9.0 TRUCK BY-PASS ROUTE

9.1 BACKGROUND

Fort Frances is situated along one of the major highway links between Thunder Bay and Winnipeg as well as serving as an important border crossing to Minnesota. As such, a significant amount of commercial truck traffic passes through the town, in both an east-west and north-south direction. In addition to the through traffic, the local natural resources based industry generates substantial truck traffic. This truck traffic impacts on congestion on the main arteries and the level of service at major intersections.

Current east-west through truck traffic on Highway 11/71 is estimated to be 435 trucks per day (TPD). With an average yearly growth rate of 1.5% per year, the projected truck traffic in Year 2006 is estimated to be 505 TPD. Some increase in this traffic is anticipated as a result of the new OSB plant in Barwick. Stone-Consolidated woodlands personnel anticipate that an annual increase of 8000 trucks (an average of 25 trucks per day, peaking at 51 trucks per day in winter months) will pass through Fort Frances from east to west to service the OSB plant after 1997. This results in additional round-trip truck traffic of 50 TPD, increasing the overall volume to 555 TPD, or approximately 202,575 trucks per year.

In order to minimize the impacts of through traffic on downtown streets, the 1969 "Fort Frances Traffic Study" report recommended diverting the main highway route from the east onto Church Street, between Shevlin Yard and Central Avenue. A subsequent 1987 study, "Official Plan of the Fort Frances Planning Area", incorporated the recommendations of the 1969 traffic study, but further recommended a two lane, signed truck route along Eighth Street and McIrvine Road.

Internal studies carried out by the Town of Fort Frances identified two possible by-pass route configurations. Option 'A' would run along Eighth Street to McIrvine and continue west from there until it eventually links up with King's Highway. Option 'B' would run south down McIrvine to King's Highway. Option 'B' would be the least costly as it requires less new road construction.

The by-pass route outlined above is illustrated on Figure 8. The route, based on Option 'B', would begin east of Fort Frances south of the Reserve where a CN Rail crossing would be required. The route would continue north of the CN line to Eighth Avenue and west along Eighth Avenue to McIrvine Road and south on McIrvine to King's Highway/Highway 71.

9.2 BENEFITS OF A TRUCK BY-PASS ROUTE

A truck by-pass route along Eighth Street would allow all east-west through traffic to entirely by-pass the downtown streets. The benefits of such a truck route to the Town of Fort Frances would be numerous. These benefits would include:

- Reduced pavement wear on downtown streets by minimizing truck traffic, with resultant savings for the Town in long-term maintenance costs.
- Reduced travel time for through truck traffic with resultant cost savings to Stone-Consolidated Corporation and Voyageur Panel (Barwick OSB plant).
- Improved safety for residents in the downtown area.
- Reduced traffic congestion on downtown streets as a result of the diverted traffic.
- Benefits to the Mill if combined with future plans to relocate the woodyard.

A detailed discussion of these benefits follows.

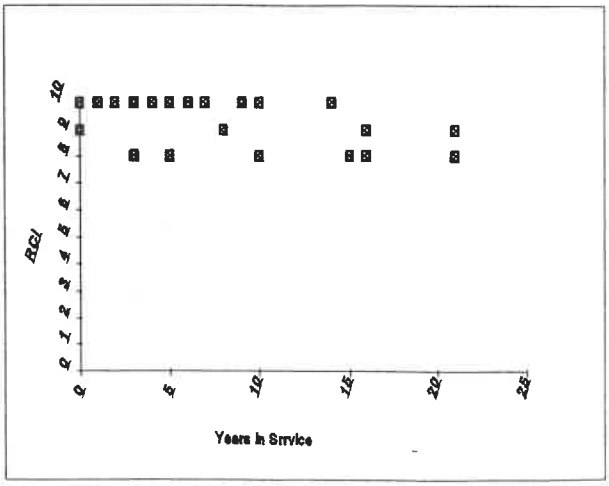
9.2.1 Pavement Condition

A detailed analysis of the influence of truck traffic on pavement deterioration on Highway 11/71 between sections 00005A and 000024 was carried out based on the following information:

- historical pavement surface condition data;
- truck traffic;
- the Ontario Pavement Analysis of Cost (OPAC) deterioration models for flexible pavements; and
- Literatures review.

Pavement Surface Condition Data

Scatter Plot RCI Versus Years in Service



Historical pavement surface condition data was provided by the Town of Fort Frances Engineering Department. Data is based on the surface condition rating, also known as Riding Comfort Index (RCI), a subjective estimate on a 0 to 10 scale used to measure pavement deterioration over time. Newly constructed pavements typically have an initial RCI value 8.5 to 10 and the RCI value gradually decreases over time as the pavement surface distorts under the action of traffic loads and climatic influences. On class-A highways, pavements are normally considered to have deteriorated to an unacceptable condition when the RCI reaches 4.5. The above scatter plot

shows the historical RCI plot over years in pavement service between pavement section 00005A on Highway 11, West Town Limit and 000024 on Mill Road, East Town Limit. The scatter plot does not show any significant trend of pavement deterioration over the service life.

Truck Traffic

As indicated in Section 9.2 above, the volume of truck traffic for Year 2006 in the Town of Fort Frances is estimated to increase to 555 TPD or 202,575 trucks per year. Truck class distribution and their equivalent truck load factors are summarized in Table 9-1. The truck classification and utilization rate for Hwy11/71 at the Town of Fort Frances were obtained from MTO's 1988 Commercial Vehicle Survey Station Summary Report. The average Truck Load Factor (TLF) per truck, for each truck class, is the weighted average sum of each axle group of that truck. The overall damage due to truck loads is measured with Equivalent Single Axle Load (ESAL) and refers to pavement damage loading that is equivalent to damage caused by a 18,000 lbs. axle load. The ESAL/day for each class of truck is the multiplication of ESAL/truck/class and the total number of trucks in that class per day.

Table 9-1
Year 2006 TLF and ESAL

Truck Type	** % of Total Truck Fleet	**Number of Empty Trucks	**Number of Loaded Trucks	*Truck Load Factor (Empty)	*Truck Load Factor (Loaded)	ESAL/Day
2-axle	7.5	13	25	0.4	1.587	44.88
3-axle	24.2	42	80	0.5	1.67	154.60
4-axle	4.4	7	15	0.52	1.80	30.64
5-axle	48.5	82	163	0.54	1.88	350.72
6-axle	11.0	18	38	0.72	2.42	104.92
7-axle	4.4	7	15	1.35	4.50	96.95
OSB Trucks***	-	25	25	1.35	4.50	146.25
					Total ESAL/Day	908.96

* "The Influence of Truck Traffic on Pavement Deterioration in the City of Winnipeg," M.Sc. Thesis, Alam,1996

** Ontario Commercial Vehicle Survey 1988, Station Summary Report.

*** Based on Stone-Consolidated Corporation's estimate of additional pulpwood truck deliveries to Barwick OSB plant.

In the Year 2006, Highway 11/71 between section 00005A and section 000024 is expected to experience approximately 330,000 ESAL/Year, compared with the existing loading of 250,000 ESAL/Year. Rerouting the truck traffic through a truck bypass route would reduce the Year 2006 truck traffic to 300 TPD. This will result in 165,000 ESAL/Year truck loading in Year 2006, compare to the projected loading of 330,000 ESAL/Year.

The OPAC Model

OPAC provides one of the few models that separates the load-associated deterioration from that due to climatic causes. The characteristics of RCI versus years in service functions estimated by the OPAC model are illustrated below for traffic loads ranging from 0 ESAL's per year to 4,000,000 ESAL's per year. This diagram has been developed for a pavement with a 127 mm surface course, a 203 mm granular base course and a 355 mm sub-base course. This diagram shows that Asphalt Concrete pavement in Ontario's environment may be expected to deteriorate to terminal condition (RCI<= 4.5) in about 40 years without any significant truck loads.

OPAC Flexible Pavement Deterioration Model

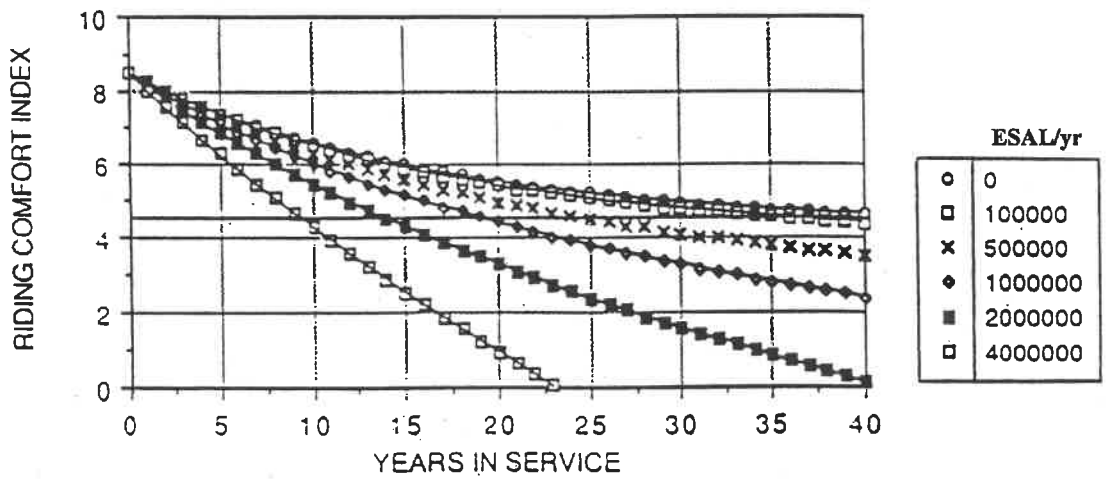
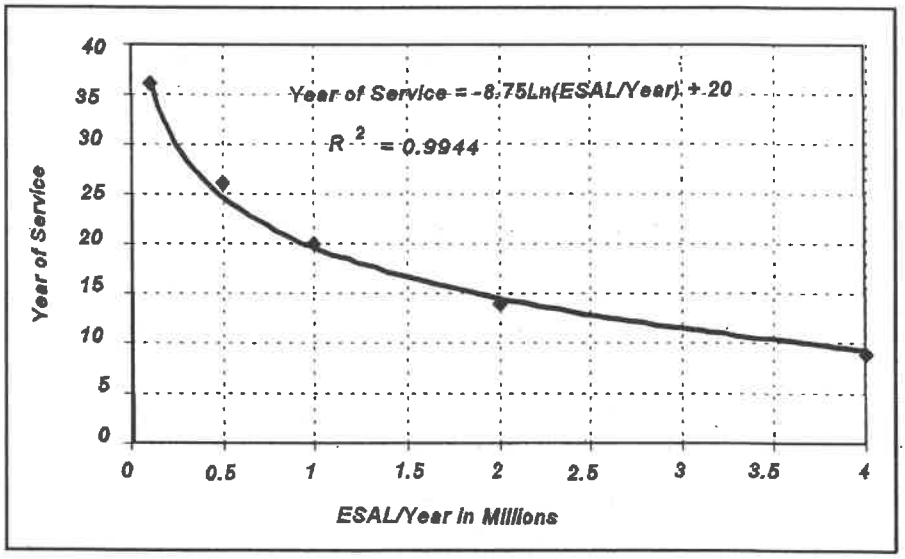


Table 9-2 summarizes the years to initial pavement failure estimated from the OPAC model. The prediction of the pavement service life is based on the assumption that the initial RCI is equal to 8.5. The pavement surface condition data provided by MTO indicates an initial RCI rating of 10 for newly constructed pavements. Therefore, a higher service life can be expected for the same loadings shown in Table 9-2.

Table 9-2
Flexible Pavement Service Life for Different Load Groups

Annual ESAL Loading	Expected Pavement Life
0	40
100,000	36
250,000	32
500,000	26
1,000,000	20
2,000,000	14
4,000,000	9



Analysis of Results

The expected life of a flexible pavement with traffic loads ranging from 0 to 300,000 ESAL/year is normally between 30-40 years. Based on existing or Year 2006 loading (without a truck bypass), the pavement sections will need to be rehabilitated within the 30-35 years of their service life. Due to the proposed truck bypass, the same pavement sections are expected to experience approximately 150,000 ESAL/year in 2006, thus, increasing the pavement service life to 35-40 years (compared to 30-35 years). The deterioration of a flexible pavement that has accumulated less than 200,000 ESAL/Year is similar to the pavement with zero loading, and is expected to deteriorate to its terminal condition due to climatic loading (Alam, 1996).

The current cost of reconstructing the rural roads and urban streets currently being utilized by through truck traffic is estimated to be approximately $5,000,000. These pavements have an estimated life expectancy of 30 years under current traffic, requiring a reconstruction budget allocation of $170,000 per year for the Town of Fort Frances. If the truck by-pass route is constructed, the same pavements are estimated to have a life expectancy of 35 years requiring a reconstruction budget allocation of $140,000 per year. Based on the above analysis, the proposed truck by-pass route would result in an annual cost benefit of $30,000 per year to the Town in reduced pavement reconstruction works.

9.2.2 Truck Travel Cost

A separate routing analysis was carried out to estimate the truck-km per day and truck-travel time per day for different truck routing options. Figure 9 shows the proposed bypass and existing routing options. Table 9-3 summarizes the routing cost in terms of total travel time and total truck kilometer travelled for the estimated Year 2006 through truck traffic of 555 TPD. Total distance travelled with all three options are similar but the truck by-pass has a significant saving of total travel time compared to the present route.

Table 9-3
Truck Travel Time and Distance Travelled By Different Routing Options

Routes	Total Travel Time per Day (hrs.)	Total Distance Travelled per Day (km)
I- Truck By-Pass	83	3,615
II - By-Pass to Portage	157	3,650
III - Present Route	222	4,068

Based on the above analysis, bypass routing (Route I) is expected to save 139 hrs of truck operation per day in the Year 2006. This is a significant user cost saving compared to the existing truck routing via Front Street.

The operating cost for trucks varies up to a maximum of $65.00 per hour for large pulpwood trucks. Based on an estimated average operating cost of $50.00 per hour for vehicles of this type, it is estimated that the truck by-pass route (Route I) would save the users $6950/day, or annual savings of $2,540,000. A truck by-pass would be a significant benefit to all commercial suppliers servicing, not only Fort Frances but, the entire region. Such a project would likely be welcomed in particular by the resources based industries in the region. A substantial portion of overall savings would be achieved by the two major industries in the region, Stone-Consolidated Corporation in Fort Frances and Voyageur Panel OSB plant in Barwick.

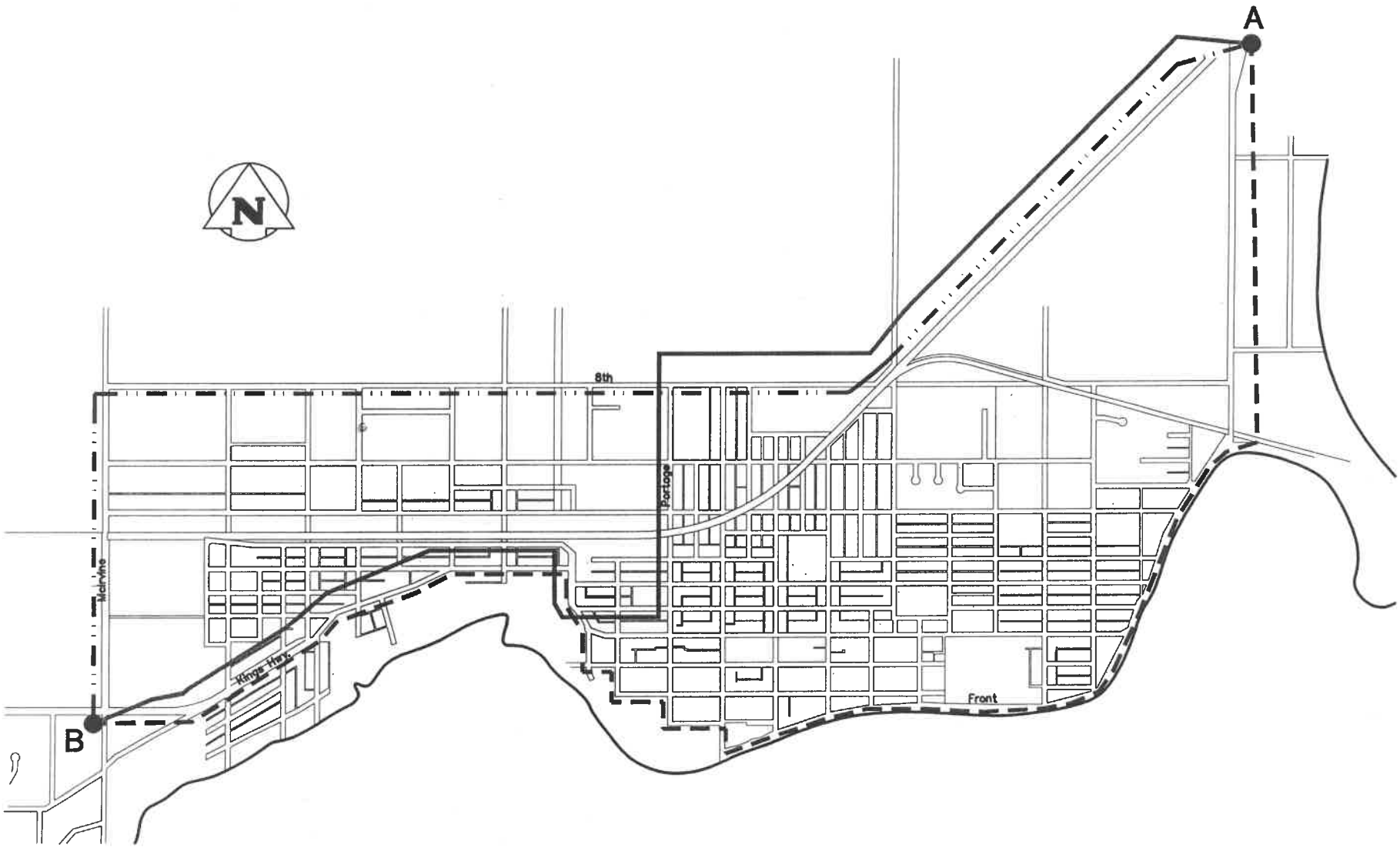


Figure 9

Truck Travel Time for Different Routing Options: Point A to B

- Route I (Proposed By-Pass Route) : 9 minutes
- Route II (By-Pass to Portage) : 17 minutes
- Route III (Present Route) : 24 minutes

Based on an average annual east-west through truck traffic of 50 truck trips per day to the Voyageur Panel OSB Plant in Barwick and return, the plant would save a total of 4250 hours of truck travel time per year if the truck by-pass was constructed. This has an estimated value of $277,000 per year to Voyageur Panel.

Given the fact that Stone-Consolidated is the largest industry in the region, it is reasonable to assume that they would achieve the greatest benefits from a truck by-pass route. Based on the above analysis, it is clear that any trucks originating from the east would save approximately 8 minutes in travel time by taking the proposed truck by-pass route directly to the mill. This time savings would certainly apply to most contractors and suppliers servicing the mill operation.

The vast majority of the truck traffic related to the pulp and paper mill however, is generated through the delivery of pulpwood and wood chips. With the present mill/woodyard configuration, all pulpwood/chips delivery must travel directly to the truck scale at the Shelvin Yard. Material is then either off-loaded for storage at Shelvin or delivered directly to the Kraft/Paper Mill property. Given the current location of the truck scale and woodyard, a truck by-pass route is presently of little benefit to Stone-Consolidated with respect to their raw wood materials delivery. Clearly, benefits would only be achieved if combined with a relocation of the Shelvin woodyard. This matter is discussed further in Subsection 9.2.5.

9.2.3 Safety

Existing through truck traffic from the east currently utilizes the truck route, along Front Street to King's Highway and Highway 71. Generally, there is excellent compliance with this route. Along the route, these trucks must pass numerous intersections, residential areas and school zones. As a result, safety is a significant issue with respect to truck traffic through Fort Frances. The construction of a truck by-pass route would address this concern by minimizing the need for trucks to pass through the downtown area.

An additional safety benefit of a truck by-pass would be to minimize the transportation of hazardous materials through the downtown area. No data is currently available on the number of trucks which would fall into this category. It is expected, however, that the number will increase in the future with completion of the Barwick OSB plant. As an example, regular deliveries of resin to the OSB plant will likely arrive by truck from Thunder Bay, passing through Fort Frances en-route.

9.2.4 Traffic Congestion

The proposed Truck By-Pass Route could be employed for vehicles other than trucks to divert the significant International Bridge traffic from the main arteries. The 1969 Traffic Study projected summer 1990 external traffic to and from the bridge of 3400 trips per day. This traffic has a substantial impact on the main downtown streets, mainly Scott Street. The proposed by-pass could be linked to the bridge by way of Portage Avenue to Church Street.

This would complement the paper mill's future plans to construct a new paper machine east of Central Avenue, effectively closing Central Avenue to through traffic. In the event that Portage is employed as the main route to and from the proposed Eighth Street by-pass, the intersection modifications at 2nd and Portage and at Scott and Portage recommended in Sub-section 6.4 would have to be reviewed.

It should be noted that the diversion of bridge traffic may have some negative economic impact on the downstream area. This traffic, particularly during the summer tourist season is an important economic stimulant for many of the commercial enterprises along the route. In some communities, such as Kenora, the highway by-pass route met with considerable resistance from downtown merchants for this reason. From an economic and political standpoint it may be desirable to minimize the use of the by-pass for vehicles other than trucks by designating the by-pass only as a truck route.

9.2.5 Future Woodyard Relocation

As indicated in Subsection 9.2.2, the economic benefits of a truck by-pass would be substantially enhanced if combined with a relocation of the Stone-Consolidated woodyard, presently located at Shelvin Avenue and Front Street. A new woodyard located along the proposed Eighth Street by-pass route could result in substantial travel time savings for pulpwood delivery trucks originating from east of Fort Frances. With 22,000 pulpwood trucks arriving at the mill annually, even nominal travel time savings result in substantial economic benefits.

In 1990, the mill studied the feasibility of relocating the woodyard to a location north of Eighth Street adjacent to the mill's effluent treatment facility.[8] At that time, this plan was not found to be economically viable for the mill, as the cost of establishing a new woodyard was not sufficiently offset by operating savings. Such savings could, however, be achieved if a new woodyard was located along a by-pass truck route.

Over and above any truck travel time savings, a woodyard at the north limits of the Town would have significant operational benefits to the mill. Currently, woodyard operations at the Shelvin Yard are restricted to an 11:00 p.m. curfew because of noise problems. A relocated woodyard could operate on a 24 hour basis. Pulpwood could be shuttled from a new woodyard to the mill by way of Portage Avenue, which incorporates an underpass at the CN rail-line, utilizing smaller more cost-efficient vehicles.

It is clear that Stone-Consolidated would achieve substantial economic benefits from the construction of a truck by-pass route. It is difficult at this time to quantify these benefits as a detailed review of the entire mill wood-handling operation would have to be carried out. This is a complex issue and beyond the terms of reference of this study. Should the Town of Fort Frances choose to take further steps toward the implementation of a truck by-pass project, it is

[8] KGS Group, "Truck Storage Area, Woodyard and Lagoon Feasibility Study", Boise Cascade Canada Ltd., September, 1990.

recommended that the Stone-Consolidated mill be asked to undertake a detailed study of a relocated woodyard operation. Such a study could be carried out jointly with the Town's overall feasibility study of the project.

9.3 COST/FUNDING ANALYSIS

The total cost of a truck by-pass route along Eighth Street and McIrvine Road is estimated to be approximately $9,000,000. This does not include the cost of any improvements to Portage Avenue which may be necessary in order to accommodate access from the truck by-pass route to the Stone-Consolidated mill. A cost estimate breakdown is included in the Appendix.

Financing for this project may be available from a number of funding agencies. These could include:

- Connecting Links
- Heritage Group
- Northern Development and Mines

In addition to the above, cost sharing for this project may be available from both Voyageur Panel in Barwick and Stone-Consolidated Corporation in Fort Frances. Both companies gain considerable benefit from a truck by-pass route, simply from the stand-point of reduced travel time alone.

In order to estimate the present value of these benefits, a long-term interest rate of 8% and long-term inflation rate of 2% was used in this analysis. For purposes of the analysis, a 10 year plant life was assumed for the Barwick OSB plant. Based on these assumptions, and a $65.00/hr. truck operating cost, the present value of the travel time benefits to Voyageur Panel is estimated to be approximately $2,000,000.

As indicated in the previous section, the cost benefits to Stone-Consolidated are more difficult to quantify as they are based largely on a relocation of the woodyard. Given the magnitude of the trucking operation associated with the mill (22,000 trucks per year), one could assume that economic benefits of a by-pass route to Stone-Consolidated would be at least equal, if not greater, than those benefits to Voyageur Panel.

Based on the above benefits, significant portions of the construction cost of a truck by-pass may possibly be available from these local industries.

Overall, the benefit to the region of a truck by-pass route for Fort Frances is substantial. Based on total annual travel time savings of $2,400,000 per year, the present value of this benefit alone is approximately $30,000,000 over a 25 year time period. These benefits certainly justify the implementation cost of this project.

Depending upon the availability of governmental funding or cost sharing with local industries, it may be desirable to implement this project on a staged basis. An initial stage would require the construction of a road link from Mill Road/Highway 11 to Eighth Street. Including all of the initial project approvals and engineering, this portion of the project would cost in the order of $6,000,000. This could be reduced by a further $400,000 to $500,000 if asphalt paving is deferred. The final stage would include the improvements to Eighth Street and McIrvine Road which would add a further $3,000,000.