

LIGHT-RAILS MODEL IN TEMPE, ARIZONA: STRATEGIES TO REDUCE AIR POLLUTION

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ABSTRACT

To rethink growth is important to keep up with an increase demand of transport in order to decrease greenhouse gas emissions. It is clear that transportation generates a loss in vegetation then leads to an increase of carbon dioxide, a prime contributor to global warming, in the atmosphere. However, new alternatives are available to show an attempt to solve congestion that ultimately promotes a further increase of pollutants in the atmosphere. From this insight, we find solutions to resolve traffic problem in the megalopolis Phoenix, in particular the city of Tempe. Although this research we highlight the factors that make up a good ridership of the Phoenix light rail looking at similar low density cities like Phoenix, we searched for solutions that would prevent low ridership in future light rail extensions. It was found that a more pedestrian friendly environment was created with businesses and residential buildings close together, especially in Tempe City around the Arizona State University (ASU), extremely benefited by the project.

Keywords: High development. Public transport. Environment. Air pollution.

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INTRODUCTION

Urbanization has been and will be a major problem in the cities around the world. In fact, most of the population from the growth nations will be experience in the future live in urban areas. Phoenix, Arizona is no exception, this megalopolis englobes Phoenix city, Scottsdale, Mesa, Tempe, Chandler, Paradise Valley, Glendale, Sun City, and Carefree. Between the years 1970 and 1990, the metropolitan population grew from 971,000 to 2,800,000 inhabitants. Today, the metropolitan population is about 4.33 million. This population has almost tripled in only 20 years, making it one of the fastest growing cities in the United States (HEUVELINE; POCH, 2007).

The high rate of the population growth has challenged the metropolitan's infrastructure enormously. In this context, transportation has been recognized as a highest problem and it is now being discussed in order to cope with the increasing population growth. Phoenix has been described as an automotive centered city by primarily focusing on creating a grid of streets for automobiles. It seemed like a phenomenal idea to the time of the invention of the car. Today with the fight against the urban traffic emitted greenhouse gases, city leaders search for alternative solutions in order to decrease air pollution and also keep up with the increasing population.

In 2005, the cities of Phoenix, Mesa and Tempe have started a Transit-Oriented Development program, in order to create a more pedestrian friendly environment in those areas with all three aspects of sustainability in mind - environmental, economic and social. This program involved a 20 mile light rail track stretching from Mesa across Tempe into Central Phoenix. The project initially showed extreme economic and social benefits by a heavy increase of development around the light rail. An expansion of the light rail further into Phoenix, Mesa and even Scottsdale might not be a bad idea seeing the benefits the Transit-Oriented Development program brought (MICHAEL; UPCHURCH, 2004).

Public Transportation Reduces Greenhouse Gases

The quantities of pollutant gases have increased due to the large increase of cars on streets between 1990-2006 in the United States, according to American Public Transportation Association (APTA, 2016). Pollutants due to transportation have increased more than 25% (APTA, 2016). The increase in cars is part of a complex problem with many interrelated factors that contribute to an exponential growth of greenhouse gases in the atmosphere.

Not only the increase of gas emission contributes for negative ecological effects. Traffic congestion becomes also a key problem by trying to solve it with actions that might backfire. Therefore, the cities tend to overcome congested streets by building new streets in the hope of reducing congestion in other areas and to achieve better fuel efficiency. This might seem like a good idea, but the construction of new streets usually means loss of land and vegetation. A loss in vegetation may cause an increase of carbon dioxide concentration in the atmosphere, a prime contributor to global warming. It shows an attempt to solve congestion that ultimately promotes a further increase of pollutants in the atmosphere; thus, less land is available for the constantly growing population with more and more streets built. Getting the light rail to be more effective is crucial to continue comfortable life in Phoenix. If not, the remaining undeveloped land will be taken up by roads instead of housing or farms that can produce food.

It is important to rethink growth to keep up with an increase demand of transportation in order to decrease greenhouse gas emissions. Studies done by the American Public Transportation Association have shown that public transportation in areas with high automotive traffic has the potential to ease congestion and also reduce carbon dioxide emissions by 37 million metric tons annually (APTA, 2016). If the cities that produce a lot of

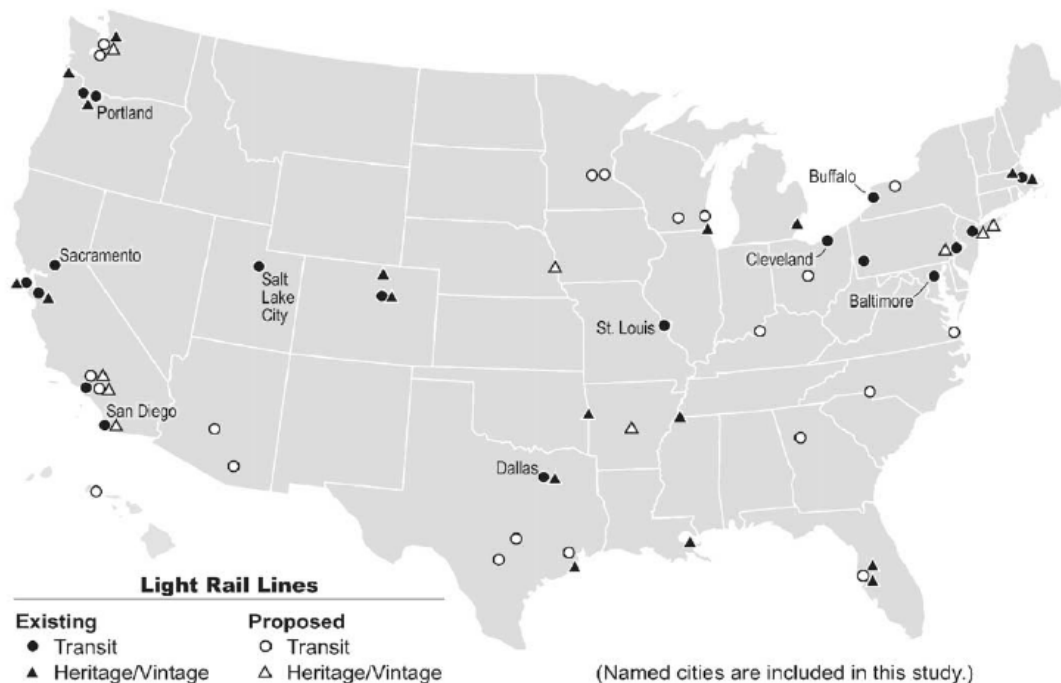
greenhouse gases could fix that, it would be extremely beneficial. Obviously, the environment would benefit without that huge contributor of gases.

From Cars to Public Transportation

People in low density cities such as Phoenix often simply prefer to use cars even though a light rail system is available. Conversely, the large usage of vehicles plays different roles in the city. Initially, it might be considered an obstacle to the development of an efficient public transportation; the motives that support this attempt are that it is a solitary transport that consequently generates a large quantities of vehicles on the streets. Another reason is because it does not carry enormous quantities of people and uses large amount of energy. However, there are some advantages of car usage. Firstly, this kind of personal transport system might be considered a kind of “support” for the public system which indubitably, would not be able to attend with quality the entire population. As support Tumlin (2012), “Transportation is not an end in itself. Rather, it is an investment tool that cities use to help achieve their larger goals”. These larger goals are around economic development, quality of life, social equity, public health and ecological sustainability. Under the circumstances that are around transportation, the majority cities in the United States have developed a lifestyle which is super dependent of vehicles, as a matter of fact, majority cities have been creating transit congestion, sprawl, and air quality problems. Thus, considering this fact, it is necessary to analyze deeply this issue, thereby, the figure 1 shows the number of existing and proposed light-rail line in the country.

With regards to this kind of transportation in the U.S is possible to consider that the country has been adapting for a “new transportation era”. However, the progress in this area occurs very slowly. We consider that it is a slow process because it needs a complex adaptability that might be considered as an adaptability material transforming this kind of mass transportation more useful and efficient as well as more attractive. Just like any other change, it needs to (and will be) gradual. Any changes that happen too fast will actually be harmful and cause society to revert back to its old ways. On the other hand, this process requires a profound mental transformation that can be defined by “think ecologically”. Thinking ecologically requires a great change in the manner that we see the nature, the other people and ourselves. People will definitely need to change the way that they think so, we can harness this new way of getting around the city, while being less harsh on the environment. Notwithstanding, we suppose that behavioral change depends on a major shift that the educational system of a city, state or country need to fortify and make it reach all sections of population.

Figure 1 – Existed and proposed light-rail systems in the U.S. In Arizona map southwest there are two Light Rail Lines transit proposed, one of these is in Phoenix and another is in Tucson (further south)



Source: HOLLE, 2013.

Phoenix Light Rail-The People's Project

It was in the year 2009 when the metro light rail after many ups and downs finally had its grand opening. It was not an easy achievement and it took the participating cities of Phoenix, Mesa and Tempe several years to complete. The light rail consisted of a 20 mile track stretching from Mesa across Tempe into central Phoenix by completion. The project was carefully planned with an extreme focus on resident's needs and inputs. The project was considered successful with 5.6 million riders in the first year.

According to the Valley Metro web site (VALLEY METRO, 2016), the ridership more than doubled the next year with 12.1 million riders in 2010. This rate was not maintained and the yearly amount of riders in the years 2010 to 2014 only increased from 12.1 million to 14.3 million (CAMELBACK et al., 2014). Opponents of a light rail system in a city like Phoenix predicted this scenario by stating that the light rail ridership will grow enormously at first but in the near future this rate will stagnate. This leading to a system with the same usual riders every day.

Our issue is that the number of daily riders is not high enough. Though there may be around 12 million daily riders, there are still many more people who just stick to the traditional driving of cars. The ideal solution is to increase the number of daily riders to such a large number that the amount of people driving cars will be little to none (PLANE, 2016).

An extension of the light rail is already a topic of conversation under city leaders. The extension will consist out of several phases. By the year 2016 the city plans an extension further into Mesa, however half of the 3.2 mile

track is yet still unfunded. In the same year, an extension will open up going from central phoenix 5 miles north along the interstate 17. An expansion east along the interstate 10 is planned as well by 2023, which is fully funded as well. A future high capacity light rail corridor is being studied right now along the freeway 51 into paradise valley. This corridor is not planned to open until 2032. The city hopes of a further increase of ridership by the large addition of light rail tracks (ALVAREZ; PARANHOS, 2012).

Expanding the light rail system is a time consuming task. The metropolitan and suburban areas that the light rail plans on reaching are quite developed and would need more cooperation with the cities involved. Tracks that travel alongside interstates 17 and 10 would need to be cleared and whatever property that was there prior to be bought off. This was done previously with the already built tracks and if it will be a success after two years future tracks have the same possibility. More and more people will fill the streets during rush hour and driving expenses may increase as the population grows. These light rails may be built just in time to accommodate the people's needs.

If the plans for the light rail system follow through it may be more than a success as more people will choose the light rail opposed to driving. What needs to be done to shift people's mind away from cars towards a more sustainable alternative of transportation? Why are not more people choosing the light rail as a means of transportation? How can Phoenix metro attract more riders to get them choose a more environmentally friendly alternative of transportation?

METHODOLOGY

In order to find solutions to the Phoenix traffic problem, it was important to understand the factors that cause the heavy traffic problems in metro Phoenix. Research on the history and geography of Phoenix and its automobile centered planning had to be done to understand how the planning for cars instead for people has serious negative effects on quality of life after the rapid population growth.

We considered the already existing light rail system as a great opportunity to expand on an already existing public transportation system. Using the valley metro website as a key resource, we used the already existing light rail extension plans as our template on how to improve the public transportation system in metro Phoenix. It was important to look at the light rail as a system consisting of the physical light rail tracks and the riders themselves. Paying more attention to the factors that make up a good ridership of the Phoenix light rail, we researched why it seems that annual ridership growth has stagnated over the recent years. Looking at similar low density cities like Phoenix, we searched for solutions that would prevent a low ridership in future light rail extensions.

Additionally, Google Maps played a huge role in researching potential new light rail corridors. The traffic application indicated high traffic areas which we considered potential light rail corridors. Median household income also played an important role in deciding whether a light rail corridor is beneficial in city areas with higher income.

ANALYSIS AND RESULTS

Phoenix, an automobile centered, polycentric city is not the classic example of a city driven by light rail transportation. However, traffic congestion is an increasing problem in the metro Phoenix area and the need for a public transportation system becomes an increasing need. The cities of Phoenix, Mesa and Tempe did a great

job in starting up the first light rail system in the metro area. Using Google maps and its traffic application, light rail corridors show less traffic during high traffic times. This results in better fuel efficiency in those areas and, therefore, also less greenhouse gas emissions by automobiles.

Park and Rides

The implementation of park and ride systems can help commuters and the environment in many ways. The most obvious impact is on the system riders. Park and rides allow people who live in suburban areas to drive out to the city or the nearest stop and park the car and take advantage of the form of public transportation. Besides saving money on gas another benefit to the users is that they get to save money avoiding expensive parking structures in areas that riddle metro areas. Along with improving the amount of public transportation ridership park and rides can reduce Vehicle Miles Traveled (VMT). The reduction of VMT of course leads to fewer emissions and therefore less air pollution (ALVAREZ; PARANHOS, 2012)

The figure 2 shows the current light rail track running from Mesa across Tempe to central Phoenix. The image also shows the eight locations of available park and ride opportunities along the first 20 miles of light rail tracks. The park and rides play an important role in potentially increasing ridership.

By evaluating the Valley Metros monthly ridership form per station, it is easy to recognize that stations with park and rides have a significant larger amount of monthly riders. Sycamore/Main and Montebello/19th the start and end station, both had the largest amount of riders per month in the year 2013, averaging at about 85,000 riders per month. Besides that, research showed that light rail riderships are higher in lower income, high density areas (PIJAWKA; GROMULAT, 2012).

High development

The ridership form on the Valley Metro website (VALLEY METRO, 2016) also gave some valuable information on ridership numbers in areas with higher development. Some examples are the stations around Arizona State University (ASU), which year round showed high ridership rates, even though no park and ride opportunities were available. University/Rural, 5th/College and 3rd/Mill Avenue showed ridership rates between 30,000 and 60,000 per month all year long. The reason that these stations are so successful is that Arizona State has a huge population of people that do not necessarily have cars. Once again, this shows how high development around transit tracks is important for it to be successful.

Figure 2 – The actual light-rail system in the Phoenix, Tempe and Mesa



Source: HOLLE, 2013.

CONCLUSION

The city of Phoenix is planning an extension of light rail tracks in the near future in the hope of attracting a larger number of light rail riders outside of Tempe and central Phoenix. It is a great idea and should definitely be executed.

The light rail proved success in all aspects of sustainability. It created jobs not only by the maintenance of the light rail, but it also attracted small businesses into proximity of light rail stations. The city of Tempe, especially around Arizona State University (ASU) was extremely benefited by the project. A more pedestrian friendly environment was created with businesses and residential buildings close together. However, attracting new riders also lays deeply within us humans as well. Phoenix is a relative low density city, especially in areas like Paradise Valley and Scottsdale. It is very hard to attract riders in those areas, because a walk to a light rail stop often requires a long walk, which in Arizona summers is rather uncomfortable. Therefore, choosing the car as a primarily means of transportation often seems like the easiest way to get around. Once again, Tempe is a leader in finding a solution to this problem. A local streetcar system is planning for the year 2016 that will go in a single loop around Tempe and will connect major neighborhoods, business areas, parks and Arizona State University with a large light rail stop on mill or College Avenue. This is a system that can be well taken into consideration once the light rail project will hit uncharted areas with lower density such as Paradise Valley and even Scottsdale. People just want their daily lives to be easier and increasing and improving the light rail system

will do exactly that. People will no longer have to worry about fueling their gas-guzzling vehicles. They can just hop on a streetcar instead, get to the light rail station, and go to work.

Increasing the amount of annual light rail riders does not necessarily depend on how many lighter rail tracks are built. It definitely helps, but the system needs to be made more attractive for the public. Park and Rides and systems that help the public access light rail stops such as streetcars in low density areas will need to be more common than they are right now in Tempe and Phoenix. Many people complain about the light rail due to the fact that more often than not, stations are a far distance from where they live. Before people can ride the light rail, they need to get to the station. Improving the accessibility of the light rail stations is the first step to getting more riders.

Metro Phoenix is on a good path towards solving a complex traffic problem that has been caused by automobile centered planning. The city is doing a great job in creating plans and ideas for potential light rail extensions, but with such a large project the city cannot forget the idea behind the “Peoples Project”. Finding ways to connect people with light rail stops should be equally important to creating light rail extensions. What is a light rail system without riders good for anyways?

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