Investment in resilient infrastructure through Public Private Partnership: Lotte World Tower & Mall in Songpa District Seoul, Republic of Korea (ROK)

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THEMATIC EVENT: DRR IN ACTION
PRIVATE SECTOR INTERVENTIONS
<4 JULY 2018>, <9:00-10:30>
Contents

1. Introduction
2. Resilient Investment
   • History
   • Pre-planning (PPP)
   • Achievements and Challenges
3. Intelligent infrastructure for safe and human-centered communities
   • Preparedness and Response
   • Social Impact
Southeast of Seoul
One of 25 autonomous districts
Population of 700,000
General Overview

Population | 664,496 persons
264,628 households

Budget | 7 hundred million KRW

Area | 33.88㎢ (5.6% of Seoul)
Residential: 21,019㎢ (62.1%)
Commercial: 2,281㎢ (6.7%)
Green: 10,557㎢ (31.2%)

Housing | 223,193 houses
- Apartment 108,833 (48.8%)
- Single house 45,481 (20.4%)
- Town house 67,524 (30.2%)
- No permit 1,355 (0.6%)
Core Value of District Administration: Safe Community

Resilient Songpa, Safe and Comfortable for 365 days!
Resilient

Imagine New Korea

LOTTE WORLD TOWER
Lotte World Tower and Mall

WORLD CLASS RANKING
The World’s 5th Tallest Building

123 floors and 555M height

115 Times the Soccer Field
Lotte World Tower and Mall

- **Tourism**
- **Jobs/Business**
- **Added value**

**Expected economic effect**

\(~\text{USD} \ 8.98 \ \text{billion/yr}~

(June 2017)

**Ripple effect**

\(~\text{USD} \ 2.7 \ \text{billion/yr}~

(June 2017)
Lotte World Tower and Mall

Kohn Pedersen Fox Associates/
Leslie E. Robertson Associates/
BAUM Architects/
Lotte Engineering & Construction

Construction cost
~ USD 3.6 billion

2,234 days
(6 years)
Construction Overview

- **Total Land Area**: 87.182m²
- **Total Building Area**: 36,471.52m²
- **Total Floor Area**: 807,686.07m²

- **Land area**
  - **Total**: 87.182m²
  - **Entire**: 504,531.27m²
  - **Tower**: 6,179.37m²

- **Building area**
  - **Ground**: 303, 154.80m²
  - **Underground**: 64,103.84m²

- **Total floor area**
  - **Total**: 807,686.07m²

- **Size**
  - **Parking space**: 3,773 vehicles (currently 2,756 used)
**Construction Timeline**

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
<th>Floors</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>Construction permission</td>
<td>123Fl.</td>
</tr>
<tr>
<td>1998</td>
<td>Construction permission</td>
<td>G5Fl. – 36 Fl.</td>
</tr>
<tr>
<td>1987</td>
<td>Land purchase</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>Final Construction</td>
</tr>
<tr>
<td>2011</td>
<td>MAT Foundation</td>
</tr>
<tr>
<td>2012</td>
<td>Framework Erection</td>
</tr>
<tr>
<td>2013</td>
<td>Safety Installation</td>
</tr>
<tr>
<td>2014</td>
<td>Tallest skyscraper in Korea</td>
</tr>
<tr>
<td>2015</td>
<td>Building Appearance Completion</td>
</tr>
<tr>
<td>2016</td>
<td>Construction Completed</td>
</tr>
</tbody>
</table>

**Current in operations**
Public Private Partnership
Legal Framework

Special Act on Management of Disasters in Super High-rise and Complex Buildings with Underground Connections

- "super high-rise building" + 50 floors  OR  + 200 meters

Safety & Disaster Management Requirements (Mgmt. entity):

- Disasters Prevention & Damage Mitigation Plan
- General Disaster Manager
- Safety Education/Training/Awareness Raising
- Integrated Disaster Prevention Office
- Installation of Evacuation Area
- Early Response Team
Joint Efforts

EXPERT GROUP
Academia/
Technical practitioners

PUBLIC
Songpa Citizen Corps

Ministry of the Interior and Safety

Seoul Metropolitan Government

SONGPA-GU

National Fire Agency

REPUBLIC OF KOREA ARMY

LOTTE
Role of Songpa District Office

- **PLANS SOPs**
  - Every 6 months

- **Response & Support Framework**
  - Every month

- **Regular Safety Mgmt.**
  - Every 6 months

- **Joint Response Training**
  - Every 6 months

- **Jamsil Lotte Zone Safety Committee**
  - 1 per month
PPP Achievements for LWT Construction

1. Super-high rise building Disaster Management Framework

DM Manuals and SOPs

First correspondence

Head of DM

Situation Control Room

Relevant agencies

- 119
- Seoul Safety Team
- Songpa District Office DM Team
- Songpa Fire Office
- Songpa Police Office
- Gas Corporation
- Korea Gas Corporation
- Seoul Hospital
- Search and Rescue Teams

Integrated Disaster Prevention Office

Situation Alert (Report 119)

① Situation report & Control

② Cooperation

③ Follow-up response

④ Response & Reporting

② Countermeasures

② Reporting & Cooperation

First correspondence

① Situation report & Control
PPP Achievements for LWT Construction

2. 5 Evacuation areas & widened emergency stairway

- **Emergency stairway (>300mm)**
- **Emergency evacuation area**
  - Installed 5 areas in every 20 floors
  - A space designed to overcome emergency evacuation difficulties (fire)
  - Equipped w/ mask, air respirator, cardio paddle, toilet, water supply, direct dial telephone
## Evacuation Time

### Comparisons

<table>
<thead>
<tr>
<th>Building</th>
<th>Height</th>
<th>Floors</th>
<th>Evacuation Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burj Khalifa (UAE)</td>
<td>828m, 160Fl.</td>
<td>89min</td>
<td></td>
</tr>
<tr>
<td>Lotte World Tower (Korea)</td>
<td>555m, 123Fl.</td>
<td>63min</td>
<td></td>
</tr>
<tr>
<td>101 Tower (Taiwan)</td>
<td>508m, 101Fl.</td>
<td>59min</td>
<td></td>
</tr>
</tbody>
</table>

![Burj Khalifa](image1.png) ![Lotte World Tower](image2.png) ![101 Tower](image3.png)
### 3. Evacuation elevators

<table>
<thead>
<tr>
<th>National Standard</th>
<th>Overseas Standard</th>
</tr>
</thead>
</table>
| Not Mandatory (Recommends installation) | • Bldg. >128m  
• Alternative to Additional Exit Stairways |

- <Adopted> • **Installed 19 evacuation elevators**

#### Time Analysis

<table>
<thead>
<tr>
<th>Class</th>
<th>No. pp. evacuated by stairways</th>
<th>No. pp. evacuated by elevators</th>
<th>Total evacuation time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15,285</td>
<td>0</td>
<td>118mins</td>
</tr>
<tr>
<td>2</td>
<td>9,017</td>
<td>6,268</td>
<td>63mins</td>
</tr>
</tbody>
</table>

**Time saved 55 mins**

※ Most of the super-high rise bldgs. have these elevators
PPP Achievements for LWT Construction

4. Public Consultation Committee (Assessment & Verification)

5,000 people

Public Site Experience

SITE VISIT
Challenges
Response measures

TASK FORCE

Ministry of the Interior and Safety

Seoul Metropolitan Government

EXPERT GROUP
Academia/Technical practitioners

Research

Safety Monitoring
Intelligent Infrastructure for **Safe & Human-Centered Communities**
- **Seismic Design**
  - Max. response value for three ground motions
  - Withstand M9 (return period of 2,400 years)

- **Wind pressure design**
  - Instantaneous max. wind speed 80m/s
    - (av. wind speed 30m/s for 10mins, withstand return period of 300)
Real Monitoring System
e- Disaster Management System

- Rapid decision making & Response
- Effective integrated system mgmt.
- Emergency manuals (disaster types)
- Prevention → big data analysis
- Enhance system management
- Secure “Golden Time”
- Serve as a control tower

Systematic communications
Accident reporting
One screen monitoring
Sensor actions

Integrated DM system through Disaster Management Solutions
Eco-friendly building

Energy Plan Optimization

- Greening of Rooftop
- High Insulation Glass (Low-E)
- Recycling of Heavy Water and Rain Water
- High Efficiency Equipment and Apparatus

New & Renewable Energy

- Solar Heat Collector
- Wind Power Generation
- Geothermal Heating and Cooling
- Collection of Waste Heat from Domestic Sewage
Disaster Preparedness: Education & Training
Social Impact: Transportation Infrastructure

1. Road Expansion
2. Underground way connections
3. Large complex square
Social Impact: Transportation Infrastructure

4. Jamsil Transit Center
Social Impact: Transportation Infrastructure

5. Advanced Traffic Information System

Transport Management System
Variable Message Sign
Traffic to decrease by 15%
Social Impact: Cultural hub
Thank you

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