Route optimization of CART

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***Abstract* - A transportations system works on the basis that people want to travel to different destinations from one point to another with ease to fulfill the purpose. For a transportation system to be effective it should be a breeze for the people to travel to the destination and should be reliable in doing so. The two most important dynamics of the transportation planning theory are mobility and accessibility. Mobility refers to ease of moving from place to place and accessibility refers to ease of access in doing so, and improving these are the main priorities and people are an essential component when planning a successful transportation system (Rosenbloom and Altshuler, 1977). The theme of this project is to study and improve selected routes of the current cart system and provide with a better solution.**

I. INTRODUCTION

CART stands for "Cleveland Area Rapid Transit" which provides service for the people of Norman and has served more than 1 million people in 2015. It has various shuttles operating in and around the city of Norman and has special services catering the needs of the students and commuters of the University of Oklahoma. It also operates a commuter route to Oklahoma City (Sooner Express) Monday through Friday. All the regular services are operated Monday through Saturday on the fixed bus – route system.

Data analysis is not a simple task. The time taken to collect data and to carry out analysis can be such that the conditions and the working environment may change. Planning a project takes considerable effort and it mostly depends on the available data. The predictions for the data available may or may not be true to the required extent.

With benchmarking, we desire to compare the existing CART routes with an existing and effective route system thereby enhancing the current routes of CART too. Even though there are many varying factors in the existing study and the reference system like topography, Climatic conditions, landmarks and the flow of traffic, a Cost Benefit analysis and a SWOT analysis are performed taking into account, all the above-mentioned parameters.

The conclusions drawn after performing these analyses provide solutions for existing complexities in the routes under consideration. The CART management should provide us an opportunity to implement our suggestions and help the commuters availing the services. With appropriate anticipation procedures, they might get convinced with the suggestions so as to approve and implement.

II. PROBLEM STATEMENT

In order for public transport to be a solution to the problems caused by traffic and to be used more by the people, there needs to be effective utilization of resources. The resources we're talking about is the public transit system in Norman i.e., **C**leveland **A**rea **R**apid **T**ransit. Serving 1 million people annually, CART operates several routes in the University of Oklahoma and city of Norman offering a variety of services. Being a student of OU, and travelling by the CART shuttles, we felt that the operation of these shuttles is not efficient, so we decided to take up a study and explore the possible ways we can improve it. Considering this shuttle service as a system, our aim is to optimize transit benefits by increasing the system efficiency. The goal of this project is to evaluate and providing a statistical overview of the public transit efficiency of the shuttle service, taking into account all the factors and substantial differences. CART shuttles operate on CNG, which makes them environment-friendly. On an average, a CNG vehicle emits 13-21% fewer greenhouse gases when compared to the Gasoline and diesel vehicles of the same segment [1].

III. LITERATURE REVIEW

A. Current State

The main theme of Mass transit or Public transportation is movement of people. In this the boundary can be limited to a small area i.e. within a city or a huge area i.e. between cities. The essential feature is that efficiency with which the system can be operated as many people travel at once which in turn leads to reduction in the overall operated costs associated compared to other means of transportation or a better service can be provided has there is an opportunity to spend more money. Public transport plays an important and unique role by providing mobility to non-drivers. It also is a means of efficient way of mass transit. Mass transit system mainly depends on the motive to provide easy access to multiple destinations and how people reach there. The factors used to describe the dynamics of a transit system are mobility and accessibility. Mobility

means physical movement from one place to the other whereas accessibility means the ease of getting to the desired location. These twos are the priorities of any transport system.

While planning for transportation network in a city, it is a tedious job to plan, create, change and re-route the network which meets the needs of the public. The routing has to be done considering all the constraints involved.

Study Area

Norman is a city of Oklahoma and home for one of the best universities in U.S.A (University of Oklahoma). The population of Norman is around 120,000 in 2014 (approx.) and operates in Cleveland County. This makes it third largest city in Oklahoma.

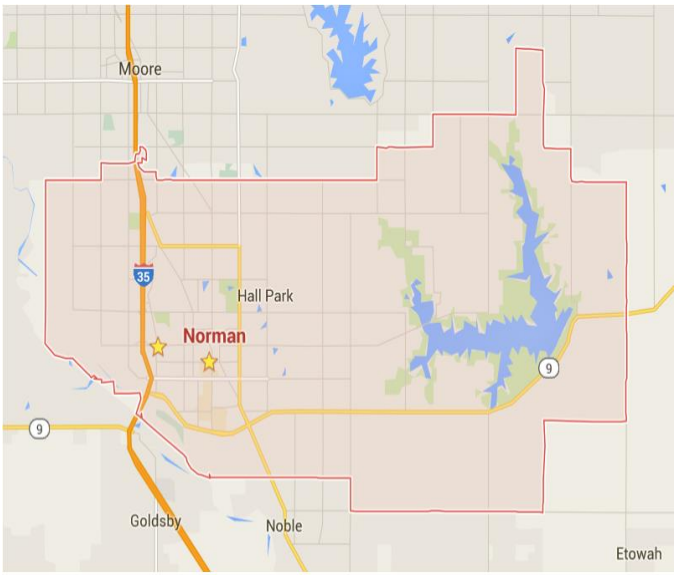

Fig. 1 Map of City Norman

Cleveland area rapid transit is providing transportation service for people of Norman and OU commuters. It is currently serving more than 1 million passengers annually. CART operates through 14 shuttles serving different routes covering most of the Norman. All the shuttles run on CNG making them pollution free and every shuttle is equipped with facilities like Wi-Fi, Real-time location tracking system (GPS) and specialized equipment for differently abled people and bike racks for people with bicycles. With all these features and facilities, a well-planned route is the only condition to be fulfilled to make them user efficient [2].

Of all the 14 shuttles, some are regular services which operate from Monday to Friday with an interval of 30 minutes in the same route from 7 AM to 6 PM. Thereafter, the frequency reduces to 1 per an hour from 6:00 P.M. to 9:00 P.M. Apart from the regular services, special services are also provided that ply only at fixed times in a day and number of trips is limited in a given day. One special service is provided keeping in mind the students of OU, especially for the ones staying late in college, where a scheduled pick up can be requested in advance (no more than a week) in the areal limits of the service. This service operates from 9:05 P.M. to 11:05 P.M., Monday through Thursday.

Out of these 14 shuttles in total, we are currently looking at some of the possible shuttles routes that we can effectively optimize in the future. Attached below are the Schedules of some routes which we want to consider.

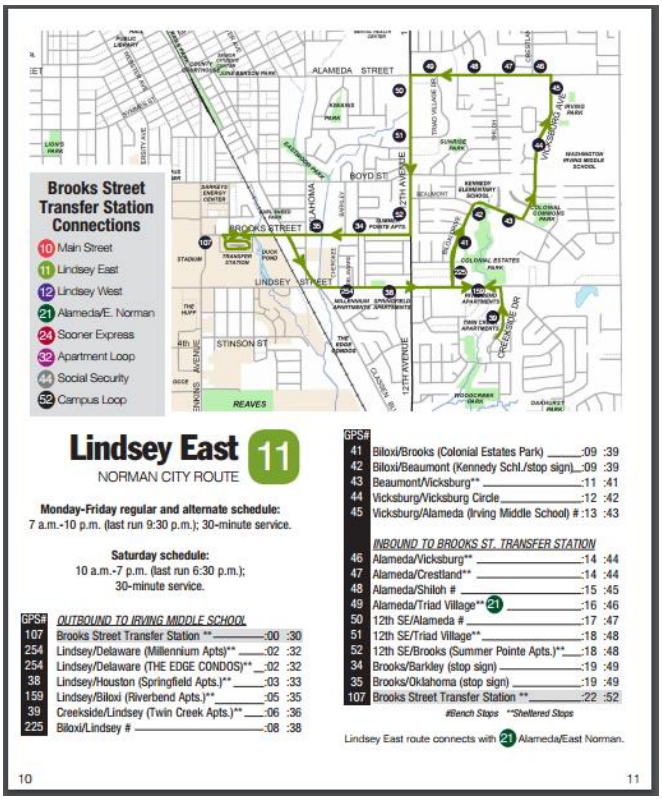

Fig. 2 Route Schedule of 11- Lindsey East

Figure 2 shows the route schedule of 11- Lindsey East covers the major streets of Norman running through East Lindsey Street, Alameda Street, 24th Ave SE and E Brooks Street. This route has 20 stops which make one round trip. The first trip of this shuttle is at 7:00 A.M. and service ends at 10:00 P.M. with the last run at 9:30 P.M from the Brooks Street Transfer station. This route is served by a standard low floor CNG Gillig© made with a seating capacity of 31. As it's a long trip, the hours of Service of a driver is maintained at 8 hrs. Making it a split shift at 2:30 P.M. The net duration of each trip is around 30 minutes (approx.) [3].

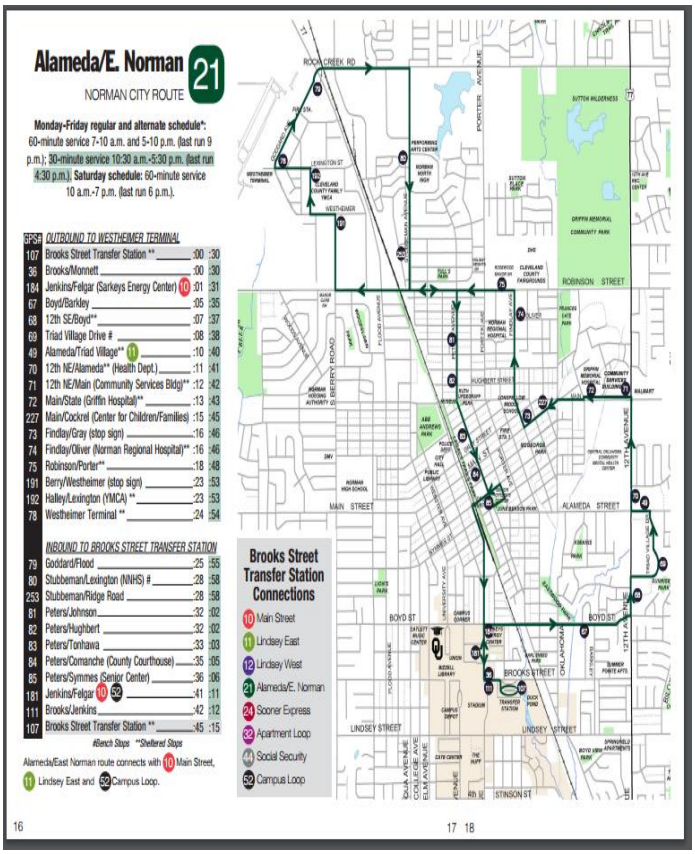

Fig. 3 Route Schedule of 21 - Alameda/ East Norman

Figure 3 shows the route schedule of 21- Alameda/ East Norman covers the majority of streets of Norman running through the campus from S Jenkins Ave, East Boyd Street, Alameda Street, 12th Ave SE and E Main Street. This route has 32 stops which make one round trip. The first trip of this shuttle is at 7:00 A.M. and service ends at 10:00 P.M. with the last run at 9:00 P.M from the Brooks Street Transfer station. This route is served by a standard low floor CNG Gillig© made with a seating capacity of 31 and sometimes depending on the passenger rush is served by a Gillig© minivan with a seating capacity of around 20 passengers. Being a long trip, the hours of Service of a driver is maintained at 8 hrs. Making it a split shift at 2:30 P.M. The net duration of each trip is around 1hr (approx.) [5].

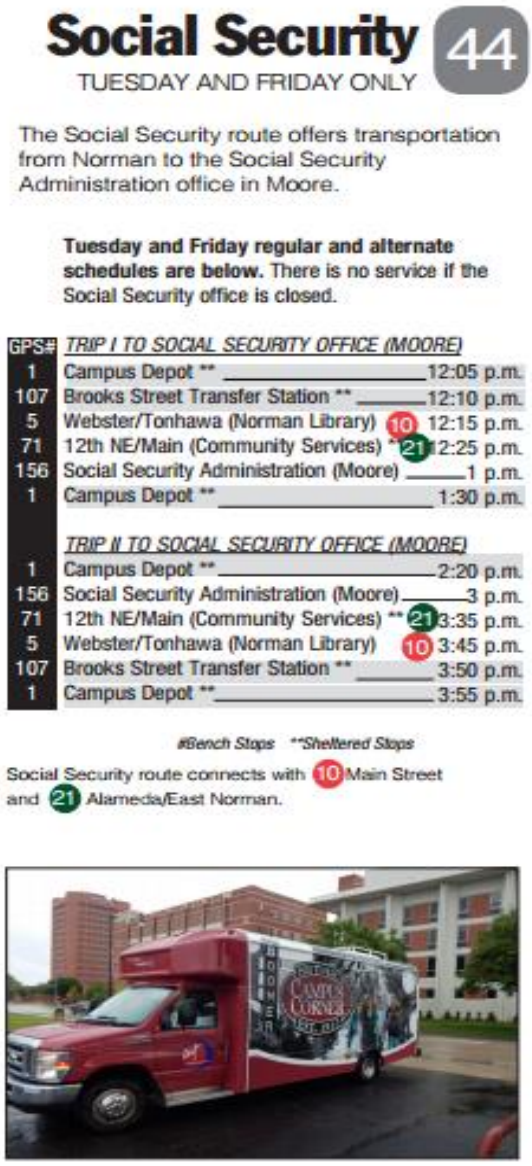

Fig. 4 Route Schedule of 44 - Social Security Route

This bus is operated only twice a week on Tuesday and Friday, unlike other shuttles. It makes 2 trips at these two days from campus Depot at 12:05 pm and 2:20 pm with duration of a trip around 90 minutes. It goes through E Brooks, Webster (Norman Library), 12th NE/Main and to Social Security Administration (Moore). This is route is operated by Minivan with a seating capacity of around 20 passengers [4] [6].

B. Desired State

Being regular commuters of CART shuttle service, we felt the need to improve the efficiency of the system by optimizing the routes. As it is impossible to consider the entire Cart service system, we are focused on some specific routes to study, analyze and suggest some changes to the existing routes by carrying out some analyses. The routes we're focused on are

11-Lindsey east, 21-Alameda/ East Norman, 44 – Social Security Route, out of which the former two are regular services and 44 is an occasional service that runs only on Tuesdays and Fridays.

We have collected data on the number of passengers boarding the shuttle at a given time randomly Monday through Friday on *11-Lindsey East, 21-Alameda/ East Norman, 44 – Social Security Route* respectively. This data gives us an insight on the percentage of people and is used as an input to the analysis we aim to perform.

We aim to perform analyses like Cost-Benefit Analysis (CBA) and SWOT Analysis in order to suggest some better routes and to make maximum use of the facilities available. These analyses, when performed provide with some better suggestions regarding the routes. Our methods include a collection of data from CART officials, recording the data about the number of people boarding the bus at different stops, the on-peak and off-peak times of the routes, the fuel consumption, the net distance covered on a given day.

Out of the above mentioned analyses, Benefit-Cost analysis and SWOT analysis are used to explore the possible options and find one of them which is better than the existing one (Maybe the existing routes can also be the desired ones.) With benchmarking, we desire to compare the existing CART routes with an existing and effective route system thereby validating the analyses we carried out. Even though there are many varying factors in the existing study and the reference system like topography, Climatic conditions, areal landmarks and the flow of traffic, benchmarking can be done within a limit making some assumptions.

The conclusions drawn after performing these analyses provide solutions for existing complexities in the routes under consideration. The CART management should provide us an opportunity to implement our suggestions and help the commuters availing the services. With appropriate anticipation procedures, they might get convinced with the suggestions so as to approve and implement.

IV. METHODOLOGY

Our aim is to provide better solutions to the existing CART system. Re-routing is a tedious process. To propose a solution by changing the routes, we worked hard and then come up with alternative routes. These routes are generated using the site www.routexl.com [9] which makes use of the travelling salesman problem algorithm and then generates the routes.

Typically, a travelling salesman problem is a problem in which the shortest route is found out passing through all the nodes only once and returning to the origin. There is no particular order to pass through, but all of them are to be joined. There is no standard method to solve a travelling salesman problem.

A. Benefit-Cost Analysis

Benefit – Cost analysis is a methodology used to support the SWOT analysis and compares the benefits in relation to the cost. Cost-Benefit analysis is performed in a series of steps starting with making a list of costs involved and the benefits associated. And then, they are weighed carefully and the course of action is followed. In any situation, Benefit – cost analysis is used to determine the best approach in terms of time and cost.

In this case, the proposed routes are compared and the benefit cost analysis is carried out with valid assumptions, and as mentioned, taking the existing system as a frame of reference. Here, we calculate the net benefits and net costs involved and then take the benefit/cost ratio and check for the better solution. If the B/C ratio is more than 1, then it shows that the benefits are more than the costs involved and the route is effective than the existing one. Note that one of the options is the base option and the other one is the proposed route [8].

B. SWOT Analysis

SWOT analysis is another technique which can be used to evaluate strengths and weaknesses of the system. Peeping into the opportunities that are feasible and the threats posed by the weaknesses. It is performed on a four square template describing the strengths, weaknesses, opportunities and threats. SWOT analysis has a greater impact on any system giving the detailed insights of the alternatives available. The purpose of performing a SWOT is to reveal positive forces that work together and potential problems that need to be recognized and possibly addressed.

Now, we perform the SWOT analysis by assessing the strengths, weaknesses, opportunities and threats of the new routes proposed. This four square assessment method helps us whether to go ahead with the change or to discard it. This process is carried out for all the routes and necessary conclusions are made. All the assumptions are made using the existing routes as the base system [10].

C. Benchmarking

Benchmarking in simple terms is a comparison of organizational performance and processes to create a new standard or as an evaluation of the current state to improve it. How well a particular system or division or the organization is performing can be compared to its counterparts using the benchmarking models. In order to professionalize the prevailing practice or organization for economic or any other reasons, a benchmark is used. Traditionally benchmarking is done with previous measures of the same organization but sometimes this can have a negative effect if the competition is improving faster. It also has some assumptions as all the systems won't be having the same features and purpose. Many conclusions from be drawn from the Benchmarking which

makes it easy to find out the necessary measures to be taken to improve the performance. [12]

V. RESOURCES

To carry out the mentioned analyses, huge amounts of data is necessary. In order to carry out the project and to make some valid conclusions, we decided to take help of the resources available without which this project would not be in a shape it is now. The resources we have are the CART mobile application on android smart phone and cartgps.com that gave us the location and the boarding details of the passengers in and out of the shuttle. Apart from this, CART officials helped us at every step of this project. From drivers to administrative staff, people who manage the existing routes of CART, everyone has helped us to progress through this project. Dr. Janet K. Allen has been helping us with some points where the clarity is required. Many online resources have been referred to while approaching this project.

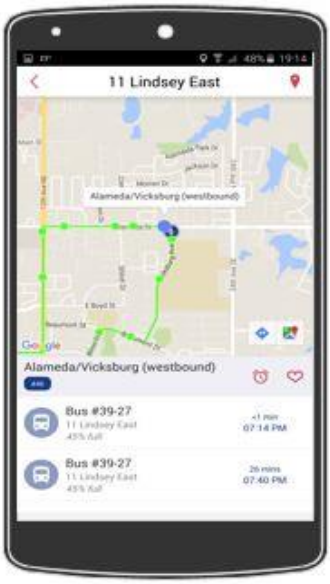

Fig 5. Image of the CART mobile application

VI. TECHNICAL APPROACH

Our Technical approach starts in an order where we initially collected data about the routes specified with the occupancy of the shuttle at all the stops during different days and point of times.

We have collected data on the number of passengers boarding the shuttle at a given time randomly from Monday through Saturday on *11-Lindsey East, 21-Alameda/ East Norman and 44 – Social Security Route* respectively from Cart mobile application & Cartgps.com. This data gave us an insight on the percentage of people boarding the bus at a shuttle stop and is used as an input to the analysis we aim to perform.

From the data we have obtained, we see that few stops are with very low occupancy or zero occupancies. Taking this into account, we have developed an alternate route, which has a comparatively lesser number of stops, making it faster and efficient.

Assumptions:

- A number of people using the service have no impact throughout the week, irrespective of the day.
- Occupancy at various stops is predicted based on the data we have gathered during the course of this project.
- Climatic conditions and any other external factors are not taken into account.
- Data provided from the CART officials and from the website https://www.cartgps.com is assumed accurate [13].
- If the occupancy remains constant for two or three consecutive stops, it is assumed that nobody boards or gets down on the bus in these stops.

The alternate route is generated with the help of www.routexl.com [9], which is a website that provides with effective route generations when provided with all the required stops in between. This website makes use of the travelling salesman problem algorithm, finds the shortest route and gives the details of the route.

The routes, thus generated from the website using the algorithm are carried out with a Cost benefit analysis taking the cost involved and benefits associated with the changed route. The details regarding the costs are estimated from the inputs given by the CART officials. A graph is drawn with the existing and proposed route costs and benefits involved. Then if that option is feasible, we proceed to the next step.

The next step is the SWOT analysis, carried out on the route obtained. The SWOT analysis as abbreviated deals with the Strengths, Weaknesses, Opportunities and the threats posed by the option in hand. This analysis helps in compiling all the information regarding the possibilities and helps us to evaluate whether to proceed or not. The SWOT analysis supports the results from the Benefit Cost analysis and provides a stand on the options ahead of us.

After the SWOT analysis, we now have an idea regarding the option which to choose and which not to. The analysis results achieved are good to go and validation is the next step to be accomplished.

VII. DATA PROCESSING

We have collected data on no of passengers boarding the bus at a given time at the stops in the above mentioned routes and are tabulated in an excel sheet.

We have used this data to find average occupancy for the shuttle, average occupancy at a given stop and average occupancy at a given stop for a particular bus.

We have repeated the above procedure for other shuttles and found out the same.

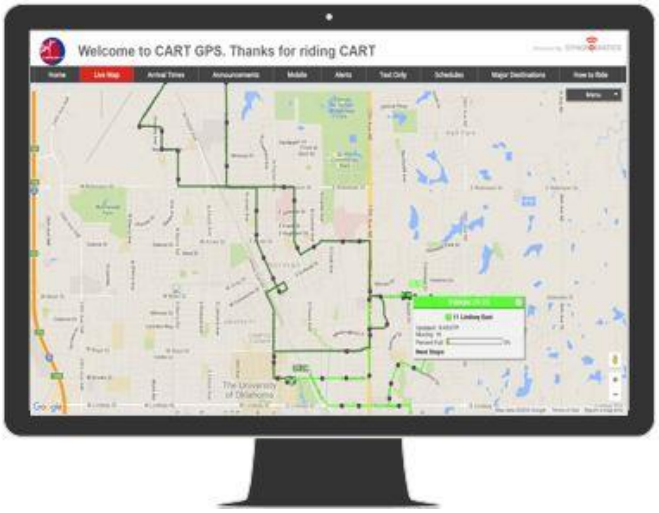

Fig 6 Image of cartgps.com website

With this we have got a brief idea about peak times for the routes and what stops are accessed more by the people for a particular route.

11 – Lindsay East:

Total no of stops – 19
Trip distance – 5.6miles
Average occupancy of the shuttle – 35%
Most occupied stops:

1. Beaumont/Vicksburg.
2. 12th SE/Brooks - Summer Pointe Apts.
3. Lindsey/Houston - Springfield Apts.
4. Brooks/Barkley.

Least occupied stops:

1. Brooks/Oklahoma (westbound).
2. Alameda/Shiloh (westbound).
3. Alameda/Crestland (westbound).
4. Alameda/Vicksburg (westbound).
5. Vicksburg/Alameda - Irving Middle School (northbound).

21 – Alameda East:

Total no of stops – 32
T4rip distance – 10.8miles
Average occupancy of the shuttle – 16%
Most occupied stops:

1. Jenkins/Felgar - Sarkeys (northbound)
2. 12th SE/Boyd (northbound)
3. Main/12th NE - Community Services Bldg.
4. Boyd/Barkley (eastbound)
5. Alameda/Triad Village (westbound)
6. Robinson/Porter (westbound)

Least occupied stops:

1. Berry/Westheimer (northbound)
2. Halley/Westheimer (farside stop) (northbound)
3. Rock Creek/Trailwood Dr (farside stop) (eastbound)
4. Stubbeman/Rock Creek (farside stop) (southbound)
5. Berry/Robinson (farside stop) (northbound)
6. Rock Creek/Industrial Blvd (farside stop) (eastbound)
7. Stubbeman/Ridge Rd (southbound)
8. Peters/Symmens (southbound)
9. Brooks/Jenkins (eastbound)
10. Brooks/Monnett (westbound)

44 – Social Security Route:

Total no of stops – 5
Trip distance – 28.3miles
Average occupancy of the shuttle – 5%
Most occupied stops:

1. Brooks Transfer Station.
2. Campus Depot.
3. Social security office.

Least occupied stops:

1. Norman library.
2. Community service building.

VIII. SOLUTION ANALYSES

Based on the data collected, for the mentioned routes, we carried out a statistical analysis and calculated an average occupancy rate for all the stops throughout the route. After the analysis, based on the recordings of the data, we decided to change the routes considering the occupancy rates and route complexity.

11 – Lindsey East:

As mentioned, when the route 11 - Lindsey east is rerouted using routeXL.com, to our surprise, the route proposed is the same as the existing route. This implies that the existing route is efficient enough in terms of the distance travelled.

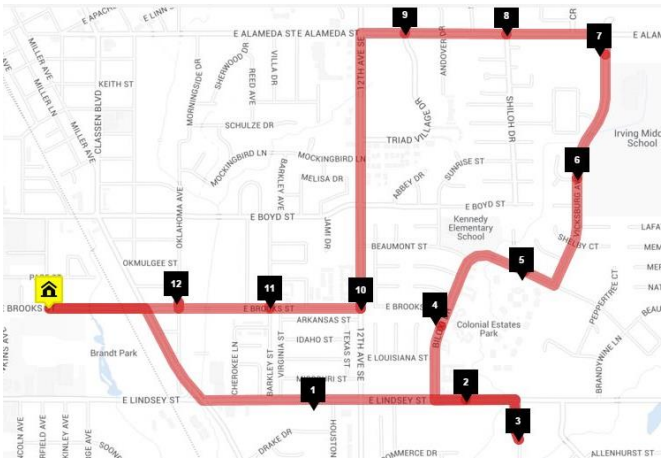

Fig 7 Route 11 from routeXL.com

But then, we had an intuition that the route is travelling an extra distance by going to creekside drive and the frequency of passengers is less in that area. After careful observations, we thought of proposing that to CART officials with the statistics at hand.

Later, this was clarified by CART officials that the route is designed considering the mixture of residential apartments, schools covered and also the connectivity to commercial areas. They've also suggested that the existing route is one of the best among all the routes and they don't have any plans to make any changes to the existing route.

21- Alameda/ east Norman:

This route is significantly a larger route and also it has many complex areas where there is scope for improvement. At first, we collected the data as mentioned and analyzed it for the stops with least occupancy and came up with some suggestions about changing the route at some points where the occupancy is almost zero percent.

And then, we had used the routeXL software to create an alternative route adhering to all the constraints. We've taken out the stops that have negligible amount of passengers availing the shuttle facility. These include stops like triad village and peter/symmens. These stops have less flow of traffic but involves a tedious loop to complete the trip.

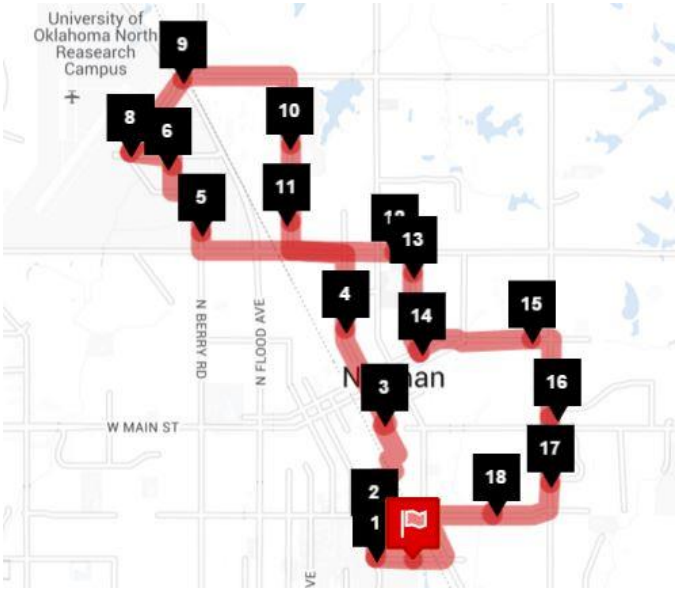

Fig 8 Route 21 from routeXL.com

We've performed a cost benefit analysis for the new route keeping the existing system as base one.

Benefits:

Total distance reduced per trip	= 0.7 miles
Time saved per trip	= 3.56 minutes
Total number of trips on a weekday	= 22 trips
Total number of trips on a Saturday	= 20 trips
Cost reduced on a weekday	= $ 97.9
Cost reduced on a Saturday	= $ 89
Total Cost reduced per week	= $578.5
Total Cost reduced per annum	= $30082

Costs:

Website costs	= $100
Advertising costs per month	= $ 600
Total costs per annum	= $ 7300

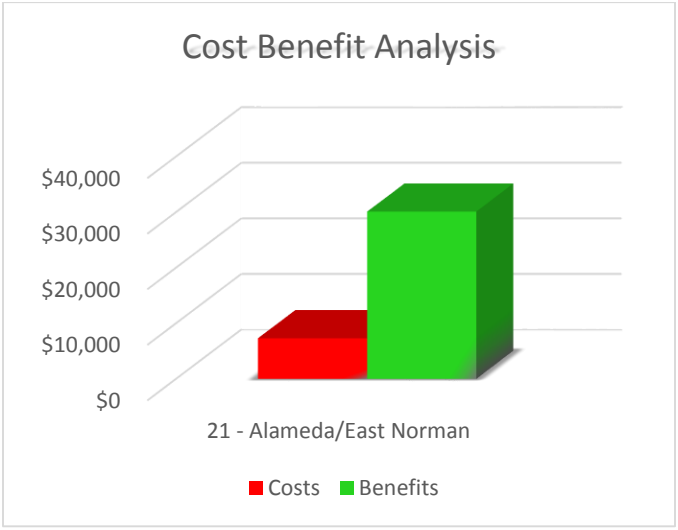

Fig 9 Benefit Cost analysis of 21

From the above graph, we can see that the benefit to cost ratio for the above changes is

Net Benefits/ Net Costs = $30082/$7300 = 4.12

With the Benefit Cost index greater than one, the changes can be implemented as it implies that the benefits dominate the costs involved and it can be seen as a better solution.

SWOT Analysis:

After looking at the financial aspects, a SWOT analysis is carried out to look at the theoretical aspects and the complexities involved in the proposed route.

Strengths	**Weaknesses**
• Reduction in operation costs for the management. • Reduced travel time increases the willingness of the commuters. • Long term impact on environment with less consumption of fuel.	• Difficulties for passengers in affected areas where stops are changed. • Implementation takes time to come into effect. • Changes in connectivity route may discourage some of the commuters.
Opportunities	**Threats**
• Scope for improvement of the service by more optimization. • Costs can be further reduced by future improvements. • Opportunity to support a different area of people and provide services to them.	• Resistance to change is observed in the areas of changed route. • Some of the existing landmarks and commercial places may lose connectivity and this may affect a specific group of people.

44- Social security route:

This is a special service operated only on two weekdays Tuesday and Friday and that too only one trips per day. This service is exclusively for the Social security office and covers some important stops on its way to Social security office.

This route has a limited number of stops and has a very less occupancy rate. As it is a special service, the occupancy rate varies seasonally. For example, at the beginning of any semester, many people visit the Social Security office in the initial days whereas, the count decreases in the later days till the end of semester.

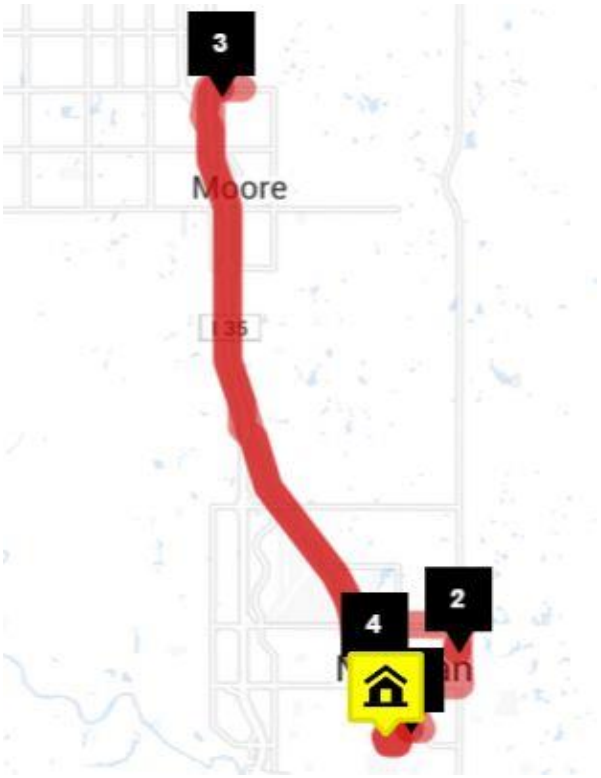

Fig. 10 Route 44 from RouteXL.com

In view of this, we proposed a change to the schedule of the shuttle which affects the timetable of the service. It'll be the same in the first one month (i.e. two days per week and 1 trip per day) and in the remaining months, it'll be once a week in any of the weekday with the same one trip per day.

This reduces the running costs by almost 40% throughout the year. The costs are calculated as follows.

Cost reduced on one trip = $ 300.

Total Cost reduced per week = $ 1200.

Total Cost reduced per annum = $12000.

There are no costs involved in reducing the frequency. So there are only benefits involved and a cost benefit analysis cannot be performed based on this data. And definitely, this is a beneficial process as it cuts costs.

Instead, a SWOT analysis can be performed to assess the changes made.

Strengths	**Weaknesses**
• Reduction in frequency increases the occupancy of the shuttle. • Reduction in operation costs for the management. • Long term impact on environment with less consumption of fuel.	• Difficulties for regular commuters where the schedule gets changed. • Implementation takes time to come into effect. • Changes in frequency can affect the public image of the organization.
Opportunities	**Threats**
• Trips can be increased by starting early and this compliments the effect of the changes made. • Scope for improvement of the service by more optimization. • Opportunity to increase the occupancy of the shuttle.	• Resistance to change is observed in the areas of changed route. • Changes in frequency can affect the public image of the organization.

IX. RESULTS

After the series of analyses, following are the results obtained. The numbers and figures are calculated based on the data provided by the respective officials and the readings taken by us. They may not be the exact values when implemented.

- Route 11 is efficient enough to support itself and doesn't require any changes in the route as it the route with the smallest distance satisfying all the constraints.
- Route 21 has some changes in order to reduce the losses and an annual amount of $ 30082 can be saved with the minor changes mentioned.
- Route 44 has the route with the smaller distance as it has only 5 stops but the frequency should be changed inorder to reduce the losses. An amount of $12000 can be saved annually with the changes mentioned.

X. VALIDATION

Validation is a process required to meet the reliability standards of the data. Here, validation of the results we achieved is necessary as the task in hand is a huge one and the results obtained should have a positive impact on the system. Benchmarking tool, in this situation, gives us the required validation. Benchmarking, as above described, gives the frame of reference to compare two systems and deduce the observations based on the inputs given.

Here, we've done benchmarking using Tulsa Transit, the similar transportation system of Tulsa, Oklahoma. The reason behind the selection of Tulsa Transit is because the environmental conditions are similar in both the systems. The stages of benchmarking are

A. Planning
B. Collection of information
C. Analysis of data

D. Implementation

E. Monitoring

We will be discussing the first three stages of the process as the last two are practical methods and require the permission of CART to implement and monitor the results.

A. Planning

Planning for the CART system is done with reference to the Tulsa transit. This is verified by CART officials. When the actual design of routes of CART is done, the designers referred to EMBARK, the transport system of Oklahoma City, Oklahoma and Tulsa Transit, Tulsa, Oklahoma. The system is similar to Tulsa transit as both of them have one common feature, university and students. We've planned to concentrate on the areas like routes, schedules and occupancies of the system. These parameters are studied and the results are deduced.

B. Collection of Information

We don't have any direct information regarding the Tulsa Transit, but we do have some information from the CART officials, who helped us to complete this process. The information given by them is sufficient to perform an analysis required for this paper.

C. Analysis of Data

When the data is compared from the two services, to our astonishment, they were almost similar in some aspects. The systems are almost similar in operation, fares, operating conditions, etc.

There are 20 routes in Tulsa Transit whereas only 14 in CART. This isn't a big point but there is some importance to this point. All of the routes in Tulsa Transit are of almost same distance and hence people don't feel the time consuming trip that happens in some of the routes in CART. The route 21 is one such route. This is quite a long route and take 50 minutes to complete one trip. This has an impact on people using the bus. Currently, 2 shuttles are being run at the same time in order to make half an hour trips. But, the same two buses can be used to make the route half of the present route and this makes the service more effective and reduces the losses to some extent [14].

The service of Tulsa transit starts from 6 in the morning and the last trip is at 6 in the evening. In CART, this is different, perhaps, the schedule is different for different services. This is a point to be noted in CART. During the off peak timings, the frequency is less and during the on peak timings, the frequency is more i.e. half an hour service. This helps the system in reducing the losses to some extent [14].

When it comes to fares, the fares are reasonable in both the systems. But Tulsa Transit has a daily unlimited pass that helps commuters to travel innumerous times a day. CART has monthly passes and several other packages. This package attracts a group of users who occasionally commute through shuttles. Inclusion of this option to riders helps the management to increase the occupancy.

The occupancy is another area, where the two systems have a conflict of interest. The two systems are working the same way but the occupancy of CART is lesser when compared to the Tulsa Transit. This has many reasons like Standard of living of the people, spread of the routes in areas, People's willingness to travel etc [14].

On a whole, CART is similar to Tulsa Transit and has some good and some bad characteristics when compared. The reason behind that can be the various factors mentioned above.

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