

# Integration of Extended Vintage Trolley Operations into New Light-Rail System in Dallas, Texas

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In 1989, restoration and construction of a 2.9-km (1.8-mi) long vintage street trolley system was completed in Dallas, Texas. The system was put into operation between the northern fringe of the central business district (CBD) and a retail and restaurant area immediately north of downtown Dallas. Five years later, plans and preliminary designs were under way to expand this system. At one end of the line, the route is to be extended further into the CBD to another retail, restaurant, and entertainment area and at the other end, to a major mixed-use development of office, housing, and retail activities. More important, these two extensions will then interface with one of the stations for Dallas' 32.2-km (20-mi) light rail transit (LRT) starter system now under construction in the CBD, a downtown bus transfer facility now being designed, and another LRT station serving the mixed-use development north of the CBD. In doing so, the vintage trolley line will become a system connector, providing feeder service to the LRT and bus components of the transit system and serving an area of the city with limited transit accessibility. The evolution of these systems and the status of their development and integration are described.

**B**eginning as early as 1873, streetcars were the primary mode of transportation in Dallas, Texas, for many years. The first streetcar was a mule-drawn vehicle. Cars drawn by steam locomotives began to be used for public transportation in 1887. Electric cars arrived in 1889, and cable cars were attempted in 1890.

The first trolley car appeared in 1884 on McKinney Avenue, a then residential street north of downtown, as part of the Dallas Street Railway Company operation. The line extended along McKinney, providing access between downtown and uptown Dallas. The line along McKinney operated until the 1950s when all streetcar operations were terminated in favor of the more flexible bus service.

## DALLAS TROLLEYS REBORN

In the late 1970s, a neighborhood group located along McKinney Avenue persuaded the city of Dallas to participate in a joint venture to improve the streetscape of the Vineyard area (Figure 1). This venture included city funds for removing the asphalt pavement overlay on a section of McKinney Avenue to expose the original brick street. The work was accomplished in 1981.

During the course of street renovation, the trolley tracks were uncovered along with the old brick paving. These original trolley tracks, with minor exceptions, were found to be in excellent condition and suitable for streetcar operation.

At about the same time, a McKinney Avenue restaurateur began investigating the possibility of reestablishing streetcar operations on the old tracks. In late 1982, a group of 36 volunteer trolley enthusiasts led by this businessman prepared a proposal for restoration of trolley service on McKinney.

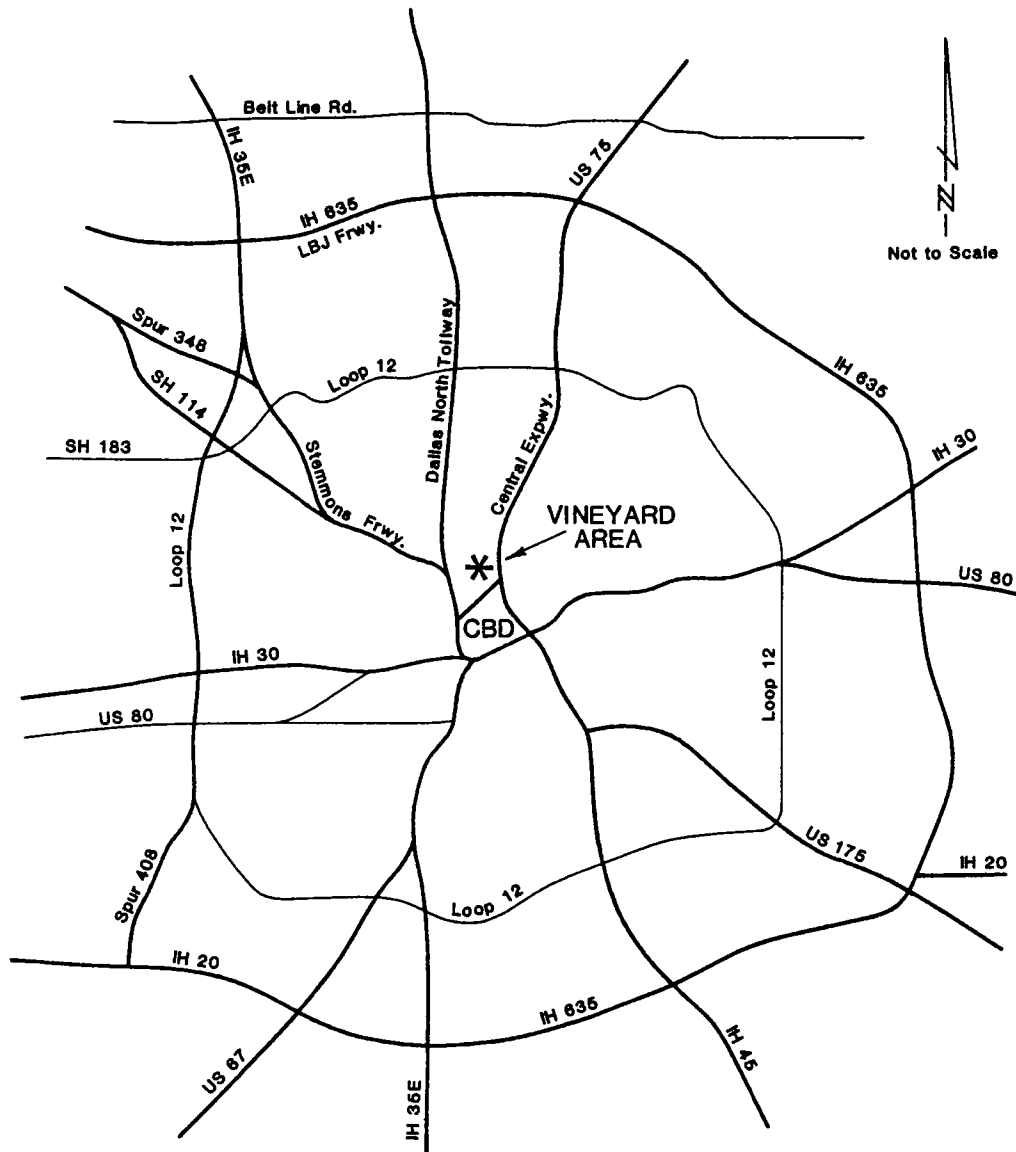


FIGURE 1 Trolley system location.

In February 1983, the McKinney Avenue Transportation Authority (MATA), Inc., a Texas not-for-profit group, was established to provide a corporation capable of obtaining funds and operating a proposed streetcar system.

### Financing

In early 1984, a federal grant application was prepared. Support for the application was sought and received from the downtown business association and the local chamber of commerce. The Dallas City Council and the local transit agency approved the grant application in summer 1984 for \$1.3 million with an additional \$200,000 to be provided by the city of Dallas from a

1976 bond program and \$400,000 by MATA from private donations.

In October 1984, the Urban Mass Transportation Administration (UMTA), now the Federal Transit Administration (FTA), initially approved a grant of \$50,000 for a feasibility and environmental study. The results of the environmental study were accepted and UMTA approved the grant for system construction in August 1985.

In July 1987, an amendment to the initial grant application was prepared for submission to UMTA. This amended application was made for Section 3 discretionary funds in the amount of approximately \$1.2 million. This grant application was approved in March 1988, increasing the total federal participation to over \$2.5 million. An additional \$2.4 million in local funding was

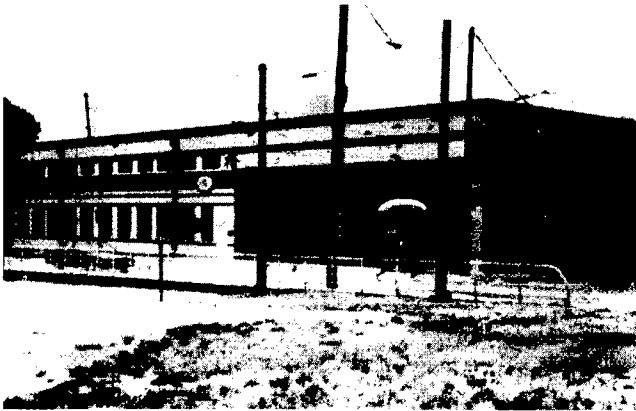


FIGURE 2 Completed car barn reconstruction.

provided through private donations to match the federal grant, purchase and renovate a maintenance and storage facility, and purchase and renovate five vintage trolley vehicles. These efforts increased the total project cost to over \$5.5 million.

### The Car Barn

Initially, a wooden frame garage behind the streetcar plan originator's restaurant was to serve as a maintenance and storage facility for a one-car trolley system. When it was determined that more vehicles would be needed to provide the desired frequency of service, another facility had to be located. The selected warehouse had an interior truck dock that could be converted into a service pit for the trolleys. It was one block from the proposed streetcar route, however, and the roof had to be raised to provide enough clearance for the trolleys.

The renovation work was begun in May 1987 with a "roof breaking" ceremony. Construction was completed in November of that year with the trolleys to be restored being moved from temporary quarters to the new maintenance and storage facility. The completed car barn is shown in Figure 2. MATA purchased and renovated the car barn for about \$760,000 with funds from private donations.

### Vehicle Renovation

A decision was made early in the implementation process to renovate existing vintage trolley vehicles rather than building new replicas. This meant that it was going to be necessary to find existing vehicles and parts to use in the rebuilding process, which started with the purchase of one 1920s New Orleans style car that was ultimately sold and used as partial payment on a total of five vintage streetcars that were acquired from a variety

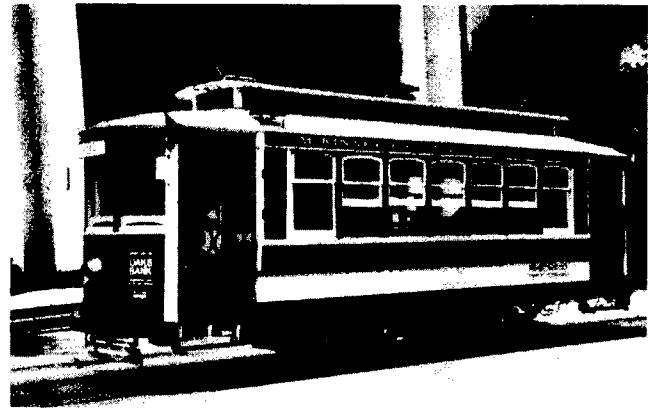


FIGURE 3 Reconditioned Brill car No. 122.

of owners and several countries. Two of the cars and their parts were obtained from Portugal and Australia. Two other vehicles were purchased or leased from a local trolley buff, and the fifth car was rescued from demolition just before the land on which it was sitting was sold. The vehicles, in various states of disrepair, were transported to the new trolley barn, where they were carefully restored and reconditioned by volunteer craftsmen. Figure 3 shows one of the vehicles in its fully restored condition.

### Trolley System Construction

In early spring 1986, the city of Dallas requested proposals for the engineering of all construction other than the car barn and vehicle renovation. An engineering contract was awarded to a local firm in June 1986 in the amount of \$392,820. Once the preparation of plans and specifications was completed, the city advertised for bids; the construction contract was awarded to a local construction company in April 1988 for \$4,273,797. Only \$2,213,277 of this contract had to be charged against the trolley project. The balance was utility replacement and street reconstruction work that was needed anyway. Construction was completed for the route shown in Figure 4 in about a year.

### Trolley Operation

Since MATA is a privately operated system, it was necessary to enter into an agreement to run its vehicles on the publicly owned tracks. No operating agreements of this type existed, so it was necessary to refer back to some of the original operating agreements with railway companies. The operating agreement with Dallas Railway and Terminal Company, which dated back to the early 1900s, was examined. Despite its age, that agreement

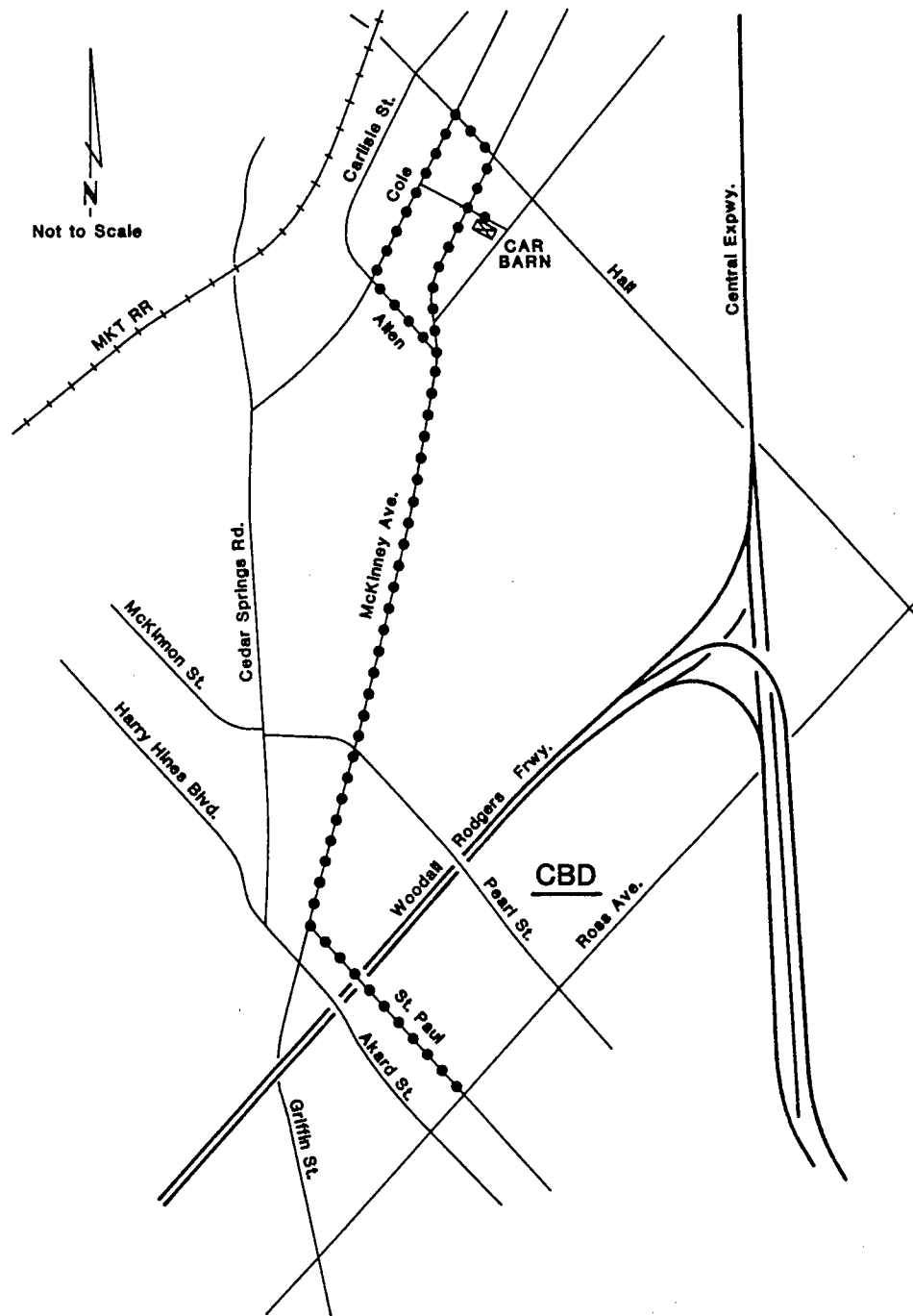


FIGURE 4 Existing trolley route.

served as a model for a new pact. MATA agreed to operate the system at its own expense for 5 years. If during that time the system became financially unable to continue, the city had a first lien on all MATA property.

The system began operation in July 1989. With the exception of shutdowns for maintenance and repairs, the system has been in continuous operation with four restored vintage cars and a largely volunteer work force ever since without requiring public agency financial assistance.

## DALLAS' LIGHT-RAIL SYSTEM

### Starter System

Following its establishment in 1983, the Dallas Area Rapid Transit (DART) regional transportation authority began preparation of plans to develop a light-rail transit (LRT) system to serve the urbanized area. A 108-km (67-mi) LRT system was ultimately approved as part of an integrated LRT, commuter rail, and bus transit system

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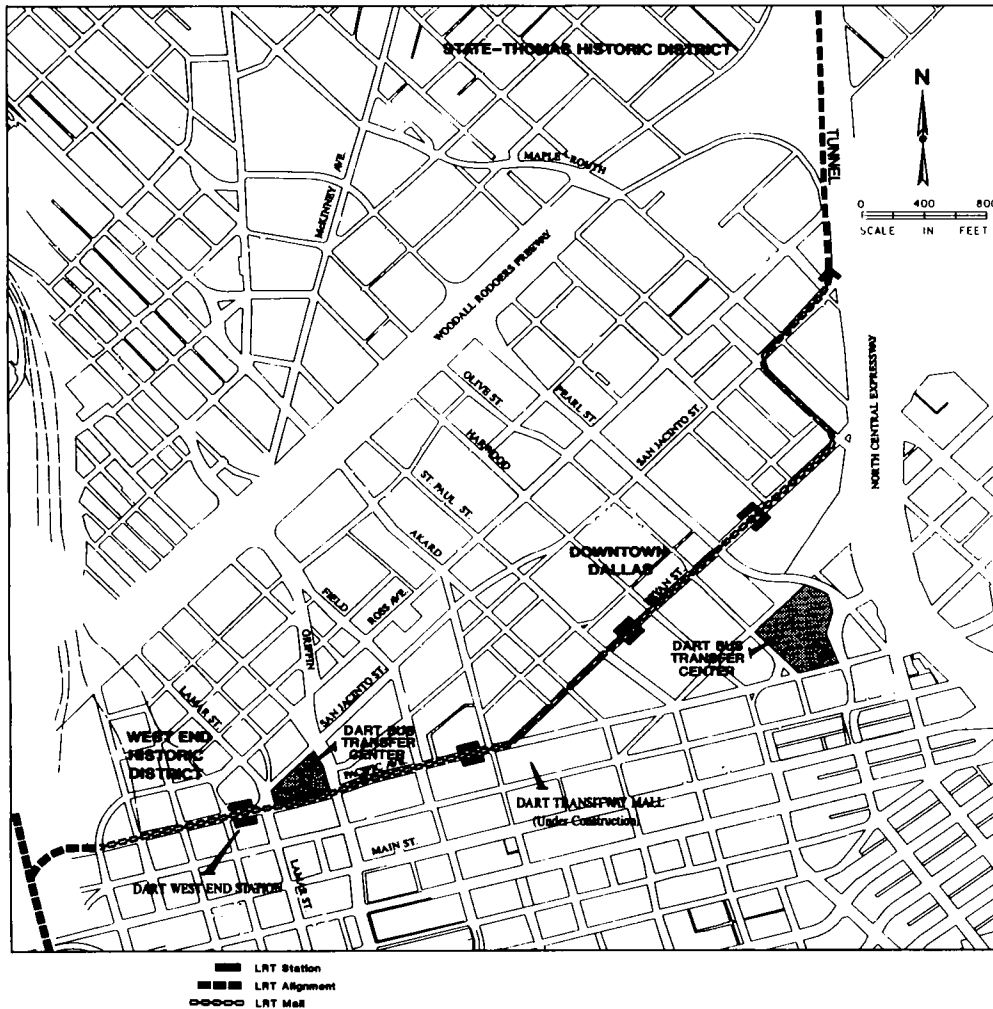


FIGURE 5 Dallas CBD LRT and bus transit facilities.

plan. Preparation of engineering plans led to project implementation, with all of the 32.2-km (20-mi) LRT starter system currently under construction. Operation of the first segment of the starter system is scheduled to begin in mid-1996.

### CBD Component

The heart of the LRT system will be located in the downtown area where all of the lines converge. The system will operate along a 3.22-km (2-mi) long at-grade transit mall located on two connecting east-west streets, linking a line to the north and another to the south.

In addition to an LRT mall, there will be two downtown bus transfer facilities at the east and west ends of downtown to serve bus routes that pass through and connect in the CBD. Each of these bus transfer centers will be located next to one of the LRT stations to accom-

modate bus-to-rail as well as bus-to-bus transfers. The configuration of the LRT mall and the locations of the bus transfer centers are shown in Figure 5.

### Trolley Extensions

Even before completion of the existing McKinney Avenue trolley restoration, studies were conducted to evaluate the possibility of a West End link. The West End Association and the Central Dallas Association strongly supported and actively pursued the extension but had not been in a position to advance beyond basic feasibility analysis. More recently, establishment of support for the Downtown Improvement District, the Uptown Public Improvement District, and the CityPlace Tax Increment Financing (T.I.F.) District gave impetus to the possibility of both north and south extensions. In addition, the Intermodal Surface Transportation Efficiency Act (ISTEA)

has added a possible alternative for capital funding that the city of Dallas is actively pursuing on behalf of the local supporters of additional restoration of historic trolley service.

Through the cooperative efforts of the city of Dallas, the North Central Texas Council of Governments (NCTCOG), the Central Dallas Association (CDA), the Texas Department of Transportation, DART, and MATA, a study was initiated to examine extensions of the trolley line and linkages with the LRT and bus systems.

### Task Force

Early in the project, it was recognized that certain segments of the community had a strong interest and a role to play in any possible extension of the McKinney Avenue Trolley. It was concluded that the knowledge, input, and support of these entities was essential to the success of the project, the measure of that success being enough consensus to result in the necessary support (financial, political, etc.) to carry the project forward as a component of an integrated transit system plan. Therefore, a task force consisting of the following entities (in addition to the consultants and NCTCOG) was created to support, advise, and critique the consultant team: MATA, DART, West End Association, CityPlace, CDA, and the city of Dallas (Department of Public Works and Transportation).

The members of the task force provided or assisted in obtaining facts, figures, plans, and previous reports that were important to the accuracy and completeness of this study. They also met to critique the progress and the interim conclusions of the study team and to engage in dialogue that assisted in identifying issues to be addressed.

### Description of Alternatives

The trolley extension study addressed a variety of potential route options that covered two physically separated service areas: the CityPlace options and the West End options. The CityPlace options extended from the northern terminus of the current McKinney Avenue trolley line at McKinney Avenue and Hall Street and are therefore referred to as the north extension alternatives. The West End options extended from the southern terminus of the current McKinney Avenue trolley line at St. Paul Street and Ross Avenue and are therefore referred to as the south extension alternatives. Any combination of north and south extensions is possible because they are physically over 1.5 km (1 mi) apart. Therefore, north and

south alternatives were, for the most part, considered independently but compared against nearly identical criteria.

The alternatives investigated were based primarily on the routes included in a report prepared by NCTCOG (1). This was essentially a ridership study, and therefore certain operational aspects of the routes were not entirely defined. In order to provide a meaningful comparison in the current study, all of the routes were defined more clearly, which resulted in several subalternatives (modifications of the basic routes). Thus the one north route in the 1992 study became three north alternatives. There were four south alternatives in the 1992 study, all of which were included with increased definition. In addition to these routes, a fourth north alternative and four south alternatives were added based on input from various study participants. These routes are shown in Figures 6 and 7.

### System Integration

#### *Northern Extension*

Each of the route extension alternatives was designed to interface with both the LRT and the bus systems. The north extension has its proposed terminus within a short walk of a pedestrian access portal to the underground subway station on the North Central Line. With feeder buses also being routed to this station, there would be an opportunity for trolley-to-bus transfers as well as trolley-to-LRT transfers. Because the area around the portal is currently vacant and controlled by a single developer (CityPlace), a member of the trolley extension task force, it was possible to develop a northern route extension with the direct station access needed to afford desirable system interface. The proposed station area is shown in Figure 8.

#### *Southern Extension*

All of the southern routes except one pass within one-half block of the proposed West End LRT station and next to a proposed bus transfer center. The trolley tracks are proposed to be located on the opposite (left) side of the one-way street next to the bus transfer center in order to avoid conflict with the high level of bus activity in the right lane. The proposed interface area is shown in Figure 9. With the extensions of the trolley line on both ends to interface with LRT stations, the route will become a system connector between two LRT stations, thus providing access to the transit stations from points in between.

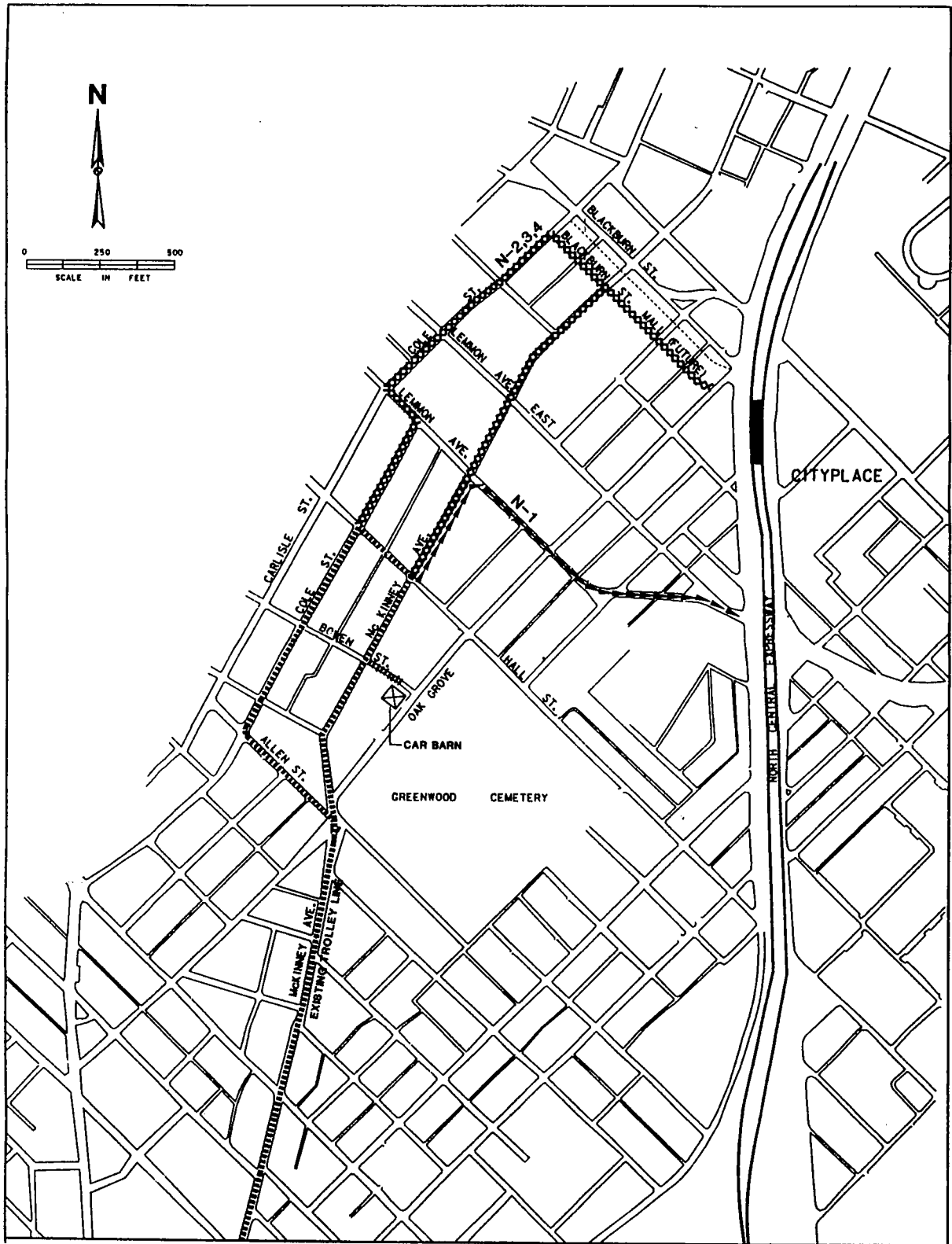


FIGURE 6 McKinney Avenue trolley: north extension alternatives.

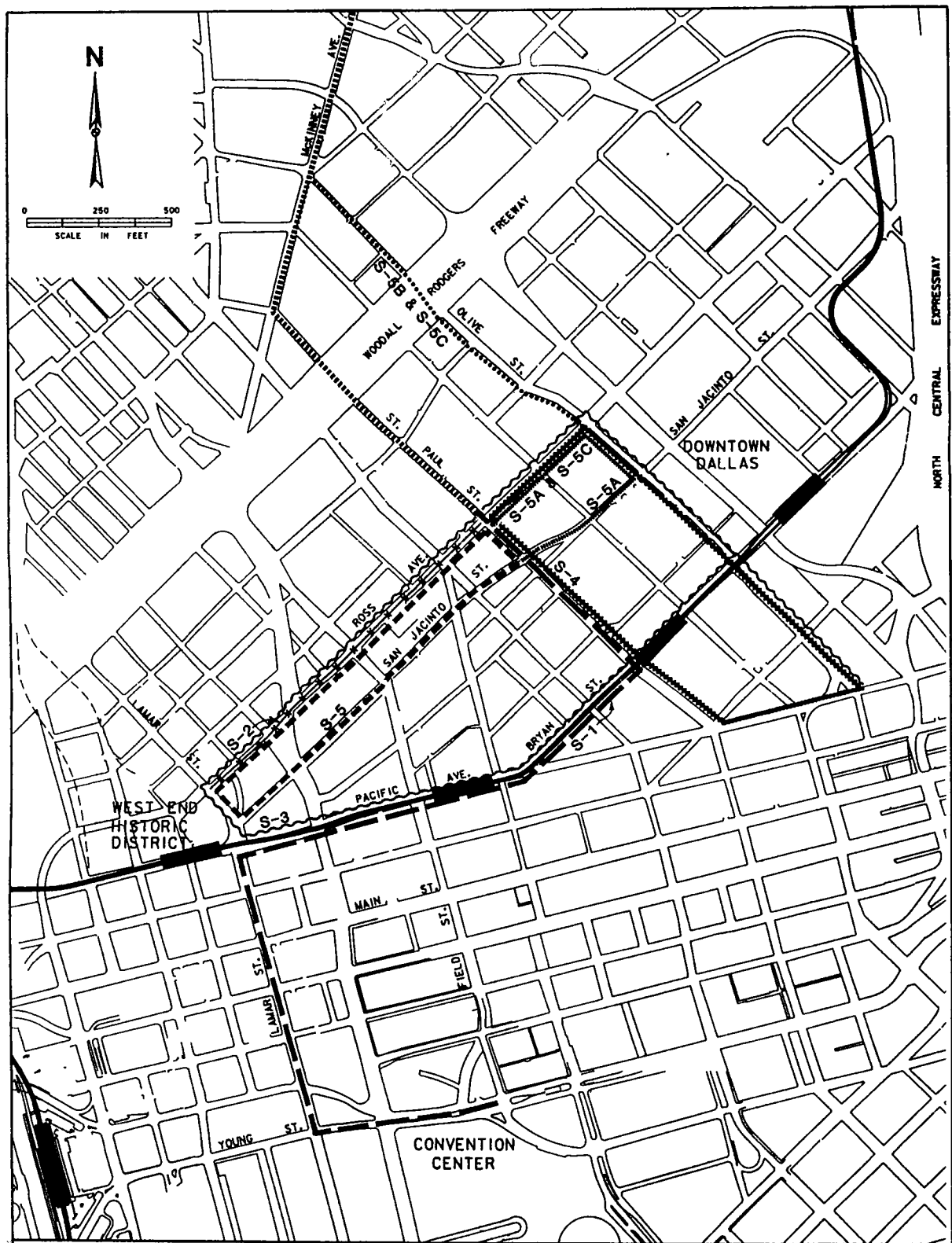


FIGURE 7 McKinney Avenue trolley: south extension alternatives.



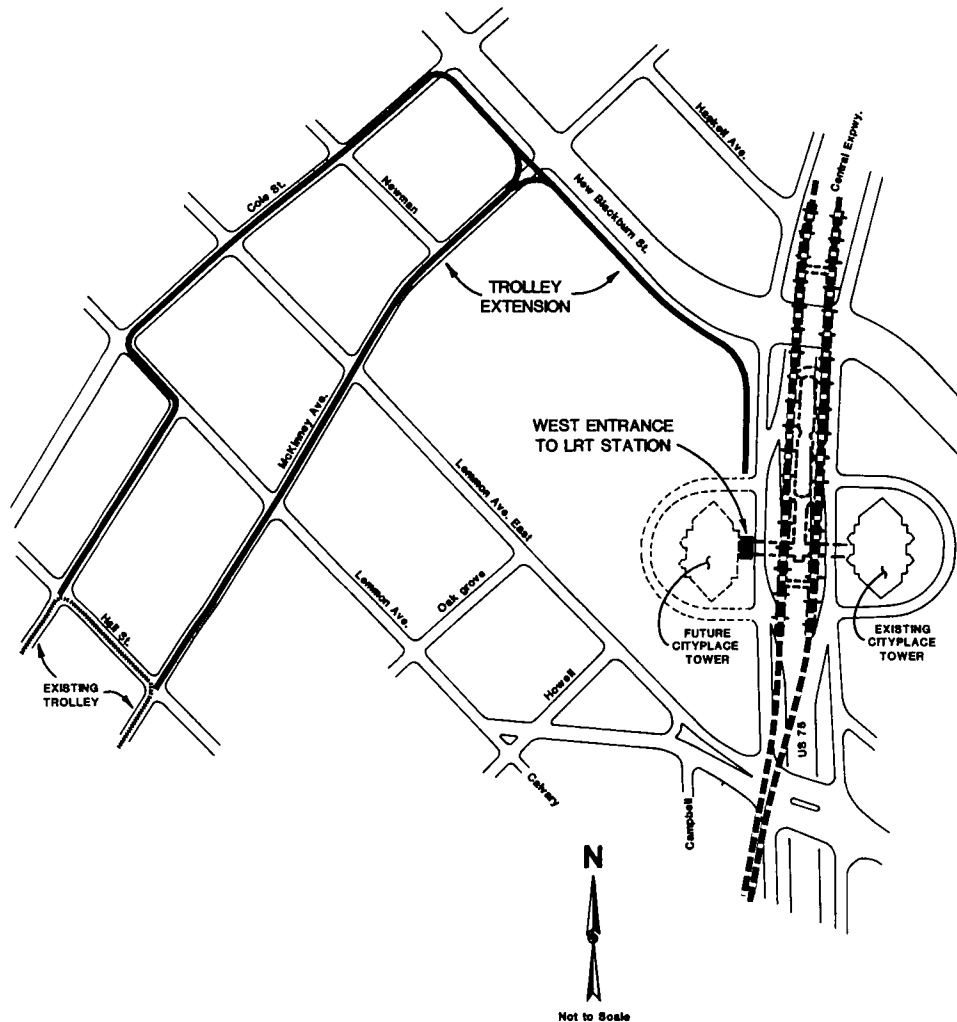


FIGURE 8 McKinney Avenue trolley north extension.

### Preliminary Screening

The first level of analysis for potential extensions of the McKinney Avenue Trolley served to reduce the number of options under consideration to those most viable for more detailed evaluation. This phase also established the parameters to be given detailed study and thus also defined the scope of this segment of the study. The study and evaluation processes for the preliminary screening consisted of the following primary elements, which were considered in the determination of the reasonableness and practicality of each option:

- Establishment of evaluation criteria,
- Data collection and review of previous studies,
- Route inspection,
- Analysis of data,
- Establishment of ranking parameters,
- Screening of alternatives (scoring and grading), and
- Recommendations for detailed study.

On the basis of the stated study goals, the consultant team proposed a list of criteria upon which to base the preliminary screening of the alternative routes. This list was presented to the task force and discussed. Recommendations were made, and the consultant team began the evaluation process. As the evaluations proceeded, it became apparent that additional criteria would provide more meaningful results, and the study team expanded the categories. The following criteria were used:

- Potential ridership per meter (foot) of route, existing and future;
- Potential total ridership, existing and future;
- Traffic and parking;
- Technical issues (electrical);
- Proximity to DART;
- Street reconstruction;
- Utility reconstruction;
- Right-of-way required;
- Service to West End or CityPlace;

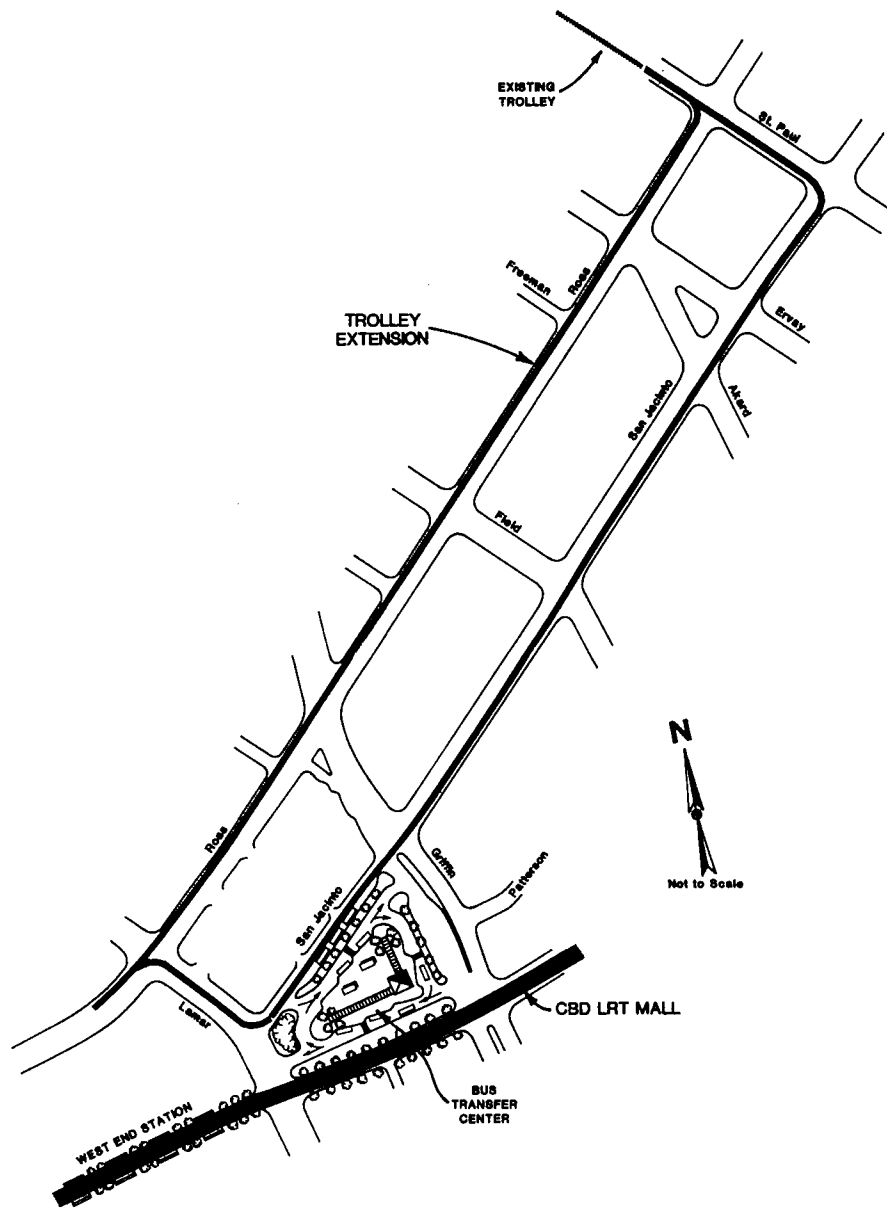


FIGURE 9 McKinney Avenue trolley south extension.

- Implementation issues;
- Overall length and cost;
- Service to CBD core;
- Operational issues; and
- Use or crossing of DART facilities

Each criterion was noted as being scored or graded; north routes were scored 1 thru 4 since there were four options. South routes were scored 1 through 5 since there were (initially) five options. Each grading criterion indicates whether it was a negative or a positive criterion. After each applicable criterion was graded, a weighting factor was applied to indicate its relative importance. Most criteria received a weight of 1; however,

several criteria were weighted 2 because of their importance. One criterion (service to CBD core) was weighted more lightly because it was considered a secondary goal. Table 1 shows the evaluation application of the criteria.

### *North Routes*

Based on its clearly superior scoring and significant level of support, the N2 route was recommended for further study. Its strengths are in its strong interface with the DART CityPlace LRT station, its favorable operating characteristics, and its residential and work-related ridership potential.

TABLE 1 McKinney Avenue Trolley Extension Study Summary of Preliminary Rankings

Criteria	Route								
	N1	N1A	N2	N3	S1	S2	0	S4	S5
Ridership/Ft. of Route - Existing	2	3	4	1	3	1	4	5	2
Ridership/Ft. of Route - Potential	2	3	4	1	1	5	4	3	2
Total Ridership - Existing	0	0	0	0	4	1	5	3	2
Total Ridership - Potential	0	0	0	0	2	1	5	4	2
Traffic & Parking	-3	-2	-1	-2	-2	-2	-2	-1	-2
Technical (Electrical)	-3	-3	-1	-1	-3	-2	0	-3	0
Proximity to DART	1	1	2	2	3	1	3	2	1
Street Reconstruction (1)	-1	-1	-1	-1	-2	-3	-2	-2	-3
Utility Reconstruction	-2	-2	-2	-2	-1	-1	-2	-2	-2
R.O.W. Required	-1	-1	0	0	-3	-2	-3	0	-2
Service to West End or Cityplace (2)	2	4	6	6	2	6	4	0	6
Implementation Issues	-3	-3	-2	-1	-3	-1	-3	-1	-1
Overall Length / Cost	4	1	2	3	1	5	2	3	4
Service to CBD Core (3)	0	0	0	0	1	0	1	1	0
Operational Issues	-3	-2	-1	0	-3	-1	-3	-1	-1
Use or Crossing of Dart (2)	0	0	0	0	-6	0	-6	-4	0
Score	-5	-2	10	6	-6	8	7	7	8
Rank	4	3	1	2	3	1	2	2	1

(1) - Considers Cross Slope, Longitudinal Slope, and General Condition of Pavement

(2) - Criteria Considered Critical (Either Positive or Negative) and Therefore Weighted More Heavily (X2)

(3) - Criterion Considered Secondary and Therefore Weighted More Lightly

### South Routes

On the basis of their direct access to the West End and their probability of expeditious implementation, routes S2 and S5 were recommended for further study. In addition, a variation of S5, S5A, merited further investigation because of its ridership potential and operational characteristics. It was acknowledged, however, that the routes that use DART facilities (S1 and S4) have the greatest ultimate potential for success based on ridership, and the further study of the recommended routes should include provisions for future interconnection with the DART LRT system through the CBD core.

The S1 and S4 routes scored well because their shared use of the DART LRT tracks gave them high ridership potential. However, it was the study team's opinion that an expedient resolution of all of the obstacles to use of DART rail facilities by trolley vehicles was not possible at that time. Therefore, these routes were acknowledged as having the greatest ultimate potential, but not being the most practical alternatives to pursue. It is important to clarify that the use or crossing of DART facilities was not seen as a serious flaw but as a factor that could significantly delay immediate implementation of a trolley extension. On the other hand, given time to address and overcome the issues that complicate the use of DART

facilities by the trolley, there is probably no greater potential for success than capitalizing on the ridership base and physical plant investment of the DART LRT system. The issues to be dealt with in order to do so include

- Reconciling the difference between DART's operating power of 750 volts and MATA's use of 600 volts;
- Modifying the trolley wheel profile so that it fits LRT tracks while still operating adequately on trolley tracks;
- Dealing with the safety issues between the historic cars and the LRT vehicles in terms of bumper heights, impact resistance, and so on;
- Satisfying DART operations personnel that the historic trolley's reliability or lack thereof will not impede LRT service;
- Reconciling union versus nonunion and paid versus volunteer operator issues on the same line; and
- Physically retrofitting the LRT with the switches necessary to connect the trolley tracks to DART's system.

It was believed that the foregoing issues were more likely to attract the necessary attention once the DART LRT system is operating. It may be possible at that time to experiment with a trolley car operating on the LRT line

to more effectively define and overcome the perceived conflicts. Then, perhaps, future extensions of the trolley can more meaningfully consider use of DART facilities in a positive light.

## Detailed Analysis

The Detailed Analysis Phase took the alternative alignments recommended by the Preliminary Screening (Routes N2, S2, S5, and S5A) as well as Routes S5B and S5C, which were added to consider the elimination of contraflow operation on St. Paul, and expanded the evaluation of each in both scope and level of detail. The result was an assessment that primarily addressed physical impacts (traffic, utilities, properties, etc.) of the proposed extensions. Also included was an analysis of potential ridership—patronage forecasts for each of the remaining alternative routes—which in turn generated an evaluation of farebox revenues, operating costs, and maintenance costs resulting in a proposed financial plan. The financial plan also addressed potential sources of funding for the capital investment necessary to design and construct the proposed streetcar extensions.

The result of this phase of the study was a definitive recommendation for the chosen route and specific track alignment for one north extension and one south extension that could be carried forward into conceptual engineering and more detailed cost estimating.

The primary factors that affected the placement of the rails within the roadway were passenger safety, traffic operations, track geometry and space requirements, utility conflicts, on-street parking, and location of existing tracks. These considerations were often in conflict with one another, and the choice of alignment became a balance among the criteria based on engineering judgment.

Each of the route options was reviewed on a block-by-block basis to determine the most appropriate preliminary track alignment. The alignments were considered preliminary because further stages of the study were required to identify physical conflicts and other impacts in detail, with the expectation that adjustments would be made.

Since only one north extension alternative remained, the focus of the impact analysis was on confirming the suitability of the track alignment within the corridor through more in-depth analysis and discussion of traffic issues and physical conflicts, if any. The goal was to reach a level of comfort with the chosen alignment such that all issues could be dealt with using conventional construction methods at a reasonable cost. The proposed route of the CityPlace extension has remarkably few complexities regarding traffic or physical conflicts with existing improvements.

Only one special trolley signal phase was required for

the entire route. There would be no loss of on-street parking on the entire northern route. All in all, this route presented no extraordinary expenses or design challenges.

## Preferred Alternatives

The S2 alternative and each of the now four variations of the S5 were reviewed against the factors and analyzed in detail, especially with respect to physical construction elements that would lead to excessive cost. Though detailed cost estimates were not developed at this stage of the analysis, the general magnitude of relative cost was apparent from the length of each route and its physical construction conflicts and issues. The results of the analysis led the study team to conclude that Route S2 did not merit further consideration. Further, the team concluded that any of the S5 alternatives would provide adequate service but that each successive version, S5A, S5B and S5C provided a better level of trolley service, greater flexibility of operation, added safety and increased ridership potential, but with a corresponding increase in cost. Therefore, contingent upon the procurement of funding, it was recommended that the West End extension consist of the S5C alternative, eliminating the contraflow operation on St. Paul and incorporating a CBD circulator loop. If funding is not immediately available for this large an investment, the interim route should be S5A so that the circulator loop will be built and the ability to eliminate the contraflow in the future will be maintained. The conceptual engineering plans and cost estimates therefore focused on the S5C option.

## Trolley Extension Features

On the basis of recommendations in the preliminary screening and detailed analysis, the extension of the McKinney Avenue Trolley will result in a system totaling approximately 47,500 linear meters (29,500 linear feet) of standard-gauge track operating primarily in city streets that historically contained trolley service. The combination of single and double track will provide the guideway for operation of faithfully restored vintage trolley cars, many of which previously served the city of Dallas. The extension constitutes nearly half of the total track length and will ultimately involve the addition of up to four historic vehicles of varying capacity and manufacture to supplement the four vintage cars currently operated by MATA. Propulsion will be provided by an extension of the overhead power distribution system supplemented by a second rectifier and power source.

Supplementary vehicle storage facilities will be required. Ultimately a separate storage facility and Trolley

Museum could complement the existing car barn, which would continue to serve as the maintenance facility.

The extension of the system includes two separate legs that, when completed, will link the West End Historic District to the CityPlace development area by way of the existing McKinney Avenue-Uptown-State-Thomas corridor.

## Vehicles

MATA currently operates four vintage trolley cars and is currently restoring a fifth vehicle. Because of limitations on headways imposed by the contraflow segment of the existing route, no more than three cars can operate at one time and rarely are more than two in service simultaneously. However, with the proposed extensions of the system and the eventual elimination of the St. Paul contraflow segment, as many as five cars will operate on 10-min headways at peak times, plus charters and party cars. In order to meet this need and allow spare cars for maintenance, MATA has options on four additional historic vehicles.

## Estimate of Cost

The basis for the estimate of cost to extend the McKinney Avenue Trolley was the quantities developed from conceptual engineering plans. The estimate was built on as many items as possible given the level of detail of the plans. The unit prices were gathered or developed from prices for similar work currently being performed in the Dallas-Ft. Worth area, as well as from inquiries about other recently constructed historic trolley systems around the country. Utility relocation costs were estimated and, under current franchise agreements, could be financed by the various utility companies.

Because of the uncertainty of funding for the trolley extension and the corresponding possibility that one of the lesser-cost alternatives other than Route S5C may

have to be constructed, the estimates were separated into four parts: Routes N2, S5, S5B, and S5C. All estimates include a 20 percent contingency to cover items that may not be identified at this conceptual level of design. They also include a 15 percent allowance for surveying needed for design, the final design itself, geotechnical investigation, materials testing during construction, and part-time private construction administration to supplement the city's inspection. The estimates are given in Table 2.

## Financial Plan

The existing trolley system's construction was funded by \$3 million in private donations, \$2.5 million in FTA grants, and \$250,000 in bond monies from the city of Dallas (for the relocation work). Two of the four operating cars were donated; they were restored with private donations. A third car was purchased and restored with private donations. The fourth car is leased. The existing system, therefore, represents four sources of possible funding that could be applied to the proposed extension: private donations, federal transit or other federal grants, city capital improvement funds, and in-kind donation of materials, equipment, labor, and so forth. The franchised utility companies and city relocation of their own facilities fall most closely in the last category.

The proposed trolley extension will involve all of the same elements as the previous restoration of historic service, and thus similar funding mechanisms will be sought for certain aspects of the work. However, it is unlikely that private donations will be available to make a significant impact on the substantial cost of the proposal. Therefore the majority of a reduced-scope \$10 million in funding is being sought through the Statewide Transportation Enhancement Program under ISTEA in the categories of rehabilitation of historic transportation, preservation of abandoned railway corridors, and historic preservation. As of this writing, MATA has been selected for \$1,000,000 of those funds under an application submitted in November 1993. In the fall of 1994,

TABLE 2 Cost Estimates of Alternatives

Extension	Basic Construction Cost	Utility Relocation	Total Cost
N-2 & S-5C*	\$10,139,000	\$2,445,100	\$12,584,100
N-2	\$3,591,600	\$276,100	\$3,867,700
S-5C	\$6,493,800	\$1,459,800	\$7,953,600
S-5	\$4,512,200	\$1,459,800	\$5,972,000
S-5B	\$6,265,000	\$2,053,300	\$8,318,300

\* Preferred Alternative

an additional \$4.6 million was received in a second award of enhancement funds. To fully finance the project, \$1 million has been pledged by the CityPlace development T.I.F. and \$3 million has been included in proposed city of Dallas general obligation bond funds.

### **Transit Service Integration**

The first segment of the LRT system from the south into the CBD is scheduled to begin operating to the West End station in June 1996. At the same time, the West End bus transfer center construction will be completed and

open for operation. It is expected that the trolley extensions will be built and placed into operation in late December 1997, thus connecting two LRT stations and interfacing with a bus transfer center. With the completion of these three independently operating systems, bus, LRT, and vintage trolleys will be integrated to provide transit service in a truly functional manner.

### **REFERENCE**

1. *McKinney Avenue Transportation Study*. NCTCOG, Dec. 1992.