Development of Universal Design Guidelines for Urban Railway Stations: Targeting Suseo Station

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Introduction

Increasing issues of railway service quality

Aging and diversification of urban railway users

Increased demand for convenience of vulnerable users

Guidance facilities that hinder use

Inconvenience due to maintenance focusing on individual facilities

Dangerous use environment, inconvenience

Insufficient total design standard optimized for each station

What is the Universal Design?

Design For All

Designing tools, equipment and facilities so that everyone can use them regardless of having a disability or other handicap

Signs to enhance the convenience of urban railway station users **Universal design-based standardization** of the design standard

*Source: google.com*
Development of Universal Design Guidelines

Refers to the comfort and ease of transportation within a station facility when urban railway passengers use the station

- **Equality**
- **Aesthetics**
- **Perceptibility**
- **Convenience**
- **Safety**
- **Accessibility**

**Universal Design**

- **Disabled** (physically & mentally challenged, vision & hearing-impaired)
  - Pregnant women, people with heavy luggage, patients, people with strollers
  - People with amblyopia, impairment in hearing, mental weakness, development disorder, autism

- **Senior Citizens**
  - People of 65 years or older whose access, movement and use of information are restricted

- **Children**
  - People accompanying infants or toddlers
  - People in a physical maturation period whose movement is restricted

- **Foreigners**
  - Foreign travelers
  - People having difficulty in communication

**Defining convenience in using urban railway station**

- **Standardizing classification of urban railway station users**

- **6 principles of universal design for urban railway stations**

- **Classifying urban railway station spaces based on movement flow of users**

**Detailed Spatial Domains within Waiting Room** (ticketing, checking tickets, sanitation, convenience, control, firefighting prevention)

**Platform ~ Platform**

**Platform ~ Waiting Room ~ Platform**

**Detailed Spatial Domains within Platform** (convenience, firefighting prevention)
Development of Universal Design Guidelines

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1. Drawing detailed standards of UD
   - Comparison review of domestic & international laws and relevant standards
   - Application of UD principles and analysis on user characteristics
2. Assessing domestic level
   - Analysis on possibility of applying UD to domestic urban railway stations
3. Developing urban railway station design guidelines
   - Design principles and standards
   - Design standard analysis
   - Detailed drawings and examples

Chapter 3. Standard guidelines on guide signs at urban railway stations

1. Deduction of detailed direction and items
   - Establishing detailed concepts
   - Determining table of contents and specifying items
2. Guide sign design (proposed)
   - Establishing design principles
   - Design concept diagram
   - Developing pictogram
3. Development of guide sign standards
   - Constituting standard guidelines
   - Developing standard guidelines (proposed)
Selection of test bed station and deducing application scope

### Selection of Test Bed Station “Suseo Station”

#### Criteria on Selection of Test Bed Station
- Effectiveness
- Ease of Construction of Infrastructure
- Cost Effectiveness
- Financing Feasibility

#### Factors for Selection
- Outdated stations
- Transfer stations
- Stations used by first timers
- Stations with a plan for upgrade by the operating agency
- Stations recommended by the operating agency
- Stations with suitable number of exits

#### Factors for Exclusion
- Stations with ongoing project
- Recently opened stations (less than 5 years)
- Stations near large commercial buildings
- Stations widely used by commuters
- Transfer stations of 3 or more lines
- Number of exits (2 or fewer or 10 or more)

### Factors for Selection
- Suitable to be selected as a test bed station
- Improvement necessary following the opening of the Suseo-bound SRT
- Operation agency support and budget subsidization available
- Formation of a Korail(Bundang Line) - Seoul Metro(Line 3) cooperation system

Daily passengers at Suseo Station / 34,604 → 84,489 (40% increase)
(As of 2015) (Estimated number for 2017)

- Approximately 22% are vulnerable users
- Transfer station Bundang Line (B4), Line 3 (B2), Construction work for SRT (B1, Exit 5) transfer passageway in progress
Test Bed Suseo Station Design

**Improvement of facility**

1. Expansion of facilities (Nursing Room)
2. Streamlined customer circulations
3. Bondung Line Access Gate (enhanced awareness)
4. Expansion of facilities (Resting area)
5. Restroom improvement (multipurpose restroom)

**Specialization of Station Facilities Universal Design Zone**

**Improvement of signage**

Integration of the transfer station guidance system
Application of standard items, including dimension, arrows, symbols, and information systems of signage
Establishment of Test Bed Suseo Station

Improvement of facility

- **Before:** Dark areas, large number of pillars and idle spaces, lack of convenience facilities, narrow entrance to toilets
  Design (Plan): *Universal design specialization zone* in the waiting room of Suseo Station, Bundang Line (B1) (approx. 85% of station facility design guidelines applied)
- **After:** Improved gate design, improved recognition with high illumination, expanded use of rational space, expanded convenience facilities

Improvement of signage

- **Before:** Different signage by each operating agency, insufficient information system for traveling routes, information signage poorly located due to many pillars
  Design (Plan): *Integration of transfer station information system* through consultation with operating agencies (approx. 80% of information signage standard guidelines applied)
- **After:** Enhanced arrangement of moving lines and viewing angles of travelers, secured visibility utilizing clear colors and layouts
Test Bed Suseo Station Improvement Benefits

Eye tracking survey (transfer)

- Gaze distribution time reduced by approx. 18 sec.
- Hanging signage attention time increased by approx. 32%

User experience survey (4 routes)

- Total required time (average) reduced by approx. 43 sec.
- Total delay time (average) reduced by approx. 38 sec.

Transfer routes and one other route, six travelers (general public, traffic-vulnerable), required time, gaze distribution time, percentage of attention time

Economic benefits

- Cost reduction through decrease of information signage by approx. KRW 100 million
- Economic benefits by approx. 1.15

Before improvement → 158 after improvement (decrease of 39%), cost of installation KRW 190 million
Time Value: Traveling time (KRW 287/person), delay time (KRW 103/person)
Universal Design Guidelines for Urban Railway Stations Utilization Plan

1. Improving practicality
   - Application to the improvement of outdated stations of railway operation agencies
     - Improvement of waiting room facilities on the basement level of Suseo Station (Bundang Line)
     - Application to new station planning and design
     - Station facilities for double-track railway line between Wonju and Gangneung
     - Information signage for double-track railway project between Seongnam and Yeoju
   - Reflection of design standards by Korea Rail Network Authority and ordering agencies
   - Securing intellectual property rights through pictogram design registration

2. Improving system
   - Systemization by reflection of urban railway design rules
   - Unified guideline application to urban railway operation agencies
   - Utilization in the improvement of station facility standard for not only the urban railway, but also express and general railways

3. Reflecting in policies
   - Utilization in the government’s UD-related mid-to-long-term road map development
   - Utilization in creating policy base for UD construction standard system establishment
   - Reflection in five-year plan for the traffic vulnerable
   - Reflection in mid- to long-term UD project plans of the local governments

“Development of universal guidelines for urban railway stations”
THANK YOU
GRACIAS