

Changes in Direction for LRT Planning in Edmonton

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Edmonton completed the first leg of an LRT system in 1978. The first part went from downtown Edmonton (Central Station) to the northeast (Belvedere Station) and was 7.8 km long (1). A further extension was completed to Clareview in 1981 at the northeast end, and a downtown extension to Corona was completed in 1983. In 1984 a new maintenance facility named after the first project manager, D.L. MacDonald, was put into use. While the first leg was under construction, extensions were planned; however, real progress on LRT implementation and construction in Edmonton has been quite slow. What happened, after a fast start and completion of the first phase, that caused a slowdown and how the city of Edmonton intends to catch up will be examined. There may be a message for all those who like to plan LRT lines.

TRANSPORTATION PLANNING IN EDMONTON

In the early 1970s transportation planning was a branch of the Engineering and Transportation Department. Other branches in this department were transit operations, geometric design, traffic operations, roadway maintenance, and the LRT project. Coordination was relatively easy within one department. There was also a lateral movement of staff; for example, D.L. MacDonald was first manager of the transit system, then became director of transportation planning and later the director of the LRT project.

The first LRT project therefore benefited from a good backup organization that permitted a relatively small (11 persons) project staff. However, when MacDonald left transportation planning, there were changes. Additional staff were hired, some recently out of the university, and a number of other developments occurred, which in retrospect greatly delayed LRT development.

The aim of the city had always been to go south of the North Saskatchewan River with the LRT line. All plans assumed that the high-level bridge would be used. The high-level bridge is a double-level steel bridge, 770 m long, completed in 1913. The lower deck is used by automobile traffic, the upper deck is presently used by the Canadian Pacific Railway (CPR) and in the past was used by streetcars. There is space for three tracks, the center one of which remains and is used by the CPR.

SHORT HISTORY OF THE CITY'S SOUTHSIDE LRT PLAN

Transportation planning in the 1970s was also planning for increased roadway capacity across the river.

A bridge study showed that a two-lane roadway bridge (105th Street Bridge) just east of the high-level bridge should be replaced by a six-lane bridge. A six-lane bridge, of course, needs approaches to utilize that capacity, and a possible path on the south side was next to a railway yard. At the same time, the federal government of Canada had developed a policy of railway relocation away from downtown areas. It did not take long before the idea developed that if the railway yard and CPR track were relocated, space would be created for an approach road to the six-lane road bridge and for redevelopment of the railway yard into high-density residential housing and that the path of the CPR line could also be used for an LRT line.

This idea was attractive to the city planners because south and east of this railway yard the city had developed 23 km² (9 mi²) as a residential community (Millwoods). The freeway, originally planned to link Millwoods with the city center, had earlier been abandoned as a financial and political impossibility.

The area just to the southwest of the high-level bridge was practically ignored in these initial studies. This area contains the University of Alberta (daytime enrollment 23,000) and the Health Sciences Centre and University Hospital complex. The area is a traffic generator of major proportions (total daily trip attraction about 47,000) and heavily transit dependent. A branch line was suggested; however, such a branch line would produce major geometric difficulties at the south end of the bridge, particularly if the CPR remained and grade separation would be required (Figure 1).

In essence then, the LRT southside extension plan was based on (3)

- Use of the high-level bridge,
- Use of railway right-of-way and relocation of the railway,
- Serving the area of Millwoods as soon as possible,
- Redevelopment to following immediately if an LRT were located through an abandoned railway yard, and
- A lot of optimism based on boom economic times in Alberta during the 1970s.

The reality was, however, a little different:

1. Nobody had examined the structural condition of the high-level bridge and whether corrosion had occurred since 1913. There was no reliable cost estimate for making the bridge suitable for LRT.

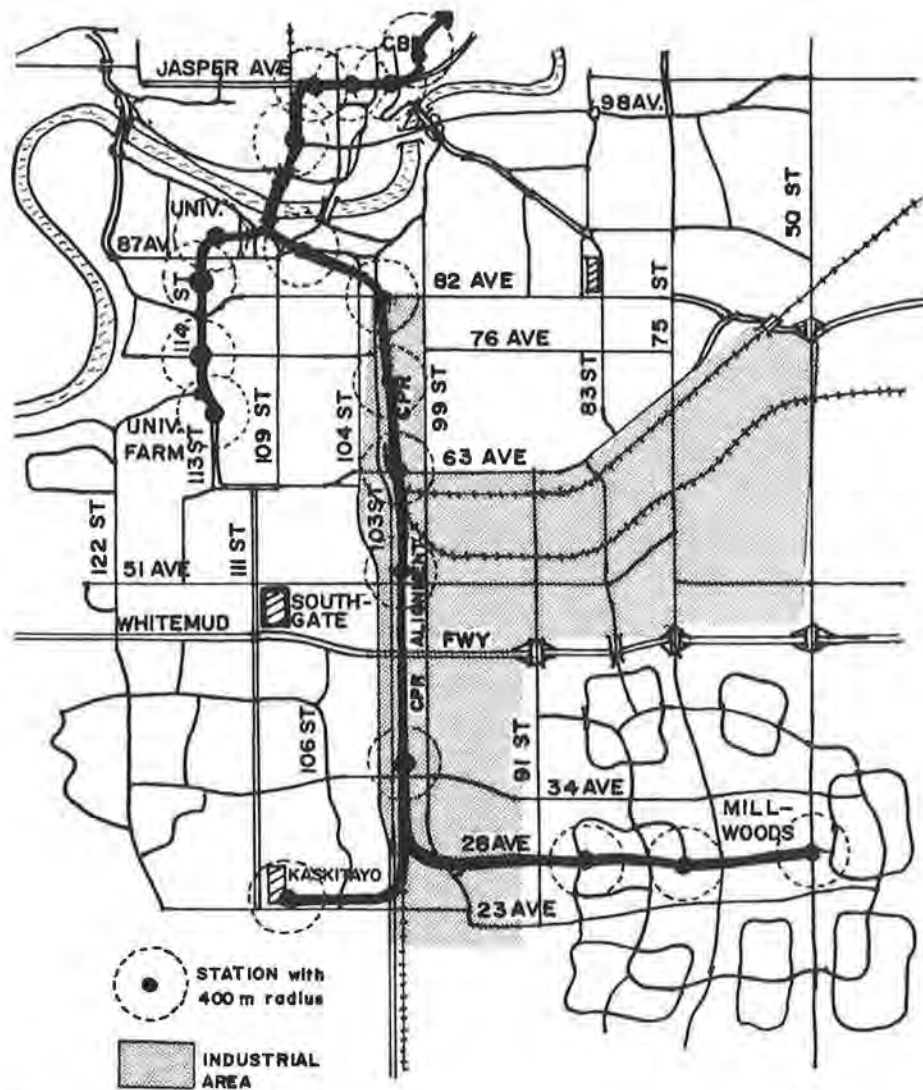


FIGURE 1 Original city proposal of 1977.

2. The federal government found quickly that they could not afford the many railway relocation plans in the country and cancelled the program. The railway right-of-way was actually not readily available.

3. Millwoods was meanwhile being served by a bus system that showed travel desire lines to be a mile east of the railway right-of-way and in a north-south direction,

4. The theory of redevelopment next to rail transit lines did not appear to work in Edmonton, particularly next to a railway right-of-way.

5. The economic boom of the 1970s changed to the depression of the 1980s.

LRT AND LAND REDEVELOPMENT

In Edmonton there has been some redevelopment as a result of the building of the LRT line. However, that redevelopment has occurred solely in the downtown area. In addition, developers contributed financially to the Clareview extension, although the residential development is some distance from the LRT station. The planned "Town Centre" at Clareview (the LRT station was to be part of it) was postponed because of the economic hard times. The Clareview Station is now surrounded by empty fields, a park-

and-ride lot, and a bus station. The "Town Centre" development is still in the future.

Because the location of the northeast LRT in Edmonton is along a railway right-of-way, no redevelopment has actually occurred adjacent to the LRT line. The nature of the land use next to a railway line inhibits redevelopment. The idea that redevelopment will happen immediately after rail transit is introduced can be called "the Toronto myth."

In Toronto the first rapid transit line was built along Yonge Street. It replaced a busy streetcar line and the first designs contemplated placing the streetcars in a tunnel. The projected travel demand showed, however, that it would be better to construct a full rapid transit line. When the rapid transit line had been built, redevelopment occurred adjacent to the stations. The following conditions existed:

1. There had been a well-used streetcar line before rapid transit was introduced; in other words, there was an existing demand.

2. The redevelopment consisted of replacing old housing stock with apartment buildings. Like all land developments it was probably a function of land economics and the marketplace not a function of transportation availability.

3. There was no railway right-of-way environment.
4. Because of the old streetcar line, stations were close together and there was a greater reliance on walk-in passengers. However, transfer stations were also developed using the body-transfer system.

EDMONTON'S EXPERIENCE

Edmonton did have redevelopment along its old established transit lines. These lines used to be streetcar lines and are now operated by trolleybuses. The housing stock along these corridors was also ripe for renewal.

Along the LRT line, Edmonton created its own high-density trip mating with a bus feeder network, originally developed under the timed-transfer concept (2). About 90 percent of the riders on the LRT at the residential end start or finish their trip on a feeder bus. In addition, Edmonton developed off-peak markets for sports facilities such as the Commonwealth Stadium and the Coliseum. However, there was no redevelopment along the railway right-of-way of the northeast LRT line. Indeed, the city planners were not ready for land redevelopment when the LRT was completed in 1978. A land use freeze was imposed. Although there has been some land clearing near the Coliseum Station, nothing has materialized yet.

The only other area in which there was an opportunity for redevelopment was southeast of Belvedere Station. A park-and-ride lot was converted into a city maintenance yard, not exactly a high transit passenger generator. Belvedere illustrates well that city ownership of land does not guarantee optimal land use.

Notwithstanding Edmonton's own experience, the city's transportation planners convinced themselves they were right, and to make sure that nothing would interfere they avoided any public hearings or outside review of their proposals. They also ignored the timed-transfer concept that had been developed on the south side because of the university and the Southgate Shopping Centre. The transit volume map clearly showed two corridors, one in the southwest (109th Street and 114th Street) and one in the southeast (83rd Street). The railway yard is in between at about 102nd Street (Figure 2).

Actual construction requires the approval of the city council to spend the money. At that time, it was suggested to the council that public hearings be held on the LRT alignment. When these hearings were held, from the fall of 1979 extending to the winter of 1980, it was found that there was great support for LRT in the community. However, most submissions recommended a different alignment, namely through the university to Southgate. The university itself

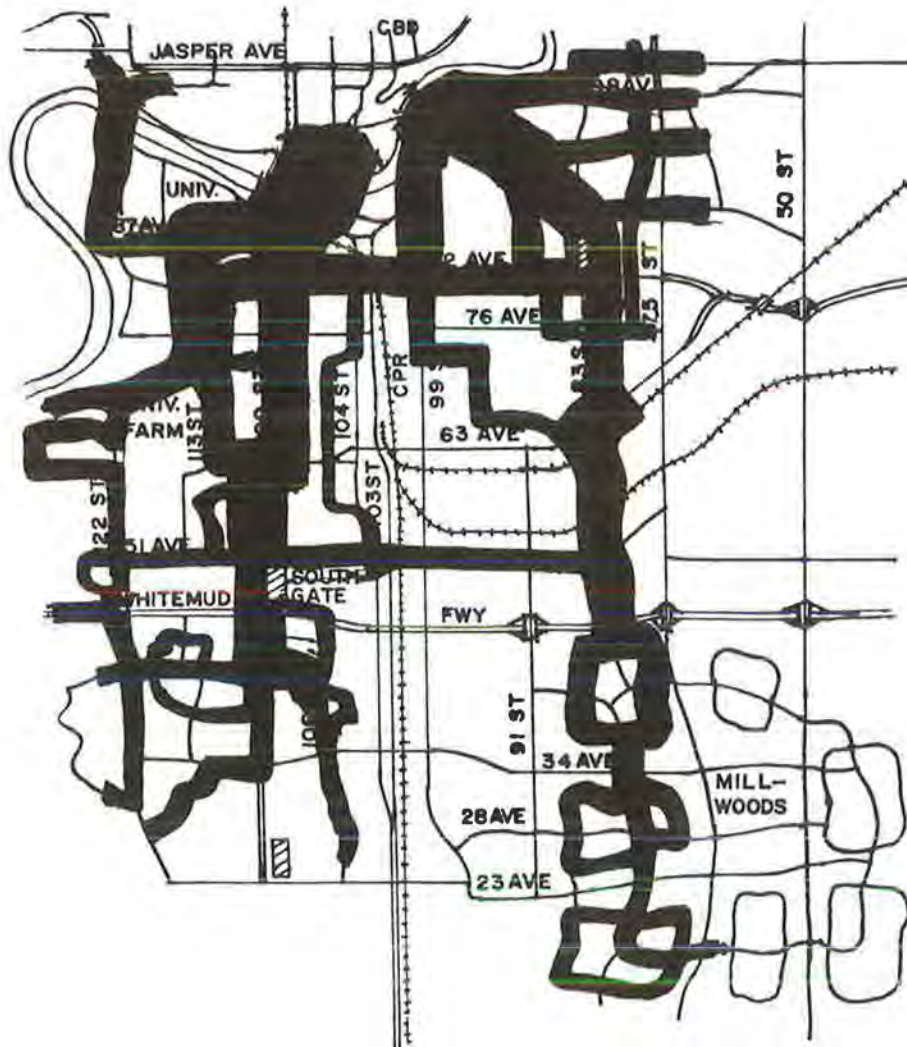


FIGURE 2 Transit flow map of 1980.

welcomed LRT but not on a surface alignment. The university was willing to give an easement for the alignment underground, but would only sell the right-of-way for a surface location.

In February 1980 the city council approved an extension to the LRT starting at Central Station under Jasper Avenue to the Government Centre. Because of outside input, particularly by the downtown businessmen, an additional station was added at 104th Street (now called The Bay). The transportation planning staff opposed this station because of the high costs. The station was added to make the LRT more accessible in the downtown area, particularly from the streets perpendicular to Jasper Avenue.

OUTSIDE STUDY REVIEW

In their report to the council, the staff rebutted the arguments brought forward. An election in 1980 brought new faces to the council and in the fall of 1981 the council decided to appoint a review panel of outside experts. This review team consisted of Vukan Vuchic from the University of Pennsylvania; D.F. Howard, Director of Engineering and Project Director of the Tyne and Wear Transport Metro; and

Herbert Feltz, Director of Planning of the Hannover Transit System, Ustra. This review study team presented its findings on April 6, 1982 (4). The study team recommended a line via the Government Centre past the university to Southgate and from there two branches, one further south and one to Millwoods (Figure 3).

This proposed line would be able to attract and serve more passengers, which greatly outweighed the "possible" redevelopment potential of the CPR corridor. Travel time from Millwoods would be up to 4 min longer compared to the original city plan.

The study team's report was different in a number of other aspects from the submissions made in the public hearings of 1979-1980. Meanwhile it had been determined that the structural condition of the high-level bridge was not as good as had first been assumed. Also, with joint use, there would be severe operating restrictions on the bridge (30 km/hr) and liability problems in case of an accident. The recommendation was to investigate a more direct alignment between the Government Centre and the university. This alignment would mean a tunnel alignment under 110th Street north of the river, a separate LRT bridge west of the present high-level bridge, and a tunnel under the university, surfacing as soon as possible to continue with road rights-of-

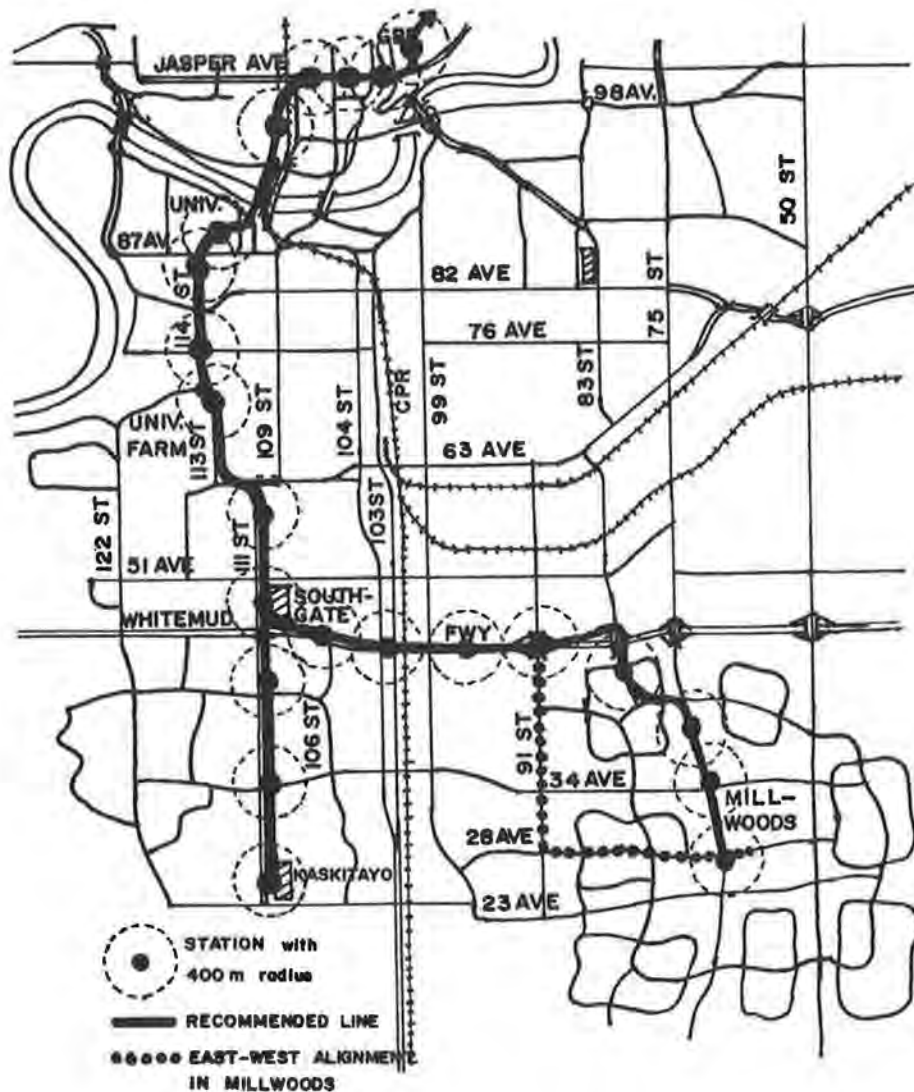


FIGURE 3 Alternative recommended by the review team.

way to Southgate. When completed, a 70 km/hr speed would be possible on this line. The university-Southgate alignment was also recommended because it would be useful all day and not serve only as a peak-hour commuter service. In Millwoods the line was given a north-south (instead of an east-west) alignment that is more in keeping with travel desire lines. It also allowed for the possibility in the far future of building a second southeast line via approximately 83rd Street. The report also used more up-to-date population and employment statistics that also favored a southwest alignment.

REACTION OF THE ADMINISTRATION

Instead of going full speed ahead, the city administration tried to delay decisions. This meant that more LRVs were bought and that a new modern LRV maintenance facility was authorized and built (so that the LRVs could be housed). The system now has 37 cars whereas it only needs 21 cars for peak-hour service. Capital funds were simply diverted to equipment away from construction.

Construction was limited to the downtown extension under Jasper Avenue as far as 108th Street (Corona Station). Because of suspected problems with the high-level bridge structure, it was considered advisable not to proceed beyond Corona Station. The option therefore remained open of using the CPR right-of-way and the high-level bridge or a tunnel alignment under 110th Street with a separate LRT bridge.

It required political action for the southwest line to be approved. A number of interesting items came to light at this time. The city had been negotiating with the CPR about the high-level bridge. The CPR was willing to sell the bridge for \$16 million with the right-of-way from 82nd Avenue to the north side. The bridge, however, would have to remain accessible to the CPR. That requirement alone meant an extremely expensive LRT-CPR grade separation at the south end of the bridge. It was further determined that the bridge was in need of some "retro-maintenance" totaling about \$6 million and it would cost another \$14 million to make the bridge suitable for LRT. The CPR also wanted to change the maintenance agreement from 63.2 percent CPR and 36.8 percent city to 25 percent CPR and 75 percent city. Obtaining and using a 1913 bridge was not exactly a bargain. The new 110th Street tunnel alignment alternative that requires only a new LRT bridge was therefore approved by the council. The CPR then offered the bridge for \$1.00 with the new maintenance agreement; but their offer was turned down.

ANOTHER ADMINISTRATION REVIEW REPORT

In May 1983 the Transportation Management Department prepared another report for the city council. In this report more up-to-date transportation data (the 1981 census) were used. Table 1 gives the estimated peak-hour travel to be expected in the various corridors (5).

The 1993 modified figures assume a 10 percent increase in modal split of transit work trips to the central business district (CBD) and to the University of Alberta. On the basis of present (1983) and anticipated future morning peak-hour work trips, the southwest line has greater potential than does the southeast alignment. The northwest and west would have to come later.

From the point of view of demand, it was clear where to build the next LRT line. The next problem was financing.

TABLE 1 Morning Peak-Hour Transit Trips

City sector	Based on Existing Mode Split			Based on Improved Transit Access	
	1983	1988	1993	1993 Modified	Incremental Increase
Northeast	3,450	4,550	5,400	6,200	+800
East	2,200	2,350	2,700	3,150	+450
Southeast	3,050	3,850	4,550	5,300	+750
Southwest	4,250	5,150	6,300	7,300	+1,000
West	2,750	3,000	3,450	4,000	+550
Northwest	3,600	4,000	4,600	5,350	+750

LRT FINANCES IN EDMONTON

The first leg of Edmonton's LRT to the northeast had a cost of \$65 million, of which \$45 million was paid by the government of Alberta. The remaining \$20 million was first borrowed, but in the debt reduction program of 1979 this debt was forgiven. The subsequent program (1979-1985) gave the city \$25 million per year for transit capital, which the city chose to spend on LRT extensions, equipment, and a maintenance facility. In 1984 only \$1 million was left with which detailed design was commenced for the southwest alignment. In November 1984 the Province of Alberta announced a new transportation assistance program for 3 years (1985-1988). It consists of the following features.

A basic capital program is established for arterial and collector roads, transit, research and development, and transportation system management. The province contributes \$70.00 per capita, a 75 percent provincial contribution to be matched by a 25 percent city contribution. This means that for the next 3 years there is an assistance of \$39 million per year from the province to be matched by the city with \$13 million per year. It will mean an average expenditure of \$20 million per year for LRT for the next 3 years.

Although the city is free to allocate the money as it sees fit between modes, it does need the approval of the province for the chosen allocation.

PRESENT STATUS

The political decision has now been made to go southwest using an underground alignment under 110th Street, a separate but lower level bridge (365 m long) across the North Saskatchewan River, and underground under the university. This political decision became easier when there was a change of mayor in October 1983. Also in the last few years there has been a tightening up within the city administration, with the result that the planners associated with the CPR right-of-way alignment are no longer with the city.

Another important reason for the decision to proceed with the southwest alignment was that each section completed would immediately become revenue producing and would also produce savings in the form of fewer city buses required (Table 2). The CPR alignment alternative would have had to be completed all the way to Millwoods before it started producing revenue or savings (5).

Consultants have now started with the detailed design, a design that will extend as far as the University Farm (Figure 4). The design will allow for further extensions to Southgate or beyond. The possibility also exists of branching at the University Health Sciences Centre to go west to West Edmonton Mall, a large shopping center that has been

TABLE 2 Staging Impacts

Stage	114th Street (southwest)				CPR (southeast)			
	Segment Corona to	Total (\$ millions)	Total 2-Way Peak Passengers	Total Annual Riders (millions)	Segment Corona to	Total (\$ millions)	Total 2-Way Peak Passengers	Total Annual Riders (millions)
1	University	120	2,800	4.5	82nd Avenue	136	1,100	2.5
2	University Farm	170	7,700	12	34th Avenue	217	3,900	6.2
3	Southgate	211	9,100	14.5	University } 34th Avenue }	264	3,100 4,200	11.5
4	Kaskitayo	254	10,200	16	University } Kaskitayo }	295	7,300 3,400 4,700	13
5	Kaskitayo } Millwoods }	354	12,700	10	University } Kaskitayo } Millwoods }	375	8,100 3,400 4,700 2,500	16
							10,600	

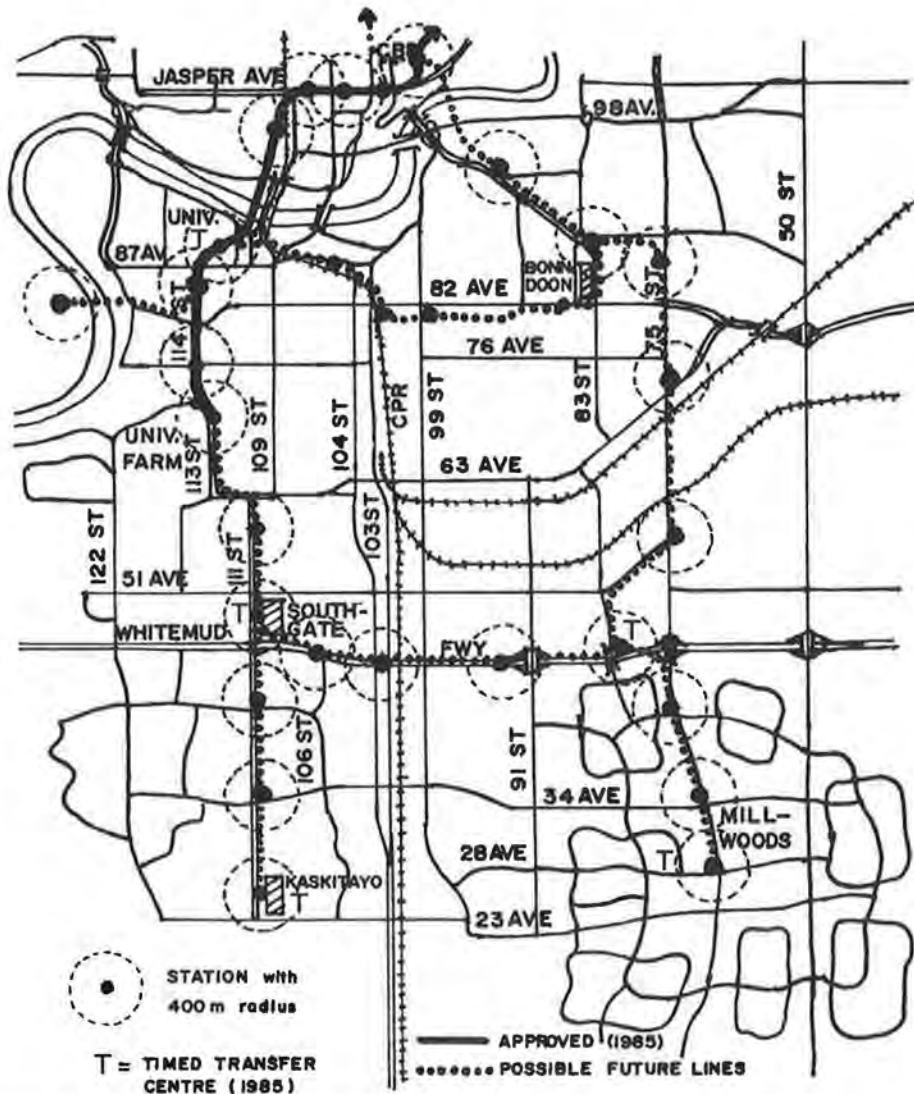


FIGURE 4 Approved line and possible future lines.

developed in the last 5 years. Even the option for an east-west line from Bonnie Doon to West Edmonton Mall will be possible. At the University Farm a major bus-LRT transfer station will be built. It is intended to open this line section by section so that the equipment that is already available can be used. The equipment now owned is sufficient for service to the University Farm. Financing is assured for the next 3 years and there is every reason to expect that it will continue beyond that period.

The task facing the city is to obtain the maximum value for dollars spent. The design therefore will have to be frugal. Studies are under way to determine whether a single-track tunnel on either side of the river with a double-track bridge would provide earlier service to the university. The policy initially is going to be to lengthen trains rather than to increase the frequency of service, until the maximum length of five-car trains has been reached. This method will permit a 7-8 min headway with single-track tunnels. In any case it is expected that the University Station will be in use by 1989 or 1990. The station design will make use of the now-adopted proof-of-payment fare system, which can greatly simplify design and reduce costs, especially with underground stations. The underground stations so far have a track level of about 15 m below the surface. The Government Centre and the University Stations will be 25 m below the surface. These stations will have no mezzanine floor and will be tube-type stations.

Beyond University Avenue the line will become a surface line located on the east side of 114th Street with crossings at grade. Then the south side of Edmonton will have a true light rail transit line.

CONCLUSIONS

The experience in Edmonton has been extremely frustrating. It clearly shows the constant need to have

plans reviewed by knowledgeable outsiders. Further, it is necessary to be sure that all transportation planners understand that transportation should serve existing travel demand first. Land redevelopment may or may not occur depending on the market, but existing facilities like government, universities, hospitals, and other major trip attractors are likely to remain. It is safer and faster to plan for known certainties than for remotely possible eventualities. In the design phase, staging becomes important so that each completed segment gives benefits on an incremental basis.

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