CENTRAL TEXAS
Regional Mobility Autho

March 29 2017
AGENDA ITEM #14

Executive Director Comments

Strategic Plan Relevance:	Regional Mobility
Department:	Executive
Contact:	Mike Heiligenstein, Executive Director
Associated Costs:	N/A
Funding Source:	N/A
Action Requested:	Briefing and Board Discussion Only

Summary:

Executive Director Comments.

A. SH 71 Express opening.

B. Report on the Texas A&M Transportation Institute's high level assessment of the Wire One Austin Urban Gondola proposal led by CapMetro.

C. New employee introduction.

D. Report on the March 2017 investor meetings.

Backup provided: High Level Considerations for the Wire One Austin Urban Gondola Proposal; Wire One Austin Proposal; Joint Agency Letter

High-Level Considerations

for the

Wire One Austin Urban Gondola Proposal

Prepared by

TEXAS A&M TRANSPORTATION INSTITUTE

THE TEXAS A&M UNIVERSITY SYSTEM

for

CAPITAL METROPOLITAN TRANSPORTATION AUTHORITY

February 24, 2016

Table of Contents

List of Tables

List of Figures

EXECUTIVE SUMMARY

Wire One Austin is a proposed urban gondola system for implementation within the city of Austin. The Board of Directors for the Central Texas Regional Mobility Authority (CTRMA) saw a concept-level presentation during a meeting on September 7, 2016.

The purpose of this technical memorandum is to present a high-level perspective of the project development considerations for the Wire One Austin proposal. Given the preliminary and high-level nature of the work, this memorandum does not make any recommendations regarding the overall suitability of the gondola. The objective of the memorandum is to provide information for additional consideration in further feasibility studies. At this time, many unknowns exist about specific ridership estimates, design characteristics, and financial considerations. This knowledge is critical for determining the overall suitability of the project.

Wire One Austin would extend north to south on a corridor from the UT-Austin campus to West Slaughter Lane, mostly following Lavaca and South First Streets. Wire One would be a monocable gondola with multiple cabins that move using a single pulled rope, continuously operating for 19 hours per day. The system consists of two 4.2-mi main lines and a third 0.25-mi line that connects the South Congress Transit Center to South First Street. Passengers would access the service at one of 19 stations located along the route. The proposer estimates the total implementation cost to be $287-$555 million, based on a low-cost design alternative for stations ($13 million per station).

The United States has limited experience with gondolas operating in an urban environment. Specific agencies operate trams, but those systems are different compared to gondolas. Trams generally have two large cabins that move back and forth as opposed to gondolas with multiple cabins that move along a cable. The Roosevelt Island Tramway and Portland Aerial Tram are two domestic tram systems. The City of Telluride operates a gondola that provides passenger service between the city center and a ski resort. Recently, other cities and region in the U.S. have expressed interest and started to investigate urban gondolas as a potential mode for transportation. As of the date of this report, three cities—San Diego, California; Washington, D.C.; and Albany, New York—had completed urban gondola feasibility assessments that are publicly available. International experience and interest is more extensive, as seen by systems currently operating in South America, Europe, and Asia. The most extensive development has occurred in Medellin, Colombia with the Metrocable system and La Paz, Bolivia with the Mi Teleférico system.

Wire One Austin is a unique proposal compared to other urban gondolas. As proposed, Wire One is longer than systems currently in operation internationally or any proposed system in the United States. Overall, most gondolas worldwide extend for 0.5 to 3.0 mi and have up to five intermediate stations in addition to 2 terminals. Almost all other systems either cross a river, traverse a steep slope, or connect neighborhoods with a poorly connected street grid. Wire One is longer, consists of more stations, and generally follows a flat slope through a well-connected street grid.

Central Texas transportation agencies would have to address a number of project development considerations before evaluating future funding opportunities. These considerations include topics related to regional and corridor-level planning, travel demand forecasting, and funding and financial options. The Wire One proposal is not included in the CAMPO 2040 Regional Transportation Plan or any transportation plans for the region. For the urban gondola to be eligible for federal funds, the regional transportation plan would require modification and the travel demand model would likely need to adapt to include a new mode. Most sources of funding for local, state, and federal funding programs are competitive. Given a limited source of revenue, an investment in an urban gondola will likely require reprioritizing other projects.

Other key considerations relate to environmental impacts, design, and constructability. Studies that pursue funding need to clearly define a purpose and need to comply with the National Environmental Policy Act and the Texas Administrative Code, which require the assessment of potential environmental impacts for transportation projects. Specific items that may have a high risk of significant environmental impact include visual aesthetics, public parks and recreational lands, and utility relocation. A few overhead utilities currently exist above Lavaca and South First Streets and would have to move to support construction and operation. Subsurface utilities necessitate additional research and investigation.

Much of the success of a new transit mode is how the public would react and use the service. Wire One Austin would be would be a unique project in the U.S. for use of the urban gondola mode for a transit commuter corridor.

INTRODUCTION

Wire One Austin is a proposed urban gondola system for implementation within the city of Austin. A concept-level plan for Wire One Austin was presented before a meeting of the Central Texas Regional Mobility Authority (CTRMA) Board of Directors on September 7, 2016. The presentation included mock-up graphics of Wire One Austin as an operational system. The visuals depicted stations where passengers could board and alight and scenes with the gondola operating above existing streets. Included in the presentation was a map of the route location, estimates for travel time (to travel to stations and along the gondola line), ridership assumptions, and construction estimates. The premise for a gondola as a high-capacity transit alternative was to provide continuous service, significantly curtail right-of-way acquisitions, and provide a service that could operate independently of roadway congestion. Additionally, Wire One Austin is a mode that might encourage more users to take transit due to having an aesthetic design and providing a scenic view for travelers.

The purpose of this technical memorandum is to present a high-level perspective of the project development considerations for the Wire One Austin proposal. Given the preliminary and high-level nature of the work, this memorandum does not make any recommendations regarding the overall suitability of the gondola. The objective of the memorandum is to provide information for additional consideration in further feasibility studies.

This memorandum organizes information into different sections to provide a clear description of the proposed urban gondola system, background about similar systems worldwide, and discussion of items that need further consideration if the Wire One Austin proposal continues into project development. The presentation from the meeting with CTRMA was distilled into key topics that pertained to system design, basic operating concepts, alignment, and costs. A background on U.S. experience presents information regarding the two aerial trams in operation and proposals for urban gondola systems. Included tables list key attributes for international gondola applications, summarizing features including length, number of stops, hours of operation, and daily ridership. Some of the items that will need further feasibility analysis include estimates of costs, possible funding sources, operations planning and ridership forecasts, design and constructability, and environmental considerations.

TERMINOLOGY

Aerial **ropeways** transport passengers suspended in the air and generally consist of terminals, towers, ropes, and evacuation components. Enclosed cabins carry passengers between destinations, and can hold between 4 and 200 people. Terminals exist at the ends of the ropeway and house the equipment used to power the movement of the ropeway. Terminals exist as either drive or return terminals. The drive terminal houses the drive wheel that powers the movement of the ropeway. The return terminal houses the bull wheel that acts as a return mechanism for the ropeway. Intermediate stations allow passengers to board or leave the ropeway in the middle of the route. Towers between the terminals support the ropeway, often with steel-framed structures and guiding wheels. A series of ropes and cables controls movement. Ropeways can support cabins by using a single cable or multiple cables.

Evacuation systems provide an element of safety and redundancy to protect passengers in the event of an incident. Most aerial systems have a rope and harness inside individual cabins to provide a means for escape. Ancillary power units located at the terminals can engage when the primary power source fails. Standards for aerial ropeways help to ensure safety and consistency with smooth operation. The American National Standards Institute (ANSI) Standard B77.1-2011 details the technical specifications for operating components of an aerial ropeway system. The ANSI standard specifically uses the phrase *passenger ropeways* to describe this transportation mode. The standard also contains language that applies to the Americans with Disabilities Act (ADA).

Aerial ropeways are a class of mass transit that entails different variations, including tramways and gondolas. **Tramways** are aerial lifts that consist of two multi-passenger cabins fixed to a suspended cable. Track cables provide physical support for the cabins, and haulage cables pull the cabin along the route. Tramways operate by pulling one cabin toward the powered engine and allowing gravity to push the second cabin away—similar to a back-and-forth seesaw. Some tramways can have dual-haul systems that allow different sides of the cable to operate independently of the other cabin. Cabins for tramways can hold up to 200 people. Operators usually have large cabins because the ropeway can serve only two cabins.

Gondolas consist of a ropeway that moves multiple enclosed cabins along a unidirectional loop. Cabins for gondolas are smaller compared to tramways. The speed of the main cable can be up to 19 mph. Gondolas are designed with cabins that can detach from the main line at terminals and intermediate stations. This capability allows cabins to move slower or stop at specific points along the route. Slower speeds allow passengers to move easily into or out of cabins.

Detachable gondolas exist in one of three different types, as characterized by the number of overhead cables supporting and pulling the cabins. A monocable gondola uses a single cable to support and pull the cabin. Bicable and tricable gondolas are supported by one and two fixed cables, respectively, and an additional cable pulls the gondolas. The number of cables influences the cabin capacity, speed, and maximum acceptable distance between supporting towers. Generally, systems with more cables tend to have larger cabins, move faster, and have a greater distance between towers. Tricable systems are the most resistant to wind but require more infrastructure when navigating horizontal curves. Overall, systems with more ropes (bicable, tricable) tend to be more expensive compared to a monocable (*1*). Specific cost comparisons between the different gondola types are not reliable because other characteristics have a greater influence on overall cost, namely the number of cabins and the design of individual stations. Table 1 provides a summary of the service characteristics for the three types of gondola systems.

Table 1. Service Characteristics of Gondola System Types (*1*)

Type of System	Monocable	Bicable	Tricable
Cabin Capacity	15 passengers	16 passengers	35 passengers
Transport Capacity	3,600 passengers/hour	3,600 passengers/hour	6,000 passengers/hour
Maximum Travel Speed	13 mph	13 mph	19 mph
Maximum Distance Between Towers	1,150 ft	2,300 ft	9,800 ft

Gondolas are most often associated with ferrying tourist traffic within ski resorts, historical sites, and other attractions. However, cities and governments have started to implement gondolas within urbanized settings as an alternative means for transit. Urban gondolas operate above the existing street network and function similarly to rail transit. Passengers access stations at ground level and walk or use escalators and elevators to an elevated platform where they can board cabins. Urban gondolas operate within cities worldwide.

WIRE ONE AUSTIN

The concept for Wire One Austin is a monocable urban gondola system to operate within the city of Austin. The system consists of multiple cabins that move along a route using a single pulled rope, providing passenger access at stations. The hours of operation suggest continuous movement for 19 hours per day, with a few hours set aside for recurring maintenance. Personnel would be assigned at stations to assist passengers with boarding and alighting. The proposer selected a monocable urban gondola system because that type of system was less expensive compared to other systems.

The proposed alignment is on a corridor that extends north to south from the University of Texas (UT-Austin) campus to West Slaughter Lane, mostly following Lavaca and South First Streets. Wire One Austin crosses a water boundary at Lady Bird Lake, which is a natural barrier that leads to congestion for major regional corridors. These corridors include highway segments identified by the Texas Department of Transportation (TxDOT) as the most congested in Texas: I-35, MoPac (Loop 1), South Lamar Blvd, and SH 360 (*2*). The real estate necessary for the gondola is anticipated to be in a public right of way controlled by the City of Austin, as well as private building owners if modifications of existing buildings are required. The system consists of two 4.2-mile main lines and a third 0.25-mi line that connects the South Congress Transit Center to South First Street. Passengers can transfer between the three lines through a midpoint transfer station at Ben White Blvd (US 290).

The proposer primarily chose the route location based on the number of homes close to the line. The hypothesis suggests that commuters would be inclined to take a 1- to 2-mi trip to a station and ride the urban gondola. The geographic area of the catchment area would include residents in the south Austin, as shown in Figure 1. Additionally, the route alignment includes key activity destinations such as City Hall, Parmer Events Center, Capital Complex, and UT Austin. Proposed stations will exist near a number of public schools.

In total, the system proposes 19 stations for passenger access to the gondola. Passengers enter and leave slow-moving gondola cabins at each station. The passenger stations would be placed every half-mile at major arterial crossings, such as William Cannon Drive, Stassney Lane, and Oltorf Street. The locations where the route would turn (to follow street curves) is a major factor for determining the number of stations and station locations. Turns need to be navigated slowly because a gondola can deflect and cause passenger discomfort. At stations, the gondola can detach from the main drive cable and move at a slower speed to provide passengers the time for boarding and alighting.

According to the Wire One proposal, built infrastructure would support the urban gondola along the route. Elevated platforms are proposed to be built into existing structures where feasible. Existing parking garages could link to constructed platform structures to accommodate the gondola, serving as an enhanced park-and-ride service. A series of steel towers and concrete structures above the street would connect the cable along the route. Individual ADA-compliant cabin cars expect to have climate control equipment, for both heating and cooling.

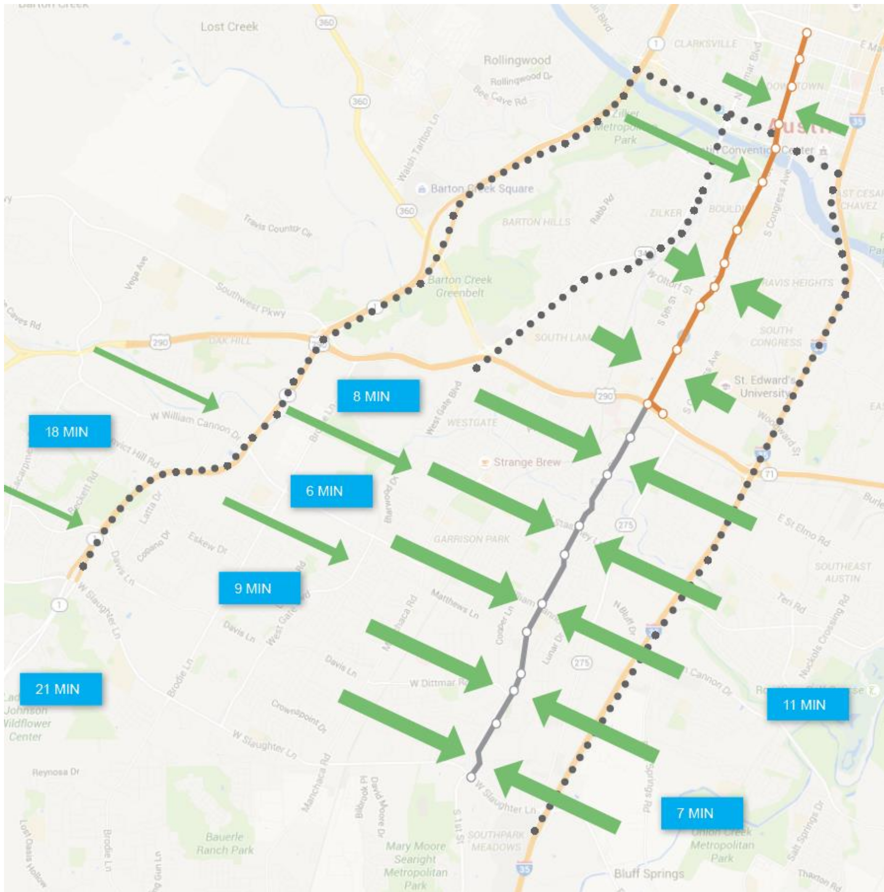

Figure 1. Map of Route and Catchment Area (*3*)

Specifically, the cited attributes of the Wire One Austin proposal include the following:

- Line Length: Two separate, 4.2-mi lines that interconnect (total length of 8.4 miles), plus a short 0.3-mi third line that connects the South Congress Transit Center to South First Street for a total of 8.7 mi.
- Number of Stops:
  - 11 stops, from UT-Austin to Ben White
  - 9 stops, from Ben White to Slaughter Lane
  - Total of 19 stops along the length of the corridor
- Travel Time:
  - 40 minutes from Slaughter Lane to Caser Chavez Street.
  - 6 minutes from Caser Chavez Street to UT-Austin.
- Average Travel Speed: 11.3 mph.
- Boarding Time: 12 seconds.
- Cabin Capacity: 10 people per cabin.
- Peak Frequency: 30 seconds between cars.
- Operational Capacity: 1,200 (base) to 3,000 (peak) persons per hour per direction (pphpd).
- Hours of Operation: Daily 19 hours per day.
- Ridership: 5.9 million per year, or daily average of 16,000 riders.
- Capital Cost for Implementation: $287–$555 million.
- Annual Operating Cost: $3–$6 million.

The proposer made many assumptions to derive estimates of ridership, costs, and financing arrangements for Wire One Austin. Supply-side assumptions for line speed, headway, and cabin capacity formed the basis for estimating a daily average ridership of 16,000 people per day. The proposer suggested a targeted ridership of 1,200 people in each direction during peak periods, with lower demand during off-peak times. The research team did not have access to detailed, written values that represented ridership predictions from the proposer. That estimate did not include a thorough consideration of demand, or an analysis of the market forces and behaviors governing trip-making decisions.

Pursuit of a low-cost design alternative formed the basis for estimating the capital cost of implementation. The proposer based most of their cost estimate on the number of 19 expected stations along the route at roughly $13M per station. Additional costs would be required to purchase individual cabins (including spares), aerial cables, towers, and a cable car storage facility. Those basic assumptions formed the proposer’s low estimate of $287M. The proposer factored their estimate of unforeseen challenges to derive a high cost estimate of $555M. Projected maintenance costs estimates ranged from $3 to $6 million per year. The proposer based their estimates using information from North American manufacturers for a theoretical system without a detailed operating plan.

Additionally, the proposer believed they could construct stations at a lower cost compared to other recently implemented urban gondola systems. Public-private partnerships could be pursued by seeking arrangements for stations at parking garages and other locations along the route. The proposer suggested CTRMA-issued bonds might support a possible funding source for construction. The completed project could be turned over to Capital Metro for operations. Revenues from fares would serve as a long-term funding source. The research team sought additional detail regarding the cost estimates, financing, and maintenance implications for Wire One Austin, but the proposer had not made that information, or their calculation methodology, available at the time of this report.

Additionally, the following financial-related items may need further clarification or consideration:

- Specific detail for constructing stations in Austin, as opposed to generic estimates.
- Specific detail for operating costs, including a staffing plan and assumptions for personnel costs.
- Specific detail for capital maintenance costs for annual investment in a state of good repair.
- Fare schedule and fare-setting processes (e.g. compliance with federal regulations).
- Utility and tower relocation costs.
- Necessary right-of-way costs.
- Environmental mitigation.
- Financial plan for source of funding for construction and operations.

Figure 2 shows a map with the proposed route and station locations. Figure 3 illustrates a gondola operating above South First Street, and Figure 4 illustrates an overhead station at the intersection of Riverside Drive and South First Street.

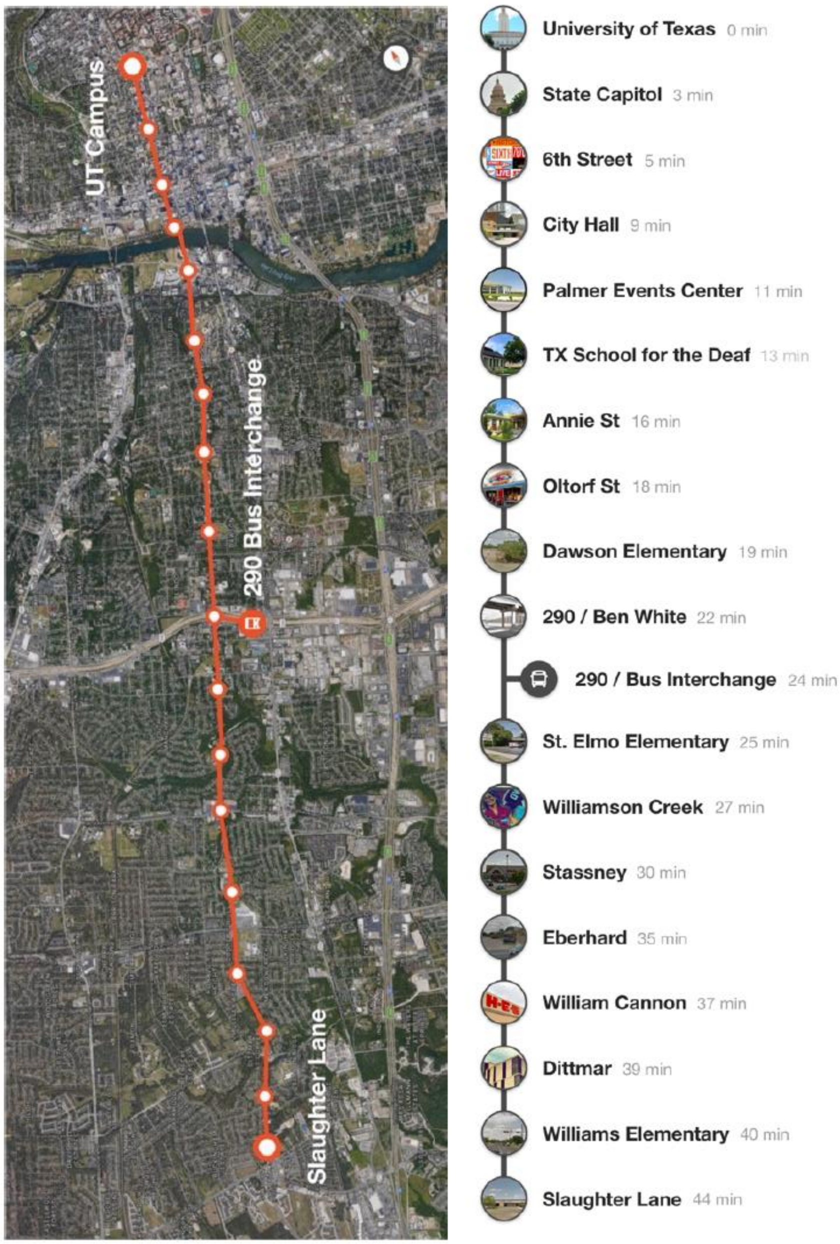

Figure 2. Map of Route and Stop Locations (*3*)

Figure 3. Illustration of a Gondola Operating Above South First Street (*3*)

Figure 4. Illustration of Overhead Station at Riverside Drive and South First Street (*3*)

U.S. EXPERIENCE

Nationally, the United States has limited practical experience with ropeways. The Roosevelt Island Tramway, implemented in 1976, is one of the oldest ropeways that currently operates. Within the past decade, a tram was implemented in Portland, Oregon and an urban gondola started carrying passengers in Colorado. As noted earlier, aerial trams and gondolas are two different types of ropeway systems. Aerial trams typically consist of two large passenger cabins that alternate positions between the two terminals on the line. Urban gondolas have multiple passenger cabins that move along a rope or multiple ropes. The City of Telluride operates a gondola that provides passenger service between the city center and the ski resort. The Telluride system was an alternative to an existing bus service. As of the date of this report, three cities—San Diego, California; Washington, D.C.; and Albany, New York—had completed urban gondola feasibility assessments that are publicly available.

Aerial Trams in Operation

Aerial trams currently operate in Portland, Oregon and Roosevelt Island in New York City. These trams carry more passengers per cabin compared to gondolas, but only two cabins move when the system operates. Table 1 lists the key features and operating characteristics of those two trams.

Portland Aerial Tram

Planning for the Portland Aerial Tram began in 1999 after the Oregon Health and Science University (OHSU) created a new campus in a different neighborhood to accommodate future growth. Existing roads and transportation services did not provide for easy transit between the two campuses, so OHSU officials studied ways to solve the problem. A study found that an aerial tram was the most cost-effective alternative given the steep incline and the anticipated ridership for the service. The tram crosses a state highway, an interstate highway with frontage and service roads, and local streets. Construction began in August 2005, and the service opened to the public in January 2007 (*4*).OHSU provided $40 million as a contribution toward the $57 million needed for construction costs since most of the passengers were either employees, patients, or visitors to the OHSU campuses. A significant share of the construction cost was to build the large station platforms and to buy two large cabins (*5*). The City of Portland operates the tram. In 2014, the latest year with available information, the total cost to operate the system was less than $2.3 million. The tram collected $495,000 from fare revenues, or 21.9 percent of the total operating cost (*6*).

Roosevelt Island Tramway

The development of the Roosevelt Island Tramway had a longer, incremental history. The system began in 1976 as a temporary means of transporting people between Manhattan and Roosevelt Island. However, the tram was very popular and became a permanent facility in 1989. The Roosevelt Island Operating Corporation, a public benefit corporation created by New York State, operates the tram. The payment systems for the tram integrate with the MetroCard fare card, managed by the New York Metropolitan Transit Authority. Additional fare to transfer to a connecting subway or bus route is not required. A modernization project started in March 2010 that converted the tram to a dual-haul system, allowing for schedule flexibility and enhanced maintenance scheduling (one side can close while the other side is open) (*4*). The total cost of the 2010 capital project was $25 million, of which $15 million came from a New York State grant (*7*). The tram generated $5.5 million in revenue for the fiscal year that ended in March 2016 (*6, 8*).

Proposed Urban Gondolas

Recently, some cities and regions have expressed interest toward investigating urban gondolas as a potential mode for transportation. Table 2 summarizes key attributes of the proposed urban gondola systems in the United States that had initial assessments and reports.

San Diego

In 2015, the San Diego Association of Governments and Metropolitan Transportation System completed an initial proof-of-concept feasibility study for a proposed urban gondola line between San Diego Bay and Balboa Park. The proposed urban gondola will travel roughly 2 mi and have four stations (including the terminals at each end). The report evaluated the existing conditions, assessed market demand, and provided estimates for implementation costs and farebox revenue. Further steps outline requirements to assess engineering design, environmental considerations, and regulatory issues (*9*).

Washington, D.C.

In the Washington, D.C., metro region, a collective group of businesses and government agencies completed a feasibility study in November 2016 for a proposed gondola system. The District of Columbia Department of Transportation and Arlington County were included as members of the study executive committee. The proposed line would provide service over the Potomac River between the Georgetown neighborhood in the District of Columbia and Rosslyn in Virginia. A major reason for pursuing the study was to consider a low-cost alternative for crossing the river. Preliminary cost estimates for a second Metrorail tunnel under the river were $2.5 billion, with a construction timeline of 12–16 years. The study focused on planning elements related to delivering transportation projects, including stakeholder engagement, travel demand forecasting, and environmental compliance. A detailed technical analysis primarily focused on route alignment and placement of the terminals and towers (*10*).

The travel demand forecasting assessment for the Washington, D.C., gondola utilized the travel demand model from the regional planning organization to estimate potential ridership and the impacts and changes in transit shed accessibility (defined as the geographic area served by transit). Within the model, the gondola route was either a similar light rail or bus rapid transit service for five specific alternatives. The highest ridership estimate derived was 15,600 people per day for a similar rail service, and the lowest estimate was 6,100 people per day for a similar bus rapid transit service. Overall, the study concluded that building and operating a gondola system would be feasible and increase transit options. No fatal flaws were identified. The estimated cost for design and construction was $80–90 million, based on similarities to the currently operating Emirates Line in London, England (*10*). In February 2017, The Arlington County Board of Supervisors declined to approve any additional funding to study and assess the urban gondola, citing concerns about the long-term value of the project and other transportation needs (*11*).

Albany, NY

In Albany, New York, an engineering firm completed a technical feasibility study in October 2016 to implement an urban gondola. The study focused more on engineering design practicality compared to the planning-based analysis for the Washington, D.C., study. The professionally licensed engineering firm and various gondola equipment manufacturers provided financial support for the study. The engineers have prior experience designing and constructing similar systems for clients in the entertainment business, including theme parks and casinos worldwide. The proposed gondola would extend for a distance of 1 mi across the Hudson River, connecting the Empire State Plaza to the Rensselaer Train Station. Three stations would operate along the route. The full build option had an estimated cost of $30 million to plan, design, fabricate, construct, and inspect—a very low amount compared to other operating systems. However, the report authors identified a number of considerations not easily found in other literature and research. These considerations include:

- Equipping cabins with air conditioning reduces cabin capacity from eight to six people. The increase in total cabin weight reduces the person-carrying capacity.
- Personnel required for recurring operations and maintenance is considerable. Job descriptions include roles for a general manager, duty/shift manager, mechanical/electrical technician, operator, and administrative assistant (*12*).

INTERNATIONAL EXPERIENCE

The number of installations of urban gondolas has increased internationally within the past decade. These ropeways can be found across multiple continents, including South America, Europe, and Asia. Most gondolas either cross a body of water, traverse a steep incline, or ferry travelers over a poorly connected street network. Existing literature and reports find the appeal for gondolas to stem from having a limited footprint, flexible network design, lower construction cost, and appealing aesthetics (*4*). Overall, urban systems tend to have similar design and operating characteristics: traveling short distances of less than 4 mi and average speed of 9 to 17 mph. The median operational capacity for gondola systems is 3,000 pphpd. Table 2 and Table 3 summarize key attributes for a sample of urban gondola systems throughout the world. Features for listed systems include cabin capacity, daily ridership, construction cost, and average passenger fare per trip. Most of the listed gondolas are monocable systems.

Medellin, Colombia

The most extensive development has occurred in South America, particularly the Metrocable system in Medellin, Colombia, and the Mi Teleférico system in La Paz, Bolivia. The Metrocable currently has three operating lines (Lines J, K, and L), and two additional lines are under construction (Lines H and M). Two gondola lines (Lines J and K) functions as a commuter service that connects travelers directly to the existing rail system. Line L serves as an extended tourist route of Line K by connecting residents to a large park located in the periphery of the urban area. The first line of the Metrocable stated operating in 2006 (Line K), with Lines J and K starting in 2008 and 2010, respectively. The city, regional transportation agency, and provincial government supported construction costs (*13*).

The goal of the Metrocable was to improve connectivity across distinct neighborhoods within the city (*14*). A private bus company that infrequently traveled in the area only served one of the neighborhoods connected by the gondola. Prior to the gondola, other neighborhoods could expect a 2 to 2.5-hour commute time to travel to the center of the city. After construction, the city center commute reduced from 1–1.5 hours (4). After opening, demand for the Metrocable caused long lines to form at stations during peak times. Line K serviced roughly 43,000 passengers per day during 2013 (*15*).

La Paz, Bolivia

In 2014, the Mi Teleférico began operations in La Paz, Bolivia—advertised as the largest and most extensive urban gondola system in the world. The system currently functions as three separate lines (Red, Yellow, and Green) that individually range in distance from 1.5 to 2.4 miles. The total length of all three lines is 6.2 mi. Two of the lines (Yellow and Green) connect through a transfer point. The cost to construct the first phase of the Red, Yellow, and Green lines was $234 million, which included construction of 11 stations serviced by lines with 427 individual cabins. After a couple years of operation, reliability was within a range of 98–99 percent for all three lines. Cabins arrive at stations in intervals of 12 seconds, and the system operates 17 hours per day (*16*).

Table 2. Representative Worldwide Urban Gondola Systems and U.S. Trams

System Name		City	Country	Opening Year	Line Length (miles)	Average Speed (mph)	Number of Stations	Number of Cabins in Service	Cabin Capacity	Peak Frequency (seconds)	Operational Capacity (PPHPD)
Proposed											
Wire One Austin		Austin, TX	USA	*Proposed*	8.7[1]	TBD	19	TBD	10	12	1,200
Capital District Gondola		Albany, NY	USA	*Proposed*	1.0	14	3	TBD	8	24	2,400
Bay to Balboa Park Skyway		San Diego, CA	USA	*Proposed*	2.0	14	4	141	8	12	2,400
Georgetown—Rosslyn		Washington, DC	USA	*Proposed*	0.7	10	2	TBD	10	60	TBD
Currently Operating Gondolas											
Cable Constantine		Constantine	Algeria	2008	0.9	13	3	35	15	22.5	2,400
Mi Teleferico	Red Line	La Paz	Bolivia	2014	1.5	11	3	427 (3 lines)	10	12	3,000
	Green Line	La Paz	Bolivia	2014	2.4	11	4		10	12	3,000
	Yellow Line	La Paz	Bolivia	2014	2.3	11	4		10	12	3,000
Complexo Do Alemao		Rio De Janeiro	Brazil	2011	2.1	13	6	152	10	12	3,000
Metrocable	Line K	Medellin	Colombia	2006	1.2	11	3	93	10	12	3,000
	Line J	Medellin	Colombia	2008	1.7	11	4	119	10	12	3,000
	Line L	Medellin	Colombia	2010	2.8	14	2	27	10	65	1,200
Emirates Air Line		London	England	2012	0.7	13	2	34	10	30	2,500
Koblenz Cable Car		Koblenz	Germany	2010	0.6	12	2	18	35	34	3,700
Ngong Ping Cable Car		Hong Kong		2006	3.5	17	2	112	17	18	3,500
Mexicable		Mexico City	Mexico	2016	3.0	11	7	190	10	12	3,000
Singapore Cable Car		Singapore	Singapore	1974; 2010[2]	1.0	9	3	81	6	15	1,400
Telluride Gondola		Telluride, CO	USA	1996	2.5	11	3	32	8	30	480
Metrocable—San Agustin Line		Caracas	Venezuela	2010	1.1	11	5	70	10	12	3,000
Currently Operating Aerial Trams											
Portland Aerial Tram		Portland, OR	USA	2007	0.6	22	2	2	79	300	936
Roosevelt Island Tramway		New York, NY	USA	1976; 2011[2]	0.6	18	2	2	110	450	1,500

Note: TBD = to be determined. PPHPD = Persons Per Hour Per Direction.

[1]*Wire One Austin includes two separate 4.2-mile lines and a 0.3-mile third line for a total distance of 8.7 miles.*

[2]*Roosevelt Island Tram and Singapore Cable Car underwent major renovations in 2011 and 2010, respectively.*

Table 3. Additional Characteristics of Representative Urban Gondola and Tram Systems

System Name		Clock Hours in Operation Daily	Daily Ridership	Main Topographic Feature	Construction Cost ($USD, in millions)	Fare (one-way ride unless noted)	Type of Gondola
Currently Operating Gondolas							
Cable Constantine		17	7,000	Deep valleys	NA	NA	Monocable
Mi Teleferico	Red Line	17	60,000 (all three lines)	Steep terrain/ Poor connectivity	$234 million (all three lines)	$0.43	Monocable
	Green Line						
	Yellow Line						
Complexo Do Alemao		12–15	NA	Deep valleys	$74 million	$1.50[1]	Monocable
Metrocable	Line K	13–18.5	43,000	Steep terrain/ Poor connectivity	$24 million ($2003)	$0.50	Monocable
	Line J	13–18.5	22,000	Steep terrain/ Poor connectivity	$47 million ($2007)	$0.50	
	Line L	13–18.5	NA	Steep terrain	$21 million ($2009)	$2.00	
Emirates Air Line		13–15	4,000–6,000	Body of water	NA	$4.25	Monocable
Koblenz Cable Car		8–10.5	NA	Body of water	$20 million ($2010)	$6.85	Tricable
Ngong Ping Cable Car		8–9.5	4,200	Body of water	NA	$24[1]	Bicable
Mexicable		15–19	NA	Poor connectivity	$87 million ($2016)	$0.30	Monocable
Singapore Cable Car		13.25	2,000–4,000	Deep valleys	NA	$24	Monocable
Telluride Gondola		16	NA	Steep terrain	$16 million ($1996)	$0	Monocable
Metrocable—San Agustin Line		NA	2,000–3,000	Steep terrain/ Poor connectivity	$18 million	NA	Monocable
Currently Operating Aerial Trams							
Portland Aerial Tram		8-16	3,800	Steep terrain	$57 million	$4.55[1]	
Roosevelt Island Tramway		18-19.5	4,000	Body of water	$6.25 million (1968; $22.6 million in $2006)	$2.50	

Note: NA = not available.

[1]Round trip fare.

PROJECT DEVELOPMENT CONSIDERATIONS

This section provides a summary of the items that need further consideration if Wire One Austin continues into project development. These items could be addressed in a detailed feasibility assessment that provides a more rigorous review of the urban gondola system. Specifically, topics addressed in this section are regional planning, travel demand forecasting for ridership estimates, corridor-level planning, design and constructability, environmental assessment, estimates of costs, and project funding options. The order of the topics does not represent relative importance.

Regional Planning

The Capital Area Metropolitan Planning Organization (CAMPO) produced the *CAMPO 2040 Regional Transportation Plan* that identifies how the region intends to invest in the transportation system. Updates to the regional plan occur every 5 years. For projects included in the regional transportation plan to be eligible for federal funding, federal law requires that the plan "include both long-range and short-range program strategies/actions that lead to the development of an integrated intermodal transportation system that facilitates the efficient movement of people and goods." The regional transportation plan is prepared through an approach that considers how roadways, transit, non-motorized transportation, and intermodal connections are able to improve the operational performance of the multimodal transportation system.

The Wire One proposal is not included in the CAMPO 2040 Regional Transportation Plan or any current modal transportation plans or transportation planning scenarios for the region.[1] The urban gondola mode has not been evaluated as a transit technology compared to bus rapid transit or urban rail. The proposed alignment along South First Street/Lavaca Street from West Slaughter Lane to UT-Austin has not been previously identified for a fixed guideway transit investment.

The presentation for Wire One Austin emphasized the strengths of the gondola system:

- Continuous operation.
- Capacity at 1,200 PPHPD (with the ability to increase to 3,000 PPHPD with additional cabins in operation).
- Opportunity for multi-modal connections.
- Limited footprint for towers between the terminals to support the guideway.
- Ability to incorporate design (towers, stations) into the urban built environment.
- Lower capital cost for infrastructure (towers, terminals) compared to other modes of fixed guideway.

This high-level review does not address specifics about how an urban gondola in the proposed corridor might affect the regional transportation system. Principally, this review does not entail an evaluation of baseline regional planning data and scenario analyses. A more-detailed corridor-level planning study can address these topics:

- How an urban gondola would compare to other modes of transit in a similar corridor (i.e., capital development costs, operating and capital maintenance costs, ridership, environmental assessments).
- How an urban gondola might affect the corridor (traffic and land use).

[1] City of Austin 2025 Austin Metropolitan Area Transportation Plan and 2016 Mobility Bond Program; Travis County Master Transportation Plan; Capital Metro Connects 2025.

- How an urban gondola would address mobility challenges (traffic congestion).
- How an urban gondola system would integrate into the transportation network and influence regional mobility—specifically, how an urban gondola or any fixed guideway investment in this corridor, would affect ridership on existing transit services.

Travel Demand Forecasting for Ridership Estimates

A travel demand model is a mathematical process used to forecast travel behavior and demand for a specific period based on a number of assumptions. A model relies on population and employment data, land use, and transportation network characteristics to simulate trip-making patterns throughout the region. As in most large urban areas, the travel demand model for the Austin region follows the four steps of trip generation, trip distribution, mode choice, and traffic assignment. In general, travel demand forecasting assists decision makers in making informed transportation planning decisions. The strength of modern travel demand forecasting is the ability to ask critical what-if questions about proposed plans and policies. CAMPO and TxDOT maintain a state of the practice regional travel demand model for the 6-county CAMPO planning area.

The CAMPO model was not used to forecast ridership for the Wire One proposal. Based on the proposal, 1,200 to 3,000 pphpd was the estimated range for ridership. The primary factor for that range was potential carrying capacity, dependent on cabin size and operating frequency—not forecasted ridership. Travel demand forecasting can predict ridership based on an analysis of demand in a corridor. For the proposal, the base assumption of potential ridership was the number of persons per hour that could be carried by a specific type of system (one cable), cabin size (10 passengers), and operating frequency (12 second headway).

Adding the urban gondola would require modification of the travel demand model to include a new mode. Adding any new mode—even a traditional light rail service—into a regional model can be a significant investment in time and money. The travel forecasting community has little experience with the type of urban gondola and associated context as proposed. Lack of knowledge limits the ability of analysts to develop modeling parameters based on existing operational systems. For scenarios with limited knowledge, modelers have to input assumptions about characteristics of potential users (market), physical operating conditions, modal competitiveness, and network interaction at origin and destination locations (e.g. parking, access). Transportation analysts could represent the new service as a fixed guideway by making assumptions about model parameters representing operating attributes, typical wait times, and specific subjective elements (e.g. reliability and comfort). However, if the new service intends to serve a tourist market, travel demand models typically are not capable of useful forecasts without extensive special studies and data collection.

Key considerations within the CAMPO regional travel demand model include:

- Addition of a new mode to the mode choice component would require recalibration of the model.
- User data to calibrate the model is not available in the local context. Assumptions based on reasonable comparison with other modes would be required.
- The regional travel demand model could help to predict typical daily travel activity by Austin residents, such as commuter (or worker) ridership. Special studies and data collection would be required to forecast tourist ridership.
- Use of the regional model requires an understanding of competing modes, residential and employment growth, network connectivity, and operating characteristics.

Corridor-Level Planning

Corridor studies offer the focus needed to develop service strategies and to examine alternative modes, alignments, station locations, termini, and so forth at an appropriate scale for decision-making. Although the Moving Ahead for Progress in the 21st Century Act (MAP-21) removed the federal requirement for stand-alone corridor level alternatives analysis studies, the Federal Transit Administrative (FTA) alternatives analysis framework still offers one model for conducting corridor-level planning studies to reach decisions on the mode for a transit project. Corridor-level transit planning following similar approaches is widely practiced around the world. The alternatives analysis framework for corridor-level planning studies includes the steps shown in Figure 5 (*17*).

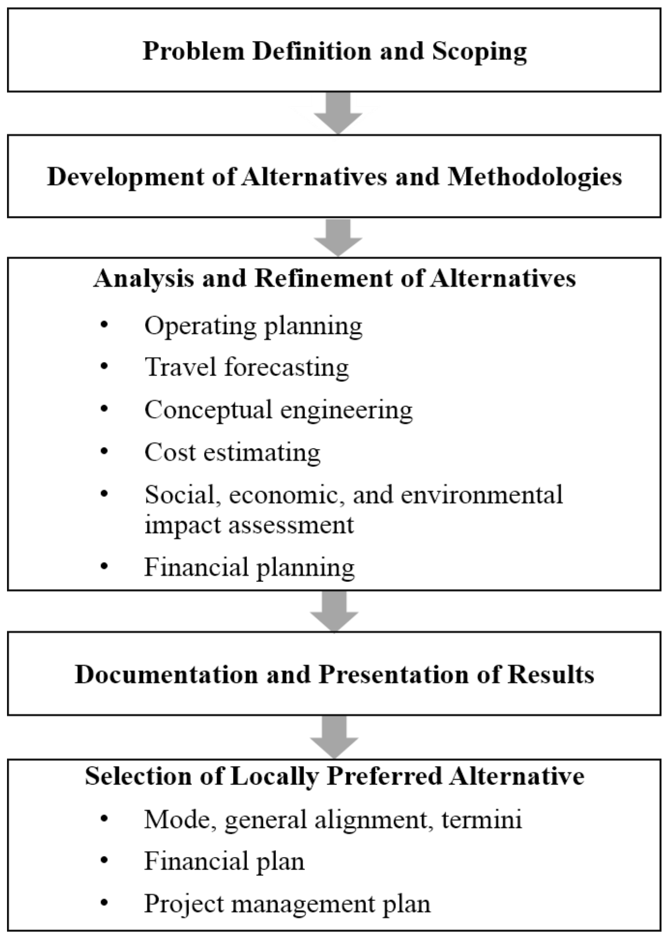

Figure 5. Technical Framework for Corridor-Level Planning Study (*17*)

Appropriate station area planning should assess station loading (the number of transit users who will access the station by any mode at peak periods), staffing by day of week and time of day, transit bus feeder services, and parking requirements. Station area planning includes evaluation of the impact of the new construction on adjacent land use. Station area planning will include an assessment for each of the categories of environmental impacts (discussed below) for each station.

Key considerations associated with corridor planning are:

- FTA's approval of a project into the subsequent engineering phase hinges on how well the project meets statutory criteria for project justification.

- Corridor and station area planning link directly to the National Environmental Policy Act (NEPA) process for environmental review.

Design and Constructability

The topic of design and constructability refers to the ability to build the proposed system within the recommended corridor. For Wire One Austin, considerations relate to whether the construction of station platforms and towers and the placement of cables will cause any expected or unforeseen challenges. A high-level review of design and constructability for Wire One Austin focused on probable need to relocate existing utilities in the corridor.

Wire One Austin would operate immediately above two existing street corridors with clearly defined dimensions and a number of existing utilities and services. The primary north-south 8.4-mi corridor consists of a section of Lavaca Street and South First Street. The Lavaca Street section is mostly a three-lane, one-way roadway with 11-ft travel lanes, a bus-only lane, and parallel parking lanes on both sides. The total right of way for the Lavaca section is roughly 70 ft wide. The bridge across the Colorado River is a six-lane facility with three 10-ft lanes traveling in both directions. The South First section consists of an urban two-way, four-lane facility with travel lanes that are 10 to 11 ft wide. The total right-of-way for the Lavaca section is about 60 ft wide for most of the corridor.

Electrical and telecommunication lines are visually apparent south of Riverside Drive on the eastern side of the corridor. Both sides of the corridor have aboveground utilities roughly 1 mi south of Riverside Drive. Figure 6 shows Wire One Austin operating above South First Street, near Powell Circle, before and after implementation. The pre-implementation image shows a number of aboveground utilities, in addition to overhead traffic control signals, that are not present in the image depicting Wire One Austin after implementation. Some consideration of the aboveground utility lines may need to include significant long distance electric transmission lines, not just distribution lines (i.e., lower voltage lines that connect to homes). Crossings with transmission lines may exist at Cesar Chavez Blvd, Ben White Blvd, Eberhart Lane, and West Slaughter Lane.

Figure 6. Illustration of Wire One Austin at the Intersection of South First Street and Powell Circle Before (Left) and After (Right) Implementation (*3*)

Additional considerations associated with design and constructability are:

- Most of the plainly visible utility installations are overhead electric and telecommunication lines installed on poles. Additional research is required to investigate subsurface utilities.
- A moonlight tower is located at South First Street and Monroe Street.
- A railroad crossing exists on South First Street just south of Radam Lane. Railroad crossings have the potential to be problematic during the environmental review process and for acquiring right of way.
- In downtown Austin, tall buildings are immediately near the right of way. For that section, it might be necessary to purchase additional right of way for towers and stations.

Environmental Impacts

Environmental considerations include a number of factors about the direct and indirect impacts of implementing a transportation project. These factors include impacts to existing transportation services, socioeconomic populations, biological resources, and air quality. Addressing environmental concerns mostly consists of regulatory compliance with federal and state statutes. NEPA, along with federal regulations and the Texas Administrative Code, requires the assessment of potential environmental impacts for transportation projects. A purpose and needs statement is one of the first items required to clearly define the objectives for the proposed project. The project must also be consistent with the CAMPO long-range regional transportation plan and transportation planning goals for the region.

Environmental Review Categories

Any project that may request federal funding has to undergo a NEPA analysis. Many state and federal transportation agencies provide resources and guides to help navigate the environmental review process. Table 4 lists the different NEPA environmental assessment categories for detailed review. Based on the anticipated impacts, each environmental assessment category links to a likely class of action. A class of action indicates the significance of the impacts and the resulting level of documentation that is required in the NEPA process.

- **Low** indicates the environmental category likely does not involve significant impacts and therefore the NEPA finding may be a categorical exclusion (CE).
- **Medium** indicates the environmental category likely will require an environmental assessment (EA) to determine the impacts and could result in a finding of no significant impact (FONSI) or require further environmental reviews if the EA finds significant impacts.
- **High** indicates the environmental category will likely require an environmental impact statement (EIS) for actions with significant impact(s).

For each category, the notation (low, medium, or high) represents the perceived risk of an environmental impact based on the Wire One Austin proposal. The perceived risk is a preliminary assessment based on the limited information provided in the presentation materials. Detailed site research was not performed.

Table 4. NEPA Environmental Assessment Categories

NEPA Environmental Assessment Categories	Perceived Risk of Environmental Impact
Right of Way/Displacements (Uniform Act) Is new right of way needed? Will businesses or people be displaced?	Medium
Land Use Impacts What is the land use and will it change near stations?	Low
Farmlands, Soils, Geology What are the soils/geology and how will it be affected, or affect the project?	Low
Utilities/Emergency Services Is utility relocation needed? Are emergency services impacted?	High
Bicycle and Pedestrian Facilities How will bicycle/pedestrian accommodation occur?	Low
Community Impacts, Social/Economic Impacts, Environmental Justice (EJ) Identify impacts on communities, neighborhood connectivity, EJ populations.	Medium
Visual/Aesthetics Impacts Identify impacts for line of sight, visual receptors, etc.	High
Cultural Resources (Archeology, Historic Properties) Identify impacts on historic structures and archeologic sites.	Medium
DOT Act Section 4(f) (Parkland), Land and Water Conservation Section 6(f) Identify impacts on public parks/parklands.	High
Water Resources (Clean Water Act, Wetlands, Floodplains, Wild and Scenic Rivers, Edwards Aquifer, Drinking Water Systems) Identify impacts on water resources, agency coordination, permitting, etc.	Low
Biological Resources (Vegetation, Wildlife, Threatened and Endangered Species) Identify influences on resources and habitats.	Low
Air Quality Demonstrate conformity and compliance.	Low
Hazardous Materials Identify sites and risks.	Low
Noise and Vibration Identify sources and receptors and assess impacts.	Medium
Greenhouse Gas Emissions and Climate Change Ensure compliance with requirements of the Council on Environmental Quality.	Low
Induced Growth/Indirect Impacts Follow TxDOT guidance on assessing induced growth and indirect impacts.	Medium
Cumulative Impacts Follow TxDOT guidance on assessing cumulative impacts.	Medium
Construction Phase Impacts Identify closures, disruptions, and traffic impacts during construction.	Medium

Visual Aesthetics

Based on an initial review, visual aesthetics is a high risk for adverse environmental impacts. A detailed assessment needs to determine if the gondola cables, towers, or stations might cause any adverse visual impacts. While some may find the aerial system visually appealing, others may perceive adverse impacts.

Specific assessments may be required for different views, potentially including the following examples:

- View of/from the State Capitol, including possible conflict with the City of Austin Capitol View Corridor ordinances.
- View across Lady Bird Lake.
- View from different land uses along South First Street.
- View of stations from adjacent neighborhoods.
- View from inside downtown high-rise buildings.

Assessments will be required for daytime and nighttime hours to assess the impact of lights and the ability of passengers in gondola cabins to see into taller buildings along the corridor. A significant privacy concern may arise if traveling passengers have the ability to see into personal residences. The overhead structures might also affect the visibility of existing traffic signals, requiring mitigation to avoid potential safety concerns in operation.

Public Parks and Recreational Lands

The category for public parks and recreational lands is potentially a high risk for adverse environmental impacts. The Department of Transportation Act of 1966 (DOT Act) Section 4(f) is the federal provision commonly cited for addressing publicly owned park and recreational areas. Generally, the provision requires federally funded projects to preserve the natural beauty of public parks, recreational lands, wildlife refuges, and historical sites. Any project that affects those types of lands must include a Section (4f) assessment prior to approval for implementation. Areas that may fall under Section 4(f) include the Colorado River (Lady Bird Lake) and the surrounding parkland. Any public land or park in the area that is touched or affected by the project may call for Section (4f) assessment.

Utilities and Right of Way

A previous section on design and constructability address the potential requirements for significant utility relocation and the possible need for right of way.

Medium-Level Risk of Environmental Impacts

The medium-level risks of environmental impacts include the impacts on existing communities, various socioeconomic populations, and historic properties. The impacts during construction may also create adverse impacts. Building a new high-capacity transit service through existing communities will likely have a significant impact on existing land uses around stations. New construction tends to develop incrementally within neighborhoods, with some land parcels redeveloping while others do not, creating impacts on existing communities. Another concern may be the noise generated by moving cables inside stations and along the route at towers.

Project Review Process

Each category and resource presents a different risk based on the project's setting, surrounding conditions, and receptors. Although an environmental assessment will eventually be required for each category, it is important to identify environmental risks as early as possible in the project development process. It is also necessary to document what risks or resources may not be present, referred to as negative declarations. For example, if there no known endangered species exist, or no farmlands present, the absence in the project corridor is important and requires documentation.

Estimates of Costs

The source for the estimate of capital costs to construct the Wire One Austin project is the proposer's *Wire One Austin Vision* document and the estimate of operating and maintenance costs in the presentation to the CTRMA Board in September 2016. The estimates present a range of costs based on the conceptual level of the proposal. More-detailed cost estimates will require additional project definition and a detailed operations plan. The Wire One proposer suggested that a possible funding source for capital construction is CTRMA-issued bonds. The completed project would then be turned over to Capital Metro for operations. The revenues from fares would serve as a long-term funding source.

Capital Costs

The estimated capital costs for implementation of the proposed Wire One Austin include cables, towers, 19 stations, and cabins to provide capacity for 1,200 (base) to 3,000 (peak) PPHPD. The estimate is a range of costs from $287 to $555 million to include aerial cables and towers, stations, cabins including spares, and a cable car storage facility. The estimate does not include right of way, environmental mitigation, or similar development expenses. A detailed capital cost estimate will depend on a more specific project definition that includes the schematics for the location and dimensions of each tower and station. The proposer's estimate of the capital costs did not include purchase of right-of-way. Purchase of right of way may be required for some towers and stations and could be required for parking. In addition, relocation of utilities, especially along South First Street, may involve costs not included in the proposer's allowance for that purpose.

Annual Operating and Maintenance Costs

The estimated annual operating and maintenance costs assumes the Wire One Austin system will operate daily, 19 hours per day, with a few hours of downtime each day for required maintenance. The estimate is a range of costs from $3 to $6 million per year, based on the proposer's estimates from previous work. A detailed operating and maintenance cost estimate will depend on a complete operations plan and more detail for the design of the Wire One Austin system to confirm the estimate for maintenance and repair expenses. The detailed operating and maintenance costs should include labor for staff (managers, operators, station attendants, and mechanics), preventive maintenance expenses, annualized cost for major maintenance and repairs, and energy costs.

Project Funding Options

One of the primary considerations for any transportation project is finding and securing approval for funding. The following section identifies several possible sources of funding for the Wire One Project. These funding sources are available conceptually; however, most sources of funding are competitive, at local, state, or federal levels. Without the regional transportation planning steps to identify need, model travel demand and mode choice, conduct corridor analysis, and evaluate alternatives, the financial feasibility of a gondola system is difficult to gauge. Given a limited source of federal, state, and local revenues, an investment in an urban gondola will require reprioritizing other projects.

A successful funding strategy may require multiple funding sources that might include innovative financing such as a public-private partnership. This section is organized by public sources of funding (federal, state, local), financing tools, project-generated revenues, and private sources of funding.

Federal Transit Administration

Federal funding for transit comes through the U.S. Department of Transportation (USDOT). Funding for USDOT is authorized by the Fixing America's Surface Transportation Act (FAST Act), approved by Congress in December 2015 to fund federal surface transportation programs from October 2015 through September 2020. The FAST Act provides funding for USDOT and its subsidiary agencies, including the Federal Transit Administration. FTA administers the different transit grant programs authorized under Title 49, Chapter 53 of the United States Code (USC).

Capital Investment Grant Program

The FTA discretionary Capital Investment Grant (CIG) program provides funding for fixed guideway investments (Chapter 53, Section 5309). Two categories of funding under CIG could apply to the Wired One Austin proposal:

- **New Starts** projects are new fixed guideway projects or extensions to existing fixed guideway systems with a total estimated cost of $300 million or more, **or** that seek $100 million or more in federal Section 5309 CIG program funds.
- **Small Starts** projects are new fixed guideway projects, extensions to fixed guideway systems, or corridor-based bus rapid transit projects with a total estimated capital cost of less than $300 million **and** that seek less than $100 million in federal Section 5309 CIG program funds.

Each category of funding has a unique set of requirements in the FAST Act. FTA must evaluate and rate all projects in accordance with statutorily defined criteria at various points during the development process. In order to be eligible to receive a construction grant, all projects must go through a multistep, multiyear process and receive at least a medium overall rating from FTA. For a New Starts project, the multistep, multiyear process consists of three steps, as illustrated in Figure 7. The first step is **project development**, the second step is **engineering**, and the third step is a **full funding grant agreement** for construction. The FAST Act specifies that New Starts projects are limited to a maximum federal Section 5309 CIG program share of 60 percent. The maximum contribution from all federal sources to a New Starts project is 80 percent.

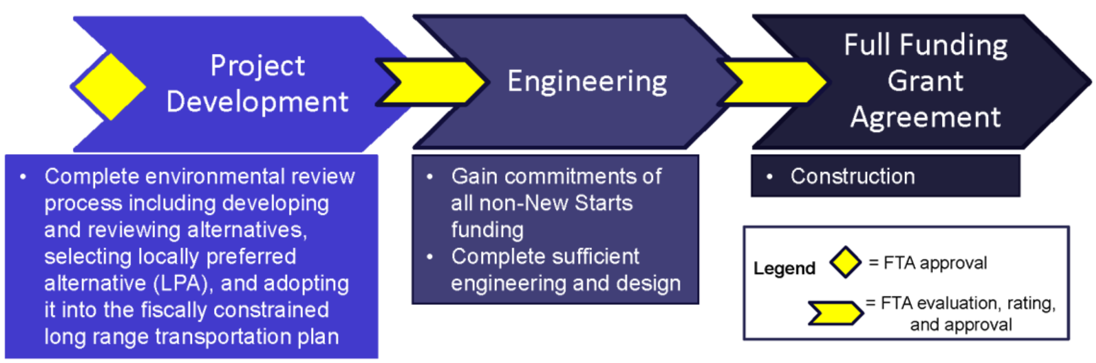

Figure 7. FTA New Starts Process (*18*)

For a Small Starts project, the multistep, multiyear process consists of two steps. The first step is **project development** and the second step is the **small starts grant agreement** for construction. Figure 8 provides an illustration of the Small Starts process. The FAST Act specifies that Small Starts projects are limited to a maximum federal Section 5309 CIG program share of 80 percent. The maximum contribution from all federal sources to a Small Starts project is 80 percent.

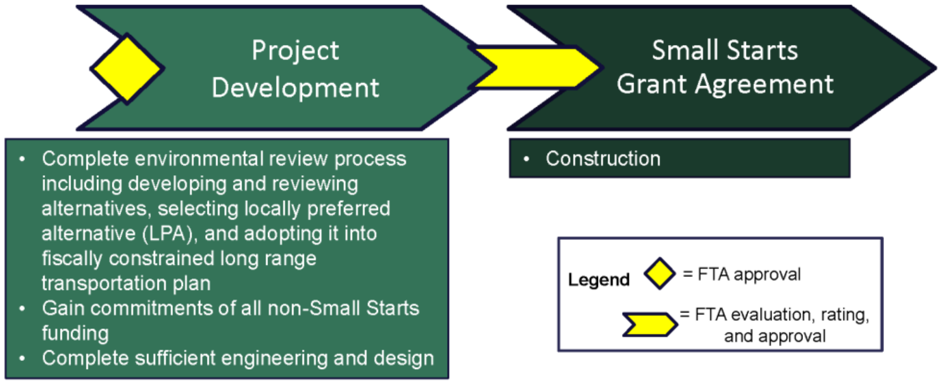

Figure 8. FTA Small Starts Process (*18*)

Key considerations associated with the FTA CIG program are:

- FTA New Starts and Small Starts are discretionary funding programs with limited resources. While funds are authorized under the FAST Act, Congress must appropriate the funds each fiscal year.
- FTA evaluates and rates each CIG project according to New Starts and Small Starts project evaluation criteria. The evaluation criteria and performance measures are described in the *Final Interim Policy Guidance Federal Transit Administration Capital Investments Grant Program* (*19*). The project must earn at least a medium rating for FTA's project justification and financial commitment criteria. Without further feasibility assessment, it is not possible to know how the Wire One Austin project would rate on these criteria.
- FTA New Starts and Small Starts are competitive funding programs. Every project is competing against other projects across the nation.
- Grants have no certainty until the funds are actually awarded. In other words, all of the work done during pre-grant steps is at risk.

TIGER Discretionary Program

The Transportation Investment Generating Economic Recovery (TIGER) Program fosters innovative, multi-modal, and multi-jurisdictional transportation projects that promise significant economic and environmental benefits to an entire metropolitan area, a region, or the nation. USDOT awards funds for the TIGER Discretionary Grant program on a competitive basis, typically on an annual schedule. The Federal government, generally, must ensure the awards represent an equitable geographic distribution of funds, appropriate balance in addressing the needs of urban and rural areas, and investment in a variety of transportation modes.

Key considerations associated with TIGER grants are:

- TIGER is a discretionary funding program with limited resources. While funds are authorized under the FAST Act, Congress must appropriate the funds each fiscal year.
- Competition for TIGER funds is intense.
- Grants tend to be no more than $50 million, and most awards are less than $25 million.

FTA Section 5307 Urban Area Formula Funds

The FTA Section 5307 Urban Area Formula Program (Chapter 53, Section 5307) provides grants to urbanized areas (UZAs) to support public transportation. FTA apportions urban area formula funds to the locally identified designated recipient. In the Austin urbanized area, the Capital Metropolitan Transportation Authority (Capital Metro) is the designated recipient. During fiscal year 2015, the FTA Section 5307 apportionment to the Austin UZA was $28.75 million. Section 5307 funds may be used for capital project expenses. In large urbanized areas, operating expenses are not an eligible use of federal Section 5307 funds (with limited exceptions for small transit operators within the large urbanized area).

Key considerations associated with FTA Section 5307 funds are:

- FTA Section 5307 is a formula funding program, and a new project, such as Wire One Austin, will not bring new funds to the region.
- The annual apportionment is less than 10 percent of the low end of the range for estimated capital costs for Wire One Austin (from $287 to $555 million).
- Capital Metro has programmed Section 5307 formula funds for regional transit projects. Wire One Austin is eligible for these funds but will have to compete with other regional priorities.

Federal Flexible Funds

In addition to FTA grant programs, the Federal Highway Administration administers programs that provide the flexibility to transfer funds to FTA for transit projects. The **Surface Transportation Program (STP)** (23 USC 133) provides flexibility in the use of funds (as capital funding) for public transportation capital improvements. STP funds may be used as capital funding for public transportation capital improvements, carpool and vanpool projects, fringe and corridor parking facilities, bicycle and pedestrian facilities, public sidewalk improvements to comply with ADA, and intercity or intra-city bus terminals and bus facilities.

Key considerations associated with a flexible funding source are:

- STP is a formula funding program, and a new project, such as Wire One Austin, will not bring new funds to the region.
- CAMPO prioritizes use of these funds. Wire One Austin will compete with other regional priorities.

State Funding

TxDOT uses 12 funding categories to support transportation project and planning activities in each metropolitan planning area in the state. Each of the funding categories has a specific purpose and allowable uses. Most of these funds are dedicated to highway projects; however, some funding categories can be used flexibly (i.e., for highway, transit, or active transportation modes). The policy board for CAMPO makes decisions on the prioritization of projects. Applicable categories from TxDOT consist of the following:

- **Category 2: Metropolitan and Urban Corridor Projects** can apply to mobility and added capacity projects along a corridor with reduced travel times due to traffic congestion.
- **Category 9: Transportation Alternatives Program** can apply to non-motorized transportation and related improvements (e.g., pedestrian and bicycle improvements). Projects are selected competitively.

Key considerations associated with state funding sources are:

- TxDOT funding categories (e.g., Categories 2 and 9) are formula funding programs and a new project, such as Wire One Austin, will not bring new funds to the region.
- The CAMPO Transportation Policy Board prioritizes use of these funds. Wire One Austin will compete with other regional priorities.

Local Funding

The Wire One Austin project could be eligible for funding from one of several sources of locally generated funds. The local funding sources consist of:

- **Capital Metro.** Voters in Austin and surrounding areas approved a 1 percent sales tax as local funding support for transit operating and capital expenses. The 1 percent sales tax makes up about 61 percent of Capital Metro's fiscal year 2016 operating and capital budget.
- **CTRMA.** CTRMA generates revenue through a combination of tolls, fees, bonds, and interest. Toll revenue can pay off encumbered debt as well as to invest in new transportation projects. All CTRMA projects begin as recommendations in the CAMPO Regional Transportation Plan. These projects are usually long-term projects, which can be done more quickly through a tolled option because toll projects receive full funding commitments prior to construction start. A continuous funding stream needs to maintain the road, and this can only be paid through tolls.
- **City of Austin.** Local governments can also generate revenue to support transportation projects. For example, the City of Austin generates the majority of revenues for transportation investments from the transportation user fee and parking fees. The City also has the authority to issue voter-approved bonds for transportation projects. Additional revenue comes from permits and the city's general fund.

Key considerations associated with local funding sources are:

- Local and regional governments have programmed use of these funds. Wire One Austin will compete with other local and regional priorities.
- Long-term bonds require a public referendum for approval.

Financing Tools

Financing tools are not actually sources of revenues. Rather, these are strategies for leveraging debt to support local and regional transportation projects. Some financing tools include:

- **Transportation Infrastructure Finance and Innovation Act (TIFIA).** TIFIA provides federal credit assistance in the form of direct loans, loan guarantees, and standby lines of credit to finance surface transportation projects of national and regional significance. TIFIA can help advance expensive projects that otherwise might be delayed or deferred because of size, complexity, or uncertainty over the timing of revenues.
- **State Infrastructure Bank (SIB). A**s authorized by the FAST Act, every state can set up an SIB that can manage a revolving loan fund, provide credit, or issue bonds capitalized with seed money from federal and state sources.

Key considerations associated with using these financing tools are:

- The project has to be eligible for federal funding.
- Financing mechanisms represent debt to be repaid.

Project-Generated Revenue

Other revenues to support operating and maintenance costs for the Wired One Austin project include:

- **Fare Revenues.** Based on ridership, the system would generate fares that would partially fund operating and maintenance costs.
- **Advertising Revenues.** Advertising revenues are earned from displaying advertising materials on vehicles and property (stations).
- **Naming Rights at Stations.** Revenues could be generated by auctioning naming rights for one or more stations.

Key considerations associated with projected generated revenues are:

- Project ridership forms the basis for fare revenue estimates. Any riders shifting travel from existing transit will not increase net fare revenues.
- Advertising and naming rights at stations may not generate significant revenues.

Private Funding

Public-private partnerships and value capture opportunities may be available for the Wire One Austin project. Some sources of private funding include the following:

- **Public-private partnerships (P3)** are agreements between public entities and private firms intended to take advantage of the benefits and expertise each party offers. P3s are structured so that the private partner has the opportunity to generate a return on its investment in exchange for assuming a portion of the risk and financial liability. The public entity may engage in a P3 with a developer to finance, build, operate, and maintain (or any combination of these) the project and grant the private partner the right to recover initial development costs by charging for parking, leasing space within the facility for other uses (e.g., ground-floor retail), or some other means.
- **Value capture** includes a variety of techniques to extract value or fees resulting from the increase in value that the project brings to the community. These techniques include joint development at station sites, assessment districts, and tax increment financing.
- **Joint development** (or transit-oriented development) is a method of developing or redeveloping transit facilities that maximizes the use of the land. This type of development can complement transit service by enhancing station locations with other uses, including residential, retail, and office space.
- **Special assessment districts** are special taxing districts where private property owners deemed to benefit from the infrastructure improvements support the cost of infrastructure. These assessments apply to the full value of the subject property, or use a Tax Increment Financing technique (see next item).
- **Tax increment financing** is a technique in which bonds finance public infrastructure improvements, to be repaid with dedicated revenues from the increment in property taxes because of such improvements.

Key considerations associated with private funding sources are:

- Public-private partnerships may face challenges due to timing, site selection and analysis, and the negotiation process.
- Joint development can be at risk if the station locations do not generate interest from the private sector for real estate development.

REVIEW

Wire One Austin is a proposed urban gondola system predicated on the development of similar ropeways internationally and in the United States. Gondolas in the United States are most often associated with ferrying tourist traffic within ski resorts, historical sites, and other attractions. However, international cities and governments have implemented gondolas within urbanized settings as a mode for transit. Urban gondolas can operate above the existing street network and function similarly to rail transit. Passengers access stations at ground level and walk or use escalators and elevators to a platform. Boarding occurs at the platform where passengers can board slow-moving cabins. The appeal for urban gondolas stems from the prospect of having a transit service that operates independently of roadway traffic congestion, provides passenger safety, limits emissions, and offers pleasing aerial views for travelers.

Wire One Austin is a unique proposal compared to other urban gondolas. As proposed, Wire One is more extensive than many systems currently in operation internationally or any proposed in the United States. Most gondolas extend for 0.5 to 3.0 mi and have up to five intermediate stations in addition to two terminal stations. The proposed Wire One Austin system consists of two 4.2-mi main lines and a third 0.3-mi connector, for a total of 8.7 mi and 19 stations. Almost all urban gondolas either cross a river, traverse a steep slope, or connect neighborhoods with a poorly connected street grid. Wire One Austin would cross Lady Bird Lake for a short part of the route, but it would generally follows an existing arterial roadway in parallel alignment to other city streets.

The Wire One proposal is not included in the CAMPO 2040 Regional Transportation Plan or any current modal transportation plans or transportation planning scenarios for the region. The urban gondola mode has not been evaluated as a transit technology compared to bus rapid transit or urban rail. The proposed alignment along South First Street/Lavaca Street from West Slaughter Lane to the University of Texas has not been previously identified for a fixed guideway transit investment.

If the Wire One proposal is evaluated for funding opportunities, the regional transportation plan would have to be modified to incorporate Wire One Austin. The transportation planning process is an extensive systematic process, and any modification or addition of a project may take time and resources. The regional travel demand model would likely need to be adapted to include a new mode. Modifying a demand model takes a significant investment of time and resources. Any fixed guideway investment should follow corridor-level planning to assess and evaluate alternative modes, alignments, station locations, termini, etc. and to identify a locally preferred alternative for mode and alignment.

Funding and financing for Wire One Austin will likely be a significant challenge. Most sources of funding for local, state, and federal funding programs are competitive. Many transportation needs exist and funding is typically limited. The financial feasibility of a gondola system is difficult to gauge without the planning steps to identify need, model travel demand, conduct corridor analyses, and evaluate alternatives. Given a limited source of revenues, an investment in an urban gondola will likely require reprioritizing other projects.

If the agencies reviewing the Wire One proposal are interested in gaining a more complete understanding of the likely magnitude of gondola commuters, the Federal Transit Administration makes a standardized travel model available called the Simplified Trips-on-Project Software (STOPS). STOPS may help to quantify the measures used by FTA to evaluate and rate projects for New Starts funding. FTA uses this tool to ensure that consistent modeling practices apply across metropolitan regions.

However, STOPS is a travel demand modeling technique similar to the CAMPO regional travel demand model that requires significant data input. Using this toll requires similar assumptions about operating and other characteristics of a potential gondola in the context of an urban corridor.

Much of the success of a new transit mode is how the public would react and use the service. Wire One Austin would be would be a unique project in the U.S. for use of the urban gondola mode for a transit commuter corridor.

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March 24, 2017

Dear Stakeholders,

Capital Metro, the Central Texas Regional Mobility Authority and the City of Austin Transportation Department worked collaboratively over the past several months to engage the Texas A&M Transportation Institute (TTI) in an analysis of the Wire One Austin Urban Gondola proposal. This work was initiated to assess the potential use of gondola technology as one means of addressing the mobility challenges of Central Texas. The analysis was requested as a result of community and stakeholder interest in this possible mobility alternative. On February 24, 2017, TTI provided their findings to the agencies. A copy of their report and the Wire One Austin proposal is attached to this cover letter.

After reviewing the report, below are some shared conclusions of the three study sponsors that emerged from our review of the analysis combined with supplemental information:

<u>General Observations</u>

- Based on a worldwide review of deployments, gondolas appear to be best suited to 'niche' applications and not as a primary means of moving people or goods as a part of a regional network or along a major corridor.
- Most places where gondolas were selected for use have a unique geographic barrier or challenge. A major change in elevation, a large waterway or some other significant constraint on more established and higher capacity mobility options appears to be a common trait.
- Based on our review of TTI's gondola cost information, capital and operating costs are relatively comparable to other modes of travel used in Austin and similar metropolitan areas. As a result, there does not appear to be an opportunity for a major cost savings by choosing gondola relative to another, more established mode.
- Travel speeds and carrying capacity also are not substantially different or better than other modes.
- Like other fully grade-separated modes, the primary advantage of a gondola system is that it can offer very reliable and consistent travel times with near 'on-demand' availability (dependent on demand).
- The fully elevated design on a gondola system can offer both advantages (more attractive user experience) and disadvantages (aesthetic concerns, fit within the right of way, potential conflicts with overhead utilities and/or adjacent structures, and possible safety concerns in the event of a system failure).

<u>Wire One Austin Observations</u>

- The Capital Area Metropolitan Planning Organization (CAMPO) 2040 Regional Transportation Plan identifies how the region intends to invest in the transportation system and considers how roadways, transit, non-motorized transportation, and intermodal connections perform. The urban gondola mode has not been included or evaluated against bus or rail transit.
- The urban gondola mode would need to be included in a corridor level planning effort and examined as one of several potential transit mode alternatives. Urban gondolas are not currently

included as a part of Capital Metro's Project Connect corridor planning effort.

- There is not a sufficient level of detail at this time to advance Wire One for further planning and development. To do so would require a detailed feasibility assessment that confirms the optimal alignment, estimates demand, and more firmly establishes capital, operations and maintenance costs. The Wire One proposer (sponsor) would need to perform this work to further develop the proposal and be able to adequately address the project considerations identified in the TTI Report.
- As proposed, Wire One Austin would be, by far, the largest and longest gondola system in the world. While this is not a fatal flaw, it does raise additional concerns about operational viability.
- The proposed alignment has some apparent benefits, but also significant challenges including constrained right-of-way; visual/aesthetic issues; and possible impacts upon City transportation planning and potential conflicts with Capitol view corridors.
- An urban gondola might be appropriate for installation along city owned waterfront property, but this would require a level of study and approval by appropriate City Boards and Commissioners and Council.

Capital Metro, CTRMA and the City of Austin recognize and appreciate the need and desire for innovative mobility options to address the significant challenges we face in Central Texas, and we applaud the Wire One Austin team for their creative proposal. To that end, we brought in TTI to provide the attached assessment. Based on that analysis, the sponsoring agencies conclude that, at this time, the proposal is not of sufficient detail to perform further assessment. If the sponsor or another interested party can advance the concept further and address the need for additional detail in the proposal, it may be worth revisiting in the future. The region can engage in regional planning efforts to consider this mode of travel. CAMPO might be able consider using the value of this mode on a regional basis.

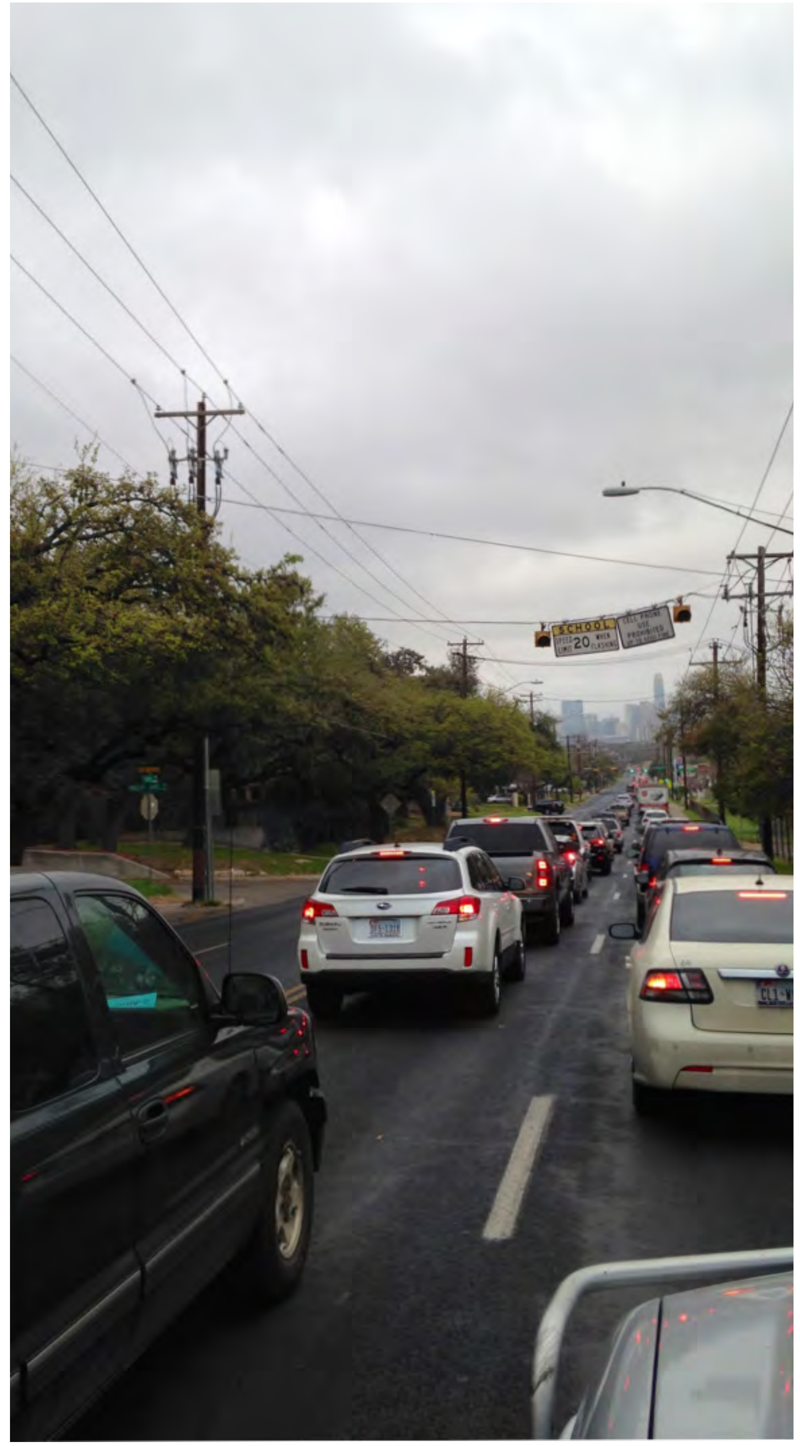
WIRE ONE **AUSTIN**

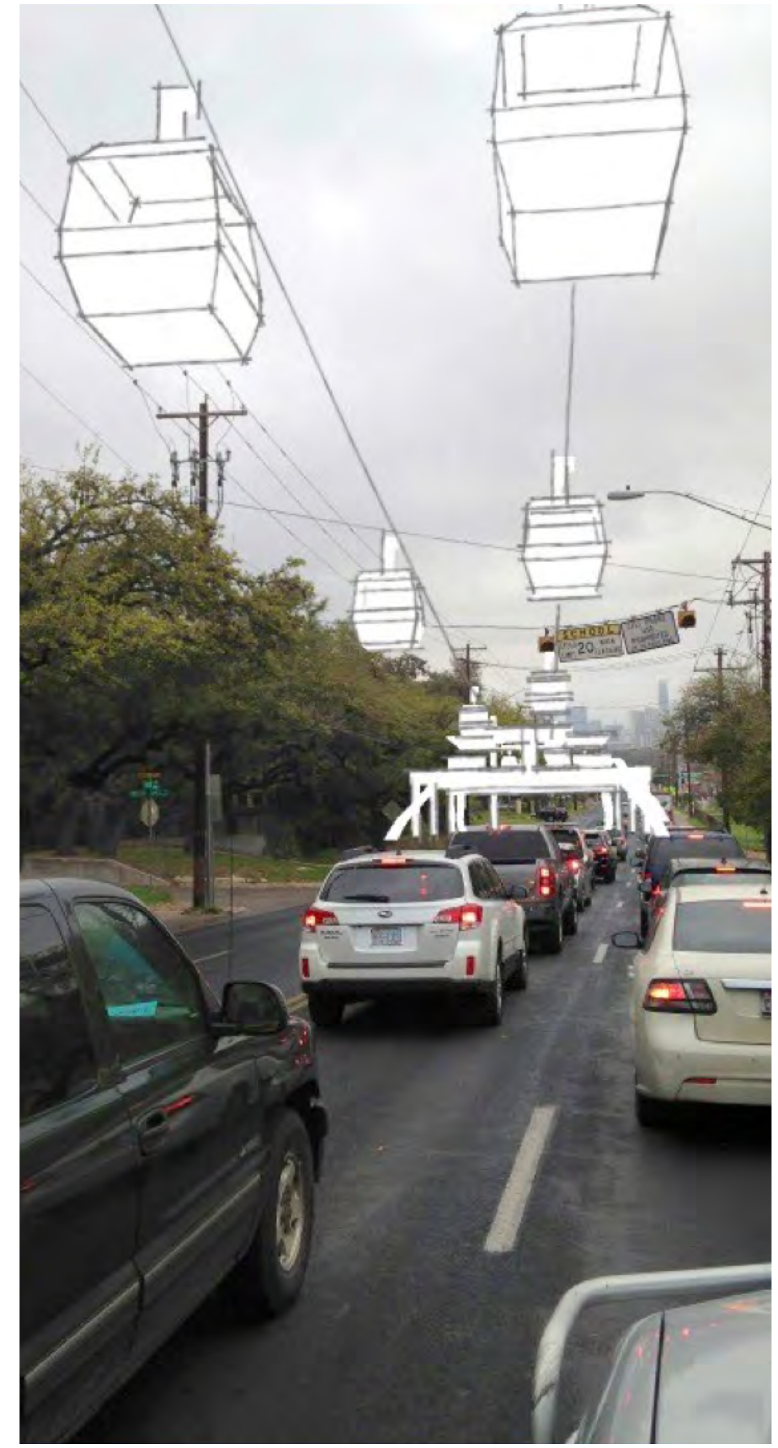
An Urban Cable Mass Transit Vision

Jared Ficklin, Co-Creator of The Wire
jared.ficklin@argodesign.com
512.576.8981

THE SHORT CASE FOR URBAN CABLE

South 1st is at capacity, the congestion point for a downtown commute now begins at Ben White. Urban Cable offers an affordable, culturally compatiable way to add capacity.





AFFORDABLE

Cost similar or lower than the Red Line
Low cost per rider
Functions like an inexpensive subway

COMPATIBLE

A Mass Transit artery into downtown
Serves downtown commuters
Allows redeployment of bus lines
Predictable Trip Times
Easily included in multi-modal routing
Safe & easy for mobility impaired
Faster than bus

SUSTAINABLE

Removes cars from congestion points
Can be carbon negative
Pedestrian & Bike friendly

ADOPTABLE

Serves tourism
Predictable Trip Times
Safe & easy for mobility impaired
No schedule
Personal space
Climate controlled

URBAN CABLE HAS WORLDWIDE DEPLOYMENTS

Urban Cable has been used around the world including in the U.S. In the modern era there has been a surge in new deployments in Europe, Asia & South America that use Urban Cable as a form of Mass Transit across a wide variety of geography.

The same strengths that help urban cable bridge valleys or cross rivers at low cost are being recognized for their ability to bridge features of urbanization. Such as connecting walkable districts or opening up capacity in areas that are already at high density. A 22 lane freeway or natural greenbelts or rivers can be crossed for little or even no additional cost.

Mid-sized Cities with pre-automotive history are primed for the benefits. Especially those cities that have a dense core and are seeing the urbanization of the first suburbs. Or divided by rivers, freeways or pushed against waterfronts. Cities with need for a circulator at lower cost than subway.

Venlo, Netherlands

The city center and an park area that hosts festivals are connected.

Barcelona, Spain

Two walkable museum districts are connected over a forested park.

Medellin, Columbia

Three lines connect exterior neighborhoods with city center transit lines. Hundreds of thousands of commuters ride Metro Cable daily.

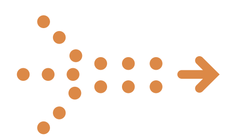
KEY ATTRIBUTES

1,200 people per hour, per direction.
With expansion to 3,600 PPPHD possible.

Like 25 full busses stopping every hour

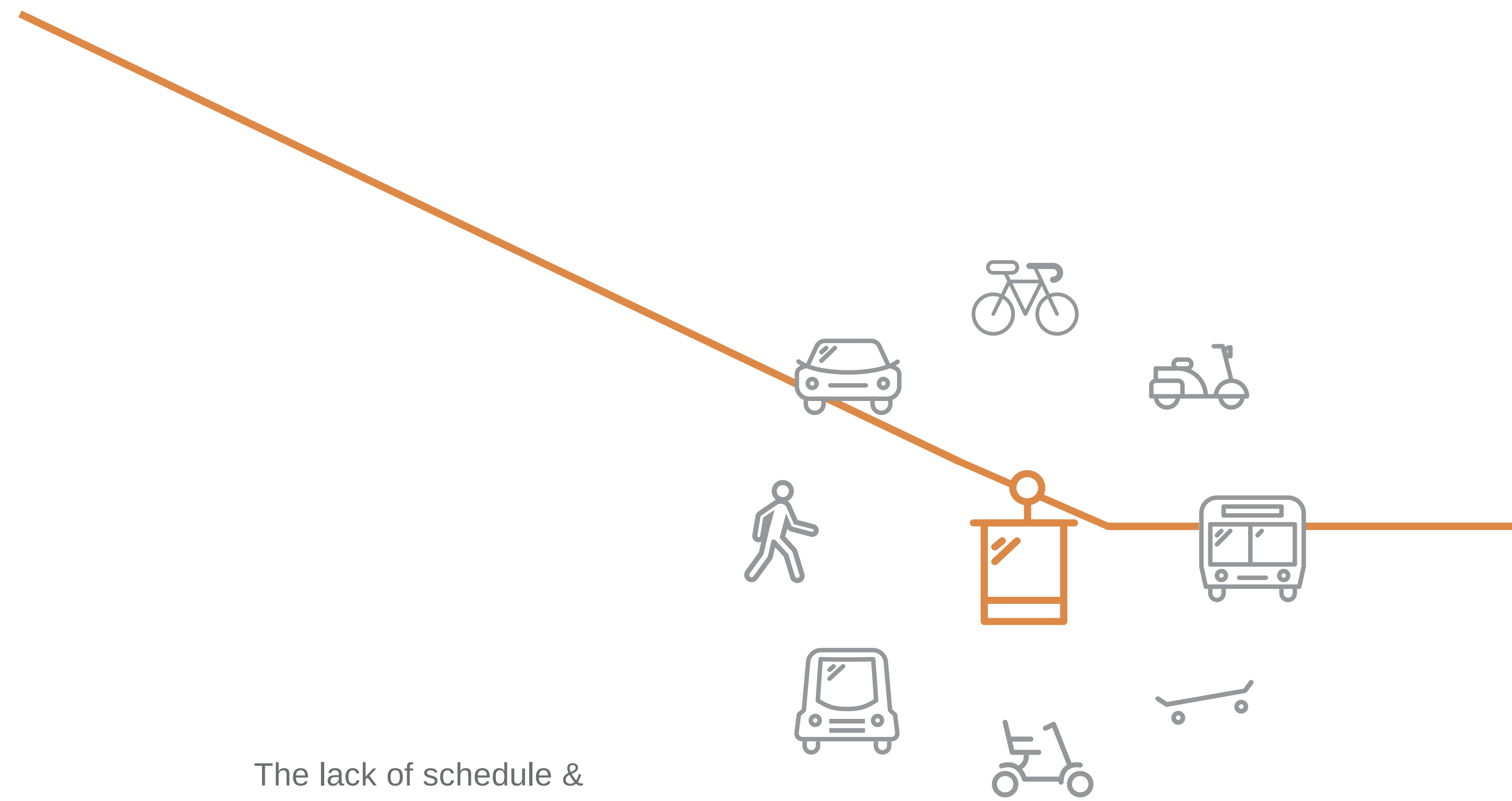
New capacity added to a route that commuters already use. A central route that can grow into a central circulator.

At last traffic count 30,000 cars a day use this route for a commute into & out of downtown. With the closure of MoPac this number has increased with drivers using South 1st as an alternative route.



Wire One removes vehicle traffic from peak congestion, eliminates micro trips, parking search trips & services tourism. A meaningful impact on the entire Core.

A 30% to 50% takeover of vehicle trips is possible

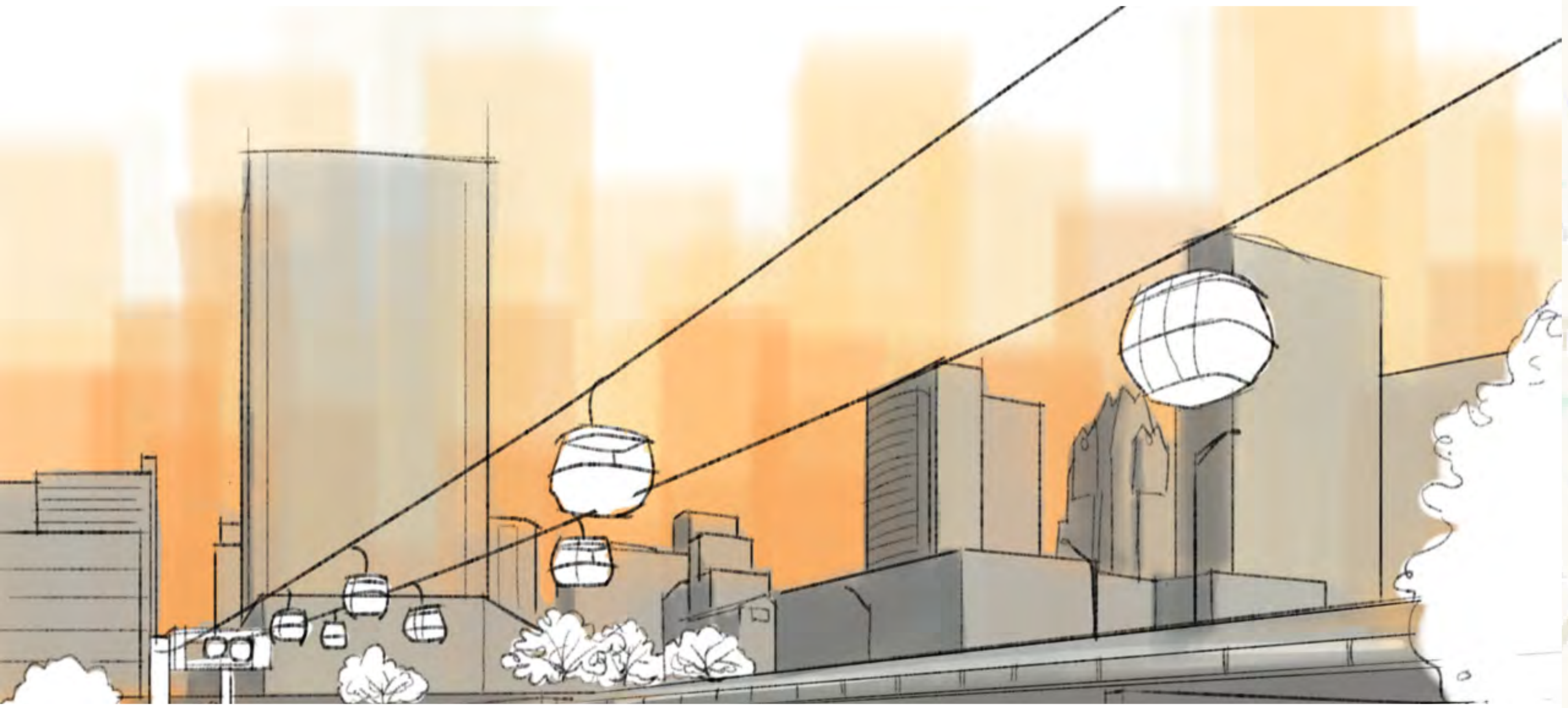


The lack of schedule & continuous operation encourages adoption without asking for cultural or demographic changes. Wire One is an amplifier for car share, biking & pedestrian travel. Wire One is an adaptable back bone for smart transit planning.

5% of residents living along South 1st commute without a car. Some bus commutes can take more than an hour.

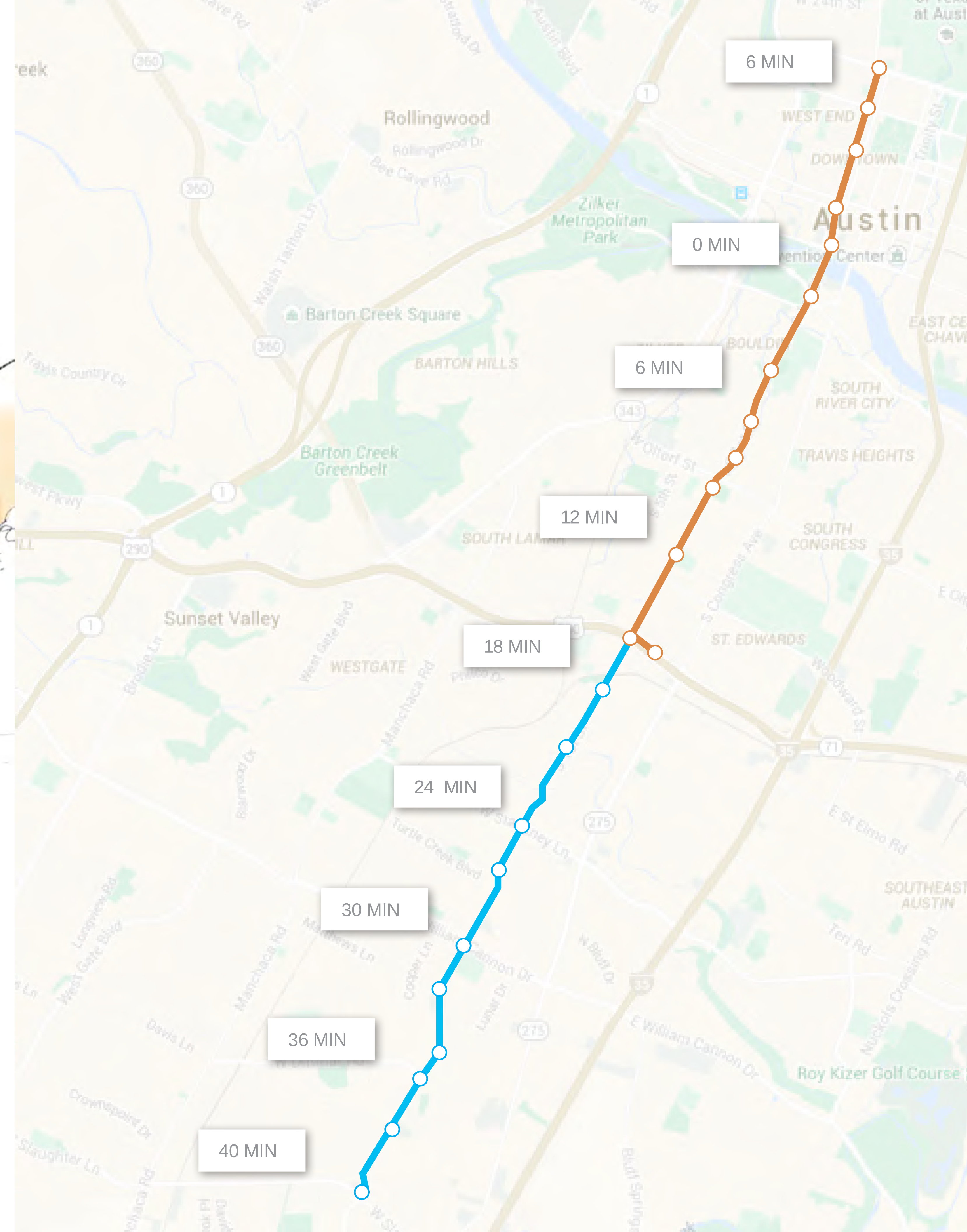
WIRE ONE OVERVIEW

Using High Speed
Detachable Mono Cable



Target Capacity: 1,200 Persons Per Hour Per Direction
Expanded Capacity: 6,000 Persons Per Hour possible
19 hours per day run time

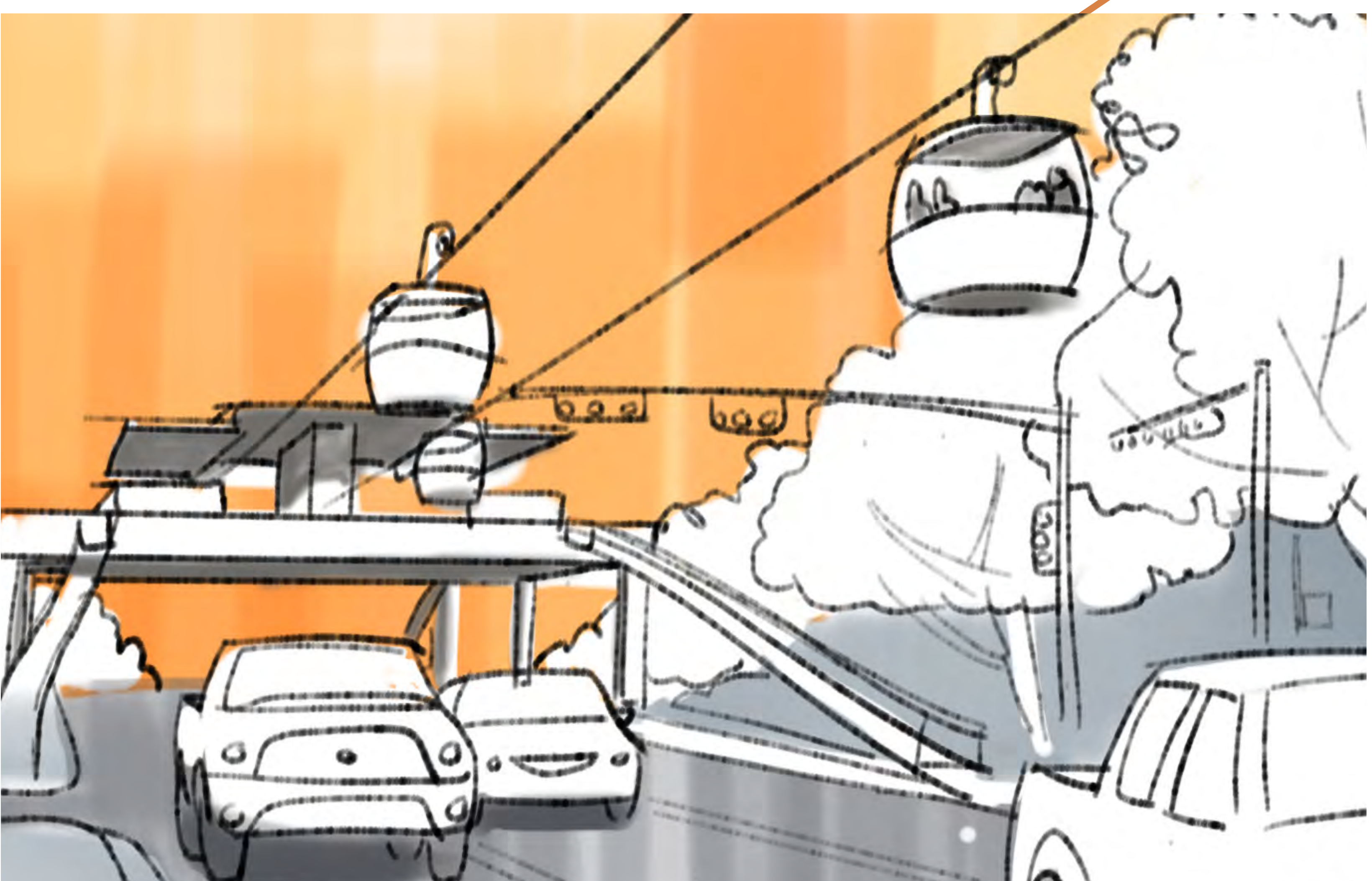
This map is a early draft. Locating stops is something that takes study.
But this is a good representation of what we could accomplish.



CAR PROFILE

Wire One would use 10 person cars similarto what is shown above except with added onboard climate control. Bicycles, strollers, scooters, walkers & wheelchairs can fit
in the cabin.

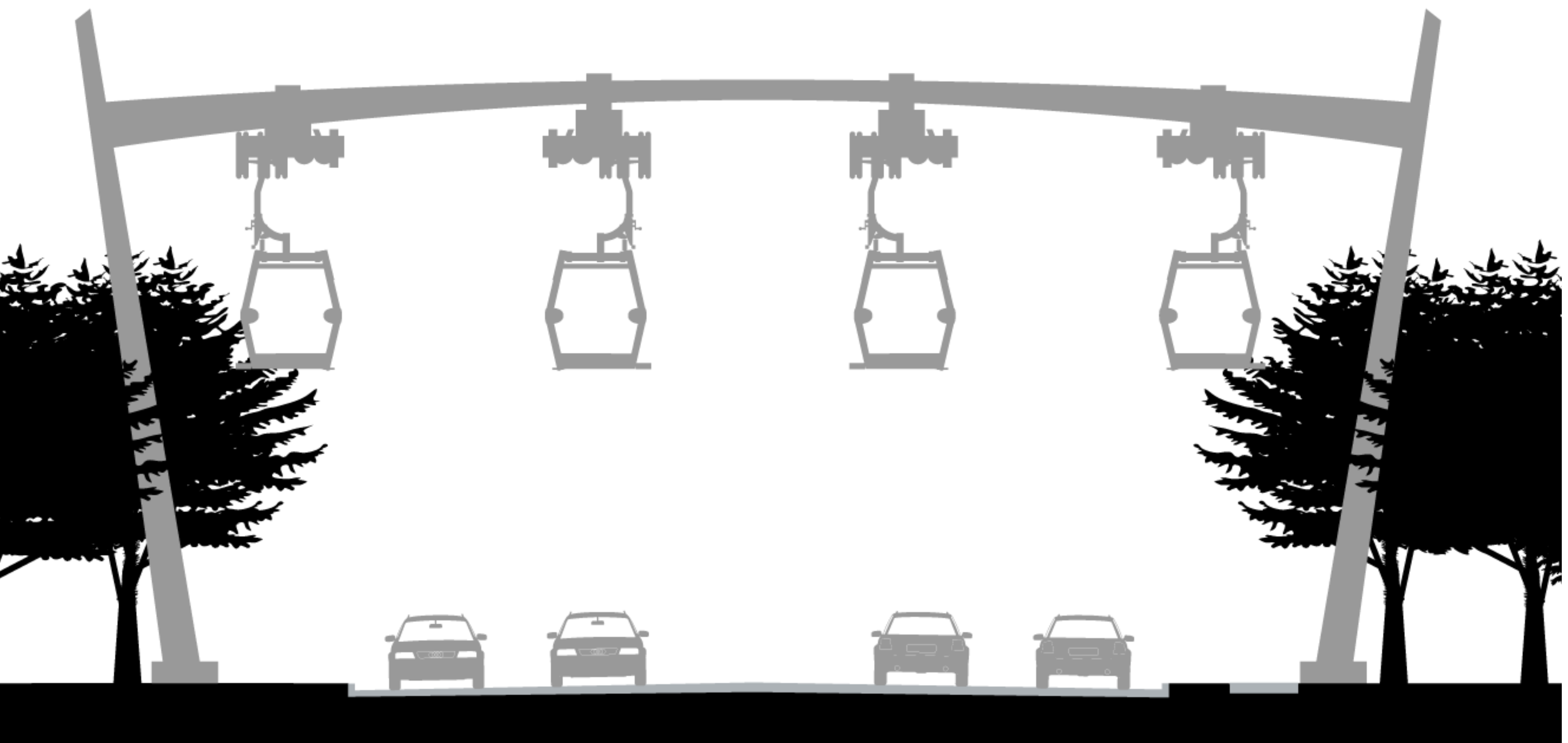
Cars would arrive at a station every few seconds. Boarding is across a flat level deck. There are station attendants to help monitor loading, but for the most part loading is continuous and does not require assistance.



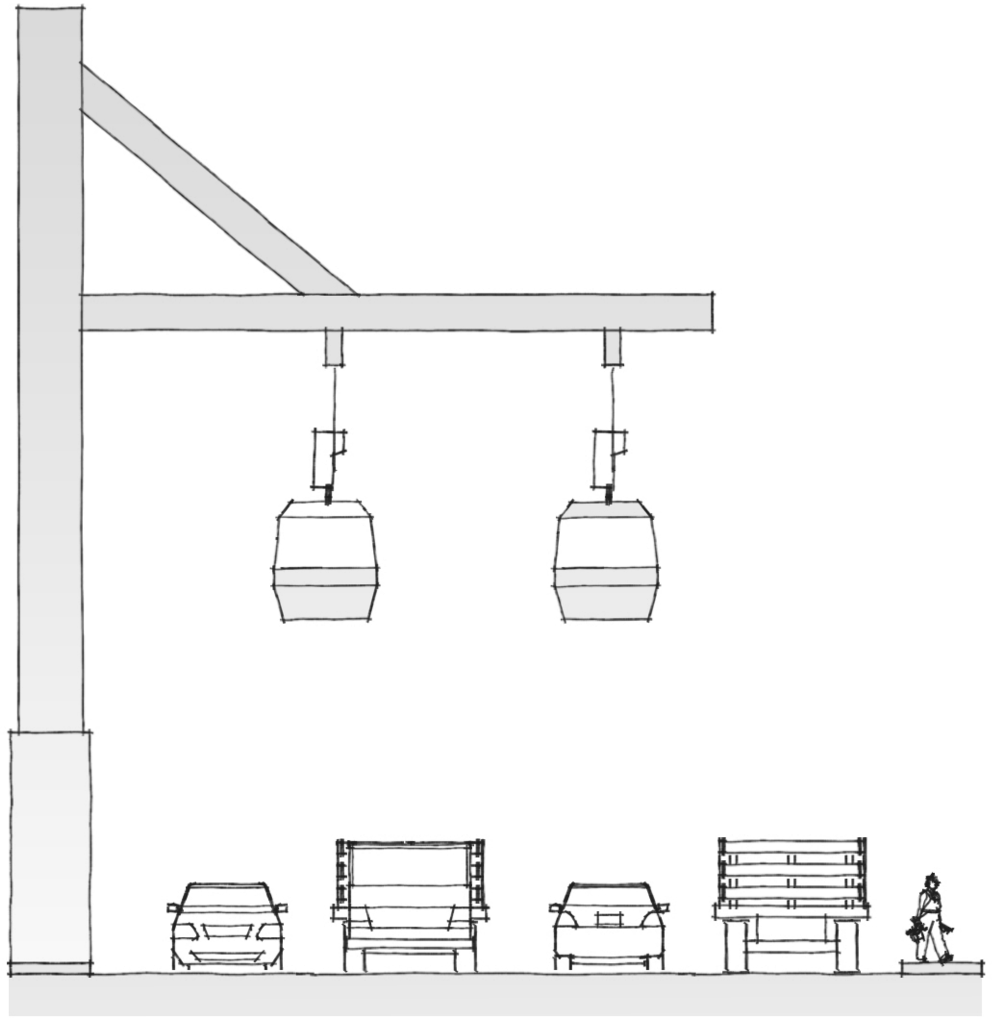
TOWER PROFILE

Wire One would use either cantilevered or bridged towers so the cars could use the eminent domain directly above south first.

This equipment is able to locate in the right of way beside the street without interrupting sidewalk service.

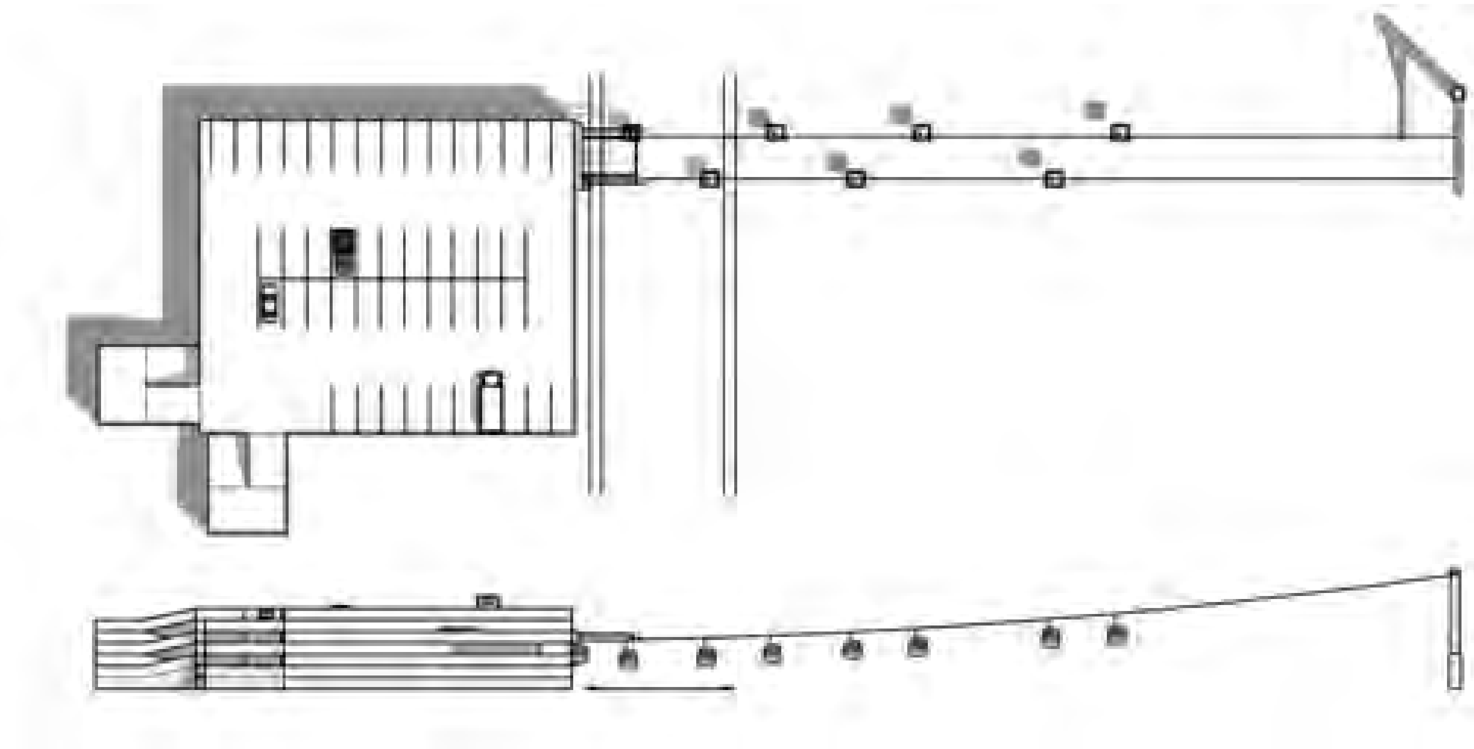


The tower bases themselves in most case are similar to what is used for freeway pylons or power service lines. Cars themselves require a small amount of horizontal clearance and vertical clearance is set by the route profile and safe transportation standards.



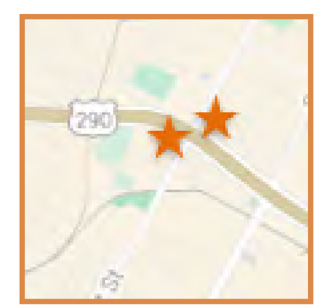
WIRE ONE PARK & FLY STATIONS

Urban Cable can be integrated into structures. For Wire One there are several areas that could be developed by public/private partnership into a combined retail and Park & Fly structure where there is retail and drive up parking on the ground floor with Urban Cable on the second story and garage parking above.

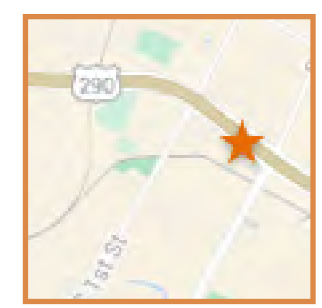


Park & Ride Station

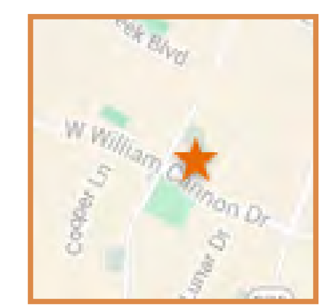
With no schedule the normal drive, park, walk to office commute remains nearly the same with only minutes on Wire One connecting parking with the final walk to the office.



SW & NE Corner of Ben White & South 1st

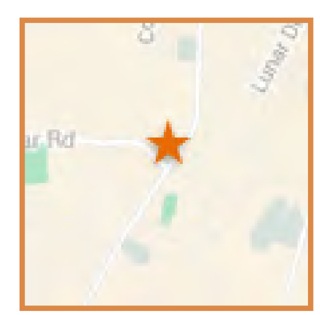


Overtop Ben White Bus Interchange

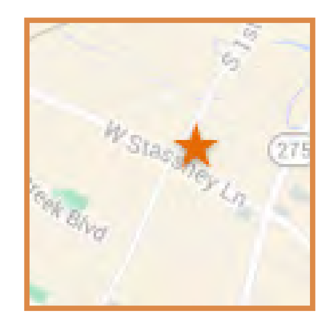


William Canon HEB Shopping Center

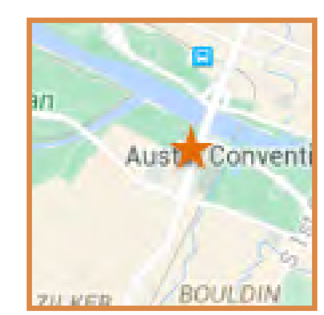
Examples of areas with Park & Fly potential & areas that have not undergone vertical development.



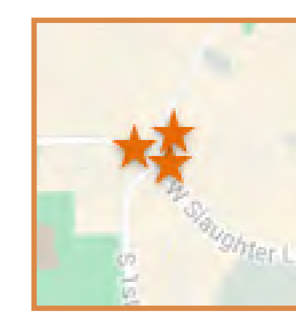
Dittmar & South 1st



Stassney & South 1st Retail Areas



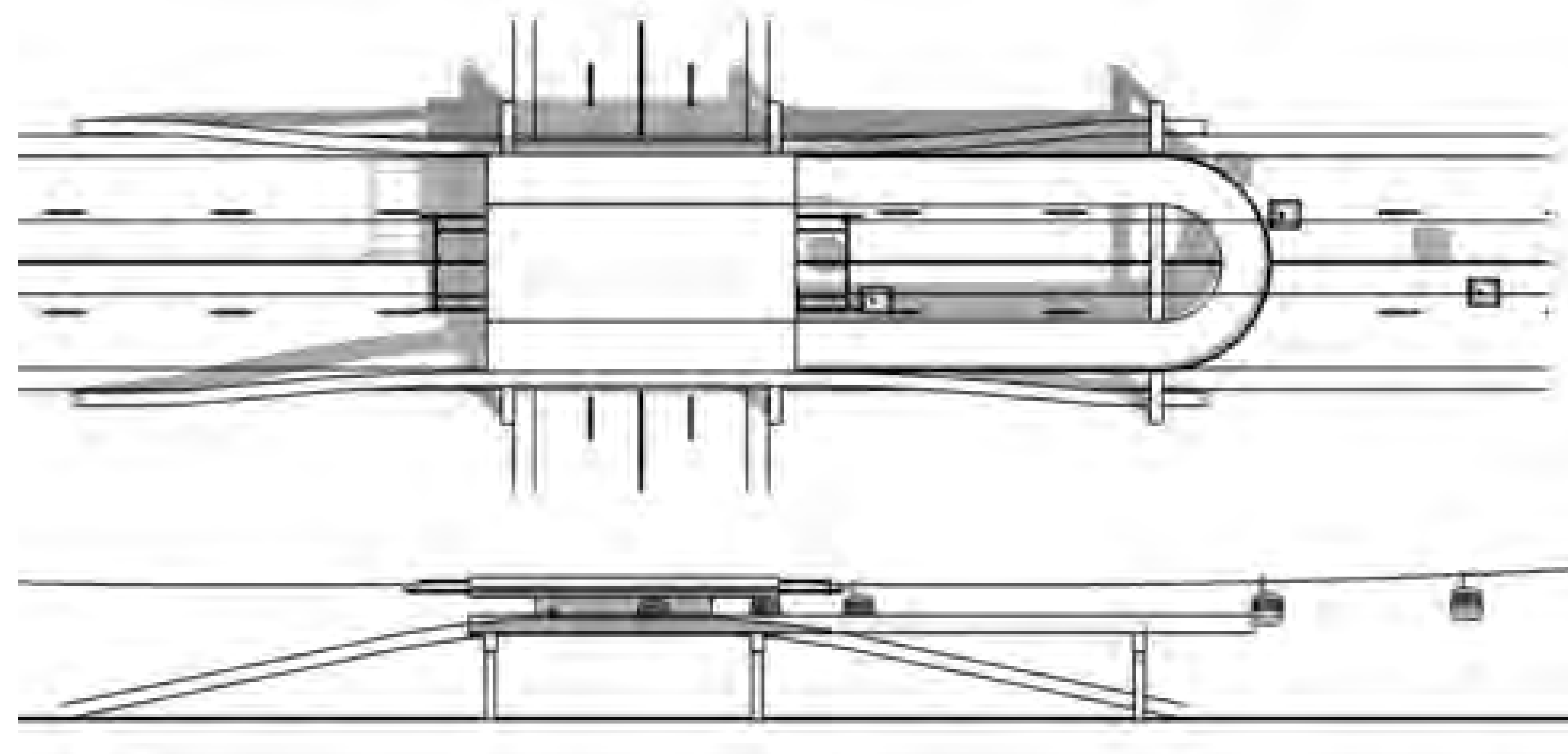
Long Center



Slaughter Drainage, Red Barn or Car Wash

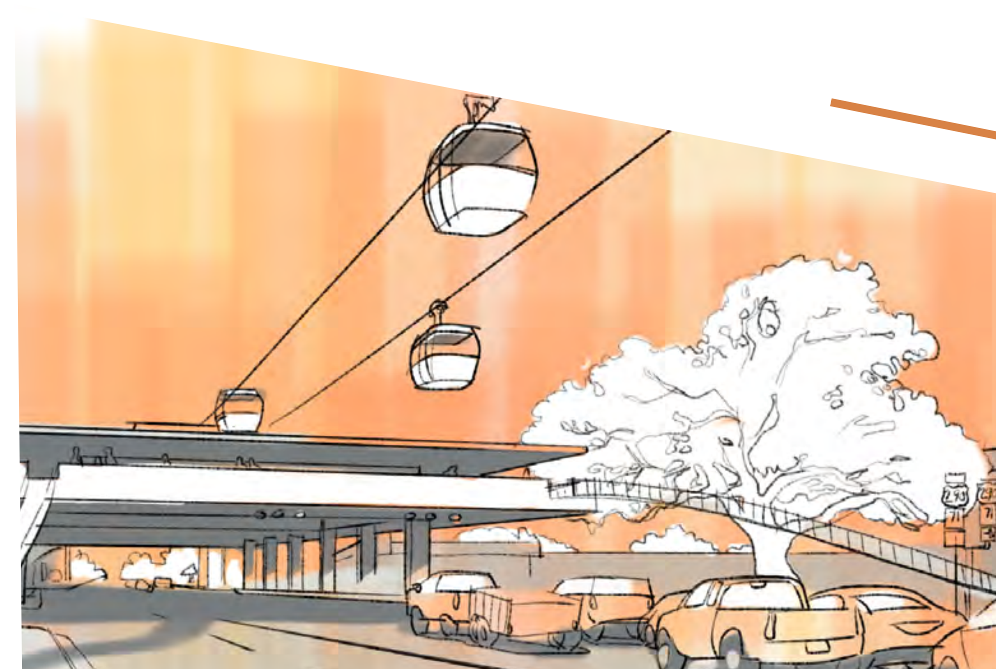
WIRE ONE PEDESTRIAN CENTERS

Urban Cable can locate over streets or intersections. Wire One would utilize these stations for local stops along South 1st. Such stations if designed correctly can also serve as pedestrian bridges. Ramps can be used for ADA as well as easy use for cycling.

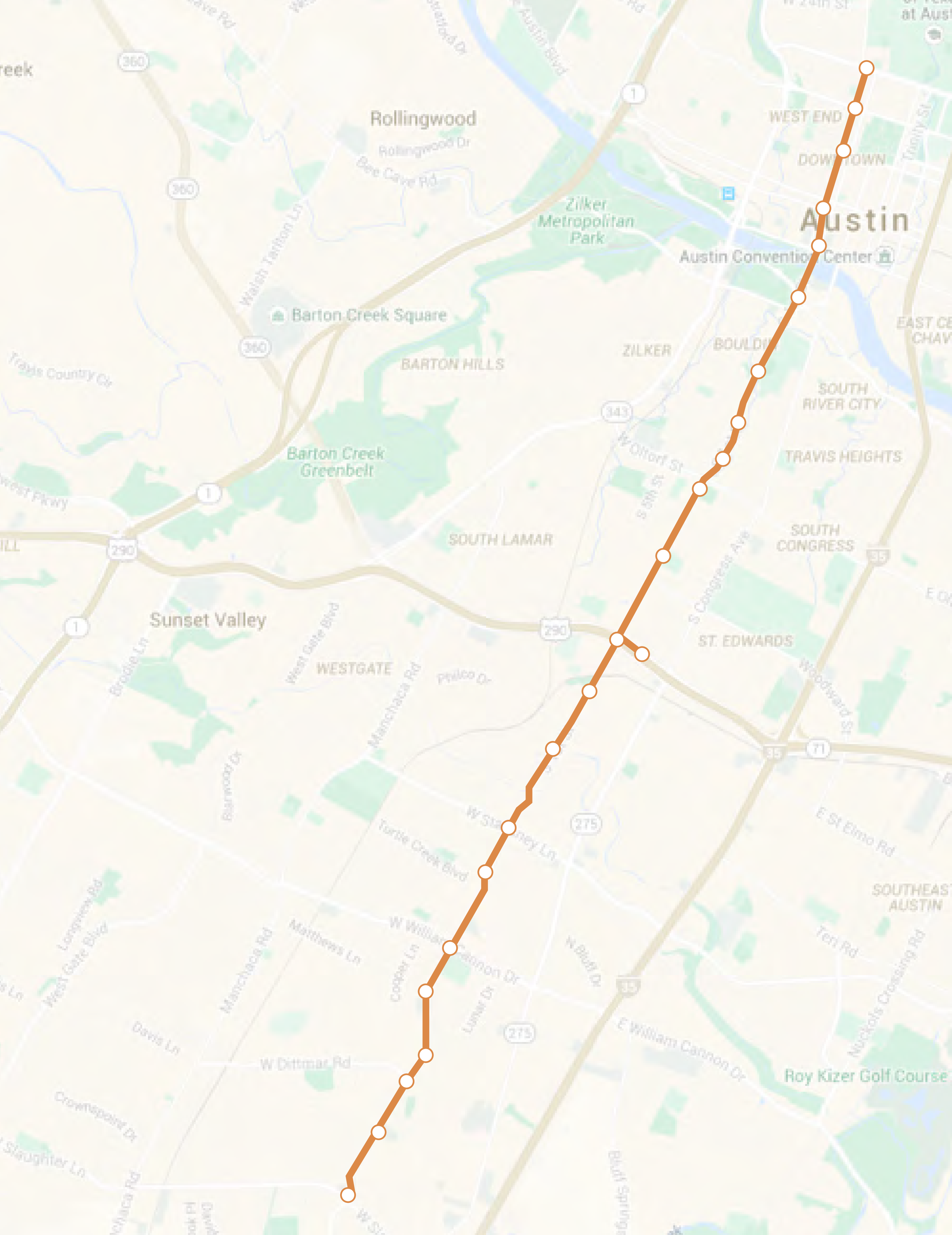


Elevated Station Type 2

A family with a stroller boarding a 6 person car in Zaragoza.



A cyclist boarding a 6 person car.



ROUTING WIRE ONE

Urban Cable offers low cost infill of Mass Transit without displacement. However Urban Cable lays out best in segments that are straight lines. There are cost savings when turns can be made at stops.

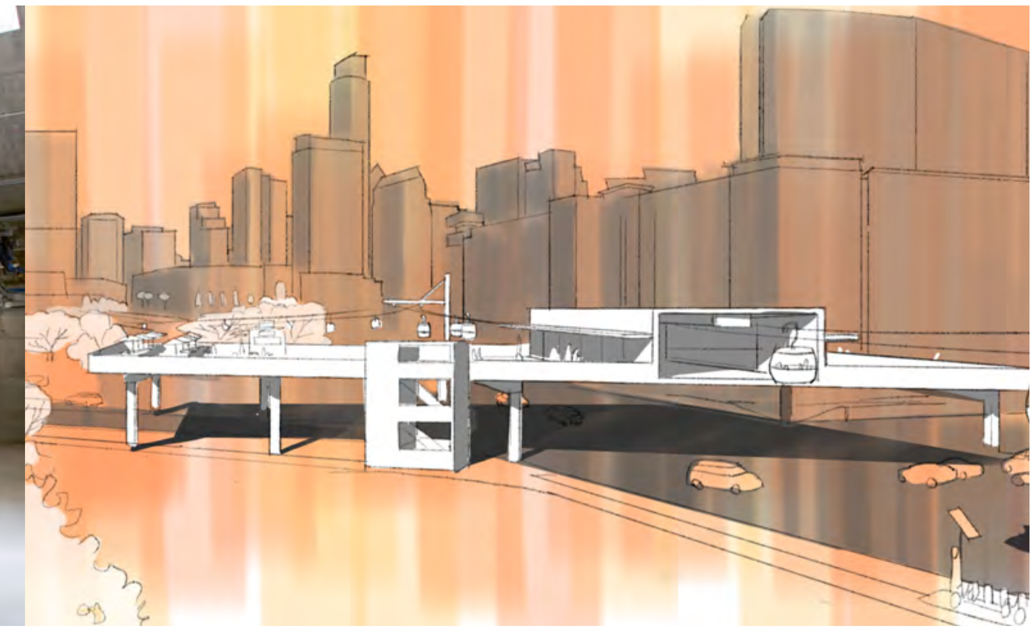
South 1st is less developed and has linear geography that favors Urban Cable. Wire One would be a back bone connecting Slaughter to South Campus adding capacity to a route heavily used by the central & southern core of Austin as the path into downtown.

Wire One can cover bus service on South 1st and could be tied into the bus interchange allowing bus re-deployment throughout south Austin to better serve adoption of Transit. Car share can also enjoy routing advantages as services can drop riders at stations rather than add to the congestion on routes into downtown.

Future lines could be added running east west or Point to Point to create Park & Fly or numerous connected walkable districts.

THE 290 BUS INTERCHANGE PARK & FLY

THE PALMER PEDESTRIAN CENTER

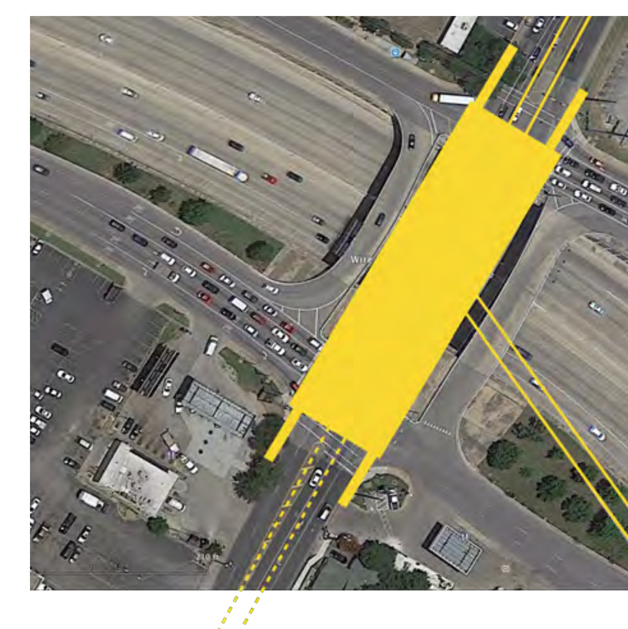


The Pedestrian center could also serve the transfer crowds over the intersection as a large pedestrian bridge.e.

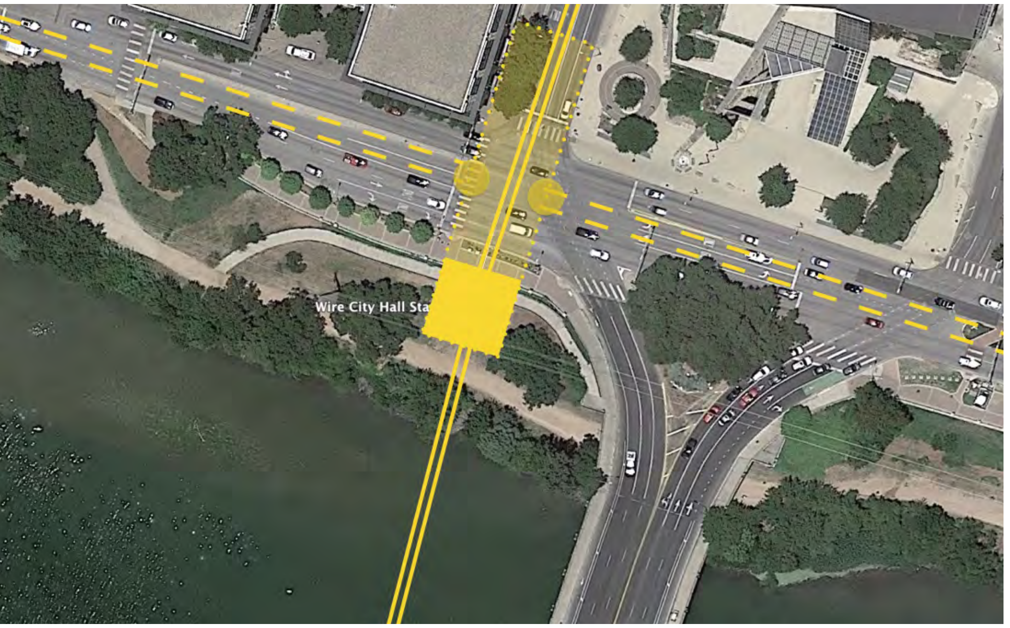
Wire One could overtop the main bus interchange on Ben White with a spur line or end line that connects to the Ben White Interchange. Passengers from buses could transfer to the Wire One into downtown and drivers could park above the bus interchange in order to avoid the wait into downtown or the average $180 a month parking fees.

With the zoning in place this also a good location for the car service yard. This is where excess capacity is added and removed to a line as well as where cars can be pulled for cleaning and maintenance.

With its proximity to festivals & the Lady Bird Lake Hike & Bike this intersection is an ideal location to build up with a pedestrian center. The center would also allow ramps to bridge easily into one of the main entries for auditorium shores and the Long & Palmer Events Center.

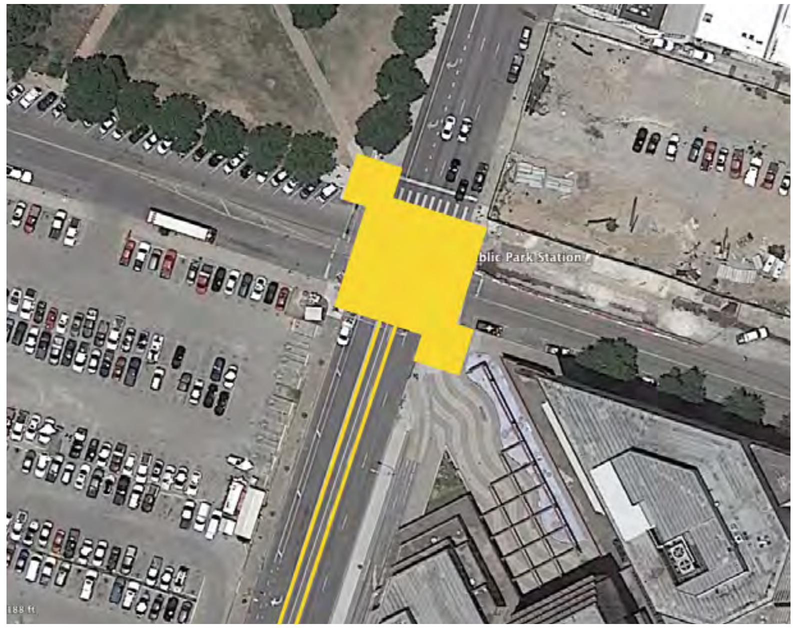


CITY HALL FUTURE INTERCHANGE



At City Hall Wire One shifts over the lake to line up with Guadalupe in order to provide downtown service without interrupting the Congress Avenue view of the capitol dome. This stop offers an opportunity to expand along Caesar Chavez. Starting as a pedestrian center and later becoming an interchange for a line that reaches from Airport to Zilker and the Grounds of ACL.

REPUBLIC SQUARE PARK



Of the Downtown Wire One stops this one is an important stop for tying into tourist activities. A major departure point for Zilker Shuttles during ACL and other activities.

RIDERSHIP

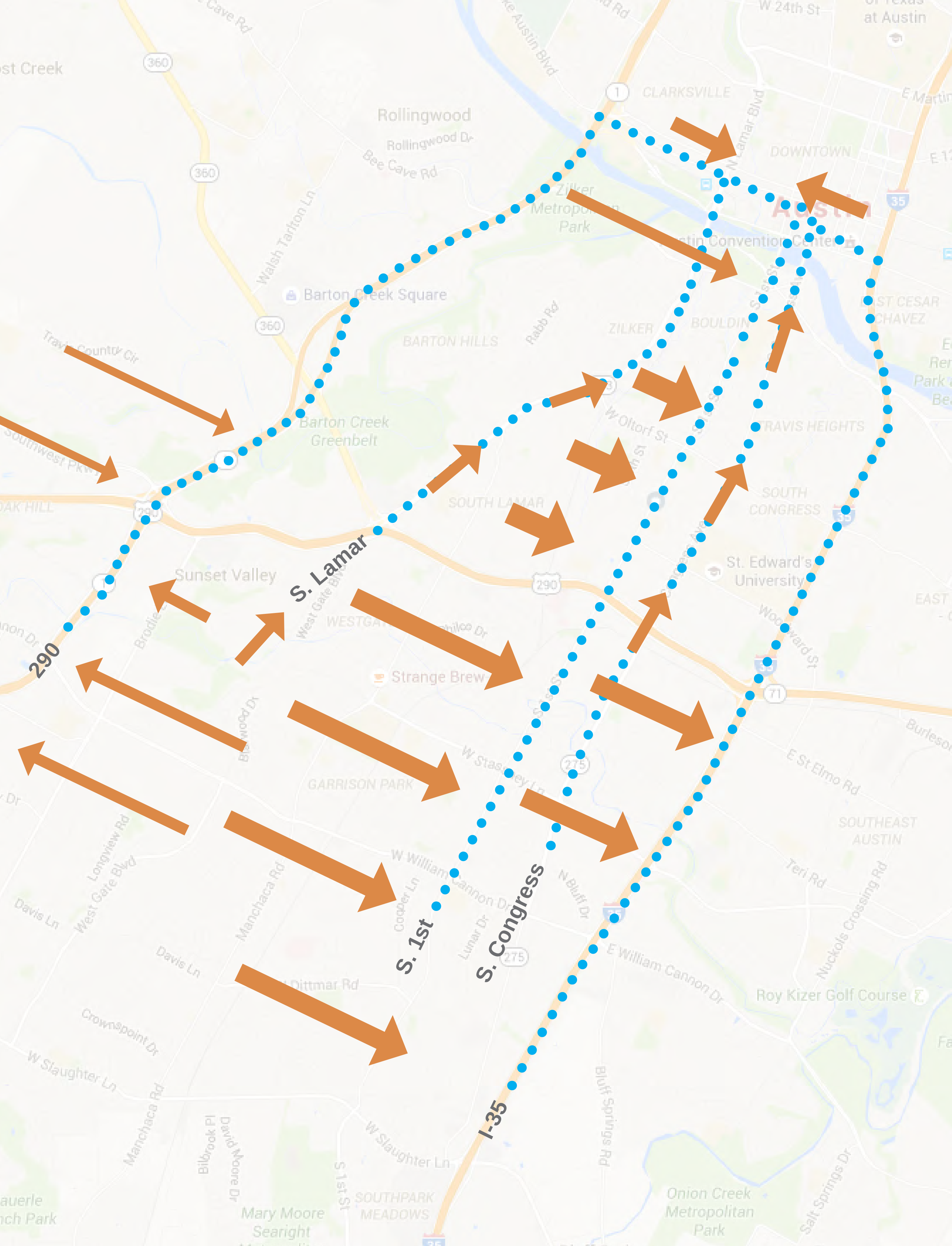
Wire One fosters adoption by borrowing characteristics of the car culture discovered in research. Which is a lack of schedule & a greater availability of personal space. These are inherent in the continuous operation and smaller car design.

Ridership will also be boosted by the ability to locate Wire One on a route that commuters already plan around, South 1st. This makes adoption as an alternative to a car commute feasible. This makes the commuter a real source of ridership.
Connecting walkable residential neighborhoods with a walkable downtown and the many shopping districts along South 1st will draw core ridership from the neighborhood micro-trips along Wire One.

Finally those neighborhoods have an important role in participating in the festival tourism of Austin.

The three pillars of commuters, neighborhood micro-trips and supporting tourism will lead to a better adoption for Wire One than rail or bus.

Last the continuous operation lends itself to easy inclusion in route planning software like that used by car share companies or integrations with multi-mode transportation systems & planning. The reach of Wire One will spread to anyone in South Austin planning a trip to Downtown or any destination along the line.



CURRENT COMMUNTING PATTERNS

95% BY CAR & 5% BY MODES OTHER THAN CAR

Time is an important consideration. These are the Google/Waze shortest routes & commuters follow.

WIRE ONE MONO CABLE

Travel Times by Car at 8:40am. As timed by Google Maps from points to City Hall. They do not include time in Downtown Congestion. Parking Time or Time Walking to Work.

vs.

Car times to downtown

Wire One Commute times to downtown

WIRE ONE MONO CABLE

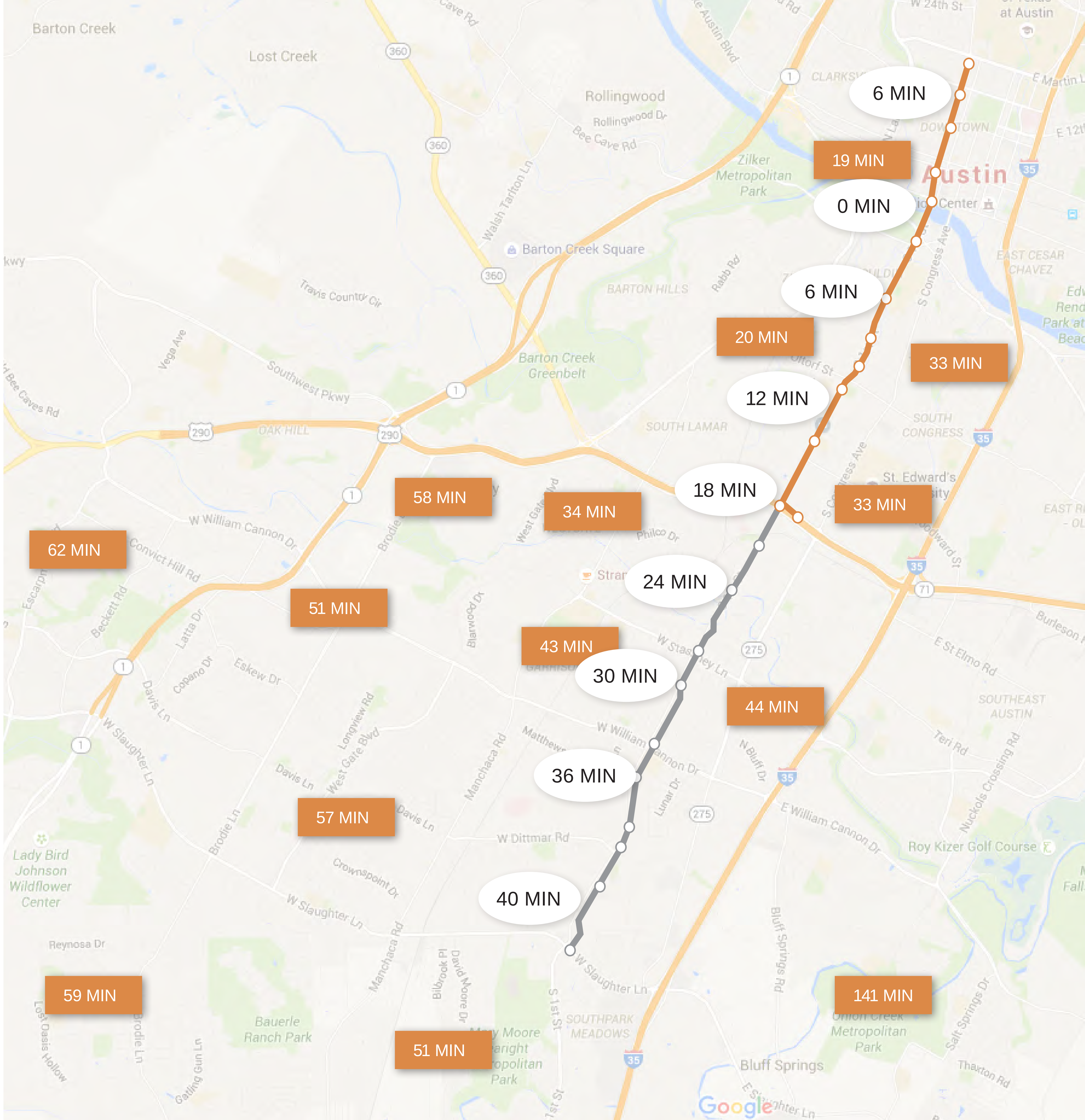
As timed by Google Maps from points to City Hall. They do not include time in Downtown Congestion. Parking Time or Time Walking to Work.

Bus schedules, transfers and the frequent trips into neighborhood routes is a major contributor to these times.

vs.

Bus times to downtown

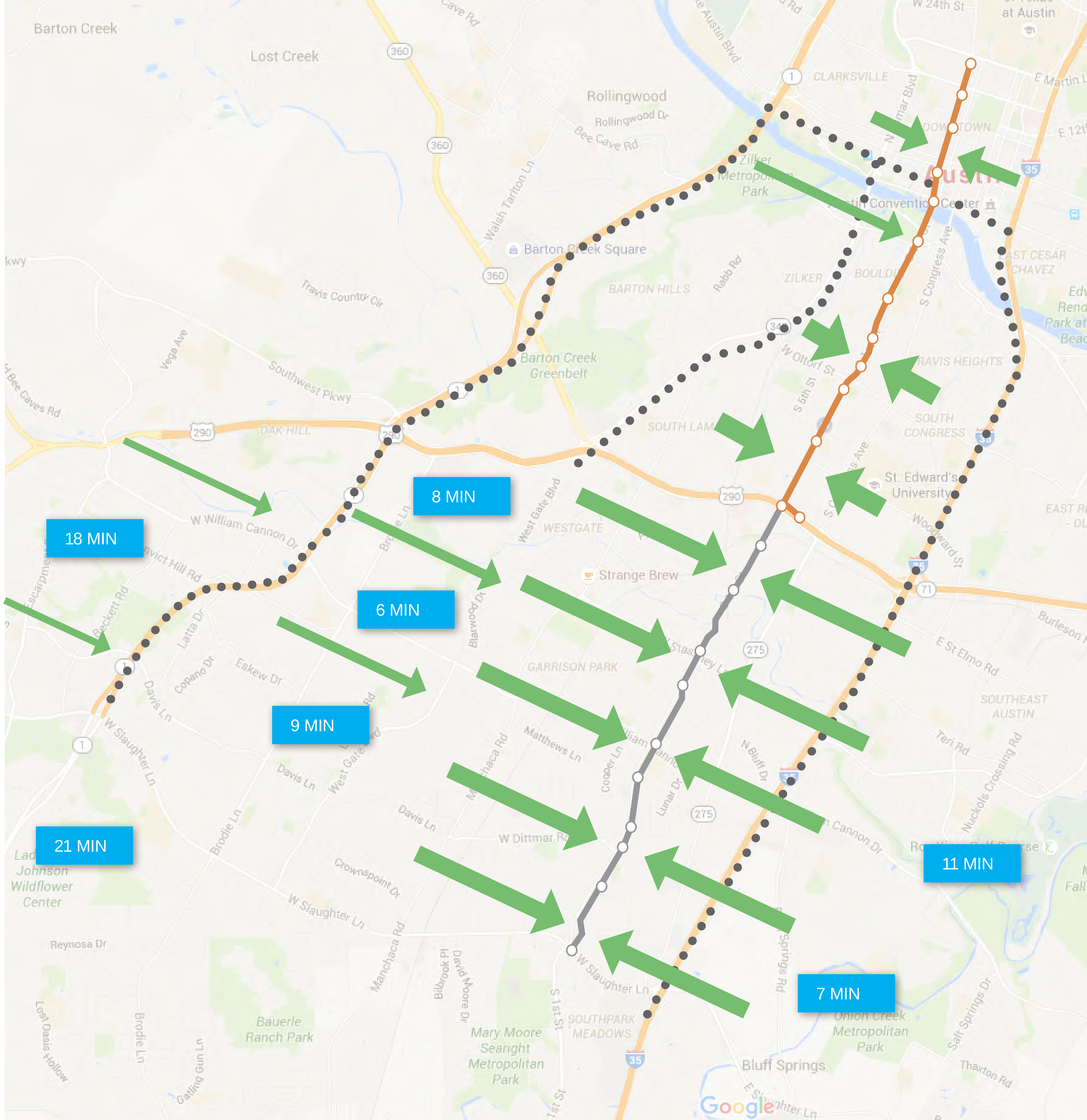
Wire One Commute times to downtown



THE WIRE ONE SHIFT

Looking at travel times to South 1st you can see a potential for shift is large in first mile. Building Park & Fly or expanding bus schedule and direct routes begins to make Wire One a shorter commute than MoPac for more distant neighborhoods.

This could create a break over where cost and convenience line up and we begin having a meaningful impact on access to Downtown from the whole of South Austin.



Car times to Park and Fly

EARLY ESTIMATES

System Phase I	not including Park & Fly	**$300 – $400 Million**
System Phase II	not including Park & Fly	**$200 – $300 Million**
Ridership Model A	75% capacity at peak 25% capacity off peak	**5,913,000 per year**
O+M		**$3 – $6 Million**
Cost per rider	75% capacity at peak 25% capacity off peak	**$0.51 - $1.01 per rider**

These are wide estimates based on formulas. Costing has enormous variability. More accurate cost would require study. Ridership estimates are at the initial 1,200 pphpd capacity.

Ridership also requires study. But capturing existing bus & tourism traffic will create an instant base of ridership. Commuters will also likely convert.

Beyond Land Use & fees there are financial opportunities in Urban Cable in advertising & naming rights. Emirates Airlines paid London $56 million for 10 year naming rights.

Consider also the costs not incurred, namely crossing obstacles.

SAFETY, ENVIRONMENT & POLICY

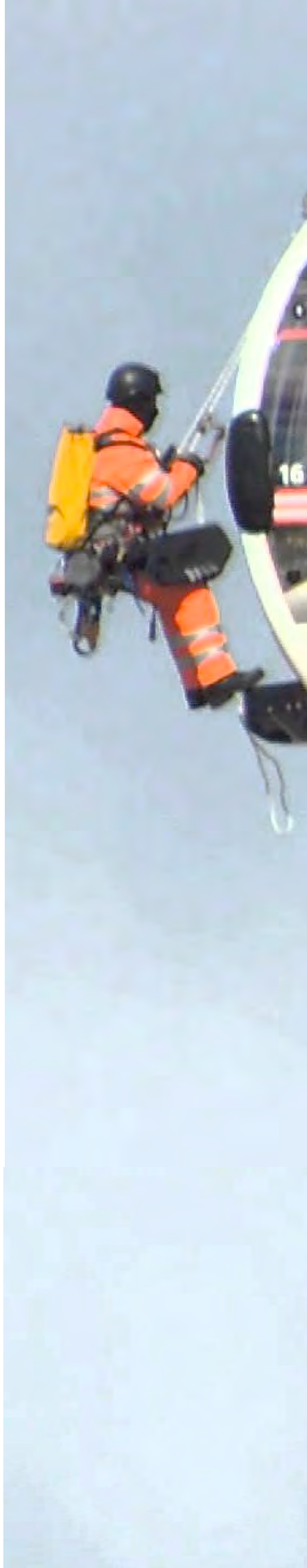
Safety is engineered into Urban Cable. The manufacturers provide service contracts and a program maintenance schedule to ensure both uptime and safe operation. Urban Cable is designed around redundant systems like air travel. In the U.S. there are regulatory and engineering bodies governing safety and policy. In urban applications call boxes like used on college campuses are installed into cars to provide individual safety. Station attendants are required for operation.

Environmental impact is extremely low. The equipment footprint is low. The energy requirements are low. An entire 7 mile line can run off of only a few Kilowatt Hours of electricity provided by the grid. In Austin we can use wind or solar. When measured against reduced car trips Wire One could end up carbon negative. Climate control may impact that formula based on the approach taken. Current thinking is the safest most robust approach is using small LCNG fueled generators to provide power and climate control. Battery & Ultra capacitor are other approaches with cost and reliability tradeoffs. Choosing an approach for climate controls requires study.

Urban Cable is impacted by winds. Wire One would run safely up to 50 mile per hour winds. In Central Texas we may experience outages due to extreme winds. But those occasions are short and are well predicted.

Urban Cable is quiet relative to transit. The noise from a running a line is less than that of cars or busses on a street. Riding Urban Cable is actually peaceful. Cell reception is typically excellent.

It is unknown how flyover of private property will be handled in the U.S. Therefore Wire One was envisioned to occupy public or City owned property. Flyover of private property is probably negotiated with the owner.



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