

Project 4. Sidewalk Safety

Background and Motivation. Sidewalks are one of the most important facilitators of human transportation. These days, it seems that everyone is using them, young, old and in between. People with disabilities (e.g., wheelchair bound) are using sidewalks. Infants in strollers are using sidewalks, thanks to a parent pushing them! Sidewalks are important for so many reasons: visiting local stores, restaurants, libraries, post office, physicians, dentists, just getting physical exercise, etc., etc. Local commerce could not survive without excellent sidewalks.

Vital to our safety is proper design and maintenance of sidewalks. As our web-based references indicate, the annual statistics on people's accidents on sidewalks are worrisome. Walkers having falls on sidewalks constitute the largest fraction of accidents; these can be classified as minor ("get up, dust off, and move on"), to serious (sprained muscle or bruised skin), to critical – even requiring hospitalization (e.g., a concussion).

In this project, we seek to be able to "grade" sidewalk segments for their safety, with the goal of reporting back to the local Department of Public Works (or comparable department with a different name) that has local government responsibility for sidewalk maintenance and safety.

Student Activities. Students will first walk a mile or more on familiar local sidewalks near their homes and report back to their Team what they found, that is, any observed safety issues. If there are no sidewalks near their homes, they need to find another location having sidewalks -- to undertake their first sidewalk safety excursion.

From their group discussions stemming from these first walking on sidewalks – with eyes wide open! – and from their readings on the web and suggestions made by others (parents?), the team will create a list of up to ten items that are safety issues for sidewalks. Among these will almost certainly be attributes such as "uneven surfaces," "broken pavement," "plant growth impeding walking or at least forward vision of the walker", etc. Suppose the students decide on exactly ten such items, and they grade each item on a zero to ten scale. Here, "0" is excellent, an A+, meaning that the attribute was not seen anywhere on the sidewalk they traversed. A ten is the worst possible score, often signaling danger and perhaps even the need to close the sidewalk to the public until the needed repairs are made. A perfect sidewalk, then, would have a perfect score of ZERO! A perfectly awful sidewalk, one that would set world records for being terrible, would have a total score of 100. We do not think that such a sidewalk exists.

Once the scoring mechanism is agreed to, the students should agree among themselves how they will apply the scoring in practice. We recommend that each student independently walks a mile on a given sidewalk in the community known to have problems, i.e., one that will certainly not get a perfect score. Each student independently grades that sidewalk. The student team then reconvenes and compares notes on their respective grading of that given sidewalk. Undoubtedly they will find differences. The goal is to reduce those differences by reaching agreements on each item in the scoring, recognizing that it is impossible to have human scorers arrive at identical scores. We except the fact that scoring is subjective. After this meeting, it may be necessary to repeat the walking scoring one more time, on a different sidewalk, just to confirm that the differences in scoring have lessened.

Now the Team is ready for their primary data collection challenge. They will “randomly select” 60 sidewalk segments, none over one mile in length and most typically being the length of the city block or town block – that is, the sidewalk just parallel to a street between two adjacent street intersections. The teacher can offer one or two ways in which sidewalk segments can be selected randomly. Each of the four Team members will walk 15 of these segments, and carefully grade each one. (Here we suggest that students work in pairs as each views and scores his/her designated mile of sidewalk.)

From this, the student Team can create histograms, ten different histograms for each of the ten sidewalk attributes and – the most important one – the final aggregate histogram showing distribution of total score over all 60 sidewalk segments. For each histogram, the students will visibly mark the average (mean), median, mode and the two 5% tail boundaries. We fully expect that many of these histograms will be highly skewed toward zero. This would be a case for a community having great maintenance of its sidewalks. The students need to discuss this and also the usefulness of the mean as a single descriptor of the situation. If possible, the students should then meet with professionals in the community (Department of Public Works) to present their results and to suggest their feedback.

The project ends with the formal presentation at the Final Event and submission of a final report.

Potentially useful web sites:

SLIPS AND FALLS – WALKING SURFACES

<https://www.guideone.com/safety-resources/slips-and-falls-walking-surfaces>

Sidewalk & Walkway Trip Hazards - Expert Article

<https://www.robsonforensic.com/articles/sidewalk-expert-witness/>