

Out of all of the sectors of the economy, transportation is the sector with the highest percentage of emissions. The average household's emissions are almost half transportation-based, and projected improvements in fuel technology would be negligible when applied to the projected transportation growth.(United States Environmental Protection Agency). One of the best ways to reduce household emissions is to switch car commuting to using public transportation, saving about 48,000 pounds of CO2 emissions per person per year (APIA). But simply providing transport infrastructure isn't enough to reduce transportation emissions. The access to transit at either end of a transit journey, usually termed as the first-and-last mile, has been recognized as one of the major barriers to improving transit accessibility (Zuo et al.). This is due to the fact that disadvantaged populations often live in urban centers and have low percentage ownership of automobiles, which makes it harder to access their job locations. Moreover, research shows that commutes longer than 30 minutes have adverse effects on health and productivity (Vitality Health). In order to provide adequate public transportation access, there should be enough options to maximize the amount of people within this 30 minute window, and there should also be measures to increase accessibility to these transportation options.

Currently, Bluebikes is Boston's public bike share, owned and managed by the City of Boston in partnership with neighboring municipalities. They own more than 250 stations and around 2,500 bikes sponsored by Blue Cross, Blue Shield. Today, more than 90% of Bostonians live within a 10-minute walk of a bike share station(Boston gov). But how many of them travel >30 mins to reach their destination? The longer commute has been shown to have adverse effects on health in the long-term. Our goal is to look at accessibility between bike sharing stations and the closest subway station. If we reposition the bikes in a way that people not only have access to bikes but also can bike to the subway station in the fastest manner possible making the total transit time (home to bike + bike to subway) in the 30-minute window.

The research question we are trying to answer is how can we reposition or place Bike Sharing Stations to increase public transit accessibility and maximize coverage. In the process of answering this question, we will also create new knowledge of an analysis of accessibility with the current bike stations. This hopefully fills the gap about the current and desired state of bike sharing to include more and more people. Time permitted, cost analysis and quantification of health benefits rendered from the final product is a possible area of exploration. In September 2022, Mayor Wu announced a 100-station expansion of the bike share system in Boston (Bluebikes) in the next three years but details of expansion plan are yet to be shared. Our final product is an optimization problem which will hopefully provide the government data on how accessible these current and new bike stations are.

The purpose of this research is to provide better access to public transportation in the greater Boston area through the use of bike stations. As bike stations are becoming more used in urban locations to provide a simple means of transportation for many people living in these areas. Many people use bike stations as easy transportation to get to other means of public transit such as bus or train stations. The locations that bike stations are placed are not always feasible for people to use when trying to get to work. An overview of how the bike stations are placed or

planned to be placed should be altered to fit a 30 minute window. In which a person is able to go from their home to a bike station and then take that bike to some public transit which will get them to work all within 30 minutes. Providing more bike stations will provide people with more environmentally friendly options to get to their destinations at a more efficient time. For people who live within the greater Boston area and in underserved communities in Boston. Will be able to use these bike stations to get anywhere within Boston. With the traffic, and pollution that is generated creating bike stations that are placed generously around the city, allows for people to use cycling as a means to reach their destination, as well as reduce carbon emissions. People living in these underrepresented communities will be able to get access to public transit at a more affordable price.