Visual characteristics of the environment such as greeneries and buildings that pedestrians encounter affect their safety directly by securing visibility, and indirectly by affecting perceptions of safety and stress responses. Previous studies used street audits, video images, and image semantic segmentation using existing street image datasets to measure the visual properties of the street environment. This research aims to develop a method to quantify pedestrians’ eye-level imagery data, using semantic segmentation and vanishing point detection methods. These methods allow measuring the direction, angle, and duration of diverse visual exposures that can be linked with walking and stress data. We recruited 36 participants who were asked to walk along the two (built-up and natural settings) pre-defined routes, carrying a mini-camera, a GPS device, and an E4 physiological sensor. We measured 12 categories of environmental features by reclassifying the Ade20K datasets. Also, we inferred the line of sight and measured the frequency of head movements based on the vanishing point.