

# **STAGE I REPORT**

## **SUDBURY RAILWAY RELOCATION FEASIBILITY STUDY**

**TO  
MR. M. M. ROSS  
DIRECTOR, STUDY COMMITTEE**

**SEPTEMBER, 1972**

**De Leuw, Cather** consulting engineers

# De Leuw, Cather

CONSULTING ENGINEERS

Our Ref: 7-172

28th September, 1972

Mr. M.M. Ross,  
Project Director,  
Traffic Planning and Programming Study,  
City of Sudbury,  
P.O. Box 1000,  
Sudbury, Ontario.

Dear Mr. Ross:

Re: Stage I Report for the Sudbury Area  
Railway Relocation Feasibility Study

We are pleased to submit herewith for the Committee's review and comment, thirty copies of the Stage I Report on the Sudbury Area Railway Relocation Feasibility Study. This report has been prepared in accordance with the Appraisal Report, dated June 1972.

Included in the report is a description of the existing railway facilities and operations together with their resulting effects on the Study Area. The benefits to be achieved by railway relocation are outlined, followed by a description of the conceptual relocation schemes developed and an evaluation of these schemes. Finally, a work program has been prepared for Stage II of the Study, which will consist of a feasibility analysis of the two most promising alternatives evolved in Stage I and functional planning for the alternative selected.

We wish to express our appreciation to you and the Committee for your co-operation and assistance rendered during this Stage I assignment. We shall await your notification regarding a review of the Work Program for Stage II.

Yours very truly,

DE LEUW, CATHER OF CANADA LTD.



A.N. Mitton, P.Eng.  
Project Manager

ANM/MB

81-8771

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## 1. INTRODUCTION AND SUMMARY

This report concludes the conceptual planning phase of the Sudbury Railway Relocation Study, as described in the Appraisal Report dated June 1972. The work program has been completed on schedule and costs are within the amount budgeted.

The work included a review of existing railway facilities and operations, their effects on traffic facilities and land development in the study area, the development and a preliminary evaluation of conceptual schemes for railway relocation, the preparation of order of costs estimates for four schemes, and a report including the preparation of a work program for further study. The City staff carried out the roadway planning and land-use development aspects of the Study. They have documented the results in Section 3 "RAIL RELOCATION BENEFITS" of this report. City staff also assisted in preparing grading quantities for the four schemes which were included in the order of cost estimates. During the course of the work we have enjoyed the full co-operation of the railway and local officials assisting in the study.

### 1.1 BACKGROUND

There are three railway companies operating within the area over approximately 32 route miles of track in the City of Sudbury. The extent of the railway network is shown on Exhibit 1. Approximately 66 trains and 2500 cars pass through the Study Area on a typical day. This traffic includes only some 12 freight cars serving local industry in the City. The large Inco development to the west of the City of Sudbury generates a substantial amount of railway traffic, which accounts for approximately 1200 cars daily or nearly 50 percent of the traffic that passes through the City. The typical daily rail traffic volumes are also indicated on Exhibit 1.

### 1.2 CONCEPTUAL RELOCATION SCHEMES

Four basic alternatives are possible to reduce the effects of the railways in the City area. These include transferring all east-west railway traffic to new routes either north or south of the City, concentrating the traffic on the existing Canadian National or Canadian Pacific corridors through the City. Twelve conceptual schemes were developed from these basic alternatives and were evaluated mainly on the basis of judging the effects each would have on the Area. Four practicable schemes with minor

variations were selected for further investigation by the Transportation Committee. These schemes are to the north of the City.

A new route to the south of the City or the concentration of the rail traffic in one of the existing corridors through the City were found to be impractical, primarily from the viewpoint of conflicts with roadway and land-use development proposals.

Discussions were held with Inco personnel who indicated that any scheme involving changes in the area of the refinery and Copper Cliff would conflict with their future development.

### 1.3 RECOMMENDED SCHEMES FOR FURTHER STUDY

Two schemes incorporating minor variations in rail line connections are recommended for further study and for comparison with the option of retaining all of the existing railway facilities in the Study Area.

These are:

1. Re-route all east-west rail traffic to a new corridor to the north of the City between Garcon Junction and Sprecher and all traffic from the Soo to a new corridor into Creighton.
2. Re-route all east-west traffic to a new corridor to the north of the City between Garcon Junction and Azilda and all traffic from the Soo to a new corridor into Creighton.

### 1.4 WORK PROGRAM FOR STAGE II

The proposed work program for Stage II is shown on Exhibit 7 and described in detail in Section 6 of this report. It is forecast that this phase will take 32 to 38 weeks to complete at an estimated cost of \$75,000.

## 2. EXISTING RAILWAY FACILITIES AND OPERATIONS

At the present time there are three Railway Companies operating within the area. These are the Canadian Pacific Railways (CPR), Canadian National Railways (CNR) and International Nickel Company of Canada Limited (Inco). The CPR handles the bulk of rail traffic and operates the majority of freight trains in the local area.

The existing tracks in the study area and the typical daily rail traffic volumes are shown on Exhibit 1.

### 2.1 CANADIAN PACIFIC RAILWAYS

This railway has three routes within the City of Sudbury. The principal route (Cartier Sub) has a double track that bisects the City from south-east to north-west. A terminal is located adjacent to the City's Central Business District. The main yard at this terminal has capacity for 542 cars.

This route is the main trans-continental line of the CPR. The traffic consists of approximately 20 freight trains, 6 passenger trains, 4 transfer trips and local switching. These trains carry a total of about 1200 cars daily.

A second route from Sault Ste. Marie enters the City in the west paralleling Lorne Street (Webbwood Sub) to form a junction with the Cartier Sub in the downtown area. The rail traffic consists of 14 trains daily to and from Inco, 4 local freight trains and a rail liner. A total of approximately 700 cars daily are hauled on this line.

The third route to Creighton also forms a junction with the Cartier Sub. in the City. A portion of the route between Clara Belle and Gilman Street is jointly operated with the CNR. Traffic on this line consists of the ore hauled from the Webbwood Sub. plus the trains from the CNR Sudbury Section. Approximately 28 trains or 1150 cars travel to and from Clara Belle with one local train continuing on to Creighton daily.

## 2.2 CANADIAN NATIONAL RAILWAYS

The Sudbury Section from Garson Junction passes through the north of the City westward to interchange with the CPR at Gilman Street and Inco at Clara Belle. The rail traffic consists of approximately 12 trains totalling 500 cars daily.

## 2.3 INTERNATIONAL NICKEL COMPANY RAILWAY

This line is electrified and runs between Copper Cliff on the CPR Webbwood Sub. and Froid Mine to the north west of the City. The traffic on this line is associated exclusively with the mining industry and the operation on the Inco trackage is not detrimental to the City of Sudbury.

However, the Inco plant does generate a large volume of railway traffic that is interchanged with the CNR and CPR and follows a route through the City to reach its destination.

## 2.4 SERVICE TO LOCAL INDUSTRY

The location and annual volumes of traffic created by existing industry in the City is shown on Exhibit 2.

At the present time there are 25 industries provided with railway sidings within the City boundaries. These industries are served by the CPR and CNR railways, depending upon the location of the industry and the origin or destination of the traffic.

The revenue car traffic associated with industry in the City averages 12 cars per day or approximately 0.5 percent of the total traffic passing through the area. The industries are located in the CPR industrial area at Creosote, adjacent to the CPR terminal downtown, also along the CNR Sudbury section to Algo yard. The major generator of railway traffic in the area is the Inco plant located to the west of the City. The train operations to this plant were described earlier.

The personnel contacted at five of the industries served directly by rail indicated that either they no longer use railway service, were in the process of converting to truck operations or intended to relocate their plant to another area. However, some 20 industries rely heavily on railway service and if a relocation program were implemented these industries would need to relocate or else be provided with railway service by industrial spur lines.

### 3. RAIL RELOCATION BENEFITS

(Prepared by City of Sudbury staff.)

Normally, when major projects of the nature of the proposed rail relocation scheme are being considered, it is prudent to attempt to quantify the benefits derived from the project. If the benefits are in balance with the costs, the project can be considered, in a freestanding sense, to be desirable. It should be noted at the outset that there will be some benefits which defy quantification and thus can only be measured as desirable or undesirable. Specifically, these types of benefits pertain to social or aesthetic values -- otherwise known as "the human element". This summary of anticipated benefits assumes an almost total removal of rail facilities out of the City.

The non-quantifiable benefits include the impact on the downtown, neighbourhood disruption and the impact of the railroads on major streets. The latter may be quantified at a future date when traffic assignments to the street system are completed.

The current and future impact of the railroad forces now constraining downtown Sudbury is perhaps the most critical of all the dis-benefits. In a word, downtown Sudbury is the heart of the region. It is the single highest point of regional accessibility. It provides the outward symbol of the quality, prosperity, character and value standards of this portion of Northern Ontario. The downtown provides the widest diversity of jobs and services in the region. It is our face-to-face communications centre. The downtown houses the special activities of the City -- both in

terms of services and specialty shops. The downtown also represents a massive tax base and a major investment in services such as roads and parking. Finally, the downtown is becoming a community in itself with an infusion of new living quarters for those people who choose to live there.

The downtown does not have room to grow. It is restrained (as it should be) by through traffic routes on its northern and easterly edges and by railroad yards on its southern and westerly edges. There is already some strong evidence of downtown type land uses locating in the suburbs. The reference here is specifically to the new regional health office, the Children's Aid building and the regional assessment office. These facilities should be in the downtown since they functionally relate to many downtown activities and they require a high degree of regional access - both by transit and auto. In addition, an identified need for 800,000 square feet of commercial floor area in the future exists. There is no room now. Space must be made available.

The railroad tracks have been in existence so long in the City that it is difficult to visualize the social benefits accruing due to their removal. There would be a number of benefits that would have some value to each individual in the affected areas. For example, services such as fire protection and policing would improve because of improved access to some areas now isolated by the tracks. Pedestrian and vehicular traffic could be more direct with the tracks removed. In addition, the tracks, especially those built on earth berms or through cut sections, sever neighbourhoods and present physical barriers to community and social interchange.

The third non-quantifiable benefit of track removal is the general impact on traffic flow in the City. Through a combination of offset streets and railroad barriers, there is little street continuity particularly from Notre Dame Avenue westward. This discontinuity exists in both the east - west and north - south direction, thereby the two major streets (Notre Dame Avenue and Kathleen Street) carry more traffic than would be normally anticipated for these types of streets. In addition, neighbourhood circulation patterns are poor, particularly in the Flour Mill and Donovan. This results in costly circuitous routing for drivers. Precise estimates of overusage of major streets will be developed in the second stage of the study.

There are three major readily quantifiable benefits accruing due to rail relocation. These include grade separation savings, travel delay costs at grade crossings and increased tax revenue from the re-development of railroad lands. The calculation of these benefits was estimated on the conservative side.

The requirement for grade separations is based on an exposure index which is the product of the number of trains per day crossing a street and the average daily traffic using the street. An exposure index of 75,000 has been established by the Canadian Transport Commission as requiring a grade separation. Using this as a guideline, seven grade separations can be eliminated by track removal. These include: Alder - Kathleen, Kathleen extension, Lorne - Regent, Douglas - Lorne, Pacific - Martindale, Barrydowne Road, and Elm Street. These grade separations are estimated to

cost some \$8,800,000. Although there are other grade separations required that could be eliminated by track relocation, they will be constructed before relocation occurs due to compelling traffic problems.

There are 33 at-grade crossings in the City which cause travel delays. The cost of these delays are manifested in additional fuel consumption and wear on the vehicles. These are estimated to cost \$160,000 annually.

The third benefit is the increased tax revenue from the development of railroad lands. Table 1 below indicates the amount of land held by the railroads in Sudbury.

TABLE 1

RAILROAD LAND

<u>Company</u>	<u>Land</u>	<u>Acres</u>
Canadian Pacific	Yards	78
Canadian Pacific	Corridors	647
Canadian National	Yards	66
Canadian National	Corridors	304

The prime redevelopable land is downtown, however, certain percentages of the remaining land would probably also be developed. In computing the taxes generated by this development, it was assumed that 800,000 square feet of commercial floor area and 500 housing units could be developed downtown; seven and one half percent of the corridor land assumed developable for commercial and two and one half percent of the

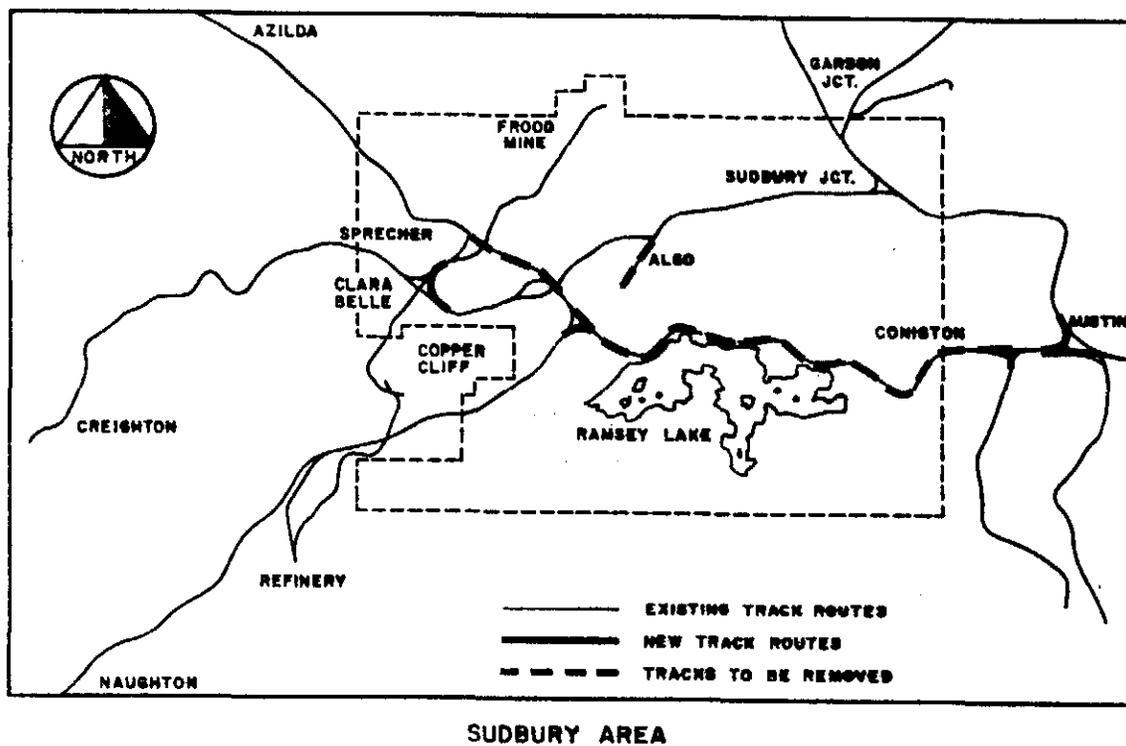
corridor land developable for residential. Using current tax rates, this yields an estimated \$2,100,000 of additional tax for the City. The railroads are currently paying approximately \$330,000 in taxes on the property now. By virtue of the relocation, this tax revenue would revert to municipalities outside the City.

The total annual benefits of rail relocation, as set forth here, would be approximately \$3,100,000 as opposed to the annual costs of relocation to the City of approximately \$2,200,000.

#### 4. PRELIMINARY RELOCATION CONCEPTS

With the foregoing information in mind, a number of conceptual railway relocation schemes have been developed for comparison with the retention of the existing railways in their present location. The basic possibilities are to consolidate railway movements in a new corridor north or south of the City or by utilizing and improving the existing rail corridors through the City. The schemes developed are described below.

##### SCHEME A - CNR CORRIDOR



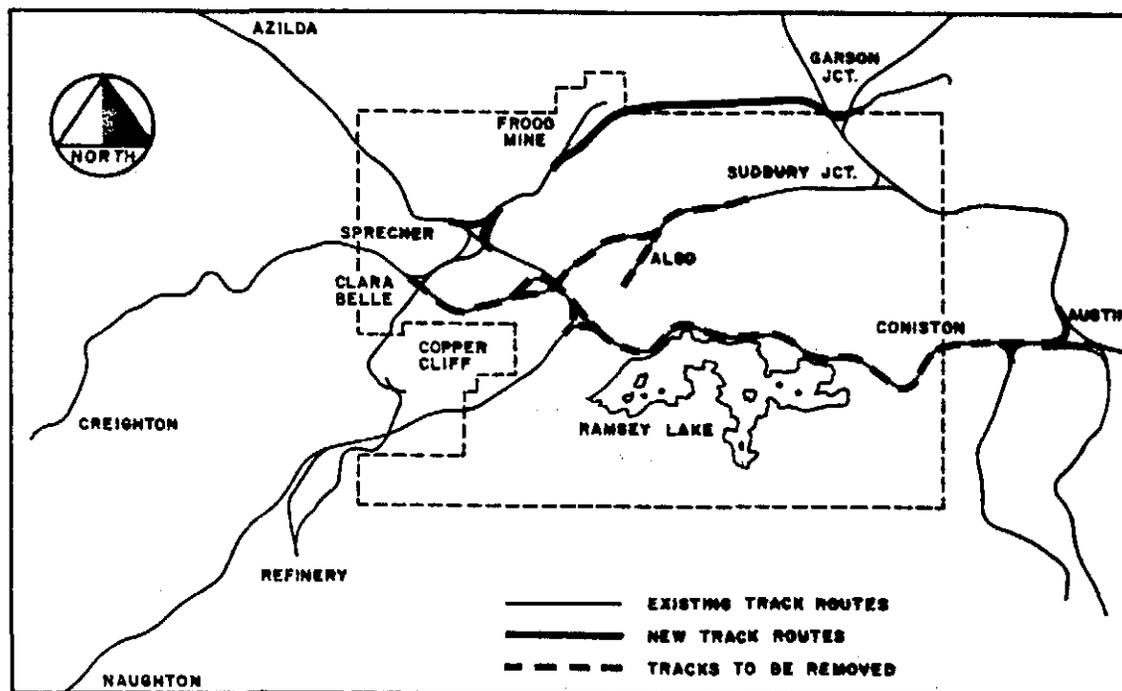
This scheme would consolidate the CPR and CNR operations on the existing CNR route and eliminate the major CPR railway corridor through the City.

The new facilities would include wye tracks at Clara Belle and Coniston. A new yard would be required at some location along this route where the industrial and railway needs would best be served.

Railway tracks to be removed would include the CPR main line from Coniston to Sprecher and the CNR and CPR terminal facilities in the City.

Changes in through train operations would include the diverting of CPR traffic at Coniston north and west over the existing CNR route to connect with the existing CPR line at Sprecher. Switching operations to a new terminal would also be significantly changed.

## SCHEME B - NORTHERN CONCEPT



SUDBURY AREA

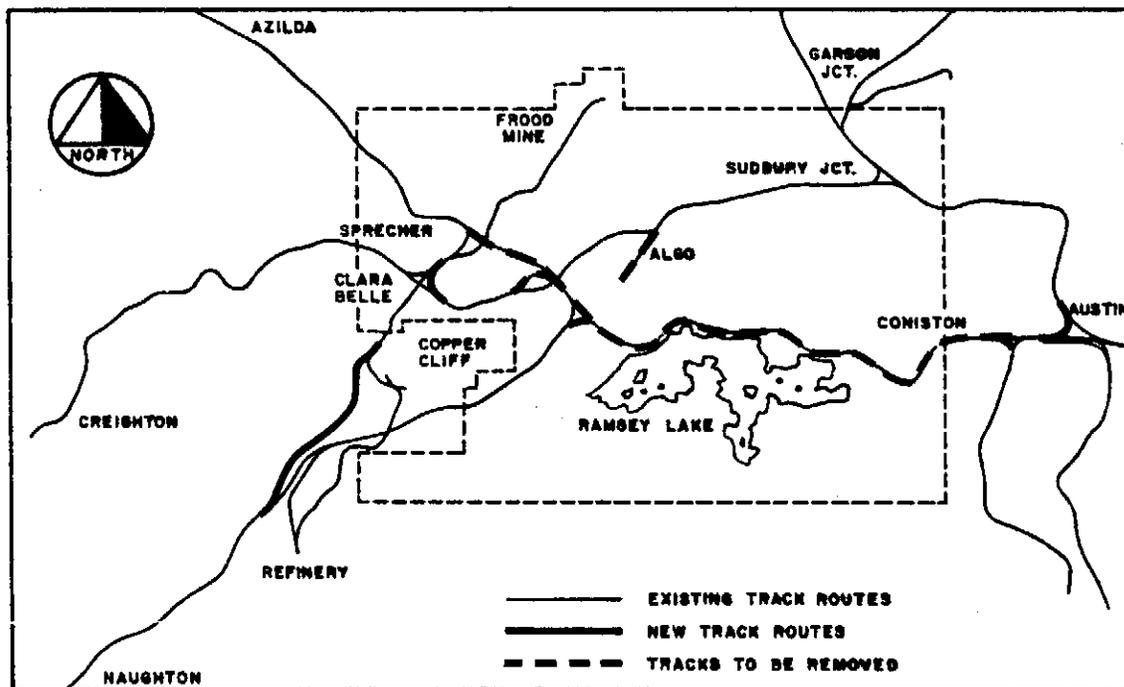
This scheme would relocate the major portion of the east-west railway operations to the north of the City.

A new route would be constructed to the north of the City limits from Garson Junction to Frood Mines. Wye connections would be required at Austin, Garson Junction and Sprecher. New terminal facilities would be needed at some accessible location along the route. The CNR has surveyed and determined that a route between Garson Junction and Stobie and Frood Mines is feasible.

Tracks to be removed are the CPR from Coniston to the terminal in Sudbury, the CPR yard tracks, the CNR Sudbury section from Algo to Clara Belle and the CNR Algo yard.

Both the CPR and CNR traffic would be rerouted to the north of the City. Only those trains from the Webbwood Sub. would enter the built-up area and continue on to the junction at Sprecher. A portion of the CNR Sudbury Section would remain for use as an industrial spur.

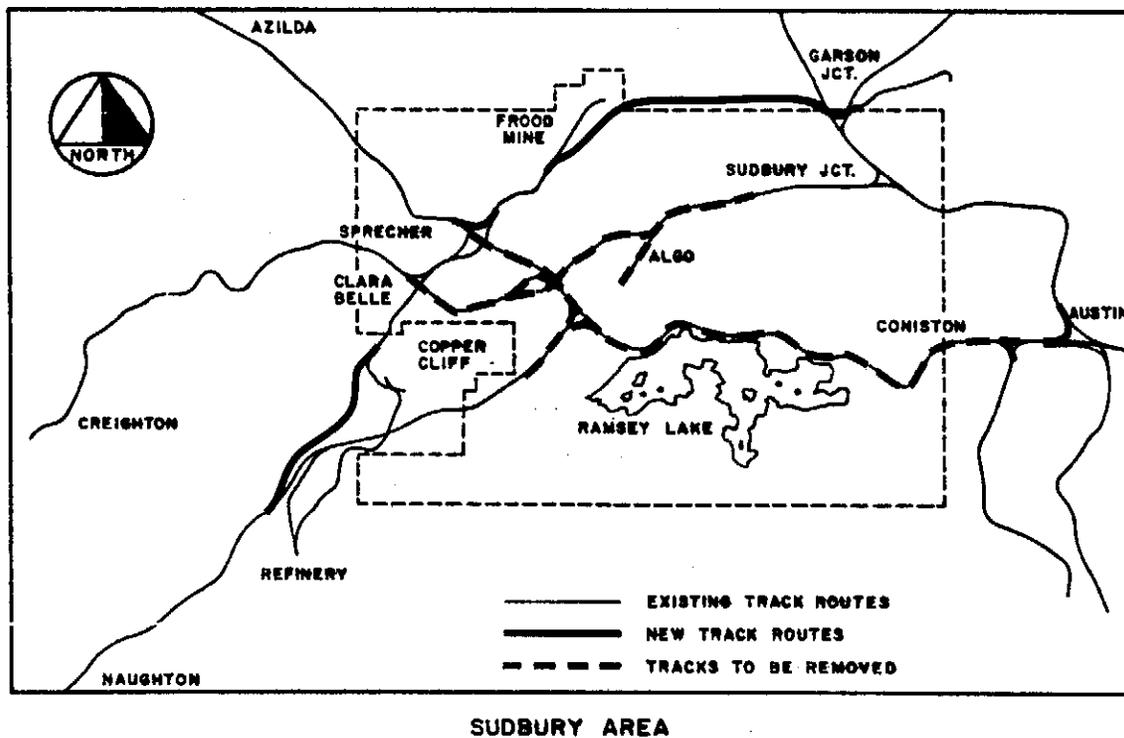
## SCHEME C - CNR CORRIDOR



SUDBURY AREA

This scheme is similar to Scheme A, except that it would provide for a track from the CPR Webbwood Subdivision main line at the refinery directly into Inco. The Cartier Sub. main line tracks and terminal facilities within the urban area would be removed. The existing Webbwood Sub. in the City would be used as an industrial spur.

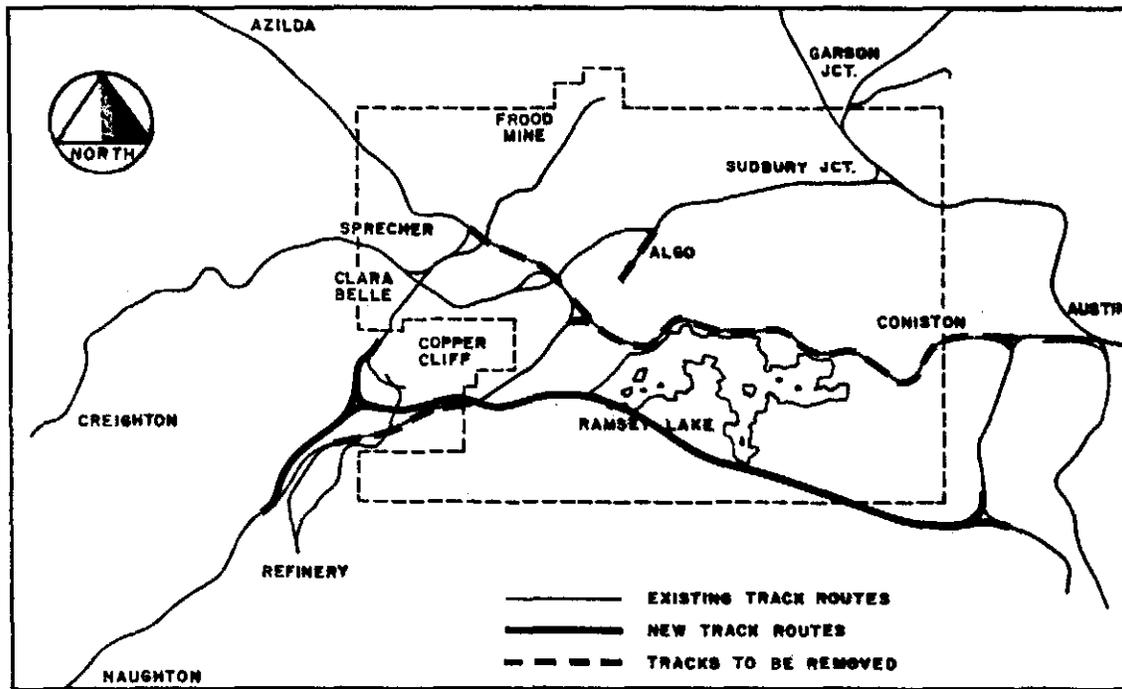
## SCHEME D - NORTHERN CONCEPT



SUDBURY AREA

Scheme D is similar to Scheme B except that traffic from the Webbwood Sub. is diverted at the refinery directly into Inco. A portion of the CPR track from the refinery to the existing terminal would be retained as an industrial spur.

## SCHEME E - SOUTHERN CONCEPT



SUDBURY AREA

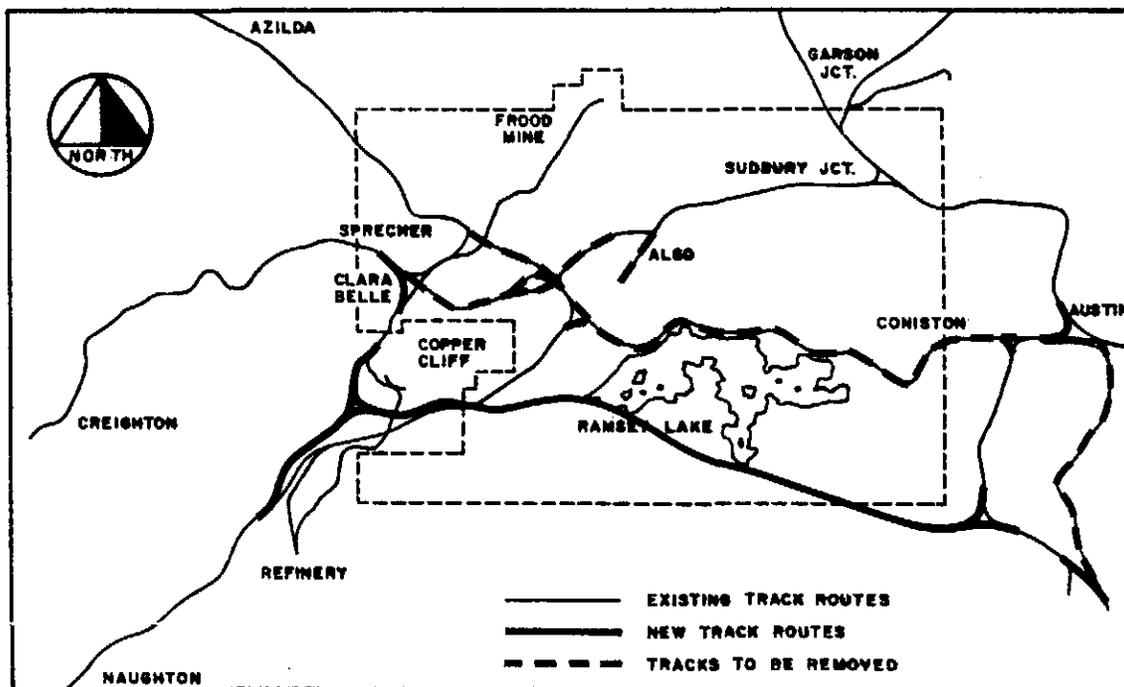
In this scheme the CPR main line route is diverted south of the City.

The new facilities would include a main line track route south of Ramsey Lake to Copper Cliff. A new route would be constructed from the Webbwood Sub. at the refinery into Inco.

Extensive facilities to be removed would include all the CPR main lines from Coniston to Sprecher, the refinery to the east and the terminal facilities of the CNR and CPR.

The CPR main line traffic via Ottawa and Toronto would be diverted to the new route south of the City. Traffic from the Webbwood Sub. would form a junction with the new route at Copper Cliff. No changes would be made in the CNR routing.

## SCHEME F - SOUTHERN CONCEPT

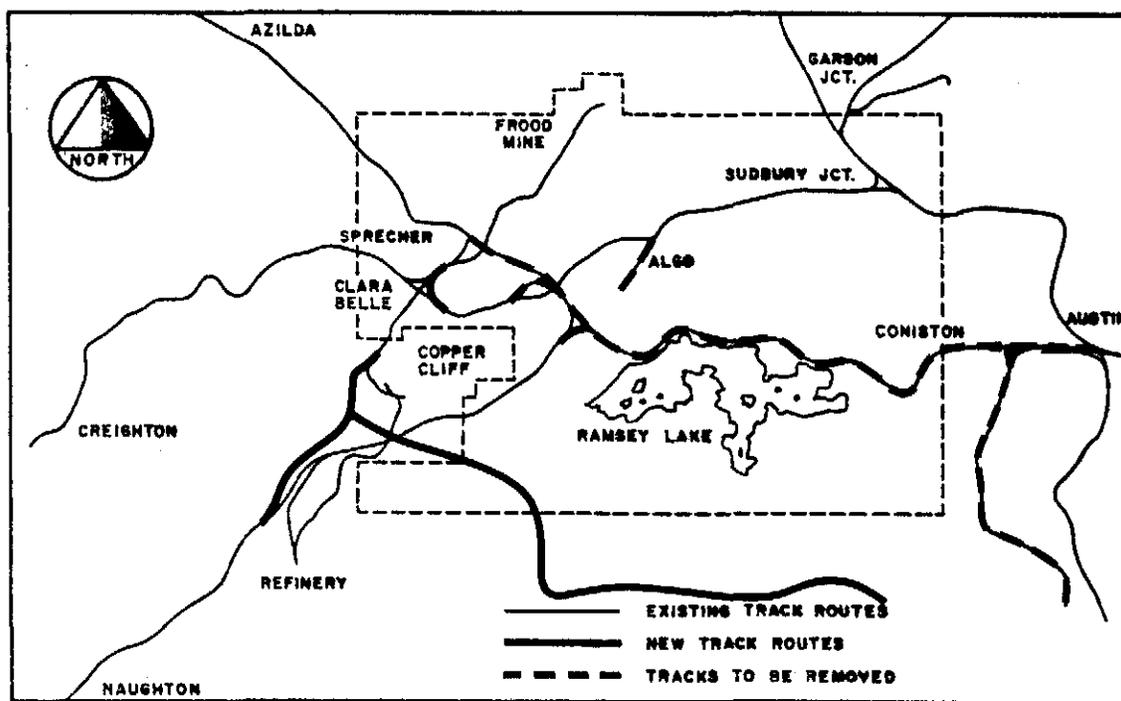


SUDBURY AREA

Scheme F is similar to Scheme E except that the CNR traffic on the Sudbury section is diverted around the City to the south.

This change in operations would allow the CNR tracks between Algo and Clara Belle and a portion south of Austin to be removed.

## SCHEME G - SOUTHERN CONCEPT

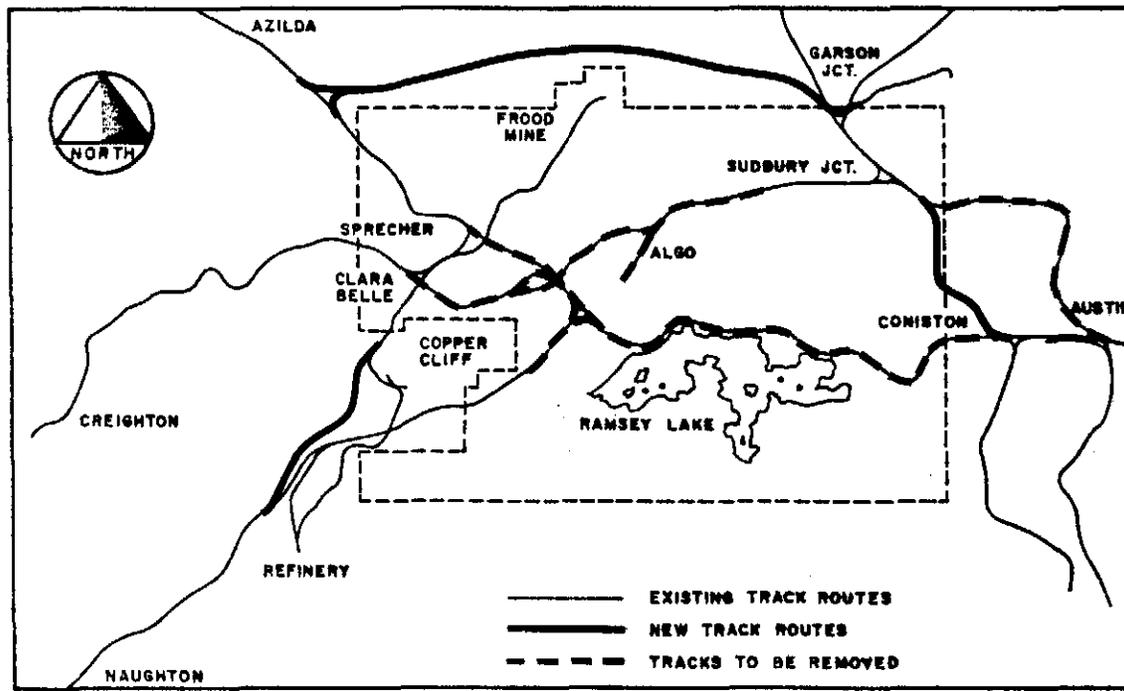


SUDBURY AREA

This scheme is also similar to Scheme E except that the new route is further south of the City.

Traffic on the new southern route would accommodate all the east-west **CPR traffic**. Trains from Ottawa would be diverted at Austin to follow the existing CNR line south to meet the new route.

## SCHEME H - NORTHERN CONCEPT



SUDBURY AREA

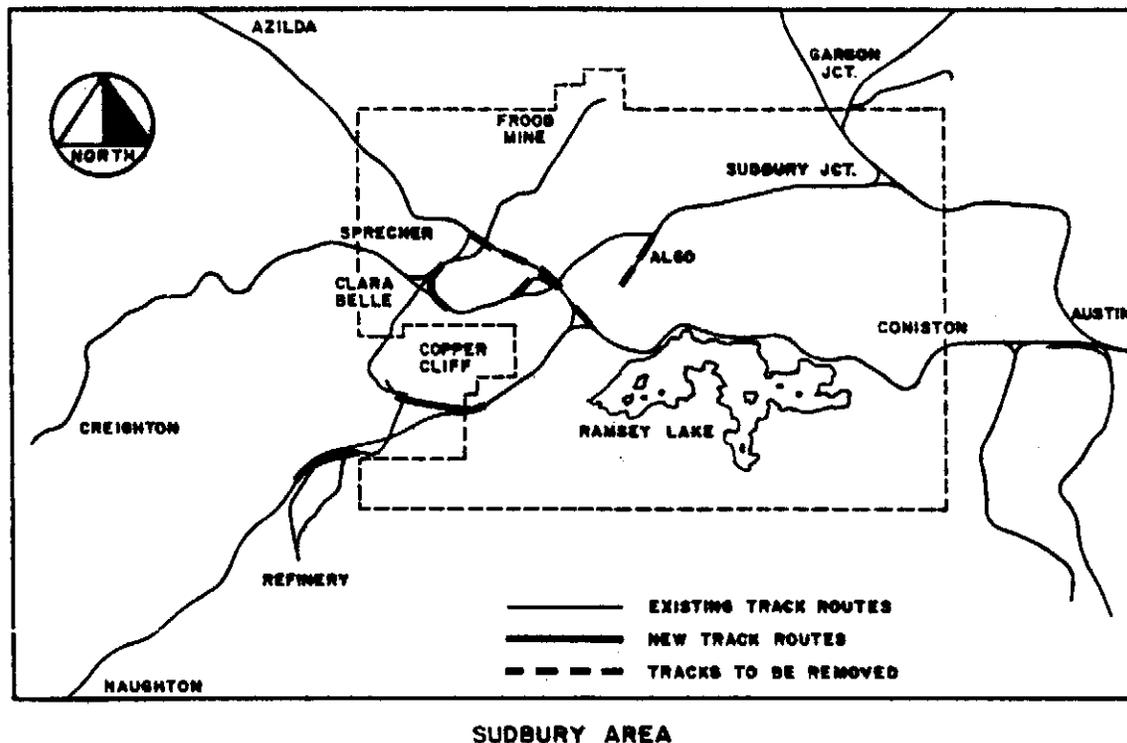
This scheme would relocate the main line traffic to the north of the City.

A new line would be constructed between Coniston and Sudbury Junction rather than following the existing CNR line via Austin. Also, a new route would be required from Garson Junction to the west to join the existing CPR tracks east of Azilda. A new connection at Copper Cliff for the Webbwood Sub. traffic would be constructed.

Tracks to be removed include the CNR tracks from Austin to Sudbury Junction, from Algo to Clara Belle, and the CPR from Coniston to Sprecher. The CPR track from Copper Cliff to Sudbury and the CNR from Lebel to Algo would become industrial spurs.

Trains would divert at Coniston to pass east and north of the City to reconnect with the existing route again east of Azilda. Traffic from the Webbwood Sub. would be rerouted at the refinery to a junction at Sprecher.

## SCHEME I - COPPER CLIFF CONCEPT



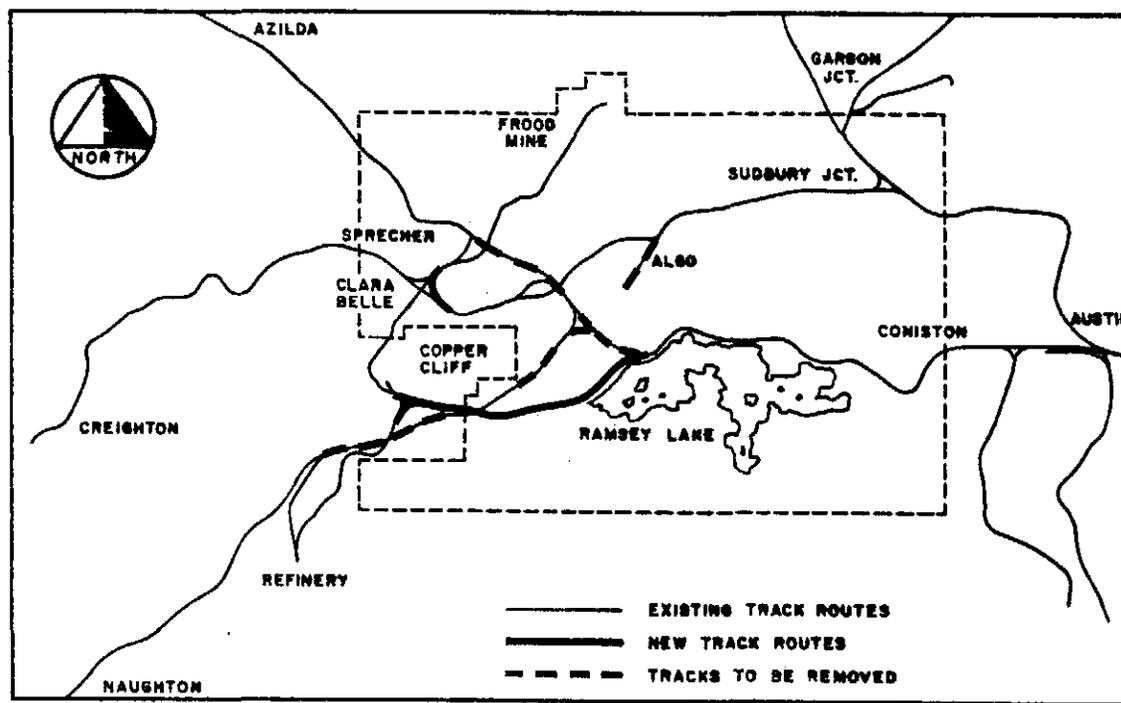
Scheme I would provide for a minimum number of new route miles of track but would remove only a portion of the tracks in the core area of the City.

The new route would be between Creosote and Copper Cliff, with connections at the refinery and at Clara Belle. The grade in the first instance would be steep and very critical in train operations.

Tracks removed would be the CPR main line between the terminal and Sprecher, as well as, the CNR and CPR terminals.

Changes in train operations would include diverting CPR trains at the terminal over the Webbwood Sub. to Copper Cliff and Sprecher; ore from the Webbwood Sub. would be diverted to Copper Cliff near the refinery and the CPR-CNR interchange would be at Clara Belle.

## SCHEME J - COPPER CLIFF CONCEPT



SUDBURY AREA

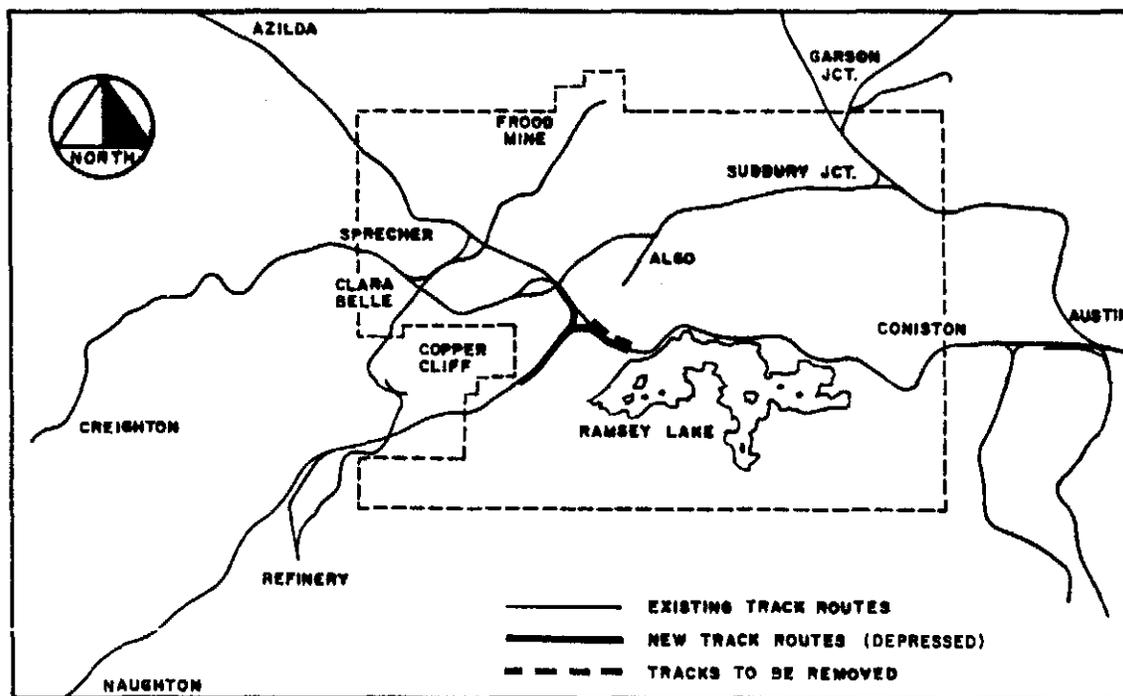
This scheme would relocate the tracks along the north shore of Ramsey Lake.

The new route would extend from the CPR tracks westward along the north shore of Ramsey Lake, and Ramsey Creek, across Highway 17 to Copper Cliff. Other connections would be made at the refinery and at Clara Belle.

Tracks that would be removed are the CPR from the terminal to Sprecher and from the terminal to the refinery. Also, the CNR and CPR terminals would be removed.

Main line trains would be diverted along the north shores of Ramsey Lake over the new route to Copper Cliff and return to the existing track at Sprecher. Ore trains on the Webbwood Sub. would be diverted at the refinery for Copper Cliff. The CNR would interchange cars with the CPR and Inco at Clara Belle.

## SCHEME K - DEPRESSED TRACK CONCEPT



SUDBURY AREA

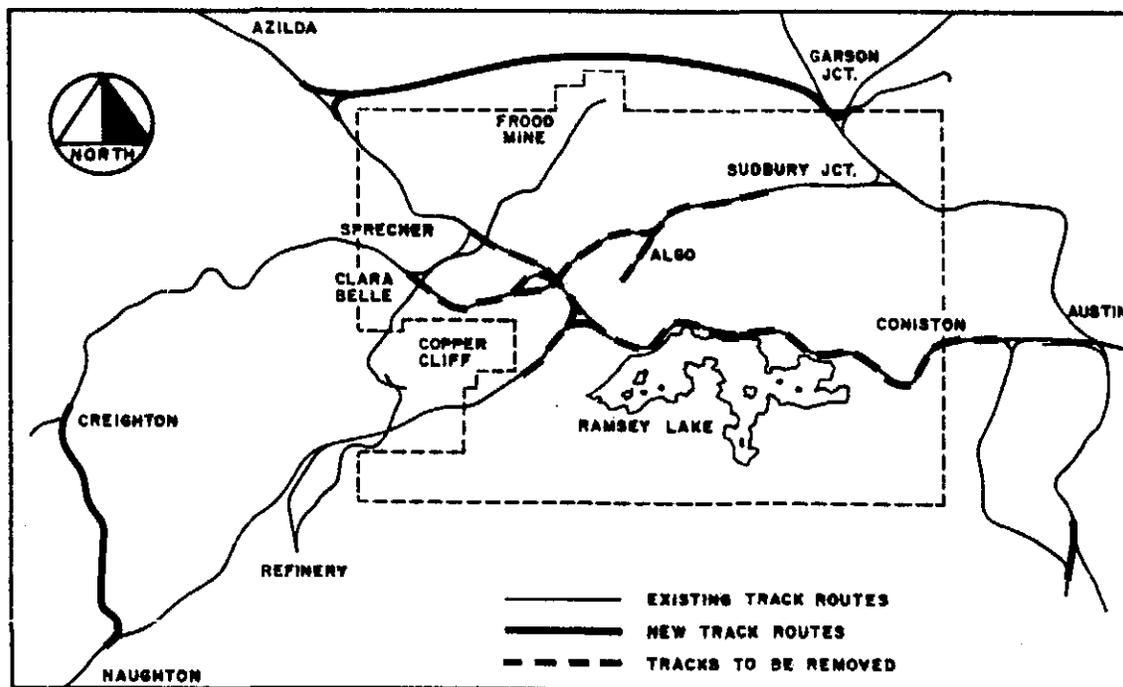
This scheme would depress the CPR main line tracks in the core area of the City.

The main line CPR tracks could be lowered various depths ranging from a cut situation to a total depression which could be enclosed. This range of track depths would have varying effects upon the environment and the ease of constructing roadway crossings. Also development over the railway tracks may be considered practical with a depressed track condition. The yard tracks located in the City would be relocated outside the built-up area.

Train routes would be the same as at present, except for the operations at a terminal located outside the City. An undesirable factor would be the grade on the Cartier Sub. track to the west. At the present time the grade averages about 0.8%. This would be increased to approximately 2%, with a total depressed condition. Also, the track grade at the beginning of the Creighton Sub. would be in excess of 2%.

This scheme would be very costly to construct and the increased grades would add substantially to the train operating expenses.

## SCHEME L - NORTH AND WEST DIVERSIONS



SUDBURY AREA

Scheme L would divert the ore traffic on the Webbwood Sub. destined for Inco to the Creighton Sub. west of the City. Also the CPR Cartier Sub. traffic would be diverted north of the City.

New track routes would be from Garson Junction to the west, north of Frood Mine, to join the existing CPR main track east of Azilda. The Webbwood Sub. route would be diverted at Naughton to connect with the existing track at Creighton. New wye tracks would be required at Austin and Garson Junction.

Trains on the CPR lines from Ottawa and Toronto would divert at Austin, north along the CNR route to Garson Junction and continue west to meet the existing route east of Azilda. Trains for Inco on the Webbwood Sub. would be diverted near Naughton to Creighton, then easterly along the existing track.

## 5. EVALUATION OF CONCEPTUAL SCHEMES

Twelve relocation concepts were presented to the Transportation Committee for review at the meeting of July 20, 1972. Each concept was assessed and evaluated for operational and physical feasibility, as well as effects on traffic circulation and land-use development opportunities. The Committee selected four alternatives from this evaluation for further study. These four alternatives are similar to Schemes B, D, H and L as outlined in Section 4 with some modification to reduce the length of industrial tracks. These Schemes are shown on Exhibits 3, 4, 5 and 6.

Railway relocation required to implement these four alternatives are essentially aimed in three areas. These are:

1. to reroute all east west railway traffic to the north of the City
2. to reroute the railway traffic from the Soo to the Inco Plant before it enters the City
3. to relocate the CPR and CNR railway terminals outside the City.

Any schemes that would relocate the railway tracks to the south of the City would conflict with present and future land-use development. Likewise, schemes that would consolidate railway traffic on one of the existing routes through the City would tend to increase the effect of severance in the community and would not accomplish the major objectives of railway relocation. The railway relocation schemes to the north of the City would, however, minimize many of these conflicts and offer the greatest number of advantages.

The more detailed evaluation of the four selected schemes considered; the number of route miles of railway lines to be built and also the length which could be removed; the effects on grade separations and grade crossing requirements; effects on land-use; effects on the service to local industry and the railways own operations. The results of the evaluation are summarised in Table 5.1. The various factors have been quantified whenever possible, however, only subjective ratings could be given to the effects on land-use and traffic circulation within the scope of this study.

TABLE 5.1

## EVALUATION TABLE

<u>Schemes</u>	<u>No. of route miles to be constructed</u>	<u>No. of route miles to be removed</u>	<u>No. of acres of new railway property</u>	<u>No. of acres of railway property released for other purposes</u>	<u>No. of grade separations to be constructed</u>	<u>No. of grade separations to be eliminated</u>	<u>No. of grade crossings in the City</u>	<u>Estimated Industries affected and annual no. of cars</u>	<u>Effect on land-use</u>	<u>Effects on traffic circulation</u>
1. Existing Tract Layout	0	0	0	0	12	0	31	0	none	none
2. Scheme B	9.6	15.2	175	270	9	3	17	4-370	fair	fair
3. Scheme D	12.6	18.4	215	315	6	6	12	12-1453	fair	good
4. Scheme H	13.9	18.4	230	315	5	7	12	12-1453	fair	good
5. Scheme L	15.6	18.8	250	320	5	7	11	12-1453	good	good

## 5.1 RECOMMENDED SCHEMES FOR FURTHER STUDY

This stage of the study has indicated that railway relocation is feasible and that many of the objectives desired by the City would be achieved. Therefore, a detailed study would be required to investigate those schemes that are feasible.

The previous evaluation of the different schemes indicates that the effects of schemes D, H and L on land-use and traffic circulation is superior to scheme B, and at little additional cost. Furthermore, a discussion with Inco personnel indicated that a new rail route between Copper Cliff and the refinery would be most undesirable because -

- a) there is an ore body in this particular corridor which lies very near to the surface. This area would be mined underground but there would be a chance of a cave-in
- b) the dikes holding the tailings in the area should not be disturbed
- c) the new track location would be very near to residential development in the area.

Based on this evaluation and from discussions held with personnel of the three railways affected, the two most promising schemes which warrant further detailed study clearly are:

1. Scheme H revised - reroute the Soo traffic via Lively to Creighton and the east-west traffic to the north of the City between Garson Junction and Sprecher.
2. Scheme L - reroute the Soo traffic via Lively to Creighton and the east-west traffic to the north of the City between Garson Junction and Azilda.

## 5.2 RAILWAY CONSTRUCTION COST

The order of capital cost for implementing either of the two schemes would be \$25 to \$30 million. All costs are based on providing tracks and terminal facilities of a quality at least equal to the standards that presently exist in the area.

New railway routes are costly to construct in the area due to the significant amount of rock grading required to prepare a roadbed. The cost indicated includes the new rail and terminal facilities with the associated grading and property cost.

No detailed planning of any of the schemes was carried out during this stage of the study, therefore the estimates of capital cost must be considered as very preliminary. In this regard, it was assumed that the existing facilities to support present railway operations would be replaced in kind.

With the implementation of any relocation scheme, portions of the existing main line tracks would be removed and salvaged. The reusable materials would be credited to the alternative at a depreciated value, and the unusable materials as scrap at the market price. However, the cost of removing the existing tracks and clearing the properties released would leave little in the way of a net credit for track materials.

Stage II of the study would consider in more detail the requirements for main tracks, sidings, yards, administrative and maintenance facilities, and structures and crossing protection at locations of rail and road conflicts.

## 6. DETAILED WORK PROGRAM FOR STAGE II

The basic purpose of Stage II is to carry out a detailed feasibility analysis and evaluation of the two most promising alternatives for railway relocation which have evolved from the Stage I Study. These alternatives would then be compared to the condition of retaining the existing tracks and improving the roadways and expanding the Central Business District on other than railway properties. One scheme would be selected in co-operation with the City for detailed planning.

Next, functional planning would be carried out to resolve the details for the selected scheme. This would determine the exact property requirements and property which could be released for other uses. Construction details would be developed to meet the requirements of railway and roadway agencies up to the point where final design and contract drawing would proceed on approval of the project. A report would be prepared to document the Study findings and recommendations.

The proposed activities in the work program for Stage II of the Study are illustrated in Exhibit 7 and are described below.

### A. EVALUATION OF RELOCATION SCHEMES

#### Activity 200-201 Develop Rating Technique for Alternatives

A method of rating each of the alternatives would be developed for comparison purposes considering capital cost, annual railway operating and maintenance cost, traffic circulation, land-use and environmental effects. Each of the factors would be weighed in relation to its importance in selecting a recommended scheme.

#### Activity 200-202 Investigate Rail Service Requirements

This is a detailed assessment of the railway operating requirements for each alternative. Meetings would be held with the railways to confirm their present and future operational requirements under each alternative.

#### Activity 202-203 Prepare Railway Operating Plans

From the information gathered in the previous activity, detailed operational plans would be prepared to meet the railways traffic requirements. These plans would include the requirements for sidings, yard tracks, interchanges and junctions between railways for each of the alternatives.

Activity 200-204 Begin Preliminary Route Location

For the two relocation alternatives to be evaluated, detailed route location would be carried out and preliminary plans and profiles would be prepared to confirm the engineering feasibility.

Activity 200-206 Determine Specific Land-Use Objectives

Specific and localized land-use development objectives which relate to the railway relocation schemes would be determined with City Officials and the Committee from a review of the Official Plan and land-use goals.

Activity 206-207 Provide Land-Use Input for Route Location

As each of the alternatives is developed, the land-use aspect would be reviewed to achieve optimum benefits.

Activity 200-208 Determine Specific Traffic Objectives

Specific traffic objectives would be determined with City Officials from a review of the present Transportation Study and an assessment of how railway relocation would improve the road and street network as presently proposed.

Activity 208-209 Provide Traffic Input and Road Planning Input for Route Location

This would define the requirements and location of crossings and warrants for grade separations so that these may be taken into account in the final location of the rail routes and facilities. Also, the locations where existing railway corridors may be used for roadway purposes would be defined.

Activity 204-205 Complete Studies for Route Location

This is a continuation of Activity 200-204 which would refine the location and extent of trackage, yards, shops and other railway facilities to reflect the land-use, traffic and roadway requirements associated with each relocation scheme.

Activity 205-211 Prepare Order of Cost Estimates for Fixed Facilities

A comparative cost estimate would be prepared for each alternative scheme considering all aspects of construction associated with railway and roadway changes, as well as the retirements. This cost estimate would be used in the evaluation and selection of the final alternative.

Activity 205-212 Assess Land-Use Benefits

The relative advantage and disadvantage of each alternative route would be compared in terms of its effect on the environment and the achievement of desirable land-use objectives in the Area. Both assessable and non-assessable benefits would be taken into account in sufficient detail to compare the land-use benefits of each scheme.

Activity 205-213 Assess Traffic Benefits

Each alternative would be compared in terms of its effects on traffic operations and the cost of the highway network planned for the area.

Activity 205-214 Determine Property Requirements and Cost

After the railway and any associated roadway geometrics are developed property requirements would be determined and detailed cost estimates prepared. This would include an assessment of the value of railway property which would be released for other uses.

Activity 211-215 Develop Staging Program for Alternatives

A staging program for the alternatives would be developed to coincide with roadway planning and prospective land-use development in the Area. This program would then be used to indicate the financial requirements for each year for implementation.

Activity 211-216 Evaluate and Rate Alternatives

The two schemes would be evaluated and compared with the option of retaining the existing tracks and carrying out a grade separation program by using the rating technique developed in Activity 200-201. The comparison would include all of the information developed in the six preceding activities. All cost would be compared on a similar basis using equivalent annual amounts or present worth.

Activity 216-217 Select Recommended Scheme

The results of the evaluation and rating in the previous activity would be reviewed with the Study Committee to select one scheme for functional planning.

B. FUNCTIONAL PLANNING

Activity 217-218 Develop Design Standards

Design standards would be confirmed with the railways, Ministry of Transportation and Communications, and Sudbury City Engineer.

Activity 217-219-221 Railway Functional Planning

This would involve the detailed planning and the preparation of plans at a scale of 1" = 400' to clearly show the rail facilities, geometrics and right of way for the selected scheme.

Activity 217-220-222 Roadway Functional Planning

Plans would be prepared at a scale of 1" = 400' to indicate specific geometrics and right of way requirements for roadway improvements associated with the selected railway relocation scheme.

Activity 222-223 Text and Exhibits for Draft Report

The text of the final report would be drafted. This would document all the information developed throughout the course of the Study. Exhibits and tables would be included as necessary.

Activity 223-224 Review and Approve Draft Report

This period would enable the Study Committee to review the context of the report prior to printing the final document.

Activity 224-225 Final Draft

Any changes considered necessary would be made at this time and the complete report prepared for printing.

Activity 225-226 Print Final Report

A period of four to six weeks would be required to print the final report.

### 6.1 TIME SCHEDULE

It is anticipated that 32 weeks would be required to complete the study after receiving the approval to proceed from the Study Committee. A further four to six weeks would be required to print the final report.

### 6.2 ESTIMATE OF COST

It is estimated that the cost of performing the work indicated above would be \$75,000. This includes an amount of \$3,000 for printing the final report which would need to be reviewed later when the total number of reports, pages and exhibits are determined. However, if the roadway planning and land-use development portion of the Study were performed by City of Sudbury Staff, the total amount may be reduced by \$16,000. A further reduction may be possible if the contingency allowance of \$4,000 is not required to investigate unforeseen conditions during the course of the Study.

### 6.3 STUDY ORGANIZATION AND STAFF

It is proposed that the Study will be carried out by a team consisting of the Consultant's staff supported by staff from the City and where necessary by the railways, who would assist the Consultant with data procurement and analysis. Should the City elect to carry out the roadway and land-use aspects of the work, technical personnel would be assigned to the Study by the City.

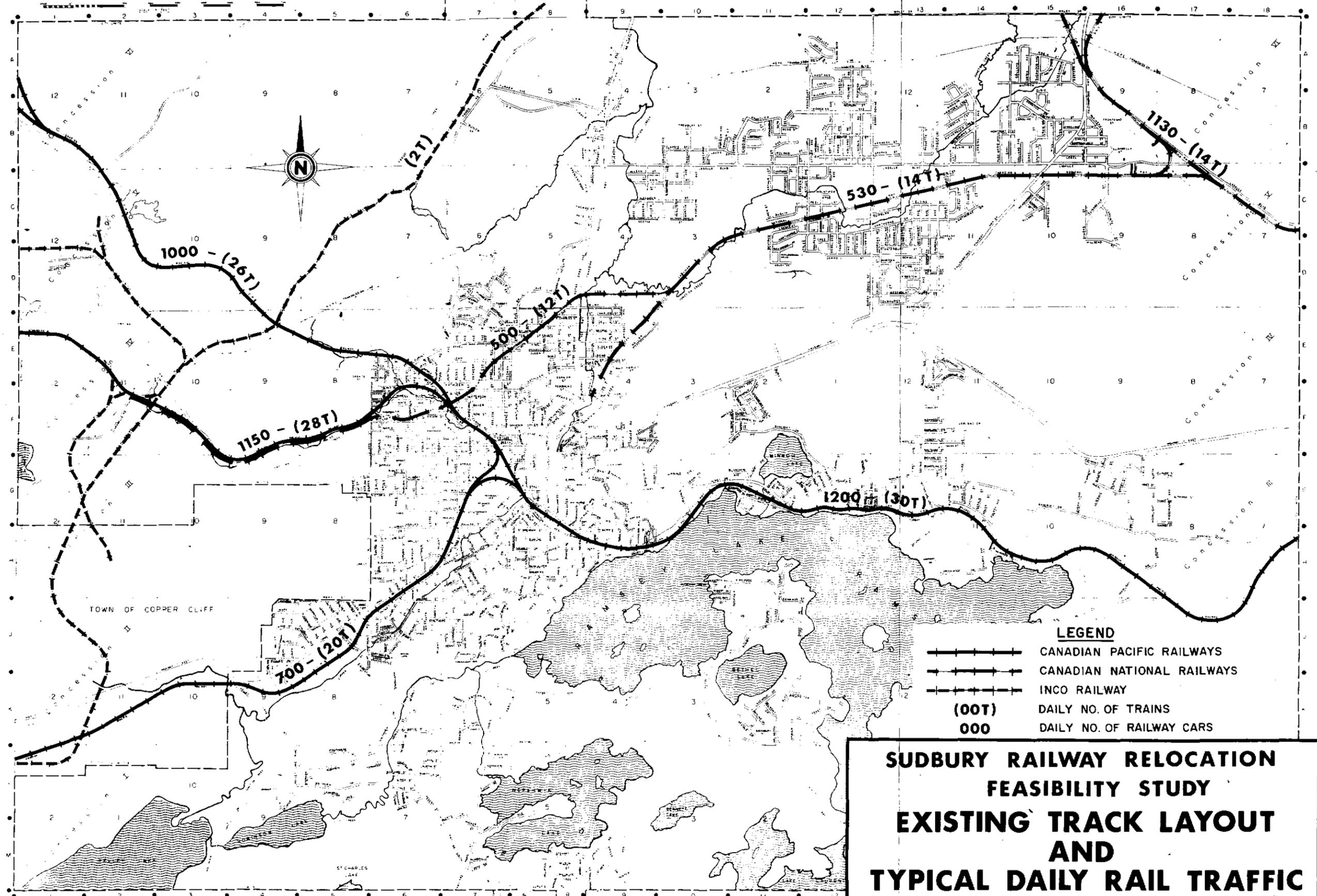
As was the case in Stage I, the Consultant's project team would include Mr. A.N. Mitton as Project Manager and Mr. D. McCorquodale, Vice President and Chief Railway Planner as Technical Director. A supporting staff of engineers and technicians would be drawn from De Leuw, Cather's permanent personnel.

### 6.4 METHOD OF PAYMENT

The Consultant shall be paid for the performance of the work in a manner satisfactory to the City of Sudbury on the basis of professional time taken plus reimbursement for direct expenses properly incurred in the performance of the work. The fee shall be based on Scale I of the Scale of Fees of the Association of Professional Engineers of Ontario.

# CITY OF SUDBURY

PREPARED BY THE CITY OF SUDBURY ENGINEERING DEPARTMENT



**LEGEND**

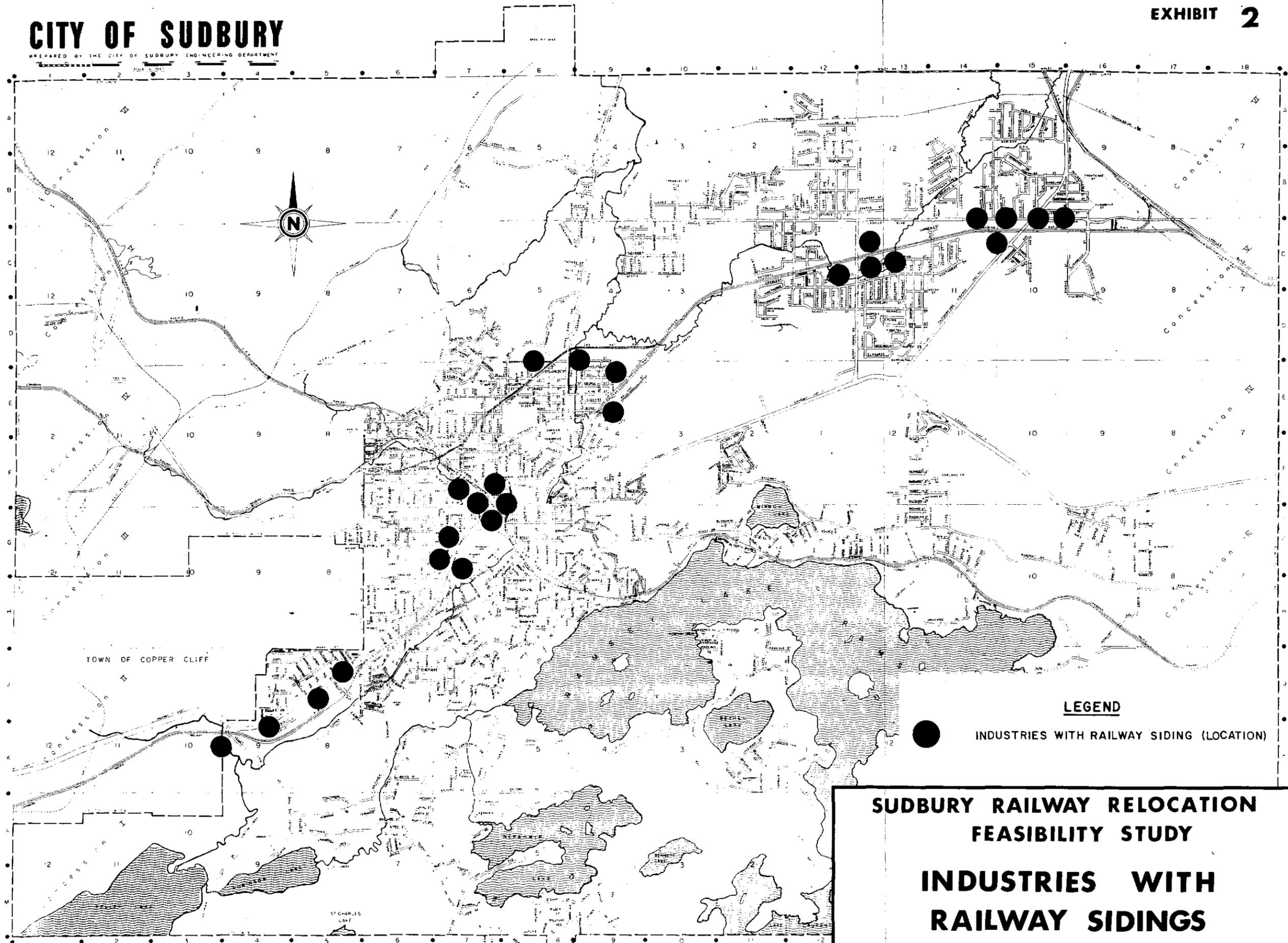
	CANADIAN PACIFIC RAILWAYS
	CANADIAN NATIONAL RAILWAYS
	INCO RAILWAY
(00T)	DAILY NO. OF TRAINS
000	DAILY NO. OF RAILWAY CARS

**SUDBURY RAILWAY RELOCATION  
FEASIBILITY STUDY  
EXISTING TRACK LAYOUT  
AND  
TYPICAL DAILY RAIL TRAFFIC**

De Leuw, Cather  
consulting engineers

# CITY OF SUDBURY

PREPARED BY THE CITY OF SUDBURY ENGINEERING DEPARTMENT



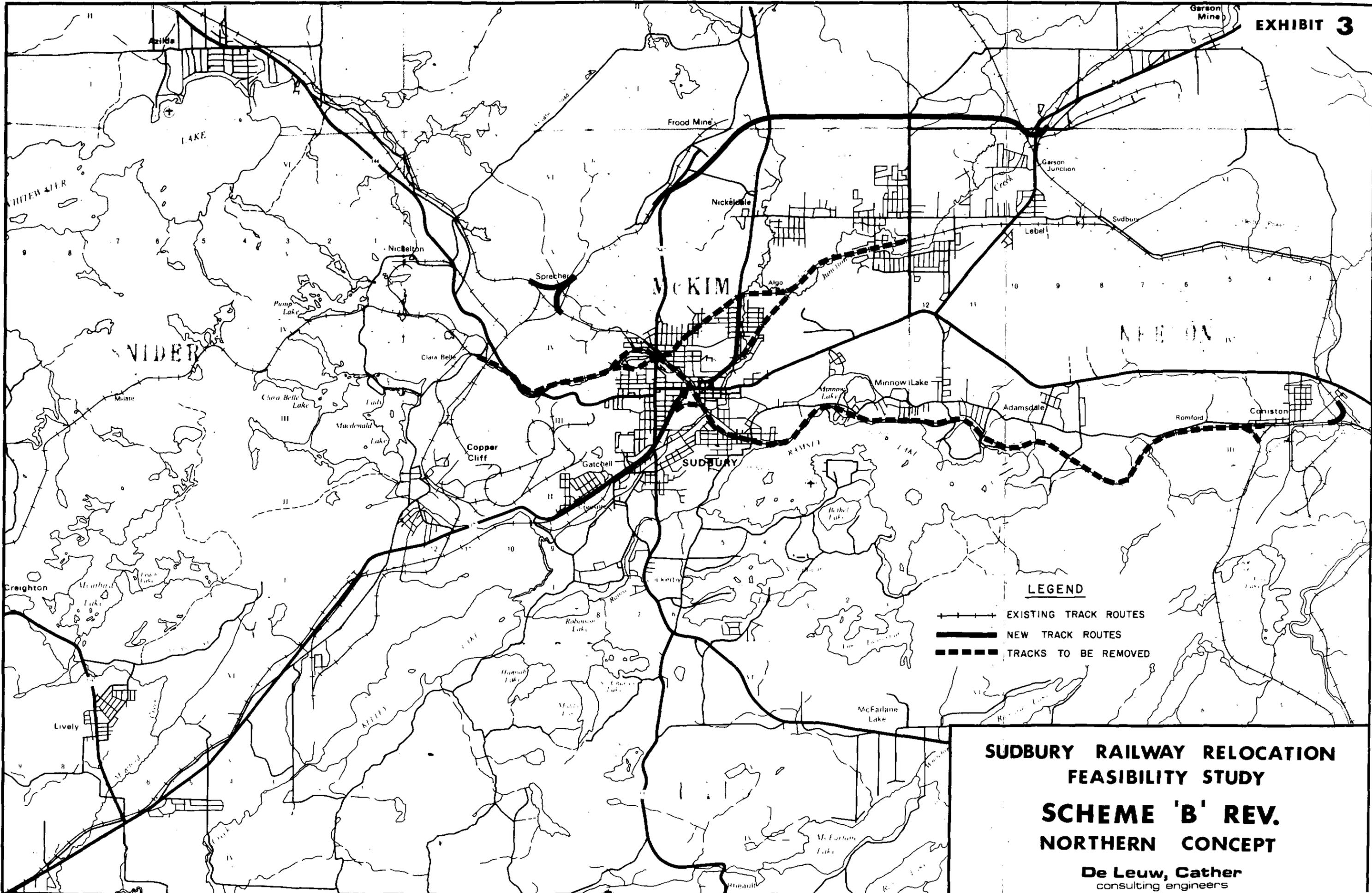
### LEGEND

● INDUSTRIES WITH RAILWAY SIDING (LOCATION)

## SUDBURY RAILWAY RELOCATION FEASIBILITY STUDY

# INDUSTRIES WITH RAILWAY SIDINGS

De Leuw, Cather  
consulting engineers



LEGEND

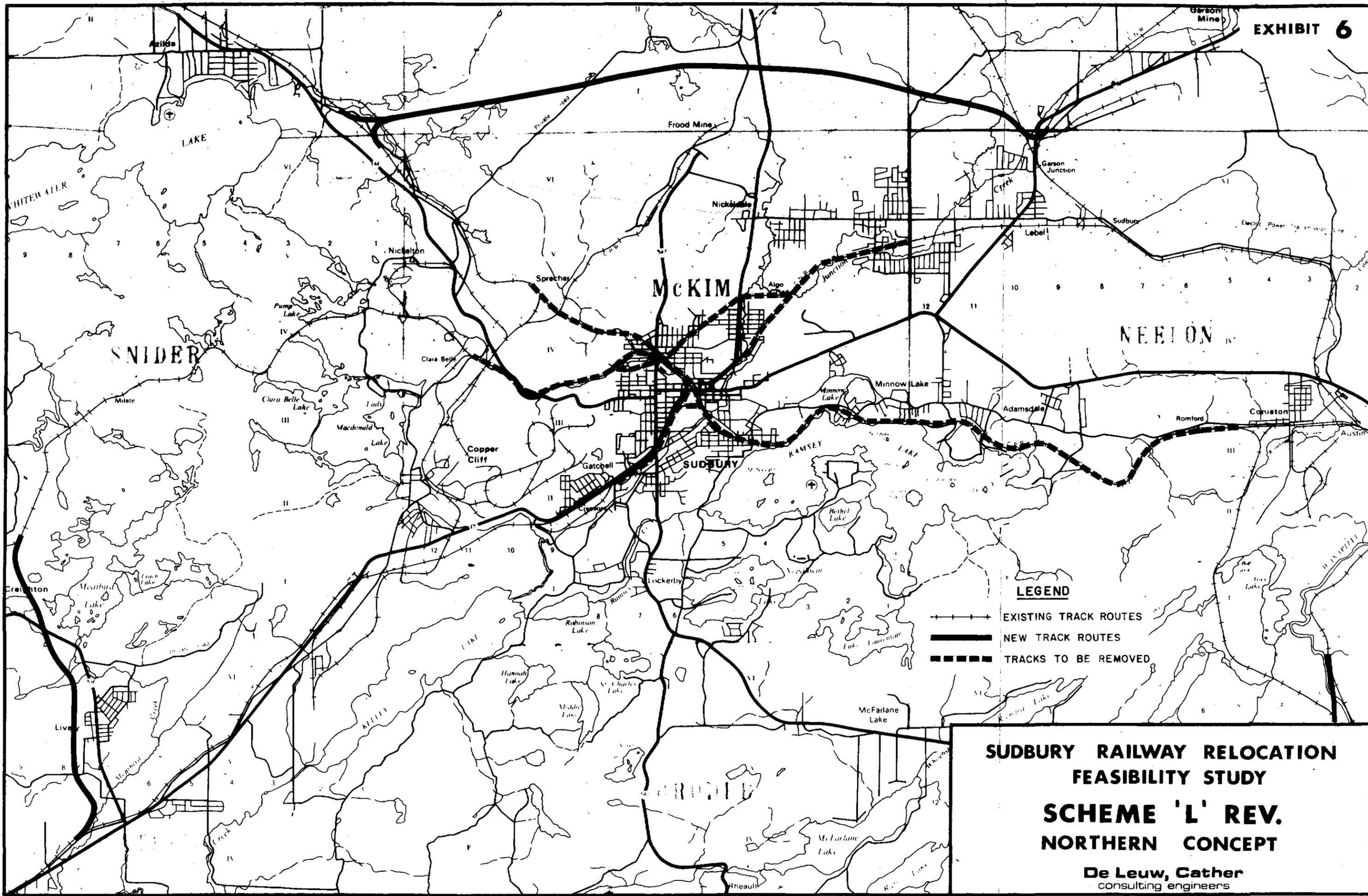
- — — — — EXISTING TRACK ROUTES
- NEW TRACK ROUTES
- - - - - TRACKS TO BE REMOVED

**SUDBURY RAILWAY RELOCATION  
FEASIBILITY STUDY  
SCHEME 'B' REV.  
NORTHERN CONCEPT**

**De Leuw, Cather**  
consulting engineers







**SUDBURY RAILWAY RELOCATION  
FEASIBILITY STUDY  
SCHEME 'L' REV.  
NORTHERN CONCEPT**

**De Leuw, Cather**  
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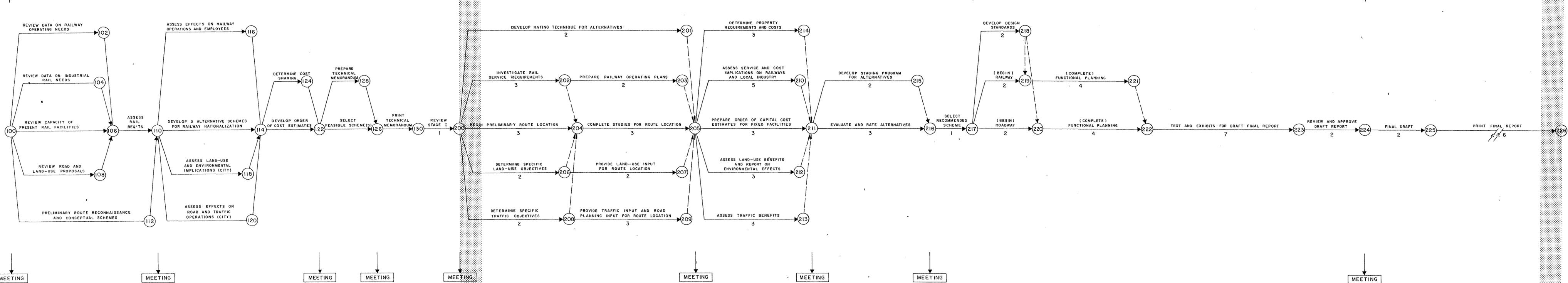
STAGE I

STAGE II

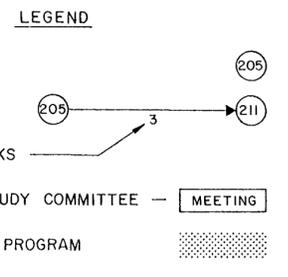
INVENTORY AND CONCEPTUAL PLANNING

FEASIBILITY ANALYSIS OF ALTERNATIVE RELOCATION SCHEMES

FUNCTIONAL PLANNING FOR RECOMMENDED SCHEME



TENTATIVE WORK PROGRAM



SUDBURY RAILWAY RELOCATION  
FEASIBILITY STUDY

WORK FLOW CHART