Transport 2050

The Future of the Past

Ian Pitts

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The Future of the Past

by Ian Pitts

Sustainable Manhattan 2050: Multimodal Transport System

Sustainable Manhattan 2050: Visions for Resilient Community
in the Age of Peak Oil and Climate Destabilization

Sustainable Manhattan 2050 Masters Thesis Studio
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Kansas State University
2011

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Introduction

Often a city will find a major part of its national image being a result of its transportation. America is still largely a country defined by the distances it spans, and the transportation systems on which it was built, leading to transportation being one of our most image-able assets. “Transportation remains one of the most important external forces that influence the shape of cities,” Witold Rybczynski says in the final chapter of Makeshift Metropolis. When visitors come to Manhattan, one of their first experiences is and will be with the region and the city’s transportation network.

Transportation is both the skeletal structure and the circulatory system of a city. It is the foundation upon which all development happens. The history of transportation and its effect on the city is evident in Manhattan’s location. Settled by pioneers traveling by riverboat, the bend in the Kansas River is the farthest they could come, their boat running aground. Years later, the river valley provided the easiest route over the rolling Flint Hills for the Kansas Pacific and its diminutive little locomotives on their way to Denver. Prosperity came as the town became home to a land grant school and a transcontinental transportation link. Eventually, the automobile allowed the city to expand beyond its flat location in the valley, spreading across the hills to the northwest.

Currently, Manhattan’s transportation options are centered on the tyranny of the automobile; its development options are based on the suburban result. But Manhattan used to have a choice. Like many small Midwestern towns, it had a streetcar system that provided clean, affordable, easily accessible transportation. Today, many may see Manhattan as too small to support a successful streetcar system, but it is possible. Manhattan can once again have a choice, a choice for the better. Streetcars will bring investment and a powerful image for the city to use to market itself regionally. Transportation can once again be the unifying theme of Manhattan.

Transport 2050 is a project envisioning a rail-based transportation system for the city of Manhattan, linking city planning considerations to the transportation choices available to the citizens. The result is a greener, denser, more sustainable and resilient community.

Manhattan, Kansas

Manhattan, Kansas

Manhattan, Kansas is a city of 52,826 people that sits roughly 120 miles west of the nearest major metropolitan area, Kansas City. It won the All-American City award in 1952, and has retained the qualities that make it the quintessential American town.[1] Home to Kansas State University and its 23,000 students, the city is also 15 miles east of Ft. Riley and its growing military population, both of which help support the extensive retail and entertainment venues available in the area. The city has fared the Great Recession well, with the extensive Crosstown Redevelopment continuing to move forward and the unemployment rate remaining one of the lowest in the country.[2]

As small cities continue to grow faster than major metropolitan ones, Manhattan's status as a college town has made it one of the most desirable. The Manhattan Area chamber of commerce has begun a "Retire to the Flint Hills" campaign, touting Manhattan's "small town feel with all of the big-city amenities."[3] Manhattan is firmly established as a regional economic center, providing the services not available in many of the smaller communities around the region.

Varney's Bookstore in Aggieville.
Photo by Ian Pitts.

Poyntz Avenue.
Photo by Ian Pitts.

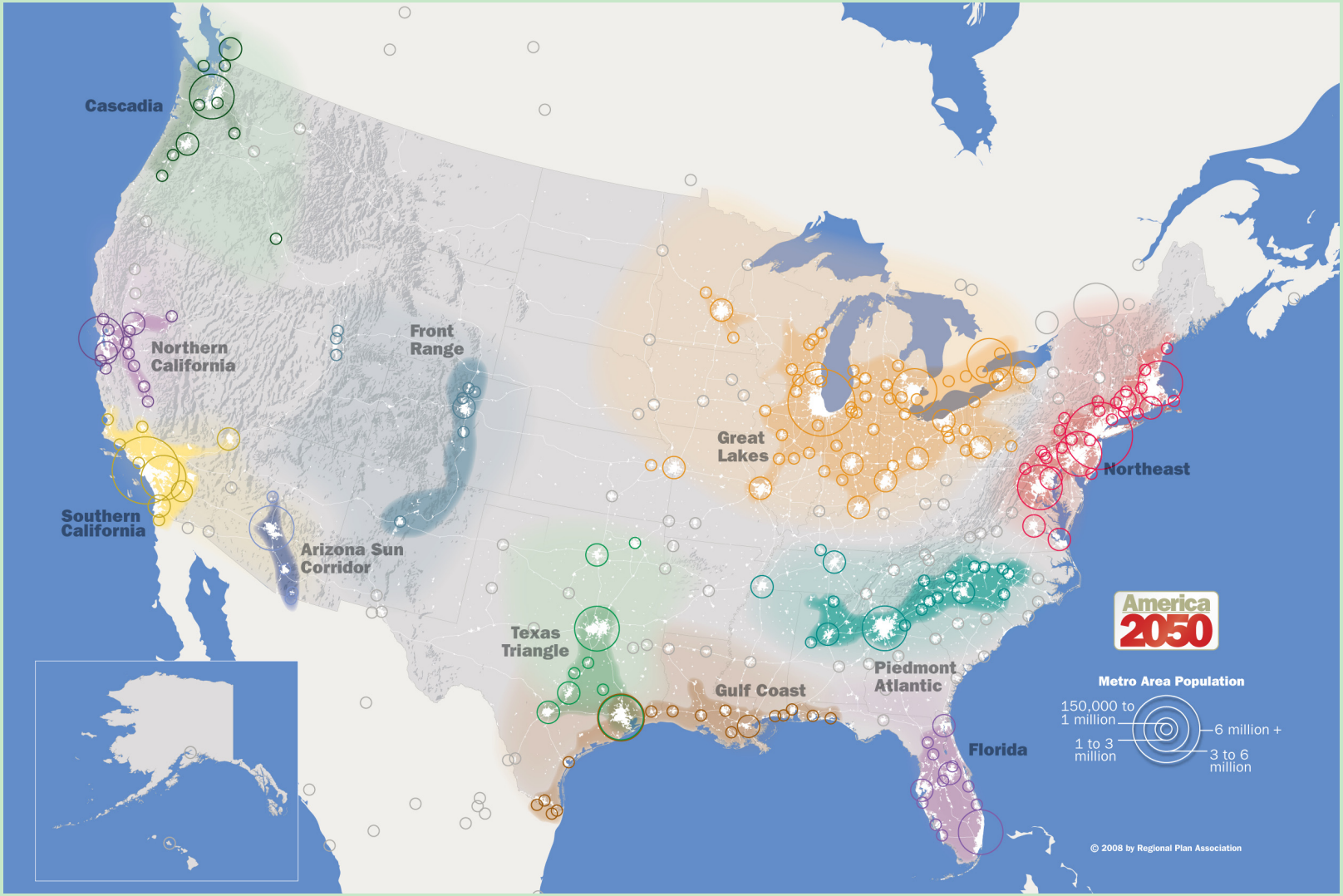
Megaregion

Great Lakes and Manhattan

Manhattan's place in the world of the future will be affected by not only peak oil, but by its relationship to larger continental growth patterns. The America 2050 project has identified 11 megaregions across the United States that focus on economic, population, transportation, and social ties between major metropolitan regions and their surrounding hinterland. Manhattan sits at the very edge of the area of influence of the Great Lakes megaregion. The America 2050 plan lays out the region's assets as twofold: its vast environmental resources, and its strong public universities.[4]

Manhattan takes advantage of both of these aspects of the region. With Kansas State University providing the backbone of the city, and Fort Riley only a few miles away, the governmental "sunk costs" in the infrastructure of the city are quite high. This provides a solid foundation for future growth, and keeps the city on the map as part of the Great Lakes megaregion.

Being under the influence of the Great Lakes megaregion with Chicago as the hub means future intercity transportation links will be predominatly to the east, as will regional economic ties. These are both important factors to consider when planning the future economic growth of the city and what populations and cultures the city might need to accomodate in the future.



Map from America 2050 Project.
http://www.america2050.org/

Great Plains Region

Underperforming Region

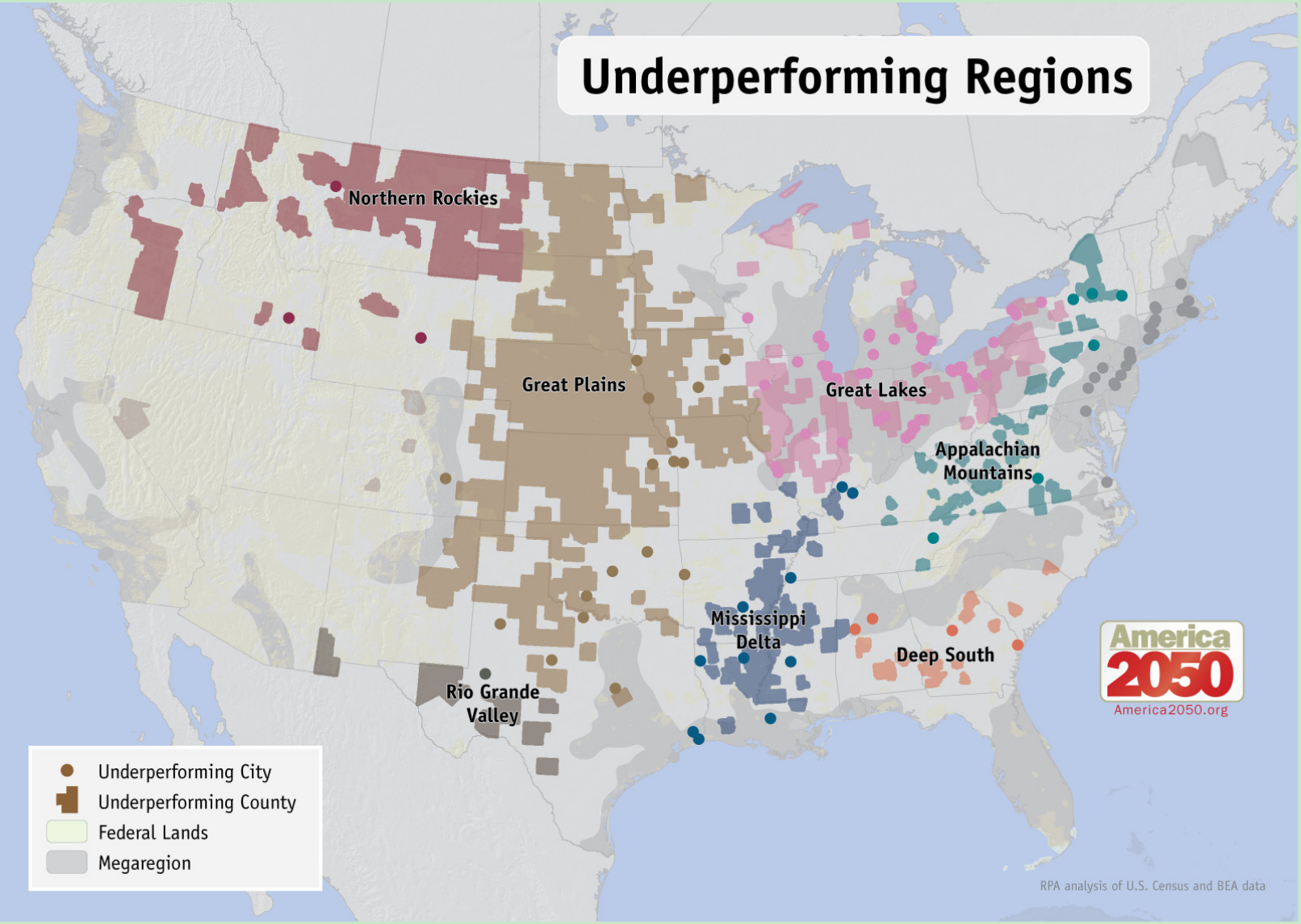
America 2050 also identifies seven underperforming regions, one of which is the vast Great Plains region to the west of Manhattan.

By being on the border of this region, Manhattan serves an important role as an interface between the urban Eastern and rural Western worlds, a role made ever more sure by the presence of Kansas State University in the City, and its focus on agricultural research.

Manhattan's local region is surrounded by small towns and villages that once made up the historic agricultural landscape. Over time, these rural areas have lost population as the country has become predominantly urban. Despite this decline, these towns retain much of the infrastructure of the historic rural fabric, making them a valuable asset to developing a network of localized sustainable agriculture to serve the nutritional needs of the city.

By developing a system of Transit Oriented Agriculture, the city can reverse the decline of the rural areas surrounding it and provide itself with a stable source of food, unaffected by fuel prices. Transit connections provide a quick link to the cultural and educational amenities of the city for those working the sustainable farms.

Pioneering this model of rural resettlement centered around emerging metropolitan areas would enhance the role of the city in providing a bridge between East and West, urban and rural. Kansas State University would be in a prime position to lead the country in sustainable and organic agricultural research, fulfilling its mission to the people as a land grant school.



Map from America 2050 Project.
http://www.america2050.org/

Emerging Challenges

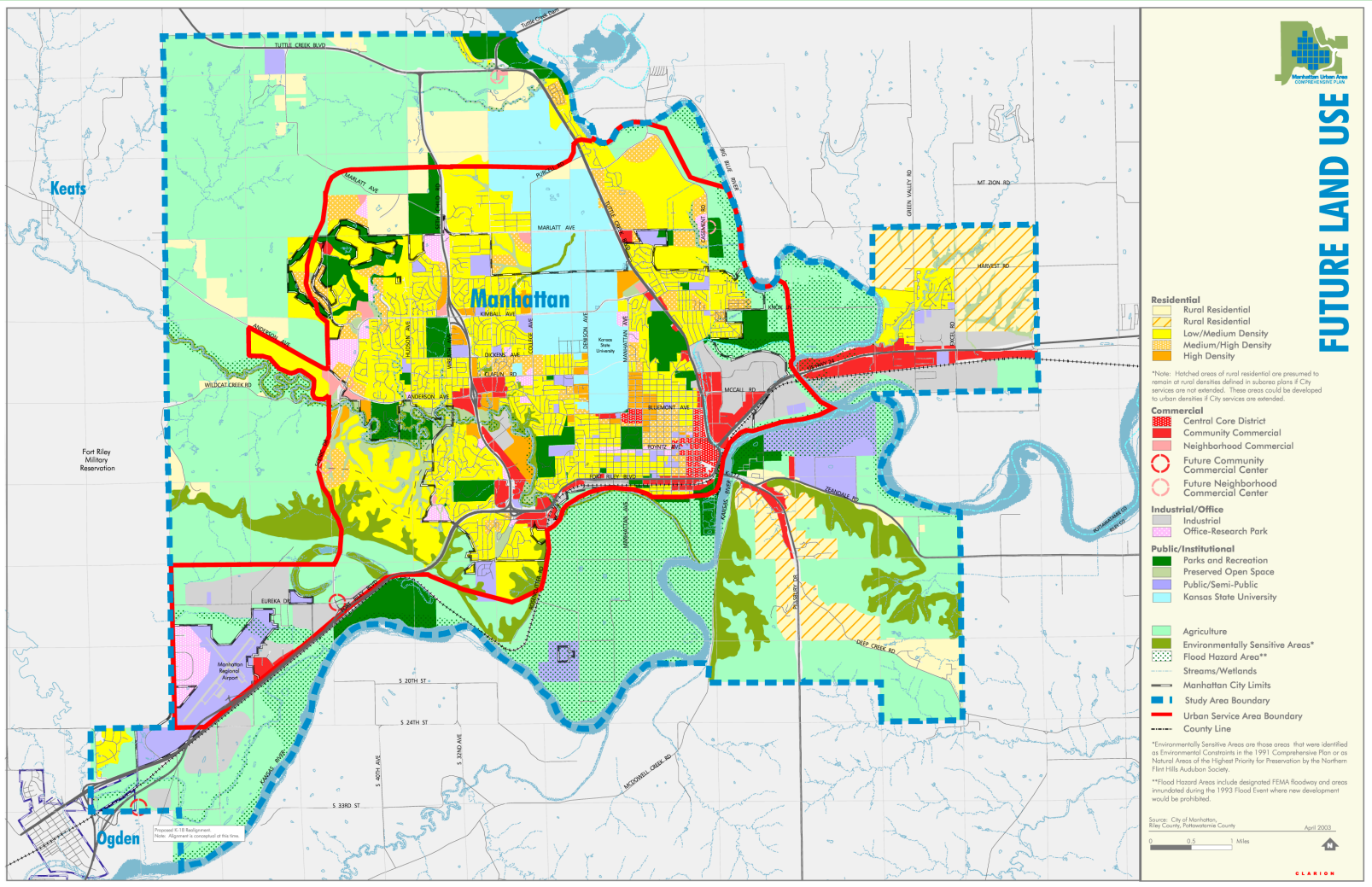
Hemmed In

The city faces physical limits to future growth, in the form of the hills that surround the valley in which it sits, and the river that created the valley. Further expansion into the hills will require major expenditures on infrastructure, leading the city to establish an Urban Service Boundary in its 2003 Comprehensive Plan.[5] The facts of limited room for growth are becoming apparent to citizens, as the Manhattan Urban Area Planning Board recently focused its discussions on uncertainty over where expansion can occur.[6]

If left unaddressed, the problem of where to expand could have disastrous consequences. The city could find itself having to build and maintain at great cost expensive suburban infrastructure, or without sufficient land to build on be passed over by developers. If sprawl becomes the only growth model available, then the rich agrarian and wildnerness lands just outside the city will be lost to other uses important to shaping a resilient city, such as localized sustainable agriculture and wind power electric generation.

Damage to the fragile wild areas surrounding the city would also destroy the very cohesive edge that the landscape has forced the city to maintain. Many residents claim that one of the most imageable aspects of Manhattan is the way it is clearly defined in the landscape, and one of its great assets is the ability to be completely immersed in nature without traveling too far from the city limits.[7]

The solution to the problem of sprawl is to have the Urban Service Boundary transition to an Urban Growth Boundary, forcing an increase in density in the core of the city. Demonstrated successfully in Portland, (need citation) an Urban Growth Boundary would protect the surrounding hinterland by preventing sprawl on a large scale. Increased density in the core would support already planned bus routes, and spur the development of higher-level transit like streetcars, which would in turn spur greater density and mixed use.



Map from Manhattan 2003 Comprehensive Plan.

Empty Tank

The world has currently reached the plateau period of Peak Oil, when rising demand and falling oil discoveries have equalized and oil begins to become a dwindling resource. From now onward, gas prices will begin an unstoppable march upward that will wreck the world of the automobile. After peaking at 82 million barrels per day in the summer of 2006, total world oil production has been in decline.[8] No new major discoveries are coming, and the world's largest oil producers – Russia and the OPEC countries – are beginning to use more of their oil internally as the riches of the oil trade have begun to fuel growth in their economies. This will result, as well-known energy expert Jeff Rubin notes, in one and a half million barrels of oil per day being taken off the market by 2012 or sooner. The United States' chief source of oil, Mexico, will quickly shrink to half its output as its deepwater oil fields rapidly decline.[9] This spells doom for the American automobile, which was already driven 100 billion fewer miles during 2008 when gas prices touched $4 per gallon.[10] Without efficient public transit, many people will become trapped in their homes as gas prices skyrocket past $10 per gallon. The mobility of small cities and towns, like Manhattan, that currently depend on the car, will be greatly diminished.

The consequences of higher energy prices are as profound as they are broad, affecting agriculture, manufacturing, and retail; everything from food prices to the ability to buy a pair of shoes made in China. The price of oil will be the one number that shapes the century, leading to changes in everyday life of a fundamental kind.

At the local level, public transit is the solution to curbing energy usage while keeping the economy flowing. The city that generates the least greenhouse gases per capita of any American city is New York, at 7.1 metric tons per year. The national average is 24.5 tons per person. People who live on the island of Manhattan generate even less.[11] The key is high density and easy access to public transportation.

A new oil well in Indiana.
http://www.myklgr.com/Significant-Oil-Well-Producing-in-Indiana/9296684

Hotter and Wetter

The Great Plains region has always been home to climate extremes, but over the course of the century these will continually become more severe. Average temperatures have already increased in the region, with the most noticeable changes occurring during the winter months in the north.[12] While rising temperatures means the western plains will suffer from decreased precipitation and increased drought frequency, the northern and eastern portions, including Manhattan, will experience increased rainfall.[13] A wetter climate overall, combined with more frequent extreme weather events like heavy downpours, will affect not only agriculture but towns like Manhattan along major rivers.

While the continued migration of people throughout the country from rural areas to more urban ones will ensure Manhattan's growth, the rural towns around Manhattan will become more vulnerable to climate changes as they are left with populations of the very old and very young.[14] Manhattan will become an even more important regional provider of emergency services and healthcare.

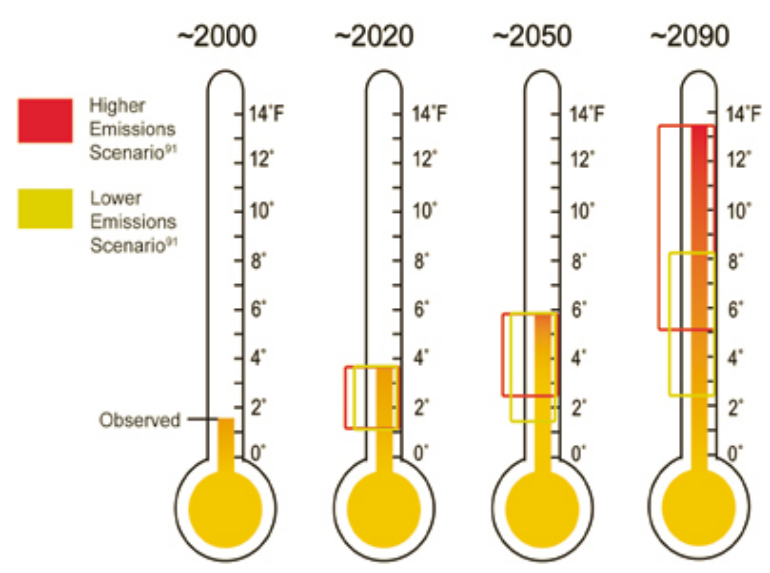
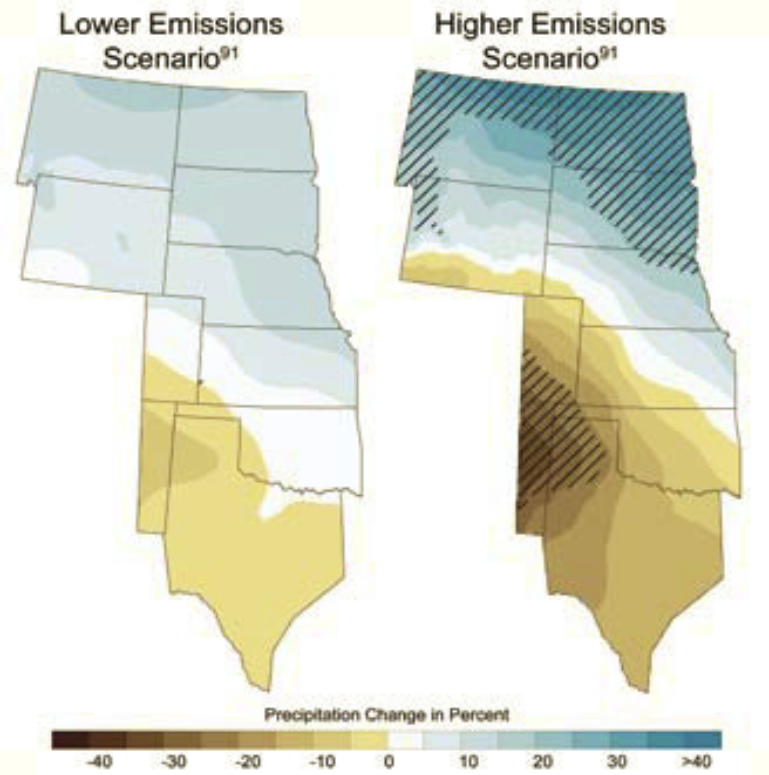
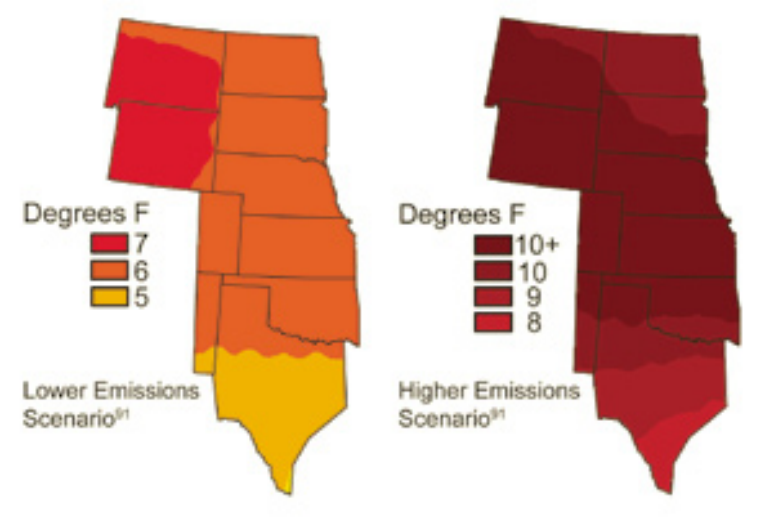


Chart from U.S. Global Change Research Program.

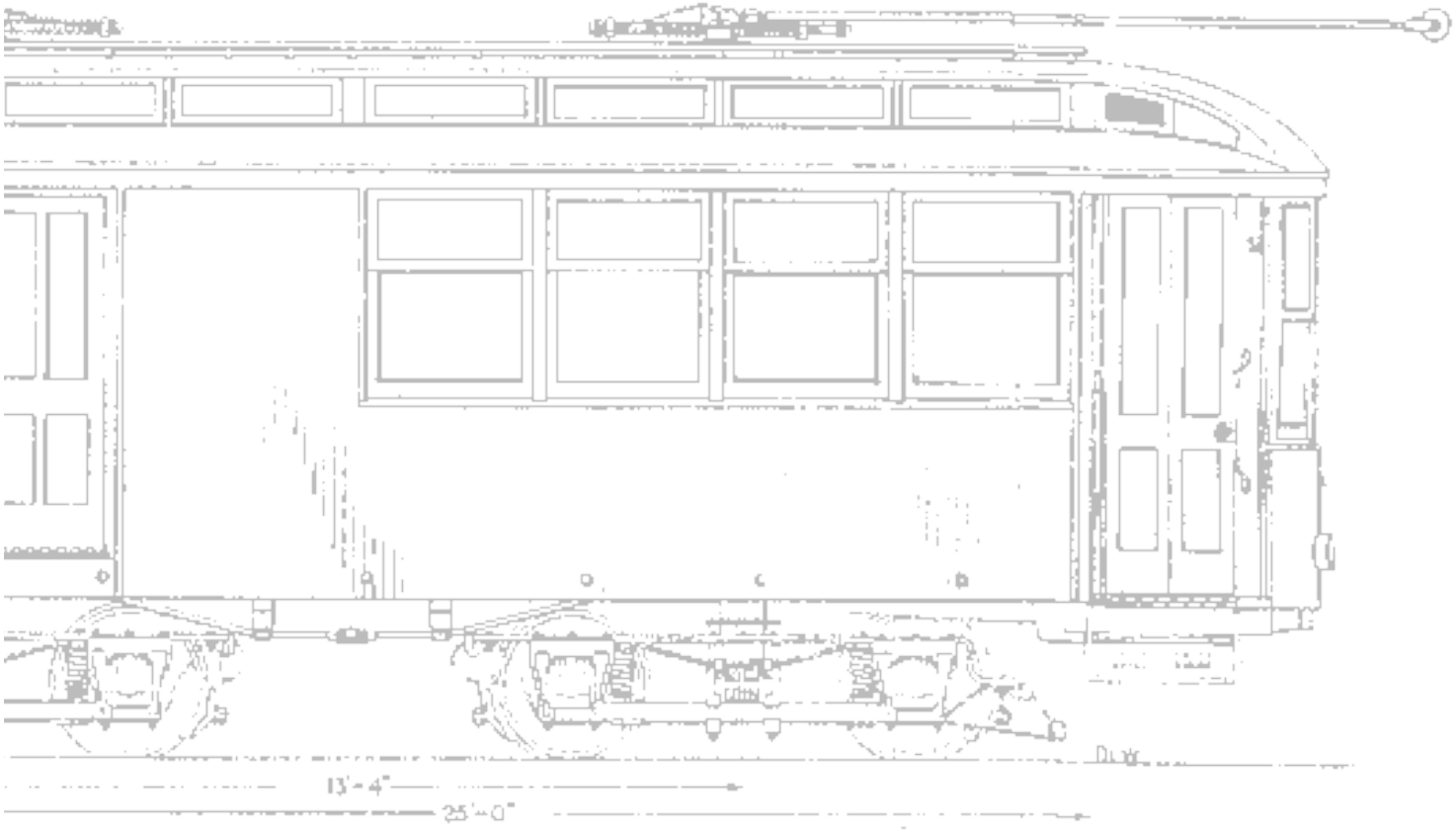


Map from U.S. Global Change Research Program.



Map from U.S. Global Change Research Program.

The Future of The Past



What Once Was

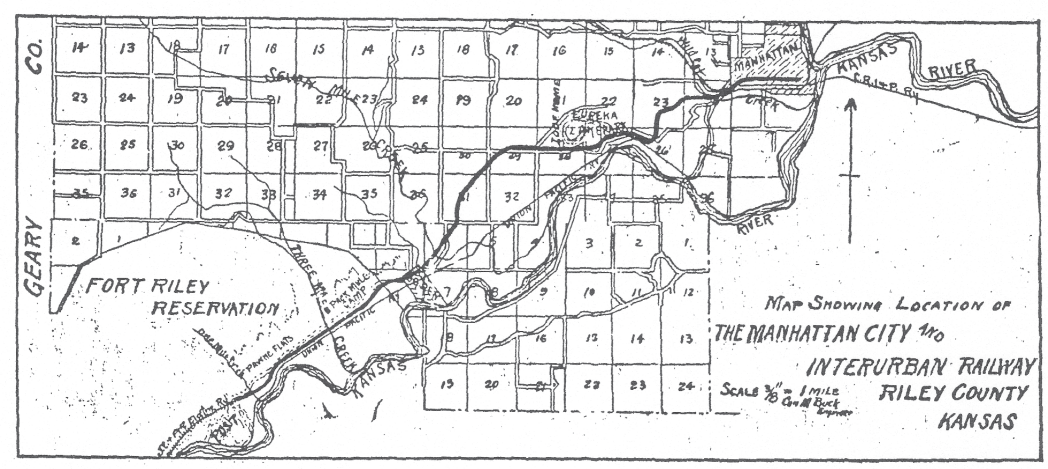
The Manhattan City and Interurban Railway

Manhattan, despite its current appearances, once possessed a streetcar system similar to any that once operated all over the Midwest. Begun in 1909, the Manhattan City and Interurban Railway built its first line from the Union Pacific Depot up Second Street, turned west on Poyntz to Ninth Street, where it turned north again, turned west on Fremont to Eleventh Street, north to Moro, and then west to Anderson Avenue and the terminus at Denison Avenue, serving traffic between the train station, the business district of downtown Poyntz, and what was at the time the Kansas State Agricultural College. This simple line, known as the "Avenue Line" was operated using four cars on twenty-minute schedules, which passed on a siding in the 800 block of Poyntz. Service officially started on June 10, 1909, to great fanfare and crowds of townsfolk eager for a ride on the new system, for five cents.[15]

The original line was soon supplemented with a line that ran north from the Rock Island depot on Fourth Street, crossed Poyntz, turned west on Fremont to Sixth Street, north to Vattier Street, and then west to North Manhattan Avenue, where it turned south to join the Avenue Line. The "Fourth Street Line," as it was called, did not last past 1911 when the College athletic park it served was relocated to build the Bluemont School.[16]

In the meantime, the Union Power and Light Company in Junction City had extended their small streetcar line the short distance to Fort Riley, resulting in increased business for merchants in that city. Not wanting to be left out, the Manhattan City and Interurban Railway man-

Streetcar on Vattier Street.
Colorization of photo from Riley County Historical Society.



Map of original interurban route between Manhattan and Junction City.
From Riley County Historical Society.

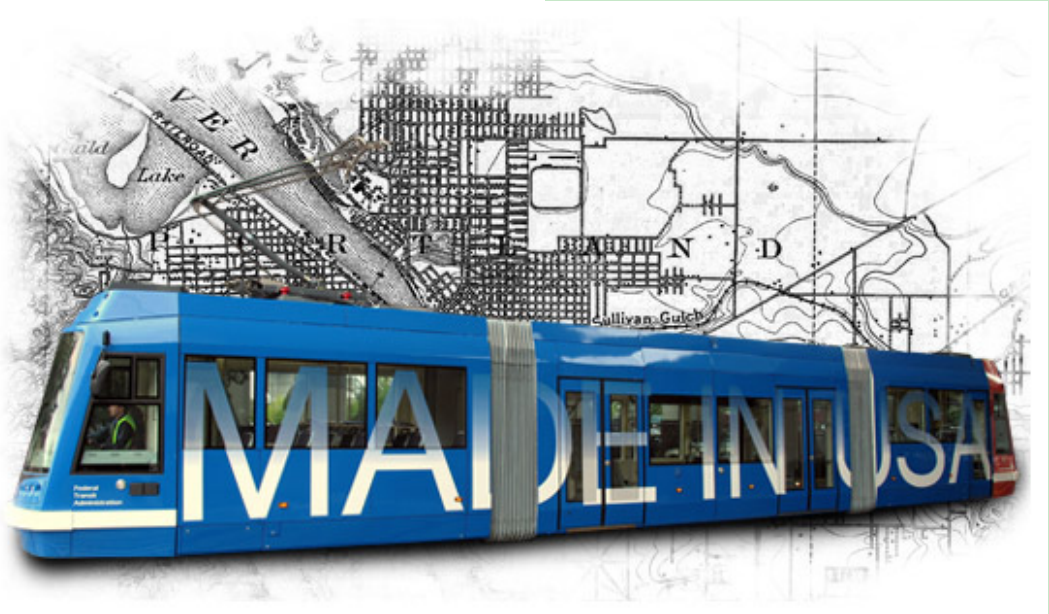
aged to get $20,000 from the city of Manhattan and $10,000 from Ogden for the construction of a line to connect with the one from Junction City in Fort Riley. By 1912, the track was extended to Eureka Lake Amusement Park, which was an electric park run on spare electricity from the streetcar power plant, as was common practice for streetcar companies of the era. The amusement park at the end of the line generated additional traffic for the streetcar system that did not exist previously. By 1914, the track was connected with that of the Union Power Company, and soon cars were running on an hourly schedule between Manhattan, Ogden, Fort Riley, and Junction City.[17]

The rise of the automobile during the 1920s soon had the same effect on Manhattan's system as was felt across the Midwest. Increased automobile ownership and improved roads led to the destruction of the vast interurban rail network that linked small midwestern towns and provided transportation to agrarian areas. In Manhattan, the combination of automobiles and a decrease in fort population after World War I led to the system's demise in 1927. The Union Power Company's line between Junction City and Fort Riley limped along until giving up in 1934.[18]

Despite this short history, Manhattan could once again have a streetcar system connecting the entire region. Given the alternatives in the face of peak oil, rail-based transportation is the most intelligent choice, remaining resilient and providing incentive for structural changes to the urban fabric.

Streetcar Economics

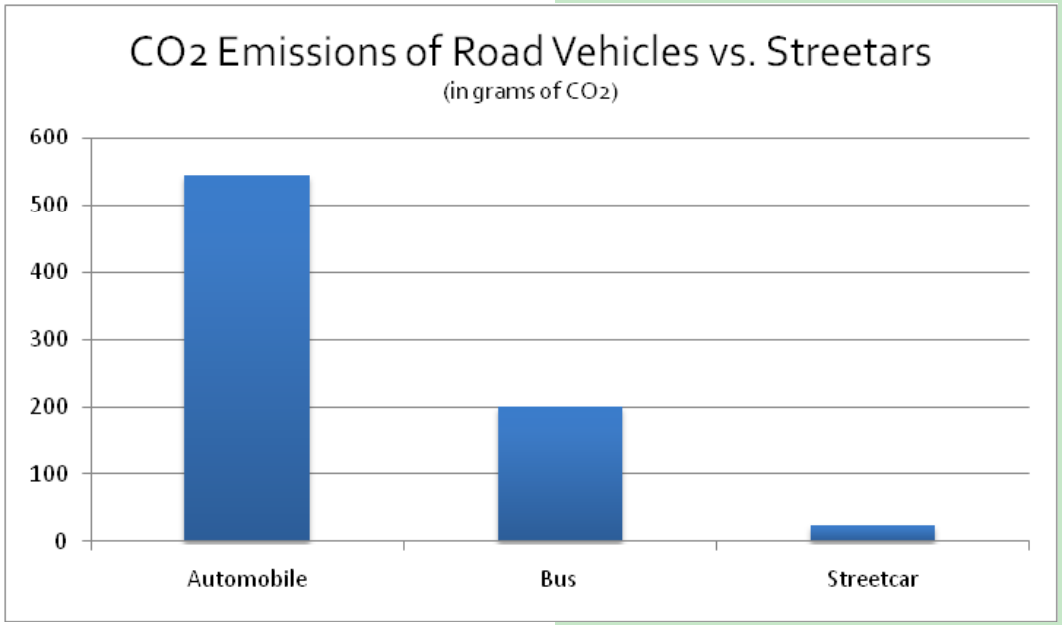
In recent years, rail transport has been picked up once again as a desirable transportation choice by a country fed up with high gas prices and spending most of their lives commuting across the suburban wasteland. Mass transit saw astounding ridership numbers during pre-recession $4 per gallon gasoline prices, and during the tough economic times to follow those numbers have remained steady as commuters look to trim their household transportation budgets, even with gas dipping back below $3. The need for streetcars in many cities has emerged as a way to promote economic growth and downtown revitalization while providing more transit options. Even some conservative editorialists, usually against public transit expenditures, are expounding on the need for streetcars to return life and vitality to city streets.[19]

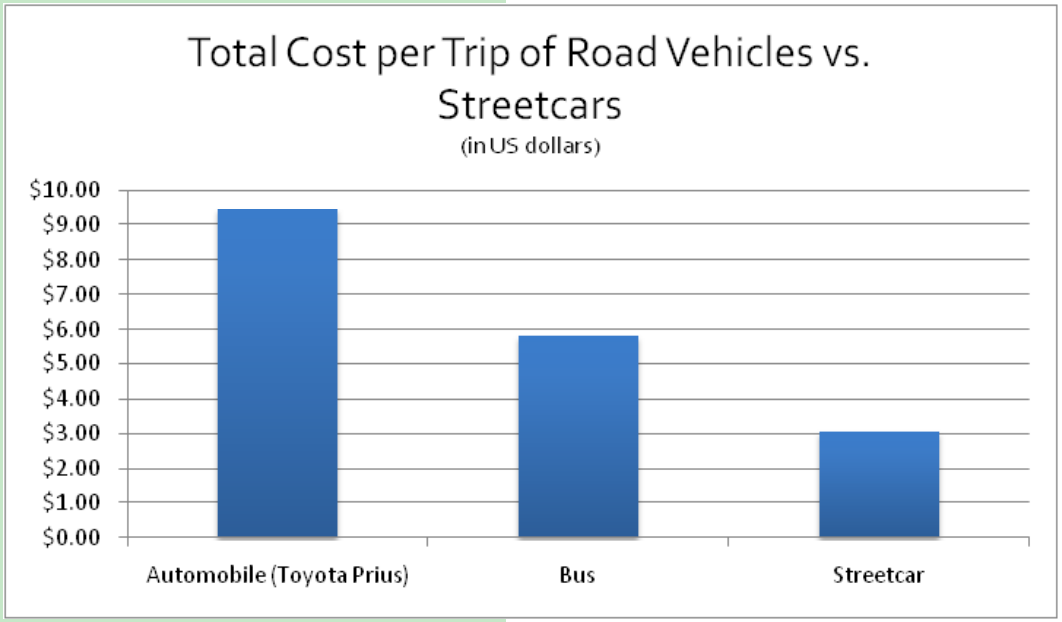


Promotional image from United Streetcar.
http://unitedstreetcar.com/projects/portland-prototype

Lower CO_2 Emissions

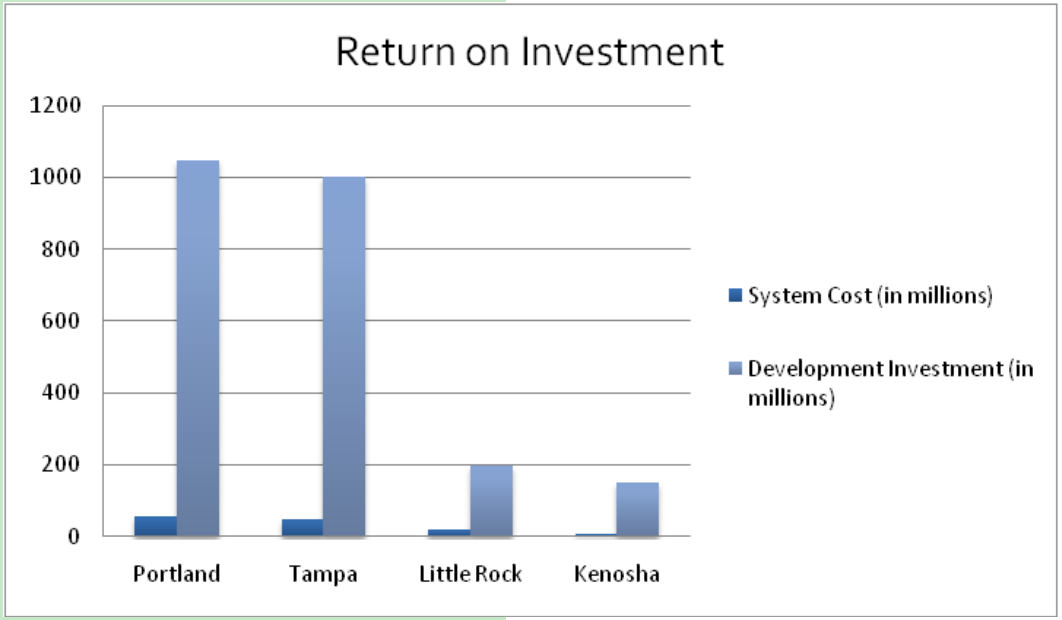
The most obvious benefit of streetcars over automobiles and buses is that they run on electricity, which can be generated from clean, renewable sources. Even streetcars that run on electricity generated by coal burning power plants use that energy more efficiently than cars or buses utilize the energy stored in gasoline.[20] In the world of ever decreasing oil supplies, this makes streetcars a more resilient transportation system that can operate on any energy source, transmitted through the medium of electric power.





Lower Cost Per Trip

Maintaining a family "fleet" of vehicles is not cost effective, especially in the present reality of ever-increasing gas prices and ever-scarcer oil. Travel by diesel bus is even cheaper than a hybrid automobile, and streetcars reduce that cost further. Streetcars are based on the simple technology of electric traction, and are built with parts that can last decades and require little maintenance. Streetcars have a cheaper lifetime cost because they lack tires, oils, fluids, and fragile parts that need constant replacement.[21]



Streetcars as Urban Investment

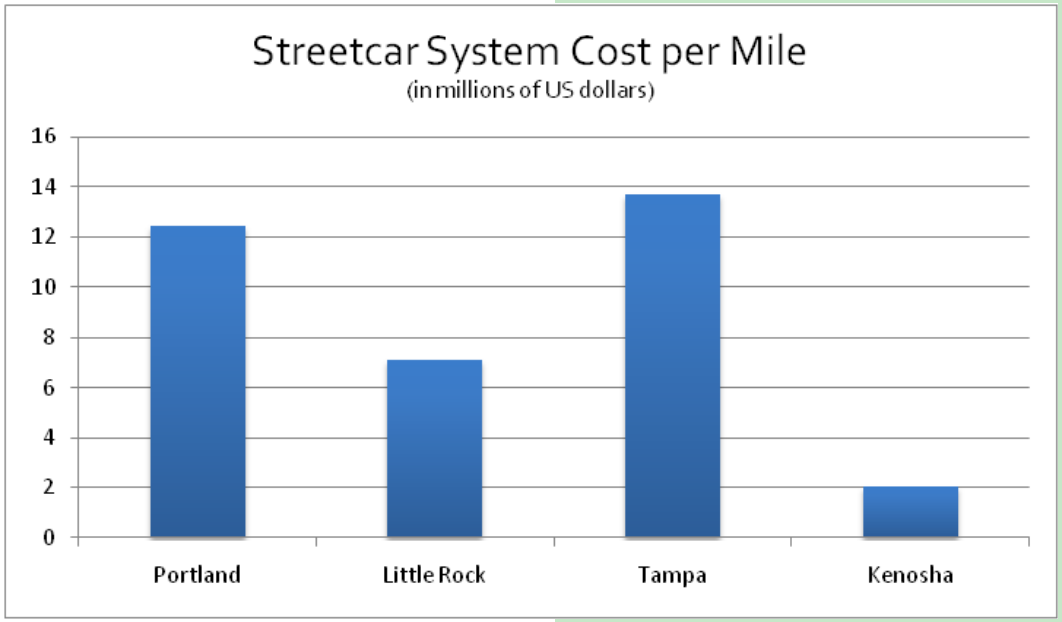
By far the most important reason cities around the United States are looking at implementing streetcar systems is their ability to spur development and densification. Portland, Oregon was the first system built in recent years that has produced major real estate investment in the areas it serves, and it is the model upon which systems in Tampa and Little Rock were based.[22] The most astounding example is Kenosha, Wisconsin. Due to its very low construction cost of $4 million, the $150 million in lakefront development the line created was the largest percentage of return on investment seen in any streetcar system constrution to date.[23]

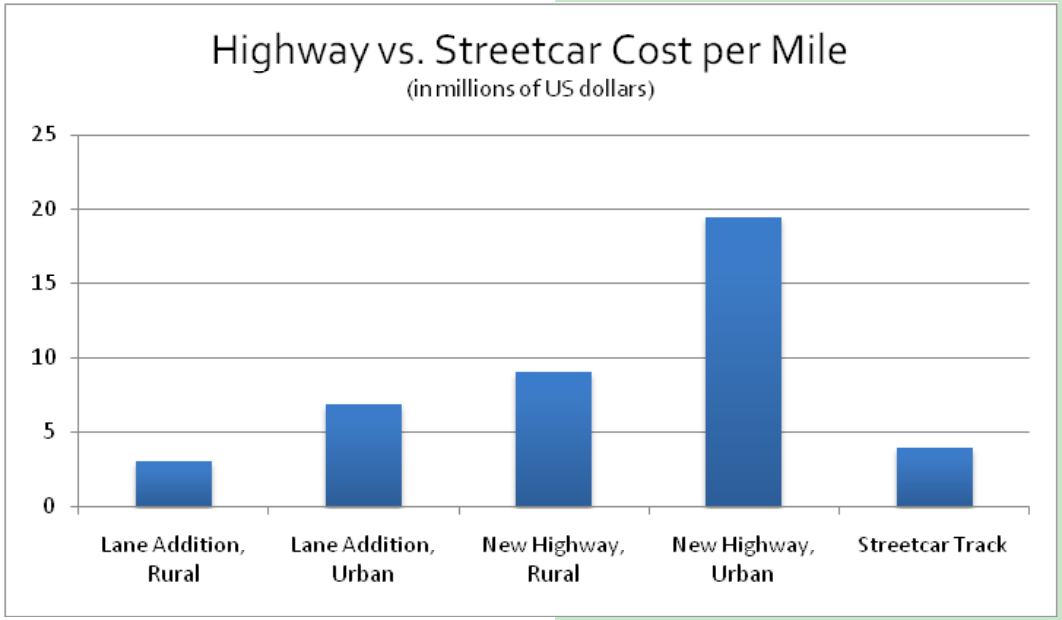
Track Cost per Mile

The cost of building streetcar systems has varied widely from city to city, and is affected by several factors, including land values, style of infrastructure used (light rail or true streetcar) and the extent of additional street improvements that get folded into streetcar proposals.

Currently, Kenosha has the distinction of being the cheapest system constructed to date, providing an example of what is possible for a small city of 90,000 to accomplish with rail transit solutions.[24] Kenosha managed to keep costs down by using restored secondhand vintage cars, doing a minimal amount of modifications to the streetscape, and using true light-duty streetcar infrastructure.

$4 million per mile may still seem too expensive for a city the size of Manhattan, but when compared with the cost per mile of lane additions and new highways to meet growing traffic, streetcars begin to emerge as a very sensible option.





Case Studies

Kenosha

The smallest city in the United States to currently have an operational streetcar system is Kenosha, Wisconsin, with a population of only 97,000. By comparison, Topeka, Kansas has over 20,000 more inhabitants. Kenosha is very small, as American cities go. Sitting on the shore of Lake Michigan, the city has an extensive waterfront that they have been in the process of developing. The city's downtown is also situated on one of the Metra commuter rail lines running north from Chicago. In order to cement the city's investment in the waterfront development, it was decided that a heritage streetcar line would be built to connect the Metra station with the waterfront. The 2 mile loop line, built for a little under $2 million, was completed in April 2000. Since then, the city has seen a 2000% return on the investment in the system. The line travels in one direction from the Metra station to the waterfront and back, with each side of the loop separated by only one block, creating in effect a two-way double-track system. The five art-deco-era PCC cars are former Toronto streetcars that were completely restored and painted in historic paint schemes of major transit systems around North America.[25]

Systems in small cities like Kenosha, with low start-up costs, are the kind of projects that prove a city like Manhattan could easily build a streetcar system in the near future. People in small cities may scoff at the idea of being able to afford a streetcar system based on the exorbitant costs per mile of Light Rail Transit or even the Portland streetcar's costs per mile. However, simple systems like Kenosha prove that streetcars are easily within reach.

Kenosha streetcar on the waterfront.
http://en.wikipedia.org/wiki/File:Kenosha_Streetcar.jpg

Tampa

Tampa's system was created to link the city's new tourist venues, which although being concentrated in a small area were not seen as a single place. The streetcar was chosen as the tool to make the separate downtown areas into a single place. The system has one of the most diverse funding schemes of any in the country, with no taxpayer subsidy supporting its operations. Funds come from a tax-assessment district in the area served by the streetcar, an endowment fund created by selling the naming rights to the system to the electric company, advertising, and fares. The system, even though targeted at tourists, has generated $1 billion worth of development investments in the area it serves. Car traffic in the area has also been greatly reduced, creating a pedestrian friendly environment that has been good for businesses. Perhaps most importantly, the streetcar has become an advantage for the convention center in luring major conventions. The streetcar "gives convention organizers a reason to choose Tampa," according to Tom Keating, president of the local chamber of commerce.[26]

The lesson of placemaking and linking from Tampa's system is of note for Manhattan, as it begins the task of bringing two areas of redevelopment into the existing fabric of the city in a way that creates a cohesive whole. When Manhattan's conference center opens in 2012, having a streetcar link to the rest of the city and KSU would make it the premier conference center in Kansas and the region.

Tampa streetcars pass each other on a loop track.
http://world.nycsubway.org/us/tampa/teco.html

Little Rock

Little Rock's River Rail streetcar connects the major tourist attractions of downtown with the parks and historic neighborhoods of North Little Rock, across the Arkansas River. The streetcar was an addition to the plan to revitalize the downtown areas of both cities by building a new arena, upgrading the convention center, and creating the River Market District of historic shops, restaurants, and entertainment. The route of the streetcar was selected to link every major destination in the two downtown areas on both sides of the river, including a later extension to the Clinton Library. The effects have been profound, with $200 million in development, 3,000 riders a day, monthly ridership of 15,000, and many more people on the streets. Keith Jones, the director of the Central Arkansas Transportation Authority and originally skeptical about streetcars, notes that one of the most meaningful niche markets the streetcar serves is grandparents who take their grandchildren for rides once a week, telling them stories from their own childhoods when the city's original streetcars still ran.[27]

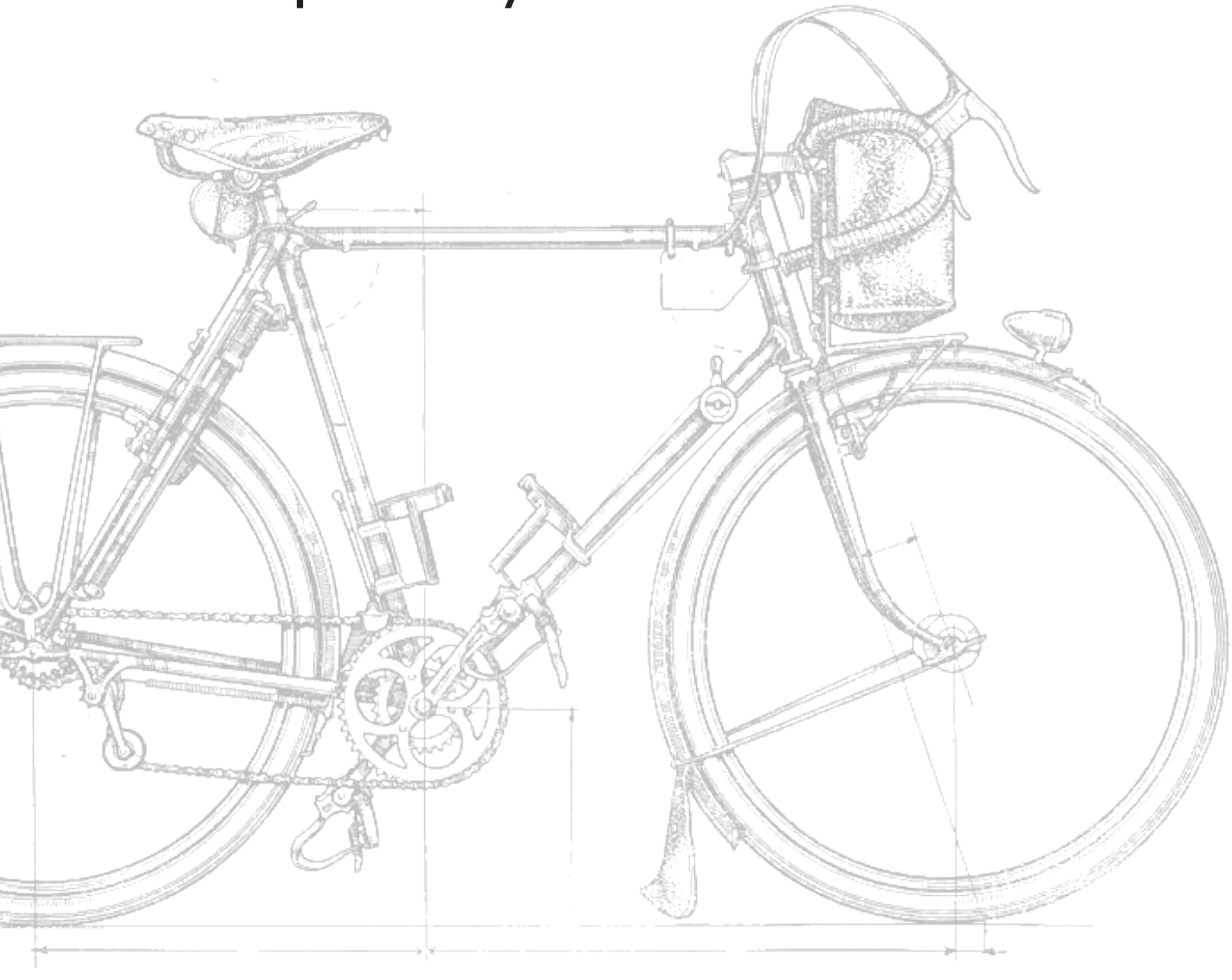
By linking every major node of two cities, the River Rail Streetcar serves an one of the best examples of alignment planning, creating a system that serves both tourists and the local population effectively and efficiently.

Little Rock streetcar in the snow.
http://www.arktimes.com/images/blogimages/2011/01/11/1294767611-streetcar2.jpg

Comparison Chart

City	Date	System Style	Cost per Mile	Length	Total Cost	Number of Cars	Stops	Headways	Fare	Operator
Dallas	1989	Vintage		5 miles		4	12	5 min	Free	Nonprofit
San Francisco	1995	Vintage	$13 million	11.6 miles	$150 million	45	33	6 min	$2.00	Transit
Kenosha	2000	Vintage	$2 million	2 miles	$6.2 million	5	17	15 min	$0.50	Transit
Portland	2001	Modern	$16 million	8 miles	$128 million	10	46	13 min	$2.05	Nonprofit
Tampa	2002	Replica	$20 million	2.4 miles	$48.3 million	8	12	15 min	$2.50	Transit
Little Rock	2004	Replica	$7.8 million	2.5 miles	$19.6 million	3	11	15 min	$1.00	Transit

Multimodal Transport System



Phased System

The complete system as it would exist in 2050 has been designed to link each project of the Sustainable Manhattan 2050 studio, the locations of which appear in orange on the map to the right. The construction of the multi-million dollar system has been broken down into phases to make it more manageable to build over time. The six phases of the system correlate to the timelines of the projects it links, providing them with service as an incentive for construction, or simply providing an area with the possibility of higher density.

FLINT HILLS TRANSIT

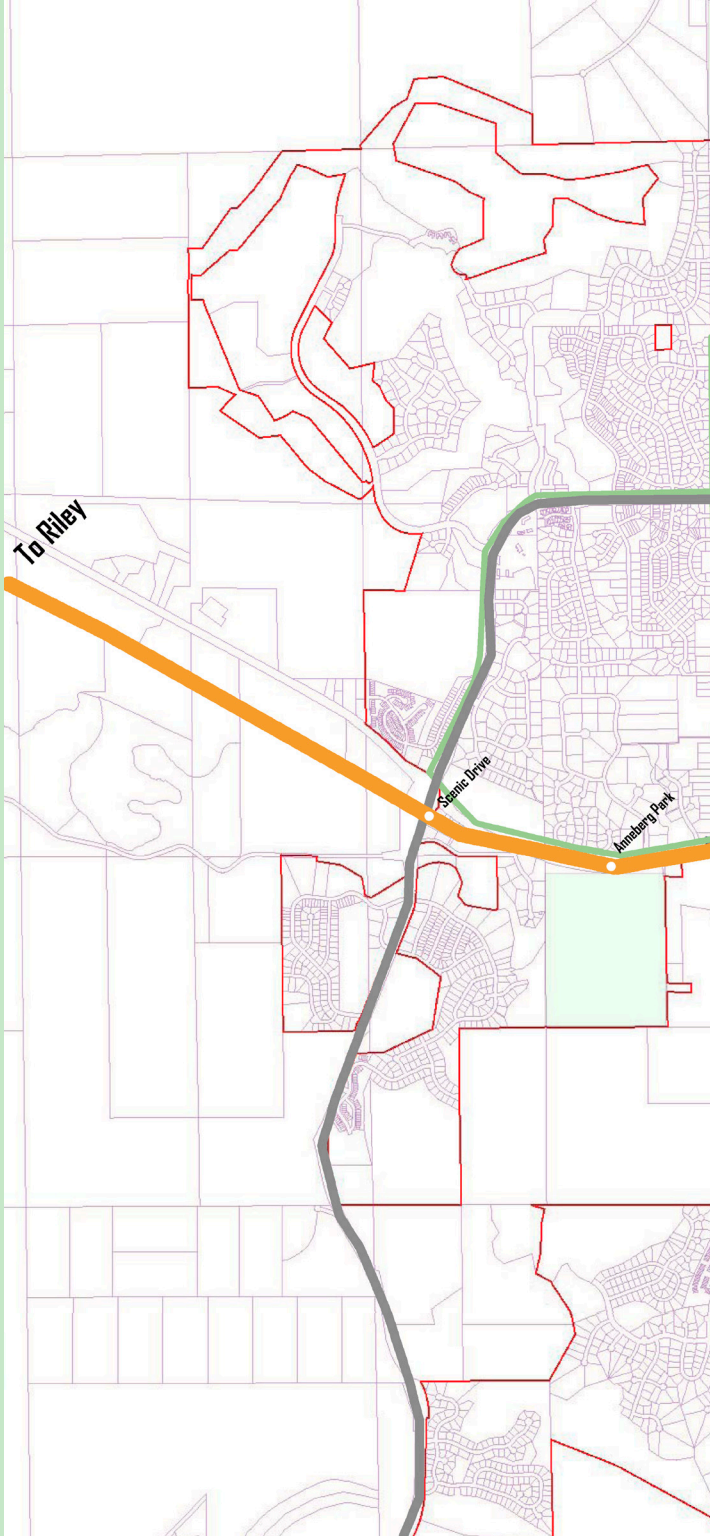
Map Legend

Streetcar System

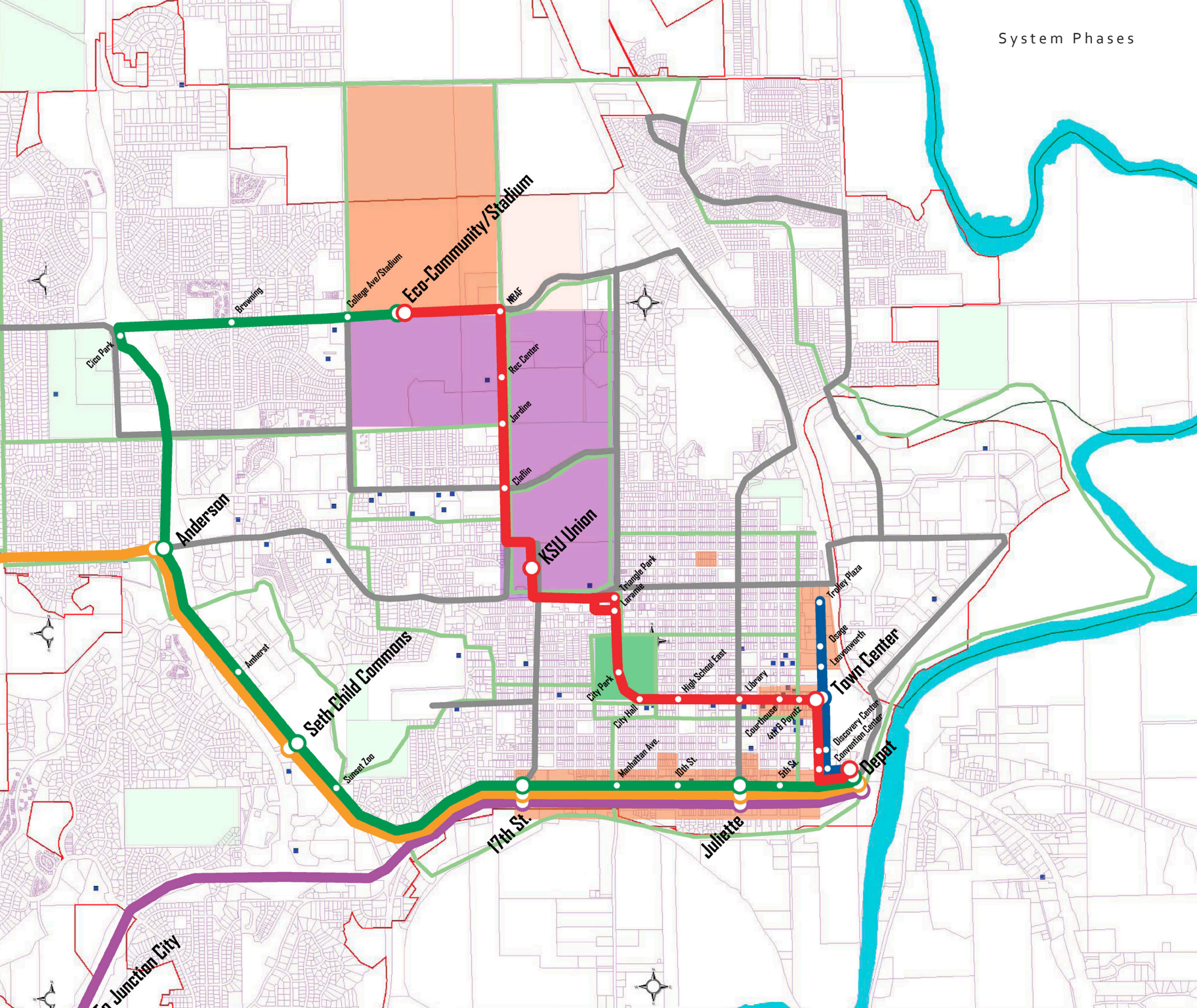
- Avenue Line
- Westside Loop
- Crosstown Link
- Wildcat Valley Line
- Junction City Line
- Sunset Zoo — Regular Stop
- Depot — Transfer Stop

Buses and Bikes

- Bus Route
- Bike Route



System Phases



Phase 1

In 2020, oil prices are well over $150 per barrel, and gas prices are beyond $4 per gallon. With students and young professionals craving ever denser urban living, added transit service beyond the bus system is necessary. Streetcars are chosen to provide relief for the city from the expense of buying diesel fuel for additional buses. The first phase "starter" system connects the major points of the core of the city, and provides a major link between the visitor and tourism functions in the Convention Center/ Discovery Center district in the southeast and the additional convention function of the KSU campus in the center of the city.

The use of historic cars and the link between a new railroad museum at the Depot, the activities at the Discovery Center, and the sights at the KSU campus bring an added tourist bonus to the line. The route proves popular with locals, by linking the shopping at the mall and along Poyntz with recreation at City Park and the entertainment and dining of Aggieville. Having a "Trolley Saturday" becomes a favorite summertime activity for young and old.

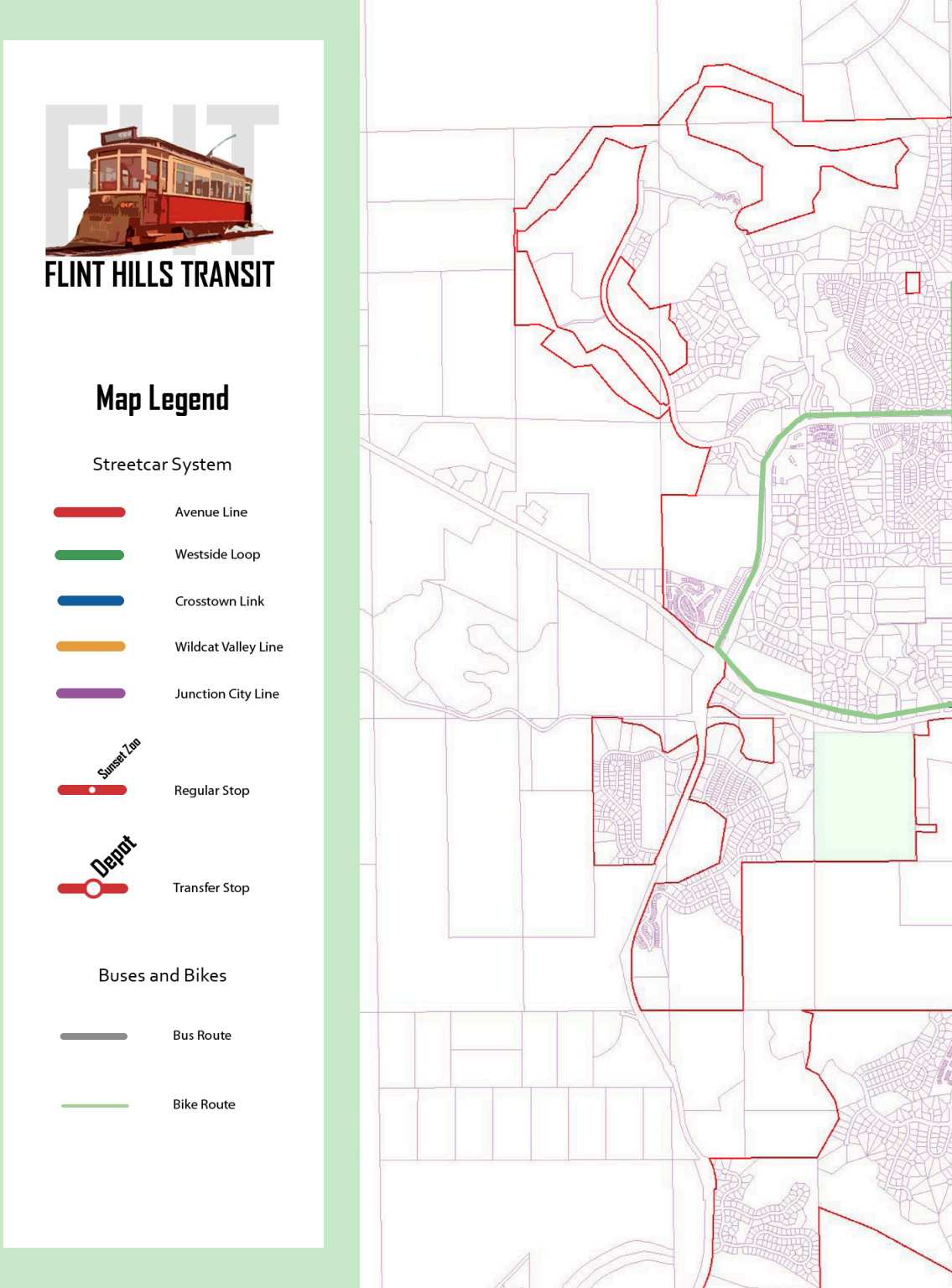
Track Miles: 2.2

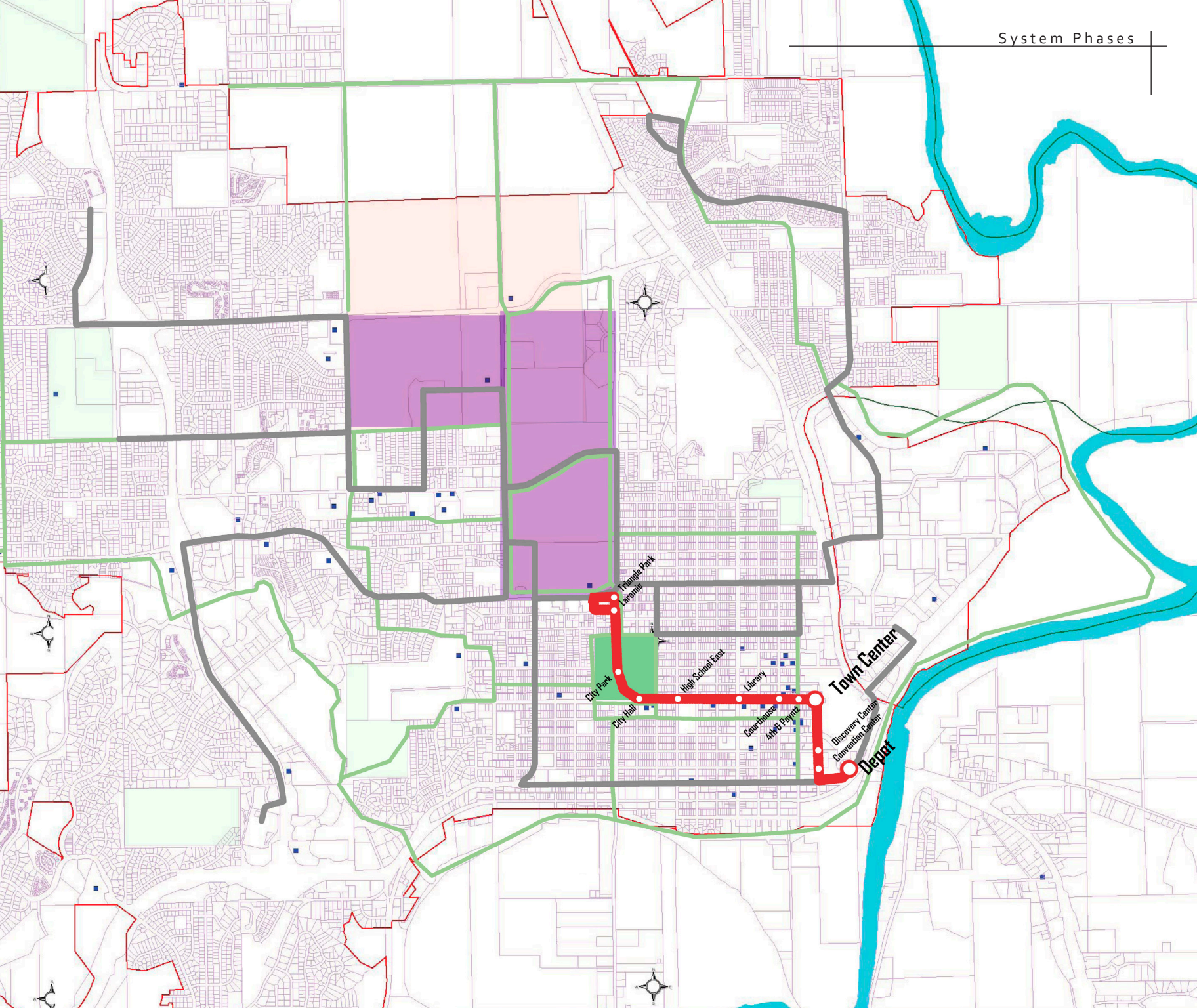
Streetcars: 3 Vintage PCC cars

Structures: Stop shelters and car barn

Cost: $8 million

Headways: 15 minutes




Triangle Park
Laramie
City Park
City Hall
High School East
Library
Courthouse
4th & Pontiac
Discovery Center
Convention Center
Town Center
Deppt

Phase 2

With the streetcar generating added business for the commercial areas it serves, the "big box" retailers in the North Redevelopment District have begun clamoring for an extension of the line into their empty parking lots to bring back their lost customers. The city sees the opportunity to generate the mixed-use density originally intended in the north end development, and goes ahead with an extension of the system in 2025, only five years after the first section entered service.

The entire length of 3rd Street now has streetcar track, and the streetcars run back and forth between the Depot and the North End's Trolley Plaza on 5 minute headways during festivals, with the street closed to car traffic.

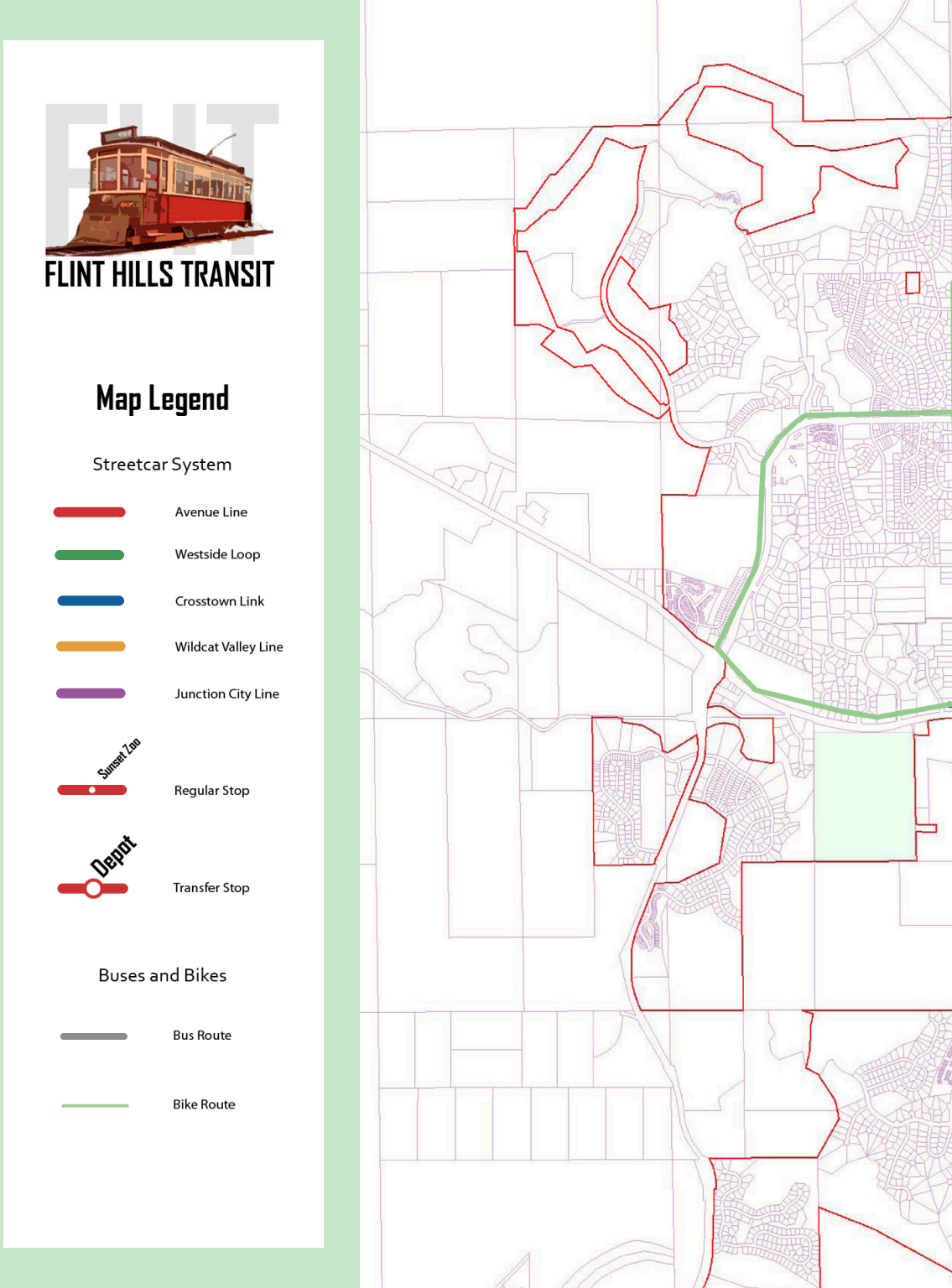
Track Miles: 0.6

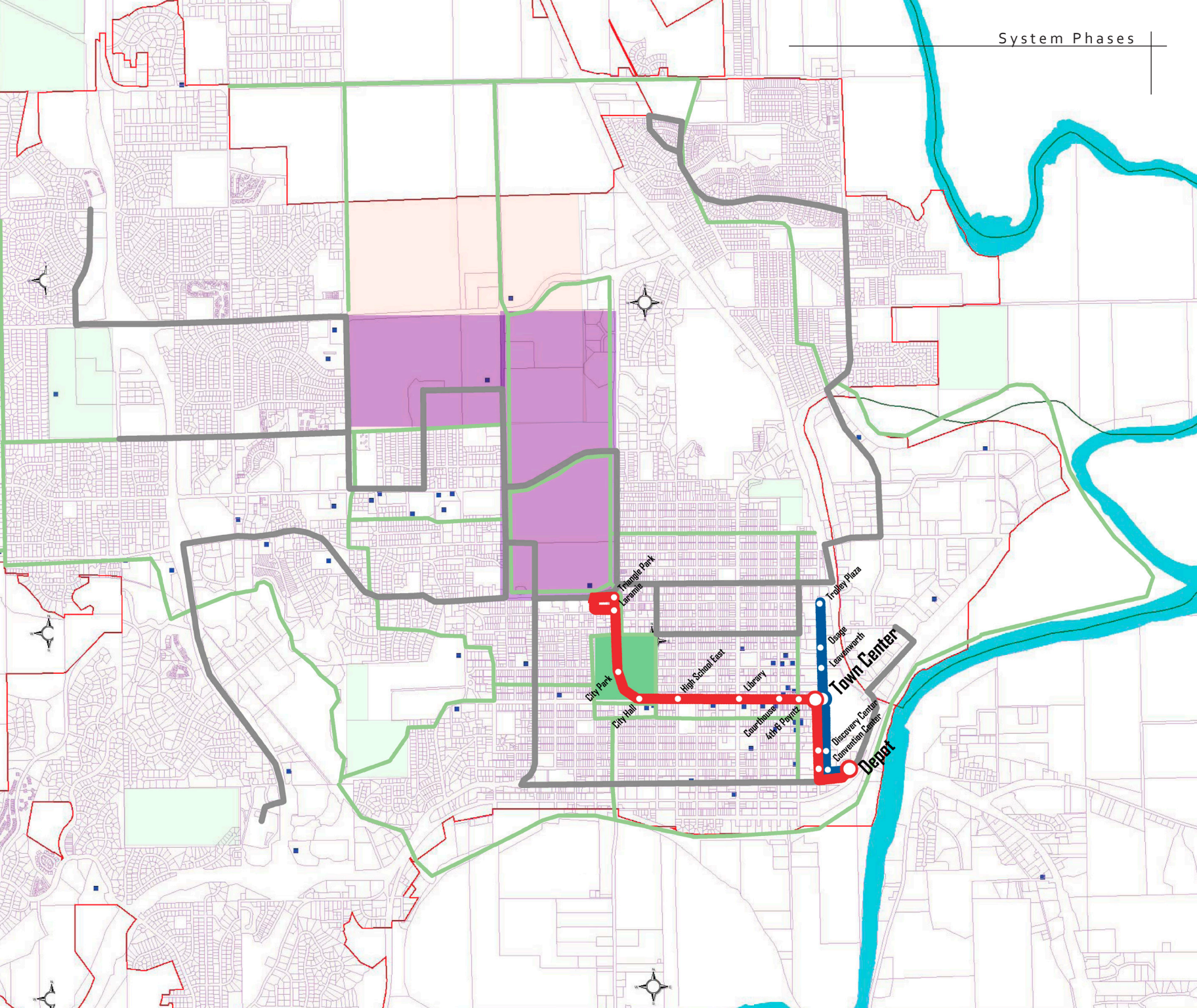
Streetcars: 2 Replica Birney cars

Structures: Stop shelters and North End Trolley Plaza

Cost: $6 million

Headways: 15 minutes




System Phases
Triangle Park
Laramie
Trolley Plaza
Osage
Leavenworth
Town Center
High School East
Library
City Park
City Hall
Courthouse
4th & Pontiac
Discovery Center
Convention Center
Deppt

Phase 3

With denser development in the North End and in the neighborhoods along Poyntz bringing in additional tax revenue, the city has looked kindly upon its investment. In 2030, the university has unveiled a plan to develop the farmlands north of the football stadium as an urban agriculture demonstration community. The community is intended to absorb some of the housing needs of the NBAF facility and its associated industries, while also providing additional student housing near the new agricultural campus. The university and the city jointly fund a doubling of the length of the streetcar system, bringing this new infill development into the city's public transport network.

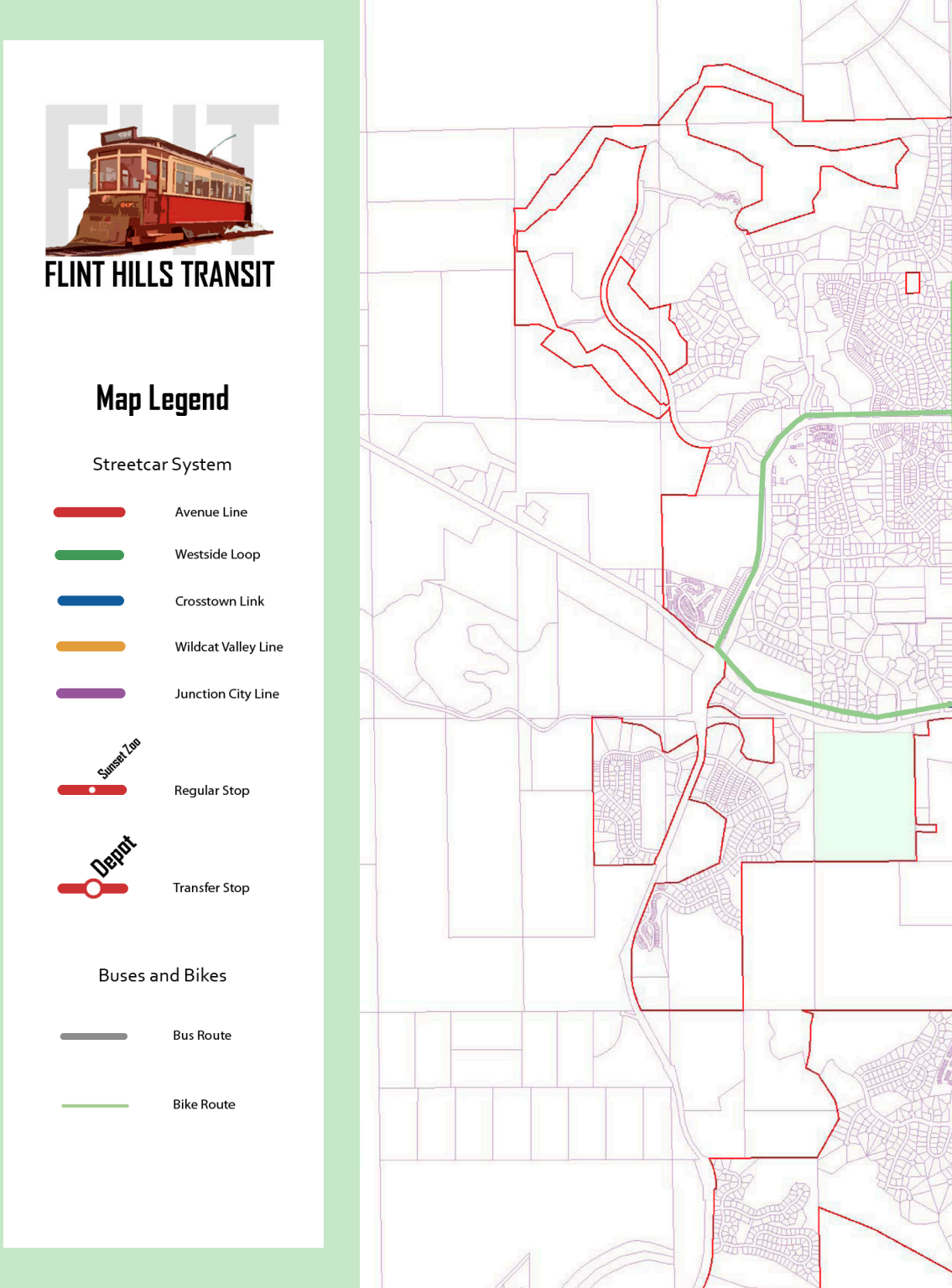
Track Miles: 2.2

Streetcars: 3 Replica Birney cars

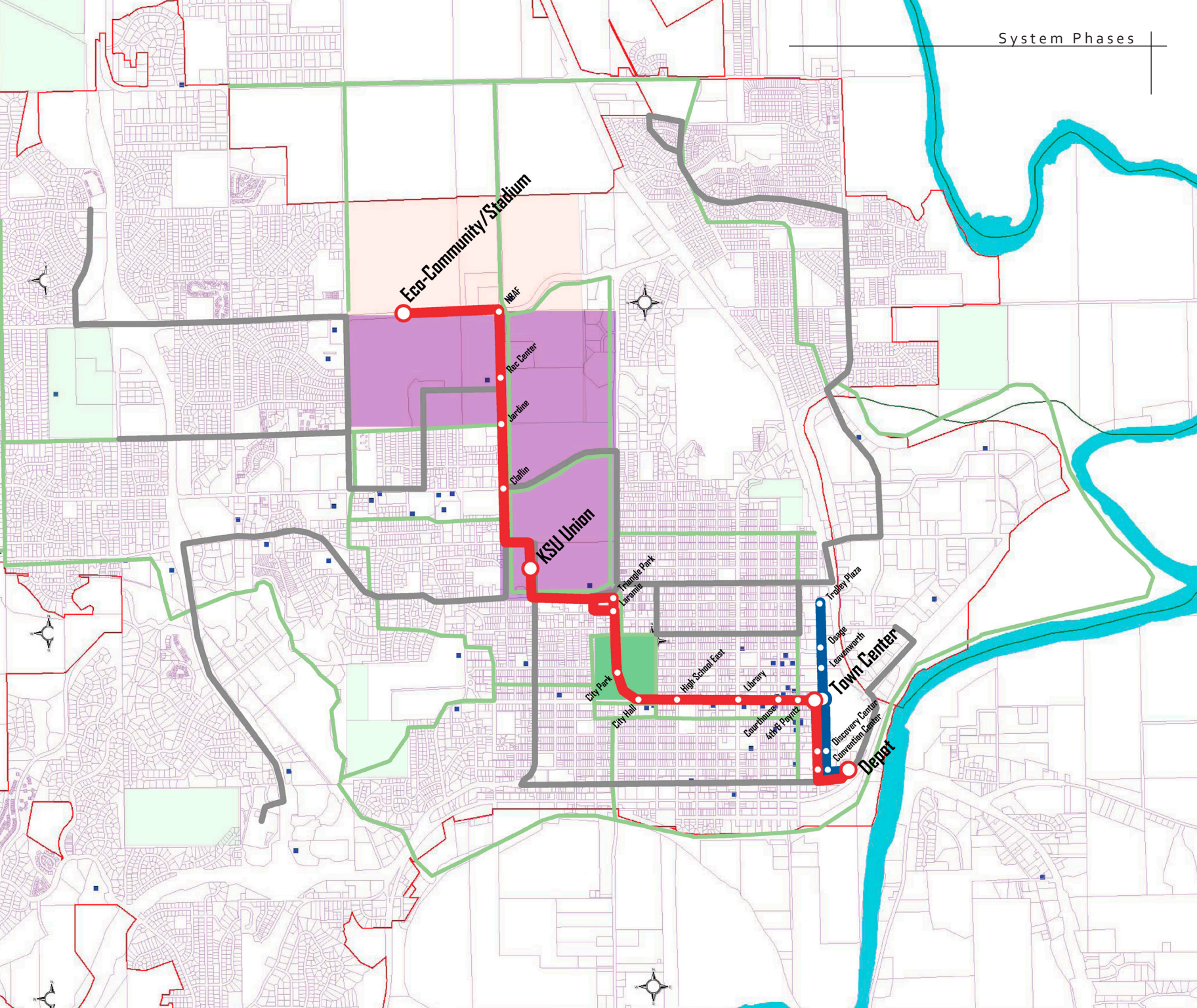
Structures: Stop shelters and bus transfer platform at KSU Union

Cost: $10 million

Headways: 15 minutes



System Phases



Phase 4

By the mid-2030s the strip commercial development along Fort Riley Boulevard has become as much of a liability to the city as the abandoned mills and warehouses of the North and South redevelopment areas were. Using the streetcar system to drive density and investment, in 2035 the city launches a redevelopment campaign to transition the highway into a true urban boulevard environment lined with mixed use buildings. The return of intercity rail service and the construction of a new transportation hub to the south of the historic depot brings more riders and further spurs boulevard development.

Track Miles: 3.4

Streetcars: 3 United Streetcar modern cars

Structures: Stop shelters, Pedestrian Bridge, Transport Center, Sunset Zoo streetcar entrance, modern car barn

Cost: $45 million

Headways: 15 minutes

FLINT HILLS TRANSIT

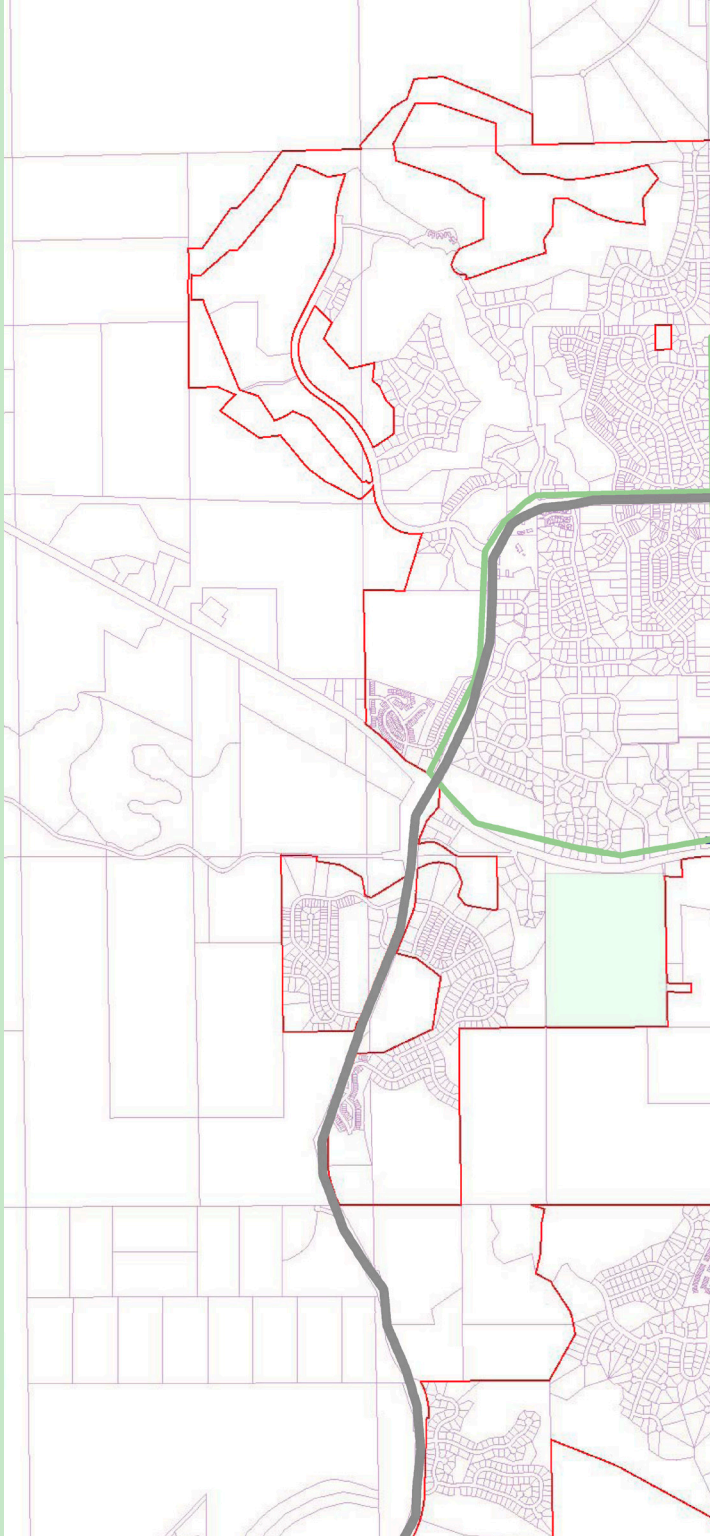
Map Legend

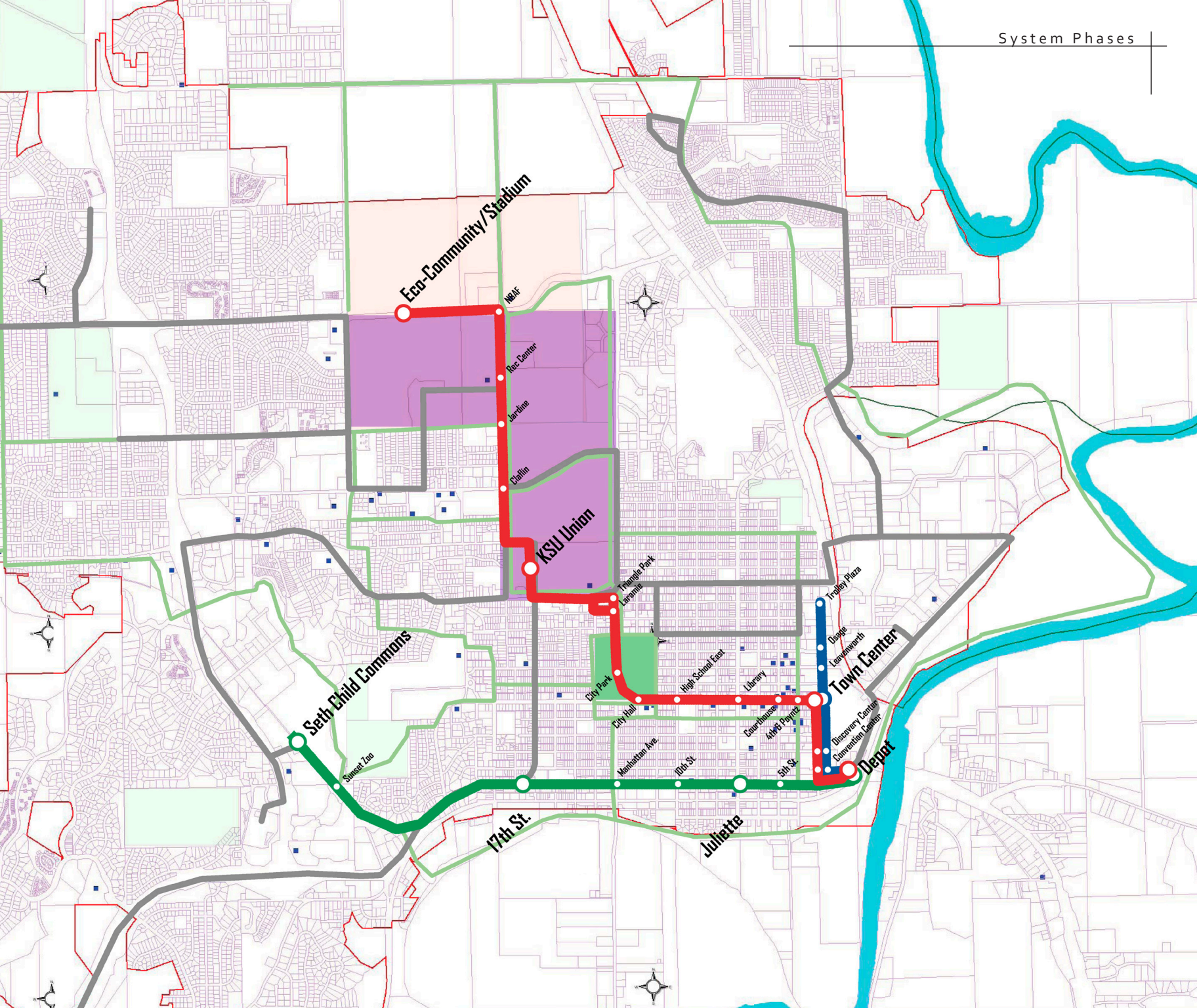
Streetcar System

- Avenue Line
- Westside Loop
- Crosstown Link
- Wildcat Valley Line
- Junction City Line
- Sunset Zoo — Regular Stop
- Depot — Transfer Stop

Buses and Bikes

- Bus Route
- Bike Route




Eco-Community/Stadium
NBAF
Rec Center
Jardine
Claflin
KSU Union
Triangle Park
Laramie
Trolley Plaza
Osage
Leavenworth
Town Center
High School East
Library
City Park
City Hall
Courthouse
4th & Poyntz
Discovery Center
Convention Center
Depot
Seth Child Commons
Sunset Zoo
Manhattan Ave.
10th St.
5th St.
17th St.
Juliette

Phase 5

In 2040 the boulevard construction is well underway, and the Eco-Community has nearly reached full buildout. The city's population has grown the most within the dense historic core areas in the eastern half, leaving some of the more remote suburbs as half-abandoned slums. In order to reduce pressure on the most historic areas of the core, the West Side line is built to the Eco-Community, completing the streetcar loop around the city. The streetcar brings denser redevelopment into the west side neighborhoods, weaving the auto-dependent citizens of suburbia back into the city.

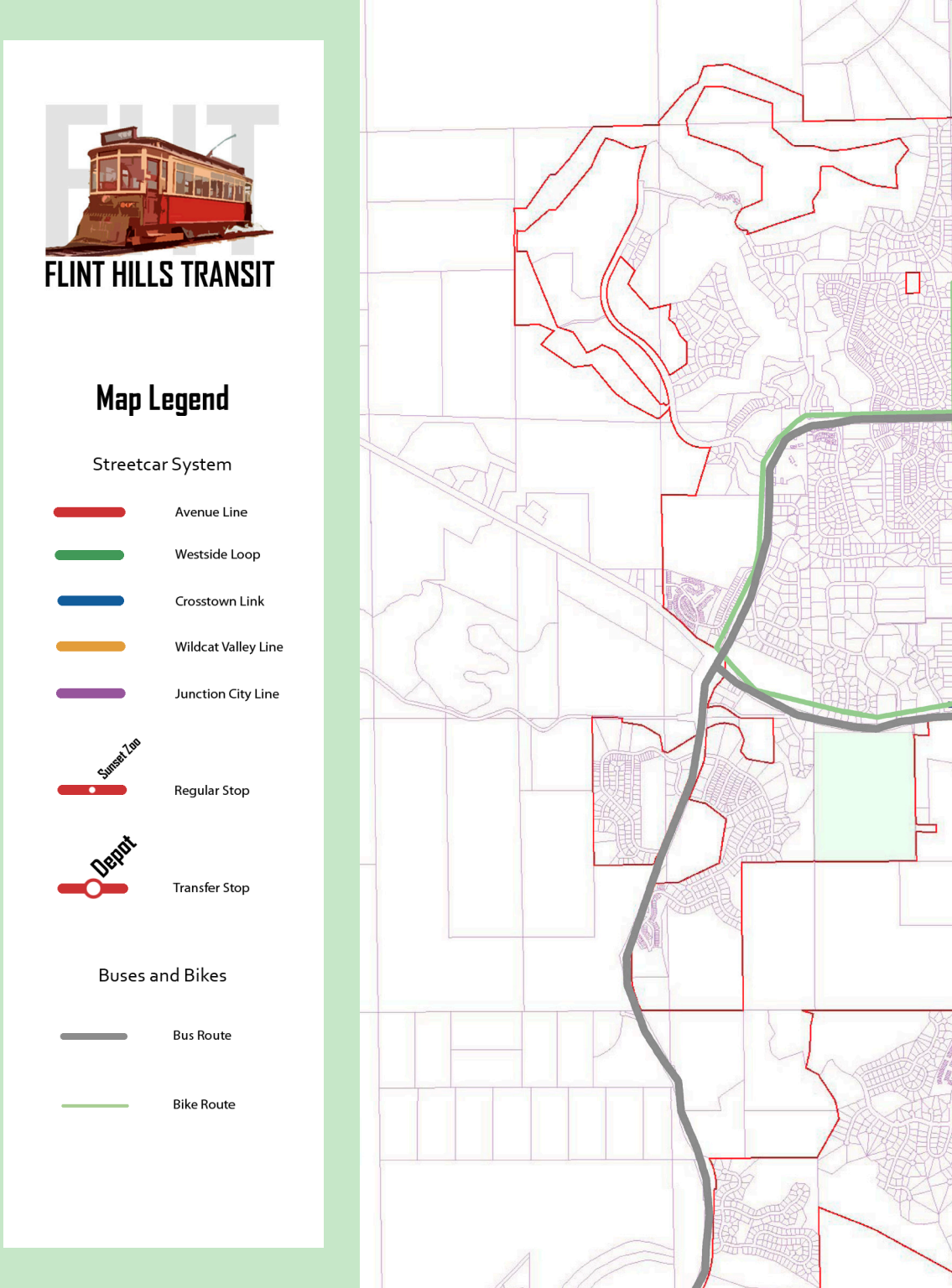
Track Miles: 3.2

Streetcars: 2 United Streetcar modern cars

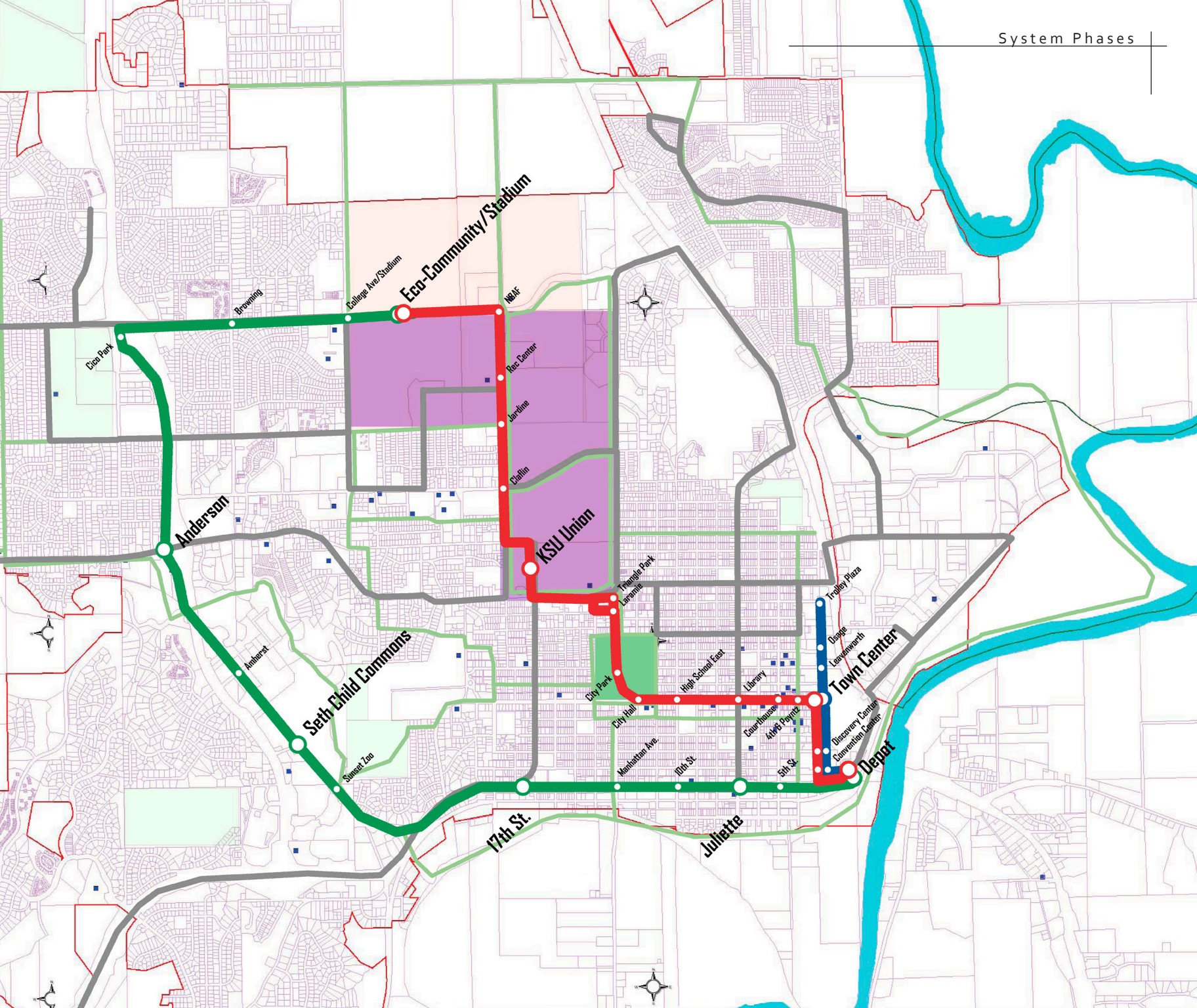
Structures: Stop shelters

Cost: $18 million

Headways: 15 minutes



System Phases



Phase 6

Road transportation based on the internal combustion engine has become a limited market by 2050, and the denser, greener cities that have emerged from the transition away from oil have led to a resurgence in rail transport nationwide. As abandoned railroads are resurrected around the rural areas of the country, the same happens in Manhattan at the hands of Flint Hills Transit. The bus connections to Junction City and Riley have become too expensive to maintain, leading to the resurrection of the old interurban line to Junction City and the Rock Island railroad to Riley. The emerging sustainable metropolitan region has been stiched together with steel rails to carry its success into the brighter future of the post-oil age.

Track Miles: 33.2

Streetcars: 4 United Streetcar modern cars

Structures: Rural stations at Keats, Riley, Manhattan Airport, Ogden, Fort Riley, and stop shelters in downtown Junction City.

Cost: $100 million

Headways: Hourly schedule

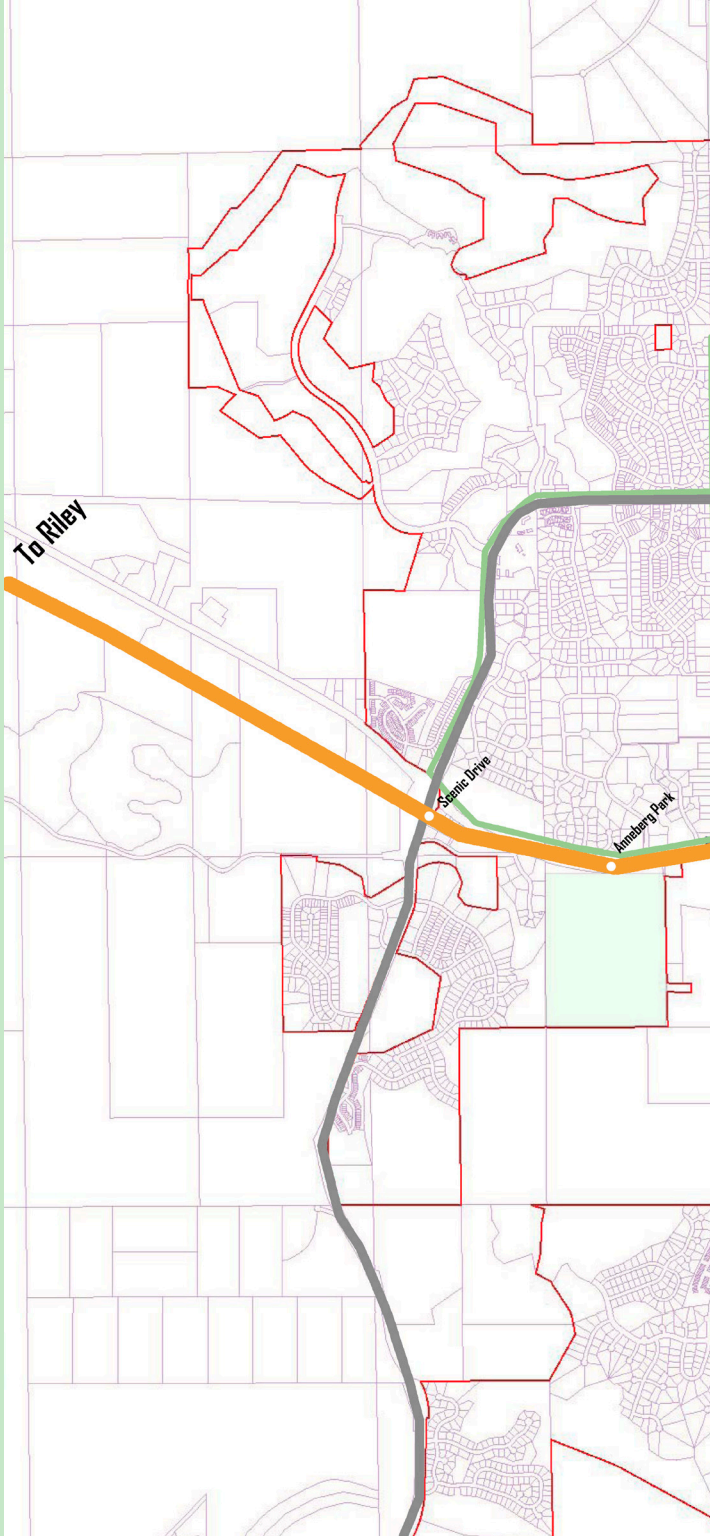
Map Legend

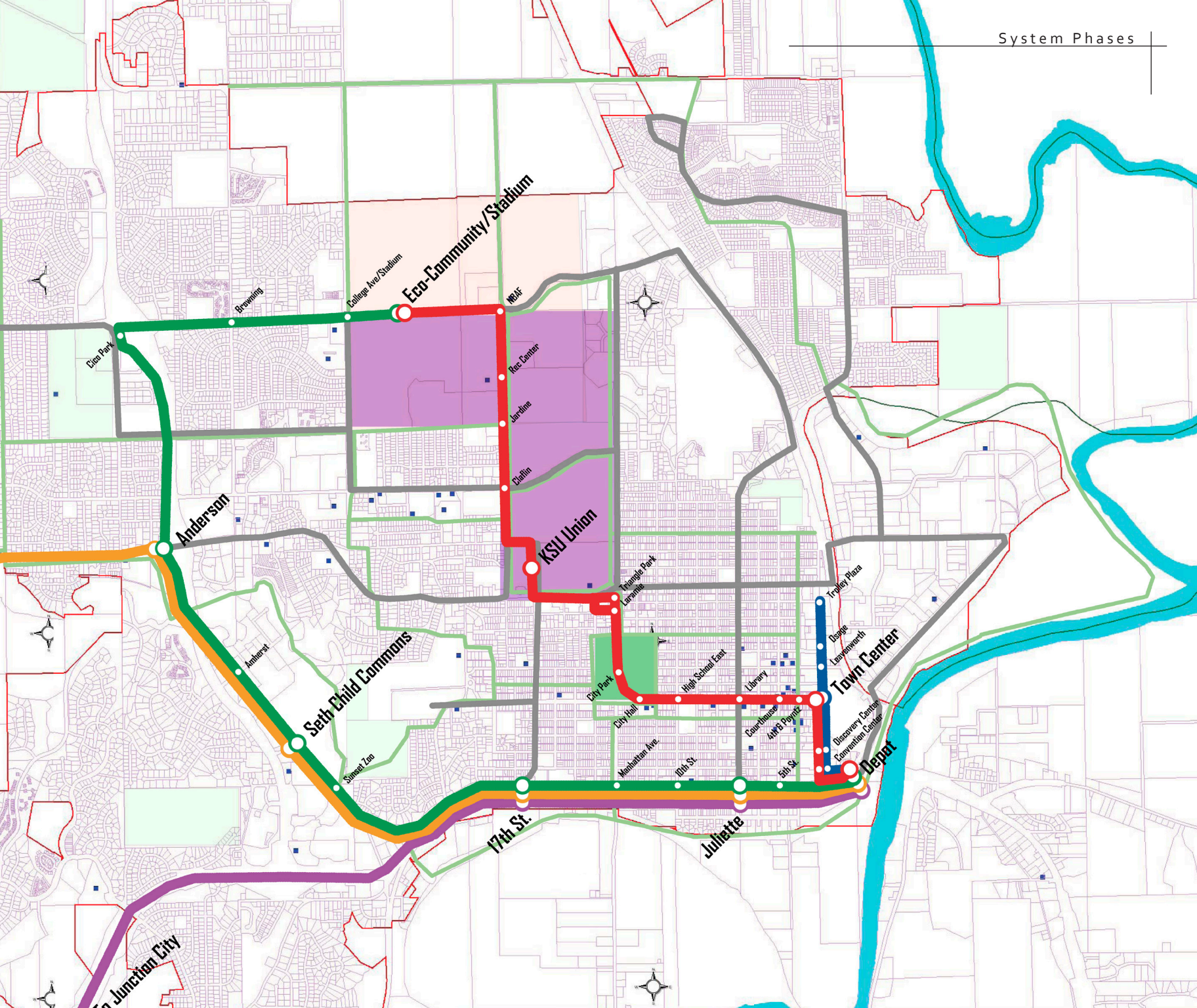
Streetcar System

- Avenue Line
- Westside Loop
- Crosstown Link
- Wildcat Valley Line
- Junction City Line
- Sunset Zoo — Regular Stop
- Depot — Transfer Stop

Buses and Bikes

- Bus Route
- Bike Route




Eco-Community/Stadium
College Ave/Stadium
Browning
Cico Park
NBAF
Rec Center
Jardine
Claflin
Anderson
KSU Union
Triangle Park
Laramie
Trolley Plaza
Osage
Leavenworth
Town Center
Discovery Center
Convention Center
Depot
Amherst
Seth Child Commons
Sunset Zoo
City Park
City Hall
High School East
Library
Courthouse
4th & Poyntz
Manhattan Ave.
10th St.
5th St.
17th St.
Juliette
Junction City

Streetcar Types

The type of streetcar chosen for any streetcar project affects three factors: the overall style of the system, the intended ridership audience, and the overall cost. Each type of car has advantages and disadvantages in each category.

Vintage cars, referring to original historic streetcars, are by far the cheapest source of streetcars for a new system, and can help keep overall costs down. Many railroad museums around the country are currently trying to divest themselves of equipment their volunteers cannot maintain, and so often streetcars can be found for as little as $25,000 from used rail equipment dealers.[28] Vintage cars are a sure way to attract tourists, but lack some of the amenities that might be expected of a transport system intended for daily use, like air conditioning and ADA accessibility.

Replica cars are those that are built new but in the style of historic cars, and so have all the same tourist attractive properties with the addition of everyday rider modern amenities. Vintage cars are more expensive than vintage cars, usually running in the $500,000 to $800,000 range.

Modern cars are usually imported cars built in Europe or Asia, and are the most efficient in terms of accessibility, ride quality, and passenger capacity. They are the most expensive, at $3,000,000 a car.

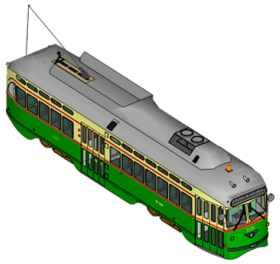
For Manhattan, a variety of these car types has been chosen depending on the goals of each phase of the system.

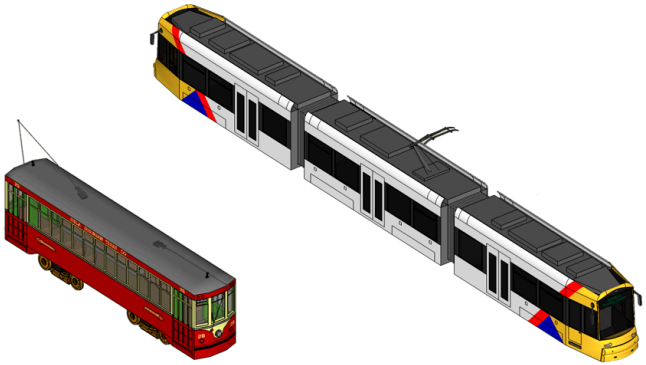
Kenosha Vintage PCC car.
http://en.wikipedia.org/wiki/File:Kenosha_Streetcar.jpg

Tampa replica Birney cars by the Gomaco Trolley Company.
http://world.nycsubway.org/us/tampa/teco.html

Modern streetcar in Portland.
http://stephenrees.wordpress.com/2009/04/24/active-transportation-in-portland/

Streetcar Types





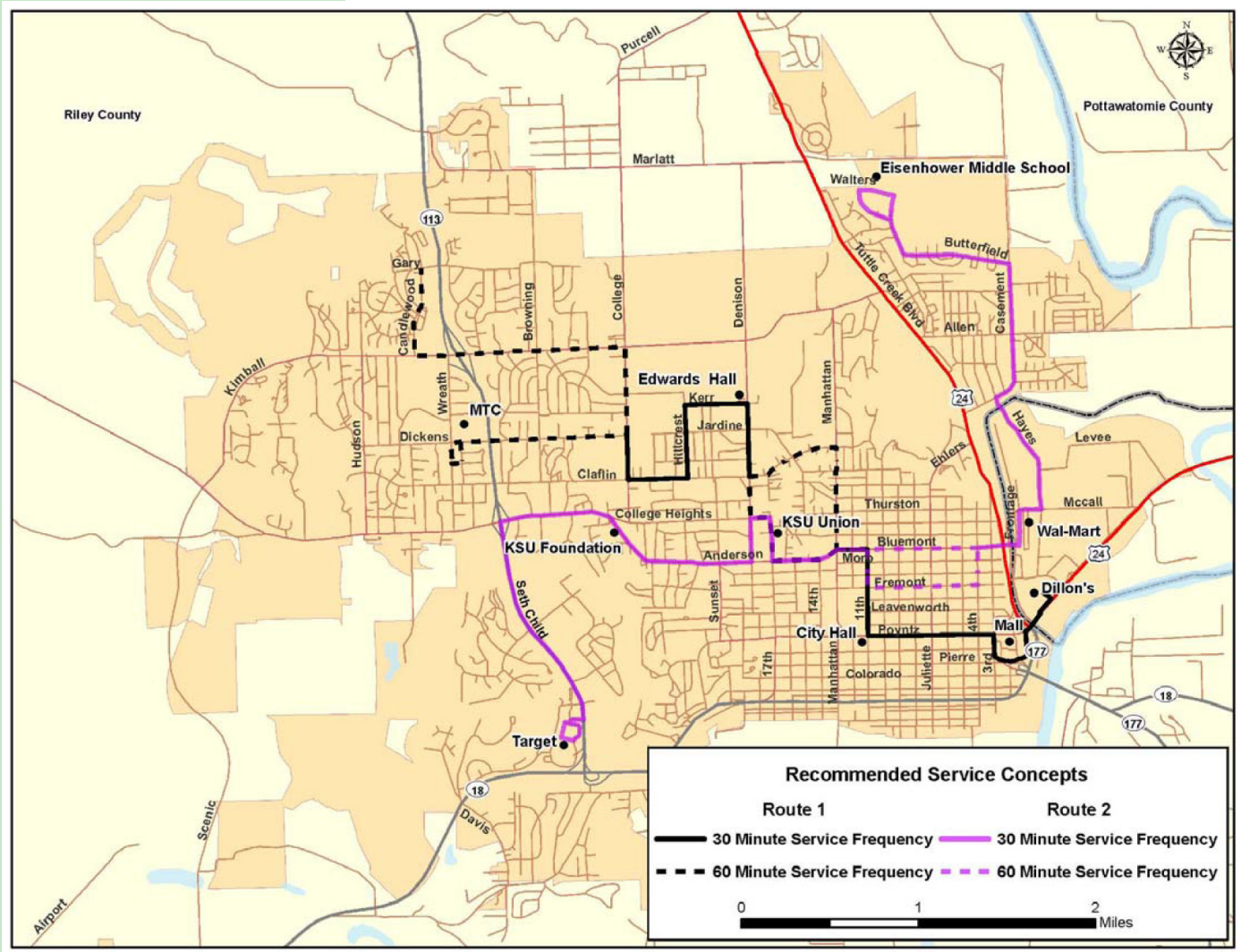
Type	Vintage PCC	Replica Birney	Modern
Length	46’ 6”	47’ 6”	66’
Width	8’ 5”	8’ 6”	8’ 1”
Min. Turning Radius	50’	50’	60’
Maximum Speed	50 mph	30 mph	44 mph
Seats	46	40	29
Total Passengers	65	90	170
Air-conditioned	No	Yes	Yes
Accessible	No	Yes	Yes

Buses

The city of Manhattan currently has a bus system planned to begin operation in 2012. Operated by the Area Transportation Agency (ATA), it will include two routes that link most areas of the city with the KSU campus on a 30 minute schedule. The schedule is timed to coincide with classes at KSU, and students will ride for free with a K-state ID. The plan also includes the potential for a commuter link to Fort Riley and Junction City.[30]

Despite their inefficiencies, buses will remain an important part of the multimodal transit system, providing the links from streetcar routes into the less dense neighborhoods of the city. Buses will also provide regional connectivity ahead of the streetcar and interurban system, paving the way for the streetcars by being the initial users of the main routes.

The buses themselves would eventually transition to hybrid and then electric vehicles, in order to keep operating costs and GHG emissions down.


Riley County
Pottawatomie County
Purcell
Marlatt
Walters
Eisenhower Middle School
Butterfield
Turtle Creek Blvd
Allen
Casement
Gary
Candlewood
Browning
College
Denison
Manhattan
Kimball
Wreath
Hudson
Dickens
MTC
Edwards Hall
Kerr
Jardine
Hillcrest
Claflin
Ehlers
Hayes
Levee
Frontage
Mccall
Thurston
College Heights
KSU Union
Wal-Mart
KSU Foundation
Anderson
Bluemont
Moro
Fremont
Dillon's
Seth Child
Sunset
14th
11th
Leavenworth
4th
Mall
City Hall
Poyntz
17th
Colorado
Juliette
Pierre
3rd
Target
Davis
Scenic
Airport
Recommended Service Concepts
Route 1
Route 2
30 Minute Service Frequency
30 Minute Service Frequency
60 Minute Service Frequency
60 Minute Service Frequency
0
1
2
Miles

Bicycles

Bicycle culture is on the rise in Manhattan as college students become more aware of bicycling as an alternative means of transportation and a recreational activity. Surprisingly, most of Manhattan is currently easily accessible by bicycle, with a significant number of low-traffic residential streets in the street grid of the historic core. The problem is promoting these routes, when the routes most potential bikers consider first are the busy arterial streets.

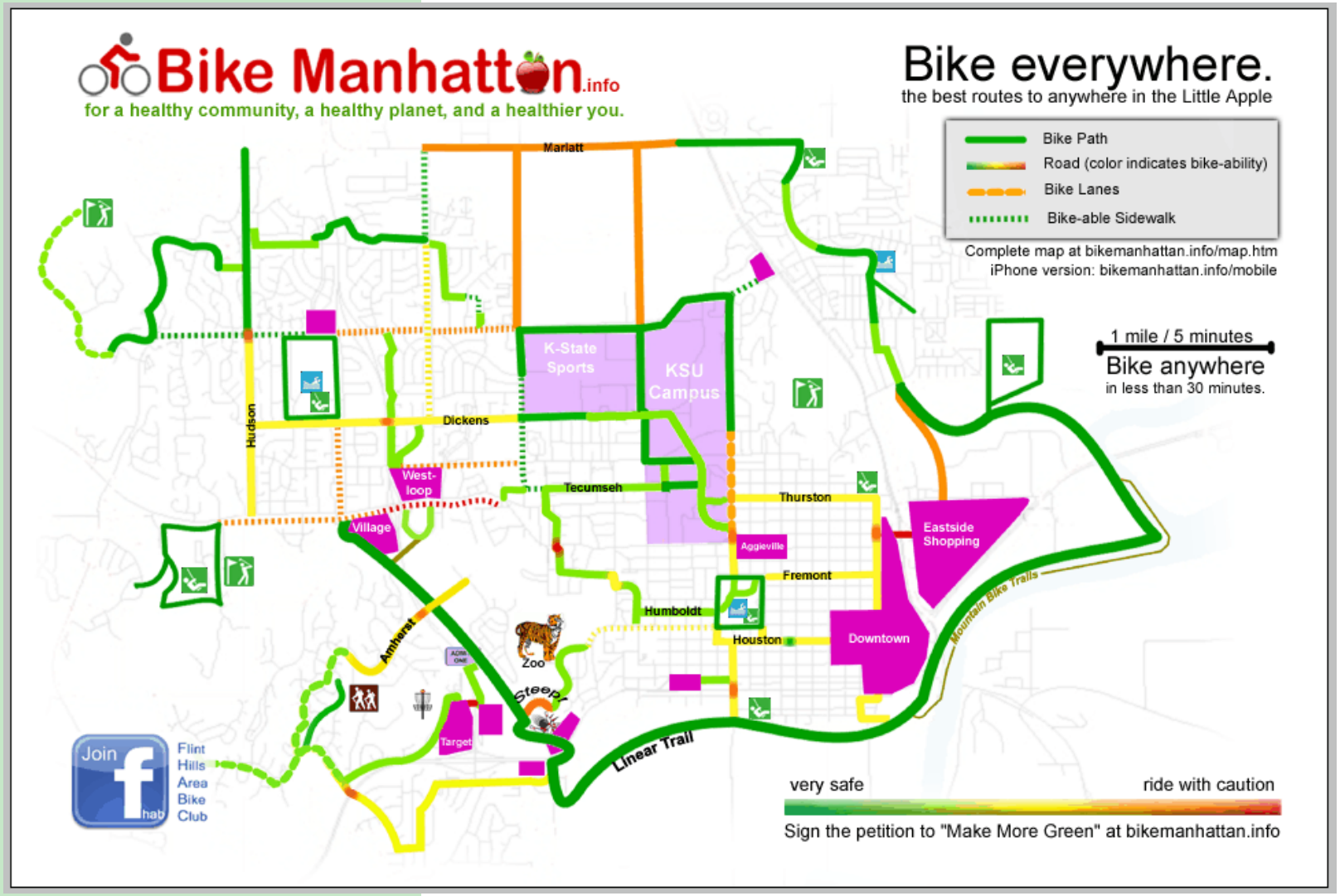
The solution is the creation of bicycle boulevards, much like has been done in Portland to provide safe routes for "B-Bikers" that parallel the main streets for bicyclists to use. The only expenses in implementing these boulevards are signage and markings, as many already have traffic calming measures in place.[31]

By integrating bicycles into a network of streetcars and buses, the multimodal system serves every density of development within the city, from busy streetcar arterials to the fine-grained tendrils of bicycle use. Both buses and streetcars would have the capability of carrying bicycles, allowing a seamless transition between modes of transport.

Bicyclists on one of Portland's bicycle boulevards.
http://bikeportland.org/photos/photo/171409042/BTA-Bike-Boulevard-Ride.html

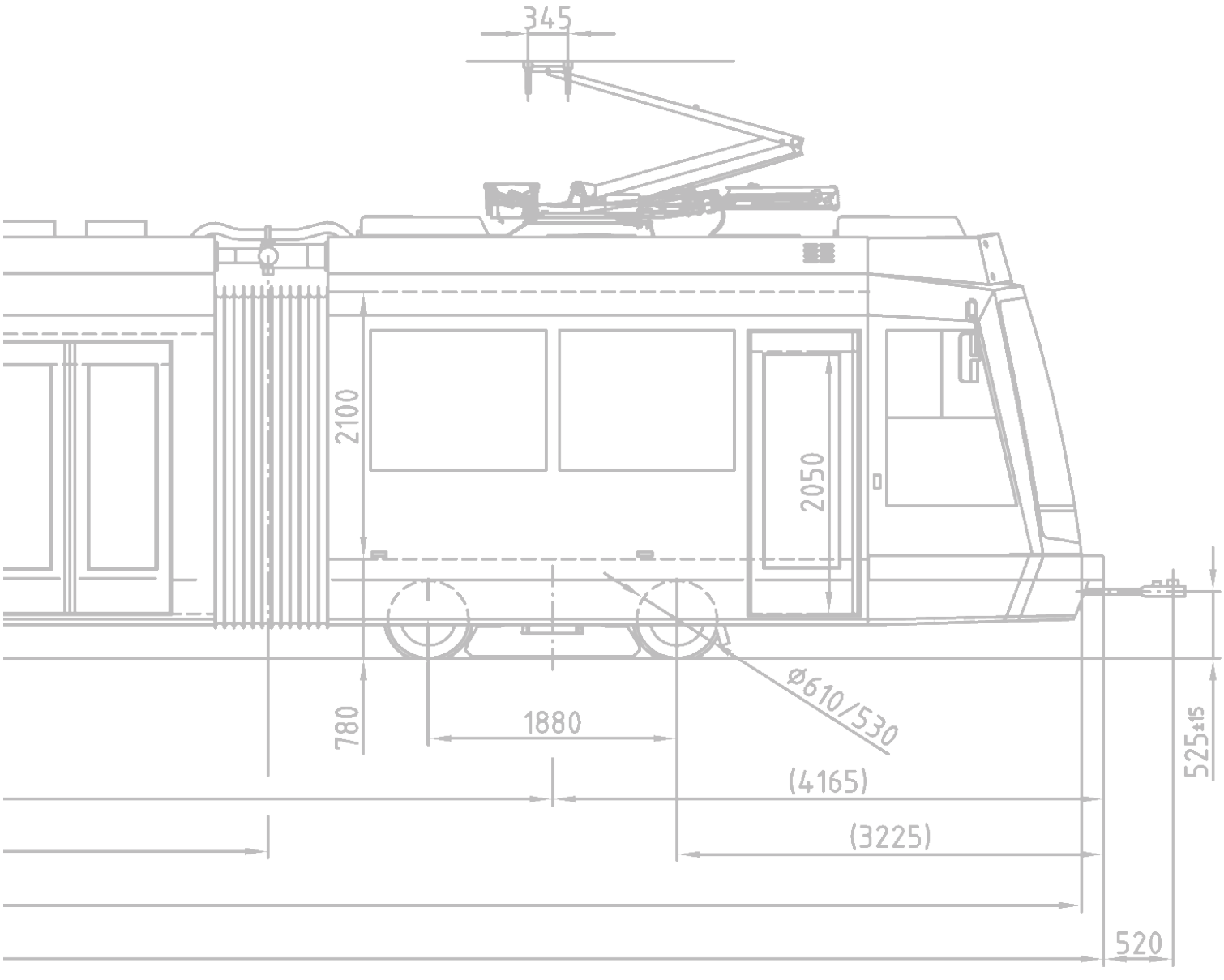
	A-Bikers Only		Some B's	B-Bikers	C-Bikers	
Level	0	1	2	3	4	5
Color	Red	Orange	Yellow	Green	Bicycle Boulevard	Path
Routes	7,000+VPD Shared lanes 40+ MPH No Shoulder	3,000+VPD 12-15 ft crbln 30-40 MPH	1-3,000 VPD 30 MPH Max	1500 max VPD Under 25 MPH	1500 max 20 MPH Signed	HPVs only
Crossing	None	Light but no Xwalk	Xwalk	X-walk with button	Bike-specific crossing light	Underpass /Overpass

Definitions of different biker types and the environments they are comfortable in.
http://bikemanhattan.info/?p=187



This "bikeability" map shows the current bicycle connectivity of the city, which could be improved with the addition of only a few bicycle boulevards.
http://bikemanhattan.info/?p=187

Regional Connections

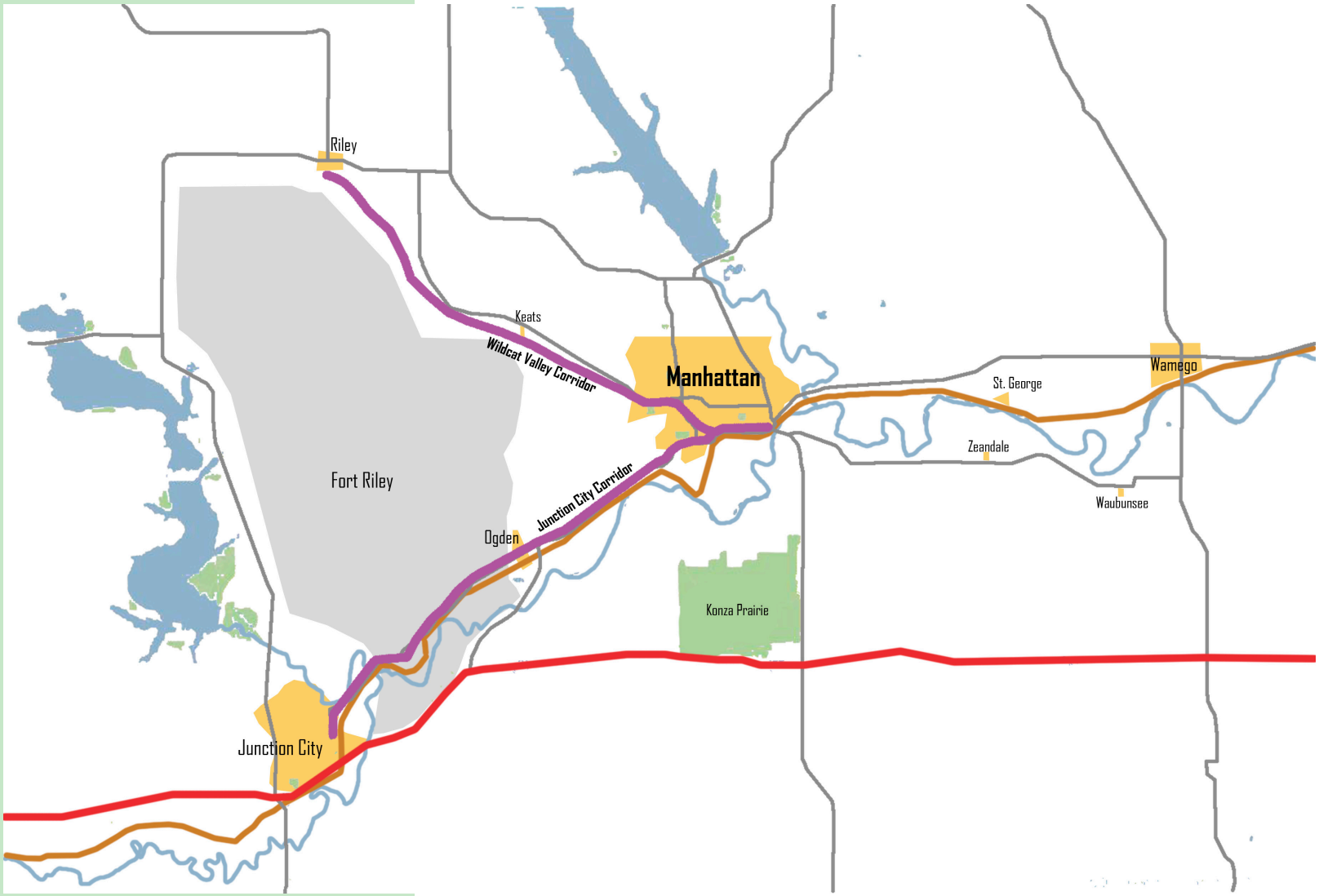


Regional Connections

The regional connections developed as part of the multimodal transport system connect Manhattan with its neighboring towns and cities, with the intention of strengthening the connections that already exist and controlling sprawl through the creation of TODs.

Wamego rail corridor.
Photo by Ian Pitts.

Downtown Riley.
Photo by Ian Pitts.


Riley
Keats
Wildcat Valley Corridor
Manhattan
Wamego
St. George
Zeandale
Waubunsee
Fort Riley
Junction City Corridor
Ogden
Konza Prairie
Junction City

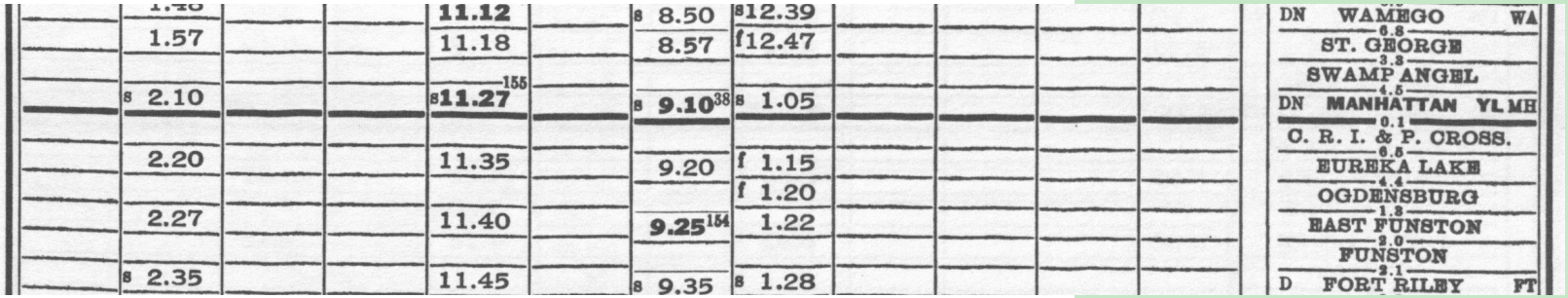
Intercity Rail

Currently, Manhattan's major connections with the outside world are automobile-based. These connections will become more tenuous as gas prices begin to climb beyond threshold of cheap long-distance travel by car.

Manhattan exists in a medium-length regional corridor stretching to Kansas City that is ripe for new passenger rail development. While the corridor did not rank highly in any High Speed Rail study, regular passenger trains would be a welcome transportation choice, especially after the end of regional airline flights like those that serve Manhattan.

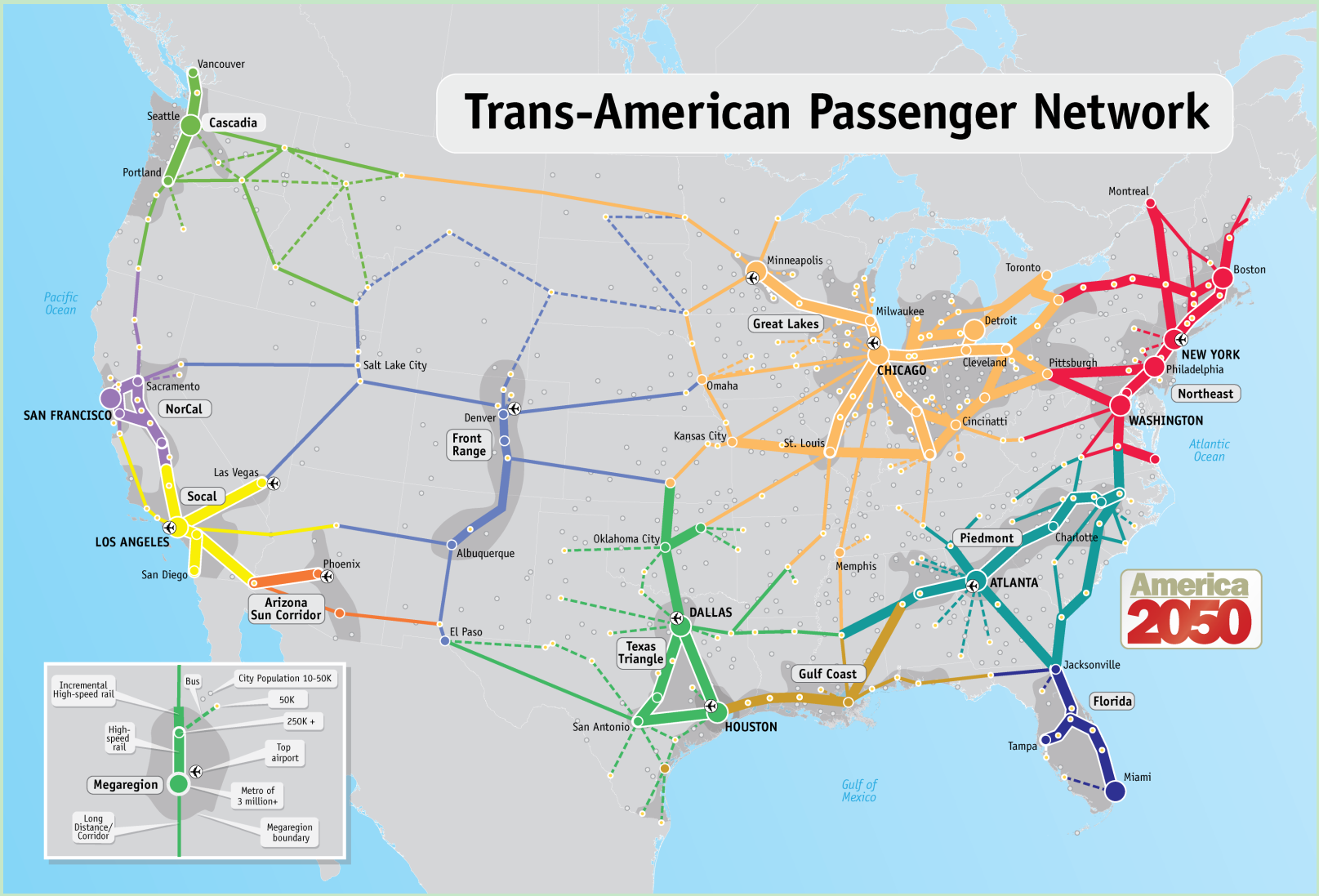
As society slows down in lockstep with the decline in available energy, normal "slow" trains traveling at 79 mph will not seem like a waste of public funds. With political pressure from rural areas farther west left isolated by gas prices, it is possible that the entire corridor from Kansas City to Denver could see the renewal of passenger service by 2030.

A regional Amtrak train operating in Missouri.
Photo by Ian Pitts.



				11.12		s 8.50	s12.39					DN	WAMEGO WA
	1.57			11.18		8.57	f12.47						6.8 ST. GEORGE
													3.3 SWAMP ANGEL
	s 2.10			s11.27 155		s 9.10 38	s 1.05						4.5 DN MANHATTAN YL MH
													0.1 C. R. I. & P. CROSS.
	2.20			11.35		9.20	f 1.15						0.5 EUREKA LAKE
							f 1.20						4.4 OGDENSBURG
	2.27			11.40		9.25 154	1.22						1.3 EAST FUNSTON
													2.0 FUNSTON
	s 2.35			11.45		s 9.35	s 1.28					D	2.1 FORT RILEY FT

This 1948 Union Pacific employee timetable shows four westbound passenger trains stopping in Mahttan. There were also four eastbound trains.
Image from Union Pacific HIstorical Society.



Map from America 2050 Project.
http://www.america2050.org/

Wildcat Valley Corridor

Case Study in Transit Oriented Agriculture

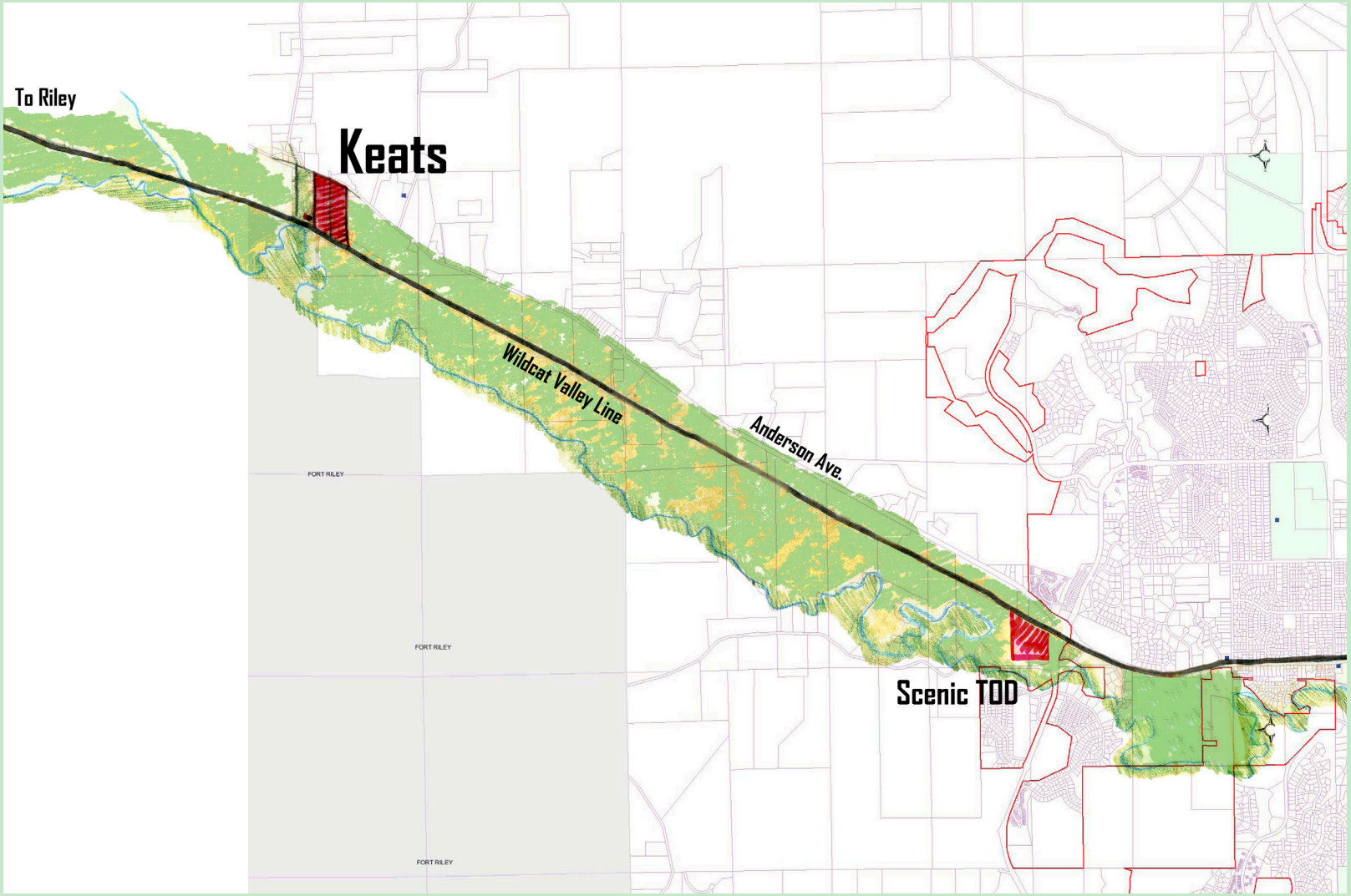
There was a time in the early twentieth century when a large portion of rural America was linked by electric railroads called "interurbans." These lines used lightweight, streetcar-style equipment to serve rural communities in the days before improved rural roads. Some even hauled railroad freight cars to these rural destinations, serving an important function in the days before extensive truck freight.

The resurrection of the cargo streetcar line is taking place in several European cities, including Dresden, Germany, where the local VW factory uses a cargo tram to deliver parts. Amsterdam is also experimenting with the idea of tram-based delieveries to businesses.

Interurban freight and passenger service could play an important role in the future of Manhattan and the rural areas that surround it, by creating a system of Transit Oriented Agriculture. Small, sustainable organic farms along the interurban lines to Junction City and Riley would preserve the natural assets of the river and creek valleys to the west of the city, along with supplying the city with a resilient source of food.

Freight train on the Walla Walla Valley Railway, serving the fruit growing areas of Washington.
http://www.wwvrailway.com/

VW factory CarGoTram, Dresden, Germany.
http://www.wwvrailway.com/



Map showing the Wilcat Valley Corridor with agricultural land in green and possible TOD locations in red.

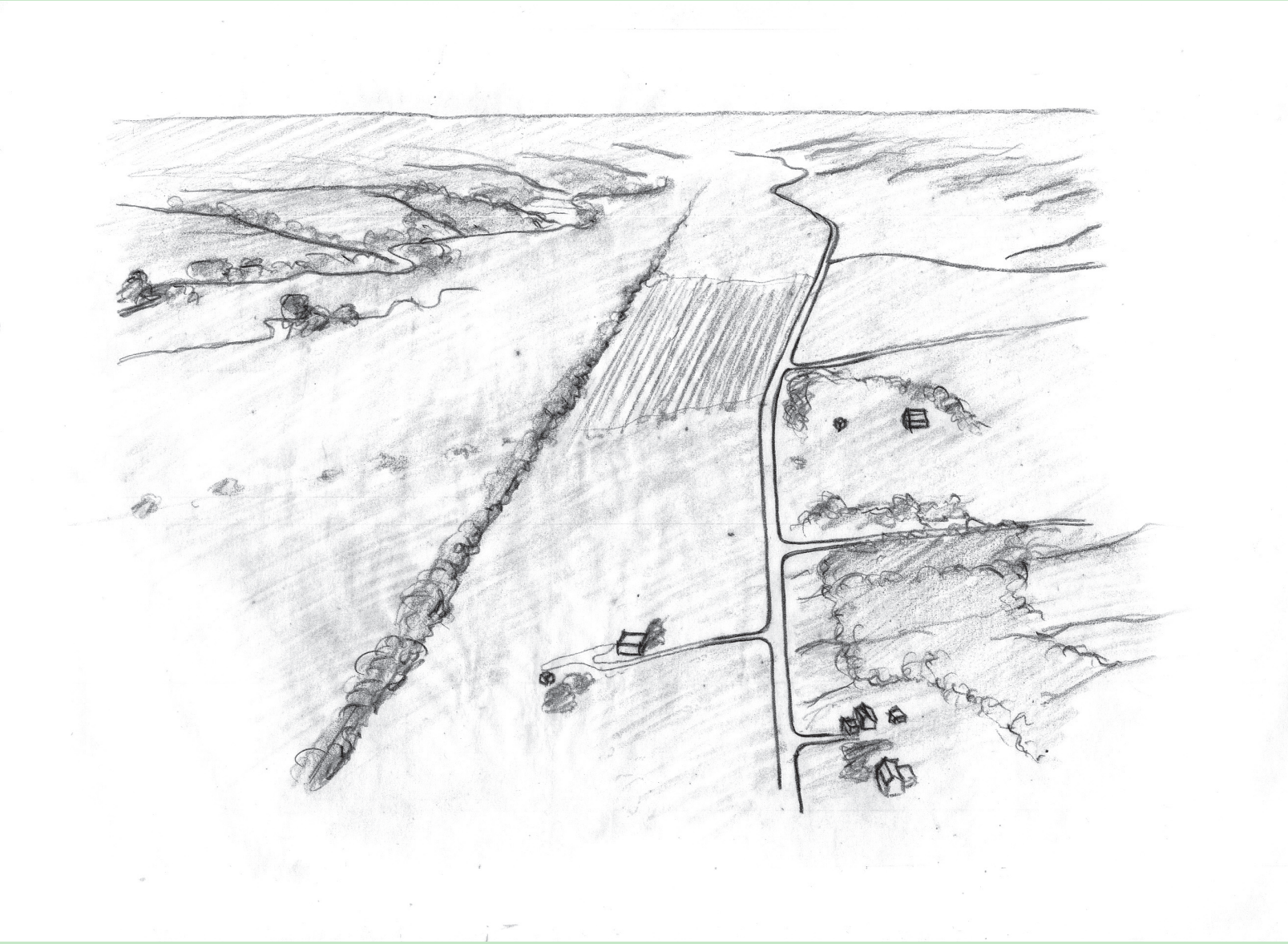
Present Day

Wildcat Creek runs to the northwest of Manhattan, carving out a beautiful narrow valley through the hills, which was once used by the Rock Island Railroad to reach the higher plains to the northwest and eventually Colorado. The area currently serves as agricultural hinterland with farms and rural estates. The inhabitants communte to jobs in Manhattan, with around 2000 commuter trips coming into the city along Anderson Avenue every day.

The valley is rife with the remains of America's rural past, with the village of Keats containing two disused rural school buildings, a church, and several small gas stations. The valley represents a valuable asset for the development of a local agricultural network to support the city.

Historic rural school building in Keats.
Photo by Ian Pitts.

Historic gas station on Anderson Avenue in Keats.
Photo by Ian Pitts.



Present-day aerial view of the Wilcat Creek valley.

The Threat

The current plan for the Wamego/US 24 corridor represents the threat to these vital nearby agricultural areas, with most of the land between Manhattan and Wamego planned to become strip commercial and medium-density single family housing. The effect of this on the narrow, hilly Wildcat Valley and Junction City corridors would be disastrous to the region.

Normal development in the Wildcat Creek valley in the style of the US 24 corridor would haphazardly destroy the potential use of the abandoned railroad ROW for a transit line, and the usefulness of the agricultural lands along the creek. Suburban development along the corridor would quickly become abandoned as commuting long distances by car became more and more expensive.

A city surrounded on all sides by suburban development of any density would have a very hard time finding suitable land for localized sustainable agriculture. Without this local food network, the city will remain reliant on long-distance shipment of food that uses the ever more expensive oil as fuel.

Suburban destruction of natural areas.
http://en.wikipedia.org/wiki/File:Suburban_development_and_sprawl_maple_ontario_dufferin_majormack_keele.jpg

Typical suburban devleopment.
http://nicolemarie.umwblogs.org/2008/11/03/lifes-tough-in-the-suburbs/

Aerial view of the Wilcat Creek valley with normal suburban development.

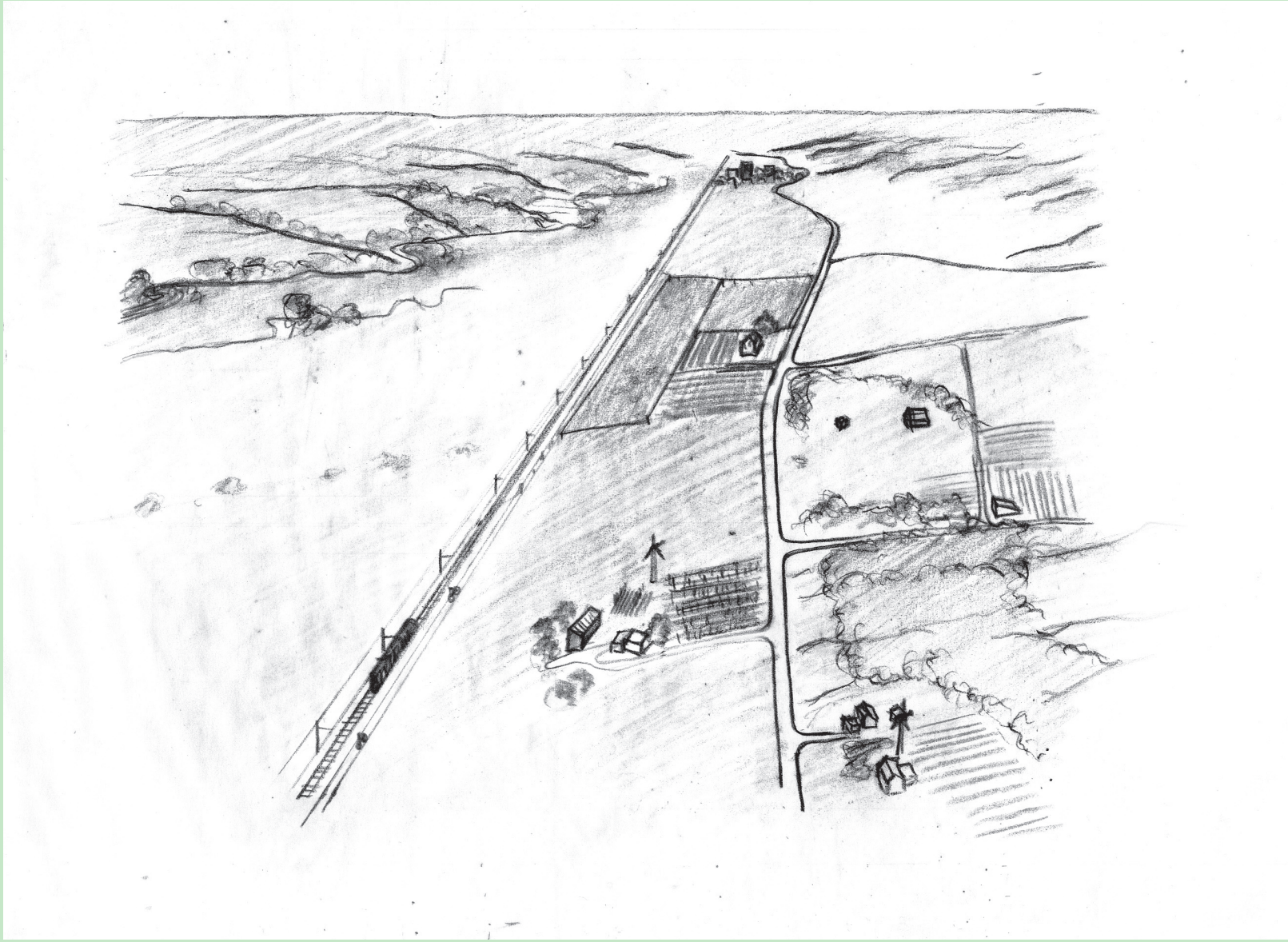
Transit Future

By concentrating additional development outside the city in TODs spaced along a streetcar interurban line to Riley, the agricultural uses of the valley can be tied in with the development of the regional transit system. Those who wished to live a rural lifestyle could still easily access Manhattan by streetcar, and Manhattan would be supported by the development of sustainable food supplies just outside its urban area. The historical rural assets could be reused and incorporated into this new regional network, with new small rural schools and small shops selling everyday items. Manhattan's bike trail network could also be extended along the interurban tracks to provide a regional recreation amenity.

This kind of development would halt the decline of rural areas and use them to support the resilience of Manhattan in the face of the unstable future of large-scale industrial agriculture and long-distance supply routes. Money in this new food economy would stay local, helping to make the city thrive.

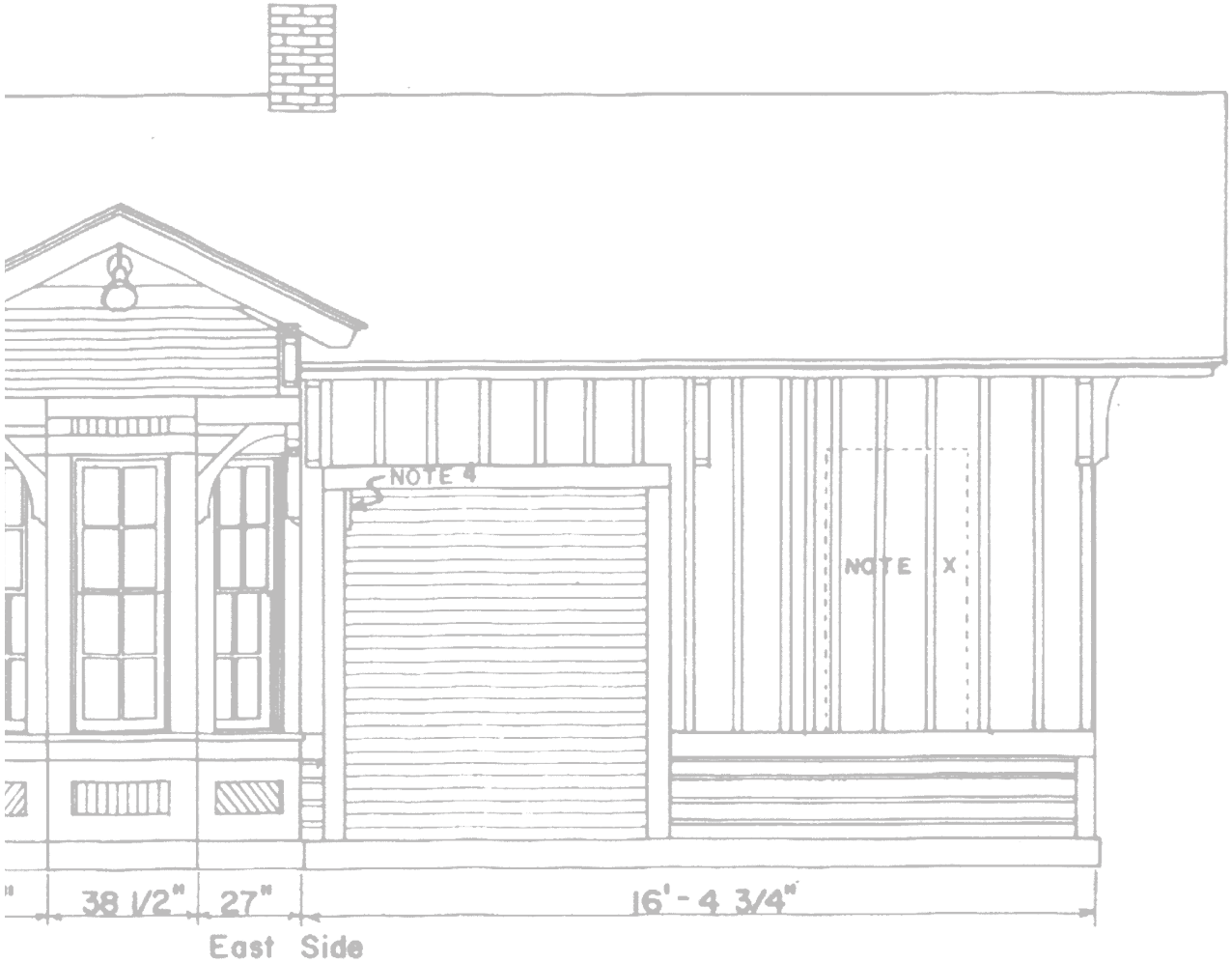
Transit-Oriented-Agriculture would protect the open spaces that define the city.
http://www.ca.uky.edu/gogreen/farm.php

Fresh, sustainable, organic produce - by streetcar.
http://www.gourmet.com/foodpolitics/2009/03/politics-of-the-plate-kathleen-merrigan



The valley with transit line and localized sustainable agriculture.

Architecture & Style



Architecture

The centerpiece of the architecture of the system is the historic Union Pacific depot. Built in an elaborate Spanish Revival style, the station's materials palette of tan brick, red tile, and wood trim blends well with the historic regional materials of limestone and wood that are prevalent throughout the city. By using the materials palette of the station for the new buildings that need to be constructed for the transit system, a visual brand can be established that is easily recognizable for people trying to find the nearest access point. It will also help the streetcar system blend into the existing historic fabric that it will mainly serve.

A replica streetcar pulls up to a waiting crowd at the depot.
Model and photo by Ian Pitts.

A postcard of the depot shortly after it was built.
http://www.oldpostcards.com/d/dep-KS009.html

The inaugural run of the streetcar system draws a crowd in historic attire to celebrate the event.

Transit Stops

One of the elements of the transit system that will become a defining characteristic of the imagery of the system is the small transit stop. This means a standard design for the transit stops needs to be developed so that the system maintains its branding and coherent image. Due to the eventual dual urban and interurban nature of the streetcar system, two transit stop types must be developed, an urban style appropriate for locating on a street and servicing both streetcars and buses, and a rural style that can become the focus of a transit oriented development much like a historical small-town train depot.

Schematic Program for Transit Stops

Platform – The area where passengers board streetcars or interurbans. Also doubles as an overflow waiting area. ADA considerations will likely be handled by the streetcars themselves, so boarding can be from ground level.

Platform area must be 300 ft. long.

Waiting Area – Must be at least sheltered from rain, preferable if also sheltered from wind, by being either partially or fully enclosed.

300 sq. ft.

Restrooms – (Rural Only) Male and female single-occupant restrooms should be provided.

2 x 40 sq. ft.

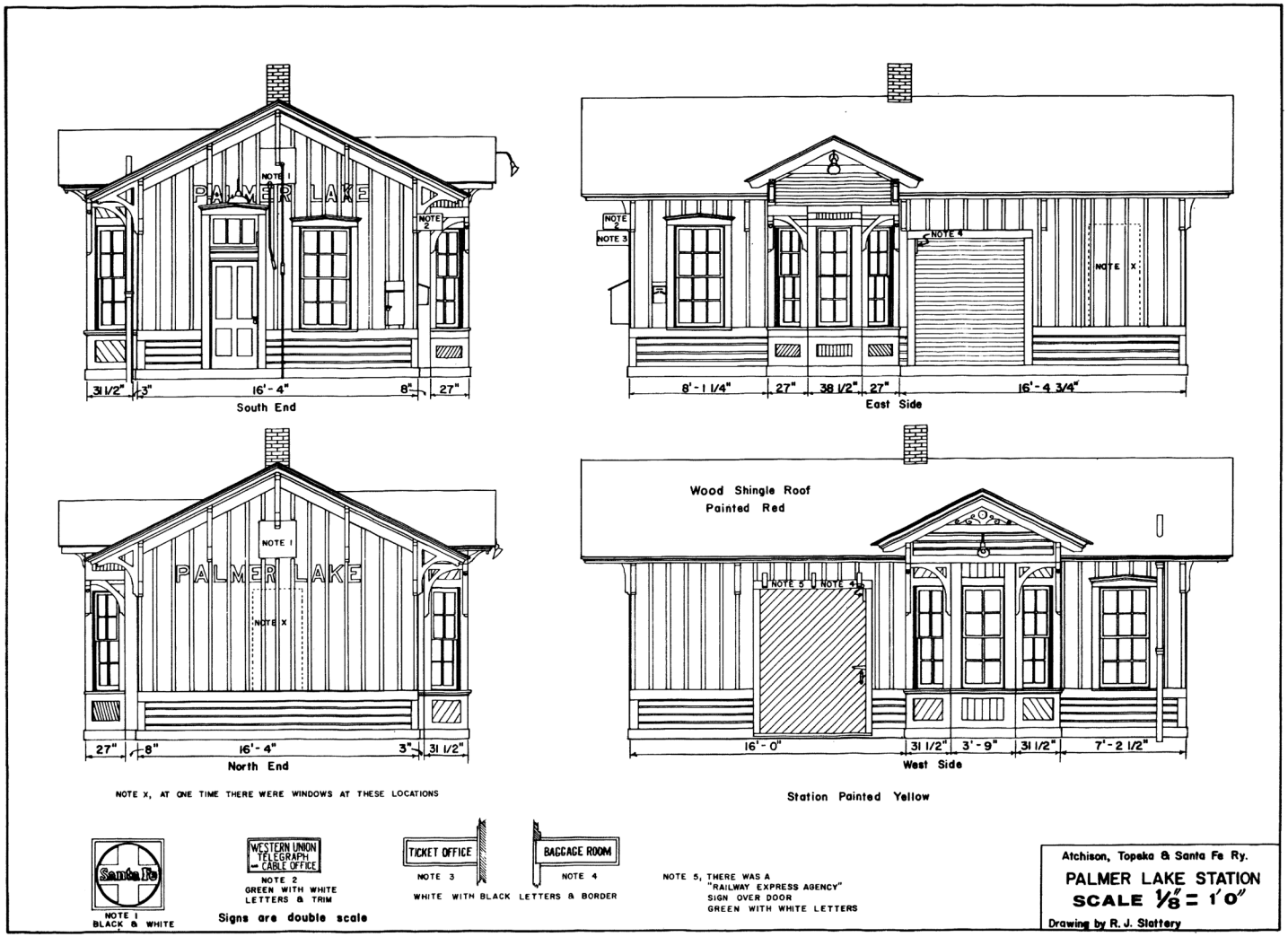
Freight Handling – (Rural Only) As the rural corridors outside of the growth boundary of Manhattan begin to produce food crops for local consumption, the interurban system can provide an inexpensive means of transporting those goods into the city's markets during the summer months. Over time other freight uses, such as package shipments could be handled at these facilities. Baggage handling would also be an occasional need at rural stops. A raised, ramped platform at car floor height should be included.

300 sq. ft.

A transit stop in Kelwona, British Columbia.
Photo by Shed Simus.

A streetcar stop in Seattle, Washington.
Photo by Matt Johnson.

A simple streetcar stop in Portland.
http://www.protransit.com/In-General/2008/10/modern-streetcars.asp



REPRINTED COURTESY - ROBERT J. SLATTERY.

The Santa Fe depot at Palmer Lake, Colorado, is an archetypal example of a small rural station. Drawing from *Santa Fe Depots of the Plains*, by Frank Ellington.

3rd St. Car Barn

Even the more utilitarian pieces of the infrastructure of the streetcar system can be integrated into the historic fabric by using the materials palette from the depot. One of these neccessary elements is the car barn, where streetcars are stored overnight and repairs are performed.

For the initial phase, with only three streetcars, the car barn need not be a large structure. Locating it in the downtown area becomes possible with a small footprint, in order to keep the activities of streetcar maintenance and storage close to the liveliest areas, so that they add to the overall street bustle.

A city-owned parking lot on 3rd Street across from the Town Center Mall provides the perfect location for a car barn. The parking would not be missed, as the streetcar would replace the cars that would normally use it. The location also provides easy access by the streetcars to the Avenue Line running north-south on 3rd Street.

The car barn is designed to hold a maximum of five cars, in order to accomodate the additional 2 cars for the North End connection. Thanks to the use of a transfer table to switch cars between the two tracks, there is ample shop space, and room for a management and dispatching office for the system. The building includes large factory windows to allow passerby on the sidewalk to stop and observe the activities within, and a sawtooth roof to fill the space with natural north light. Employee parking is off the alley in the rear.

The location of the car barn is currently a city-owned parking lot.
Aerial photo from Riley County GIS.

An exterior view of the car barn shows how it blends into the massing of the downtown area.

A view inside the car barn shows the ample space for shops and five streetcars.

Transport Center

The return of passenger rail to Manhattan will require the construction of a new station, with the highway-dominated thinking of the 1980s cutting the historic depot off from the tracks with the four concrete lanes of Fort Riley Boulevard. While the easiest solution would be to build a new station on undeveloped land to the east or west of the city, the central location of the historic depot site is the most desirable.

The solution to this dilemma is to build a new passenger rail complex on the south side of the tracks, linked to the streetcar hub at the historic depot by a pedestrian bridge. The new station would be home to Zip Car rentals, bicycle rentals, and an extensive gateway park that ties the streetcar, bus, and passenger rail systems into the Linear Trail and citywide network of bicycle boulevards. By locating the complex closer to the river, it also becomes easier to tie the downtown area back to the river's edge with the construction of a riverside park to take advantage of this natural asset.

Serving as the main transportation hub of the entire region, due to streetcar, interurban and bus links, the Transport Center supports the conference center, the Flint Hills Discovery Center, and the densification of the downtown core.

This culmination of the process of linking the city and the region with sustainable transportation options would cement Manhattan's place in the future as a city providing educational and research services on the national scale, support for a major military base, and serving as an interface between the urban East and the rural West.

This map shows the location of the new Transport Center site across from the original depot, and its relationship to the Convention Center and South End hotels.

This rendering shows a possible concept for the Transport Center, with a curving platform to meet the tracks and a materials palette based on the original depot.


VARLEYS
AVENUE Q
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Conclusion

Manhattan, Kansas, sits at a crossroads of transportation choices. The city can follow the suburban model of transportation planning used by other cities of the same size, or it can utilize its inherent compactness and connectivity to make a better choice. The path of normal transportation planning centered on the automobile, in the face of peak oil, leads to a wrecked local economy and a failing city. The path of streetcars, buses, and bicycles leads to a vibrant, resilient future that only increases the opportunities available for economic well-being.

A streetcar system would bring development to the city and create Manhattan as a destination city within the Midwest, a place where one can simultaneously experience what life used to be like, and what it can be in the future.

With the completion of the Discovery Center and the Conference Center rapidly approaching, the time is now to begin building a transit system that would secure these investments long into the future. Cities of every size around the United States are implementing streetcar systems, and Manhattan should not be left behind.

Streetcars are a throwback to the past, but also a step into a sustainable future that ignites people's imaginations and developers' pocketbooks in ways that buses can't. Streetcars move us in more ways than from point A to point B. Perhaps someday soon their rumbling and clanging will be added to the soundtrack of the Little Apple.

Opposite: A streetcar in Aggieville, circa 2025.

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