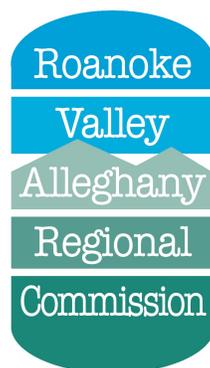


Roanoke Trolley Economic Impact Study



2007



Prepared by the Roanoke Valley Area Metropolitan Planning Organization



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This report was prepared by the Roanoke Valley Area Metropolitan Planning Organization (RVAMPO) in cooperation with the U.S. Department of Transportation (USDOT), the Federal Highway Administration (FHWA), and the Virginia Department of Transportation (VDOT). The contents of this report reflect the views of the staff of the Roanoke Valley Metropolitan Planning Organization (MPO). The MPO staff is responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the FHWA, VDOT, or RVARC. This report does not constitute a standard, specification, or regulation. FHWA or VDOT acceptance of this report as evidence of fulfillment of the objectives of this planning study does not constitute endorsement/approval of the need for any recommended improvements nor does it constitute approval of their location and design or a commitment to fund any such improvements. Additional project level environmental impact assessments and/or studies of alternatives may be necessary.



Executive Summary

The City of Roanoke is exploring the feasibility of constructing and operating a vintage trolley line on Jefferson Street in downtown Roanoke, VA, between the City Market and the South Jefferson Redevelopment Area. The trolley would be designed to serve downtown employees and students, area residents, and tourists. It would also act as a catalyst for redevelopment and new construction along the Jefferson Street corridor and in the South Jefferson Redevelopment Area.

This study was undertaken to evaluate the economic impact that the proposed vintage trolley could have on downtown Roanoke, the City of Roanoke, and the larger metropolitan region. It reviews the history of streetcars in Roanoke, describes the characteristics of the proposed trolley system, and evaluates the development potential of properties adjacent to the proposed line on Jefferson Street. The study also provides brief case reviews of the economic impact of streetcar systems in four different U.S. cities. Finally, the economic impact of the construction and operating cost of the proposed Roanoke trolley line are estimated using a computer model and potential real estate development effects are explored based on hypothetical build-out scenarios. cursory cost/benefit analysis is also provided, with further analysis anticipated in a future, more detailed alternatives study, completed in compliance with federal guidelines.

In 2004, Wilbur Smith Associates completed the Roanoke Vintage Trolley Conceptual Analysis that examined the technical and financial feasibility of a downtown Roanoke trolley line on the Jefferson Street corridor. This study estimated that the capital cost of the trolley system (including trolley cars, rail lines, and a maintenance facility) would be \$16,975,750 and the annual operating costs would be \$274,560. Based on these estimates, the construction of the Roanoke trolley line is estimated to have a \$16,980,302 one-time impact on the economy of the Roanoke Metropolitan Statistical Area (MSA) and



Conceptual Trolley on Jefferson St. - Source: City Market District Plan

produce approximately 180 jobs during the construction period. The ongoing operations of the trolley line are projected to have a \$441,116 annual impact on the MSA (including the annual operating cost) and create 7.4 permanent jobs.

If, as in other cities that have started streetcar systems, the Roanoke trolley line catalyzes new land development, there could be between \$31.5 million to \$78.7 million of new construction along Jefferson Street, and \$336,945 to \$842,363 in annual real estate tax revenue to the City. If the City of Roanoke were to finance \$8 million of the capital costs, based on the estimates and assumptions in our study, it could recoup its initial investment through additional tax revenue in 9 to 23 years, depending upon the rate and intensity of redevelopment or new construction along the trolley line. Furthermore, if the impacts on real estate values and development materialize as estimated, the City could see a 4.3% to 10.6% return on its investment within a similar time period.

This study assumes that the trolley project will be initiated as a component of other significant economic development efforts in the corridor. It is clear from the case reviews that trolley and streetcar systems can be an integral component in the redevelopment of an area or corridor. However, due to differing development and demographic conditions, it cannot be assured that the economic impact of a trolley line in one city will be the same in another.



Roanoke Streetcar History

The history of the City of Roanoke is intertwined with that of the American rail industry. As the Town of Big Lick was being renamed to Roanoke in 1882, the recently merged Norfolk Western (NW) and Shenandoah Valley (SV) Railroad Companies located their rail junction and new headquarters in Roanoke. During the ensuing decades, NW was integral in the opening of the Pocahontas coalfields in western Virginia and West Virginia, which fueled half the world's navies and today stokes steel mills and power plants all over the globe. NW also opened the Roanoke Shops, where the famed classes A, J, and Y6 locomotives would be designed, built and maintained. These successes brought extraordinary employment and population growth in the Roanoke Valley during the early part of the 20th Century (Norfolk Southern Corpotation, 2007).



Former Lynchburg 1929 Brill Master Unit. Roanoke car 54
Source: David Steinburg Collection

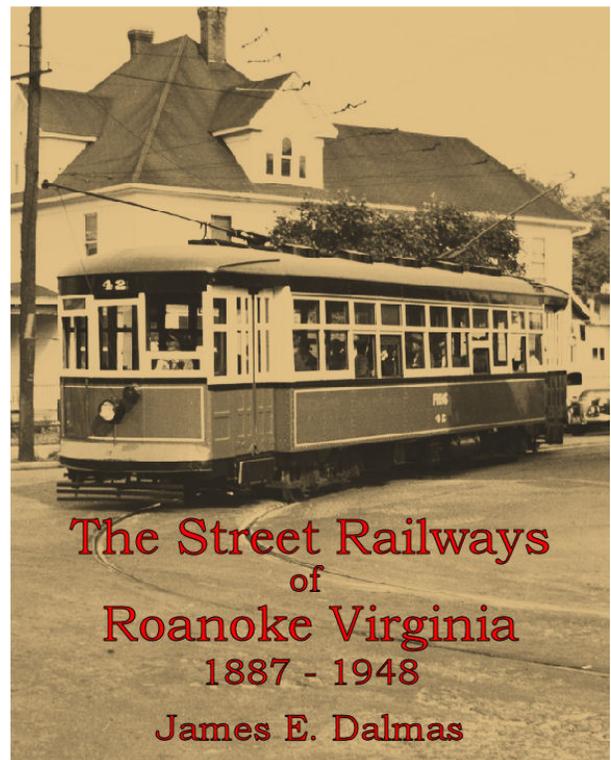
To accommodate the employment needs of NW and the growing population of Roanoke, many new homes were built in close proximity to downtown Roanoke and near the NW offices and shops. As the distance between homes and downtown increased, workers needed a faster way to travel to work than walking.

In 1887, the Roanoke Street Railway Company was incorporated to provide horse-drawn railway service between Roanoke and the present day City of Salem and Town of Vinton. This line provided the service needed to transport workers to the NW shops and allowed Roanoke Valley citizens the opportunity to live in the first ring of suburban areas. After the development of the world's first electric streetcar system in Richmond, VA, Roanoke started its own electric streetcar in 1892. During the nineteen

hundreds the streetcar system expanded rapidly and by 1925 the company was operating about 50 cars over 30 miles of tracks. The bleak year of 1929 and the widespread ownership of automobiles marked the beginning of the end of streetcars in Roanoke when two lines were abandoned. Automobile ownership rates quickly increased, and by 1940 six more lines had ceased operation, leaving only 2 major lines. In July 1948, the two remaining lines were abandoned and the eighteen remaining passenger cars were sold for scrap (Dalmas, 2006).

Since that time many Roanoke residents have been nostalgic about the once ubiquitous trolley system and there have been many efforts over the years to safeguard the City's trolley history, such as the donation of an original Roanoke streetcar to the Virginia Museum of Transportation and the preservation of the old streetcar maintenance barn.

In 2006, James E. Dalmas, a Roanoke native and former President of the Baltimore Streetcar Museum, wrote *The Street Railways of Roanoke, Virginia 1887-1948*, which contains the most complete history and collection of photos of the Roanoke streetcar system.





Proposed Trolley Line and Conceptual Analysis

The development of the Dalmas book occurred during the same time as a renaissance in interest in streetcars in Roanoke and throughout the United States. In 2004 the Roanoke Valley-Alleghany Regional Commission and the Greater Roanoke Transit Company hired Wilbur Smith Associates and the Lomardo Group to conduct a preliminary examination of the technical and financial feasibility of a downtown Roanoke vintage trolley line on the Jefferson Street corridor. Vintage trolley systems are transportation lines that operate on fixed rails and use vehicles that were built before 1960 or are replica transit vehicles. Such systems are operating in approximately 26 cities across the United States and are under consideration in many other locations.

The Roanoke Vintage Trolley Conceptual Analysis was undertaken in response to City leaders who were interested in innovative ways to serve short trips within the downtown, expand tourism opportunities, and support future economic development. As described in the Conceptual Analysis, the goals of the proposed trolley line are to:

- “Link various venues in the downtown area with an efficient and “fun” transit line.
- Provide an attractive alternate to the automobile for short trips, and one that would attract use from tourists, visitors, and residents alike.
- Celebrate the historic role of the streetcar in the development and urbanization of the greater downtown area.
- Serve as a transportation link to support economic development as the area served undergoes economic redevelopment as a mixed-use urban neighborhood.”

The trolley line is proposed to connect the Roanoke central business district and the South Jefferson Redevelopment District, via the Jefferson Street corridor. The line is recommended to run 1.26 miles on Jefferson Street, between Norfolk and Salem Avenues to Reserve Avenue, with potential, future south and north extensions. The recommended fleet consists of three double-truck, electrically propelled replica streetcars, approximately 46 feet in length, seating 46 passengers and having American With

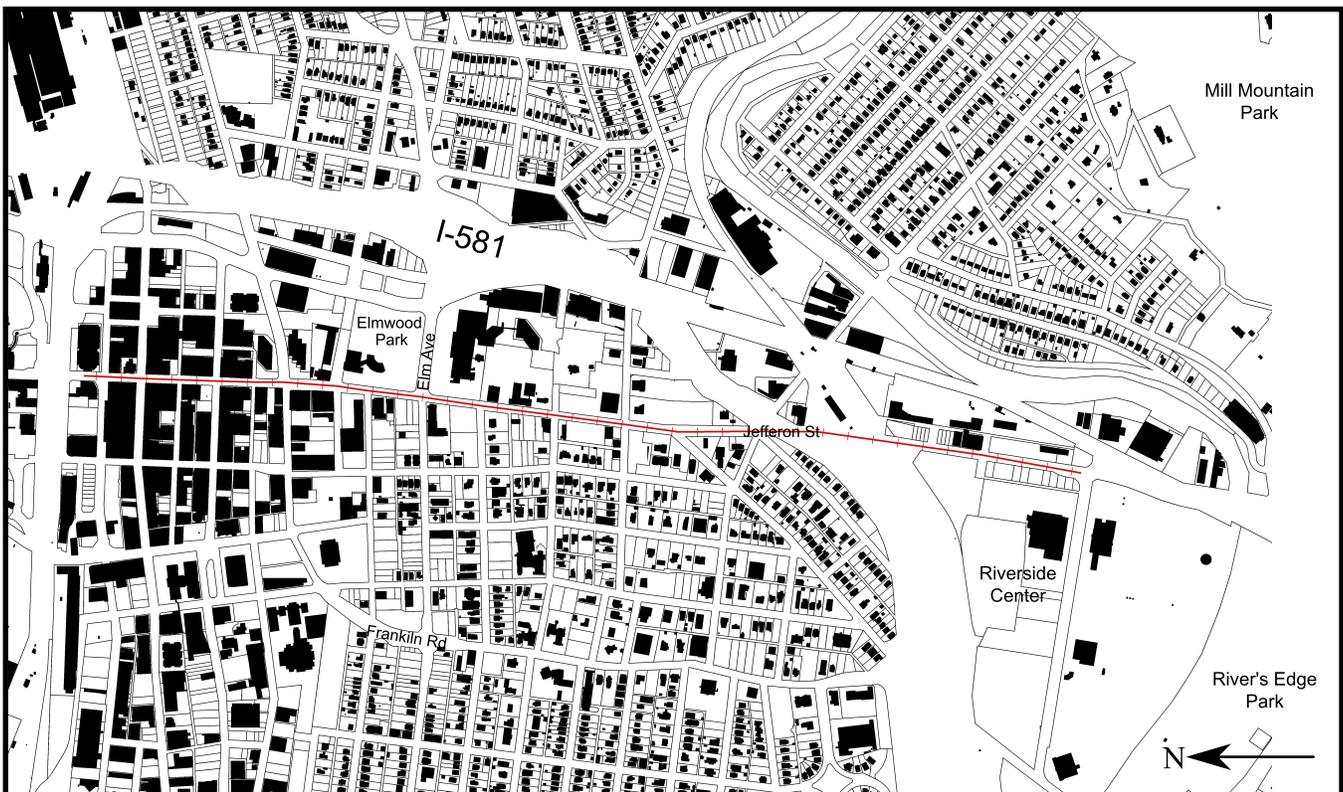


Figure 1: Map of proposed Roanoke Vintage Trolley line along Jefferson Street. Line represented by red rail tracks.



Disabilities Act (ADA) compliant wheelchair lifts. There would be passenger stops located approximately every 4 blocks and the trolley tracks will be located in Jefferson Street and paved flush with rail tops, so that automobiles can drive over top of them. The trolley will be controlled by the existing traffic signals on Jefferson Street and powered by overhead contact lines.



Conceptual trolley on Market Street in Roanoke City Market area. Source: Vintage Trolley Conceptual Analysis

The City of Roanoke central business district is thriving and experiencing an increase in downtown residential dwellings. The jewel of the downtown is the Historic Roanoke City Market, which is the oldest continuously operating open-air market in Virginia. The City recently completed a City Market District Plan that contains proposals to ensure the continued success of this area and spur new infill development.



Carillion Biomedical Institute under construction. Source: Carillion Biomedical Institute

The downtown also boasts the historic Hotel Roanoke and Conference Center, Center in the Square, and the Art Museum of Western Museum.

The South Jefferson Redevelopment District is a 110-acre area located south of downtown Roanoke and is designated by the State of Virginia as a “Redevelopment Area” due to its deficient infrastructure and depressed economic activity. The area is now starting to experience new development with the construction of the Riverside Development Center, which will contain the Carilion Biomedical Institute, a medical school, offices, a hotel, and restaurants. Adjacent to the Redevelopment Area is the Carilion Roanoke Memorial Hospital and the Rivers Edge Park. The City of Roanoke recently completed a conceptual plan for the redevelopment of the Park that includes proposals for an amphitheater, a multi-use plaza, whitewater park, and a gondola to Mill Mountain.

City leaders believe that the existence of the vintage trolley line will strengthen the development efforts at both ends of the line, as well as along the line on the Jefferson Street corridor. Jefferson Street has a tremendous history as one of the oldest streets in the City of Roanoke. For the past couple of decades the Jefferson Street corridor has experienced gradual improvements, but unfortunately still has multiple vacant storefronts, as well as numerous underutilized buildings and land.



Case Reviews of Trolley Economic Impact

Heritage streetcar systems are being operated in approximately 26 cities of all sizes in the United States and about 46 are in the process of studying or developing heritage streetcar systems. Four trolley systems in cities of different populations are examined in this section, with particular focus on the economic impact that their streetcar or trolley systems are having on real estate development. The reviews are for illustrative purposes only, since it cannot be assumed that the economic impact of a trolley line in one city will be the same in another.

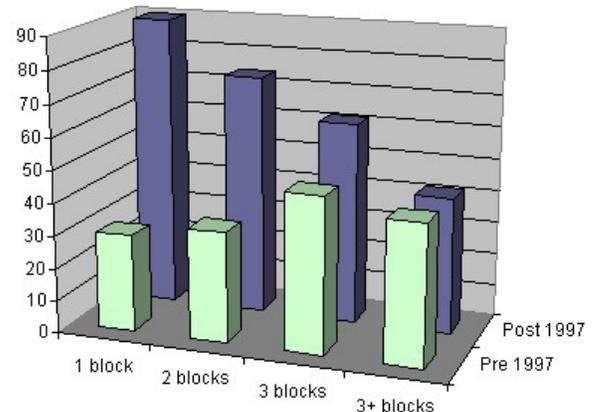
Portland, OR

The City of Portland has a population of 542,034, with a metropolitan area population of 2,566,263. The Metropolitan Area and the City have light-rail, modern streetcar, and vintage trolley systems. In 1986, light rail service, named the Metropolitan Area Express (MAX), opened on a 15-mile alignment between the suburb of Gresham and downtown Portland. Soon thereafter the City created a local improvement district to finance the local share of a proposed Vintage Trolley System. The Trolley service began in 1987 and ran between Lloyd Center and downtown Portland's existing MAX tracks. In 1997, Portland also started plans for a modern streetcar circulator and in 2001 the system opened and became the first modern streetcar system in North America (APTA, 2007).

A 2005 study by E.D. Hovee and Associates found that properties located adjacent to Portland's modern streetcar line now have the greatest percentage of development in the Central Business District (Portland Streetcar, Inc., 2006). Prior to the 1997 designation of the location of the first streetcar line, land located within one block of the line captured only 19% of all Central Business District (CBD) development, and development projects were built to less than half of the allowable density. Since that time, new development within one block of the streetcar line makes up 55% of all CBD development and has achieved an average of 90% (Figure 1) of the allowable density (as measured by floor area ratio, or FAR). After the construction of the streetcar system there was over \$2.28 billion invested and 4.6 million square feet of office, institutional, retail, and hotel structures

constructed within two blocks of the streetcar alignment (Portland Streetcar, Inc., 2006).

Figure 1: Percentage of Permitted FAR Realized Based on Distance from Portland Streetcar.
Source: Portland Streetcar, Inc.



Kenosha, WI

The City of Kenosha has a population of 95,039, with a metropolitan area population of 158,255. The City has a 1.7-mile, vintage streetcar loop that was conceived as a circulator system to connect the historic downtown and the Metra commuter rail station with the Harbor Park redevelopment project, located on a former brownfield site (GEM, 2004). The streetcar was considered integral to the success of Harbor Park since it would connect the Park with downtown and the commuter rail station.



Kenosha, WI streetcar along Lake Michigan.
Source: Railway Preservation Resources, John Smatlak.



The streetcar travels on a grassy roadbed along an attractive boulevard into the downtown area. It runs in the street for half of the route and along the side of the street on the other half. The City plans to build a 4-mile extension of the streetcar to another 30-acre brownfield site. Since the opening of the Harbor Park streetcar line in 2000 there has been close to \$150 million of development adjacent to it, including a public museum, 400 housing units, a waterfront park, and a promenade (Ohland and Poticha, 2006). Harbor Park is now a regional tourist destination with thousands of visitors and streetcar riders per year.

Little Rock, AR

The City of Little Rock has a population of 184,564, with a metropolitan area population of 652,834. The City has a 2.5-mile, vintage streetcar system that was initiated as a component of a downtown revitalization plan to link the downtown River Market District with neighborhoods, shopping, and parks on the other side of the Arkansas River. The route now connects many destinations, such as the convention center, hotels,

two City Halls, the historic Argenta neighborhood, two museums, an amphitheater, and dozens of office buildings. Since the beginning of the streetcar service in 2004 there has been about \$200 million in development either constructed or under development along the line (Ohland and Poticha, 2006). Construction of a 1-mile extension of the streetcar line began in 2006 in order to connect with the William Jefferson Clinton Presidential Library.

Tampa, FL

The City of Tampa has a population of 322,539, with a metropolitan area population of 2,566,263. The City has a 2.4-mile vintage streetcar system that was developed in order to connect and promote new development in Ybor City, the Channelside and Garrison Seaport Districts, and the Convention Center. The streetcar right-of-way is separate from the surface streets, so the streetcar does not operate with automobile traffic. Since the inception of the system in 2002, it is credited with catalyzing \$1 billion in development within three blocks of the line (Ohland and Poticha, 2006).



Little Rock, AR River Rail Streetcar. Source: Roanoke Valley Alleghany Regional Commission.



Economic Impact of Roanoke Trolley

This section contains estimates of the economic impact of the construction and operating cost of the proposed Roanoke trolley line and its potential impact on real estate development effects in the Jefferson Street corridor. In 2004, Wilbur Smith Associates completed the Roanoke Vintage Trolley Conceptual Analysis that examined the technical and financial feasibility of a downtown Roanoke trolley line on the Jefferson Street corridor. This study estimated that the capital cost of the trolley system (including trolley cars, rail lines, and a maintenance facility) would be \$16,975,750 and the annual operating costs would be \$274,560.

IMPLAN Model

The economic impact of the construction and operating costs of the proposed trolley service on the economy of the Roanoke Metropolitan Statistical Area (MSA) was calculated using IMPLAN, an economic impact software package. To perform this analysis, a model was built using 2003 economic and employment data for the Counties of Botetourt, Craig, Franklin and Roanoke and the Cities of Roanoke and Salem.

IMPLAN builds a model of a region's economy based on a variety of publicly available economic data sources. Information regarding a potential project is entered into the system and run through the model to simulate the "rounds of purchasing" that occur when an economic stimulus is introduced. IMPLAN captures economic activity that occurs directly as a result of the project, indirectly as a result of the company purchasing goods and services from other companies within the study area, and induced economic activity, or spending of employees on

typical household goods and services.

All inputs were taken from the Roanoke Vintage Trolley Conceptual Analysis. The total capital budget for the project was estimated at \$16,975,750 and was broken down into several subcategories, while the operating costs were estimated to be \$274,560 annually. A cursory examination of the budget in the original feasibility analysis suggests that there are several items on the budget that will likely be purchased outside of the project area. The actual trolley vehicles and certain tools and equipment will likely be manufactured elsewhere and represent an obvious leakage. The model's regional purchase coefficients were also used on all sectors to estimate the proportion of activity within each specific industry sector of direct impact that will occur outside of the project area. These leakages, both assumed and estimated by the model, are the reasons for the discrepancy in the total capital budget and the direct impact in the tables.

Impact of Trolley Construction

Table I contains the estimated construction impacts upon the Roanoke MSA's economy. This is an impact estimate for the entire construction project from start to finish and includes impacts on sales (output), employment, labor income, and indirect business taxes (see Glossary for definitions of each category). The direct employment may appear deceptively large for the construction phase, however these jobs are not necessarily full-time equivalents or permanent, and the project will support them at different points along the construction timeline.

Table I: Estimated Impact of the Construction of the Trolley on Economy of the Roanoke MSA

	Direct	Indirect	Induced	Total
Output	\$10,139,357	\$3,049,802	\$3,791,143	\$16,980,302
Employment	107.9	29.8	42.8	180.5
Labor Income	\$4,163,599	\$1,183,695	\$1,308,497	\$6,655,791
Indirect Business Taxes	\$53,828	\$117,719	\$248,414	\$419,961



Impact of Trolley Operations

Once operations commence, it is calculated that based on the estimated \$274,560 operating expenses the new trolley project will have an annual impact of \$441,116 on the economy of the Roanoke MSA.

Table 2 breaks out estimated impacts on sales (output), employment, labor income, and indirect business taxes. Note that the impact estimates in Table 2 are estimated on an annual basis and the jobs supported in the indirect and induced categories are not necessarily new jobs and could represent either full or part-time positions. Therefore, the trolley is estimated to have a \$441,116 impact on the economy each year and support 7.4 jobs, including approximately 6 employed directly in support of the trolley. In other words, the model simply estimates that sufficient additional demand will be generated by the trolley to support nearly 2 jobs elsewhere in the larger region’s economy. Indirect business taxes represent taxes paid to the federal, state and local levels of government by businesses engaged in various ‘rounds of spending.’ This includes federal and state income taxes, motor vehicle licenses and personal property taxes, property tax, state and local sales taxes, and other fees/taxes.

Impact of Trolley on Real Estate Values

As shown in the case review section, when streetcar lines are coordinated with other economic development projects there can be a substantial impact on adjacent property values and development.

Cities with streetcar systems are also experiencing higher density development on properties in close

proximity to the line. Along the northern portion of the proposed Jefferson Street Trolley line, from Salem Avenue down to Elm Avenue, the adjacent properties are largely built-out, with less potential for additional density. However, many of these structures are underutilized, with vacant storefronts and upper stories. South of Elm Avenue, the development density is much lower and there are opportunities for infill development or grayfield redevelopment.

Since there is not a well-established method to estimate the potential impact of a new trolley line real estate, this study evaluates build-out scenarios assuming different intensities of new development on the vacant properties directly adjacent to Jefferson Street. The scenarios assume development at 10%, 25%, 75%, and 100% of the property’s permitted density, based upon its current zoning. Most of the properties are in the Downtown Zoning District, which permits a maximum floor area ratio (FAR) of 15:1. Buildings in this district can have a floor area that is 15 times larger than the area of the property on which it is built. For example, if a building is covers 100% of its lot, it can be a maximum of 15 stories tall based on the floor area ratio standard.

Properties developed at 10% of the FAR could be 1.5 story buildings covering all of the property or 3 story buildings with a footprint half the size of the lot. At 25% FAR, the buildings could be 3.75 stories or 7 stories, using the same assumptions. Presently, the average FAR for all properties adjacent to Jefferson Street is 2.42, or 16% of the permitted FAR of 15:1. See Table III for the build-out analysis.

Table II: Estimated Impact of the Operations of the Trolley on Economy of the Roanoke MSA

	Direct	Indirect	Induced	Total
Output	\$274,560	\$67,929	\$98,627	\$441,116
Employment	5.7	0.6	1.1	7.4
Labor Income	\$117,128	\$24,749	\$34,039	\$175,917
Indirect Business Taxes	\$6,033	\$2,720	\$6,302	\$15,055



Table III: Estimated Impact of the Trolley on Vacant Properties Along Jefferson Street

	10% of FAR	25% of FAR	50% of FAR	100% of FAR
Square Feet	656,046	1,640,115	3,280,230	6,560,460
Construction Value	\$31,490,208	\$78,725,520	\$157,451,040	\$314,902,080
Annual Tax Revenue	\$336,945	\$842,363	\$1,684,726	\$3,369,452

The plans adopted by the City of Roanoke relative to the Jefferson Street Corridor and the South Jefferson Redevelopment Area all recommend development of urban character and scale that extends the downtown service area. Based on these plans and the scale of development occurring in the Riverside Development center, it is reasonable to project that future infill development in the corridor will be more dense than the current mean of 16% FAR, possibly as high as 25% of the permitted FAR. It is however unlikely that the average of this development will come close to 50%-100% of the FAR. Therefore, if the construction of the trolley line spurs new development as it has in other U.S. cities and is part of other comprehensive improvement and redevelopment efforts, there could be between \$31.5 million to \$78.7 million of new construction along Jefferson Street, and \$336,945 to \$842,363 in annual real estate tax revenue to the City.



Conclusions

In the Roanoke Vintage Trolley Conceptual Analysis, the capital and start-up cost of the vintage trolley line were estimated to be \$16,975,750, while the annual operating costs were estimated to be \$274,560. The actual construction of the Roanoke trolley line is estimated to have a \$16,980,302 one-time impact on the Roanoke Metropolitan Statistical Area (MSA) and produce approximately 180 jobs during the construction period. The ongoing operations of the trolley line are projected to have a \$441,116 annual impact on the MSA (including the annual operating cost) and create 7.4 permanent jobs.

If, as in other cities that have started streetcar systems, the Roanoke trolley line catalyzes new land development, there could be between \$31.5 million to \$78.7 million of new construction along Jefferson Street, and \$336,945 to \$842,363 in annual real estate tax revenue to the City. This assumes that the trolley project is initiated as a component of other significant economic development efforts in the corridor.

Many trolley projects in the United States have been funded through a combination of federal, state, and local government funds and private partnerships. If the City of Roanoke were to finance \$8 million of the capital costs, based on the estimates and assumptions in our study, it could recoup its initial investment through additional tax revenue in 9 to 23 years, depending upon the rate and intensity with which redevelopment and new construction occur along the trolley line. Furthermore, if the impacts on real estate values and development materialize, as estimated in this study, the City could see a 4.3% to 10.6% return on its investment within a similar time period.

This study assumes that the trolley project will be initiated as a component of other significant economic development efforts in the corridor. It is clear from the case reviews that trolley and streetcar systems can be an integral component in the redevelopment of an area or corridor. However due

to differing development and demographic conditions, it is it cannot be assured that the economic impact of a trolley line in one city will be the same in another.

Nevertheless, the conditions under which a trolley system is likely to successfully initiate development or redevelopment is widely recognized, such as:

- A mix of attractors and producers of pedestrians and a diverse mix of land uses.
- Walkable areas in close proximity to the trolley line.
- Opportunities for redevelopment, joint development, and public/private partnerships.
- Complements existing or proposed economic development efforts and is integrated into development plans.
- Route has high visibility and runs through planned developed areas, not on the periphery.
- Connects to other transportation modes (bus, rail, air, greenways, park-n-ride, etc.).
- Planning for a compact, high-density, pedestrian-friendly environment along the route, such as multi-family developments, mixed-use areas, retail, special activity centers, and other public uses.



Glossary

Direct impacts consist of permanent jobs, wages and output of company operations, construction or other economic activity being studied.

Floor Area Ratio is the gross floor area in square feet of all buildings on a lot divided by the area of such lot in square feet.

Indirect impacts are the jobs, wages and output created by businesses, which provide goods and services essential to the construction of the project or to the company. They are also referred to as "supplier" impacts. These businesses range from manufacturers (who make goods related to the project activity) to wholesalers (who deliver goods related to the project) to janitorial firms who clean the buildings.

Induced impacts are the result of spending of the wages and salaries from the direct and indirect employees on items such as food, housing, transportation and medical services. This spending creates induced employment in nearly all sectors of the economy. Induced impacts are also commonly referred to as "consumer" impacts.

Labor income or earnings and wages, refers to the total wage and salary payments as well as benefits including health and life insurance, retirement payments and any other such non-cash compensation.

Output, also referred to as sales, relates to the gross receipts for goods and services generated by the company's operations. For retail operations, sales are margined to account for leakage since the good sold in most cases is not manufactured in the same community. Only retail margins are considered.

Total impacts are the sum of the direct, indirect and induced impacts.



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