



Rochester Rail and Trolley
Corporation:
Phase I Plan Analysis

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1. Executive Summary

Rochester Trolley & Rail Corporation (RTRC) is a local company that has interest in developing and implementing a heritage rail-based trolley and streetcar system in Monroe County. For the first phase of the project ("Phase I"), the RTRC has developed an implementation plan for a recreational line between High Falls, Charlotte waterfront and Sea Breeze amusement park. In addition to serving the local recreational users, the RTRC hopes to capitalize on pedestrian and tourist traffic generated by the Fast Ferry, scheduled to begin operating at the Charlotte waterfront in spring 2004. The RTRC trolley concept would compete with the RTS bus line as the mass transit of choice for this tourist traffic.

The RTRC must secure funding in order to conduct a more exhaustive feasibility study. Additional data would make their lobby for financial support more likely to succeed. RTRC must first determine if public enthusiasm for such a trolley project would be high, if current recreational users of the Phase I sites would be willing to use such a trolley, and if the current site design of the Phase I plan is useable. Survey points of intercept were the three recreational areas that would be served by Phase I. Current recreational users provide a convenience sample and are more likely to be repeat users if the system is installed. Data was collected through the use of a cross sectional person-administered survey. Units of analysis include general perceptions such as satisfaction/dissatisfaction of current transportation modes, willingness to ride at a projected price, and some qualitative polling.

The survey resulted in information quite different than expected. The survey did not find people unhappy with their travel experiences upon arrival at their destinations. These positive travel experiences provide for no strong incentive for the long-term sustainability of mass transit without an outside influx of passengers. In addition, the RTRC had hoped to segment out families and singles as high-interest customers. However, there was no evidence to establish that marital status or having children made any difference in attitude toward either the trolley or purchase intention.

The sample did have a relatively high attitude concerning the idea of a trolley in Rochester. With little trolley experience to speak of, the current sample rated them as significantly more fun and environmentally friendly than the bus, and did not perceive lack of comfort, cost or other commonly cited trolley complaints to be any worse for those of a bus. The Rochester sample matches that of other studies. Secondary research has shown that with all other conditions being equal, rail transit is likely to attract from 34% to 43% more riders than equivalent bus service.¹ Simply put, more people are willing to ride trolleys than buses. While this too, on the surface, would seem to make a strong case for trolleys over buses, the truth of the matter is that mass transit use as whole has been declining in the U.S.² The Rochester sample's willingness to purchase tickets and actually use the trolley as outlined in the Phase I plan is in fact somewhat low. A slightly higher than average score on purchase intention, as our results indicate, most often translates into a small percentage of actual purchase. While it is true that the trolley might see more rider ship than the RTS bus to the same location, this may not be a sustainable passenger load. These results suggest that the RTRC rethink their initial development plans quite carefully.

There is ample room for future research on the topics. The RTRC may want to explore the issue of different or more destinations incorporated in the Phase I plan. If the trolley is to get off the ground, a high-interest target segment of the population must be found. Gathering the interest of the student population may be one way to change the trolley from a ho-hum idea into a smashing success. More wide spread acceptance might be gained by an educational campaign that focuses on the activities available in the areas the trolley reaches. A tie-in with recent efforts to revitalize the High Falls area of Rochester is a necessity.

2. Introduction

a. RTRC Background

Formed in early 2003, Rochester Trolley & Rail Corporation (RTRC) is a local company that has interest in developing and implementing a heritage rail-based trolley and streetcar system in Monroe County. The Rochester area currently has a large number of abandoned, unused, or underutilized railways, one example being the historical Hojack Swing Bridge. Recently, RTRC has obtained the right to purchase the Hojack Line right-of-way from CSX, including the river lines on the East bank (BeeBee Line and bridge). RTRC has developed a “Phase I” implementation plan for what they believe would be a high interest, high traffic recreational line. Due to pre-existing tracks and right of ways, this Phase I line would also be significantly lower cost than an entirely new line, and more importantly, may capitalize on pedestrian and tourist traffic generated by the Fast Ferry scheduled to be implemented at the Charlotte waterfront in spring 2004.

Eventually, RTRC can begin networking out tracks with further phases of growth, connecting downtown, area colleges, airport and suburbs. Sustainability in the early years before the expanded track network can be installed may well hinge on the sustainability of the Fast Ferry. Securing success of the high-speed ferry and securing high-speed ferry tourist riders are considered primary factors for long-term success. This brings an additional sense of urgency to the project. RTRC CEO Christopher Burns feels that visitors to Rochester who don’t bring their vehicles will need some way to travel away from the port of Rochester:

“The sense of urgency is the fast ferry that will be coming in less than a year from now... If we don’t have a way to get people in and out of there quickly, the Fast Ferry is going to go from an exciting thing to possibly a black eye – where there’s gridlock and people come over and they don’t have a way to get anywhere and they don’t come back. As a community, we can’t afford that.”³

City officials, as well as other community groups, recognize this issue as well, which could lead to competition for the RTRC as the transport of choice. Irondequoit and the Rochester-Genesee Regional Transportation Authority proposed running a bus trolley from Charlotte to Seabreeze. The City of Rochester also realizes that improvements over current RTS bus service to the Charlotte area may be needed to accommodate ferry passengers and are considering improvements.⁴ Buses, both trolley and diesel, are easily digested as plausible by the general public, but the idea of rail trolley may be a hard sell.

The number of rail trolley systems operating in the United States remains relatively low, twenty-three as of June 2002.⁵ Very few of these lines are public transit holdovers from the street railway era such as in New Orleans and San Francisco, and these holdovers often remain only because they are an integral part of the tourist cultures of those areas.⁶ The majority of the trolleys that exist in the United States are tiny in scale and currently operated as tourist attractions or within amusement parks, traveling limited distances.⁷

b. Definition of Research Problem

The RTRC must secure funding in order to conduct a more exhaustive feasibility study and is interested in obtaining the data necessary to lobby for financial support. First and foremost, the RTRC seeks to convince city officials that a historic trolley would be a far more appealing choice with Rochesterians than other form of mass transit. Brief discussions with local individuals and officials have suggested that this is the case, but the RTRC is interested in more quantitative data, both in order to make their own case more compelling and to determine if their Phase I plan, as written, is a useable outline. The “blanket” question posed by the RTRC team is in essence: “Is there evidence to suggest that a Rochester historical trolley, as outlined in the Phase I plan, will succeed?”

RTRC must first determine if public enthusiasm for such a trolley project would be high, if current recreational users of the Phase I sites would be willing to use such a trolley, and if the current site design of the Phase I plan is useable. As no current primary or secondary data exists which well describes the Rochester perceptions, RTRC’s main objective is to receive preliminary descriptive data from such a

study. Units of analysis would include general perceptions such as satisfaction/dissatisfaction of current transportation modes, willingness to ride at a projected price, and some qualitative polling.

c. Specification of Research Objectives

RTRC is interested in capturing market data that will determine if funds for a larger feasibility study are merited, i.e., “Is there evidence to suggest that a Rochester historical trolley, as outlined in the Phase I plan, will succeed?” Ideally, the survey will determine traveling experiences of current recreational users for the possible Phase I sites, general perceptions of the trolley concept among these users, and consumer willingness to use data. RTRC posed the following questions:

1. What are the travel experiences of those who drove by car to the poll locations? This data could suggest improvements over car travel that mass transit could alleviate. If all car travel experiences were all positive, this could suggest mass transit is not a good solution for current recreational users at these sites.
2. What are the general perceptions of the Rochester recreational users about trolleys as compared to buses? The City of Rochester needs to make mass transit available at the Charlotte port to accommodate Fast Ferry traffic. An increase in the frequency of RTS bus service is the most obvious choice. However, if bus perceptions score lower than those of a trolley, this could make a case to the local Transit Authority for public enthusiasm about the trolley as an additional form of mass transit from the Charlotte waterfront to High Falls.
3. What is the willingness to use the trolley to travel to recreational locations at the projected one-way ticket price of \$2.00?
4. Would the public be interested in using a trolley to travel to the Phase I sites? Has the RTRC chosen the correct connection sites for its Phase I plan?

3. Methodology

a. Population of Interest

The chosen survey points of intercept were three recreational areas that could be served by the potential Phase I trolley network. The current Phase I design would run from the Charlotte Waterfront to High Falls and from the Charlotte Waterfront to Seabreeze amusement park. (See *Figure 1*.) The current survey was designed to target the current population of recreational users, not future passengers utilizing the high-speed ferry whose numbers and habits are as yet unknown. Current recreational users provide a convenience sample and are more likely to be repeat users if the system is installed. It is to these users that attention will be directed in the current study.

b. Secondary Research

The study team began by examining available secondary sources. Clearinghouses of publicly available transit research data were mined for relevant or similar studies that could contribute to answering the RTRC’s blanket question. Sites including the American Public Transportation Association (<http://www.apta.com/research/>) and the Transportation Research Board (<http://gulliver.trb.org>) were examined but yielded few articles of direct interest.

A Florida Department of Transportation (FDOT) study, prepared in November of 2001, appears to be the most comprehensive pre-installation evaluative study of an electric trolley system in the United States.⁸ The study concludes that unless certain precipitating factors exist, an in-going trolley system would likely not meet with success. Specifically, a comprehensive survey looked at a variety of narrow rail train installations recently installed within the U.S. and polled local transportation agencies to see if the installations performed as planned. As the number of rail trolleys operating in the U.S. is small, this survey was fairly comprehensive. A cursory glance seems to indicate that a high number of the trolley systems across the country are currently being upgraded and extended, appearing to validate the accomplishment of the systems.⁹ An alternative suggestion posed by FDOT is that these efforts may be to

upgrade failing systems in order to save them, and save local politicians, from political embarrassments. Every transit agency that was asked about their trolley indicated that it was indeed successful. Yet, when commissioners, local planners, and the general public were surveyed, answers varied greatly.

Pre-existing success factors. The FDOT study found that those urban areas that have experienced the greatest perceived success with their trolley systems have had a fairly consistent set of preexisting factors: (1) high population densities; (2) a number of specific activity centers or destinations for that population; (3) costly, inconvenient, or limited parking at those activity centers; (4) frequent transit congestions; (5) a high incidences or tourists and travelers; and (6) a high population of elderly. A study by the transportation research board supplements the FDOT's listing with two additional trolley success factors: (7) vintage trolleys are also generally successful in areas where they serve as a tourist attraction in of themselves and (8) where they connect to other lines of public transportation.¹⁰

Though few secondary studies specifically concerning the success of installed trolleys are available, monorail projects in a number of urban areas offer good lessons about similar operations in limited environments.¹¹ Any public investment should have a high degree of potential success prior to implementation. This underscores the need for research before RTRC moves ahead with its plan. Unfortunately for the RTRC, Rochester lacks nearly all of these pre-existing factors (high inter-urban population densities, frequent transit congestions, specific activity centers, high tourist incidence, and the historic concept of a vintage trolley as a tourist attraction in its own right). However, two unknowns remain: (3) costly, inconvenient or limited parking at popular activity centers and (8) a link to other lines of public transportation. Travel convenience to recreational spots in Rochester has not yet been measured and thus will be a goal of the present study.

Trolley and Bus Perceptions. There are only two likely immediate mass transit installation options for the Rochester port to High Falls: an upgrade of the current bus system or a trolley line. Of particular interest to RTRC, then, would be the comparative opinion of the public between the two travel modes. In order to make this comparison comprehensive, secondary literature was mined to create public perception lists of the two transit forms.

It was found that electric trolleys have a number of distinct advantages, perceived and actual, over other forms of public transportation, including buses.¹² Trolleys have no direct emissions, only indirect emissions from fossil fuel power generation, which is far less than those from diesel engines. Trolleys are very quiet, generally no louder than ambient street noise, though there is a concern that public perception of clanging metal wheels and bells might dictate otherwise. Trolley engines are extremely efficient, as no energy is wasted keeping a trolley engine idling when it is not required, unlike buses or other types of fuel trains. Electric trolleys are very low maintenance. While diesel and natural gas buses require a major engine overhaul every five to six years, trolleys do not require such major scheduled maintenance. Diesel buses have a twenty-year life span, but trolley cars themselves are significantly longer lived.¹³ British Columbia transit conducted a study and found the combined costs of electricity and overhead wire maintenance for trolley buses to be lower than the cost of diesel fuel for diesel buses on a per kilometer basis.¹⁴ This cost savings finding can be generalized to rail trolleys as well. Further, labor is generally thought to be the most expensive part of any transit operation, and since trolleys require no special training to operate, a lower salary can be paid. Substantial labor costs with trolley systems can be realized.

Trolleys have a number of disadvantages over traditional bus lines as well. One primary downside is the high capital costs as compared to a bus route. Though general maintenance and upkeep fees for trolley lines are smaller than those for buses, the infrastructure capital costs are extremely expensive. Such high overhead is of particular concern in a situation such as RTRC's, as public opinion of expense could be a huge disadvantage to obtaining funds for a larger study. New rail trolley cars are custom built, causing the initial cost of the vehicle to be substantially increased. Restorations are somewhat less expensive. Replica cars can range in cost from about \$500,000 to \$800,000 with new cars running about \$1 million each.¹⁵ Costs for creation of the right-of-way are variable and are usually the most expensive part of any transportation project, however, as previously explained, RTRC has a unique and low-cost right of way situation.

Inflexibility is another huge potential disadvantage of a rail trolley system. As permanent tracks and overhead wires are laid in advance and cannot be moved, trolley routes are completely set. Unlike a bus system, which can add additional buses during peak influx (festivals, concerts, etc.) a trolley system can allow a limited number of cars to ride its tracks at any given time.

Visual pollution may be a concern with some members of the public when comparing buses and trolleys. Buses, though not necessarily attractive, are fairly innocuous. With trolleys however, overhead wiring can be seen as unpleasant. Some authors point out that these permanent fixtures have potential benefits. Such wires act as a standing advertisement that there is trolley service in that area¹⁶ and the visual impact of this overhead system can be blended in with roadside trees using proper supporting poles and arms.¹⁷ Some riders perceive trolleys as being somewhat uncomfortable to ride in, comparing visions of hard wooden benches to plush upholstered bus seats.¹⁸

Rider Preference. Despite any disadvantages trolleys may have, several studies indicate that transit passengers prefer trolleys to other forms of transit. This preference includes elements such as comfort, nostalgia and overall experience.¹⁹ The end hope for those areas installing trolley transit lines is that mass transit use will increase, i.e., that people who wouldn't ride a bus will ride a streetcar.²⁰ If positive perceptions of trolleys over buses holds true in Rochester, willingness to use for recreational travel might be higher than that for the bus system. The current survey will seek to measure willingness to ride.

c. Sampling Strategy

Data collection was completed using a person-administered survey, a survey type chosen for three major reasons. First, the target population, those who had recently used one of the recreational sites of interest, could be reached more easily by traveling to the polling sites. Other methods such as online polling may not have reached a high enough number of responders who fit this criterion. Second, it was decided that some of the questions (for example, perception of trolleys) would have fairly low response rates if responders were left to self-administer the survey, through an electronic or mail survey. During a preliminary round of polling, it was noted that responders would often skip the trolley perception question if they had not used a trolley (most had not), despite written instructions to the contrary. Third, with RTRC's requested questions included, the survey was somewhat long. A series of pilot runs without the informational trolley script yielded an average time to finish of four minutes and five seconds with a range of 3:45 to 4:20 minutes. It was felt that the dropout rate might be quite high with a self-administered version.

Our total survey pool included 103 respondents. Our goal was to collect a minimum of 30 surveys per intercept location, in an attempt to achieve meaningful results when we broke down the data based on location. We were only able to find 26 people willing to help us out in Charlotte, but 42 in Seabreeze and 35 in High Falls.

d. Data Collection Design

The sampling tool was a cross sectional person-administered survey. (*See Figure 2.*) The following is a listing of the specific questions and a description of the information they were designed to elicit. Some questions were specifically requested by the RTRC group, others were designed by the study team to answer actionable questions posed by the RTRC. Many questions, particularly those of a demographic nature, remained part of the survey despite the realization that the current sample would be unlikely to yield enough responses for statistically significant segmentation. RTRC has plans to post the survey online at www.surveymonkey.com in order to collect additional data. Please refer to the attached survey for the wording and answer options available in each question.

"1. What type of transportation did you use today to arrive at Seabreeze?" This is a segmentation question. We will be able to separate the opinions of those who used cars to travel to the recreational sites. This segmentation will in part measure two of the three pre-existing criteria for trolley success: (3) costly, inconvenient, or limited parking at activity centers and (4) frequent transit congestions. This will further illustrate if those who drove to the different recreational locations have had

different travel experiences. Also, the RTRC is curious to see how many of those who drove would be willing to take a form of mass transit.

“2. How would you rate the trip you took to arrive here on the following measures?” This question measures satisfaction of people with their travel experience to each of the recreational sites. Data from this question may help determine if the current three sites chosen for the Phase I of the trolley stations are desirable. Negative experiences by car travel for each location can be examined to see if mass transit to those locals is viable. If most travelers had a positive experience driving to a given location, this would suggest that the current recreational population is not looking for an alternative travel experience. The trolley would be attempting to solve a travel problem that does not exist in the minds of the general public.

“3. We would now like to ask you about your opinion about several forms of transportation. Please check the category that best describes your feelings about each. While you may not have taken all of them, take into account any experience or knowledge about each that you might have.” This question measures the public's perceptions of trolleys as compared to buses. RTRC is interested in these results for two reasons.

The first is to yield information about trolley perceptions that will help the RTRC design their PR campaign or use as hard data for any number of presentations. If misconceptions exist, then these may need to first be cleared up through an educational campaign in order to garner public enthusiasm. Also, presentations must be made to various local officials in order to get support, and any misperceptions affect them as well. It may confound data since most people who answer the trolley question haven't had any experience with actual trolleys, but the valid point was made by RTRC that even if the public doesn't know anything about trolleys, they would still form opinions one way or the other.

The reason to rate the bus versus the trolley is as follows: no other mass transit from the high speed ferry landing to downtown but bus or trolley could be realistically installed within the next few years. If people have negative perceptions and experiences with buses, this means the public and municipal officials may be amendable to installing another form of mass transit when the ferry is in place. Negative reactions to one or the other would obviously argue against additional funds being spent on that form of transit. The majority of perception areas were taken from secondary data sources concerning advantages and disadvantages of the two transit forms.

“4. Do you like the idea of a trolley in Rochester?” This question measures the general opinion of whether or not the public thinks a trolley line should be built in Rochester. If the RTRC were to move ahead with their campaign, what kind of public response could they expect? Does public enthusiasm merit a larger validity study? The RTRC team also requested the open-ended question here. Such a question is obviously qualitative, but the RTRC feels it is actionable, as it will give them ideas for future research when they start designing their PR campaign. The qualitative responses to negative answers may be particularly interesting to the group and help them prepare statements for future negative reactions.

“5-8. If the price of a one-way ticket were \$2.00, how likely would you be to use the trolley to go to a) High Falls, b) Seabreeze, c) Charlotte, d) Seneca Park/Seneca Park Zoo?” These questions state the price of a one-way ticket (\$2.00) and measure the likelihood of use at that price. It specifically targets the four sites that the Phase I track plan will visit. If the public has no willingness to use, then this is a strong indication for the RTRC to alter its Phase I plan and look into other possible stops or termination of the project. If the public has strong willingness to use, this makes a compelling case in support of funding for a future feasibility study and eventual installation of the trolley line.

“9. Other than Charlotte, Seabreeze, and High Falls, what other entertainment/tourist destinations would you use the trolley to visit?” Responses here measure other destinations the public would like to visit by taking the trolley. Specific items were listed by RTRC on the basis of trolley service areas included in future phases of their plan. These answers may provide proof to determine if the RTRC has correctly mapped out the next phases of their plan, or provide suggestions as to where other stations may go and to what the public might respond favorably to in their PR campaign. If any of these regions scored very highly, this would strongly suggest a more quantitative look at modifying the Phase I plan be conducted.

“10. How often would you like the trolley to leave the station?” The question measures whether or not the public has realistic expectations about how often the trolley should run. If the intervals desired are too short or too long, the current plan may have to be altered, or RTRC may have to address the issue through their PR campaign to capture public support. Unlike bus schedules, the number of trolleys that can run on the track and the maximum speeds at which they move fixes trolley departure time. Ideally, the majority of the public would be satisfied with trolley departures approximately every twenty minutes.

11 - 14. Demographic data. These questions capture demographic data including gender, age, marital status and children. If enough surveys are collected, these can be used for segmentation in the current project. However, even if the number of surveys is too low, the demographic data can serve as population descriptors for the recreational users at individual sites on the days the data was captured. As noted above, the RTRC is interested in placing the survey online at www.Surveymonkey.com in order to continue to capture additional data.

“15. Are you a full-time student?” The RTRC is considering a campaign specifically directed at full-time students by extending the line to a number of area colleges. Possible segmentation of the above data along these lines, if enough responses are obtained, is of particular interest. Also, the RTRC is curious to see if full-time students are more or less willing to use the trolley than the general population. If students were shown to be more willing to use the trolley, one actionable result would be to add a university link to travel plan earlier than planned.

“16. Do you have access to a car to use for recreation activities?” This question determines if people attending this particular recreational site have access to a car. It serves further as a descriptor of the recreational population's travel habits. The RTRC was also curious to see wither or not the student populations in the sample had access to a car for recreational purposes.

“17. In the past 6 months, have you used any of the following forms of travel?” This question will be used to segment out responses from question three. Are the perceptions of people who have used trolleys and buses different from those who haven't?

“18. What is your zip code?” Respondent's zip codes were gathered as a possible segmentation variable.

4. Results

a. Data Analysis

The first set of data we looked at was the respondents' experiences in traveling to their destination. We asked each respondent to rate their experience on a 1-5 scale for each of the following factors: time, congestion, comfort, convenience and parking. 92% of the people we polled had driven, by car, to their destination. From this group of respondents, we found the average rating for each attribute, for each location. (See Figures 3 & 4.)

Anecdotal evidence suggested that the drive to Charlotte, in particular, could be very unpleasant during the summer months due to travel time and the level of congestion encountered on Lake Avenue. However, the results of our survey painted a different picture. Overall, visitors to Charlotte had a better travel experience, based on all factors, than respondents at the other survey intercept locations. Hypothesis testing found these average ratings to be significantly different than the midpoint of the scale, at a 95% confidence level. There could be several reasons for the difference in anticipated data and actual data. Since we didn't ask the respondents where they began their drive, we have no way of knowing if they came via the Lake Avenue route. The weather conditions on the day we collected the data could have made a difference in the number of people traveling to the area. In addition, the day of the week, the time of day, and the lack of scheduled events at the waterfront could have also made a difference in number of people traveling to the area. The sample was taken on an early Saturday afternoon between 10 am and 2 pm with no scheduled events and the beach was not particularly crowded.

Second, perceptions of traveling by bus verses traveling by trolley were compared. For seven different attributes, we asked respondents to rate their perceptions on a seven-point scale. The trolley received higher average ratings for all attributes, however, only for attractiveness, fun, and environmental

friendliness were the ratings significantly different for the trolley than for the bus. For the other four attributes, comfort, schedule, noise level, and expense, the average ratings were not significantly different for the two forms of travel at the 95% confidence level. (See Figures 5 & 6.)

After providing the survey participants with more information about the plans to implement a trolley line in Rochester, we asked them how they felt about the idea. On a five-point scale, the respondents in each location gave an average rating of 4.0 for the idea, which translates into a “Somewhat Favorable” opinion. At the 95% confidence level, there was no significant difference in the average ratings between each location. Further hypothesis testing showed, however, that for all respondents, the average attitude towards the trolley is significantly higher than the midpoint of scale. (See Figures 7, 8 & 9.)

The RTRC anticipates that the cost of a one-way ticket to ride the trolley will be \$2.00. Using this price, we asked the survey participants about their likelihood of using the trolley to travel to the four initially planned destinations: High Falls, Charlotte, Seabreeze and the Seneca Park Zoo. Testing the responses in the three different locations, as well as for the group as a whole, we found that in all but one situation the average response was higher than three, on a five-point scale. Partly due to small sample sizes, the differences between the groups are not statistically significant. However, testing the group as a whole, for each of the four destinations, we found that the average likelihood of purchasing a one-way ticket to that destination is significantly higher than the midpoint on the scale, again at the 95% confidence level. (See Figures 10 & 11.)

In addition to testing the group as a whole, we were interested in determining if certain demographic factors made a difference in the average appeal or likelihood of use of the trolley. Segmenting the respondents based on marital status, we found that there is no significant difference in appeal or likelihood of use between those that are married and those that are not married. In addition, we broke down the data for those respondents with children under the age of 18 and those without children under the age of 18. The results were the same for this demographic segmentation as they were with marital status. There is no significant difference in appeal or likelihood of use between those that have children and those that do not have children. (See Figure 12 & 13.)

Although we asked all respondents about how frequently they thought the trolley should leave the station, we felt that the most important information gleaned from this question was the opinions of those respondents most likely to use the trolley. Not surprisingly, those that expressed a higher likelihood of using the trolley in the future would like to see it run more frequently. (See Figures 14 & 15.) The sample as a whole, however, had realistic expectations as to the trolley’s schedule. Only 15% felt that the trolley should leave the station more frequently than a 15 minute interval. Overall, 58% of the total sample felt that the trolley should leave the station at 20 minute or longer intervals.

Finally, the RTRC is very interested in learning which types of entertainment destinations people would like to travel to by trolley. To address this question, we listed four types of events, with examples, plus an “other” option, so people could fill in their own responses. Respondents were encouraged to check all destinations they were interested in, so the categories are not mutually exclusive. The highest rating, 59%, was for culture events such as museums, theater and musical events. Not far behind, at 57%, was sporting events such as baseball, hockey and soccer. 54% of respondents felt that they would use the trolley to attend holiday events, such as fireworks and parades, while 48% felt they would use the trolley to travel to the public market.

b. Threats to Internal Validity

Despite careful design, our study is subject to several different threats to internal validity, which could affect our results. Our largest concern is due to instrumentation. Although we attempted to minimize this threat by creating a uniform survey and writing a script to follow when approaching potential survey participants, our lack of experience in conducting market research, our anxiousness about collecting sufficient data and completing the assignment, as well as our different personalities all likely played a part in influencing the respondents in some way.

The three locations were chosen as intercept points because they are the three recreational areas that could be served by the potential Phase I trolley network. The survey was designed to target the current

population of recreational users because they are more likely to be repeat users if the system is installed (as opposed to tourist travelers) and among the potential Rochester sample, these individuals will by default all have recently experienced travel to the given sight. However, these participants may have led to some selection bias, as they might not accurately represent the highest population of trolley consumers. The RTRC has predicted that a large percentage of trolley users will be the future passengers of the Fast Ferry, whose numbers and habits are as yet unknown.

In an attempt to minimize our own selection bias, we approached everyone we encountered at the three locations. The number of people who agreed to complete the survey upon being approached varied greatly between the survey sights, from high (an estimated 4 out of 5 at Charlotte and High Falls) to low (only 1 out of 5 at Seabreeze).

The main testing effect may also have been a threat to our survey in that some of our early questions may have affected responses to later questions. For example, after participants answered questions about their perceptions and concluded that a trolley is “fun” and “attractive, they might have given more positive responses to whether they liked the idea of a trolley in Rochester, or the likelihood of their using the trolley, than would have been the case if we had asked the questions in the reverse order.

As we only took one sample, during a short period of time, history and regression to the mean were not threats. Nor do we feel that maturation was an issue. The drop out rate was very low; nearly all of the people who began the survey completed it. We excluded the data from those who did not complete the survey; therefore mortality was not a threat.

c. Threats to External Validity

The largest perceived threat to the external validity of our study is due to surrogate situation. Placed in a situation where they are given information about the trolley, including a photograph, the participants may have amplified feelings toward the project. Already, these participants are at one of the locations the trolley is expected to serve, so they are more likely to be receptive to the idea of a trolley for entertainment purposes. It is unknown whether the population as a whole, sitting in their homes or offices, will give it serious consideration and feel as warmly about the project.

d. Survey Design Concerns

The survey took approximately four minutes, thirty-five seconds to complete and was considered “long” by many of the respondents. Our major concern with the design of the survey was question three. We chose to create a semantic differential scale in an attempt to shorten the length of the survey and minimize the directions given for each individual question. However, our attempts backfired because many respondents found the streamlined question confusing or difficult. If they had never ridden a trolley, or had no knowledge of how they worked, the respondents did not want to answer the question. Many wanted more information about the Rochester trolley before they felt they could answer. Although we did encourage most to complete the question, explaining they we wanted to their perceptions regardless of their experience or knowledge, 8% did not fully complete the question. When the question was designed, we didn’t take into consideration that the greatest advantage of the semantic scale is that it allows subject to express the intensity of their feelings toward the attribute being measured. In the case of our survey, few people have strong feelings about the bus, and even fewer have feelings about a trolley.

5. Conclusions and Recommendations

a. Discussion

Rochesterians love to hate the RTS bus system, and from the current survey results, it seems a given that the installation of a trolley would be an easy sell to the general public over that of a bus if viability concerns could be set aside. With little trolley experience to speak of, the current sample rated them as significantly more fun and environmentally friendly than the bus, and did not perceive lack of comfort, cost or other commonly cited trolley complaints to be any worse for those of a bus. The Rochester sample matches that of other studies. Our secondary research has shown that with all other conditions

being equal, rail transit is likely to attract from 34% to 43% more riders than equivalent bus service.²¹ Simply put, more people are willing to ride trolleys than buses. Though the current research project did not specifically poll willingness to ride buses, findings concerning ride perceptions were consistent with this statement. While this too, on the surface, would seem to make a strong case for trolleys over buses, the truth of the matter is that mass transit use as whole has been declining in the U.S.²² The preference of trolley travel over bus travel may make no difference whatsoever if urban dwellers prefer to use neither. While it is true that the trolley might see more rider ship than the RTS bus to the same locations, this may not be a sustainable passenger load.

Research has linked trolley rider-ship with factors such as convenience of parking, road congestion, location of activity centers, age, income, and vehicle ownership.²³ The high number of respondents who had access to their own vehicles, 95%, and the high convenience scores of parking do not make an obvious case for trolley installation. Of particular note is the high convenience parking score in Charlotte, 4.8/5.0, the area which would be the focal point of the trolley activity. Though High Falls and Seabreeze had lower convenience scores (3.3 and 3.2 respectively), neither scored significantly below a neutral attitude.

The results of our survey, as well as the information found through our secondary research, make it clear that Americans, Rochesterians included, love the comfort and convenience of their cars.²⁴ This love affair may override frustration with congestion and parking, or consumers just may not have encountered these problems on the day they responded to the survey. But for whatever reason, they are generally satisfied with their travel experiences.

The cold truth remains that although the concept of a Trolley scored quite highly among the polled population, they were fairly neutral about willingness to use the trolley. The hypothesis testing did show that the average likelihood of purchasing a one-way ticket to each location is significantly higher than the midpoint on the scale. However the scores were not phenomenally high. A mean across all locations of 3.4 is not convincing evidence that people will indeed purchase tickets. Research by Urban and Hauser has shown that a purchase intention of three on a five-point scale results in only 10% actual purchase. A four results in only 50% actual purchase.

In many ways, this is the worse possible result for the RTRC team, as an educational campaign about trolley benefits is unlikely to increase rider-ship. The population already knows the benefits and don't consider the negatives of a trolley serious. Having shown that parking and congestion are not serious issues with the polled recreational area users, Rochester lacks nine of the ten pre-existing criteria that predict trolley success. The 10th item, a link to another form of mass transit, is yet unproven. Until the true Fast Ferry traffic is known, or an additional survey suggests that willingness to use is higher than in the polled population, or an educational campaign is proven to change attitudes and behaviors, it seems unlikely that a trolley installation in Rochester would meet with a high degree of success.

b. Directions for Future Research

Since the sample population has shown a low willingness to use the trolley, the RTRC needs to examine their destination routes for Phase I. 92% of respondents showed interest in using the trolley as transport to entertainment destinations, other than Sea Breeze, Charlotte and High Falls. Although we did not poll for likelihood of use for these other destinations, further studies could address the issue about which locations Rochesterians are most likely to use the trolley?

In particular, linking the trolley to one or more of the local colleges may be considered for adoption as part of the new Phase I plan. If such a modified Phase I is possible, further research to yield expected use numbers from students may be conducted. However, it should be realized before such a study is conducted that student usage would be cyclical, high through the fall, winter and spring, and likely be quite absent in the summer.

Attempts to segment the population by age, marital status and whether respondents had children under the age of 18, failed to result in significant differences in appeal or likelihood of use. Lack of successful segmentation leaves the RTRC without a high-use target market to address their marketing efforts. The sample did not contain enough full-time students to accurately gauge their attitudes. Further

studies, with more extensive demographic information, might be able to identify the elusive high-use segment.

Rail trolleys are very limited in their geographic coverage and therefore serve a very limited population with very narrow destinations. The FDOT study found ridership to be based on factors such as convenience of parking, road congestion, location of activity centers, age, income, and vehicle ownership. One key factor for expected ridership is that “it assumes there is somewhere to go.” This is a subtle but important point. Educational campaigns about sights reachable when using the trolley are crucial. People must know both that the trolley travels to High Falls and exactly what attractions High Falls has to offer.

Figure 1. Phase I Trail Route. The Phase I trolley route would travel from the Charlotte waterfront to High Falls (passing through Seneca Park Zoo) and from the Charlotte waterfront to Seabreeze amusement park (passing through Durand Eastman Park). Figure courtesy RTRC.

ROCHESTER TROLLEY & RAIL CORPORATION

We're putting Rochester Back on Track!

Formed in early 2003, we're a new company that will develop, own and operate a heritage rail-based trolley and streetcar system. We have an executive team developed, and every day we're working on developing great community partnerships to move this endeavor forward. We are targeting an underserved and/or unserved market, creating economic development, community revitalization, and leveraging a unique mode of transportation to run all over town.

OUR MISSION:

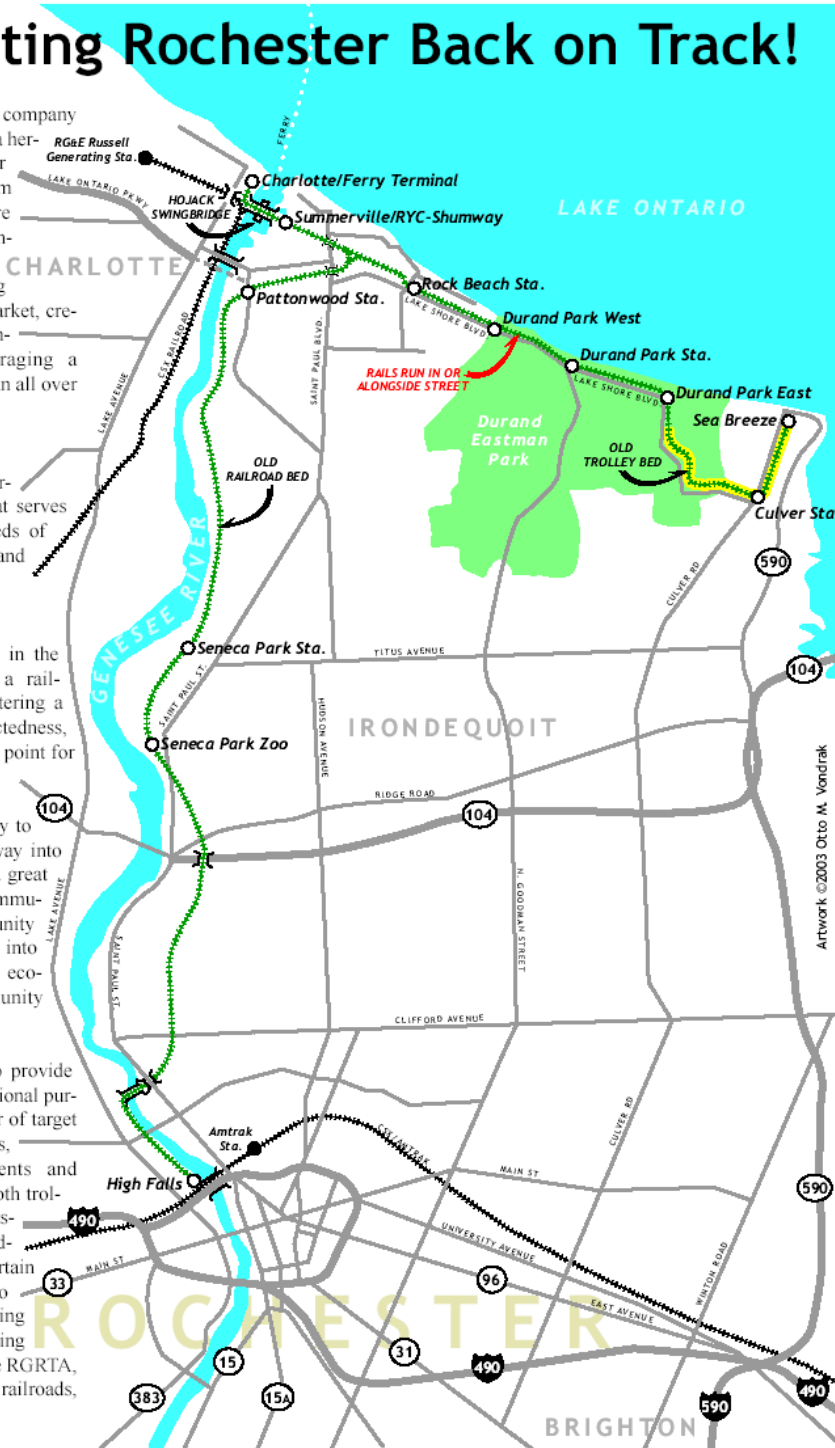
To bring back the nostalgia of yesterday through a heritage trolley that serves the recreational transportation needs of our community today, tomorrow and beyond!

OUR VISION:

To connect each point of interest in the Greater Rochester area through a rail-based heritage trolley system, fostering a sense of community and connectedness, and restoring Downtown as a focal point for our region.

In many areas, efforts are underway to convert former railroad rights-of-way into recreational trails. We see this as a great quality-of-life initiative for our community, though the greater opportunity exists to turn these latent assets into sources of tourism, job creation, economic development, and community revitalization for our region.

Quite simply, we're gearing up to provide rail-based transportation for recreational purposes (not commuter) for a number of target markets, including leisure travelers, tourists, families, college students and seniors. Our system will include both trolley cars operating on separate rights-of-way from highways and roadways, as well streetcar lines in certain key districts. Our expectation is to coordinate with and support existing transportation infrastructure, including regional bus service operated by the RGRTA, excursion rail trips run by regional railroads, and downtown visitors' shuttles.



<http://www.RochesterTrolleyRail.org/>

Figure 2. Rochester Recreational Trolley Survey Design. (Pages 13 through 16). The surveys were four pages and presented to each respondent with a clipboard and writing implement after a brief introduction. Introductions were individually tailored to some degree, but were similar to the following script:

“Hi, my name is X. How are you today? That’s great. I’m a student at the Simon School, at the University of Rochester and working on a class project. I was wondering if you’d be willing to help me out for just a few minutes.

A color photo of a historical trolley was presented to each respondent as well, which they could refer to after reading the informational script on page 2.



1. What type of transportation did you use today to arrive at Seabreeze / Charlotte / High Falls?

Car Bus Bicycle Walk Other (Please specify) _____

2. How would you rate the trip you took to arrive here on the following measures?

	Very Unfavorable	Somewhat Unfavorable	Neutral	Somewhat Favorable	Very Favorable
Time	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Congestion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comfort	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Convenience	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Parking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. We would now like to ask you about your opinion about several forms of transportation. Please check the category that best describes your feelings about each. While you may not have taken all of them, take into account any experience or knowledge about each that you might have.

Trolley:

Convenient Schedule	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Inconvenient Schedule
Dull	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Fun
Comfortable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Uncomfortable
Unattractive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Attractive
Expensive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Inexpensive
Quiet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Noisy
Environmentally friendly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Environmentally unfriendly

Bus:

Convenient Schedule	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Inconvenient Schedule
Dull	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Fun
Comfortable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Uncomfortable
Unattractive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Attractive
Expensive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Inexpensive
Quiet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Noisy
Environmentally friendly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Environmentally unfriendly

The Rochester Trolley & Rail Corporation is considering building and operating a rail-based trolley and streetcar system in Rochester. One set of plans is for the trolley to run between High Falls, Charlotte and Seabreeze, with an additional stop at the Seneca Park Zoo. Such a trolley would run in the evenings and on weekends to service people traveling to those destinations, as well as those people using the Fast Ferry, which is planned to launch in the spring of 2004. This is a sample picture of what a trolley car could look like.

I'd like to ask you a few more questions about the trolley. It will just take a few more minutes.

4. Do you like the idea of a trolley in Rochester?

Very Unfavorable	Somewhat Unfavorable	Neutral	Somewhat Favorable	Very Favorable
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Why or why not? _____

5. If the price of a one-way ticket were \$2.00, how likely would you be to use the trolley to go to High Falls?

Very Unlikely	Somewhat Unlikely	Neutral	Somewhat Likely	Very Likely
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. If the price of a one-way ticket were \$2.00, how likely would you be to use the trolley to go to Seabreeze?

Very Unlikely	Somewhat Unlikely	Neutral	Somewhat Likely	Very Likely
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. If the price of a one-way ticket were \$2.00, how likely would you be to use the trolley to go to Charlotte?

Very Unlikely	Somewhat Unlikely	Neutral	Somewhat Likely	Very Likely
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. If the price of a one-way ticket were \$2.00, how likely would you be to use the trolley to go to Seneca Park / Seneca Park Zoo?

Very Unlikely	Somewhat Unlikely	Neutral	Somewhat Likely	Very Likely
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. Other than Charlotte, Seabreeze, and High Falls, what other entertainment/tourist destinations would you use the trolley to visit? *(Check all that apply)*

- Sporting events (baseball, hockey, soccer)
- Cultural events (museums, theater, musical events)
- Public Market
- Holiday events (parades, fireworks)
- Other (Please specify) _____
- Other (Please specify) _____

10. How often would you like the trolley to leave the station?

- | | | | | | |
|-----------------------------|--------------------------|--------------------------|--------------------------|--------------------------|----------------------------------------|
| Every 60
minutes or less | Every 30
minutes | Every 20
minutes | Every 15
minutes | Every 10
minutes | More often
than every 10
minutes |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

11. What is your gender?

- Male Female

12. What is your age?

- Under 18
- 18 - 24
- 25 - 34
- 35 - 44
- 45 - 54
- 55+

13. What is your marital status?

- Married / Partnered Single

14. How many children do you have in the following age groups?

- | | | | |
|----------------|-------|-----------------|-------|
| 0-3 years old | _____ | 4-6 years old | _____ |
| 7-10 years old | _____ | 10-18 years old | _____ |

15. Are you a full-time student?

- Yes No

16. Do you have access to a car to use for recreational activities?

Yes

No

17. In the past 6 months, have you used any of the following forms of travel?

Trolley

Bus

18. What is your zip code? _____

Thank you so much for you time. I appreciate your help.

Figure 3. Average rating on a 1-5 scale of respondents' travel experience. *Conclusion:* Visitors to Charlotte had a better travel experience based on all factors than respondents at the other survey intercept locations

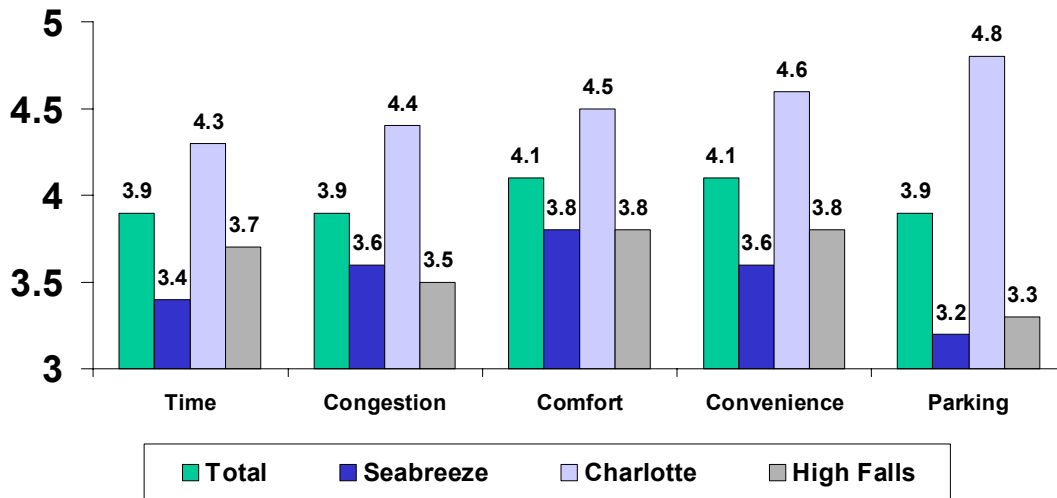


Figure 4. Significance testing of respondents' travel experience.

	All					
	N	Mean	SD	T-Stat	P-Value	Significant?
Time	98	3.87	1.14	7.55	0.00	Yes
Congestion	98	3.93	1.12	8.22	0.00	Yes
Comfort	98	4.14	1.02	11.06	0.00	Yes
Convenience	98	4.08	1.16	9.22	0.00	Yes
Parking	98	3.9	1.4	6.36	0.00	Yes

	Seabreeze					
	N	Mean	SD	T-Stat	P-Value	Significant?
Time	26	3.5	1.3	1.96	0.06	No
Congestion	26	3.62	1.27	2.49	0.02	Yes
Comfort	26	3.88	1.24	3.62	0.00	Yes
Convenience	26	3.65	1.29	2.57	0.02	Yes
Parking	26	3.27	1.31	1.05	0.30	No

	Charlotte					
--	-----------	--	--	--	--	--

	N	Mean	SD	T-Stat	P-Value	Significant?
Time	38	4.32	0.84	9.69	0.00	Yes
Congestion	38	4.45	0.72	12.41	0.00	Yes
Comfort	38	4.55	0.6	15.92	0.00	Yes
Convenience	38	4.58	0.83	11.73	0.00	Yes
Parking	38	4.82	0.61	18.39	0.00	Yes

High Falls						
	N	Mean	SD	T-Stat	P-Value	Significant?
Time	34	3.65	1.15	3.30	0.00	Yes
Congestion	34	3.59	1.18	2.92	0.01	Yes
Comfort	34	3.88	1.07	4.80	0.00	Yes
Convenience	34	3.85	1.21	4.10	0.00	Yes
Parking	34	3.35	1.55	1.32	0.20	No

Figure 5. Average rating on a 1-7 scale of respondents' perceptions of bus and trolley transportation

Conclusion: Perceptions of travel by trolley is more positive across all criteria

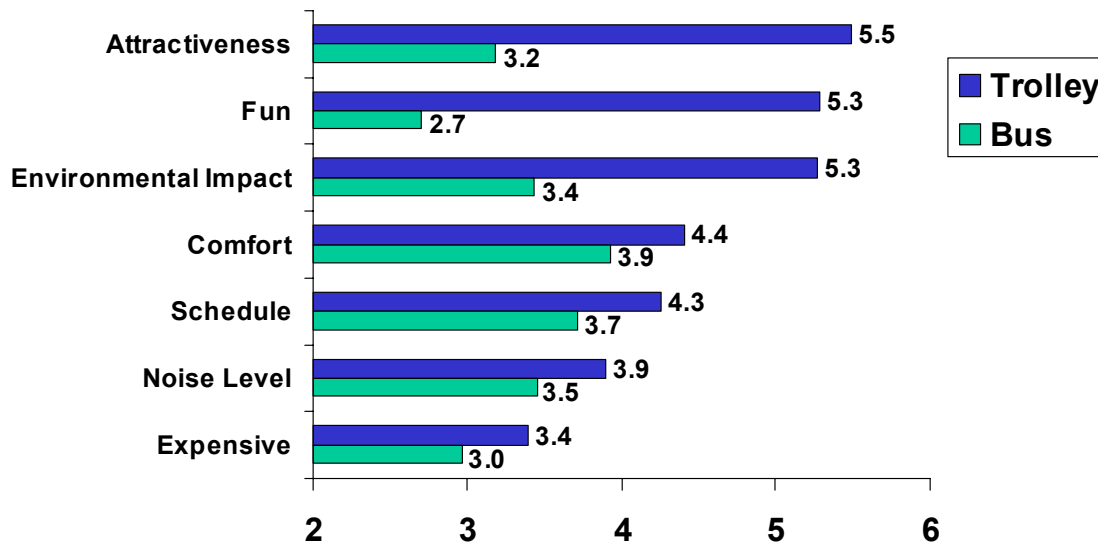


Figure 6. Significance testing of appeal of respondents' perceptions of bus and trolley transportation.

		N	Mean	SD	T-Stat	P-Value	Significant?
Schedule	Trolley	96	4.26	1.66	1.96	0.05	Yes
	Bus	96	3.72	2.12			
Fun/Dull	Trolley	96	5.29	1.69	10.22	0.00	Yes
	Bus	96	2.7	1.82			
Comfort	Trolley	96	4.41	1.71	1.79	0.07	No
	Bus	96	3.93	1.99			
Attractive	Trolley	96	5.49	1.49	9.65	0.00	Yes
	Bus	96	3.18	1.81			
Expensive	Trolley	96	3.4	1.61	1.81	0.07	No
	Bus	96	2.97	1.69			
Quiet	Trolley	96	3.9	1.64	1.79	0.07	No
	Bus	96	3.45	1.83			
Env. Frndly	Trolley	96	5.27	1.7	6.85	0.00	Yes
	Bus	96	3.44	1.99			

Figure 7. Average rating on a 1-5 scale of appeal of the idea of a trolley in Rochester.

Conclusion: Across the entire sample, respondents showed a higher than average appeal for the trolley project. There was no significant difference across the locations surveyed.

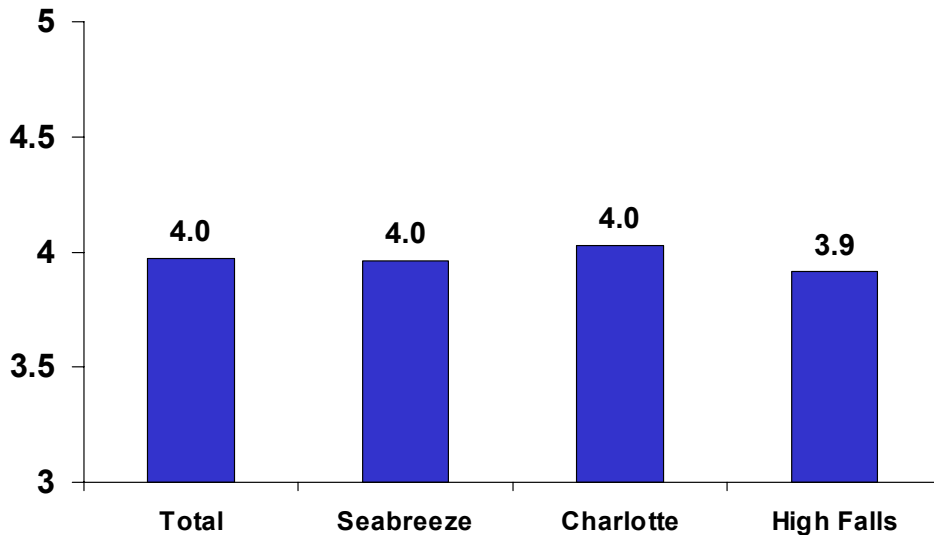


Figure 8. Significance testing of appeal of the idea of a trolley in Rochester.

	All					
	N	Mean	SD	T-Stat	P-Value	Significant?
Total	100	3.97	1.11	8.74	0.00	Yes
Seabreeze	26	3.96	1.22	4.01	0.00	Yes
Charlotte	39	4.03	1.18	5.45	0.00	Yes
High Falls	35	3.91	0.95	5.67	0.00	Yes

Figure 9. Hypothesis testing of appeal of the idea of a trolley in Rochester.**Single Sample T-Test**

H_0 = The average attitude towards the Trolley is not significantly higher than the midpoint on the scale.

H_1 = The average attitude towards the Trolley is significantly higher than the midpoint on the scale.

$$n = 103$$

$$df = n-1$$

$$\bar{x} = 4.08$$

$$df = 103-1$$

$$\hat{s} = 1.30$$

$$df = 102$$

$$\mu = 3$$

$$\alpha = .05$$

$$t_{obt} = (\bar{x} - \mu) / (\hat{s} / \sqrt{n})$$

$$t_{obt} = (4.08 - 3) / (1.30 / \sqrt{103})$$

$$t_{obt} = 8.3468$$

$$t_{crit} = 1.671 \quad 8.3468 > 1.671 \text{ reject } H_0$$

Figure 10. Average rating on a 1-5 scale of likelihood to purchase a one-way \$2.00 trolley ticket to go to each destination.

Conclusion: The likelihood of purchase for a trolley ticket to each location is significantly higher than the midpoint of the scale. Partly due to small sample sizes, the differences between the samples are not statistically significant.

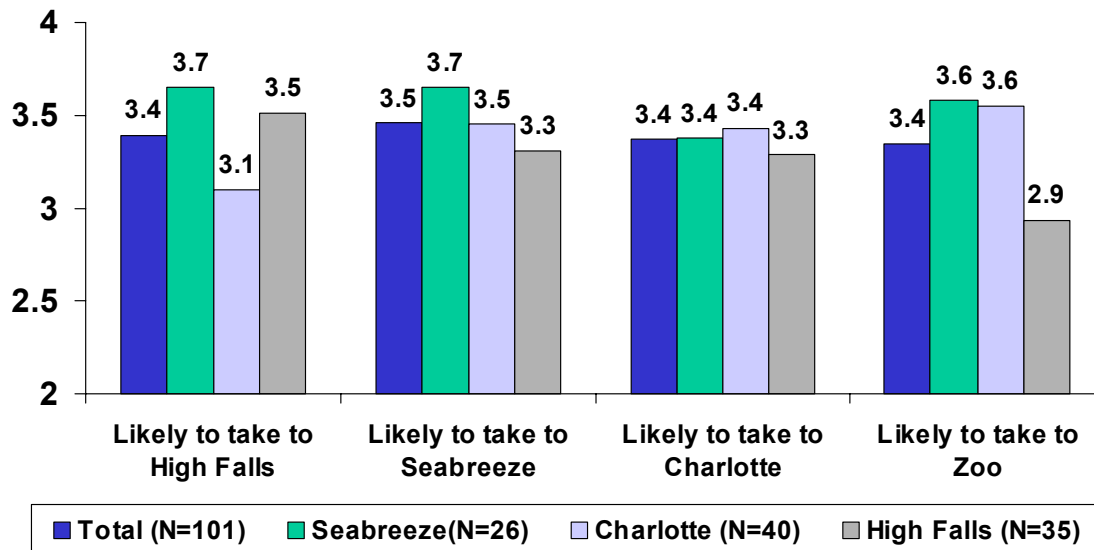


Figure 11. Hypothesis testing of likelihood of purchase.

Single Sample T-Test

H_0 = The average likelihood of purchasing a one way ticket to take the Trolley to the stated destination is not significantly higher than the midpoint on the scale.

H_1 = The average likelihood of purchasing a one way ticket to take the Trolley to the stated destination is significantly higher than the midpoint on the scale.

$$n = 103$$

$$df = n-1$$

$$\hat{s} = 1.30$$

$$df = 103-1$$

$$\mu = 3$$

$$df = 102$$

$$\alpha = .05$$

Charlotte: $\bar{x} = 3.54$

$$t_{obt} = (\bar{x} - \mu) / (\hat{s} / \sqrt{n})$$

$$t_{obt} = (3.54 - 3) / (1.30 / \sqrt{103})$$

$$t_{obt} = 3.2002$$

$$t_{crit} = 1.671 \quad 3.2002 > 1.671 \quad \text{reject } H_0$$

Seabreeze: $x = 3.9366$

$$t_{obt} = (x - \mu) / (\hat{s} / \sqrt{n})$$

$$t_{obt} = (3.54 - 3) / (1.30 / \sqrt{103})$$

$$t_{obt} = 3.2002$$

$t_{crit} = 1.671$ $3.9366 > 1.671$ reject H_0

High Falls: $x = 3.5067$

$$t_{obt} = (x - \mu) / (\hat{s} / \sqrt{n})$$

$$t_{obt} = (3.54 - 3) / (1.30 / \sqrt{103})$$

$$t_{obt} = 3.2002$$

$t_{crit} = 1.671$ $3.5067 > 1.671$ reject H_0

Seneca Park Zoo: $x = 2.9644$

$$t_{obt} = (x - \mu) / (\hat{s} / \sqrt{n})$$

$$t_{obt} = (3.54 - 3) / (1.30 / \sqrt{103})$$

$$t_{obt} = 3.2002$$

$t_{crit} = 1.671$ $2.9644 > 1.671$ reject H_0

Figure 12. Average rating on a 1-5 scale of appeal and purchase likelihood.

Conclusion: There is no difference in appeal or likelihood of use between those that have children and those that do not have children. Partly due to small sample sizes, the differences between the samples are not statistically significant.

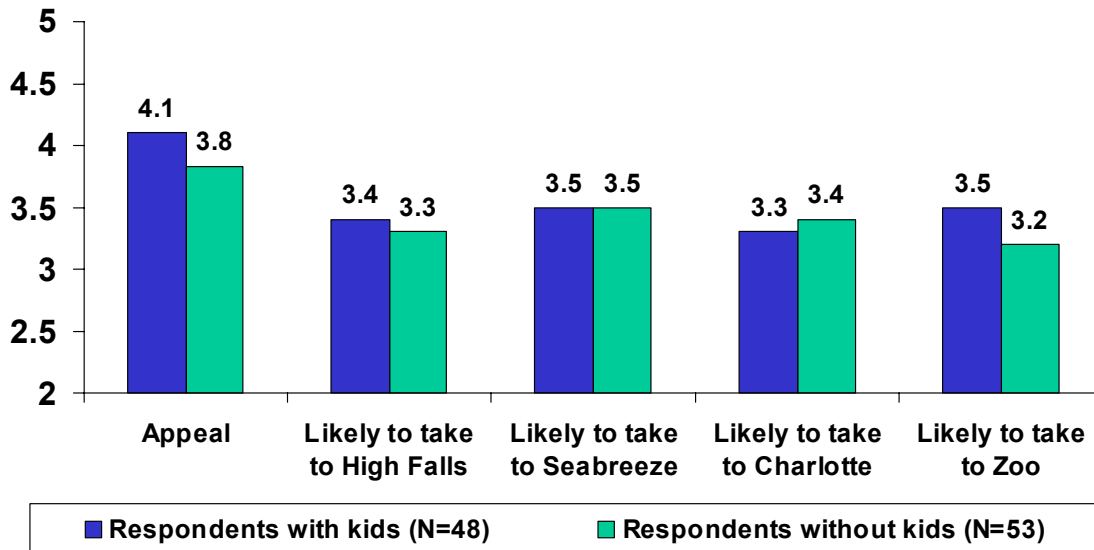


Figure 13. Average rating on a 1-5 scale of appeal and purchase likelihood.

Conclusion: There is no difference in appeal or likelihood of use between those that are married and those that are not married. Partly due to small sample sizes, the differences between the samples are not statistically significant.

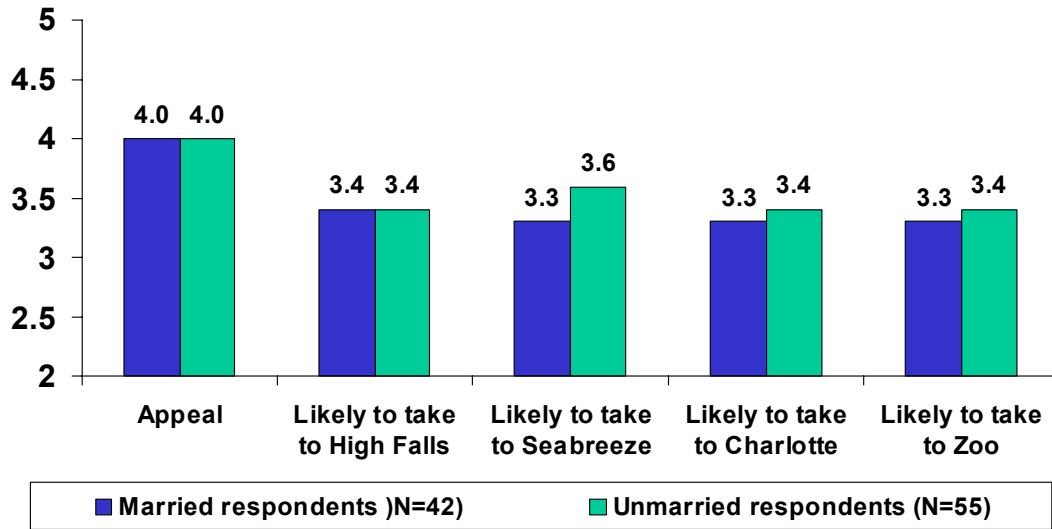


Figure 14. Percentage of respondents in each group showing a preference for each frequency.

Conclusion: Those that expressed a higher likelihood of using the trolley in the future would like to see it run more frequently

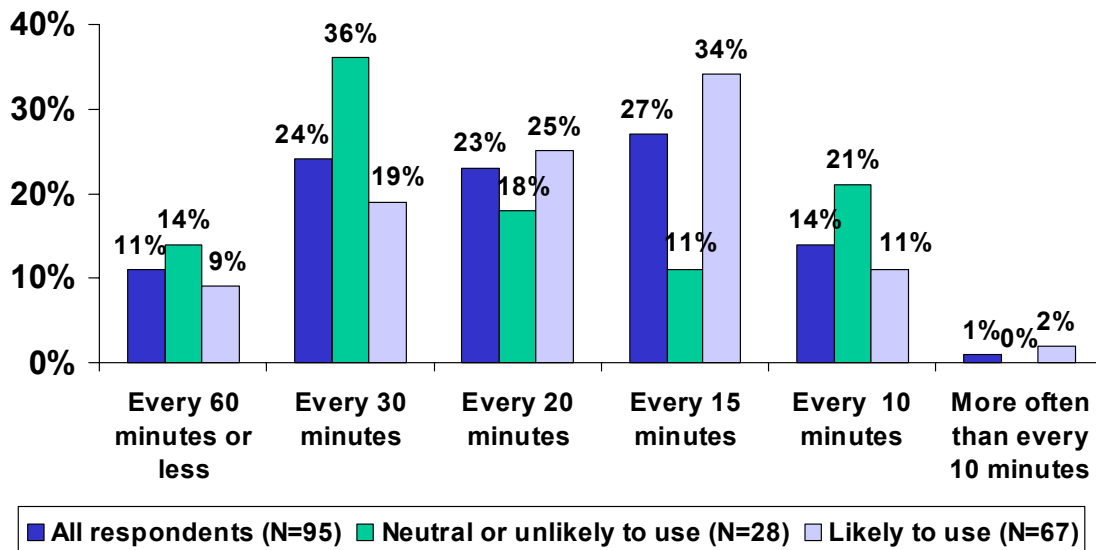


Figure 15. Hypothesis testing for frequency.

Frequency	Observed		
	Not likely	Likely	Total
60 min or less	4	6	10
Every 30 min	10	13	23
Every 20 min	5	17	22
Every 15 min	3	23	26
Every 10 min	6	7	13
10 min or less	0	1	1
Total	28	67	95

Frequency	Expected		
	Not likely	Likely	Total
60 min or less	2.947	7.053	10
Every 30 min	6.779	16.221	23
Every 20 min	6.484	15.516	22
Every 15 min	7.663	18.337	26
Every 10 min	3.832	9.168	13
10 min or less	0.295	0.705	1
Total	28	67	95

Frequency	(Obs-Exp) ² /Exp		
	Not likely	Likely	Total
60 min or less	0.376	0.157	0.533
Every 30 min	1.531	0.640	2.170
Every 20 min	0.340	0.142	0.482
Every 15 min	2.838	1.186	4.023
Every 10 min	1.227	0.513	1.740
10 min or less	0.295	0.123	0.418
Total	6.606	2.761	9.366

$$\text{Chi-square}_{\text{Obs}} = 9.366$$

$$\text{DF} = 5$$

$$\text{Chi-square}_{\text{Crit}} = 11.070$$

Retain H_0

Figure 16. Percentage of respondents who would like to use the trolley to visit other destinations.

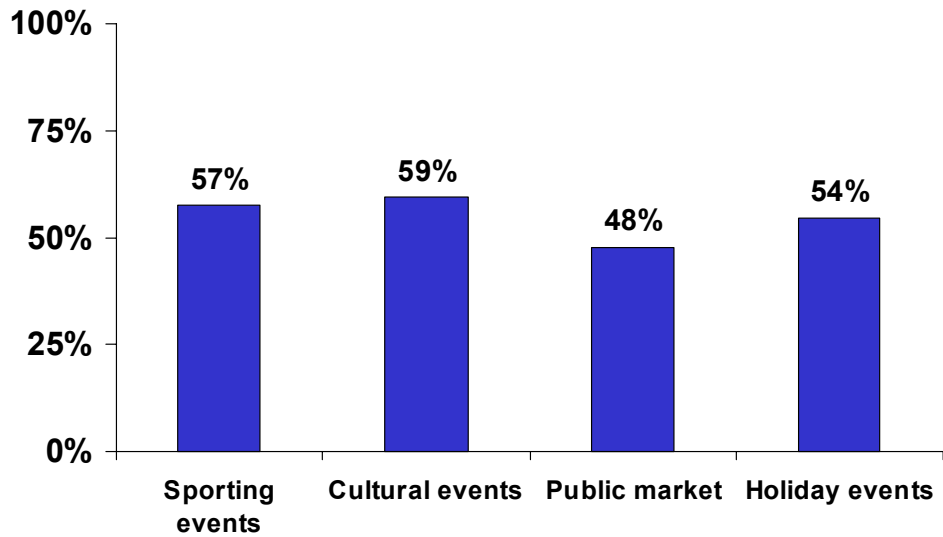
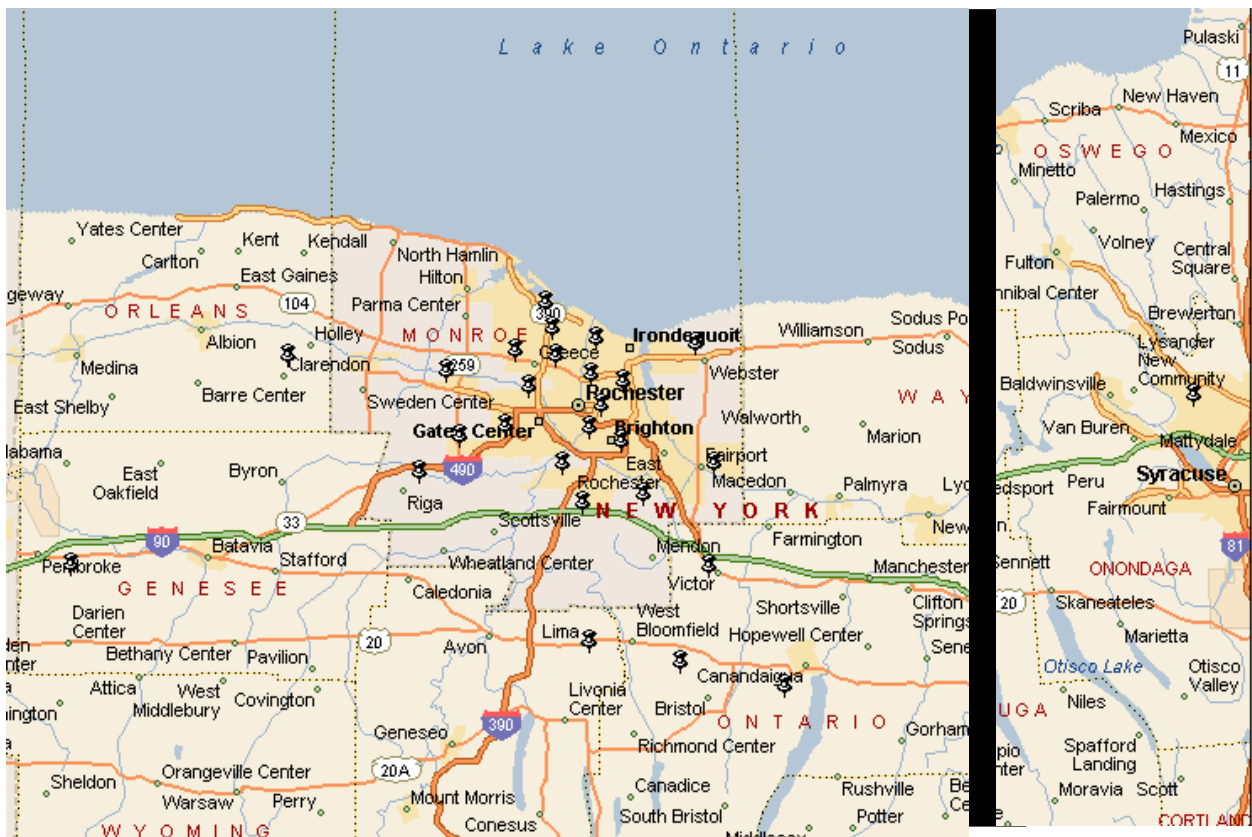


Figure 17. Distribution of Survey Respondents.



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- ¹ “Impact on Transit Patronage of Cessation or Inauguration of Rail Service.” Edson L. Tennyson. The Transportation Research Board Special Report No.1221.
- ² American Public Transportation Association
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