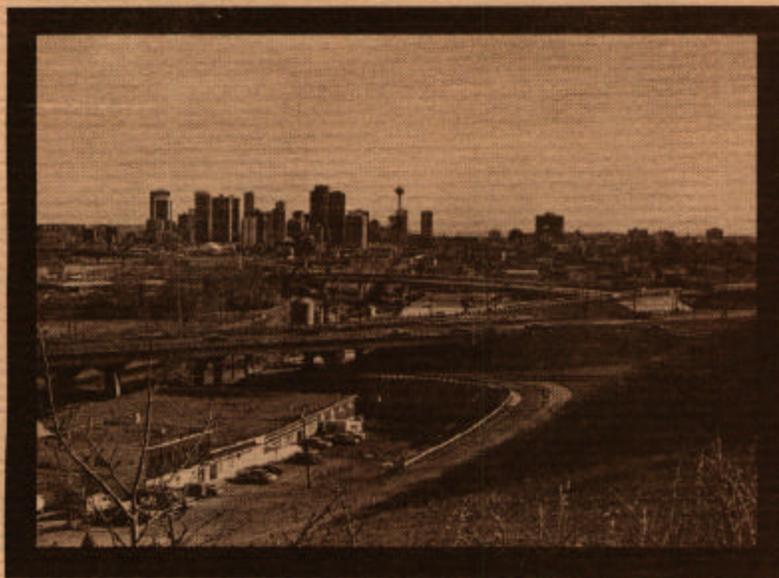


LV 17 02 CROT

a functional planning study



Crowchild Trail South



CITY OF CALGARY
TRANSPORTATION DEPT.
CALTS SERIES FIFTY TWO
DECEMBER, 1978

On December 18, 1978, at a regular meeting, City Council adopted the following recommendations regarding Crowchild Trail South Functional Planning Report:

- “ 1. That the roadway plans shown in Exhibits 3 and 4 of the Crowchild Trail South Functional Planning Report be approved and that lands necessary to implement these plans be acquired on an opportunity basis and reserved for road purposes.
2. That a pedestrian overpass be constructed in the northeast quadrant of the Glenmore Trail and Crowchild Trail interchange in conjunction with the construction of the dual right turn lane.
3. That in addition to the right turns only from 20 Street, emergency access be provided to 20 Street South West from Glenmore Trail by constructing a paved median and providing a break-away fence.
4. That the final design of the noise barrier or privacy fence be discussed further with residents during the detailed design stage and be built to the satisfaction of the communities and, if concurrence cannot be reached, to be returned to Council for final decision.
5. That 20 Street remain open for right turn exists only from the community and that further traffic studies be conducted after the interchange is constructed to see if there is any short-cutting traffic.
6. That no additional access roads be built to service the Earl Grey Golf Course at this time.”

CROWCHILD TRAIL SOUTH

FUNCTIONAL PLANNING REPORT

December, 1978

Transportation Department

CALTS SERIES #52

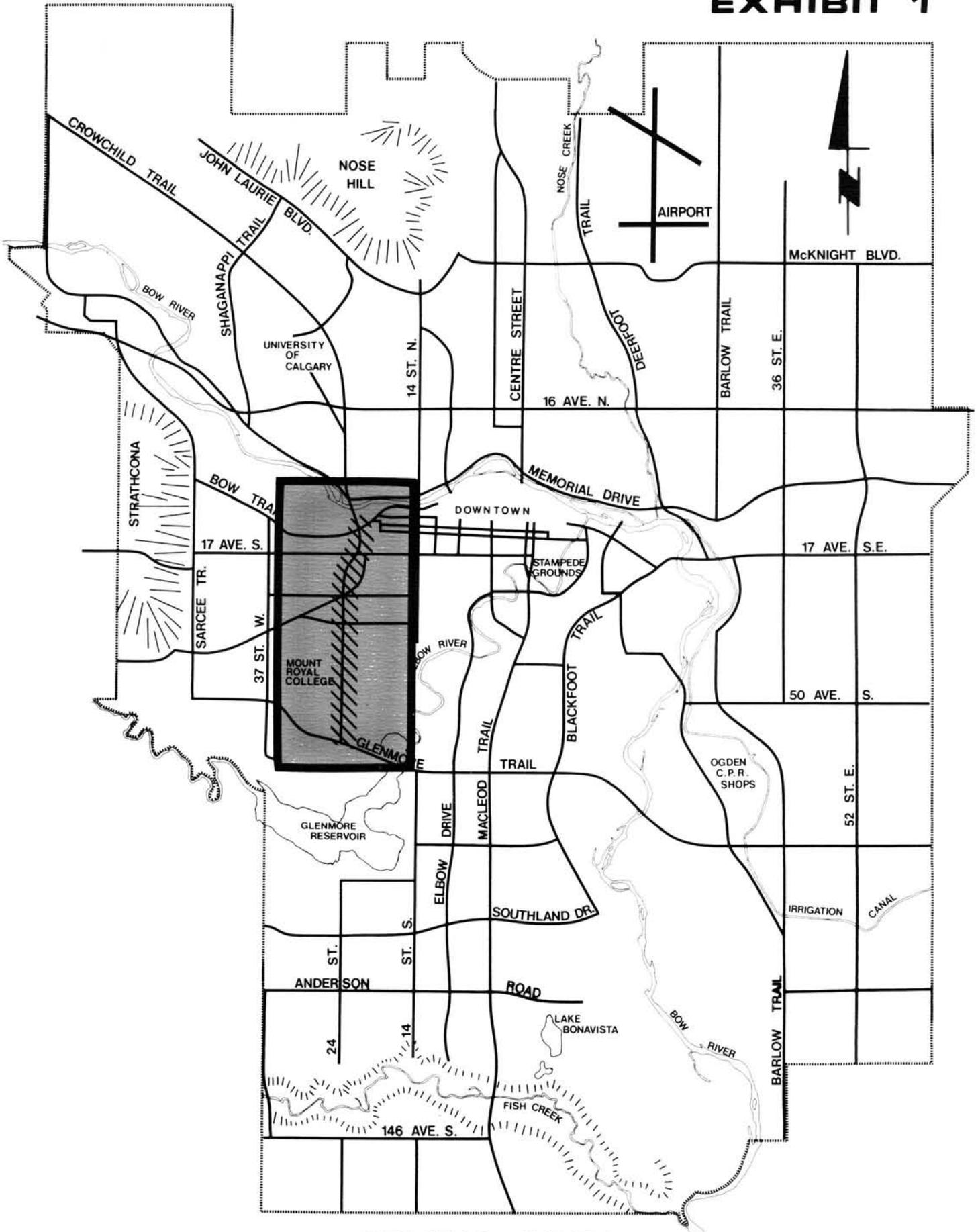
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LIST OF EXHIBITS

	EXHIBIT NO.
Study Area	1
Transportation Network	2
Stage I - Design	3
Subsequent Stages - Design	4
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EXHIBIT 1



STUDY AREA

1.0 INTRODUCTION

A functional planning study of the Crowchild Trail between Glenmore Trail South and 85 Street North West was initiated in 1977 by the City of Calgary Transportation Department. The section of Crowchild Trail from the Bow River south to Glenmore Trail was undertaken by the staff of the Transportation Department, while the portion from the Bow River north to 85 Street was undertaken by Stanley Associates Engineering Ltd. This report presents the results of the study south of the river, and proposed changes to Crowchild Trail from Glenmore Trail to the Bow River. The study area is shown in Exhibit 1. A companion document, CALTS Series 53, presents the functional work completed for Crowchild Trail north of the Bow River.

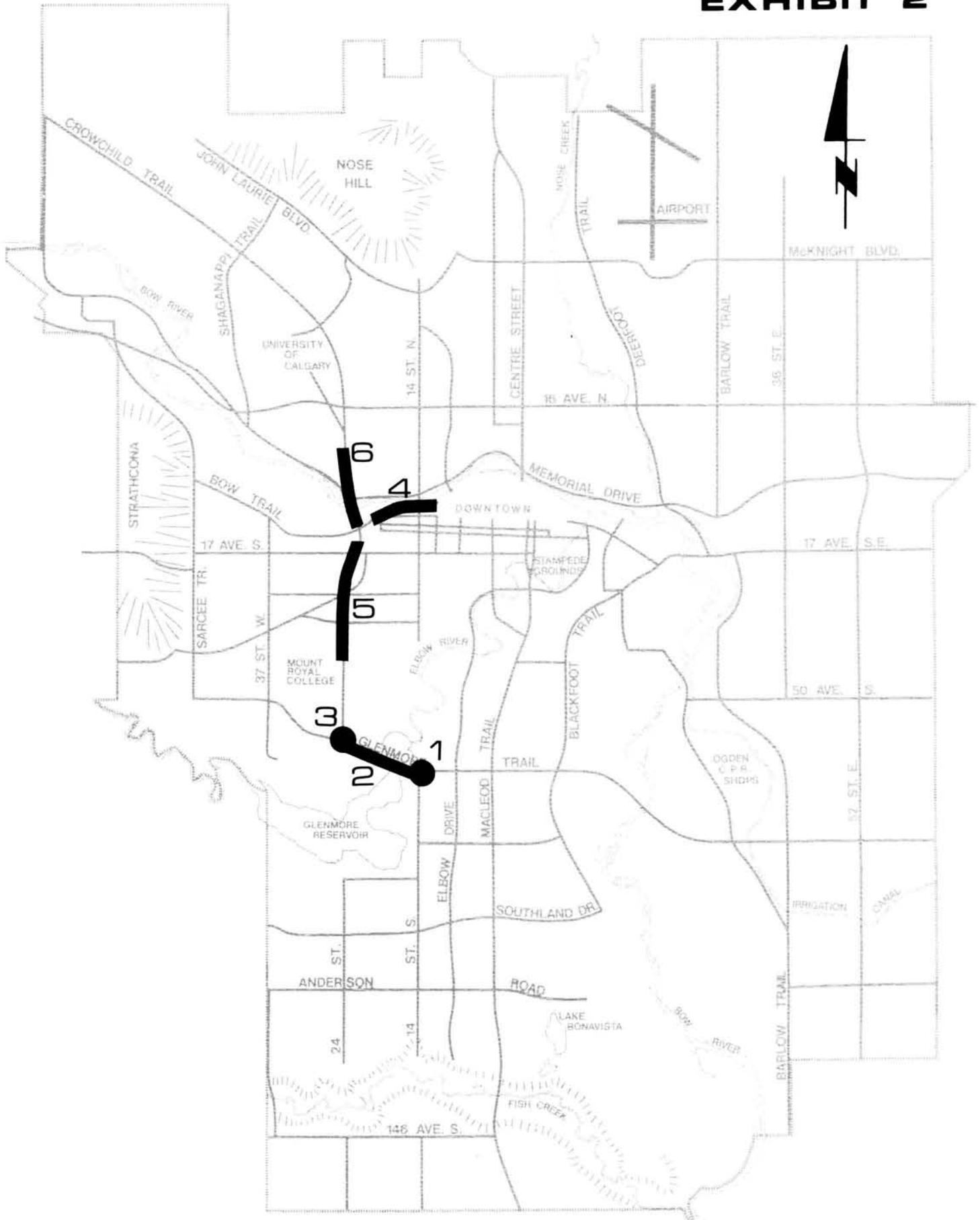
The need for upgrading Crowchild Trail South, proposed road-way design, impacts on adjacent land uses, and estimated land and construction costs are contained in this report.

2.0 RECOMMENDATIONS

Based on the results of this study, it is recommended that:

- A. consistent with the Transportation Improvement Priority Study Report, an interchange at Crowchild Trail and Glenmore Trail be constructed in 1979-1980,
- B. the following projects be undertaken in the period 1981-1983;
 - i) construction of an interchange at 33 Avenue South West,
 - ii) grade separation at 26 Avenue South West,
 - iii) Crowchild Trail widening to six lanes, between 38 Avenue South West and 17 Avenue South West, and
 - iv) exit ramp at 17 Avenue South West,
- C. interchanges be constructed at 50 Avenue South West and at Flanders Avenue South West once Strathcona Heights and Lincoln Park are in the final stage of development (1990-1996),
- D. ramps be constructed from Crowchild Trail to 11 Avenue and 12 Avenue South West consistent with the implementation of the Downtown Master Plan.

EXHIBIT 2



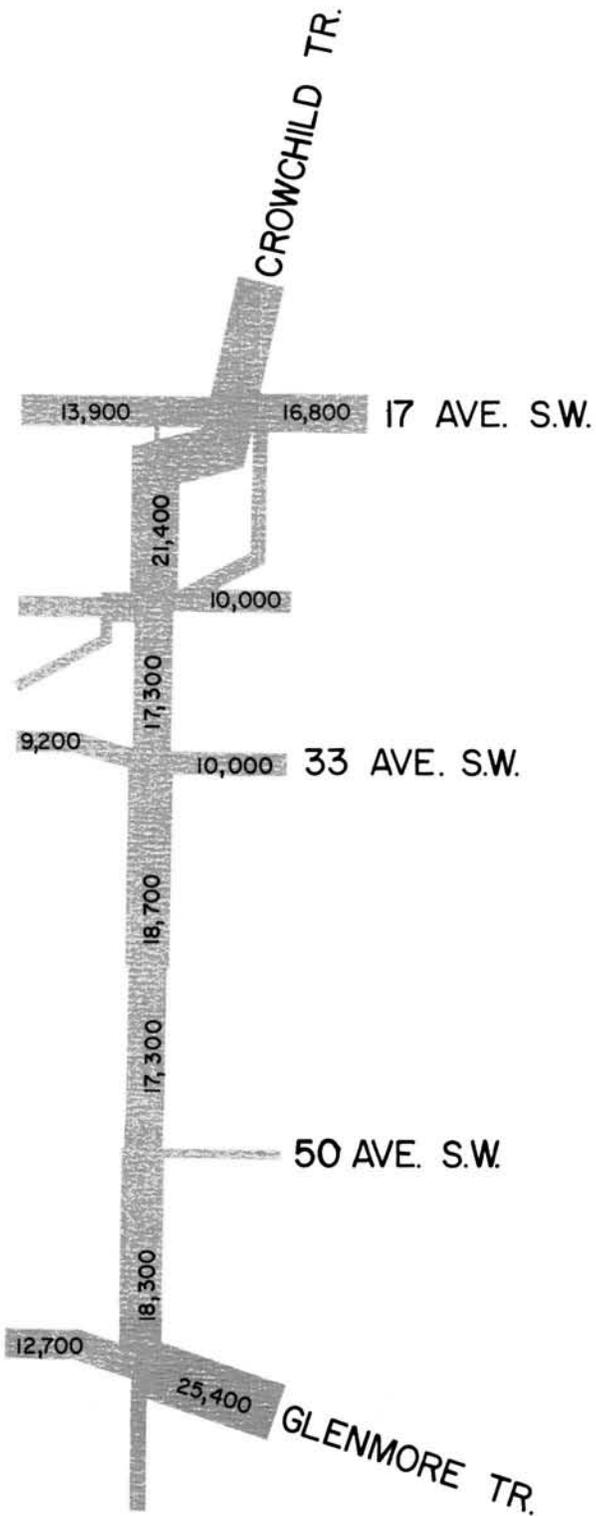
TRANSPORTATION NETWORK

The transportation network shown in Exhibit 2, illustrates how recommendations for Crowchild Trail relate to the adjoining network. On the west side of the City, the principal north-south corridor is a combination of 14 Street South West, Glenmore Trail and its causeway, and Crowchild Trail. As the first stage of this corridor development, City Council approved the Glenmore Trail/ 14 Street interchange (November, 1976). The second stage provided the widening of Glenmore Trail to six lanes during the 1978-1979 construction season and was approved by City Council in the 1978 Capital Budget. During the third stage of the corridor development, the interchange at Crowchild Trail and Glenmore Trail will be constructed. The fourth major construction stage will include the re-alignment of Bow Trail shown as number four. Finally, the improvements to Crowchild Trail from 38 Avenue South West to 17 Avenue South West will be undertaken. Also, in this corridor are the improvements to Crowchild Trail North from the Bow River to University Drive.

3.0 NEED FOR IMPROVEMENT

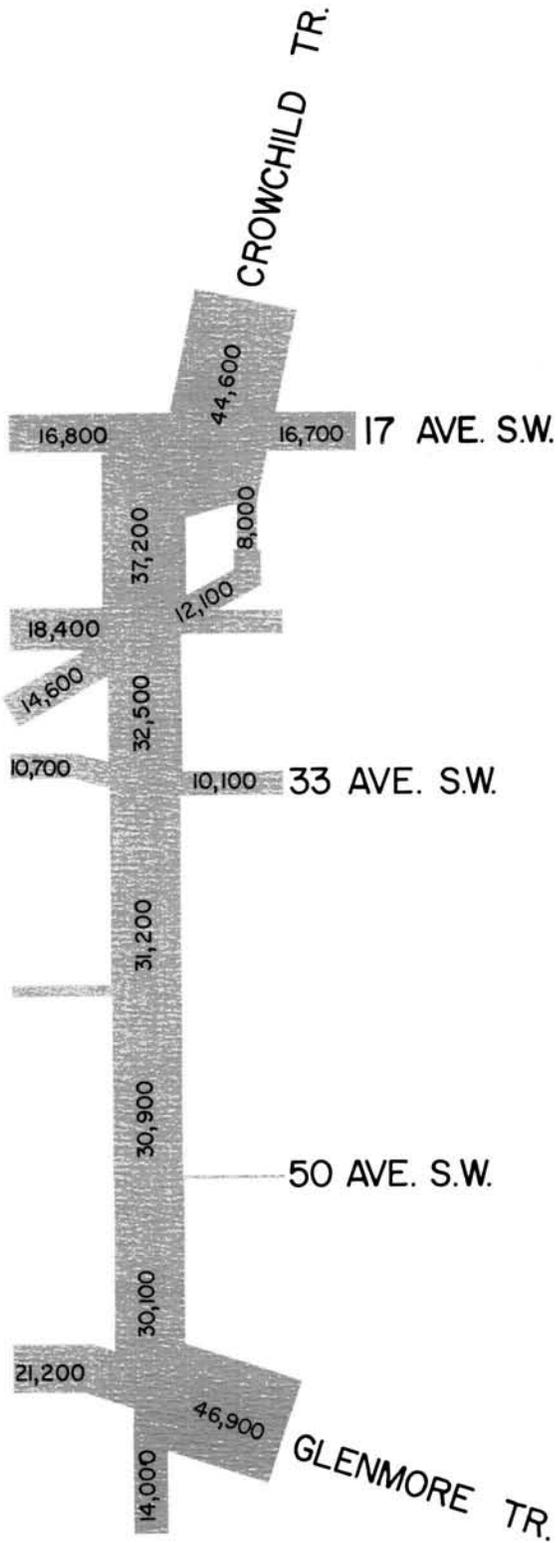
Crowchild Trail is an important component of the Calgary Transportation system. In addition to serving communities and developments adjacent to it, Crowchild Trail combined with 14 Street South West and Glenmore Trail, is the major north-south transportation corridor providing access across the Bow River on the west side of the City. The Crowchild Bridge river crossing and direct connection to downtown via Bow Trail have contributed to the desirability of the roadway as a major thoroughfare.

This desirability is reflected in the increasing traffic volumes that use the route on a daily basis.



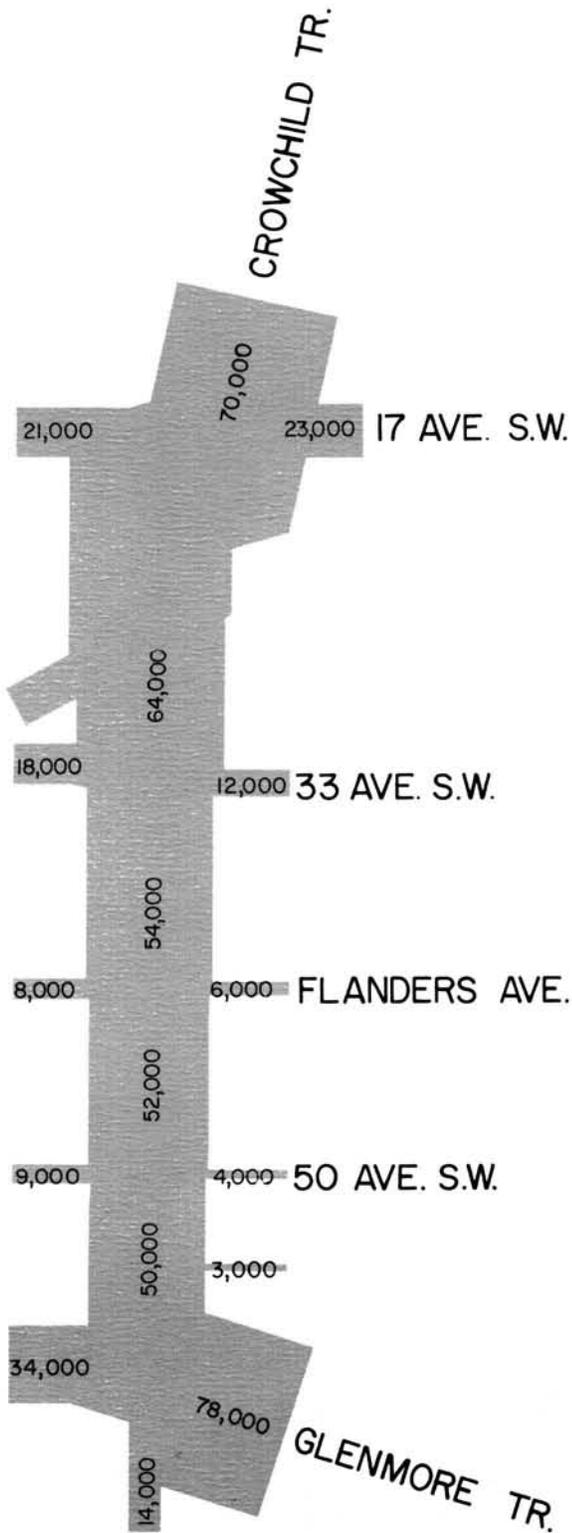
Since construction of the Crowchild Trail river crossing in the late 1960's, traffic volumes have increased substantially on Crowchild Trail.

1968 AVERAGE DAILY TRAFFIC



Continued residential development in the south western area of Calgary has contributed significantly to the increased use of Crowchild Trail south of the Bow River.

1977 AVERAGE DAILY TRAFFIC



The balanced growth strategy approved by City Council provides for continued concentration of employment opportunities in the inner city. This emphasis, combined with residential subdivision development south of Glenmore Reservoir and in the northwest, will place additional traffic on Crowchild Trail. The traffic volumes shown here assume that all other major facilities listed in the T.I.P.S. report have been constructed and that transit ridership has increased.

1986 AVERAGE DAILY TRAFFIC



The existing roadway is experiencing high levels of congestion and does not have the capacity to accommodate the predicted future traffic volumes. When the last upgrading of Crowchild Trail occurred in the late 1960's, the new construction between Kensington Road North West and 17 Avenue South West was tied into the existing relatively narrow right-of-way of 24 Street South West. The rush hour volumes of traffic presently using Crowchild Trail are in excess of the intended capacity of the roadway.

4.0 STUDY APPROACH

4.1 Previous Studies

The importance of the 14 Street South West/Glenmore Trail/Crowchild Trail corridor has been recognized since the late 1950's. The Calgary Metropolitan Area Transportation Study (1959) referred to the corridor as the West Freeway. Interchanges along this route were shown at Glenmore Trail and 14 Street, Glenmore Trail and Crowchild Trail, and Crowchild Trail and 33 Avenue South West. Crowchild Trail's role as a high standard roadway in a balanced transportation network was documented in the Transportation By-law, By-law #8500 (1972). City Council recently recognized the need for upgrading this corridor in its adoption of the list of priority transportation improvements contained in the report Transportation Improvement Priority Study (May, 1976).

Alternatives to upgrading Crowchild Trail are not feasible at this time. Fourteenth Street Freeway, 50 Avenue Freeway, and Sarcee Trail South extension are links in the transportation network which could be developed but at prohibitive social, economic, and environmental costs. These constraints reinforce the need to maintain Crowchild Trail as a north-south corridor on the west side of the city.

4.2 Organization

The objective of the Crowchild Trail functional planning study was to develop the best possible roadway design integrating safety standards, community needs, economics, and the values and policies expressed in the draft Calgary General Plan. To achieve this goal it was necessary to co-ordinate two work streams; the public participation and the technical team.

Valuable citizen input to the planning process was obtained through interviews, office visits, correspondence and a citizen's design team. Representatives from community associations, local businesses and interest groups participated in the design team and were active in a series of meetings with Transportation Department staff. Additional meetings were held in response to inquiries from specific groups or to resolve particular community issues. Input from a wider spectrum of the public was solicited at public information centres held in large regional shopping centers. The formalized public participation program is summarized in Table 4.2.1. It was supplemented by numerous informal inquiries and office consultations with individual citizens.

To ensure compatibility of the roadway design with the objectives and standards of the Provincial Government and other City departments, representatives from Alberta Transportation and relevant City departments contributed their technical guidance through a series of technical team meetings. This technical team received ideas from the public in various ways as described above and incorporated them into the design process. This design process included such things as 400' = 1" scale sketching, 200' = 1" design, and model building at a scale of 100' = 1".

TABLE 4.2.1

SYNOPSIS OF
PUBLIC INPUT TO CROWCHILD TRAIL SOUTH
FUNCTIONAL PLANNING STUDY

<u>DATE</u>	<u>LOCATION</u>	<u>PARTICIPANTS</u>	<u>PURPOSE</u>
February 17, 1977	Lakeview Community Association Hall	Community representatives, interest group representatives.	Outline purpose of citizen discussion groups in planning procedures. Provide background to Crowchild Trail planning study. Preliminary identification of community concerns.
May 5, 1977	Lakeview Community Association Hall	Community association, interest group, business representatives.	Outline role of Crowchild Trail in overall city transportation network. Predicted 1986 volumes and alternative ways to accommodate them. Introduction to impact assessment techniques.
September 19, 1977	City Hall	Canadian Forces Base (Calgary), Calgary Board of Education, Calgary Separate School Board.	Familiarization with project and identification of concerns.
September 29, 1977	Lakeview Community Association Hall	Community association, interest group, business representatives.	Presentation and discussion of 1" = 400' scale alternative roadway plans and staging of improvements.
November 23, 1977	Richmond Community Association Hall	Richmond Community representatives.	Discussion of impact of 33 Avenue interchange on adjacent properties.
November 24, 1977	Lakeview Community Association Hall	Community association, interest group, business representatives.	Discussion of impact of Glenmore Trail interchange on adjacent properties.
January 19, 1978	Lakeview Community Association Hall	Residents of Lakeview & North Glenmore.	Discussion of impact of Glenmore Trail and Crowchild Trail interchange.

<u>DATE</u>	<u>LOCATION</u>	<u>PARTICIPANTS</u>	<u>PURPOSE</u>
January 28 & 29, 1978	Chinook Shopping Centre.	Open to General Public.	Public information centre. Provide opportunity for discussion with and input from wide spectrum of people.
February 3 & 4, 1978	Market Mall Shopping Centre.	Open to General Public.	Public Information centre. Provide opportunity for discussion with and input from wide spectrum of people.
February 23, 1978	Lakeview Community Association Hall.	Residents of Lakeview & North Glenmore.	Discussion of impact of Glenmore Trail and Crowchild Trail interchange.
April 19, 1978	Richmond Community Association Hall.	Richmond Community Association members	Annual meeting of community association. Provide transportation planning input to plans for the Richmond Community.
June 1, 1978	Richmond Community Association Hall.	Residents of Richmond, Sarcee Park & Killarney communities.	Discussion of widening of 33 Avenue S.W. 29 Street S.W. to Crowchild Trail.
June 3, 1978	Lakeview Community Association Hall.	Community residents, interest groups, business owners/operators.	Public information centre.
November 1, 1978	North Glenmore Community Association Hall	Community representatives, interest group representatives.	Discussion of Draft Report.

4.3 Major Considerations

The recommended design evolved after careful consideration of safety standards, economics, and impact on adjacent land uses. Where possible the road right-of-way is widened from sixty-six feet to two hundred feet to provide approximately forty feet of buffer between the roadway and the nearest residential dwelling.

Typically, the buffer zone will include a landscaped earth berm, a six to eight foot fence, and pedestrian walkway. The berm and fence combination will enhance the aesthetics of the roadway as well as providing noise attenuation. Although Crowchild Trail will be carrying higher traffic volumes, the noise environment for homes that will abut Crowchild Trail will be improved over what is presently experienced by homes adjacent to the roadway.

The horizontal alignment of the roadway has been located in order to maximize the use of city owned land while still avoiding large installations such as the Electrical Substation south of 33 Avenue and the Viscount Bennett High School.

Another major objective was to improve and lower the existing vertical alignment of the roadway. This has been achieved with reasonable success. However, ground-water *, and major underground facilities substantially influenced the final grade for the roadway.

An assessment of impacts from the roadway design on the environment through which it traverses was undertaken. A list of these is shown below:

- displacement of homes
- displacement of institutions
- displacement of businesses
- changes in access
- public transit
- noise attenuation
- pedestrian and cycle movements
- landscaping
- utilities within road right-of-way

* Geotechnical Evaluation - Crowchild Trail Functional Planning Study, EBA Engineering Consultants Ltd., May 1976.

5.0 PROPOSED SOLUTION

5.1 Stage 1

5.1.1 Glenmore Trail

Grade separation of Glenmore Trail and Crowchild Trail is required to provide free flow conditions for both expressways. A conventional diamond interchange provides free flow conditions on Glenmore Trail, while two lane ramps provide free flow capacity for the heavy westbound to northbound right turn movements and the reverse equally heavy, southbound to eastbound left turn movements.

Widening to six lanes on Crowchild Trail will start at the northern terminals of the two lane ramps and proceed north and tie into the existing four lane area just north of 50 Avenue as shown in Exhibit 3.

Crowchild Trail will be elevated to pass over Glenmore Trail and return to existing elevation at 58 Avenue. The southbound to eastbound left turn ramp will be constructed to pass over the west leg interchange ramps on Glenmore Trail and revert to the existing elevation of Glenmore Trail near the Lakeview Elementary School (Exhibit 3).

Land requirements for this interchange in addition to city owned land, amount to 1.04 acres from the Federal Government in the north west quadrant and 0.57 acres from the Calgary Public School Board in the south east quadrant.

Noise attenuation measures, landscaping, street closures, transit and pedestrian facilities in this area are shown in Exhibit 3.

Due to concern expressed by residents in the immediate vicinity, the residents should be contacted prior to road construction to review the noise attenuation measures. This is particularly true of residents in the north east quadrant of the interchange.

Safe operation of the directional ramps at Glenmore Trail necessitates that the existing 58 Avenue South West access to the North Glenmore Community and the southern most access to Calgary Forces Base be closed.

5.1.2 50 Avenue South West

The existing at-grade intersection of Crowchild Trail and 50 Avenue will be slightly modified to handle the relatively low volume of cross traffic anticipated within the time frame of Stage I. This modification involves widening Crowchild Trail through the intersection, construction of bus bays and installation of new signal lights. Additional construction of sidewalks and sound barriers is shown in Exhibit 3.

5.1.3 Flanders Avenue

The Flanders Avenue diamond interchange constructed in the late 1960's shortly after the Bow Trail - Crowchild Trail Complex, has served its purpose very well and no roadway widening is recommended during Stage I. However, there are some noise attenuation measures and sidewalk construction recommended in Exhibit 3 which will require 4.41 acres of Federal land containing twenty-two homes between Flanders Avenue and 34 Avenue South West.

5.1.4 33 Avenue South West

A conventional diamond interchange is recommended for the Crowchild Trail and 33 Avenue South West intersection to vertically separate Crowchild Trail traffic from the 33 Avenue traffic. The elevation of Crowchild Trail through this area will be lowered from one to six feet while the elevation of 33 Avenue will be raised to over pass Crowchild Trail.

Crowchild Trail widening to six lanes will begin at 38 Avenue South West and continue north through the interchange area and tie into the existing six lane cross-section just north of 17 Avenue South West.

Exhibit 3 illustrates proposed street closures, sidewalks, bus bays, noise attenuation devices and landscaping.

Land required for roadway improvements through this section from 34 Avenue to 26 Avenue will affect certain residential, commercial, institutional and recreational components of adjacent communities. Residential properties required for the proposal include four City owned parcels, twenty-two parcels owned by Calgary Forces Base, and twenty-six privately owned dwellings. Subsequent to purchase of these properties by the City, adequate notice to vacate will be given to ensure sufficient time is available to arrange satisfactory relocation. The City of Calgary Social Services Department can assist in a relocation program if necessary.

Roadway intrusion upon institutional and community facilities will be restricted to acquisition of the Grace Lutheran Church, 0.18 acres of community reserve, and 0.46 acres of Public School Board land. Access to the Richmond Community Association site and to the Richmond Green recreational facilities will be altered. Pedestrian access to Viscount Bennett High School and to Richmond Elementary School will be enhanced.

5.1.5 26 Avenue South West

At this location 26 Avenue South West will be elevated to pass over Crowchild Trail, thereby providing a direct link across Crowchild Trail without connections to and from it. All of the turning movements which are occurring at 26 Avenue can take place at either

the 33 Avenue interchange or the 17 Avenue interchange. The limited access free flow concept is continued through this portion of the roadway. All existing direct driveway and residential street access to Crowchild Trail will be eliminated. Local access to properties bordering the northbound lanes of Crowchild Trail will be provided by frontage roads as illustrated in Exhibit 3.

To take advantage of City owned land, the horizontal alignment of Crowchild Trail through this area will swing from its easterly location (to avoid the Viscount Bennett High School) to a westerly location. In addition to the nineteen properties owned by the City, another sixteen private properties will be required.

The majority of the impact on commercial development resulting from the proposed upgrading of Crowchild Trail is attributed to the 26 Avenue flyover. Businesses east of Crowchild Trail in the vicinity of 33 Avenue will feel the impact to a lesser degree. Approximately twenty-one retail and service outlets will be displaced from twelve commercial properties. The access of ten other businesses will be restricted. There is potential for relocation of these establishments. The Business Development and the Land Department can assist in finding alternative sites.

An examination of Exhibit 3, reveals that the linear buffer strip, sidewalks, landscaping and transit facilities are continued in this area of Crowchild Trail.

5.1.6 17 Avenue South West

The addition of a ramp will provide the only turning movement presently missing at the 17 Avenue interchange. This ramp will allow the movement which originates from northbound on Crowchild Trail to eastbound or westbound on 17 Avenue.

The horizontal alignment of the six lane roadway just south of the interchange will be modified from 19 Avenue where the sharp curve will be flattened and tie into the existing alignment north of 17 Avenue.

The changes in this area will require the acquisition of four residential properties.

Throughout this area and north towards Bow Trail noise attenuation measures are proposed in Exhibit 3.

5.1.7 Estimated Costs - Stage I

A cost summary for implementing the first stage of the proposed improvements to Crowchild Trail is shown below. Detailed costs used in these estimates reflect current tender prices in the City of Calgary. No inflation factor has been included. Right-of-way cost estimates were provided by the City of Calgary Land Department and reflect 1978 market values. The estimates include costs for existing City owned land.

Construction	12,489,000.00
Land	11,000,000.00
	<hr/> <hr/>
TOTAL	23,489,000.00

DETAILED COST ESTIMATE - STAGE 1

	<u>UNIT</u>	<u>QUANTITY</u>	<u>UNIT COST</u>	<u>1978 \$ AMOUNT</u>
Earthwork	c.y.	452,000	2.50	1,130,000.
Pavement	s.y.	143,000	13.85	1,980,000.
Curb & Gutter	l.f.	62,000	6.10	378,000.
Separate Walk	s.f.	30,000	1.95	59,000.
SUB-TOTAL				3,547,000.
Materials Testing 5%				177,000.
Drainage - Storm Sewer	l.f.	3,100	30.00	93,000.
- C.B.	each	38	650.00	25,000.
- C.B. Lead	l.f.	2,700	15.00	41,000.
Lighting - 0'-54' Spacing	each	102	850.00	87,000.
- 54'-80' Spacing	each	38	1,250.00	48,000.
- 80' + Spacing	each	33	5,250.00	173,000.
Landscaping	s.y.	169,000	1.80	304,000.
8' Wood Sound Barrier	l.f.	9,500	20.00	190,000.
G. M. Barrier	l.f.	8,200	27.00	221,000.
Traffic Signal	Inter.	1	22,000.00	22,000.
Cul-de-sac	each	13	8,000.00	104,000.
Structures - Retaining Walls	s.f.	11,500	25.00	288,000.
- Roadway	s.f.	62,000	50.00	3,100,000.
- Pedestrian	s.f.	3,260	60.00	196,000.
SUB-TOTAL				8,616,000.
10% Engineering + 12½% E. & A.				2,046,000.
Utility Relocations				1,827,000.
Land				11,000,000.
TOTAL				23,489,000.

TABLE 5.1.7

5.2 Future Subsequent Stages

The construction of improvements illustrated in Exhibit 4 will not occur simultaneously. Rather, their timing will depend on where the major population growth occurs and what planning decisions are made and implemented during the interim period.

5.2.1 50 Avenue South West

A conventional diamond interchange is recommended for this location. Crowchild Trail will remain at its existing elevation to under pass 50 Avenue South West.

5.2.2 Flanders Avenue

Replacement of the existing diamond interchange structure at Flanders Avenue is necessary to widen Crowchild Trail to six lanes. At the same time, all ramp terminals will be modified to higher design standards.

5.2.3 Estimated Costs
50 Avenue and Flanders Avenue

A cost summary for constructing the 50 Avenue and Flanders Avenue interchanges is shown below. Detailed breakdowns are contained in Table 5.2.3. Unit costs used in these estimates reflect current tender prices in the City of Calgary. No inflation factor has been included. Right-of-way costs estimates were provided by the City of Calgary Land Department and reflect 1978 market values. The estimates include costs of existing City owned land.

Construction	6,114,000.00
Land	500,000.00
	<hr/> <hr/>
TOTAL	6,614,000.00

DETAILED COST ESTIMATE - 50 AVENUE & FLANDERS AVENUE INTERCHANGES

	<u>UNIT</u>	<u>QUANTITY</u>	<u>UNIT COST</u>	<u>1978 \$ AMOUNT</u>
Earthwork	c.y.	150,000	2.50	375,000.
Pavement	s.y.	89,000	13.85	1,233,000.
Curb & Gutter	l.f.	40,000	6.10	244,000.
Separate Walk	s.f.	10,000	1.95	20,000.
SUB-TOTAL				1,872,000.
Materials Testing 5%				94,000.
Drainage - Storm Sewer	l.f.			
- C.B.	each	24	650.00	16,000.
- C.B. Lead	l.f.	1,800	15.00	27,000.
Lighting - 0'-54' Spacing	each	46	850.00	39,000.
- 54'-80' Spacing	each	7	1,250.00	10,000.
- 80' + Spacing	each	32	5,250.00	168,000.
Landscaping	s.y.	96,000	1.80	173,000.
8' Wood Sound Barrier	l.f.	3,000	20.00	60,000.
G.M. Barrier	l.f.	5,900	27.00	159,000.
Traffic Signal	Inter.	1	22,000.00	22,000.
Cul-de-sac	each			
Structures - Retaining Walls	s.f.			
- Roadway	s.f.	26,000	50.00	1,300,000.
- Pedestrian	s.f.	1,630	60.00	98,000.
SUB-TOTAL				4,038,000.
10% Eng. + 12½% E & A				959,000.
Utility Relocations				1,117,000.
Land				500,000.
TOTAL				6,614,000.

TABLE 5.2.3.

5.2.4 Bow Trail

The Bow Trail interchange complex was constructed in the late 1960's and has served its purpose extremely well. However, Calgary's tremendous population increase has begun to take its toll. Detailed analysis of this complex shows that it is not handling traffic as efficiently as it should. The deficiency has been traced to the at-grade intersection of 9 Avenue and 11 Street South West. Largely because of this analysis the construction of the Bow Trail realignment from 17 Avenue South West to the 4 and 5 Avenue couplet should be raised to a higher priority than shown in the Transportation Improvement Priority Study Report (T.I.P.S.).

The direct connections to the 11 and 12 Avenue couplet represent the longest range planning in this report. Their construction timing will depend upon the implementation of the current Downtown Master Plan and attendant transportation system.

The details of these connections can be seen in Exhibit 4.

5.2.5 Estimated Costs -
11 and 12 Avenue Connections

A cost summary for constructing the ramps from Crowchild Trail to 11 and 12 Avenues is shown below. Detailed breakdowns are contained in Table 5.2.5. Unit cost used in these estimates reflect current tender prices in the City of Calgary. No inflation factor has been included. Right-of-way costs estimates were provided by the City of Calgary Land Department and reflect 1978 market values. The estimates include costs of existing City owned land.

Construction	1,465,000.00
Land	<u>1,000,000.00</u>
TOTAL	2,465,000.00

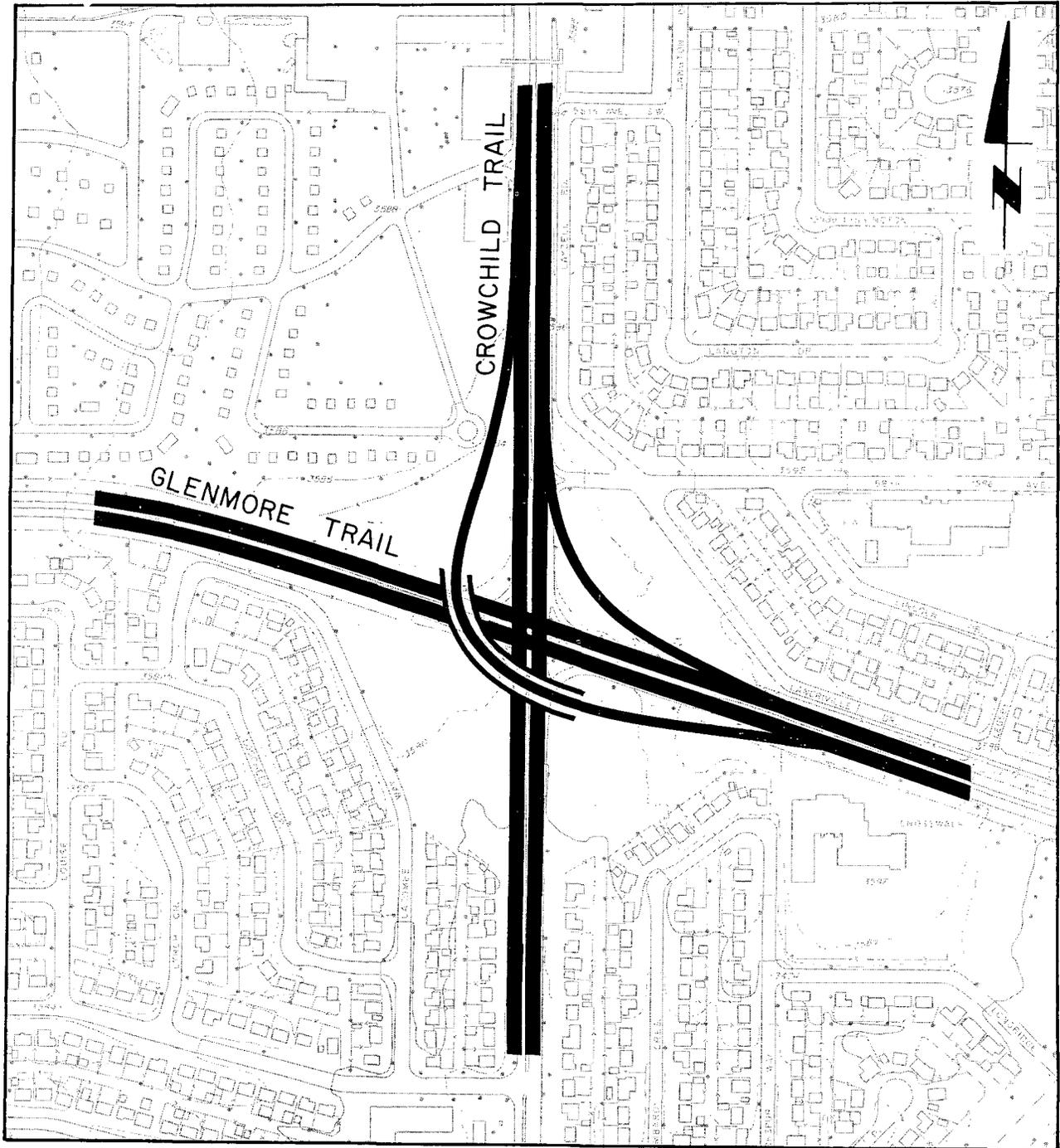
DETAILED COST ESTIMATE - 11 & 12 AVENUE CONNECTION

	<u>UNIT</u>	<u>QUANTITY</u>	<u>UNIT COST</u>	<u>1978 \$ AMOUNT</u>
Earthwork	c.y.	40,000	2.50	100,000.
Pavement	s.y.	10,000	13.85	136,000.
Curb & Gutter	l.f.	7,700	6.10	47,000.
Separate Walk	s.f.			
SUB-TOTAL				283,000.
Materials Testing 5%				14,000.
Drainage - Storm Sewer	l.f.			
- C.B.	each			
- C.B. Lead	l.f.			
Lightng - 0' - 54' Spacing	each	29	850.00	25,000.
- 54' - 80' Spacing	each			
- 80' + Spacing	each			
Landscaping	s.y.	18,000	1.80	32,000.
8' Wood Sound Barrier	l.f.			
G.M. Barrier	l.f.			
Traffic Signal	Inter.			
Cul-de-sac	each			
Structures - Retaining Walls	s.f.	3,600	25.00	90,000.
- Roadway	s.f.	5,200	50.00	260,000.
- Pedestrian	s.f.			
- Tunnel	l.f.	160	3,000.00	480,000.
SUB-TOTAL				1,184,000.
10% Eng. + 12½% E & A				281,000.
Land				1,000,000.
TOTAL				2,465,000.

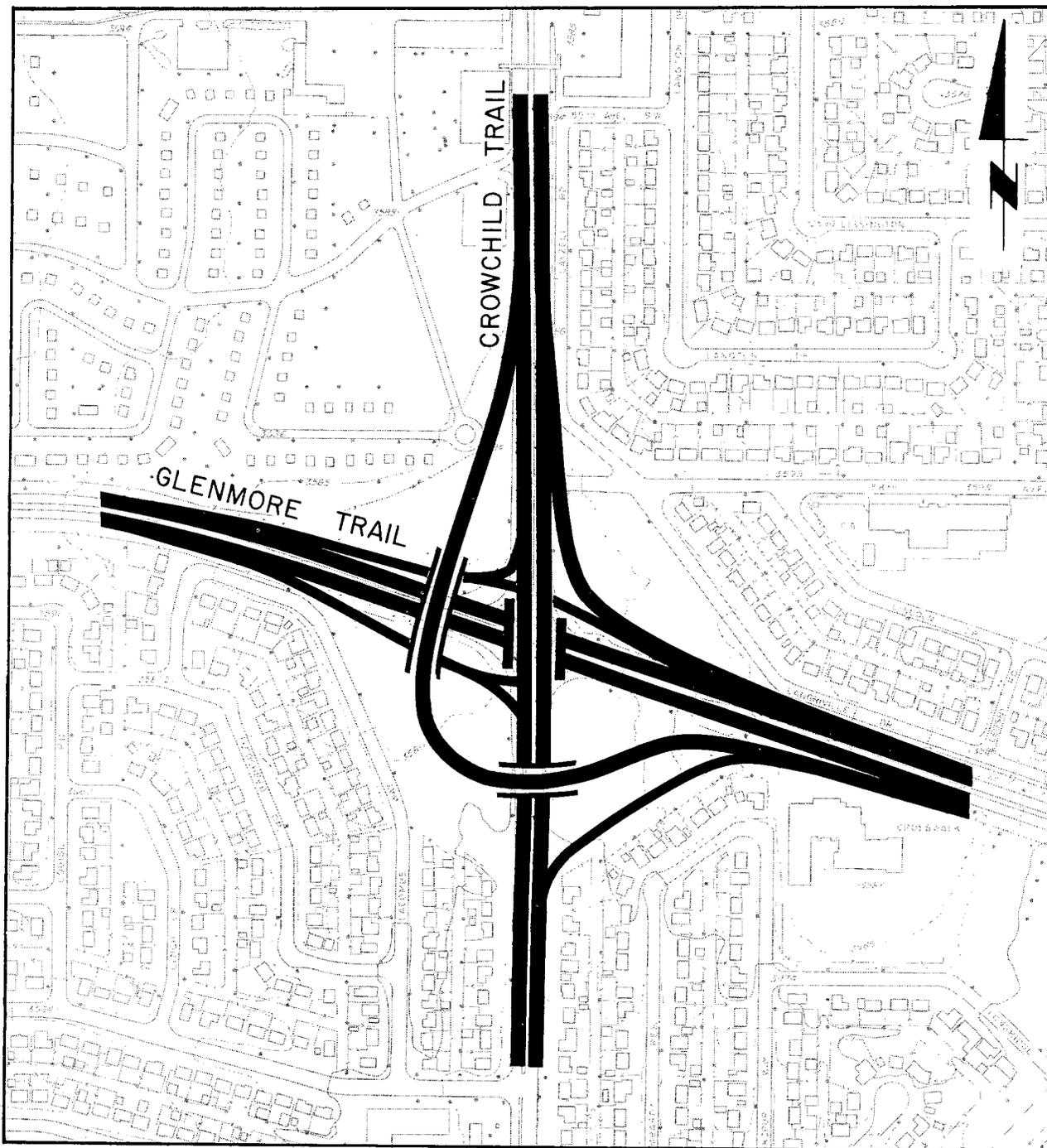
TABLE 5.2.5.

6.0 ALTERNATIVE DESIGN CONSIDERED

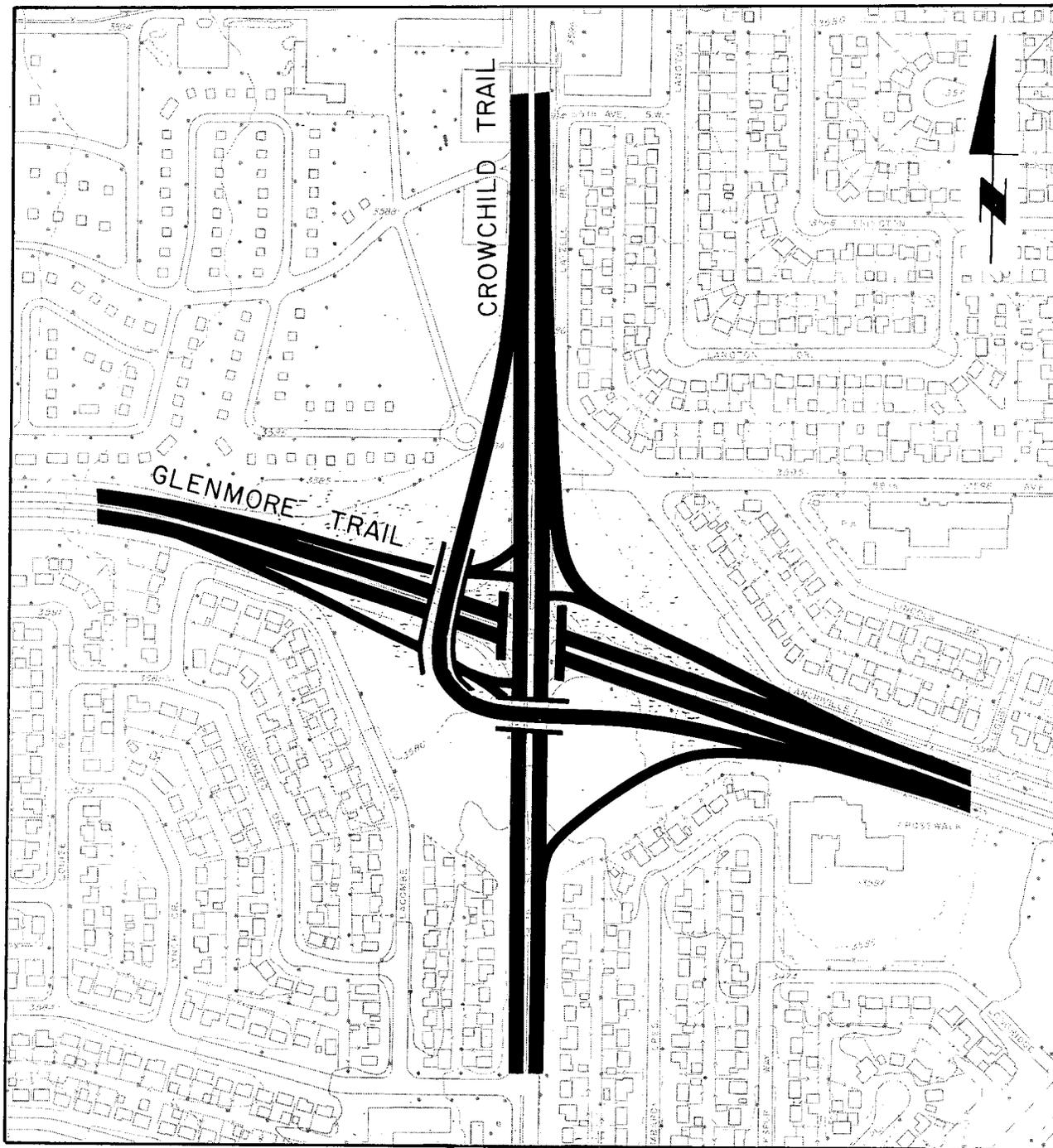
Functional geometric design of an interchange is an iterative process which evolves over a period of time responding to requirements unique to each particular location. A part of this process for each interchange on Crowchild Trail can be traced by examining the sketches overleaf. The notes on each sketch highlight the major reason why that particular alternative design was discarded or modified.



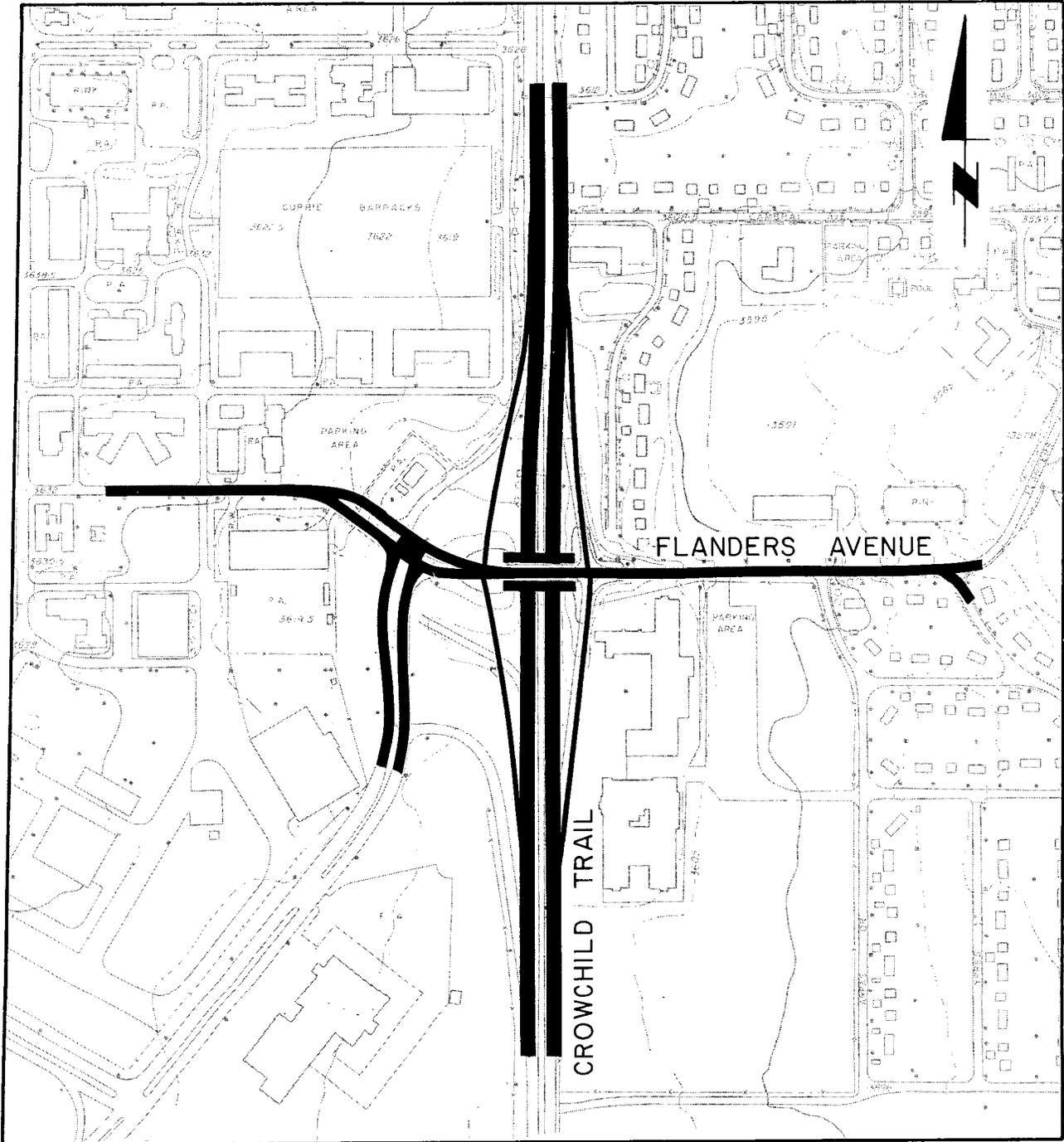
- SIGNAL LIGHTS ON GLENMORE TRAIL



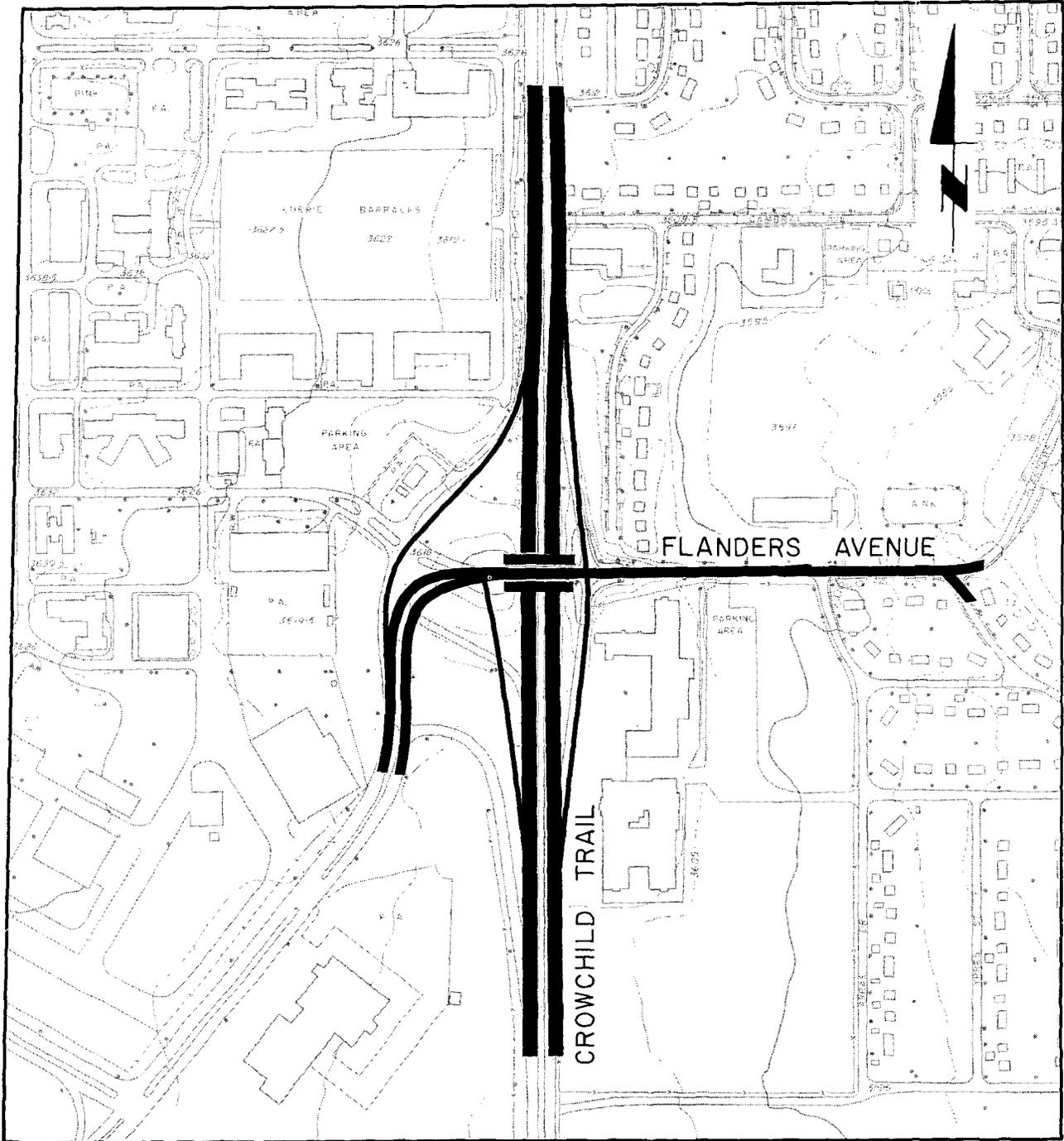
SOUTHBOUND TO EASTBOUND RAMP TOO
CLOSE TO HOMES IN S.W. QUADRANT



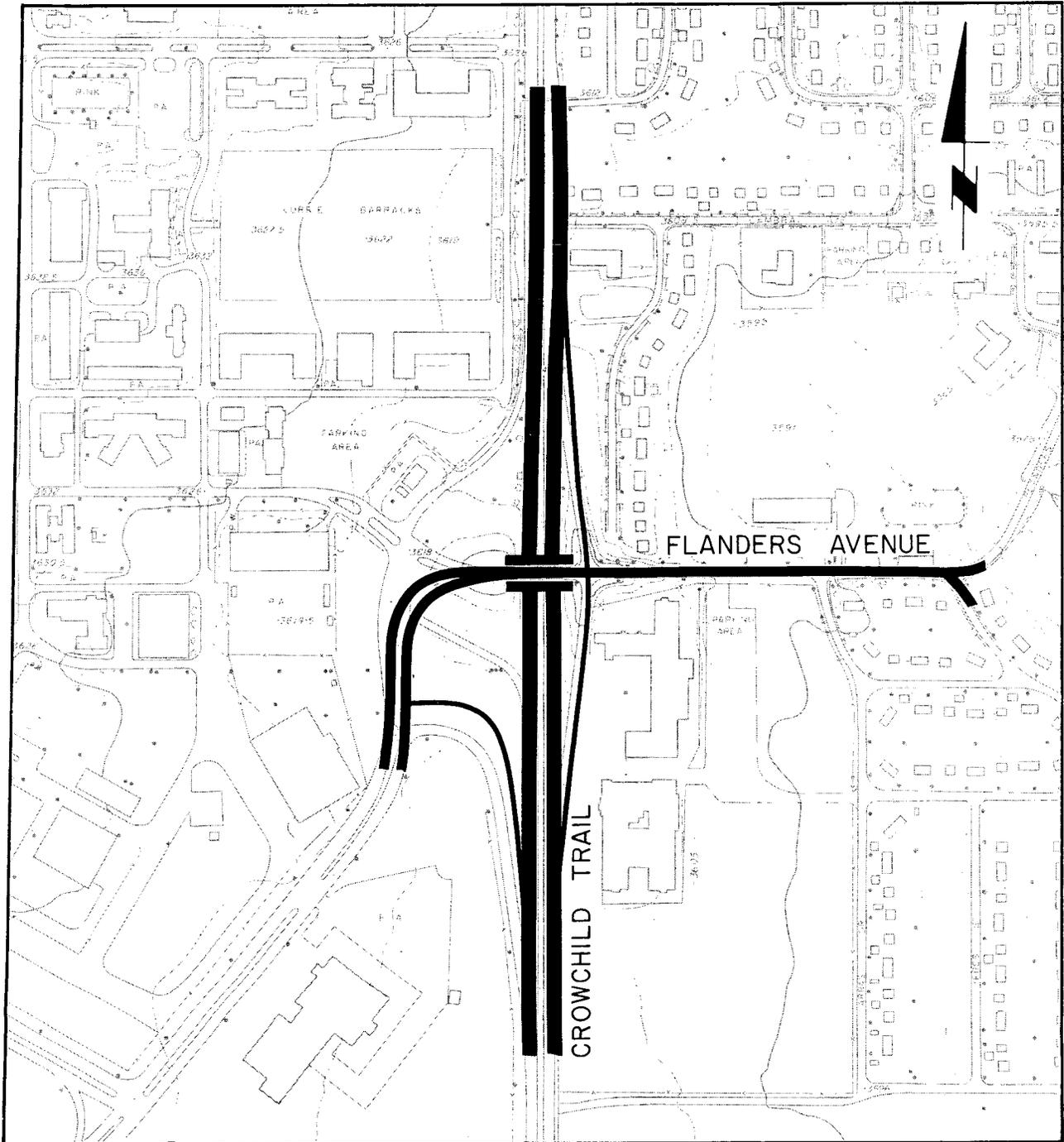
SOUTHBOUND TO EASTBOUND RAMP STRUCTURE
EXCESSIVE IN LENGTH AND HEIGHT



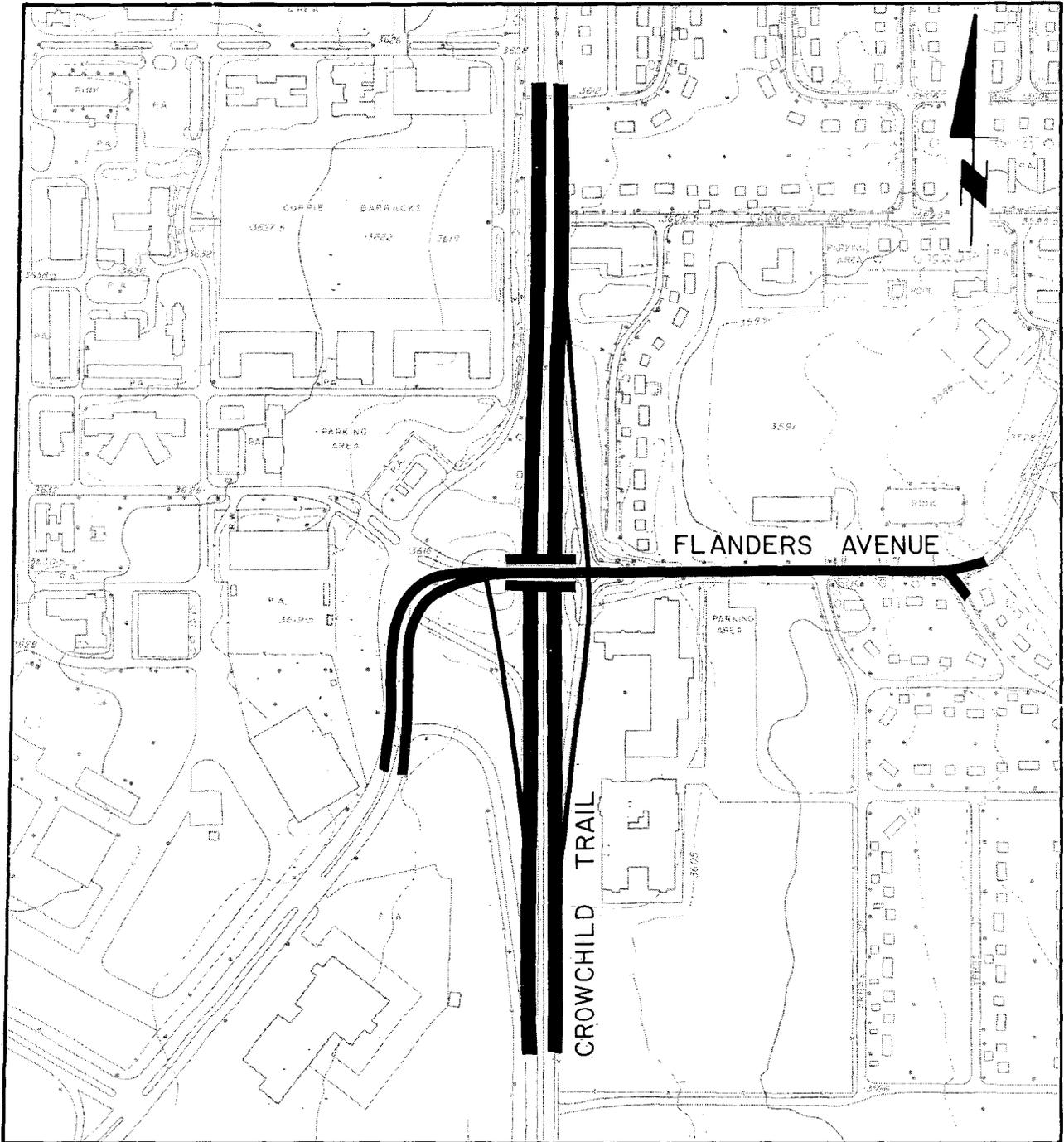
POSSIBLE ALTERNATIVE



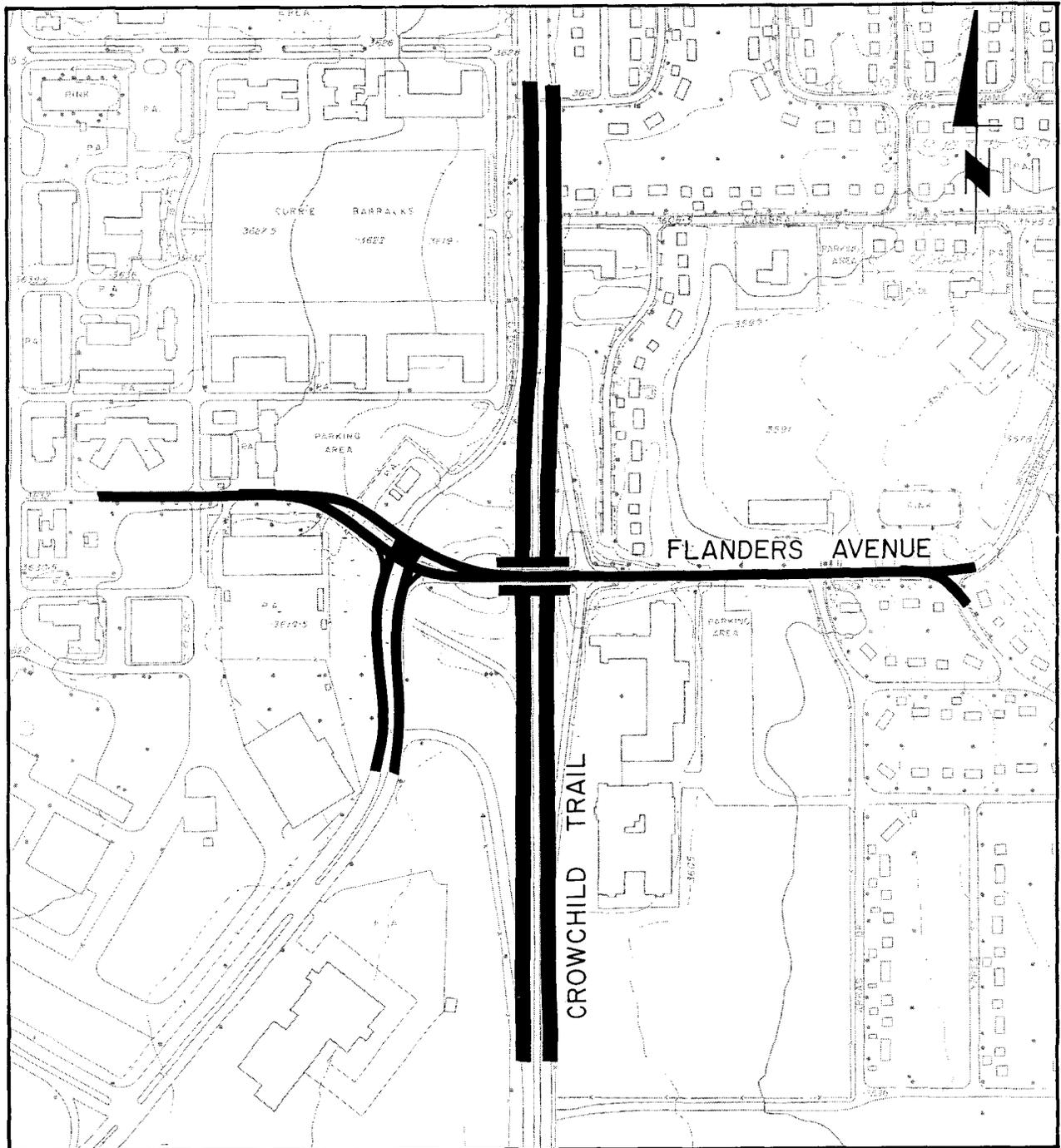
UNDESIRABLE OPERATING CHARACTERISTICS



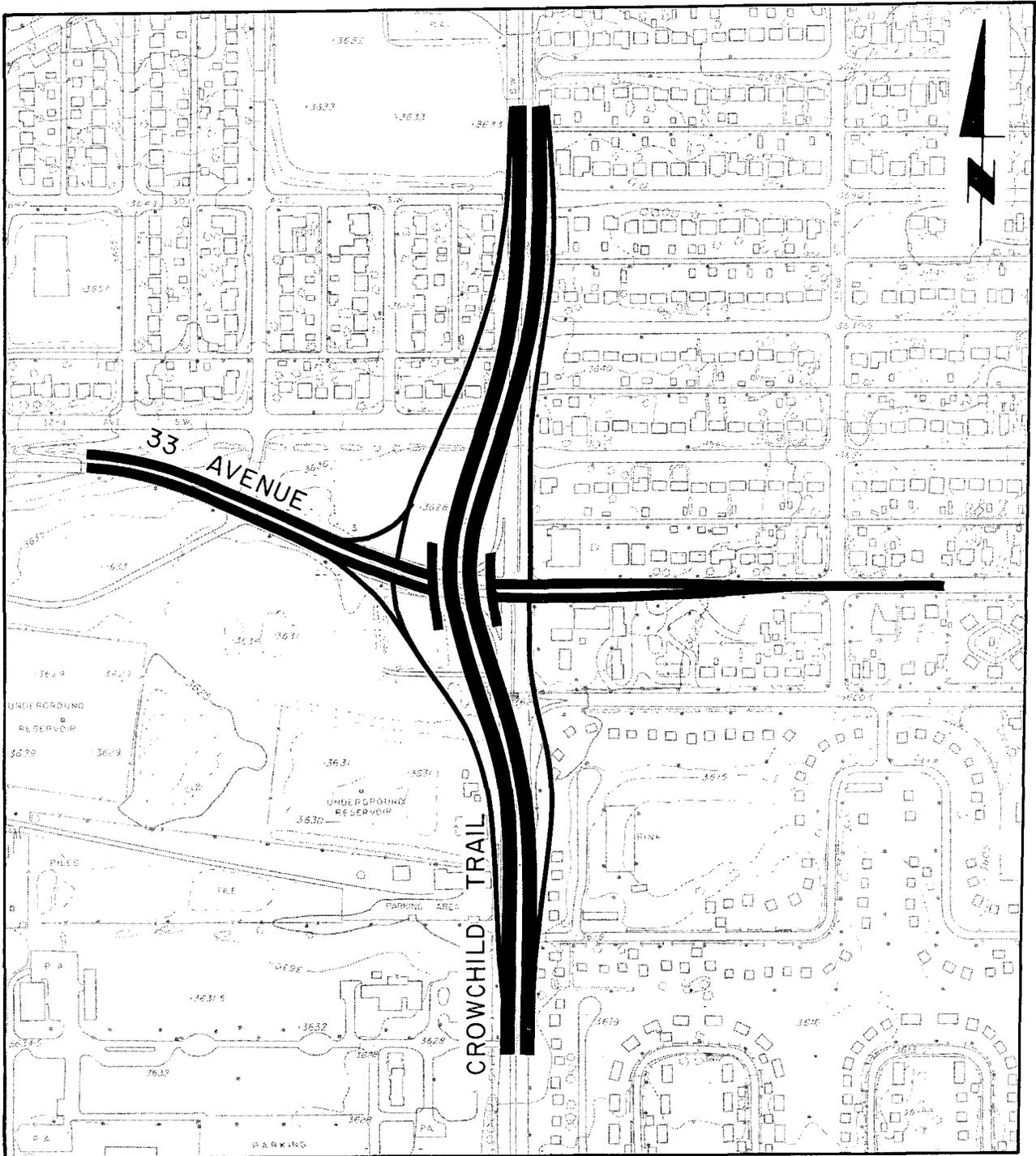
DOES NOT PROVIDE GOOD ACCESS
TO MOUNT ROYAL COLLEGE



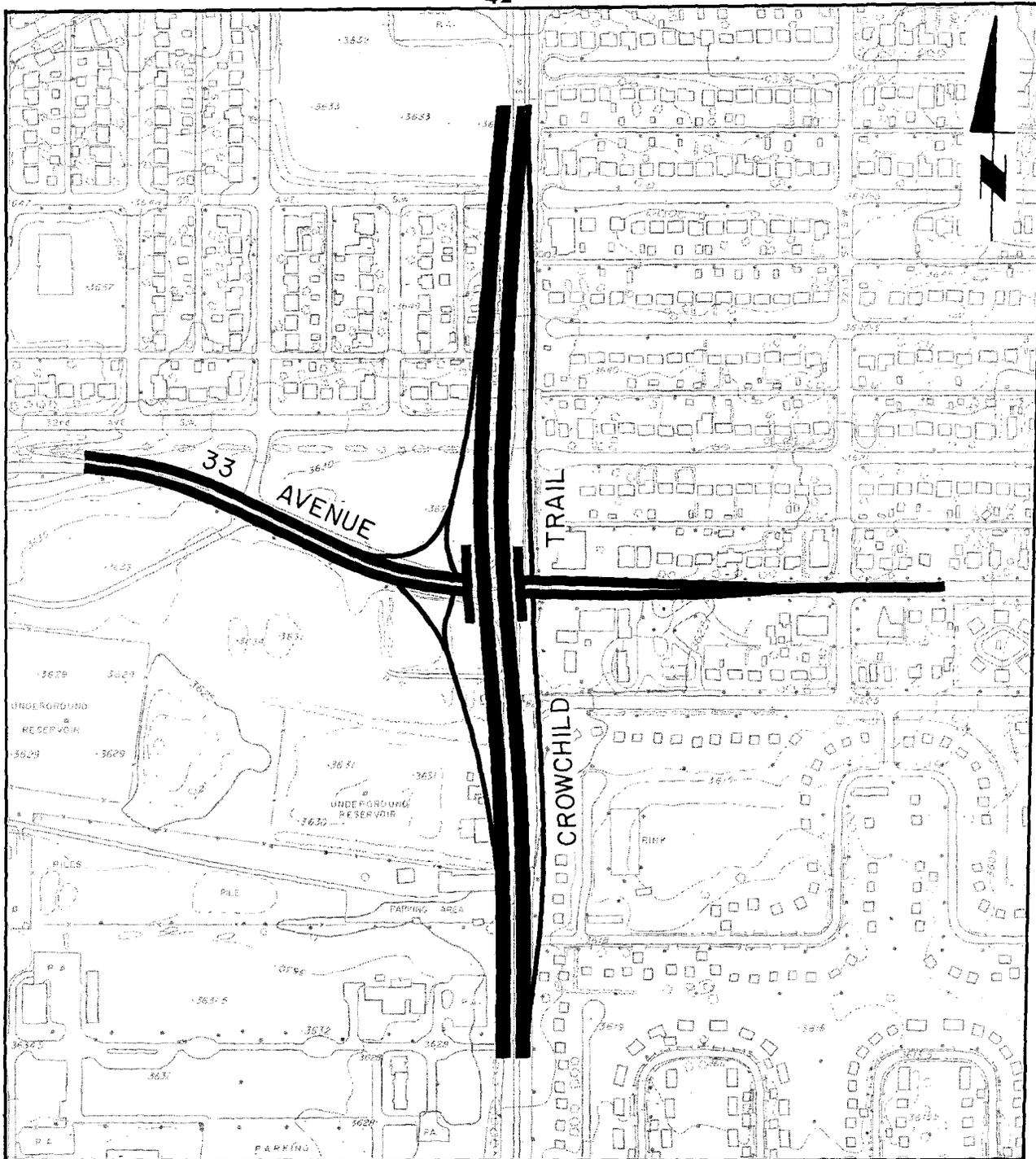
POSSIBLE ALTERNATIVE



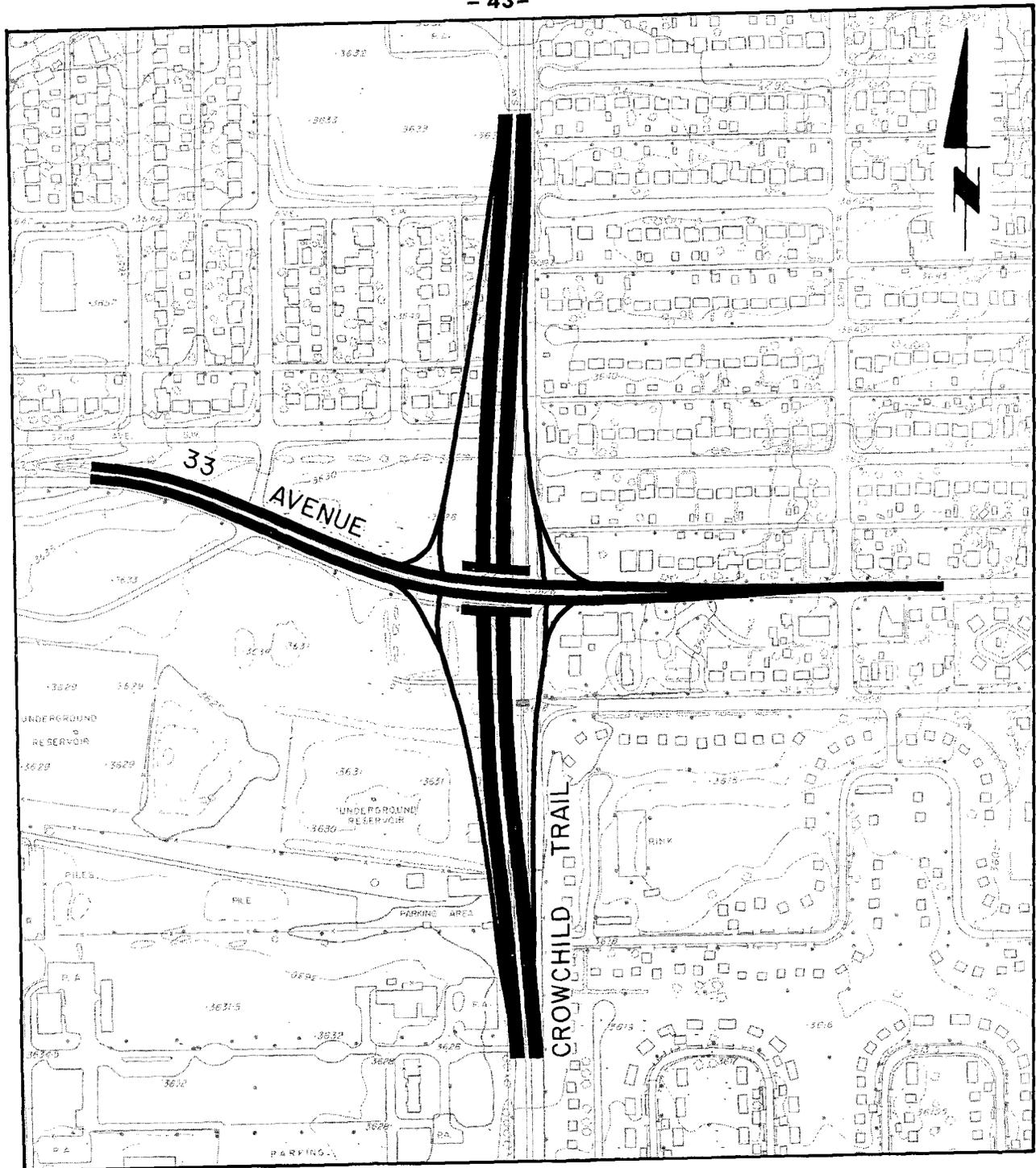
NO ACCESS TO CROWCHILD TRAIL



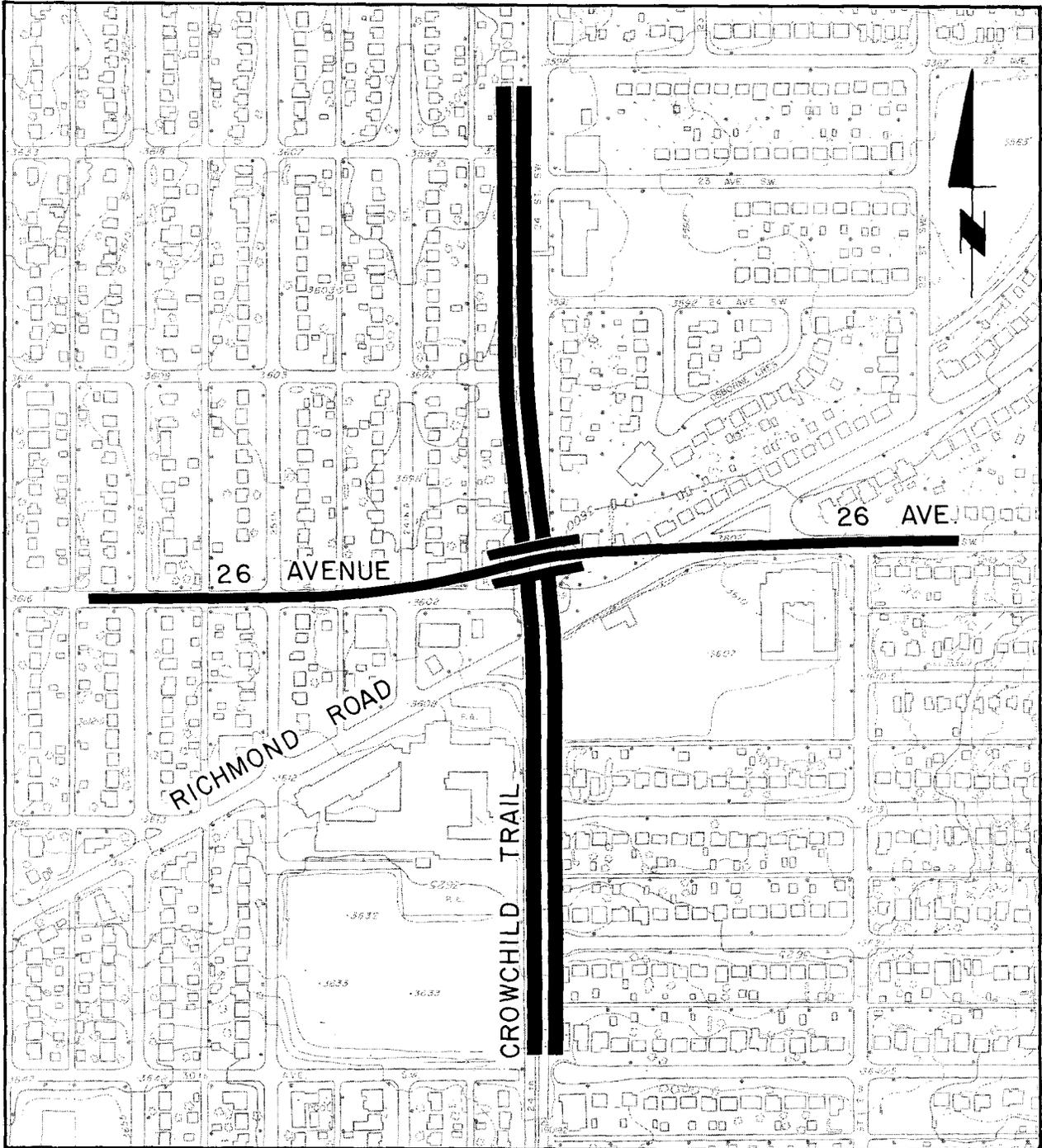
- EXCESSIVE COST AND NOISE SINCE THE LARGER ROADWAY (CROWCHILD TRAIL) IS OVERPASSING THE SMALLER ROADWAY (33 AVENUE S.W.)
- UNDESIRABLE CURVATURE ON CROWCHILD TRAIL
- EXCESSIVE UTILITY RELOCATION COSTS



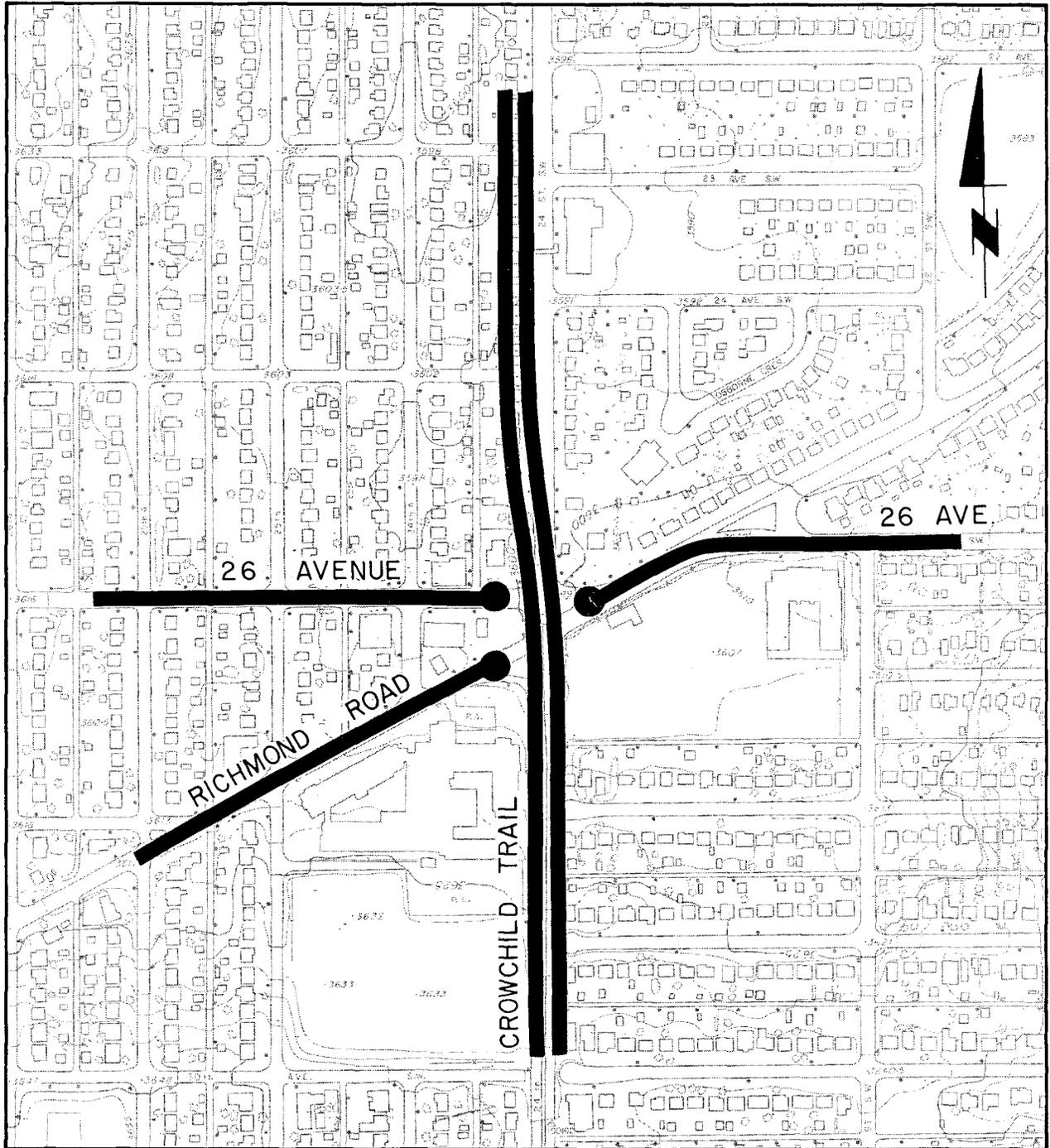
- EXCESSIVE COST AND NOISE SINCE THE LARGER ROADWAY (CROWCHILD TRAIL) IS OVERPASSING THE SMALLER ROADWAY (33 AVENUE S.W.).
- EXCESSIVE UTILITY RELOCATION COSTS.



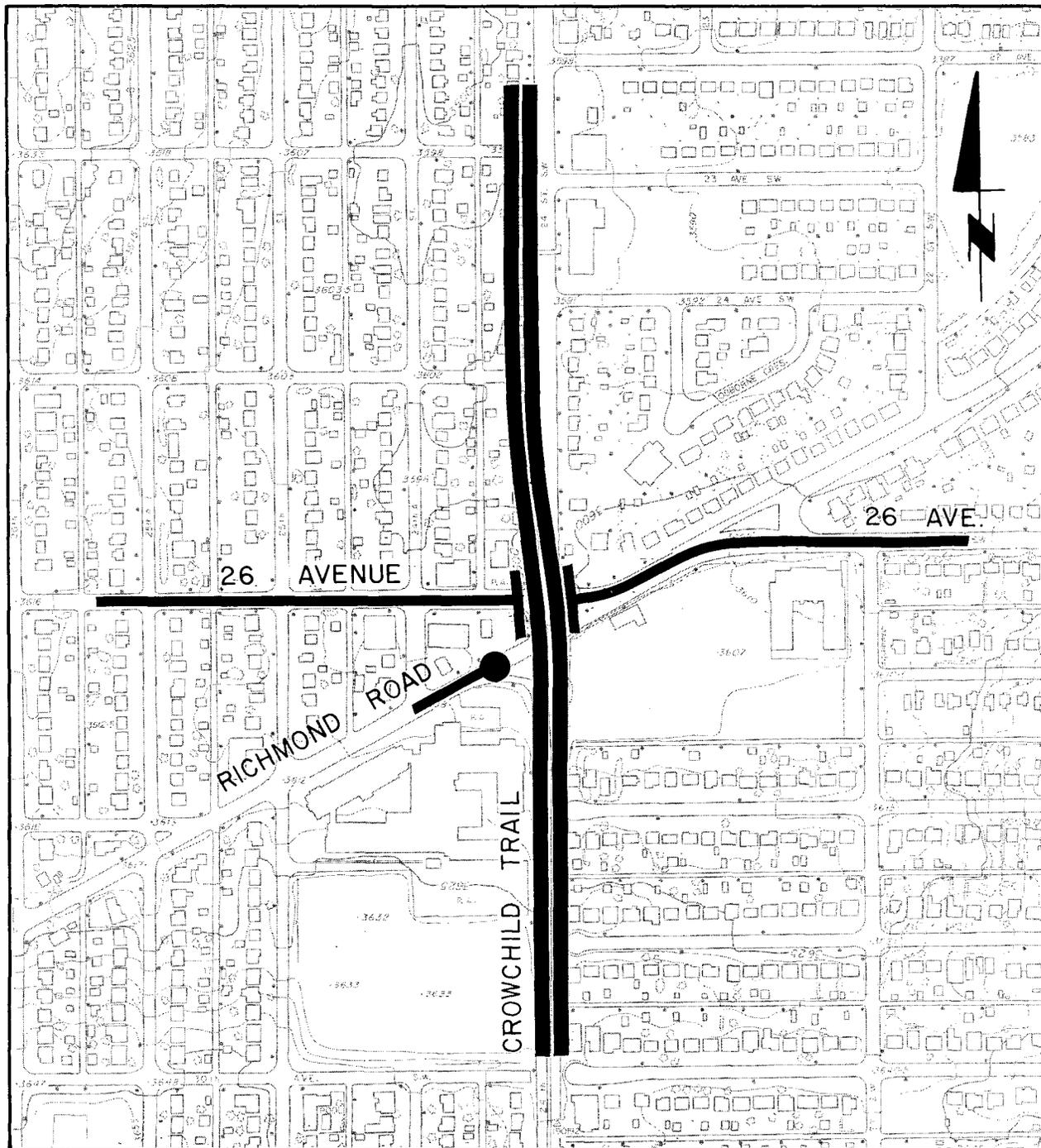
EXCESSIVE UTILITY RELOCATION COST



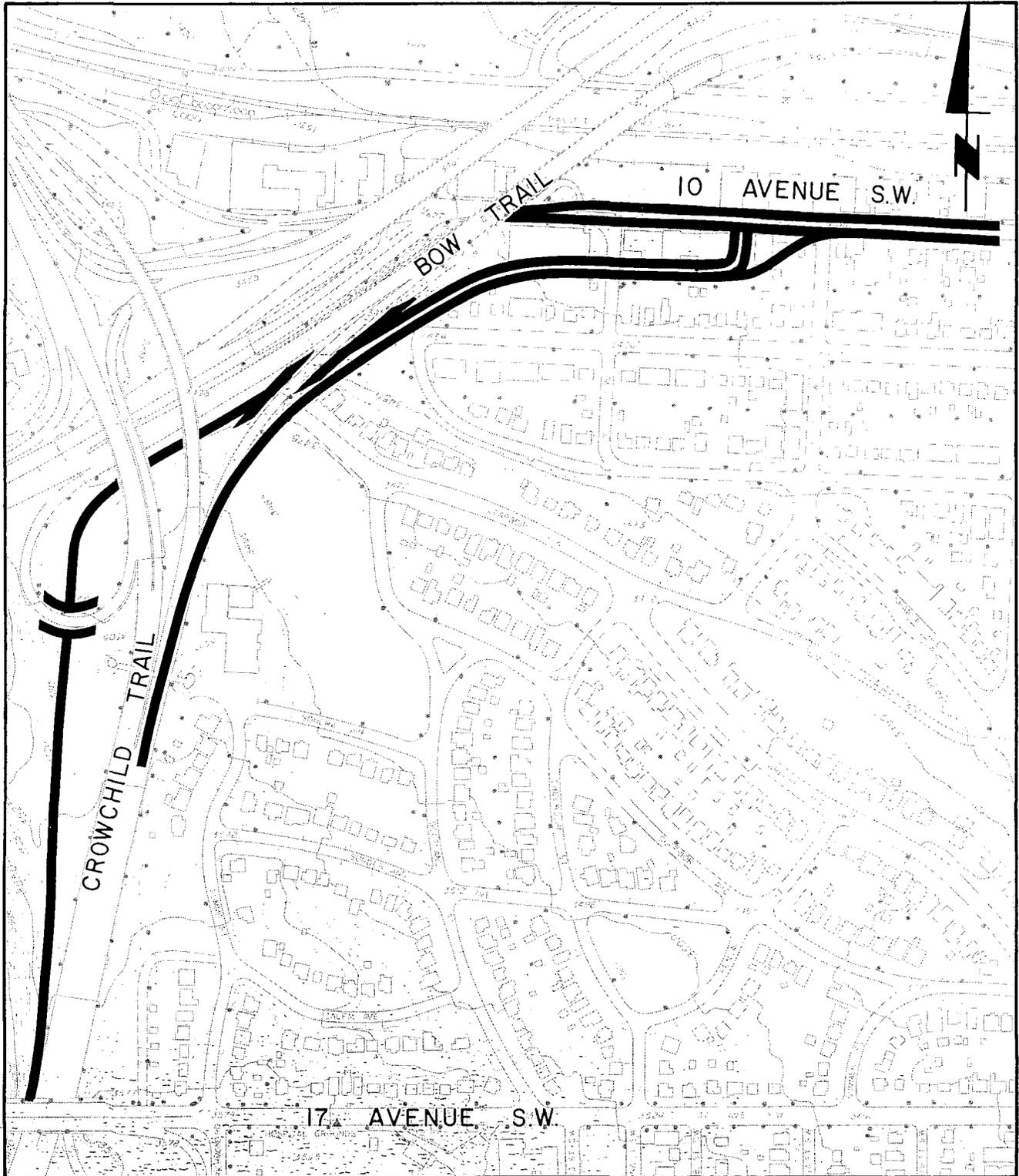
EXCESSIVE PROPERTY REQUIREMENTS



NO ACCESS ACROSS CROWCHILD TRAIL



EXCESSIVE COST AND NOISE SINCE LARGER ROADWAY (CROWCHILD TRAIL) OVERPASSES SMALLER ROADWAY (26 AVENUE S.W.)



- HEAVY IMPACT TO THREE BLOCKS OF
COMMERCIAL DEVELOPEMENT ON 10 AVENUE

7.0 TECHNICAL DATA

7.1 Design Criteria

7.1.1 Design Speed

Crowchild Trail	40 MPH
Glenmore Trail	50 MPH
50 Avenue	30 MPH
33 Avenue	30 MPH
26 Avenue	30 MPH
Ramps	25 MPH

7.1.2 Vertical Alignment

7.1.2.1 Gradients

Roadways	Maximum 5%	Minimum 0.6%
Ramps	Maximum 6%	Minimum 0.6%

7.1.2.2 Vertical Curves

Crowchild Trail	Crest = 70 Minimum	Sag = 70 Minimum
Others	Crest = 28 Minimum	Sag = 35 Minimum
Ramps	Crest = 35 Minimum	Sag = 35 Minimum

7.1.2.3 Clearances

All Structures 17.5 Feet

7.2 Traffic Accommodation

7.2.1 Levels of Service

Level "E" (Minimum)

7.2.2 Traffic Characteristics

Percentage of ADT in peak Hour (K)

AM Peak 10%

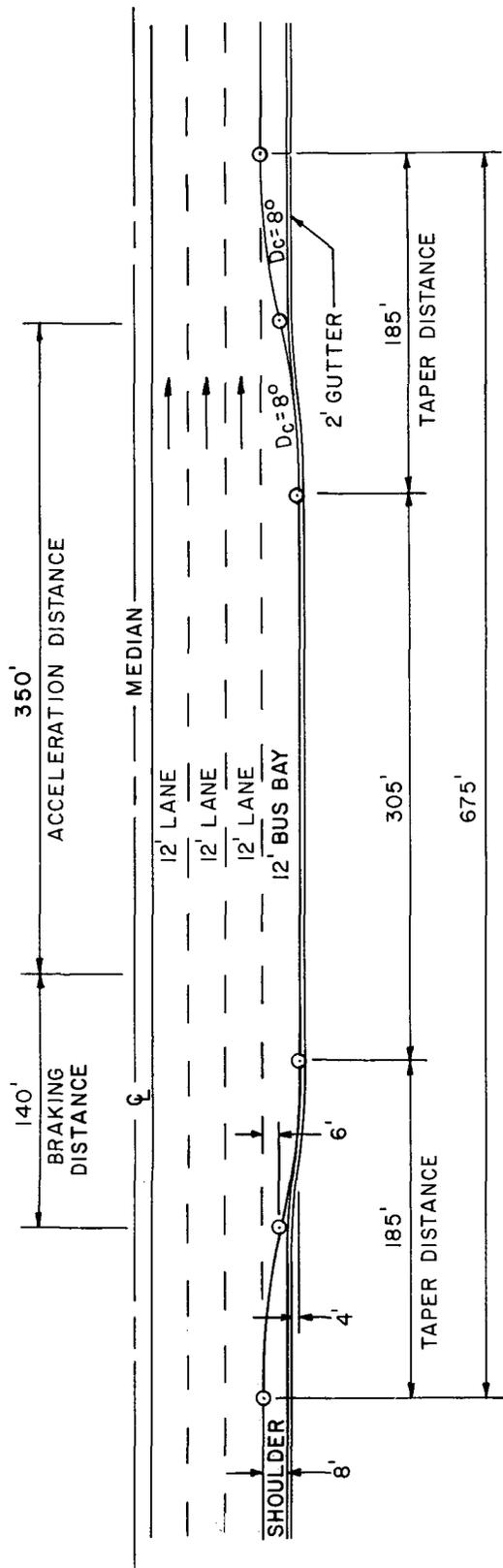
PM Peak 10%

Peak Hour Directional Split (D)

Ranges between 65/35 and
50/50 depending on location

7.3 Typical Bus Bay Detail

See Figure 1



ASSUMED PEAK HOUR TRAVEL SPEED OF 40mph

CROWCHILD TRAIL (SOUTH)

SCALE : 1" = 100'

**TYPICAL BUS
BAY DETAIL**

SCARBORO

SUNALTA
ELEMENTARY

RICHMOND ROAD S.W.

26 AVE. S.W.

RICHMOND

33 AVE. S.W.

34 AVE. S.W.



BOW TRAIL

SHAGANAPPI

17 AVE. S.W.

24 STREET S.W.

CROWCHILD TRAIL

RICHMOND
ELEMENTARY

26 AVE. S.W.

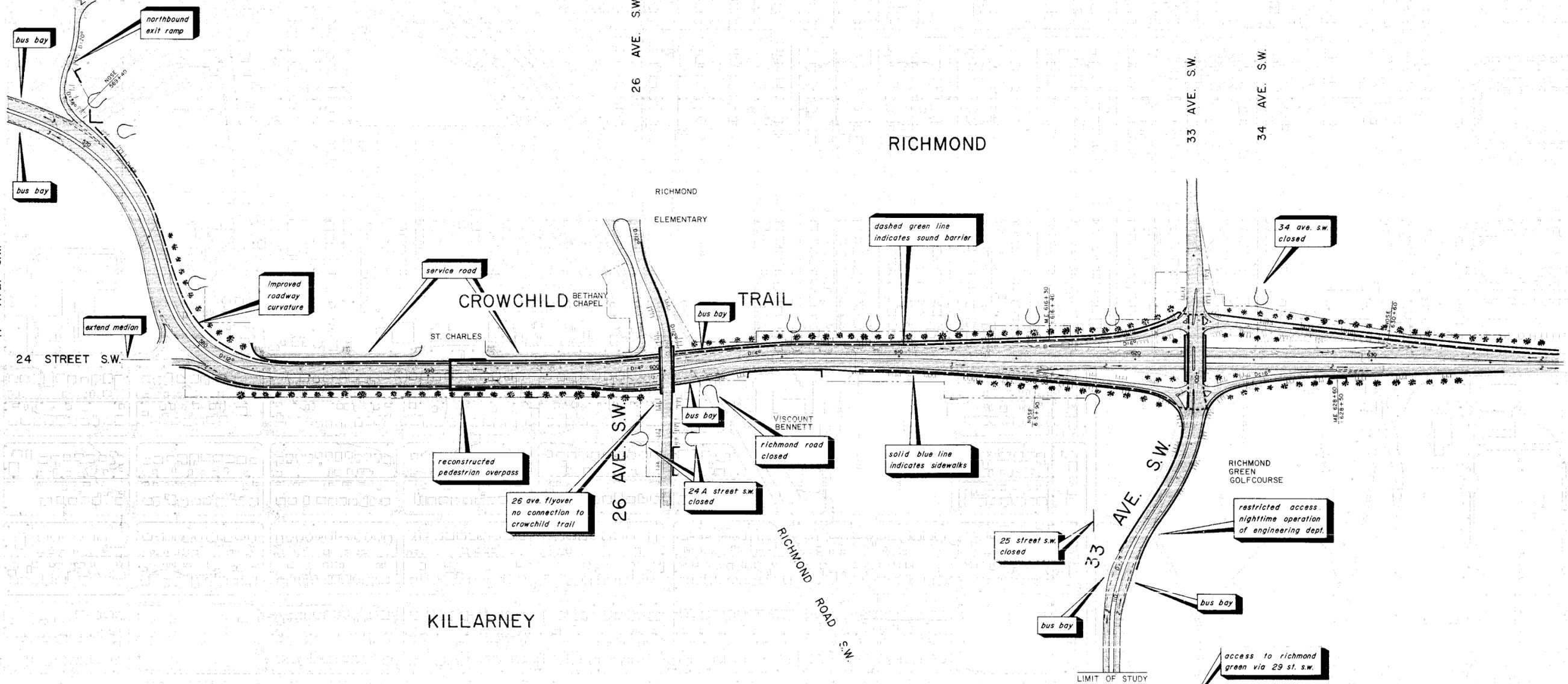
RICHMOND ROAD S.W.

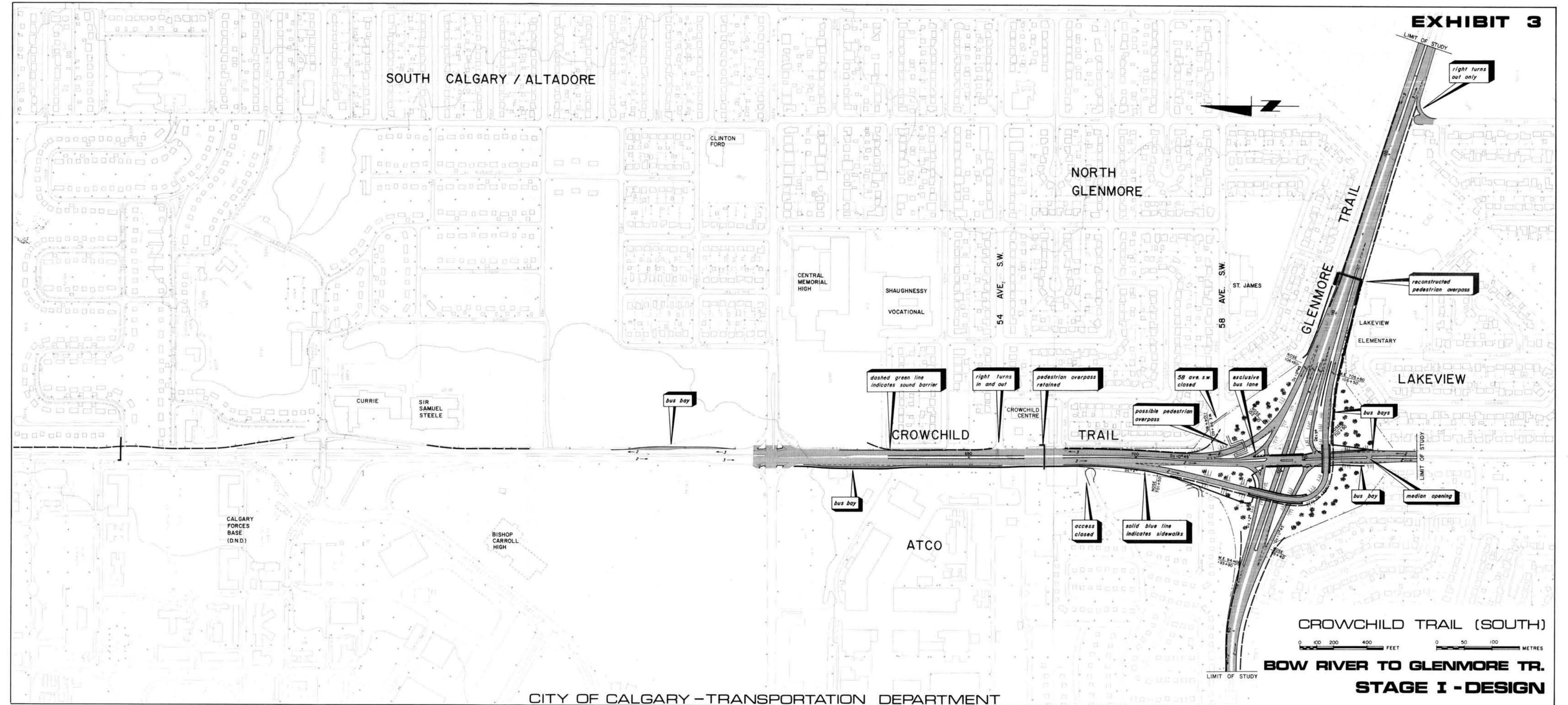
33 AVE. S.W.

KILLARNEY

RICHMOND
GREEN
GOLF COURSE

LIMIT OF STUDY





SOUTH CALGARY / ALTADORE

NORTH GLENMORE

LAKEVIEW

ATCO

CROWCHILD TRAIL (SOUTH)

0 100 200 400 FEET 0 50 100 METRES

BOW RIVER TO GLENMORE TR.

STAGE I - DESIGN

right turns out only

reconstructed pedestrian overpass

dashed green line indicates sound barrier

right turns in and out

pedestrian overpass retained

58 ave. s.w. closed

exclusive bus lane

possible pedestrian overpass

bus bay

bus bay

access closed

solid blue line indicates sidewalks

bus bays

bus bay

median opening

LIMIT OF STUDY

LIMIT OF STUDY

CLINTON FORD

CENTRAL MEMORIAL HIGH

SHAUGHNESSY VOCATIONAL

54 AVE. S.W.

ST. JAMES

58 AVE. S.W.

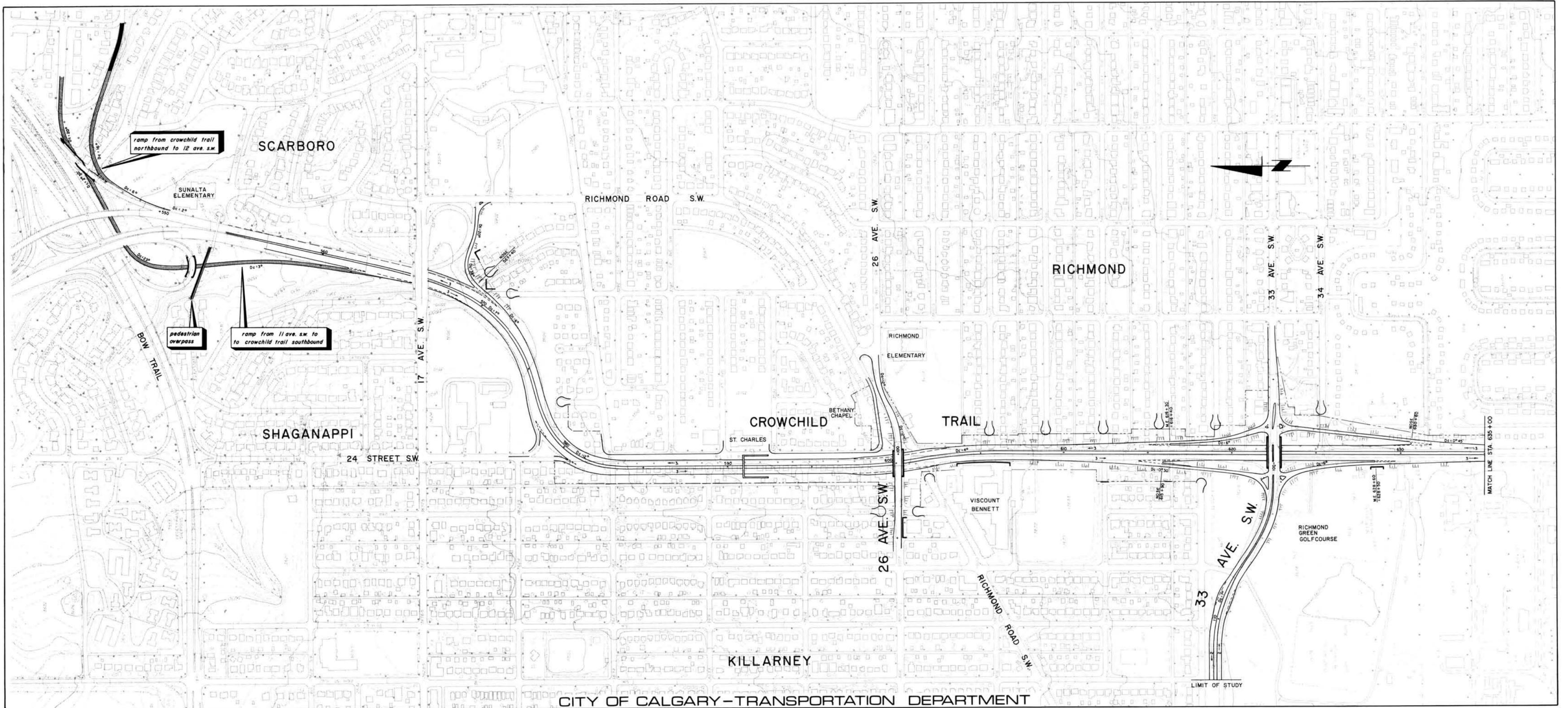
CURRIE

SIR SAMUEL STEELE

CALGARY FORCES BASE (D.N.D.)

BISHOP CARROLL HIGH

LAKEVIEW ELEMENTARY



ramp from crowchild trail northbound to 12 ave. s.w.

pedestrian overpass

ramp from 11 ave. s.w. to crowchild trail southbound

SCARBORO

SUNALTA ELEMENTARY

RICHMOND ROAD S.W.

RICHMOND

SHAGANAPPI

BOW TRAIL

24 STREET SW

17 AVE S.W.

CROWCHILD TRAIL

RICHMOND ELEMENTARY

BETHANY CHAPEL

ST. CHARLES

26 AVE S.W.

VISCOUNT BENNETT

RICHMOND ROAD S.W.

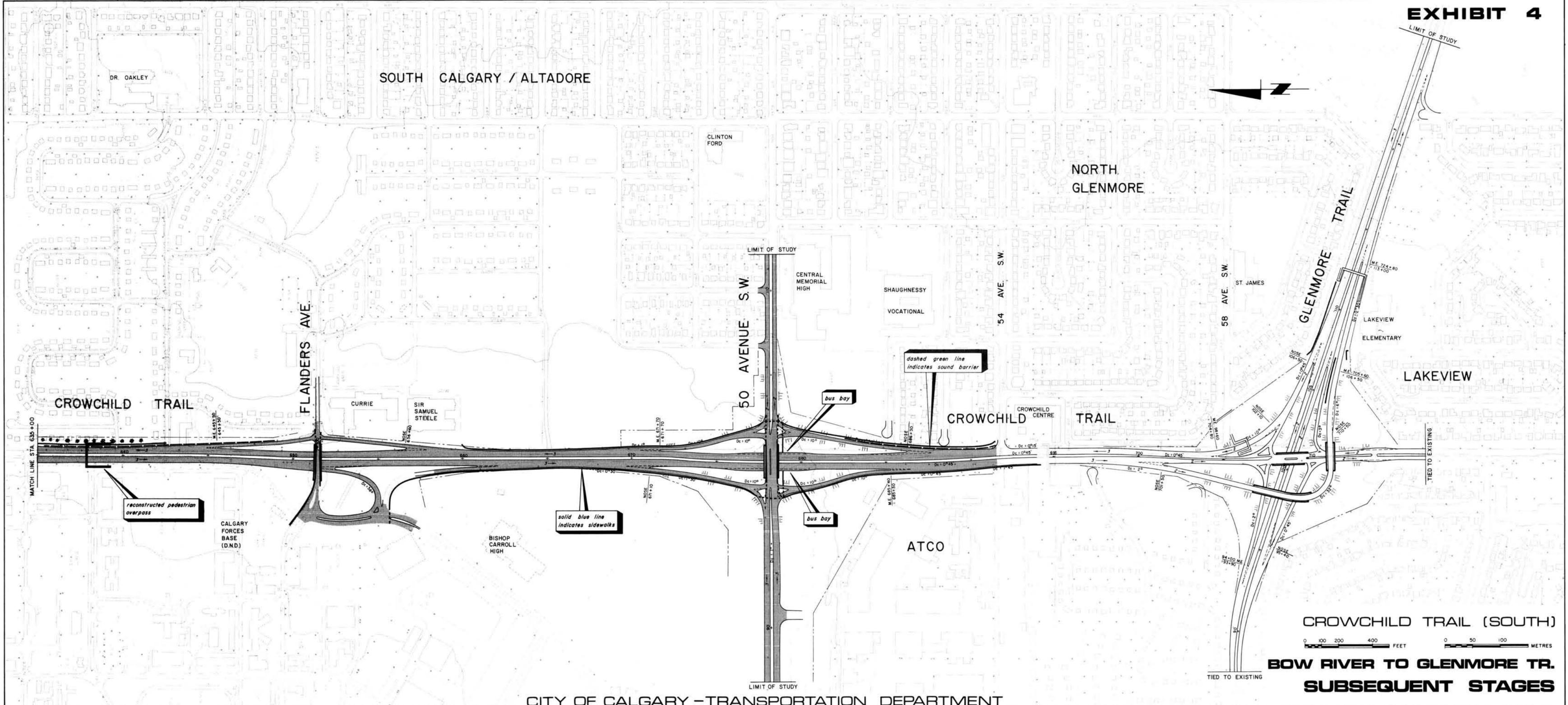
33 AVE S.W.

RICHMOND GREEN GOLF COURSE

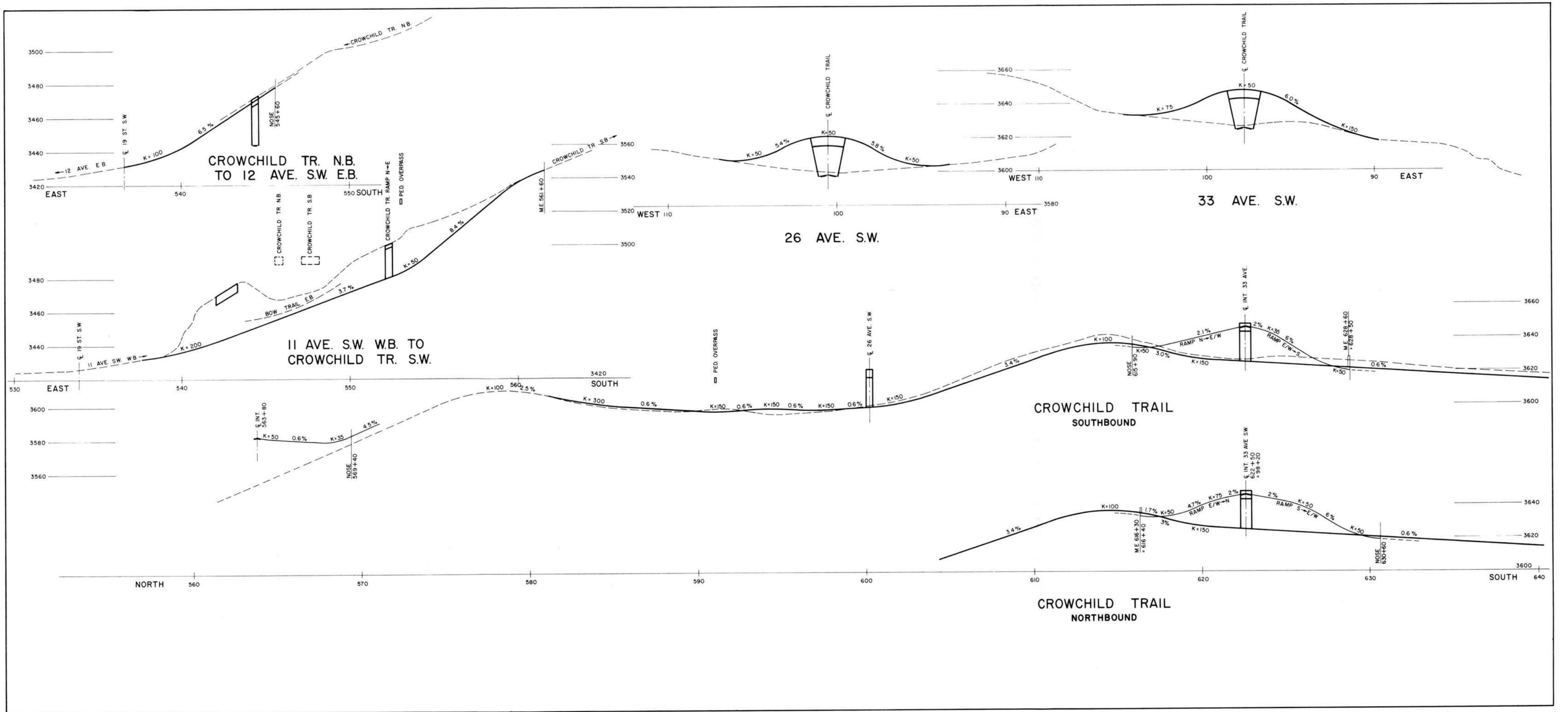
KILLARNEY

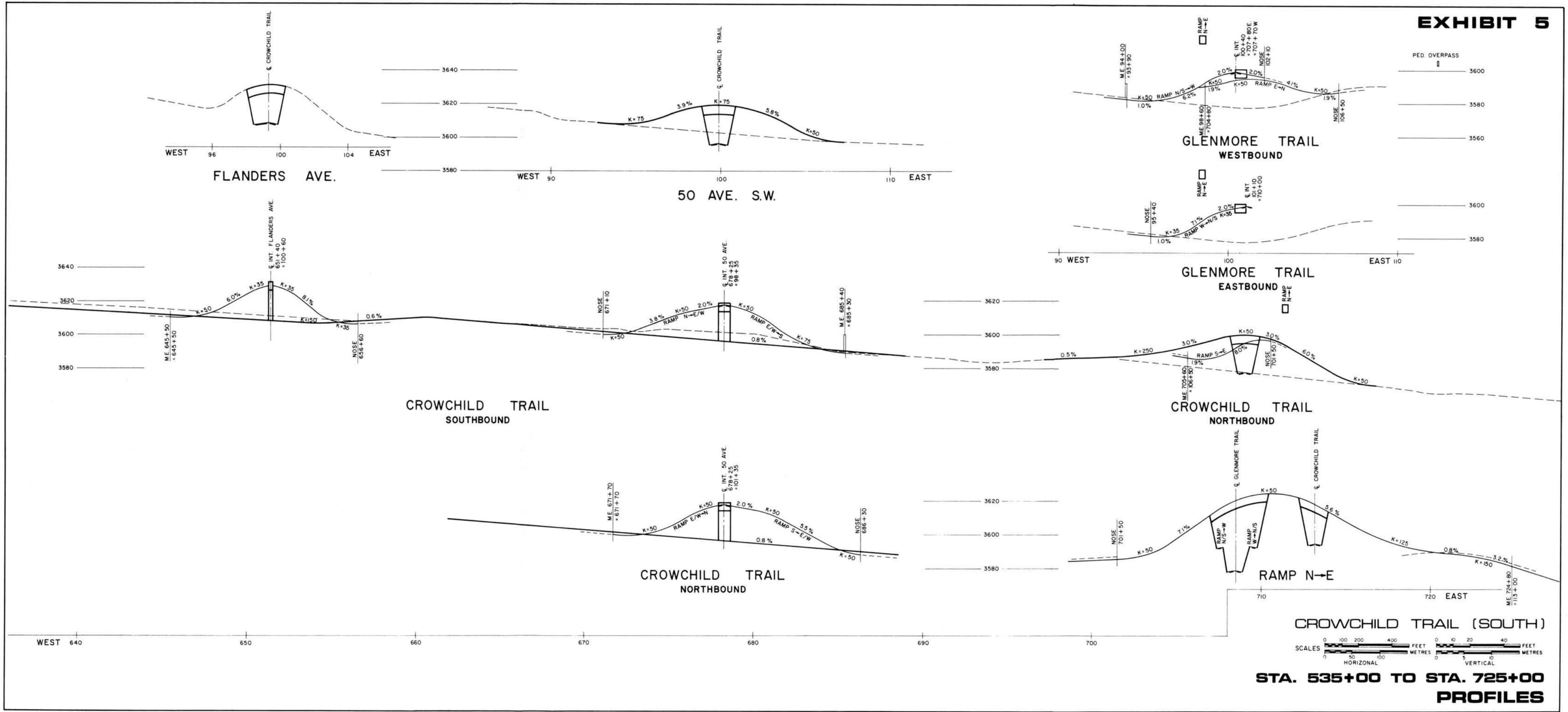
LIMIT OF STUDY

MATCH LINE STA. 635+00



CROWCHILD TRAIL (SOUTH)
 BOW RIVER TO GLENMORE TR.
 SUBSEQUENT STAGES

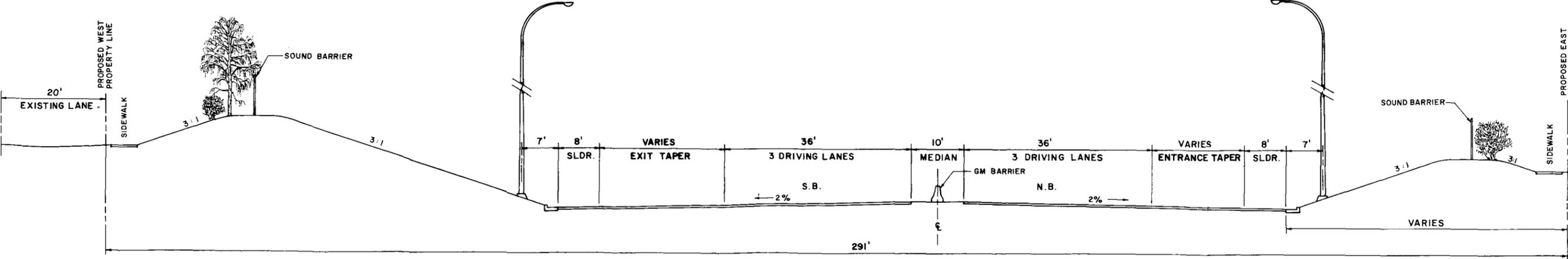
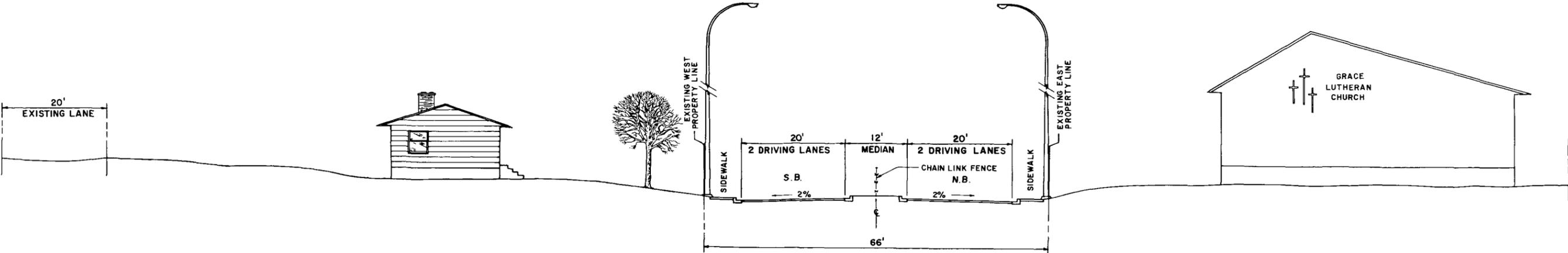




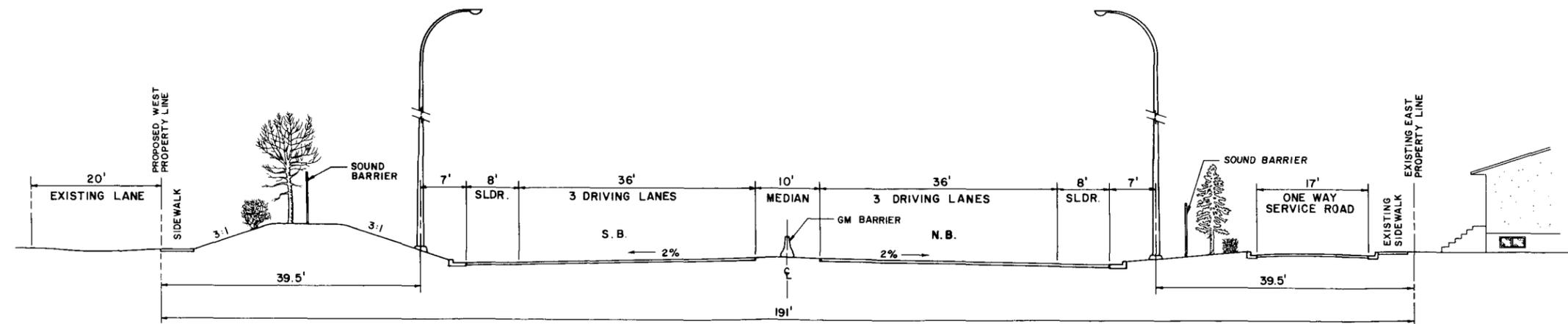
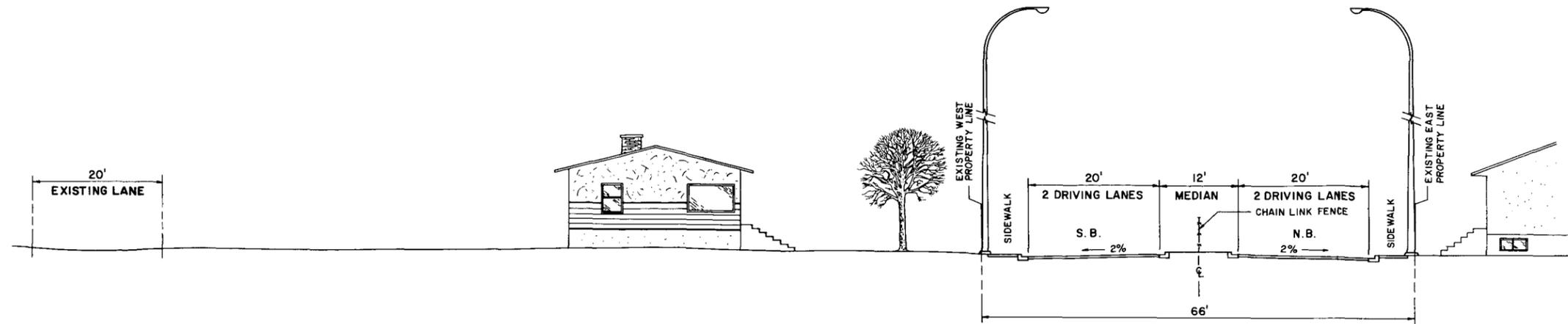
CROWCHILD TRAIL (SOUTH)



**STA. 535+00 TO STA. 725+00
 PROFILES**



CROWCHILD TRAIL (SOUTH)
STA. 613 + 50
CROSS-SECTIONS



CROWCHILD TRAIL (SOUTH)
BTWN. 21 & 26 AVE. S.W.
CROSS-SECTIONS