

# Analysis of conditions of the sidewalk in Ichinoya Area

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## 1. Motivation

When commuting between university and dormitory areas, sidewalk used by the pedestrians and bicyclists. In some areas, due to the damages of the sidewalk it's difficult to commute for the people specially in night times. Holes, bumps on the sidewalk are inconvenience and unsafe for travelers.

## 2. Introduction

Sidewalks are the main channel for walking and cycling for students of University of Tsukuba. Also, this inner sidewalk used for walking/running/jogging in term of the exercise purpose by the people.

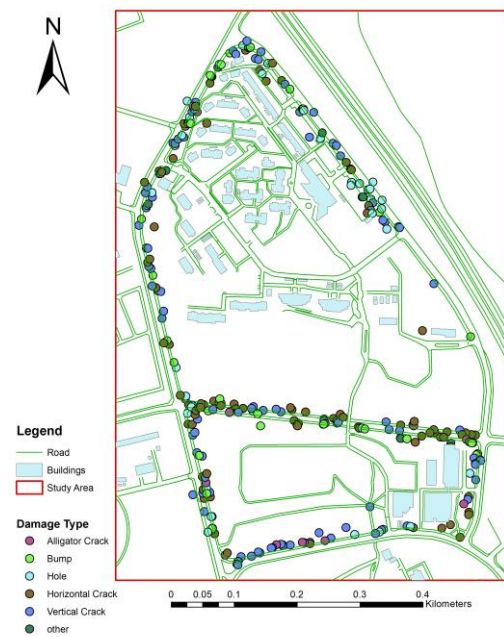


Figure 01: Damage type distribution

## 3. Study Area

The fieldwork has carried out the Ichinoya area of the University of Tsukuba to identify the damage locations of the sidewalk. In this study, only the inner sidewalk of the Ichinoya area considered.

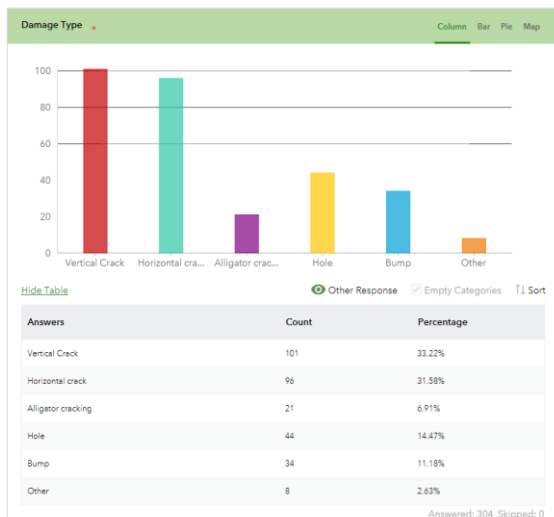


Figure 02: Percentages of damage type

## 4. Methodology

In this fieldwork Survey123 by ESRI used to get the information about damages and the locations. Damage type, dimensions, image of the damage area and the GPS locations collected using Survey123. Damage types are categorized into vertical cracks, horizontal cracks, alligator cracks, holes, bumps and others. 304 points were collected in this field survey. After the field survey, collected points converted into shape files and used for preparing the damaged map. Damaged density sidewalk map was created using the point density tool in spatial analyst of the ArcGIS.

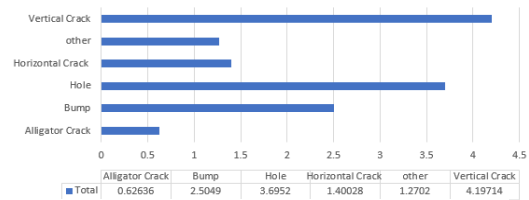


Figure 03: Sum of area by damage type

## 5. Results and Discussion

Figure 01 shows the Damage type distribution of the study area. According to the survey results (Figure 02), most reported damage types are Vertical Cracks (33.22%) and Horizontal Cracks (31.58%). Also, Holes (14.47%), Bumps (11.18%), Alligator Crack (6.91%) and Other (2.63%). Figure 04 shows the Damage density analysis map of the sidewalk. East side of the maps shows the less damages because of recent renovate of the sidewalk. North side of the Ichinoya dormitory area and the many places around TARA center have high density of damages.

Figure 03 shows the sum of area by the damage type. vertical cracks damage area is the highest and the value is 7.19714m<sup>2</sup>, while damage area of the holes is 3.6952 m<sup>2</sup>. Bumps damage area is 2.5049 m<sup>2</sup>. Horizontal cracks damage area is 1.40028 m<sup>2</sup>. Other types damage area is 1.2702 m<sup>2</sup> and alligator crack damage area is the lowest and value is 0.62636 m<sup>2</sup>.



Figure 04: Damage density of the sidewalk