# Introduction

Jonathan Rausseo is Manager of sustainable Development from The Office of Campus Sustainability at the University of Ottawa. He has tasked us with designing and prototyping a modular or rollable sidewalk that can be deployed in winter and removed in summer. This sidewalk is to have a heating apparatus for snow removal with the end goal of replacing salt as the main tool for dealing with snow and ice on campus. In this document we will identify the customer’s needs, identify some design ideas, and benchmark the design using other existing products.

# Needs Identification Rank (5-1)

1. Cost

Easy to clean and repair the product 4

Reduce the cost of indoor cleaning 4

No more than 100$ 5

- The budget is just to create a prototype (approximately 1 m3)

## 2. Shaping Requirement

Scalability and modularity 4

Make it flexible to fix different roads with different size 1

Design the product moveable and easy to storage, which needs to be small, thin, and compact 3

Make it three feet wide as this is the standard width of a sidewalk 2

Able to attach to other sections of sidewalk 3

## 3. Less Damage

Reduce damage and pollution to the natural environment 1

Enhance the protection of living things 1

Lengthen the service time of infrastructure 1

Make it sustainable for years 3

Cannot become waterlogged 4

## 4. Safety

Enough traction in order to prevent falling 5

Make it stable, not easy to slide 4

Convenient for people with basic transportation (walking, bike, wheelchair) 5

Make sure there are no large bumps or divots in the sidewalk that prevent wheelchairs from rolling 5

## 5. Operating Conditions

Must work up to –25◦C 5

Be able to withstand the weight of snow and people but will not be driven over necessarily 5

Must be able to be walked and wheelchaired over safely 5

Must be able to be plugged in to the universities electrical or hot water system 3

Its surface should be level and have good grit and traction 4

3 feet wide 2

## 6. Design ideas

Make it black to absorb solar radiation to aid in the melting process

Put an insulation layer on the bottom to prevent heat diffusion

Electric would likely be easier and more cost effective then the hot water option

Heat sensor may be useful

# Ranking (Most to least important)

5 The product is safe for people to walk on

4 The product works at the specified weather conditions

3 Limited cost to design

2 Project is compact and flexible

1 Sidewalk is friendly to the environment

# Benchmarking of Heated sidewalk

Hot water, Glycol, and Electric

Put an insulation layer on the bottom to prevent heat diffusion

Cover a layer of pipes containing hot water

Hot water storage to offer thermal energy

Necessary power supply for use at one location

Up to 15 amps, 120 V, 350 W

UV protection

Commercial products around $423.83/m2

# Problem statement

We need to design a low-cost, modular, heated sidewalk for The Office of Campus Sustainability that can efficiently melt snow as it falls and is safe to walk on even during a heavy snowstorm.

# Conclusion

In order to satisfy our client, we must fulfill the needs and requirements that he has laid out. Our modular heated sidewalk will attempt to satisfy all conditions including those of costs, shape, resilience, safety, and operating conditions. We have ranked the importance of each of these five sections, with safety being the top priority. We have laid out benchmarks from already existing products in order to understand what parameters we are to meet or surpass. We have identified the problem statement. With the collection and summation of this information, we are now more well informed and can now move on to the next part of developing our project, having tabulated information that can help us identify what markers need to be reached.

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