Korean National Parks facilities’ universal design guidelines

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I. Background and Objectives

Purposes of visiting National Park are becoming various and also various of people including foreigners, children, and adults are visiting National Park. Therefore, the applicability review and applying measures of the Universal Design to park facilities based on the characteristics of Korean National Parks are required. As a first step of applying Universal Design to park facilities, walking trails should be graded based on the walking trail classification system. As a second step, Universal Design guideline for park facilities based on the characteristics of visitors should be developed in order to seek condition improvements for the visitors.
II. Contents

1. The first step: The trail classification system based on the management direction and the characteristics of National Park

- Methods
  This project has proceeded in two parts.
  First, a walking trails classification system has been developed and adopted in order to setup the basic framework for the management of trails.
  Second, the guidelines of universal design for park facilities like trails, parking lots, and campsites have been applied based on the Korean trail classification system.

- Developing trail classification system (TCS)
  In order to develop the TCS, it was necessary to consider gradient, length, trail surface condition, and hiking time of the trail, etc. The Korean trail classification system identified 5 difficulty ratings (easy, moderate, intermediate, advanced, and expert) based on above factors.
  KNPS developed the guidelines for the trail classification system in 2011 and applied the guidelines to 1,700km of trail, of which is the total trail length of the Korean National Parks, from 2012 to 2013.
  This system will more clearly provide basic information to better match facilities to the user, including handicapped, elderly, and moderately skilled visitors to expert visitors for hiking and mountain climbing. Detailed descriptions of the trail classes will be provided to visitors in order to manage risk and minimize exhaustion, injuries, and accidents. At the same time this will make it more convenient for visitors, as they will be provided information about trail routes that is relevant to their physical abilities and condition.

- Standards of the trail classification system
  In order to develop a standard trail classification system for the Korean National Parks, it was necessary to identify systems that are currently
used in other countries such as Australia, New Zealand, USA and Canada. Based on these examples, 5 classifications were developed for the Korean National Parks. An easy class and barrier free park facilities were established for the disabled and transportation vulnerable.

Another important aspect to developing the trail classification system was the necessity to identify variables for judging the classes of the trails. After selecting the possible variables, the delphi method and analytic hierarchy process was applied to identify the validity, importance and weight of each variable. Through this process, 5 major variables were identified to develop the trail classes, which were gradient, trail length, trail surface condition, rocky features, and hiking time.

<table>
<thead>
<tr>
<th>Classes</th>
<th>Easy</th>
<th>Moderate</th>
<th>Intermediate</th>
<th>Advanced</th>
<th>Expert</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gradient</td>
<td>8% or less (~)</td>
<td>8% to 12% less than (0~10%)</td>
<td>12% to 25% less than (10~15%)</td>
<td>25% to 32% less than (15~20%)</td>
<td>More than 32% (More than 20%)</td>
</tr>
<tr>
<td>Distance</td>
<td>500m or less (2km or less)</td>
<td>1km or less (2~4km)</td>
<td>3km or less (4~6km)</td>
<td>5km or less (6~8km)</td>
<td>More than 5km (More than 8km)</td>
</tr>
<tr>
<td>Surface Conditions</td>
<td>Well formed trail (Wood decks, concrete etc)</td>
<td>Formed trail (Dirt road 80% ~ 100%)</td>
<td>Relatively unformed trail (Dirt road 50~80%)</td>
<td>Unformed trail (Stone road 50~80%)</td>
<td>Very unformed trail (Stone road 80~100%)</td>
</tr>
<tr>
<td>Natural obstacles</td>
<td>None</td>
<td>Somerock</td>
<td>Wooden stairs are installed</td>
<td>Ropes, ladders etc. are installed</td>
<td>Required hand up and down</td>
</tr>
<tr>
<td>Time required</td>
<td>in an hour</td>
<td>in an hour or two</td>
<td>2~6 hour</td>
<td>5~7 hour</td>
<td>More than 7 hours</td>
</tr>
</tbody>
</table>

- **Use of trail classification system for Trails of the Korean National Parks**

Inspections for Trail classification were carried out for 1,700km of the 20 national parks from 2012 to 2013. Using the GPS measurement units by the Trimble, gradient and length of trails were measured.

Staff of the Korean National Parks surveyed the trails for surface conditions and any natural obstacles on the trails, like rocky features. Information from the national park maps were utilized to measure the hiking time of each trail route. All the data were then entered into Microsoft Excel and were analyzed.

Trail classes analysis were as follows.
Trail classes and incorporate universal design

2. The second step: Establishment of design guidelines according to the visitors trait based on trail level

2-1 The process and main contents

Conducted researches and site investigations based on the walking trail classification system to develop Universal Design Guideline considering each facility's features.
2-2 User and expert survey

- Three types of survey of user, expert and poll about amenities and National Park trails.

<table>
<thead>
<tr>
<th>Survey method</th>
<th>User participation survey</th>
<th>Expert status survey</th>
<th>Poll</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area</td>
<td>Participants</td>
<td>Area</td>
<td>Area</td>
</tr>
<tr>
<td>Bukhan mountain trail</td>
<td>Wheel chair user 1 person</td>
<td>Gaeryong Mountain trail</td>
<td>17 National Parks</td>
</tr>
<tr>
<td>Taean trail</td>
<td>Wheel chair user</td>
<td>Chik Mountain campsite</td>
<td></td>
</tr>
<tr>
<td>Bukhan mountain trail</td>
<td>wheel chair user 2, 2 families using strollers 2 kids, 1 the old</td>
<td>Odae Mountain campsite</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bukhan mountain trail</td>
<td>National Parks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dukyu Mountain trail, campsite</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Jili Mountain trail</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Naejang Mountain trail</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Where: Non handicapped trails</td>
<td>How: Walking through the target trails, observing the facility users and interview</td>
<td>Where: Trails, campsites and other facilities in National Park</td>
</tr>
</tbody>
</table>
- In order to provide safe and comfortable conditions for visitors, development of Universal Design standards is necessary.
- Various guidelines based on the classification are required because of difference of visitors.
- National Parks not only require development of facilities but they also require development of amenities.

- **Case studies of domestic (Bukhansan National Park)**

  **Tour map - Verification of non handicapped trails**

  Jung Ji Young 27 female Seoul DPI manager
  Handicapped type: wheel chair using
  Transportation: Owner driving
  Destination: 2 section trails (300m)

- **Non handicapped trail search**
- **Info desk use**
- **Trail search**
- **Trail use**
- **Toilet use**
- **Back to office**

  - **Lack of signs**
  - **Lack of secure facility**
  - **Lack of convenience facility**
III. Universal Design Guideline

1. Design Strategy

Based on survey results, establishment of design strategy

- Plan for the walking trail classification system

<table>
<thead>
<tr>
<th>Grading Name</th>
<th>Easy</th>
<th>Moderate</th>
<th>Intermediate</th>
<th>Advanced</th>
<th>Expert</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hikers</td>
<td>- people with disabilities, pregnant</td>
<td>- children, seniors</td>
<td>- Beginning hikers</td>
<td>- Experienced hikers</td>
<td>- Experienced hikers</td>
</tr>
<tr>
<td>Pictogram</td>
<td>![Pictogram]</td>
<td>![Pictogram]</td>
<td>![Pictogram]</td>
<td>![Pictogram]</td>
<td>![Pictogram]</td>
</tr>
<tr>
<td>Gradient</td>
<td>Flat</td>
<td>Gentle hills</td>
<td>Short steep hills</td>
<td>Very steep</td>
<td>Very steep and difficult</td>
</tr>
<tr>
<td>Trail surface</td>
<td>Well formed trail</td>
<td>Formed trail</td>
<td>Relatively unformed trail</td>
<td>Unformed trail</td>
<td>Very unformed trail</td>
</tr>
<tr>
<td>Suggested gear</td>
<td>None</td>
<td>Sneakers</td>
<td>Hiking boots, backpack, water, pole, etc.</td>
<td>Hiking boots, backpack, water, pole, etc.</td>
<td>Hiking boots, backpack, water, pole, etc.</td>
</tr>
</tbody>
</table>
**Guideline for National Park facility Universal Design**

**Objectives**
Helping various National Park visitors to achieve their visiting purposes safely and conveniently

**Basic Direction**
**Man & Nature & Areas**
Considering Design  Respecting Design  Harmonious Design

**Basic Principles**

- **Accessibility**
The physical components of the environment that assists users’ behavior functionally. Regardless of User’s body size, position, movement, the appropriate size and accessible space are provided to operate easily and to be reached easily by hands. Without psychological sense of discrimination, some of the options can be selected equally.

- **Safety**
Self-knowledge, improvement and prevention of physical risks such as accidents. Coping and reverting errors and accidents have already happened. Using with confidence wherever and whenever through a unified promise and system.

- **Comfort**
With not only functional satisfaction but also aesthetic beauty, harmonious dignity arises. Through environmental stimuli such as light, heat, air and sound, bringing physical and psychological pleasure.

- **Individuality**
With maximizing and expressing the unique characteristics, differentiating is possible. Based on regional history and cultural context, meaningful story and new value creation.

- **Sustainability**
Easy maintenance and low cost of operation for a long time. No waste of energy and resources. Deep considering of the earth environment.

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**Characters**
- Pursuant to city space
- Including all facilities
- Vehicle accessible
- Most visitors usage
- Various activity such as meeting and rest

**UD application method**
- Fault-tolerant facility maintenance for reasonable access
- Expansion of public function for various users

**Applicable standards**
- Applying any accessibility act
- Proposal considering the characteristics of National Park

- Very flat trails 15% of National Park
- Wheel chair and stroller easy access
- Low countries trail
- Flat trails 13% of National Park
- Various trail activity such as walk, rest
- Various visitors such as the young and old
- Most of National park
- Relatively steep and rough trail
- Summit conquer climbing activity
- Climber

- Facility maintenance for comfortable access
- Consideration of recreation and healing function for various visitors
- Facility maintenance for safe climbing
- Promotion of nature conservation and efficient climbing

- Proposal considering the characteristics of National Park
2. Main contents of guidelines

- Securing pedestrian safety and space

- Considering various type of visitors
• Efficient & comfortable shelter

• Universal Design guideline