



TEXAS TECH UNIVERSITY

Transit Master Plan



in conjunction with:
Bourne Transit Consulting

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INTRODUCTION

Transit service at Texas Tech University (TTU) is a vital part of campus and community infrastructure. Each year, students, staff and visitors take nearly three million trips on TTU transit routes, making it the greatest share of transit ridership in Lubbock. Citibus, the City of Lubbock transit operator, serves the TTU campus with three fixed routes, off-campus apartment routes, and provides accessible transportation to people with disabilities. This master planning project will help Texas Tech University gain an understanding of the transit market in the area develop strategies to improve the transit system, and understand how to position its transit service to meet future needs.

The transit master plan involved a technical review and analysis of key aspects of current fixed route transit performance, assessing the effectiveness of routes, schedules, stops, and equipment. Additionally, the plan involved a multi-disciplinary approach to stakeholder engagement involving focus groups, personal interviews, and web-based outreach. This plan provides pathways to bridge the gaps between where the transportation network is today, and where it should be in the future.

GUIDING PRINCIPLES

Texas Tech University/Texas Tech University Health Sciences Center Lubbock Campus Master Plan: Land-Use Vision & Plan (2014)

The Texas Tech University/Texas Tech University Health Sciences Center Lubbock Campus Master Plan: Land-Use Vision and Plan (Master Plan) is an extension of previous strategic planning work for the Texas Tech University System. In the 17 years since the adoption of the 1997 Campus Master Plan there have been amendments regarding residence halls, chapel, golf course, Rawls College of Business, and recently, discussions of commercial/retail initiatives.

The Master Plan includes a plan for future land use, identifies a set of campus gateways that will serve as the primary entry points to the TTU campus, delineation of a historic district and campus design standards, a plan for open space, a plan for campus circulation, and campus growth forecasts. The plan puts in place a framework for managing the growth of campus population and future investments.

Enrollment Growth

TTU currently has a goal of growing student enrollment to 40,000 by the year 2020 and it is projected that the university will meet that goal. Land use and design will be implemented in such a way that it will sustainably support this growth.

Strengthening the Academic Core

The general academic core of Texas Tech University has been and still remains the lifeblood that enriches student experiences on campus. This core contains

vital nodes of student activities, including a majority of academic facilities, the Student Union Building (SUB), University Library, and Administration Buildings. To further reinforce student life, the general academic core is ringed with a large percentage of the student housing, athletic venues, recreation facilities and spaces, physical plant, and support services.

The following key objectives would be achieved through the strengthening of the general academic core:

- Increase connectivity between academic facilities and other campus nodes.
- Further infill undeveloped open space on campus so as to increase density and reinforce the campus plan.
- Incorporate more sustainable design solutions to the academic core.

- Promote greater infrastructure efficiency into the campus fabric.
- Create a built campus environment that invigorates collaboration and synergy between students and disciplines.

Campus Identity and Sense of Place

The following key objectives would be part of the Master Plan component of strengthening campus identity and reinforcing the institutional sense of place:

- Locate and install architectural and didactic elements to further define and celebrate both the Texas Technological College Historic District (TTCHD), but also the various vehicular entry points around the periphery of the general academic campus, the TTUHSC district, the medical academic campus, Research Park, and northernmost boundaries.
- Extend the planning model established in the 1997 Campus Master Plan.
- Define material specific architectural design guidelines, and provide design guidelines for Spanish Renaissance revival architecture on campus.
- Maintain the campus vistas and broad grassy malls that define the campus physical plan; endeavor to increase the presence of a smaller, sheltered, pedestrian scale landscape peripheral zones that feed into the axial malls and provide usable outdoor space.

- Minimize the presence of the parking lot within the TTCHD and reduce the visibility of remaining parking.

Land Endowment

This principle states that TTU's land holdings should be developed in a strategic manner, consistent with Master Plan principles. Development should accommodate enrollment growth and embrace strategic partnerships with university organizations, researchers, and private sector enterprises.

Open Space

The master plan lays a framework for a future campus where all parts reinforce its environmental quality. To this end, campus open space is evaluated according to its positive, negative, or neutral contribution to the aesthetic and functional integrity of the campus. The campus character depends on a careful balance between buildings and open space.

The removal of cars and surface parking from the campus core, along with efficient bus routes and bike paths are imperative in the recovery of open space. Guidelines for various categories open space are defined and include pedestrian malls, street hardscape, walkways, plazas, courtyards, and parks.

Campus Circulation and Connectivity

The intent of the 2014 Master Plan Update is to provide a safe, efficient, and convenient circulation network which, by virtue of its design and integration with the total campus fabric, complements and enhances the visual and perceptual experiences of its users. The primary transportation modes of walking,

bicycling, private cars, motorcycles, university service vehicles, and Citibus should be managed individually but in complementing fashion to connectivity within the campus fabric. Every attempt should be made to optimize each circulation system, within the context of an existing campus and scarce resources. The integration of these systems, as well as the resolution of conflicts between them, shall recognize safety as the primary and uncompromised objective. Where issues of convenience are concerned, the solution to system conflicts should favor, in order, pedestrians, bicyclists, bus passengers, and automobile users.

EXISTING CONDITIONS

Transit at Texas Tech University (TTU) is currently operated under a contract with Citibus, the City of Lubbock's transit provider. TTU is also the largest local funding partner of the Citibus system's operations, which it derives from annual student fees. Citibus provides the following services:

- Seven fixed routes that link student apartment complexes with the TTU main campus.
- Three campus circulator routes (Red Raider, Masked Rider, Double T).
- "S-Bus" late night service that circulates among downtown Lubbock, off-campus entertainment areas, and student housing complexes.
- "Safe Ride" demand response service that provides curb-to-curb service to students late at night.
- ADA complimentary paratransit service.

In 2014 people took over 2.9 million trips on the TTU transit services.

Current Transit Operations at Texas Tech University

Citibus provides campus bus service in Lubbock under the direction and guidance of the Texas Tech University Student Government Association (SGA) in collaboration with TTU Transportation & Parking Services. On-campus service is free to anyone on the TTU campus. Students may also ride for free on any Citibus off-campus fixed route bus by showing their TTU I.D. card.

TTU bus service consists of seven routes that connect various apartment complexes in Lubbock with central campus and a three route system for intra-campus transportation that also connect with park-and-ride lots. The three campus routes operate at six minute intervals from approximately 7:00a.m. to 7:00p.m. The seven off campus routes run from approximately 7:00a.m. to 8:00p.m. with slightly different spans of service for each route. Frequencies vary from six to fourteen minutes, depending on the route. Reduced service levels are provided during breaks and summer.

Transit System Governance and Funding

Oversight

Transit service at Texas Tech University (TTU) is operated by Citibus which is financially supported by TTU and the City of Lubbock. For the TTU service, decisions regarding routes, frequency, and span of service are made by the Student Government Association (SGA). Service is adjusted each year based on comments received from passengers, analysis of changes in housing patterns, and service reliability issues. The contractual arrangement for service is between Citibus and TTU Transportation & Parking Services. Transportation & Parking provides technical assistance to SGA for transit issues on campus.

The Transportation Policy Committee has been created by TTU senior administration as a forum to discuss issues related to transit and transportation on campus. It has a wide range of membership representing several segments of the university community that are affected

by transit service. This includes representatives from SGA and various auxiliary service areas of TTU – housing, hospitality, parking and transportation, among others.

Funding

Student transportation fees (\$52 per semester per student for those taking more than 4 hours and \$26 for those taking less than 4 hours) are used to pay for operating costs of the bus services. Fee levels are determined on an annual basis. Administrative assistance is provided from the Dean of Students Office (staff coordinator for SGA) and Transportation & Parking Services. The wages for these positions are paid through their individual departments and student fees are not used for administrative purposes.

Financial Trends

Total operating costs for the TTU transit contract in 2015 is projected to be approximately \$3.7 million. The cost per rider has increased approximately 17 percent since the 2012 fiscal year, however ridership has also increased in these years and the operating cost per rider, a measure of cost effectiveness, has decreased. The trends from 2012-2015 are shown in Table 1. Systemwide, Citibus' operating cost per hour is about \$58.00.

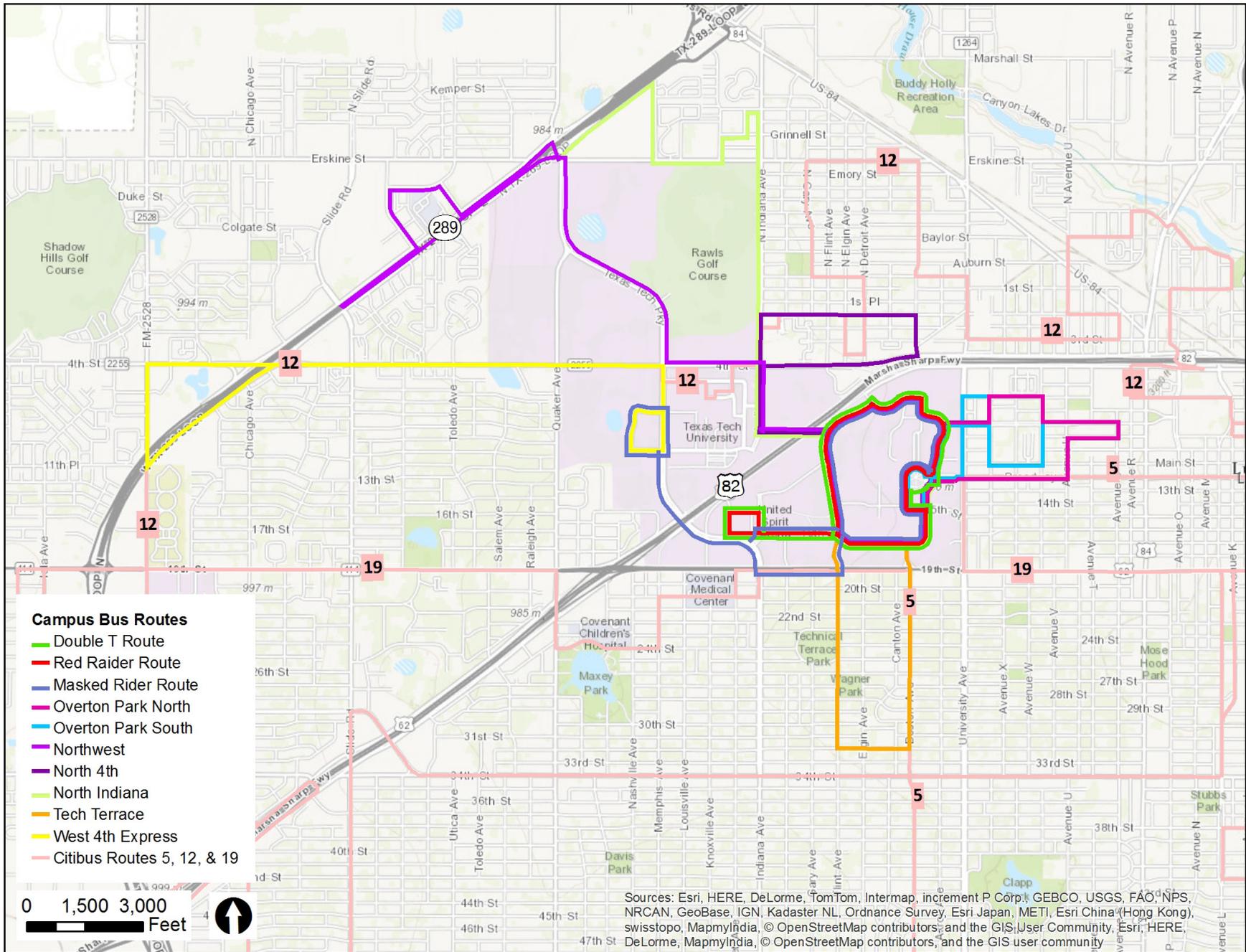


TABLE 1. OPERATING COST TRENDS

Year	FY 2012	FY 2013	FY 2014	FY 2015
Operating Cost	\$3,295,705	\$3,541,196	\$3,641,826	\$3,704,226 (est.)
Annual Ridership	2,582,609	2,733,819	2,951,504	TBD
Cost Per Rider	\$1.27	\$1.29	\$1.23	\$0.82 (ytd)

Cost effectiveness by route is shown in Table 2 and Table 3 identifies revenue trends.

TABLE 2. ROUTE LEVEL COST EFFECTIVENESS

Route	Operating Cost Per Passenger (2014)	
Texas Tech TT	\$ 0.80	Circulation
Red Raider	\$ 0.72	
Masked Rider	\$ 1.45	
Overton Park North	\$ 0.87	Apartment
Overton Park South	\$ 0.96	
Northwest	\$ 2.90	
North 4th	\$ 1.36	
North Indiana	\$ 1.91	
Tech Terrace	\$ 1.96	
West 4th	\$ 2.97	Special
Nite Owl	\$ 10.46	
S Bus	\$ 34.19	

TABLE 3. SUMMARY OF TTU TRANSIT REVENUES

Year	Student Fee Revenues	Apartment Revenues	Apartment Revenue % of all Revenue	Off Campus Shuttle % of Ridership
2009-2010	\$2,916,653	\$150,262	5%	40%
2010-2011	\$2,953,082	\$144,494	5%	45%
2011-2012	\$2,983,997	\$333,666	11%	49%
2012-2013	\$2,853,844	\$377,333	13%	44%
2013-2014	\$2,888,859	\$485,000	17%	37%
2014-2015	\$3,328,000	\$540,750	16%	38%

Field Observations

In March 2015 the consultant team spent several days on the TTU campus observing transit operations on typical days when class was in session. Overall, the service had several strengths including good operator driving or customer service. There were some periods during peak class turnover where bus loads were relatively high, but no “crush loads” where buses were filled to the door were observed during this time. Routes appear to be organized effectively, and the success of establishing three “campus gateway” bus transfer points was evident. Shortcomings were observed in the following areas:

- Pedestrian Access
- Lack of Bicycle Facilities
- Transfer Point Facilities and Locations

Safety and Pedestrian Interactions

FIGURE 1. RAWLS BUSINESS SCHOOL TRANSFER POINT; PEDESTRIAN HAZARDS





FIGURE 2. LACK OF BICYCLE FACILITIES AT MAJOR TRANSFER POINT



FIGURE 3. BUS TRANSFER POINT AT HOLDEN HALL

There are marked bicycle lanes on several campus streets. Bus pull-outs have been constructed at several locations to minimize bicycle/bus conflicts and provide safe loading zones for passengers. The master plan identifies pedestrian and bicycle safety as high priorities, and important components of campus circulation.



Transit Fleet

The TTU bus fleet is aging with individual vehicles in good to poor physical condition, but still safe to operate. Replacement parts are becoming scarce and additional used buses have recently been purchased due to lack of replacement parts. The average age of the fleet is more than 14 years. Heavy duty buses are designed for a 12 year life and the optimal average fleet age is six years. Replacement buses should be added to the fleet on a regular basis to get closer to the optimal fleet age. For a system like Citibus, this means that new vehicles need to be brought on line every one to two years. With a fleet of 44 buses, optimal bus replacement for TTU buses would be to purchase seven buses every two years.

TABLE 4. TTU/CITIBUS FLEET STATUS

Transit System	# of Vehicles	Average Age	Useful Life	Vehicles Beyond Useful Life	% of Fleet Beyond Useful Life
Texas Tech University	46	14.5	12	44	96%
Citibus	34	10.1	12	15	44%
Paratransit	32	7.5	6	32	100%

Schedule Adherence

Buses appeared to be operating close to schedule during field observations. Mid-route recovery time was frequently observed indicating that the scheduled cycle time is adequate on many routes. Passenger loads were observed to be balanced. Anecdotal information indicated that extra buses are added at the beginning of each semester due to overloading and are withdrawn as travel patterns stabilize during the semester. This is typical of university transit operations as student travel patterns typically change and are proportional to class attendance.

Some buses were observed with passengers standing near the front of the bus, but the lack of clear windows made it difficult to verify that the bus was at capacity. In some situations, passengers stand near the front of the bus creating the appearance of a full bus, but there is often standing room in the rear of the bus.

Public Information

The TTU routes serve their designed function well. However, route alignments, stops, and schedules are difficult to understand for new customers due to the poor media presentation and lack of normal transit marketing practice. Routes are named but not numbered. Stops are not well defined on the map and are not correlated to the bus stop shelters on campus. Wayfinding infrastructure to and from bus stops is non-existent.

STAKEHOLDER INPUT

A critical component of the Texas Tech University (TTU) Transit Master Plan included gathering input from students, faculty, staff, and community members. Texas Tech University Transportation & Parking Services facilitated multiple outreach tasks to shape the recommendations of the plan. The input from these stakeholder groups identify current transportation issues on campus – those components that are successful and those that are falling short – and offer perspectives on opportunities and threats. Outreach tasks included:

- *Interviews, meetings, and focus groups with members of TTU administration, auxiliary services, and student government.*
- *An open house-style town hall meeting in which members of the TTU community could participate in various transit planning exercises, take a survey, and offer their assessment of transit service in Lubbock.*
- *A web-based survey distributed to TTU community members.*

This section summarizes the various outreach exercises that contributed to the plan recommendations.

Interviews, Meetings, and Focus Groups

In March and April 2015 the project team visited the TTU Campus to meet with a broad group of university officials and stakeholders to gather input on the Transit Master Plan. The consultant team conducted a series of interviews, meetings, and focus groups while on campus to supplement the survey effort and open house meeting.

Discussion Topics

While each meeting was tailored to the interests of each group, the intended outcome was to establish a strategic direction for the project. Transit Master Plan recommendations reflect the issues and opportunities described in each of these meetings. The topics addressed at the sessions follow.

Mission

What is the primary role of transit at TTU?

- On campus circulation.
- Connections between Health Sciences and Main Campus.
- Meet the needs of commuters (park-and-ride, longer distances).
- Connect TTU to the rest of Lubbock.
- Another purpose.

Campus Master Plan

How does transportation relate to these principles?

- Enrollment growth.
- Strengthen the academic core.
- Enhance campus identity and sense of place.
- Position land endowment parcels for strategic initiatives.
- Open space.
- Campus circulation and activity.

Service Planning Topics

- Who currently uses transit? Are their needs well met?
- Who does not use transit? Why not?
- What are some of the most important transit destinations?
- Is there an organization or group of users in your community that we should be contacting?
- Are there specific service adjustments (route, schedule, pricing, equipment, facilities) that should be considered?

Strategic Planning

Strengths and Weaknesses are primarily internal to the organization. Opportunities and Threats focus on things in the external environment that can have an impact on the organization.

Transportation System Strengths

- Recent improvements to transit system have made operations more efficient – transfer point system.
- Citibus is an efficient service that brings a great deal of technical capacity to the organization.
- Transit system is generally understood to be safe.

Transportation System Weaknesses

- Parking in the central part of campus is scarce, therefore placing more pressure on the transit system.
- Transit is confusing, unclear where buses go or how to plan a transit trip.
- Evening services have low ridership and high subsidy.
- No smartphone app or real-time information.
- Graduate students and those that are on campus at night are not particularly well served.
- Fleet condition and pedestrian environment presents challenges for students with disabilities.

Future Opportunities

- Acknowledgement that surface parking is not the highest and best use of land in the Academic Core of campus; transit will be helpful in moving people to and through this area.
- Growth of on-campus population (students, faculty, staff). Enrollment to increase to 40,000 by 2020. From present day this means an increase of 8,000 people on campus, including staff and faculty.
- Late night services seem to work better than taxis, but the market is still underdeveloped.
- Master plan indicates that autos will be moved to the periphery of campus; transit will be an integral part of moving people from the periphery to the core of campus.
- Momentum from TTU Master Plan, timely to be discussing transportation and infrastructure.
- Turnover of student body is an opportunity to continually bring new ideas to the table.

Potential Threats

- Lubbock is a very automobile oriented community, and it may be a challenge to shift people to explore using other transportation modes.
- Pedestrian facilities are not adequate given the level of foot traffic on campus (growing problem).
- No current funding source for replacement buses or facilities.

Open House

On April 1, 2015 an open house meeting was held at TTU to engage the student body and gather input on the Transit Master Plan. The venue for the open house was the foyer of the Main Library (see Figures 4 and 5), a relatively high traffic area on campus. The open house was designed with the following components

- Representatives from TTU, Citibus, and the consultant team were present to answer any questions from the community about transit service in the area or the Transit Master Plan project.
- Several stations where open house attendees participated in planning exercises that requested input on transit use, current transit service, and suggestions for future transit service priorities.
- Various campus maps where people could provide general comments and feedback.
- Computer workstations where people could take part in the web survey.

It is estimated that about 125 people participated in the open house meeting.



FIGURE 4. SIGNS DIRECTING PARTICIPANTS TO THE LIBRARY



FIGURE 5. WORKSHOP PARTICIPANTS

125 people participated in the Library Town Hall Meeting, and nearly 2,600 people engaged online via web-survey to provide feedback on transit at TTU.

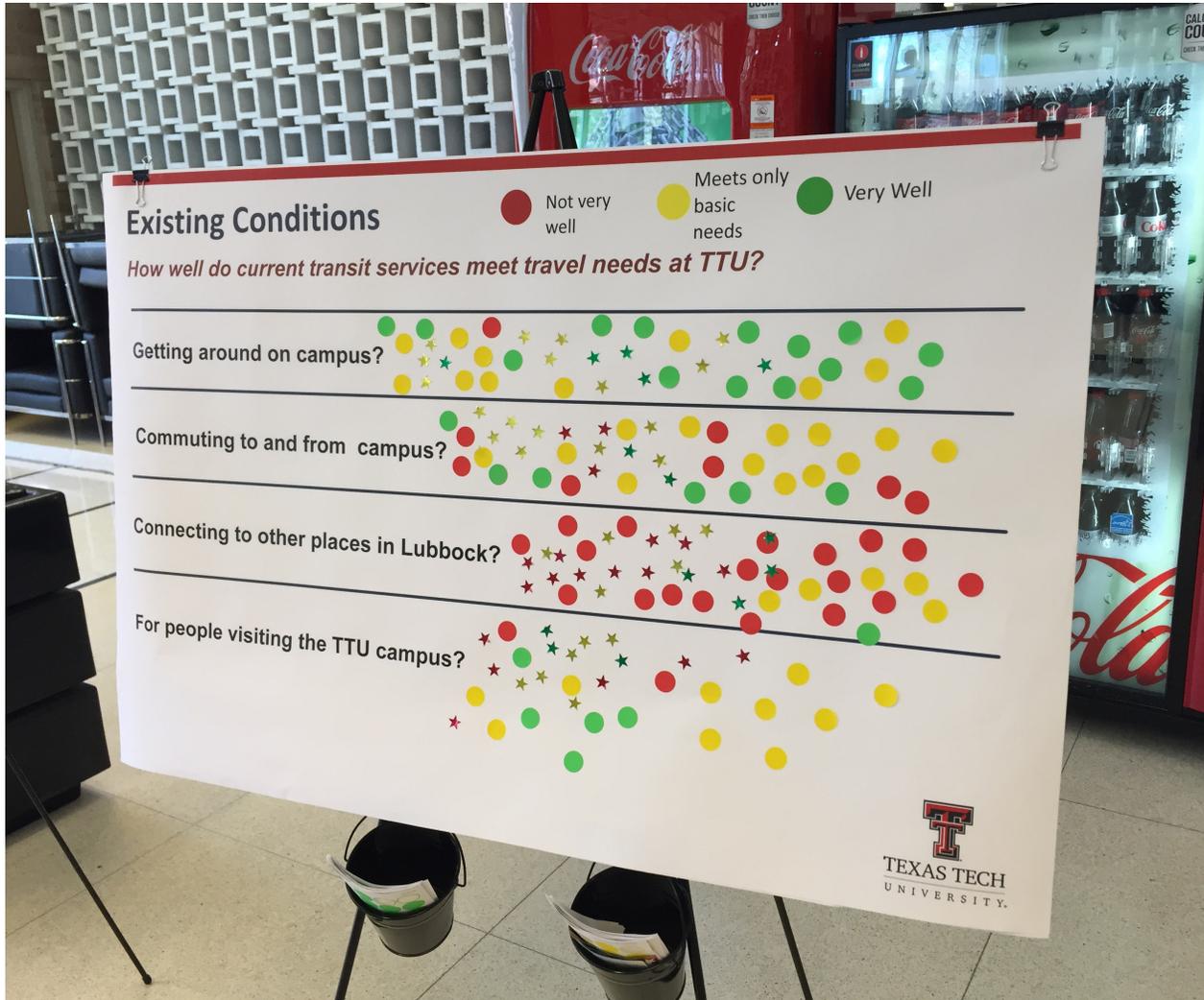


TABLE 5. HOW WELL DO CURRENT TRANSIT SERVICES MEET TRAVEL NEEDS AT TTU?

Getting around on campus?	Very well: 59% Meets only basic needs: 39% Not very well: 3%
Commuting to and from campus?	Very well: 26% Meets only basic needs: 49% Not very well: 25%
Connecting to other places in Lubbock?	Very well: 11% Meets only basic needs: 11% Not very well: 78%
For people visiting the TTU campus?	Very well: 23% Meets only basic needs: 57% Not very well: 20%

FIGURE 6. HOW WELL TO CURRENT TRANSIT SERVICES MEET TRAVEL NEEDS AT TTU?

The results of this exercise are shown in Table 5.

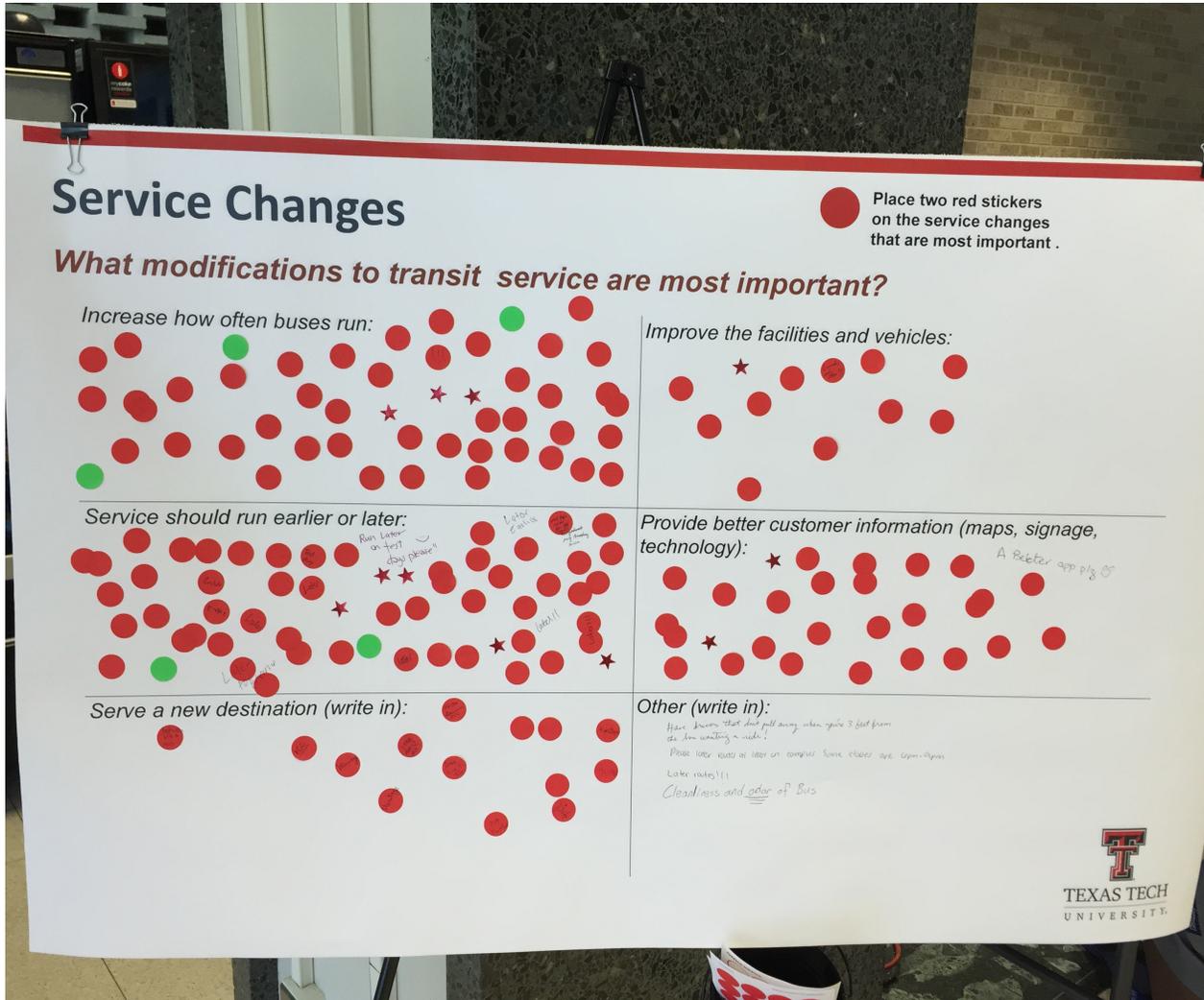
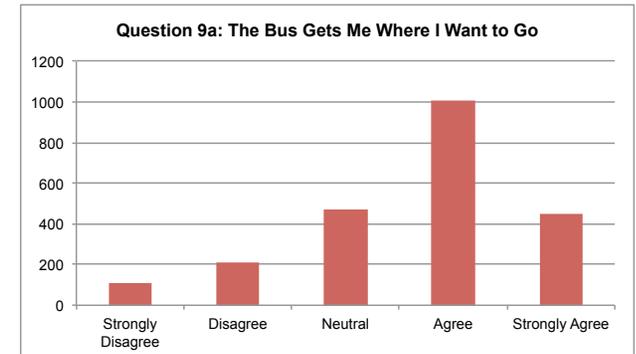


FIGURE 7. WHAT SERVICE CHANGES ARE MOST IMPORTANT?

Student and Staff Survey

Methodology

A web based survey was distributed to the university community for approximately two weeks in March-April 2015 through a variety of channels including email lists, social media, and at a town hall meeting held on the TTU Campus. Participation in the survey was outstanding, with approximately 2,600 unique responses. A portion of the survey offered an opportunity for open-ended comments to capture any input that was not specifically covered in the survey questions. Participants left over 700 comments in this section. The survey's purpose was to gain broad input on the Transit Master Plan from the community, understand transit use patterns, and inform future strategies.



Peer Review

A key component of the Transit Master Plan process included review of strategies in place at peer institutions. TTU staff and stakeholders posed several questions about what types of services are available in similar communities, different approaches to governance, and methods of funding. In researching the various universities the project team identified several examples of transit project management and service provision strategies that can be applied to TTU. This includes the areas of management, funding, and customer information. In Table 6, a comparison of each transit system's characteristics is presented. There are several effective practices in place at TTU including the cost-effective operation at Citibus, improved service design, and positive sentiment toward the importance of transit on campus. However, when reviewing peer institutions there are several functional areas where TTU Transit can be improved. While transit ridership has remained steady in recent years, the level of transit service consumed in relation to student enrollment lags behind its peers. TTU can draw from the practices at these institutions and tailor them to the local context to increase transit ridership and customer satisfaction.

TABLE 6. PEER UNIVERSITY INFORMATION

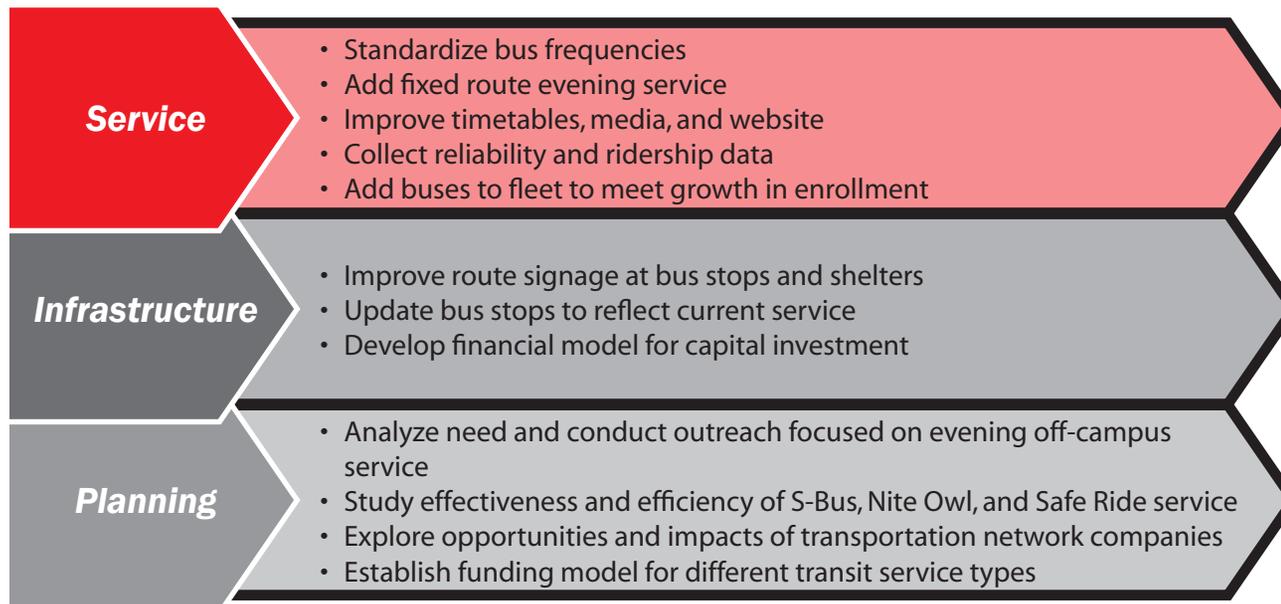
	Transit Operator	Oversight of Operations	Annual Ridership	Enrollment	Trips Per Student	University Revenue	Primary Source of Capital Funding
Texas Tech University	Citibus, under agreement with City of Lubbock	Student Government Association w/ Technical Assistance from Transportation and Parking Services and Citibus	3 million	35,500	85	Student Fee: \$52/semester	City of Lubbock/FTA Grants
University of Kansas	KU oversees MV Transportation (contractor)	University Transportation Commission (majority student gov.) makes recommendations to Provost; Students oversee late-night services	2.9 million	30,000	97	Student Fees: \$51.10/semester – General Operations \$16.30/semester – Late Night Service	Student fees: \$22.40/semester
Texas A&M University	Texas A&M oversees SSC (contractor)	University Staff	6 million	62,000	97	Student Fee: \$77/semester Parking Fees: \$250,000/year	Student Fee, capital set-aside from global student fees
Penn State University	CATA	Penn State staff and CATA Board	7.2 million	45,500	158	Tuition and parking revenue: ~ \$5 million/year (\$110/student)	State of PA Grants
University of Iowa	University of Iowa	Parking and Transportation Advisory Committee	4 million	31,500	127	Student Fee: \$58/year \$900,000 in Parking Fees	University of Iowa
University of Georgia	University of Georgia	University staff, student government allocates funding	9.5 million	31,500	271	Student Fee: \$116/semester	FTA Section 5307 funding/ Capital set-aside

TRANSIT DEVELOPMENT PLAN

If existing trends hold steady, there is a market potential for TTU bus service of about 3.5 million annual trips per year. Ridership could increase beyond that if nearby development and student perspectives on transit change. The core route structure is effective; service delivery is appropriate; but there are several minor impediments to generating higher ridership on existing services. A series of recommendations for short term; medium term; and long term development of the transit system consistent with the overall master plan vision are presented in this section.

Near Term Recommendations (2015-2016)

Several improvements can be made in the near term that will improve and enhance the current bus service. Near term improvements require comparatively low levels of investment and include changes to service, infrastructure, and identification of topics for further study.



Service Elements

FREQUENCY

Service frequencies on current campus bus routes are at odd intervals. These should be changed to times that are easier to remember for the transit user, especially for those routes that have frequencies greater than ten minutes. 10-minute, 12-minute, 15-minute, or 20-minute intervals coordinate well with class times. The table below shows current service intervals and recommended intervals for school year and summer periods.

Route Num.	Route Name	Current Interval	Recom'd Interval	Summer Interval	Summer Recom'd
44	Overton North	6	6	18	20
45	Overton South	9	10	18	20
46	Northwest	12	12	36	40
47	North 4th	7	7.5	21	20-30
48	North Indiana	9	10	27	30
49	Tech Terrace	6	6	18	20
50	West 4th	14	15-20	28	30

TABLE 7. SERVICE INTERVAL IMPROVEMENTS

EVENING SERVICE

Stakeholder input indicated a need to provide better transportation to those on campus during late hours. Providing this service will benefit those students who use park-and-ride lots during the day and have evening classes, as they will not have to move their car before the end of bus service. It will also benefit students in residence halls who have evening classes or desire to travel to the Student Union Building or Library, and it provides a safe ride for those students concerned about walking on campus at night.

This change will require additional financial resources. Analysis of ridership numbers will determine if there are any potential savings in other services to offset these costs.

TRANSIT MEDIA

Based on stakeholder input the current public paper timetable does not adequately communicate to transit users how the buses operate. For frequent service routes (lower than eight minute intervals), this is not a significant issue. However, in the late afternoon, the number of buses is reduced on several routes and exact departure times should be available to passengers after the intervals are increased. The #50 - West 4th Express is scheduled at 14 minute intervals and a public timetable showing exact departure times all day would be beneficial for customers on that route.

Routes are not numbered and the color identification on the timetable is not carried through to the vehicle identification. It is recommended that all services

should be numbered. For this document the following numbers will be used.

TTU students appear to be strong users of a variety of social media and would likely respond to an effective information program. Transportation and Parking Services has developed an effective program for its parking services and it is recommended that Transportation and Parking Services should assume responsibility for building and monitoring such an effort for transit service. This requires close communication with Citibus dispatchers for route delays, detours, service interruptions as well as positive aspects of social media. Control of the content will be the responsibility of Transportation and Parking Services.

Infrastructure Elements

SHELTERS AND SIGNAGE

The existing bus shelters are not consistently identified and this creates difficulties for new passengers to determine their location as they travel along the bus route. The shelters and signage in Figure 8 are examples of how other communities identify shelters as well as provide basic information on the routes that serve each shelter. The map sign is used at bus stops, and shows route information. QR codes for smartphones or text information can also be added to these signs, and there are numerous software applications that offer capability to link to bus and schedule information.

FIGURE 8. SHELTER AND SIGNAGE EXAMPLES



FINANCIAL MODEL

Part of developing a good infrastructure program is establishing a financial model that encompasses all the revenue sources and has predictive capacity for future improvements. The expense model is based on the hourly charge of Citibus and is at a defined rate through FY18. The revenue model is more complex. Apartment owners are contributing to the operation of several routes. Student fees are the primary source of revenue for all routes and the exclusive source of revenue for the three on-campus circulator routes and #49 Tech Terrace.

Transportation and Parking Services provides “soft” contributions including wages for staff involved in the transit service and physical improvements such as bus stops, signage, and shelters. A fair and understandable participation rate for apartment owners will assist in predictable future funding shares from them. The opportunity for them to assist with funding evening or weekend service will be more successful if they understand the basis for the revenue requests.

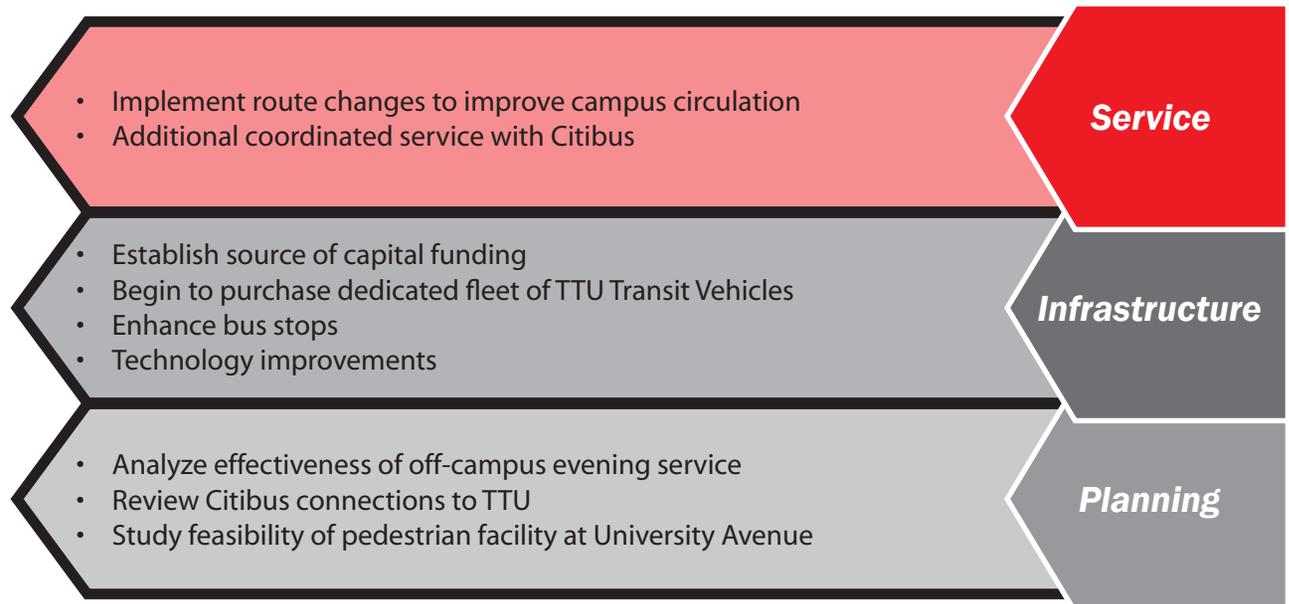
The financial model should also consider user charges for select premium services. Door to door service is more expensive than fixed route but is provided at no charge to the student. Discussion about appropriate user contributions should consider the value of the premium service and the SGA commitment to fare free transit.

Planning Elements

There are several elements that require additional analysis and study to inform future decisions. The Transportation Policy Committee is the ideal organization to study these interests and include a wide range of viewpoints. The top priority for future study is the status of evening service.

Medium Term Recommendations (2016-2019)

Medium term recommendations for the transit system require another increment of administrative effort and therefore will take some additional time to coordinate. In some cases there are needs for additional investment so new funding will be required



Service Elements

ROUTE CHANGES

There are three primary route changes that will benefit the connectivity of campus and circulation within Texas Tech.

- Remove all routes (including Citibus) from Memorial Circle and Student Union Building and relocate to Akron Avenue
- Relocate #41 Double T and #42 Red Raider via Main and Indiana from current route
- Operate #43 Masked Rider from S-1 Parking via 10th – Indiana – 9th and then the campus loop instead of current route.

Moving all routes away from University Circle and the Student Union Building will be a significant safety improvement and be consistent with the master plan principle of focusing pedestrian activity in the academic core. This is consistent with the recommendations in the Campus Master Plan. Operating on Akron will be more direct and provide an equivalent level of service with improved transit facilities near Holden Hall and the east side of the Student Union. Additionally, the route will be 0.25 miles shorter, improving efficiency and providing a cost savings to TTU Transit operations.

Moving #41 Double T and #42 Red Raider to operate on Main and Indiana from the current route will free up valuable transportation space on Flint that can be used to enhance bicycle traffic. It will also remove bus and pedestrian conflicts in an area where there is significant pedestrian movement and vehicular traffic

Infrastructure Elements

CAPITAL INVESTMENT

The TTU fleet and the Citibus fleet are aged beyond useful life and in deteriorating condition. It is important that TTU invest in new buses, with or without federal funding. Operating costs are increasing due to the age of buses and the lack of available spare parts for the old buses has required Citibus to purchase used buses from Cleveland and Dallas. The yearly allocation of capital funding is primarily used for operating expenses which has resulted in lower operating subsidy, but higher operating cost. As maintenance requirements and equipment failures increase, so will the operating subsidy.

In the past, Citibus was able to access Texas Toll Credits from Texas Toll Roads to provide the 20% local funding to match the 80% FTA funds for new buses. Lubbock was one of the first cities in Texas to make extensive use of the toll credit program. Currently, the credits are being distributed across the state and Lubbock has limited access to these funds

The TTU fleet consists of 46 buses. 44 (96 percent) of them are beyond their 12 year design life. The average fleet age is more than 14 years old while the optimum average fleet age is six years. 42 of the buses were built in either 2000 or 2001. Manufacturers are not required to stock spare parts for buses more than 12 years old. Citibus has had difficulty locating parts for some of the vehicles in its fleet.

A capital investment partnership will involve contributions from the University; students (student

fees); and City to provide new buses in a timely manner and have the 20 percent local funds available when “shovel ready” grants appear.

UNIVERSITY FUNDED BUSES

TTU and SGA leaders should begin the discussion of purchasing vehicles with full local funding, as the federal government’s investment in mid-sized communities without rail transit is unlikely to change in the near term. Six to eight buses should be purchased in the next two years with local funds. After 2017, a re-assessment of local purchasing should be made to determine if FTA formula or discretionary funding is available for such purposes.

Locally funded buses can be used for a wider range of university activities that are not permitted with federally funded buses. They can be used for service that is not open to the general public, such as exclusive event charters; new student orientation; high school visitation; or other similar group movements on campus or in Lubbock.

Because they will be used for fixed route service, they can still be operated and maintained by Citibus in a federally supported maintenance facility. A cost allocation program based on mileage operated in transit service and in exclusive service will need to be approved by the FTA.

OFF CAMPUS BUS STOPS

The function of the off-campus bus routes is to provide access to and from campus and to reduce auto traffic and the need for on campus parking.

To enhance and encourage ridership on these routes, a “sense of place” is needed to allow students to easily find their departure location from campus. The gathering space design would be consistent with the design in other aspects of the Master Plan. These gathering spaces would offer a consistent visual identity for the majority of people who arrive only a few minutes before bus departure time, as well as space for people who may desire to gather and socialize for extended periods of time while waiting for a bus. Examples of transit related gathering spaces are shown in Figures 9-11. These show transit facilities with amenities like shelters and sitting areas that are functional for passengers.

The three primary off-campus transit entry points on campus are at Rawls College of Business, Holden Hall, and near Boston/18th. Construction of three similar appearing bus stops, consistent with overall campus design will differentiate these three stops from the other bus stops on campus.

FIGURE 9. PEDESTRIAN MALL AND SITTING AREA ON UNIVERSITY OF MINNESOTA CAMPUS



Green Line, Source: Wikimedia Commons

FIGURE 10. FISCHER PLAZA TRANSIT FACILITY AT PENN STATE UNIVERSITY



Penn State University, Fisher Plaza, Source: Penn State University

FIGURE 11. LOS ANGELES, CA BUS STOP FACILITY



The North County Bus Shelter, Source: Los Angeles County

ON CAMPUS BUS STOPS

The Campus Circulator routes, #41 Double T; #42 Red Raider; and #43 Masked Rider, are designed to connect the academic core of campus with the park-and-ride lots, and handle movement within the TTU campus. These bus stops should enhance the common thread of connectivity through campus and reflect design

guidelines related to Spanish revival architecture that is detailed in the campus master plan. A common coloration, pavement design, shelters, benches, waste/recycling receptacles should enhance the theme of connectivity. Signage showing the name of the bus stop will also help people navigate throughout the bus system. Improved way-finding on campus and identification on public timetables and the website should be consistent with bus shelter appearance.

TECHNOLOGY

Transit technology has become very cost effective in the last few years. Automatic Vehicle Location (AVL); on-board cameras; Automatic Passenger Counters (APC) are three examples that many transit systems have incorporated into recent purchases. The AVL allows management to know where all buses are, but also provides the platform for passenger access to real time information on route performance and how long the wait will be for the next bus.

Planning Elements

There are several elements that will require some additional study before additional service recommendations can be provided. These are a lower priority than items like capital investment, but require analysis before changes are made. The analysis should consider costs and benefits as the impact on existing customers.

OFF CAMPUS EVENING SERVICE

Consultation with apartment owners and SGA is needed to determine the probability of success of evening service.

CITIBUS SERVICE

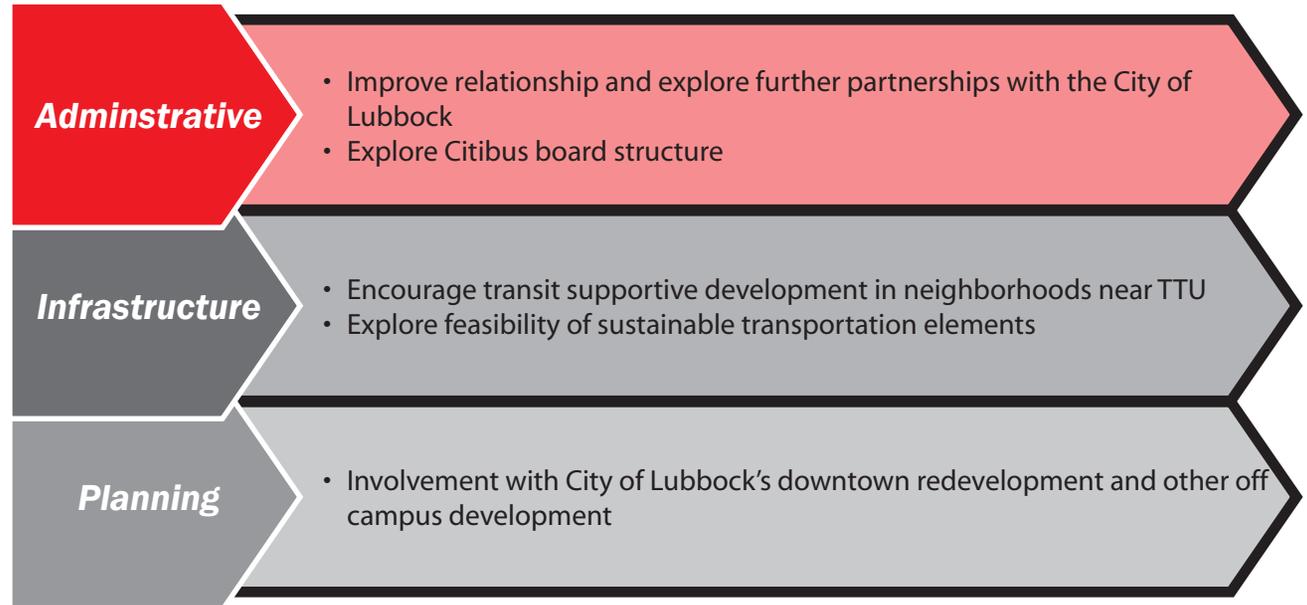
The Citibus Fixed Route Study recommended additional investment in Routes #5 and #19 for more frequent service near campus and not on the entire route. This would provide better service to the higher density areas near the TTU campus where students live. Further analysis and outreach regarding this recommendation to determine if there would be a benefit to students and the university should be conducted in 2017 to allow adequate time to develop financing if it is determined that there is a benefit in Citibus fixed route investment.

BICYCLE AND PEDESTRIAN INFRASTRUCTURE

A bicycle/pedestrian facility at Glenna Goodacre and University may provide several benefits. A well designed underpass will provide a safe grade separated crossing for bicycle and pedestrian traffic. This will reduce pedestrian/vehicle conflicts that back up traffic and cause buses to run late on the Overton routes in the afternoon.

Careful study and preliminary engineering is needed to determine the effects of the underpass on traffic and bus usage.

Long Term Strategies (2020 - Onward)



STRATEGIC PLAN

Adding to specific recommendations for transit routes and facilities, this section provides a set of principles for campus development in the context of transit, and a review of various governance and funding scenarios.

How Transit Interfaces with TTU Master Plan Principles

Enrollment Growth

The existing pedestrian, transit, and roadway infrastructure cannot efficiently or effectively accommodate the projected growth of the on-campus population. Transit development is an important factor in accommodating this growth. By the year 2024, the student population will increase to over 43,000. If current ridership trends continue at the present pace, the TTU transit system could have a demand for up to 500,000 additional passenger trips. Transit service that provides convenient travel times is an alternative to having automobiles in the core of campus. The role of shuttle service and satellite parking lots will become more important as the campus grows.

Strengthening the Academic Core

The Academic Core is the center of campus life at TTU. It is a hub of pedestrian activity, gathering spaces, and serves as the basis for many of the urban design guidelines set forth in the Master Plan. It is understood that roadways and surface parking are not the highest and best use of land in the Academic Core, however it is important to connect this area to the rest of the TTU campus and surrounding community. The academic core is ringed with a large percentage of the

student housing, athletic venues, recreation facilities and spaces, physical plant, and support services. Transit service is important as it enables TTU to move parking away from the academic core, and provide direct connections to all of these locations.

Campus Identity and Sense of Place

The Transit Master Plan identifies several shortcomings with the built environment associated with transit. Transit facilities can serve as gathering places, gateways to the TTU campus, and expressions of TTU's visual identity. Signage, wayfinding, and architectural elements of shelters should all be consistent and at the same standard as other components of TTU's physical environment. Examples of a shelter that is both visually pleasing and provide information to passengers are shown in Figure 12.

FIGURE 12. SYRACUSE UNIVERSITY TRANSIT SHELTER



Land Endowment

TTU has a wealth of land holdings and they should be developed in a strategic and efficient manner. Transit can help in preserving open space and reducing the need for on-campus surface parking. High quality public transit is also attractive to staff, faculty, students, and researches and can be promoted when recruiting people to the Lubbock area.

Open Space

The master plan lays a framework for a future campus where all parts reinforce its environmental quality. Transit investment is a strategy that enables to removal of cars and surface parking from the campus core, along with efficient bus routes and bike paths. Additionally, it offers a more environmentally friendly option than automobiles by reducing vehicles miles traveled and vehicle emissions on campus.

Campus Circulation and Connectivity

Transit is one of the most visible manners in which people move about the TTU Campus. It is the transportation mode that can move many people efficiently and create convenient links between and within each region of the Lubbock campus. The most common way that people get around campus is by walking. Having a safe, well maintained pedestrian environment supports transit as all trips on transit begin or end with pedestrian connection to a bus

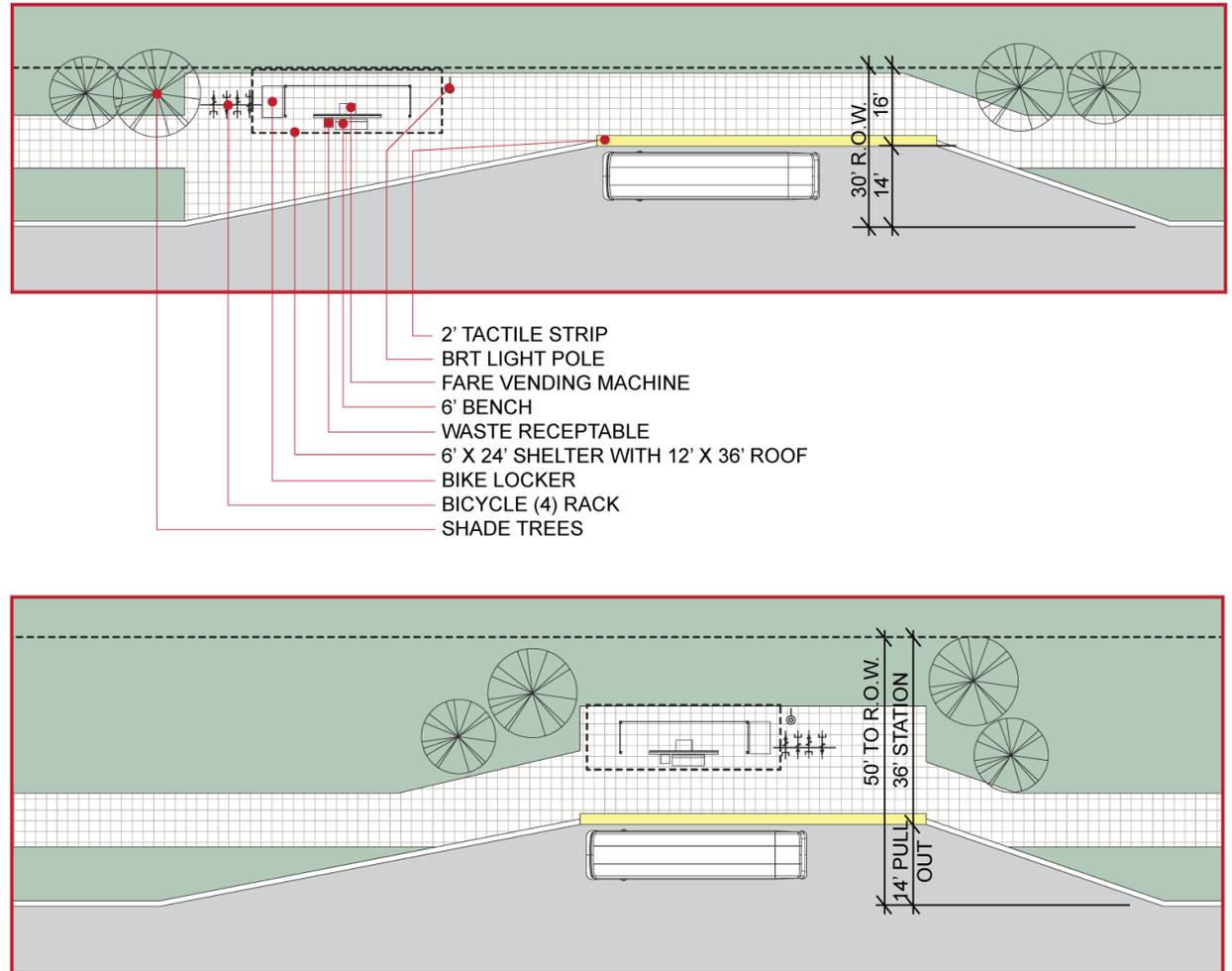
stop or station. Additionally, improving sidewalks and transit facilities provides much needed utility to people with disabilities.

TTU has effectively developed a transit service plan that focuses on campus circulation by bus using a system of transfer points to bring people to the circulators from off campus. Many of these transfer points do not have adequate waiting areas or shelters, or the facilities are not consistent with design principles in the Master Plan. There are also opportunities to move some of the transfer points to off-street facilities. Examples of design concepts for transit facilities are shown in Figures 13-14.

FIGURE 13. PARK-AND-RIDE STATION WITH BUS TRANSFER POINT



FIGURE 14. COMPONENTS OF A HIGHLY USED BUS STOP



Governance Plan

None of the peer transit systems reviewed in this effort delegated complete control of the transit system's operations to student government. The typical role for student government is to focus on broader service levels and funding. A parking or transit department of a university will typically assume the fiscal responsibility to insure that funding is adequate to match the student generated desired service levels. Additional university funding for service is sometimes another function of the transit and parking department by using parking or ticket fee revenues. Support services of the parking department usually include data reporting, marketing, and coordination with other modal interests.

TTU service is in a transition period as the university is recovering from a series of several years of deficit spending on transit service. Appropriate activities for student focus in the next few years should be on bus service levels on campus; decisions regarding off-campus shuttles; and possible revision of S-Ride service. The studies suggested in this report will require extensive student input and analysis to provide the basis for thoughtful decision making.

The role of Transportation and Parking Services should focus on data analysis; cost and revenue models; budget monitoring; technology development for the system; and prioritization of service development to complement university prerogatives.

Transportation and Parking Services should also serve as the communication bridge between those entities that are focused on making the TTU routes successful. Student government, university administration, Transportation and Parking Services, Citibus, and the City of Lubbock have differing priorities and Transportation and Parking Services should focus efforts to facilitate effective communication among the groups to enhance the university focused transit system.

TTU Self Operation Cost Analysis

Some universities operate an independent transit system focused on meeting university needs. They are often separate and not coordinated with the city transit service. Typically, these systems operate with minimal FTA participation in finances. In Lubbock, the transit services are combined into one operation which is more cost effective than having two separate systems with two garages; two management structures; and some overlapping services.

However, in some situations it can be more effective to have two distinct transit systems. As part of the scope of this project, the possibility of a separate TTU bus operation was examined.

A comparison of city and university labor rates is shown in Table 8. The minimum estimate for TTU to operate transit service in-house is roughly \$1,645,268 per year (2.4 percent below the Citibus average) and the maximum annual operating cost is approximately \$2,001,054 (18.7 percent above the Citibus average). Regardless of where the labor cost is at initially, it can be assumed that the labor cost will be eventually be greater for TTU operation of transit service compared to Citibus because of higher inflationary trends at the university.

TABLE 8. LABOR ANALYSIS

Position	Hours/Year	Median Wage and Benefits	TTU Cost	Maximum Wage and Benefits	Max. TTU Cost	Citibus Wage and Benefits	Citibus Cost
Driver	72,054	\$16.37	\$1,179,524	\$19.11	\$1,376,952	\$14.63	\$1,054,150
Mechanic	12,480	\$14.96	\$186,701	\$23.50	\$293,280	\$23.68	\$295,526
Lane Worker	8,320	\$12.20	\$101,504	\$14.22	\$118,310	\$16.77	\$139,526
Clerk	4,160	\$13.97	\$58,115	\$16.32	\$67,891	\$17.50	\$72,800
Supervisor	Salaried	\$57,190.00	\$57,190	\$71,820.00	\$71,820	\$53,335.00	\$53,334
Dispatcher	4,160	\$14.96	\$62,234	\$17.50	\$72,800	\$16.83	\$70,013
TOTAL			\$1,645,268		\$2,001,054		\$1,685,350

Insurance Costs

Typically, insurance is based on fleet age and condition; minimum driver qualifications; and claims experience. Citibus has a long history of transit experience and its liability cost is \$128,691 for the current year. For TTU self operation, the estimate is \$300,000.

Facility Costs

A bus maintenance facility would also be needed for TTU operations. With expected growth through 2024, the facility should be designed for 55 buses with room for future growth over the life of the Transit Master Plan to allow for 70 buses.

Fleet Requirements

Fleet acquisition cost could be as low as \$763,400 if FTA allows the transfer of the federal interest. If the FTA requires reimbursement of the federal interest, the cost of fleet acquisition would be approximately \$1,000,800.

A summary of the total cost of TTU operation of transit services is shown in Table 9.

TABLE 9. COST SUMMARY FOR TTU SELF OPERATION OF TRANSIT SERVICES

	TTU Low Estimate	TTU High Estimate	Estimate of Citibus Costs
Labor	\$1,645,300	\$2,001,000	\$1,685,400
Insurance	\$300,000	\$300,000	\$128,691
Facility	\$4,000,000	\$8,000,000	
Fleet	\$763,400	\$1,000,800	
TOTAL	\$6,708,700	\$11,301,800	\$1,814,091

Summary

The cursory analysis of Citibus versus TTU operation of the TTU bus services shows that it will cost more for TTU to operate the system; federal revenues now included in Citibus operation may not transfer to TTU; and additional capital cost will be incurred. Citibus has one of the lowest operating costs of any system operating full size, heavy duty transit buses. It has a low average wage rate and has a reasonable management and support structure in place to serve Texas Tech and the City of Lubbock.

Texas Tech can self operate the transit services if it is willing to incur the increased operating cost and \$4.8 Million to \$9.0 Million in capital cost associated with an independent operation.



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