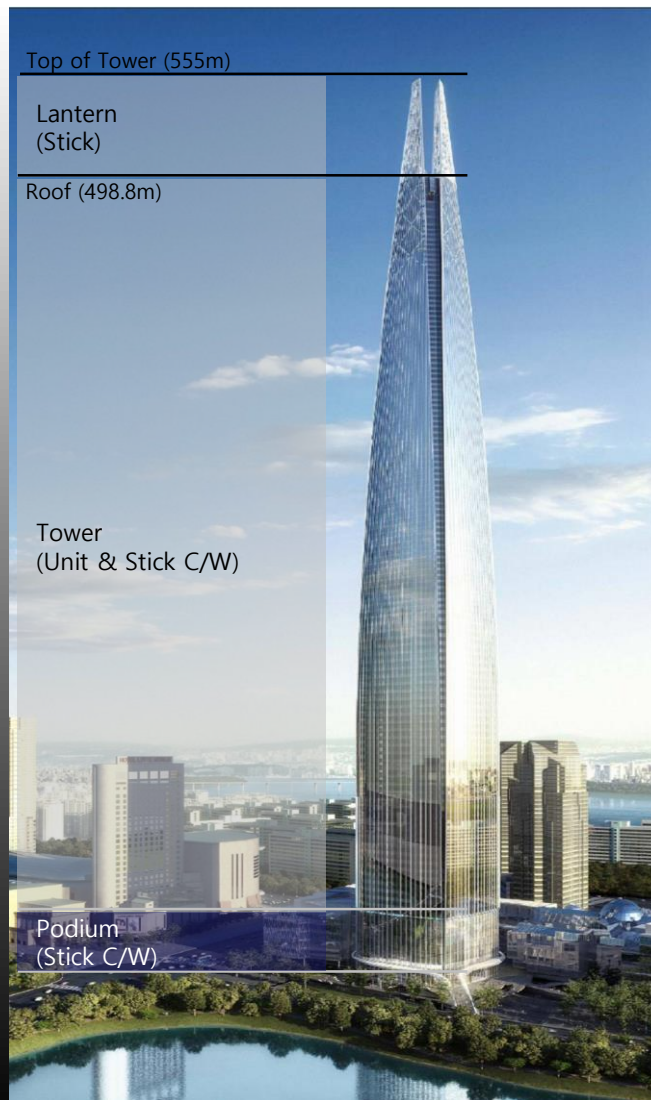
## Flat Slab System



- Hotel Zone (71F~101F)
- 3-Day Cycle
- Service Ability : H30 (AIJ)

# Construction Technology (Curtain Wall)

## Curtain Wall System



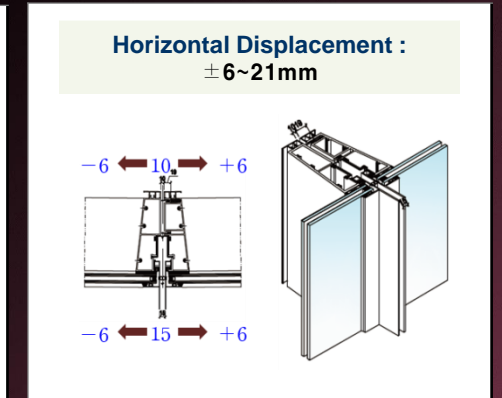
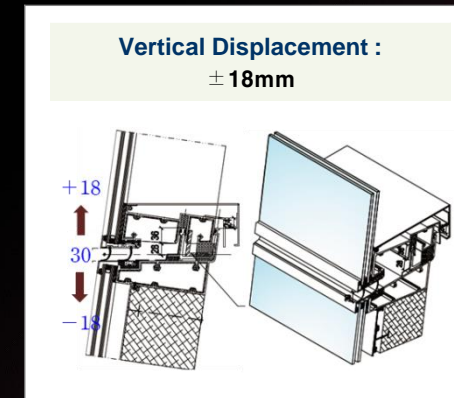
## Summary

ITEM		Quantities	Remarks
Installation Area		120,000 M2	
C/W Quantity	Lantern	4,560 M2	Tower Podium
	Unit	20,950 EA	
	Stick	10,544 M2	

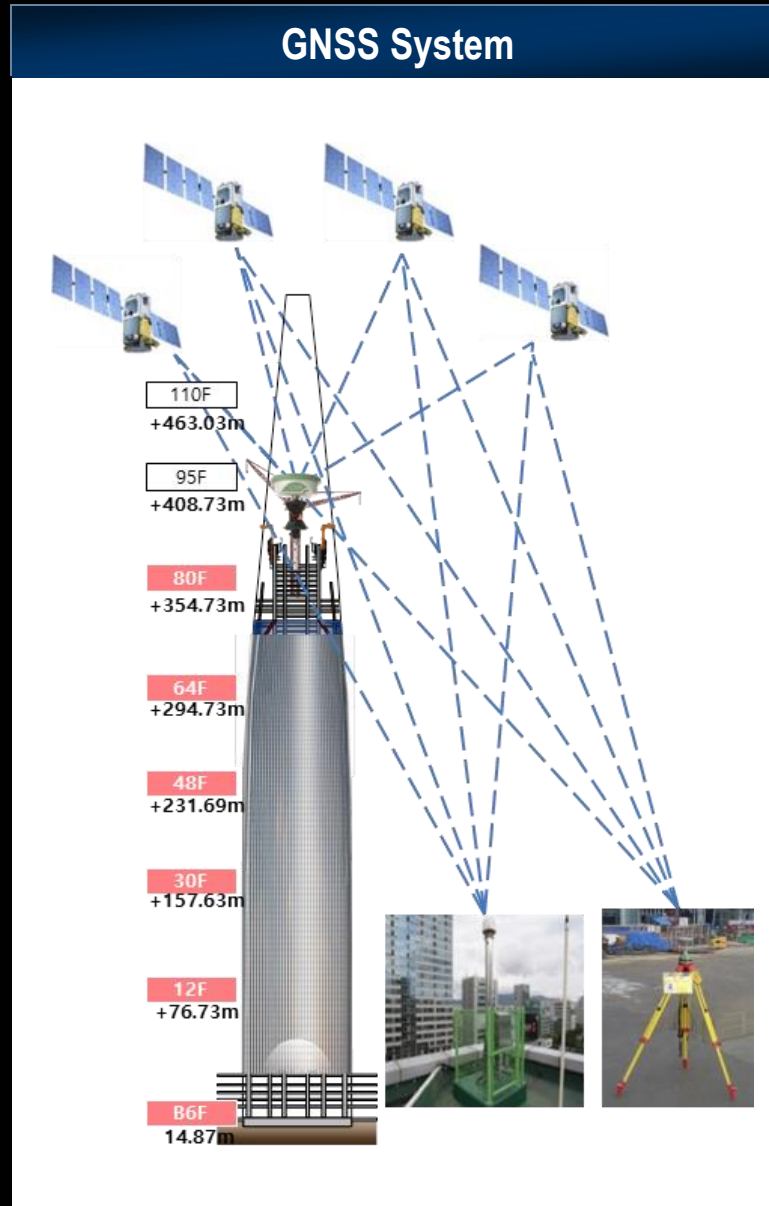
## Curtain Wall Units Optimization (Panel Grouping)

KPF Proposal	CDC Proposal	Lotte E&C
<b>1,141 Types</b>	<b>1,329 Types</b>	<b>5,009 Types</b>

## Displacement Absorption (Vertical & Horizontal)



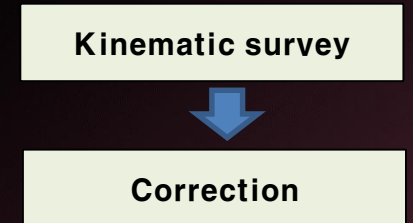
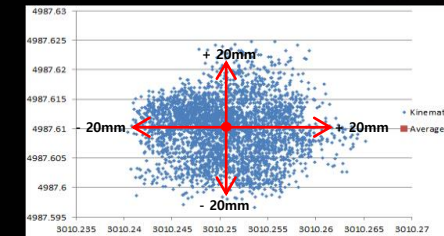
# Construction Technology (GNSS System)



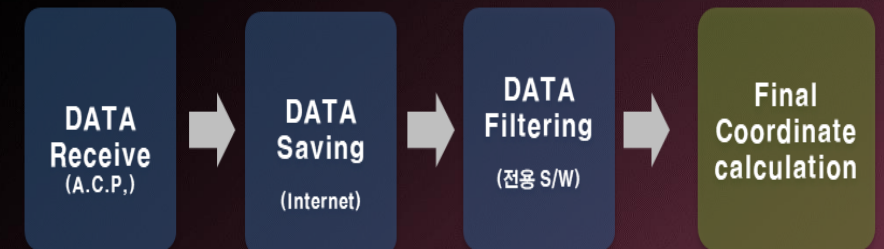
## ■ GPS Receiver



## ■ Data Filtering



## ■ Survey Process



# Thank you

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