CHAPTER 5

MINI-TRAIN OPERATION WITH TRANSLOADING FACILITIES -- A FEASIBILITY STUDY

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EXECUTIVE SUMMARY

Study Objectives:

1. This Chapter summarizes a study of four grain handling and transportation alternatives for application on light density branch lines.

2. Each of the alternatives was structured to utilize the existing elevator system on the branch lines. The four alternatives examined were:

   - a mini train alternative: an independently owned/ operated power unit delivering modified grain cars from the elevator to a transloading facility on the main line where the grain would be transferred to a hopper car.

   - a short line alternative: an independently owned/ operated power unit delivering grain cars from the elevator to the mainline for train assembly.

   - a trucking alternative: an independently owned/ operated trucking fleet would delivery grain from the elevators to a transloading facility on the mainline. The grain would be transferred to a hopper car.

   - the do nothing alternative: continuation of the current system.

Study Methodology

1. Each of the four grain handling and transportation alternatives was examined for its technical feasibility.

2. Grain handling and labour implications for each of the four alternatives were also defined.

3. The operational economics of the four alternatives as applied to three typical branch line areas were defined.

4. Sensitivity analyses to show the variation in operational economics for changes in the underlying parameters are summarized in the report. Sensitivity analyses were conducted on the following parameters:

    - grain volumes
    - rail right of way acquisition costs and alternative rail maintenance options.

5. The comparative operational economics across the three areas was also examined. From this analysis it was possible to derive conclusions as to alternative applications.

<u>Conclusions</u>

1. Summary Table V-1 is a display of the four grain handling and transportation alternatives. The following can be concluded:

    - all power units for the four alternatives possess the technical capability for operation.
    - the most expensive power unit is the truck tractor with an annual cost of $19 thousand.
    - the short line and do nothing alternatives use the same grain cars as at present. Demurrage charges for the short line may run to $16 per grain car. Capital outlay for the modified grain cars is estimated at $7,433 per car and for the trucking at $12 thousand per trailer.
    - transloading facilities are required for the mini-train and trucking alternatives. Capital outlays are $210 thousand and $67 thousand respectively. This translates to an annual cost of $65.9 thousand (mini-train) and $42.2 thousand (trucking). Both facilities have adequate capacity.

2. Some grain handling restrictions are anticipated with the mini-train and trucking concepts. Each of these alternatives must load multiple cars (trailers) of grain equal to the capacity of a covered hopper car. Although the restrictions are not insurmountable, additional handling costs are incurred.

3. The labour implications of implementing the alternatives were not deemed as insurmountable. It was felt that if a small number of branch lines changed to any of the alternatives few labour problems would be experienced.

4. The operational economics of the branch line alternatives are shown in Summary Figure V-1. A number of conclusions can be derived as to possible applications and these are:

   - Trucking from elevator points to transloading facilities is the least costly up to a transport product of about 2.5 million ton-miles per annum. This represents branch lines from 30 to 120 miles in length handling between 3.0 and 0.8 million bushels respectively.

   - However, the cross hatched lines on the trucking and short line curves are indicative of the wide variation that may exist because of varying rail acquisition and rail maintenance values.

   - As the rail acquisition and rail maintenance costs increase, the range over which trucking is a viable alternative also increases.

   - In other words, if the existing trackage is in poor condition, then in all likelihood trucking is the least costly alternative.

   - On the other hand, if grain volumes are moderate to high in an area, the short line concept is applicable if the trackage is in reasonable condition. (Large cpaital outlays to maintain the track are not required).

SUMMARY TABLE V-1
GRAIN HANDLING AND TRANSPORT ALTERNATIVES
- COMPARISON -

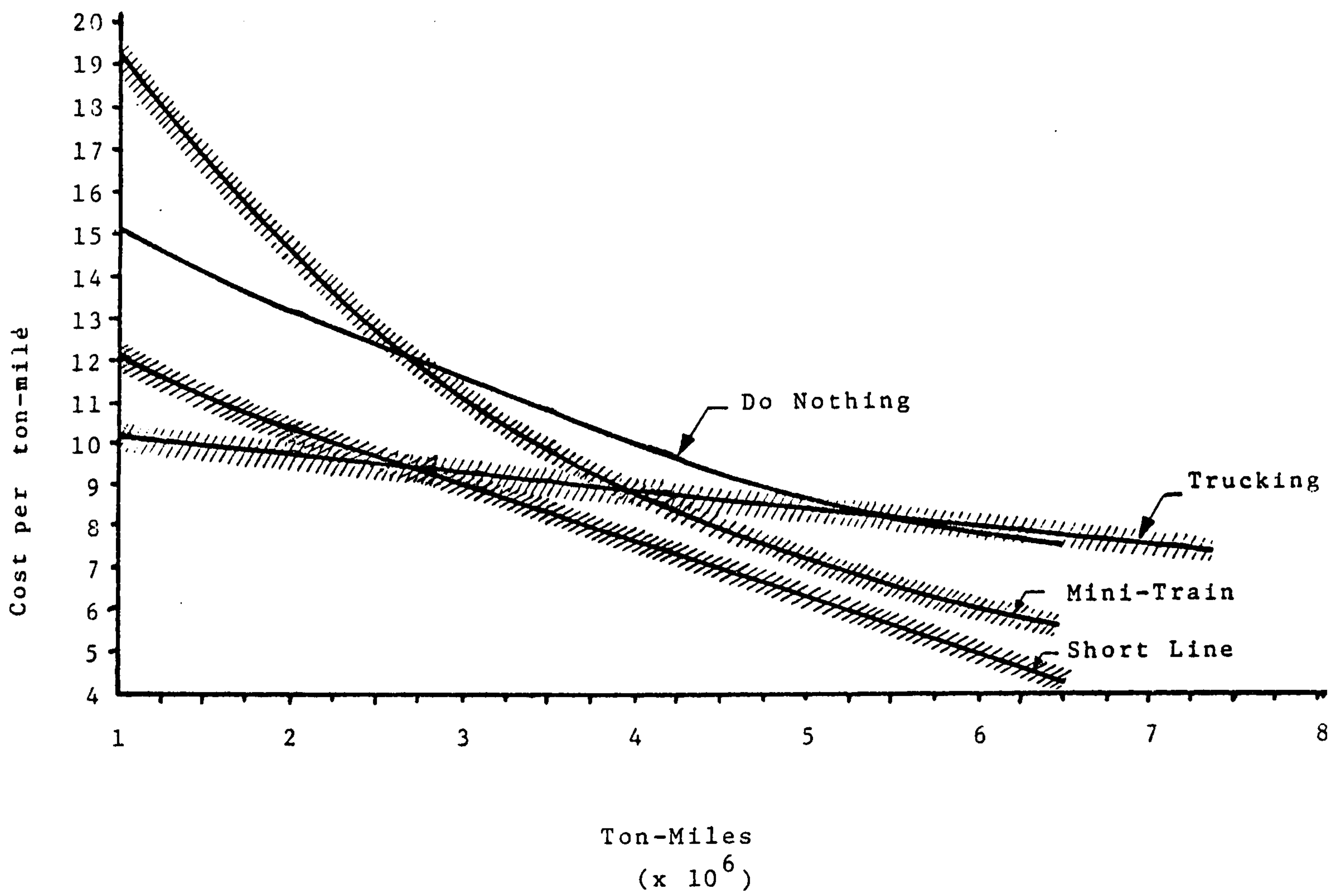
Component	Mini-Train	Short Line	Trucking	Do Nothing
Power Unit	Diesel Electric	Diesel Electric	Truck Tractor	Diesel Electric
Technical Capability	good	good	good	good
Capital Outlay	$80,000	$80,000	$37,500	as current
Annual Capital	10,518	10,518	18,720	as current
Operating Cost/Hour*	$5.45	$5.45	$10.36**	as current
Grain Cars				
Technical Capability	good	as current	hoppered trailer	as current
Capital Outlay	$7,433 per car	n.a.	$12,000 per trailer	as current
Annual Capital	$977	$16 per car***	$2,416	as current
Maintenance Costs	$200 per annum	as current	$890 per annum ****	as current
Transloading Facility				
Technical Capability	good	n.a.	good	n.a.
Capital Outlay	$210,067	n.a.	$66,575	n.a.
Annual Capital	$ 65,902	n.a.	$42,216	n.a.
Capacity	7.5 mm bu./year	n.a.	10.0 mm bu./year	n.a.
Elevator				
Total Capital	n.a.	n.a.	$5,000	n.a.
Annual Capital	n.a.	n.a.	$660	n.a.
Maintenance Costs	n.a.	n.a.	$200	n.a.
Grain Handling	some problems	as current	some problems	as current

* Excludes wages
** Based on 40 miles driving per hour
*** Two days demurrage per car
**** Based on 35,000 miles per annum

SUMMARY FIGURE V-1

OPERATIONAL ECONOMICS OF BRANCH LINE ALTERNATIVE

(cost per ton-mile versus transport production)



- In all applications the short line concept will reduce the annual subsidy requirements.

- The need for transloading facilities and grain car conversion negates the desirability of the mini-train concept. In other words the mini-train cannot compete with the short line because of the additional costs associated with the transloading facility. The advantage of loading to hopper cars does not make up for this additional cost.*

- The least desirable concept in economic terms is the continuation of the current system.

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* This assumes that the advantages of hopper car operations on the main line do not fully compensate for the costs of the transloading facility and the additional handling involved.

A Feasibility Study

MINI-TRAIN OPERATION WITH TRANSLOADING FACILITIES

INTRODUCTION

The agricultural economy of Western Canada has, historically, been reliant on rail as a major means of grain transportation. However, from the railway point-of-view, particularly in the case of operations on some branch lines*, diseconomies are experienced, and in many cases, the rail lines operate in a loss position. There are a number of symptoms of the problem and these are:

- gradual decline of the services offered on branch lines
- gradual decline of the physical condition of the branch lines
- gradual decline of the physical condition of some elevators and the eventual closing of some of the elevators.

The Grain Handling and Transportation Commission, as one of its major functions, is involved in deriving long term solutions for the handling and transportation of Western Canada grains. Undoubtedly, a long term solution may well eliminate all but heavy density branch

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* See List of Definitions at the end of this section of the report.

lines. However, in the interim, the branch lines must be maintained such that these are gradually phased out to be replaced by a more efficient grain gathering system.*

This study is concerned with the interim time period. The question approached is: <u>What are the most reliable and least costly methods of maintaining branch line operations for a period of 10 to 15 years while a modified structure of grain handling and transportation evolves?</u> During this time frame, any operation recommended should not create difficulties for the grain producers but offer him a variety of options to enter the grain gathering process.

Eventually, the grain gathering system may alleviate additional grain handling costs through widespread utilization of inland terminals or the phasing of specific branch lines into the overall larger system. The former alternative can minimize additional handling costs if it includes for example:

- cleaning and/or partial processing of grain at facilities developed at transfer points
- solid grain train shipments from one point
- direct loading of ships at Thunder Bay, Vancouver and Churchill.

Thus it follows that branch line alternatives should be considered in relation to the present system with a view to the long range possibilities. This study looks at a number of alternatives for moving grain off branch lines and into the mainline traffic stream.

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* Such a system may evolve on the inland terminal concept.

It has been suggested that one appropriate solution to the branch line problem might include the use of a mini-train* transferring the grain to larger grain trains at strategically located transloading points on the main line*. Such an operation could result in a more efficient movement of grain on main lines and higher traffic density branch lines, as well as a less costly movement of grain from elevators located on light traffic density* branch lines.

Systems other than mini-trains with transloading facilities might also prove to be more efficient and reliable than conventional rail. These include short line* operations and trucking* to some main line point.

Other competing transportation systems can also be identified. Farm or commercial trucking direct to an inland terminal or main line elevator is an example and may be typical of the grain handling system after the end of the next decade. However, these systems represent operations exclusive of branch line utilization and were not considered in this study.

Study Objectives

The primary objective of the study can be stated as follows:

> "To examine the technical and economic feasibility of a mini-train system with transloading to a grain train. The implications of this system on producers, elevator companies and railways are to be considered as well as its effect on labour relations."

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* See List of Definitions at the end of this section of the report.

In addition to the operation of the mini-train system costs were developed for three systems capable of operation in a branch line area. In total, the four systems compared were as follows:

1) Mini-train with transloading facilities on the mainline.

2) Short line rail operation utilizing a power source designated to the branch line. Main line grain cars would be used. The short line power unit would deliver empty grain cars to the elevators and deliver full cars to the main line for train assembly.

3) Commercial trucking from the country elevator to the mainline. Transloading facilities are required at a common main line point in this alternative.

4) The do nothing alternative. In this alternative operations are carried out under the present system. The trackage if necessary is upgraded and maintained for 177 thousand pound rail cars operating at 20 miles per hour.

Main line costs of grain train operation expressed in cents per bushels can vary depending on the type of car used. However, these were no considered in this report.

Scope of Study

This study summarizes an analysis of the technical and economic feasibility of mini-train operations on light density branch lines. The study is structured as follows:

1) The four grain transportation and handling alternatives are considered.

2) A number of typical branch line areas are identified and described.

3) The technical, economic and labour implications of each of the alternatives as applied to the typical areas are examined.

4) A series of sensitivity analyses which were conducted are summarized. Parameter changes were made in rail line acquisition costs, grain volume, and track maintenance costs. The results of these sensitivity analyses were cross tabulated over the branch line areas.

5) Conclusions are drawn concerning the best applications for the mini-train, the short line and the trucking alternative.

List of Definitions

The following is a list of definitions of rail terms as used in this study:

1. A Branch Line is a rail line in Prairie Canada of light weight steel (85 pounds per yard or less) in such a condition as to limit the speed and/or weight of trains. That is, the larger rail cars cannot be fully loaded and trains are restricted to speeds of 20 miles per hour or less. Other than periodic grain shipments, there is very little other traffic on these lines.

2. A Main Line is part of the national rail network. The rails are generally of a weight of 110 pounds per yard and the rail bed is in good to excellent condition. All weights and freight car types can be handled. No dead weight or other shipping problems occur.

3. Light Density refers to the annual amount of grain handled on a particular branch line. Generally, 4.0 to 5.0 million bushels per year would be considered as the upper limits of a light density line.

4. <u>Dead Weight</u> is the unused capacity of a freight car. For example, if a box car has a capacity of two thousand bushels of wheat but because of a bridge condition it can only be loaded to 1,500 bushels the remaining 500 bushels is dead weight.

5. <u>Mini-train</u>. The mini-train concept is an independent rail operation on a branch line. It can be owned/operated by a major rail company, a grain company or an independent agent. The mini-train company will have as its rolling stock one power unit, some maintenance equipment, and a number of modified grain box cars. The mini-train company operates between the elevators on the branch line and a transloading facility on the mainline. At the transloading facility grain from the modified box cars is transferred to a mainline rail hopper car.

6. <u>Short Line</u>. The short line concept is an independent rail operation on a branch line. It can be owned/operated by a major rail company, a grain company or an independent agent. The short line rail company will have as its rolling stock one power unit and some maintenance equipment. The short line rail company operates between elevators on the branch line and the main line. The short line company delivers loaded main line grain cars to the main line for train assembly.

7. <u>Trucking</u>. The trucking concept is an independent trucking operation in a branch line area. It can be owned/operated by a major

rail company, a grain company or an independent agent. The rolling stock consists of a fleet of truck tractors and hoppered grain trailers. The trucking company delivers grain from the branch line elevators to a transloading facility on the main line.

8. Rail to Rail Transloading Facility. This is a system designed to transfer grain from the modified box cars of the mini-train company to covered hopper cars of a main line rail company.

9. Truck to Rail Transloading Facility. This is a system designed to transfer grain from the hoppered trailers of a trucking company to covered hopper cars of a main line rail company.

GRAIN HANDLING AND TRANSPORTATION ALTERNATIVES

The analysis which was conducted during this study examined a number of possible alternatives for handling and transporting grain in branch line areas. Although mini-train systems with transloading facilities may be shown to be more efficient than conventional rail on specific light density branch lines, other alternatives also exist which may, in certain instances, be even more attractive. A comparative analysis of a number of systems was conducted such that meaningful conclusions as to specific operations could be generated.

Specifically, four grain handling and transportation alternatives* were examined and these were:

1) an independently owned power unit operating on the branch line, utilizing specially constructed grain cars and a transloading facility on the main line; the mini-train alternative;

2) an independently owned power unit operating on the branch line delivering main line grain cars to/from the elevators for grain train assembly; the short line alternative;

3) commercial trucks carrying grain from the elevators to a transloading facility on the main line; the trucking alternative; and

4) continuation of the current system; the do-nothing alternative.

The above alternatives were examined both technically and economically as they apply to specific branch line areas. This section of the study describes each of the grain handling and transportation alternatives. They typical areas chosen for alternative evaluation are defined in the next section.

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* The detailed examination conducted in this study deals with maintaining or utilizing the country elevator system on the branch line. Direct farm delivery to main line elevators or inland terminals and over platform loading alternatives were not considered. The underlying reasoning was as follows:

- The concepts outlined are intended to utilize the country elevator for some time into the future, and
- This provides the grain companies with the opportunity to assess the future and gradually phase in new facilities to serve changing demands while eliminating the need for immediate large capital outlays.

The Mini-train Alternative

The mini-train concept is an independently owned/operated* rail line on a specific light density branch line. The rolling stock consists of a power unit, assorted maintenance equipment and modified grain box cars. The modified grain cars are loaded at the elevator and delivered to a transloading facility at the junction of the branch line and the main line. Here the grain is transloaded into a main line covered grain hopper car.

There are four major components to consider in the mini-train concept and these are:

- the power unit,
- the converted grain car,
- the transloading facility, and
- the country elevator.

-- The Power Unit: Technical Feasibility

A detailed description of the power units examined is provided in Appendix A**. Two alternative power units*** were examined and these were:

- a used diesel electric switching locomotive,
- a Whiting Corporation Model 11-TM Trackmobile.

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* The owner/operator might be a major rail company, a grain company or a third party agency.

** The Appendices of this chapter are not included in this volume of the report but are available upon request.

*** An off-track power unit was eliminated from consideration because of high capital requirements and technical problems. See Appendix A.

The diesel electric switching locomotive of approximately 70 tons weight generates a tractive effort of about 42 thousand pounds for train start-up. The technical capabilities of the switching locomotive can be summarized as follows:

- in cold weather the switching locomotive can start up to seventeen 80 ton box cars*,

- the engine can haul approximately 26 cars fully loaded at 20 miles per hour,

- on a 2.0 percent grade at 2.5 miles per hour the engine can haul approximately eleven loaded cars,

- restricting grades on the branch line examined were 1.0 percent to 1.5 percent. This engine can haul 17 to 20 fully loaded grain cars under these conditions, and

- the weight of switching engines runs from 65 to 70 tons. A loaded grain car will weigh up to 80 tons. Therefore, the weight of the engine is not a restricting factor.

Considering the above remarks, the diesel switching locomotive has the technical capabilities for operation of the mini-train concept.

The Whiting 11-TM Trackmobile has a gross weight of 60 thousand pounds. With reference to Figure A.3, page A.8**, the trackmobile

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* A weight of 80 tons is more or less equivalent to a grain box car loaded with two thousand bushels.

** The Appendices of this chapter are not included in this volume of the report but are available upon request.

borrows weight from the adjacent rail car through the use of hydraulic jacking couplers. The effective weight of the engine becomes:

- with one coupler, 100 thousand pounds.
- with two couplers, 140 thousand pounds.

This gives a maximum tractive force of 42 thousand pounds with two couplers and 30 thousand pounds with one coupler.

Considering one coupler* in use, the following can be concluded:

- the TM-11 can start up to twelve 80-ton box cars in cold weather,
- at 20 miles per hour, the TM-11 can pull approximately** 12 fully loaded grain cars,
- on a 2.0 percent grade at 2.5 miles per hour, the TM-11 can haul approximately five box cars,
- on the limiting 1.0 to 1.5 percent grades, the TM-11 can haul seven to eleven grain cars, and
- the weight of the engine is not a controlling factor.

Considering the above remarks, the Whiting TM-11 Trackmobile also has the technical capabilities for operation of a mini-train.

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* One coupler in use is the most likely type of operation for the TM-11 on a branch line.

** Numbers given are approximate since power tractive curve was not available.

-- <u>The Power Unit: Economic Feasibility</u>

Appendix 'A"* summarizes the economics of operation of the diesel switching engine and the TM-11 Trackmobile. The power unit economics are summarized as follows:

1) Diesel Electric

- Capital Outlay Annual charge over 15 years at a 10.0 percent interest rate	$10,518
- Annual Maintenance Schedule Costs per operating hour	$1.57
- Fuel Charges Costs per operating hour	$3.88
- Total Variable Costs per operating hour (Fuel and Maintenance)	$5.45
- Total Annual Costs for one thousand hours of operation**	$15,968

2) TM-11 Trackmobile**

- Capital Outlay (annual cost)	$21,276
- Annual Maintenance Schedule Costs per operating hour	$1.09
- Fuel Charges Costs per operating hour	$3.65
- Total Variable Costs per operating hour (Fuel and Maintenance)	$4.74
- Total Annual Costs for one thousand hours of operation**	$26,016

* The Appendices are available on request.

** In the applications examined, one thousand hours of operation is more or less typical.

*** Maintenance schedule was simulated from available data as was fuel consumption.

-- <u>Comparison of Power Units</u>

Table V-2 compares the diesel switching locomotive with the TM-11 Trackmobile. Both engines can technically perform the work required of a mini-train or short line operation. The diesel electric switching locomotive is the better choice because of the lower annual cost of $16 thousand as compared to $26 thousand for the TM-11 Trackmobile.

-- <u>Grain Car Modifications</u>

Appendix 'B'* summarizes the grain car modification analysis. In all, five alternatives were examined and these were:

- Alternative I: conventional grain cars with a side car dumper
- Alternative II: grain car with bottom trap doors, no hoppering
- Alternative III: grain car with two hoppers and two bottom gates
- Alternative IV: grain car with four hoppers and four bottom gates
- Alternative V: grain car with longitudinal hoppering and seven trap doors along the bottom of each side.

The side car dumper was too costly. Alternative II presented unloading problems. Alternative III and Alternative IV resulted in a 40 percent loss of payload capacity along with stability problems. Alternative V was chosen as the best solution.

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* The Appendices are available upon request.

TABLE V-2

COMPARISON OF POWER UNITS

DIESEL ELECTRIC vs. TM-11 TRACKMOBILE

TECHNICAL	Diesel Locomotive	TM-11 Trackmobile (one coupler)***
Maximum Tractive Force	42,000 lbs.	30,000 lbs.
Grain Cars* started in cold weather	17	12
Grain Cars Hauled on 2.0 percent Grade	11	5
Weight (approximate)	70 tons	30 tons**
Technical Feasibility of Operation	yes	yes
Economic		
Annual Cost of Capital	$10,518	$21,276
Operating Cost per Annum (one thousand hours)	$5,450	$4,740
Total Annual Costs	$15,968	$26,016

* Grain box cars with a gross weight of 80 tons.

** Engine weight increases to 50 tons with one hydraulic jacking coupler in use and 70 tons with two couplers in use.

*** The TM-11 Trackmobile with one coupler in use is the most likely form of operation on a branch line.

Figure V-2 is a schematic of the suggested grain car modifications. Only 25 percent of the payload is lost and most of the box car stability is retained. The car* will carry 1,500 bushels (two modified cars will provide full load for a hopper car).

The estimated cost of the box car modification is $2,033.00. (See Table B.1, Page B.8)** Capital outlay for a used steel box car is $5,400.00. Total costs for capital and modification are $7,433.00 per car.***

-- <u>Rail to Rail Transloading Facility</u>

Figure V-3 is a plan view of the rail to rail transloading facility. A cross-sectional view is given in Figure V-4. Detailed cost estimates and design are summarized in Appendix C.**

The cost of the rail-to-rail transload was estimated at $47,092 plus the cost of two car pullers ($19 thousand), shelter ($5 thousand), site development ($10 thousand), rail siding ($100 thousand) and sales tax at $28,975 for a total cost of $210,067.

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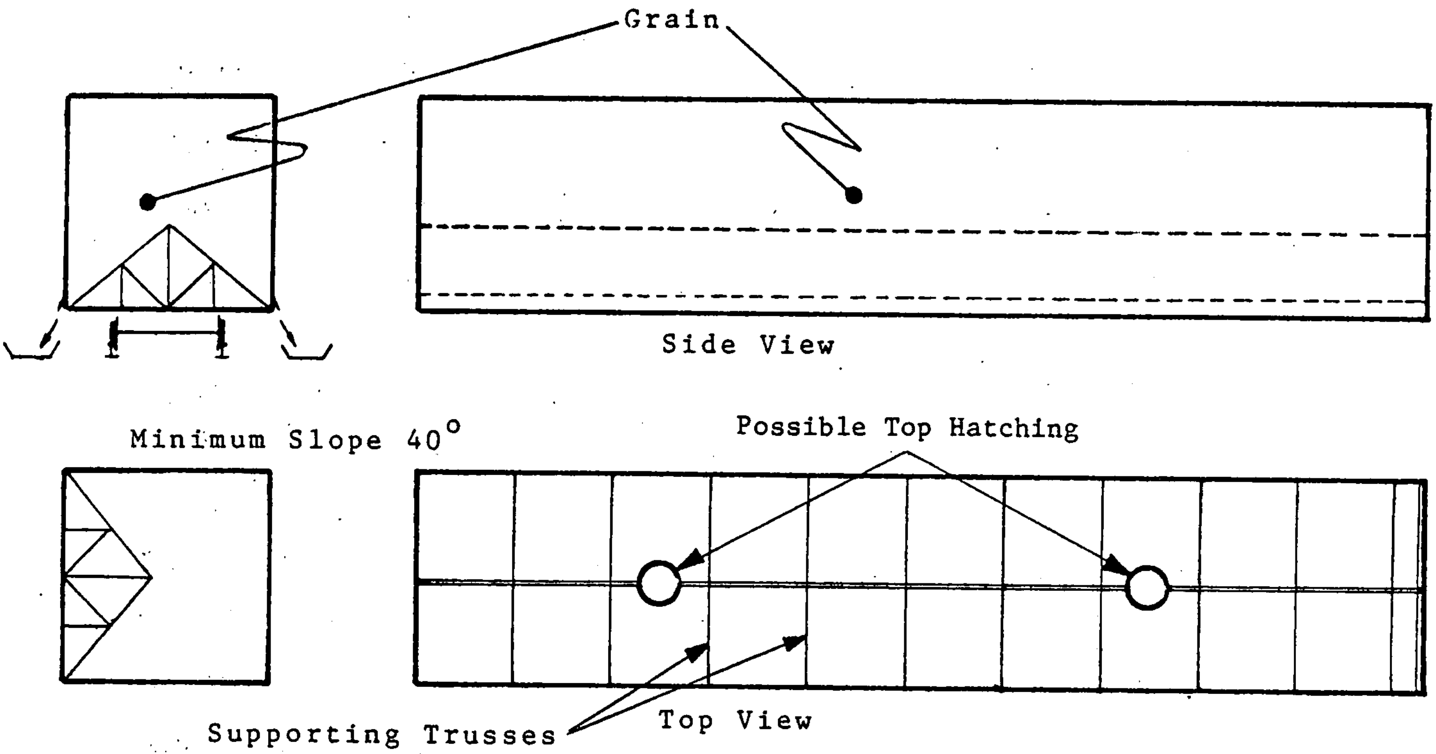
* If necessary or desired, the car can be top hatched to facilitate loading.

** The Appendices are available upon request.

*** Used steel box cars are available in North America mainly from American railway companies.

FIGURE V-2

SUGGESTED GRAIN CAR MODIFICATION



Raise center of floor approximately 3½ feet to form 2 hoppers the length of the car. Install 7 hinged flap doors down each side of the car.

Result:

1. The car will empty by gravity.

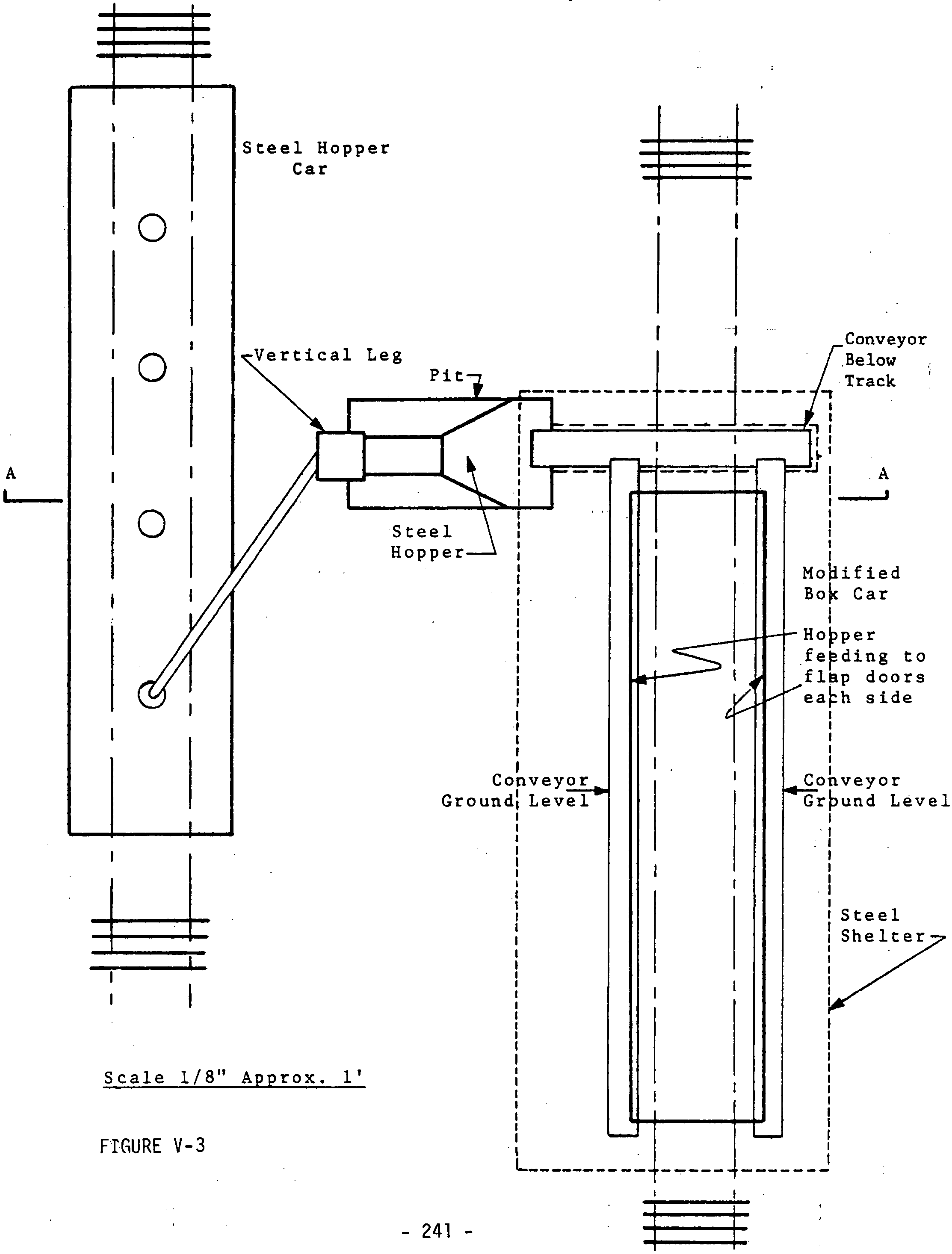
2. 25% of the volume is lost. The car will carry 1,500 bushels.

3. The center of gravity of the wheat is raised only 3 - 4 inches retaining most of the stability of the car.

4. If necessary or desirable, the box cars can be top hatched to facilitate loading.

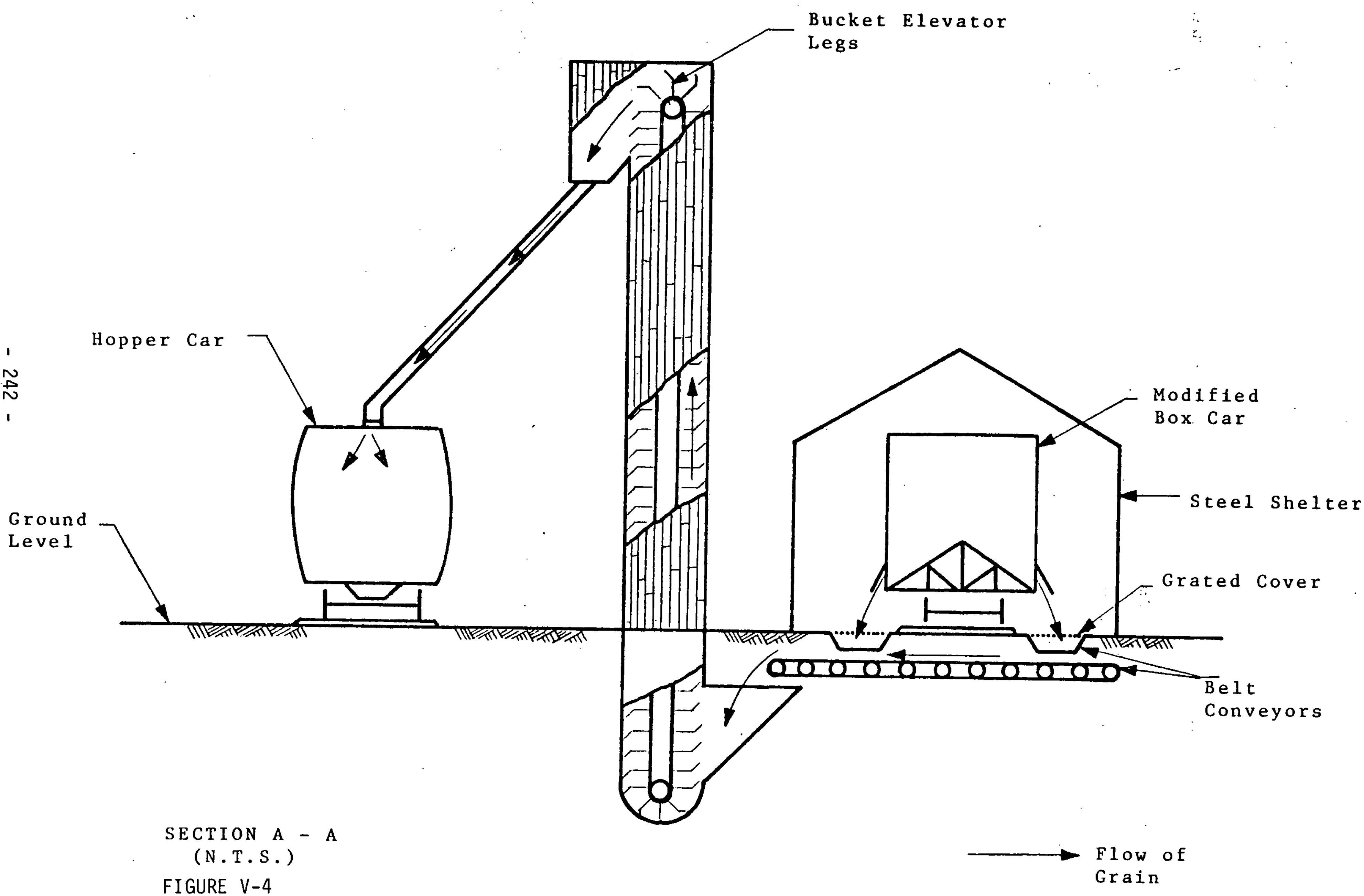
TRANS LOAD RAIL TO RAIL

Rate of Grain Transfer - up to 10,000 Bushels/Hour



Scale 1/8" Approx. 1'

FIGURE V-3



SECTION A - A
(N.T.S.)
FIGURE V-4

The total annual costs were estimated as follows:

- Labour	$26,000.00
- Electrical Power	2,142.00
- Maintenance	5,755.00
- Depreciation	30,198.00
- Insurance	307.00
- Taxes (property)	1,000.00
- Administration	500.00
Total Annual Costs	$65,902.00

This operation can have an annual throughput of 7.5 million bushels per year based on an eight hour day, five days a week. This capacity is adequate for volumes of grain anticipated on a branch line utilizing a mini-train system.

No technological problems are anticipated with the trans-loading facility.

-- The Country Elevator

In the mini-train alternative, the branch line elevators require no modification.

-- Mini-train Alternative Grain Handling Feasibility

There are a number of limitations imposed on the grain handling aspects of the mini-train alternative: These are:

1) the modified grain cars must be delivered to the elevator in multiples that equal the capacity of a grain car. In the design presented herein, each converted grain car has a capacity of 1,500 bushels. Therefore, the modified box cars must operate in pairs.

2) the grade and type loaded to any two converted cars should be identical. While this may present no problem from one specific elevator, an appropriate marshalling may be required for shipments coming from two elevators, particularly if the elevators are of different companies.

3) weight loss at the transloading facility must be restricted to 60 pounds or less from both of the modified cars.

4) some grain quality may be lost at the transloading facility.

None of the above restrictions are insurmountable, although some additional handling costs will be incurred in attempting to trade-off the overall transportation cost components. It is unlikely that these costs will be incurred by the producers. However, some form of compensation less than or equal to current rail subsidies may be required for one or more parties involved.

The Short Line Alternative

The short line concept is an independently owned/operated rail line on a specific light density branch. The rolling stock consists of a power unit and assorted maintenance equipment. The short line rail company delivers loaded grain cars from the elevator to the main line for main line train assembly.

There are four major components to consider in the short line concept and these are:

- the power unit
- the grain car
- a main line siding
- the country elevator.

-- The Power Unit

The power unit suitable for the short line rail company is a used diesel electric switching locomotive. (See Table V-2)

-- The Grain Car

Main line railway company grain cars are used in this alternative. The cost to the short line rail company is a demurrage charge of #8.00 per day over 48 hours. A four day turn-around was estimated. Thus, a demurrage charge of $16.00 per box car was used in this study.

-- Main Line Siding

In the short line alternative, the rail-to-rail transloading facility is eliminated. The grain cars are delivered to a main line siding. In the areas examined, all had appropriate sidings at the branch line - main line junction. Thus the cost of such a siding was not estimated.

-- The Country Elevator

No modifications to the country elevator are required in the short line concept.

-- Short Line Grain Handling Implications

The short line alternative is simply a train assembly operation. There are no changes to the current grain handling system.

The Trucking Alternative

The trucking alternative consists of an independently owned/ operated trucking fleet assigned to a specific light density branch line area. The rolling stock consists of an appropriate number of truck tractors and hoppered trailers. The trailers are loaded at the elevator and trucked to a main line point. A truck-to-rail trans-loading facility is used to transfer the grain from the hoppered trailers to a main line covered rail hopper car.

There are four major components to consider in the trucking concept and these are:

- the truck tractor
- the hoppered trailer
- the transloading facility
- the country elevator.

-- The Truck Tractor

The costing of the trucking operation is detailed in Appendix D* and summarized below.

The annual fixed costs of the truck tractor unit were estimated on a full maintenance lease which included capital, interest,

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* The Appendices are available upon request.

maintenance, licensing and insurance. The total annual cost of the tractor unit is:

- lease arrangement*	$15,600
- 20 percent contingency	3,120
- total annual costs	$18,720

The variable per mile costs of the truck tractor were as follows:

- flat rate	$0.10 per mile
- fuel	0.12 per mile
- drivers' wages	0.17 per mile
- contingency 10.0 percent	0.039 per mile
- total per mile costs	$0.429 per mile

-- <u>The Hoppered Trailer</u>

The trailer has a tare weight of 12 thousand pounds and a maximum payload of 55 thousand pounds or 1,100 bushels. The cost of the trailer is $12 thousand which translates to an annual capital cost of $2,416.00. Adding a 20 percent contingency, total annual cost of the trailer is $2,900.00

The variable cost of the trailer included the following:

- tires	$0.0132 per mile
- brakes	0.003 per mile

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* Premiere Truck Leasing: LT 9000 Ford Diesel Tractor. 318 HP. Tandemaxle. Based on a three year lease. A flat rate of 10 cents per mile is applied as a variable cost.

- miscellaneous	$0.007 per mile
- 10 percent contingency	0.0023 per mile
Total	$0.0255 per mile.

Total per mile costs for the tractor and trailer unit are $0.4545

Ton-mile costs for the tractor trailer unit based on varying revenue miles per year and on varying payloads are summarized in Figure D.2, page D.8*. For example, at 30 thousand revenue miles per year and a payload of 23.25 tons** (approximately 830 bushels) a ton-mile cost of 6.8 cents can be anticipated.

-- The Transloading Facility

Figure V-5 is a plan view of the truck-to-rail transloading facility. A cross-sectional view is shown in Figure V-6. Detailed cost estimates and design are summarized in Appendix F.*

The cost of the truck-to-rail transborder was estimated at $35,892 plus the cost of a car puller ($9,500), shelter (two thousand dollars)*** , site development ($10 thousand) and taxes ($9,183) for a total capital outlay of $66,575.00.

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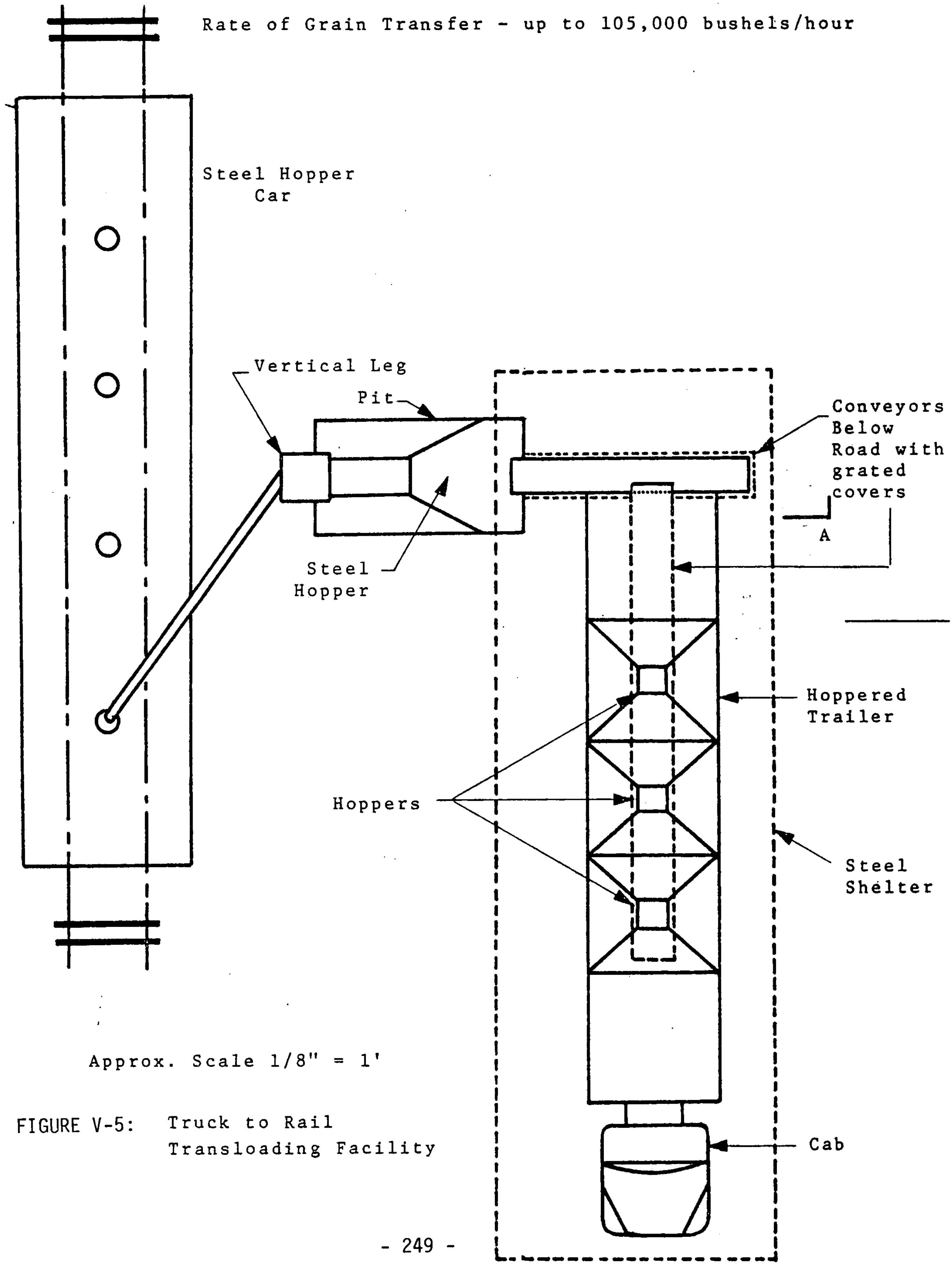
* The Appendices are available upon request.

** This payload is achievable on most roads and highways in Western Canada that have load restrictions of 74 thousand pounds G.V.W.

*** The required truck shelter is much smaller than the rail car shelter.

TRANS LOAD TRUCK TO RAIL

Rate of Grain Transfer - up to 105,000 bushels/hour



Approx. Scale 1/8" = 1'

FIGURE V-5: Truck to Rail Transloading Facility

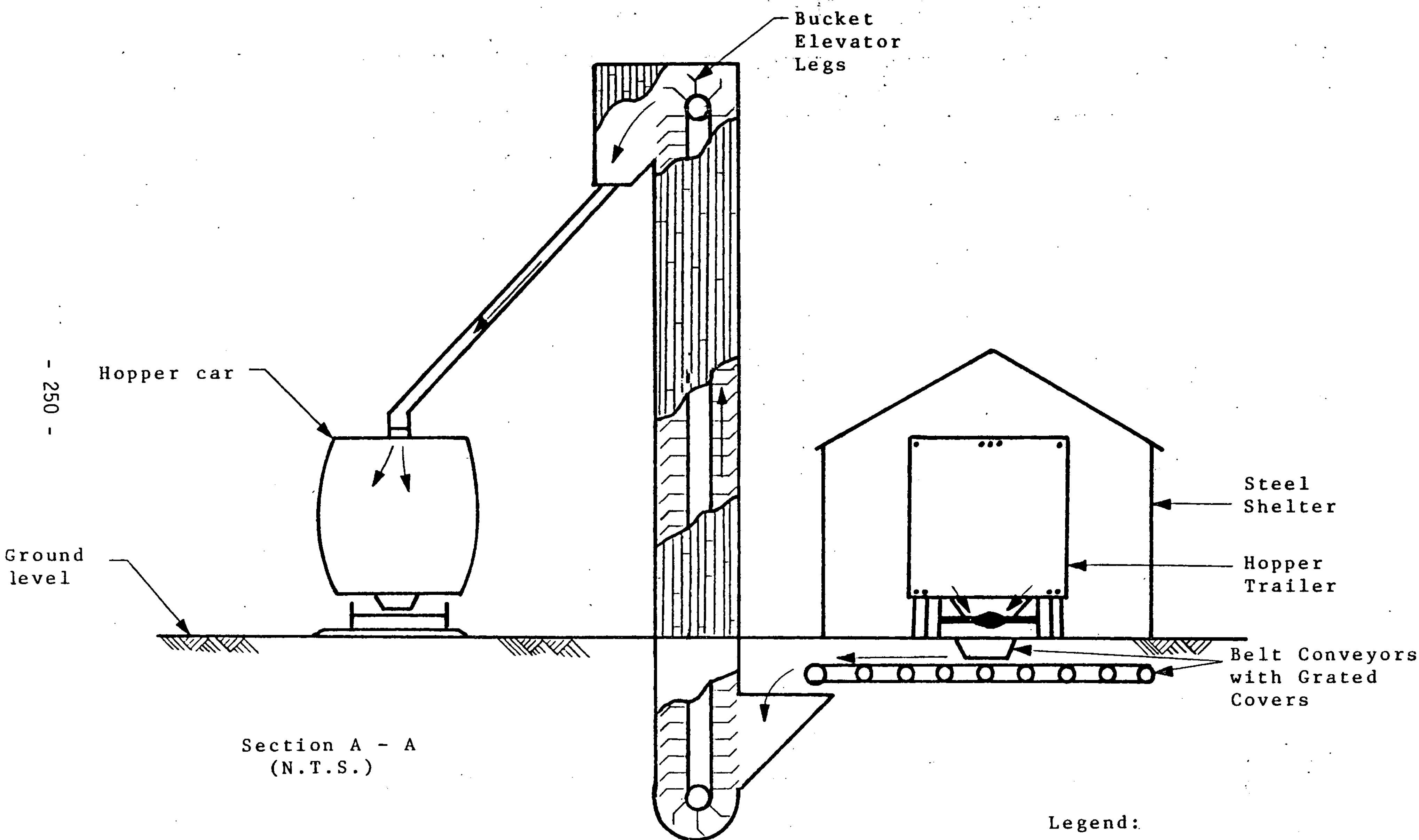


FIGURE V-6: Truck to Rail Transloading Facility

Total annual operating costs were estimated as follows:

- Labour	$26,000.00
- Electrical power	1,338.00
- Maintenance	2,870.00
- Depreciation	10,472.00
- Insurance	286.00
- Taxes	750.00
- Administration	500.00
Total Annual Costs	$42,216.00

This operation could have an annual throughput of about ten million bushels* based on an eight hour day and a five day week. The capacity is more than adequate for branch line operations for the areas examined.

-- <u>The Country Elevator</u>

Appendix E** details the required elevator alterations for the trucking alternative. A roadway and loading pad are required. These alterations are estimated at a cost of $5 thousand each. Additional annual maintenance was estimated at $200 per elevator per year. Figure E.1 and Figure E.2 (pp. E.2 and E.3) are schematics of the required loading pads.*

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* The rail-to-rail transloading facility has less capacity (7.5 mm. bushels per annum) due to the need to position two rail cars and subsequent time lost.

** The Appendices are available upon request.

-- Trucking Alternative Grain Handling Feasibility

There are a number of limitations imposed on the grain handling aspects of the trucking alternative.* These are similar to the mini-train restrictions with the following exceptions:

1) loading of the hopper cars will be from three or four trailers depending on the loading restrictions in the area, and

2) weights and grades of grain must be consistent across the trailers used.

Again these restrictions are not insurmountable.

The Do Nothing Alternative

The do nothing alternative consists of a continuation of the current system. That is the main line rail companies will continue to operate on the branch lines. Cost components of the do-nothing alternative were estimated as follows:

1) required capital to upgrade the branch line to minimum standards sufficient for operation to a 15 year planning horizon (if such capital is required),

2) all on-line operating costs as identified in rail submission to the Canadian Transport Commission under Section 258 of the Railway Act less current maintenance, and

3) a maintenance charge of $1 thousand per track mile per annum** required for maintaining the line.

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* Other aspects of shipping grain by truck are discussed in 'A Profile of Commercial Grain Trucking in Saskatchewan" by Clayton, Sparks and Associates Ltd. October 1975.

** See Table I.9, Appendix I. (Available upon request).

A Comparison of Alternatives

Table V-3 provides a comparison of the grain handling and transportation alternatives. The comparison is summarized as follows:

1) All power units for the four alternatives possess the technical capability for operation.

2) The most expensive power unit is the truck tractor with an annual cost of about $19 thousand.

3) The truck tractor also has the highest per hour operating costs.

4) The short line and do nothing alternatives will use the same grain cars as at present. Demurrage charges for the short line may run to $16 per grain car. Capital outlay for the modified grain cars for the mini-train are estimated at $7,433 per car and for the trucking at $12 thousand per trailer.

5) Transloading facilities are required for the mini-train and trucking alternatives. Capital outlays are $210 thousand and $67 thousand respectively. This translates to an annual cost of $65.9 thousand (mini-train) and $42.2 thousand (trucking). Both facilities have adequate capacity.

6) Some grain handling restrictions are anticipated with the mini-train and trucking concepts. Each of these alternatives must load multiple cars of grain equal to the capacity of a covered hopper car. Although the restrictions are not insurmountable, additional handling costs are incurred.

Summary

1. Four grain handling and transportation alternatives as these apply to light density branch lines were reviewed in this chapter.

TABLE V-3

GRAIN HANDLING AND TRANSPORT ALTERNATIVES

- COMPARISON -

Component	Mini-Train	Short Line	Trucking	Do Nothing
Power Unit	Diesel Electric	Diesel Electric	Truck Tractor	Diesel Electric
Technical Capability	good	good	good	good
Capital Outlay	$80,000	$80,000	$37,500	as current
Annual Capital	10,518	10,518	18,720	as current
Operating Cost/Hour*	$5.45	$5.45	$10.36**	as current
Grain Cars				
Technical Capability	good	as current	hoppered trailer	as current
Capital Outlay	$7,433 per car	n.a.	$12,000 per trailer	as current
Annual Capital	$977	$16 per car***	$2,416	as current
Maintenance Costs	$200 per annum	as current	$890 per annum ****	as current
Transloading Facility				
Technical Capability	good	n.a.	good	n.a.
Capital Outlay	$210,067	n.a.	$66,575	n.a.
Annual Capital	$ 65,902	n.a.	$42,216	n.a.
Capacity	7.5 mm bu./year	n.a.	10.0 mm bu./year	n.a.
Elevator				
Total Capital	n.a.	n.a.	$5,000	n.a.
Annual Capital	n.a.	n.a.	$660	n.a.
Maintenance Costs	n.a.	n.a.	$200	n.a.
Grain Handling	some problems	as current	some problems	as current

* Excludes wages
** Based on 40 miles driving per hour
*** Two days demurrage per car
**** Based on 35,000 miles per annum

2. These alternatives are:

   - mini-train which operates a power unit on a branch line delivering loaded and modified grain cars from the elevator to a transloading facility on the main line for transfer of grain to a covered hopper car,

   - short line which operates a power unit on a branch line delivering standard grain box cars from the elevator to the main line for train assembly,

   - trucking from the current elevator to a transloading facility at the main line. Hoppered trailers will be unloaded to covered hoppered grain cars, and

   - current system or the do nothing alternative.

3. The power unit exhibiting the technical capabilities and operational economics for the mini-train and short line alternatives was a 70 ton diesel electric switching locomotive.

TYPICAL BRANCH LINE AREAS

Four grain handling and transportation alternatives were defined in the preceding section. A sound basis on which to make recommendations concerning the application of any of the alternatives can be developed by simulating the operational impacts of the alternatives on typical branch lines. Three such areas were chosen for investigation. These branch lines are described in this section and are the Lyleton area of Manitoba, the Riverhurst-Main Centre area of Saskatchewan and the Cardston-Whisky Gap and Glenwood area of Alberta. Actual areas were chosen to provide a basis on which to simulate the operational economics of the four transport alternatives. The three areas chosen exhibit a reasonable range of branch line length, grain volumes handled and permissable highway loadings. Because of the parameter variation across the three areas, conclusions can be made as to the overall applicability of the four grain handling and transportation alternatives.

Two further branch line areas were chosen for qualitative assessment of possible labour problems. The Dunelm, Pennant and Stewart Valley subdivisions are three short branch lines that intersect the main line in the Swift Current area. Possible labour problems are posed because of the necessity for a power unit serving all three branch lines* to operate on a section of the main line joining the three subdivisions. The Coronation subdivision was chosen to examine any labour problems associated with crossing provincial boundaries (in this case the Alberta - Saskatchewan border).

The objective of this section of the chapter is to describe the three areas chosen for economic evaluation. The labour implications associated with all five areas are also identified.

Area Selection Process

A number of typical branch line areas were identified for study. The selection process was as follows:

1) a number of branch line areas in the three provinces were selected.

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* A preliminary assessment of the three branch lines suggested that because of length, grain volumes and economics, one power unit would be sufficient to serve the needs of the subdivision.

2) each of these areas was examined with respect to the following:

   - length of branch line,

   - physical condition of branch line,

   - number of operating elevators on the branch line and their location relative to the main line,

   - annual throughput of each elevator,

   - current rail operating costs* on the branch line,

   - the highway infrastructure, and

   - current load restrictions on the various highway sections;

3) following the selection of the areas, a presentation was made to the Grain Handling and Transportation Commission Steering Committee for study. As a result of that meeting five areas were selected as typical: three for detailed economic and technical evaluation, one for qualitative labour implication assessment and one for a qualitative assessment of operational problems.

The areas examined were selected as typical. However, it is not the intention of this study to associate a specific alternative with a particular region.

Area I: Lyleton

Figure V-7 is a map of the Lyleton area. The branch line (Lyleton Subdivision) joins the main line at Deloraine. Appendix I** provides

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* Current rail operating costs were derived from CNR/CP Rail Submissions to the Canadian Transport Commission under Section 258 of the Railway Act.

** The Appendices are available upon request.

a detailed description of the Lyleton area. Some of the features of Area I are described as follows:

1) the branch line is 37.4 miles in length,

2) the rail line is in poor condition and will require substantial investment to bring the facilities up to a minimum standard,

3) restricting highway load limit in Area I is 74 thousand pounds, Gross Vehicle Weight (G.V.W.),

4) total volumes of grain handled in Area I amounted to 1.9 million bushels per year,

5) average weight per bushel is 55.6 pounds,

6) there are five elevator points in Area I,

7) the rail transport production* of Area I was 1.1 million ton-miles at an on-line cost of $125 thousand per annum,** and

8) required truck transport production would be 1.3 million ton-miles.

<u>Area II: Cardston</u>

Figure V-8 is a map of the Cardston area. There are two subdivisions in this area and these are:

- Woolford Subdivision
- Cardston Subdivision.

The main line is joined at Raymond, Albert

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* Net ton-miles required to move grain from elevator points to the main line.

** From CP Rail/CNR Submission to the Canadian Transport Commission under Section 258 of the Railway Act.

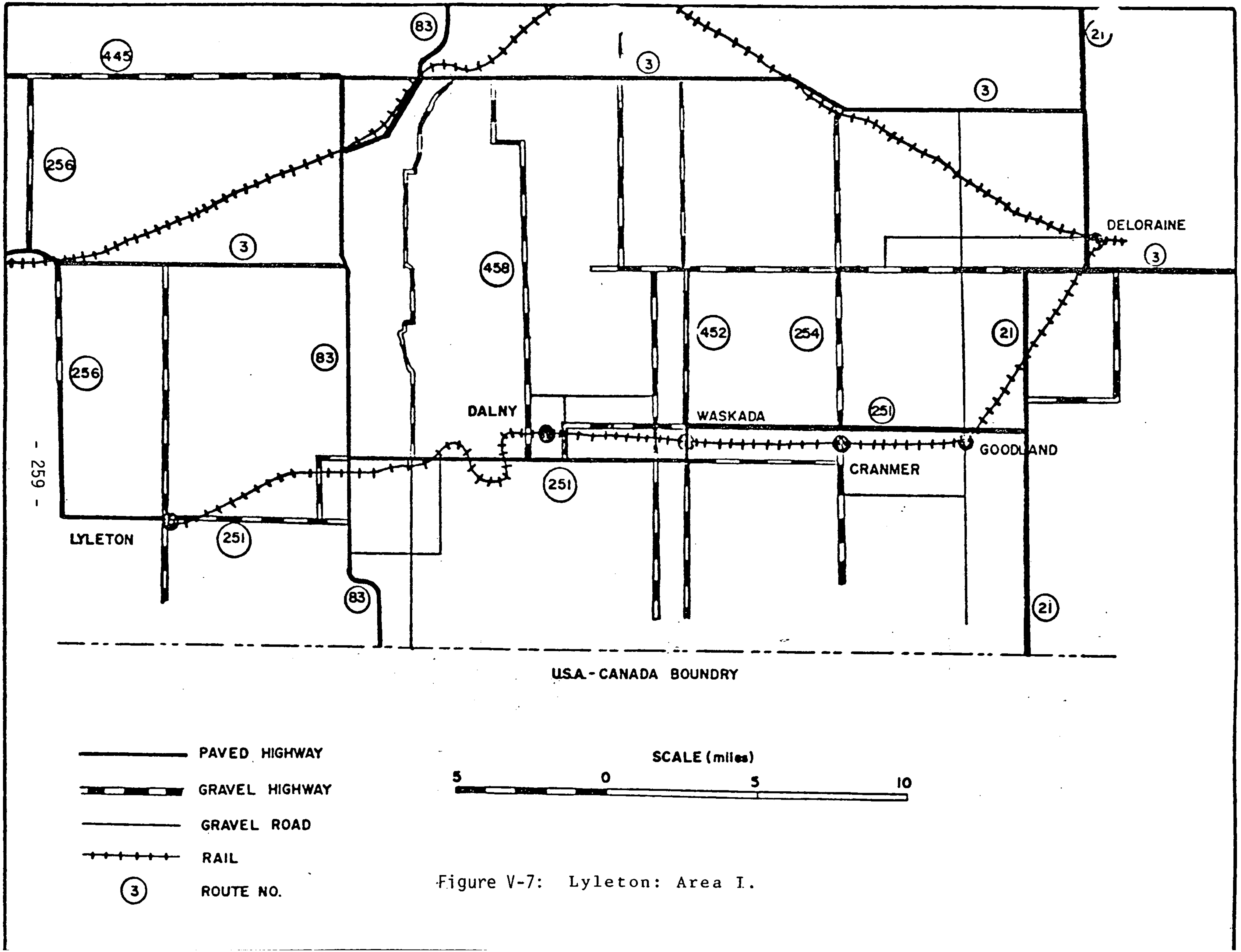

Figure V-7: Lyleton: Area I.

Some of the features of Area II* are described as follows:

1) the two branch lines have a combined 95.0 miles of rail,

2) the physical condition of the rail line can be classified as reasonable,

3) restricting highway load limits in the Cardston area are 45 thousand pounds Gross Vehicle Weight (G.V.W.), 59 thousand pounds G.V.W. and 110 thousand pounds G.V.W. from different elevator points,

4) total volumes of grain handled in Area II amount to 3.1 million bushels per annum,

5) composite weight of grain in the area is 56.5 pounds,

6) there are nine elevator points in Area II,

7) the rail transport production is 2.8 million ton-miles at an annual cost of $357 thousand, and

8) required truck transport production would amount to 2.8 million ton miles.

<u>Area III: Riverhurst - Main Centre</u>

Figure V-9 is a map of the Riverhurst - Main Centre area. There are three rail subdivision in Area III and these are:

- the Central Butte Subdivision, west of Moose Jaw**
- the Main Centre Subdivision
- the Riverhurst Subdivision.

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* Area II is described in detail in Appendix J which is not included in this volume of the report but is available upon request.

** The Central Butte Subdivision extends as far east as Regina.

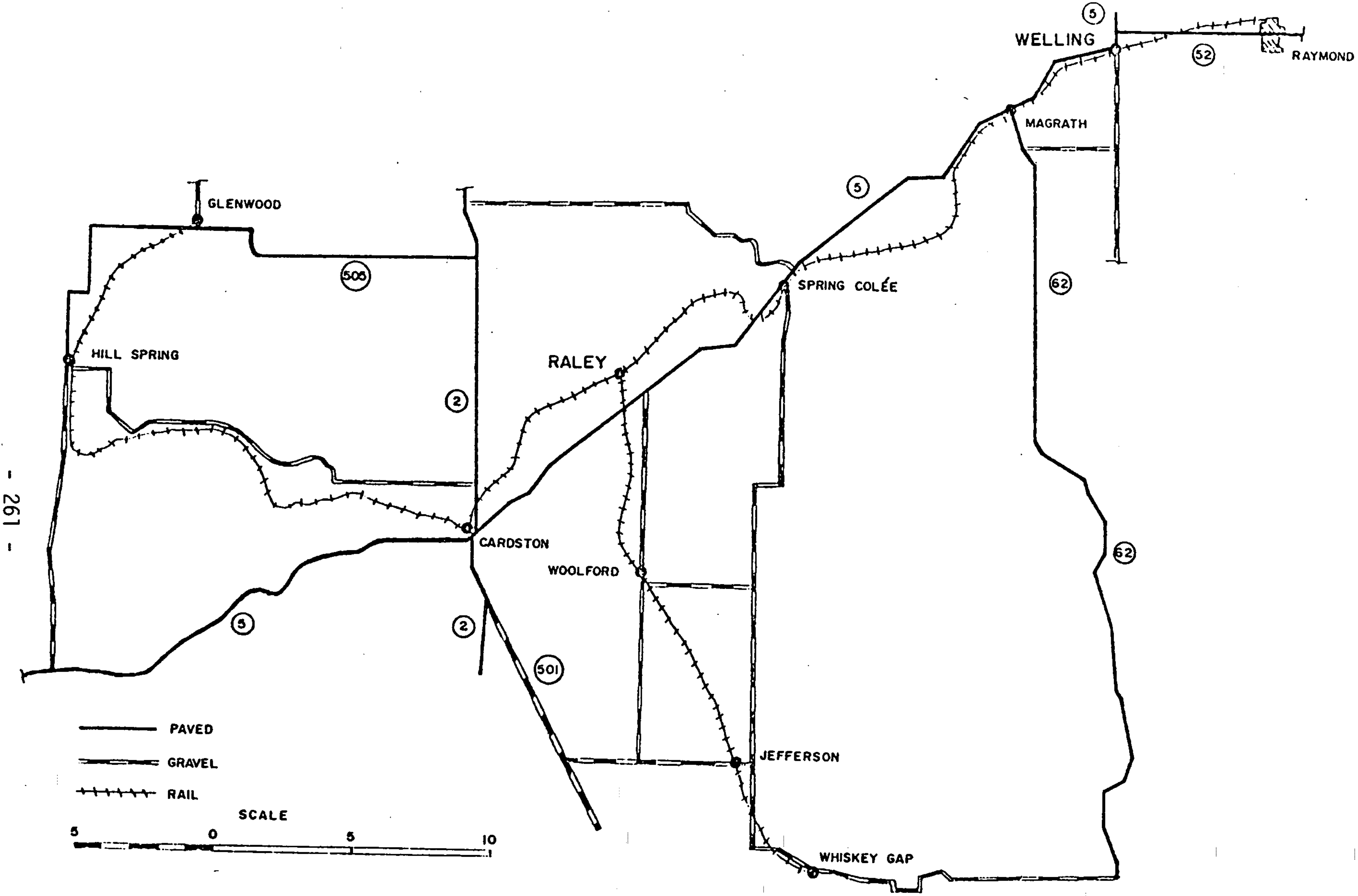

Figure V-8: Area II: The Cardston Area

The main line is joined at Moose Jaw.

Appendix K* details the Riverhurst - Main Centre region. Some of the features of Area III are described as follows:

1) total branch line trackage amounts to 119.0 miles,

2) the physical condition of the trackage is fair,

3) the restricting highway load limit is 74 thousand G.V.W.,

4) total volumes of grain handled in Area III are 3.9 million bushels per annum,

5) the composite average weight of grain is 58.0 pounds per bushel,

6) there are 14 elevator points in Area III,

7) the rail transport production of Area III is 6.5 million ton-miles at an annual cost of $549 thousand, and

8) the required truck transport production would amount to 7.4 million ton-miles.

<u>Comparison: Area I, Area II and Area III</u>

The four grain handling and transportation alternatives will be applied to these areas. Table V-4 illustrates the wide variation in the three areas. The comparative table can be summarized as follows:

1) the variation in branch line length is from 37.4 miles to 119.0 miles. This provides a good range of mileage.

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* The Appendices are available upon request.

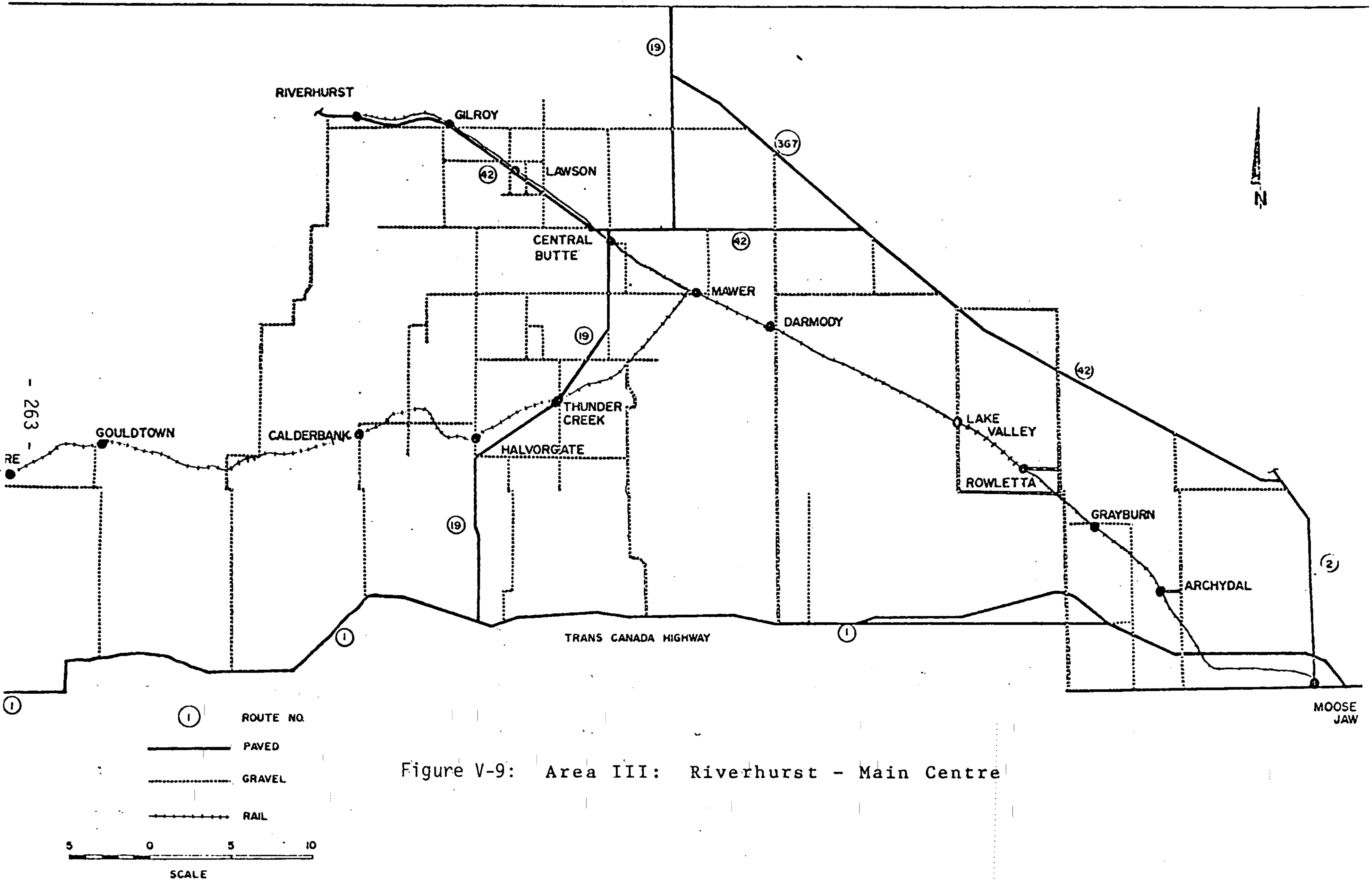

Figure V-9: Area III: Riverhurst - Main Centre

2) One track (Area I) is in poor condition requiring substantial upgrade. This is costed out in the analysis. A sensitivity test treating the track as if it were in reasonable condition is also presented.

3) Maximum allowable highway loads range from 45 thousand pounds G.V.W. to 110 thousand pounds G.V.W.

4) Grain volumes handled also provide a wide range for examination of from 1.9 million bushels per annum to 3.9 bushels per annum.

5) Consistent with the grain volumes, the elevator points also range from 5 to 14 respectively.

6) Transport production requirements by rail and truck also vary significantly.

This comparison illustrates the wide variation in parameters that will be examined in the evaluation.

Labour Implications*

The objective of this part of the section is to discuss the labour implications that might be associated with the implementation of the grain handling and transportation alternatives (except the do nothing alternative). These remarks would apply not only to the three areas that have been described, but also to other typical branch lines.

In the short term, the least disruptive alternative, from a labour standpoint, is the do nothing alternative. All of the others imply that the present national carrier would no longer be involved in the branch line operation.

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* The labour implications discussed herein were derived from private conversations with Mr. J.F. McGee, Senior Partner, Hickling-Johnston Limited. Mr. McGee specializes in labour negotiations.

TABLE V-4

COMPARISON OF AREA I, AREA II, AREA III

Component	Area I	Area II	Area III
Branch Line Length (Miles)	37.4	95.0	119.0
Track Condition	Poor	Fair	Fair
Limiting Highway Load Limit (Pounds)	74,000	45,000	74,000
Grain Volumes (Bushels)[1]	1.9 mm	3.1 mm	3.9 mm
Elevator Points	5	9	14
Rail Transport Production (ton-miles	1.1 mm	2.8 mm	6.5 mm
Annual Rail Cost ($Thousands)[2]	125	357	547
Required Truck Transport Procution (ton-miles)	1.3 mm	2.8 mm	7.4 mm

Source: 1. Canadian Grain Commission 'Summary of Primary Elevator Receipts at Individual Prairie Points: Crop Year 1973/74'.

2. CNR/CP Rail Submissions to Canadian Transport Commission under Section 258 of Railway Act.

If the grain handling system were changed on only a few branch lines in Western Canada, it is anticipated that there would be little adverse impact on the labour situation. That is, all current employees could be absorbed into the present system or be taken care of by attrition since only a small percentage of their time is spent on any single light density branch line.

However, if there were a large scale shift to one of the above alternatives, the national carrier would be faced with layoffs and subsequent labour difficulties due to loss of jobs. These difficulties would be encountered for any change to the present system and would not be associated with a specific alternative.

From the national carriers' viewpoint, many of these lines should be closed. Therefore the solving of the loss of jobs situation due to abandonement is one that the carriers will have to face as a matter of course in the closing of branch lines. The actual solving of these anticipated labour problems is beyond the scope of this study but they are not deemed to be overwhelming.

Other labour problems are believed to be of a minor nature in comparison to the large scale abandonment or transfer of jurisdiction of branch lines.

The labour involved at the transloading facility for both the mini-train and trucking alternatives should be the responsibility of the grain companies that own elevators along the line. From the labour point of view the most ideal situation would occur if a single grain company owned all of the elevators along the line.*

The key words in setting up a trucking system, mini-train system or a short line system is to keep the business small and operate on a non-union basis.

Area IV and Area V

In certain instances, more complex problems may arise. This section of the report considers two other typical areas. In Area IV, an operational and associated labour problem is illustrated. Area V is typical of branch lines that cross provincial boundaries.

Area IV

Area IV consists of a series of three short branch lines, each less than 25 miles in length, with end points on a main line less than 20 miles apart. The three subdivisions are the Dunelm, the Pennant and the Stewart Valley. All join the main line in the Swift Current area.

The grain cars from these lines would be assembled or transloaded at a common point on the main line. The branch line railway would be operated by a third party, that is, by a non-national carrier. However the power unit that would be used would have to run over main line track with automatic block signals and would incur significant operational problems. Federal jurisdiction would become an issue concerning

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* This would provide the highest degree of co-ordination between elevator points along the branch line.

equipment operating on the lines of a national carrier. The utilization of labour would create difficulties and would have to be dealt with before joint running rights could be considered in view of the national carriers' labour agreements with their employee unions.

Employees of the mini-train or short line operation running over national carriers' trackage would be required to conform to the "Uniform Code of Operating Rules". A very serious situation could develop if the operator were to interfere with main line traffic while travelling between these branch lines.

Although these problems are significant, they can be overcome. The integrated co-operation of the major railway company(s) in this type of situation would be essential. However, these problems would not be encountered if the power unit were confined to a single "dead end" line.

Area V

The branch line in Area V is the Coronation Subdivision. It is 107 miles in length and handles a little over 4.0 million bushels of grain annually. This branch line is different from those in the other areas only because it crosses the Alberta - Saskatchewan boundary at Compeer. The labour statutes of each of the Provinces involved would have to be examined in detail. The operator of the mini-train and short line alternatives would have to conform to the labour statutes of each Province as well as the Federal labour statutes. However, these are not deemed to be overly restrictive. The biggest problem in the labour areas would be the negotiation of the change in jurisdiction. That is, the National Carrier would no longer operate on the branch line in question. This would be the case for all but the do nothing alternative.

Summary

1. This section of the report identified three areas which will serve as a basis for costing out the four grain handling and transportation alternatives.

2. A comparison of the three areas indicated a wide range of parameters including length of branch line, grain handled and highway loading limitations.

3. The labour implications of the four alternatives were reviewed. It was felt that if a small number of branch lines changed to any of the alternatives few labour problems would be experienced. If a large number of branch lines changed in operation, loss of railway jobs could occur creating significant labour disruption. However, the labour implications were not deemed as insurmountable.

4. Two other branch line areas were examined, one with respect to operational problems and one with respect to the labour implications concerned with crossing a provincial boundary.

5. Operational problems of assigning one power unit to several short branch lines could be significant if the power unit is not equipped to run on the main line between the branch lines.

6. No insurmountable labour problems are foreseen in crossing a provincial boundary.

EVALUATION METHODOLOGY

Four grain handling and transportation alternatives for application to light density traffic branch lines have been identified. Three typical branch lines have also been described. It is the objective of this section of the study to summarize the operational economics methodology that was applied to each of the typical branch line areas.

The alternatives do not consider ways and means of handling grain which farmers wish to ship through "platform cars". Grain producers who wish to ship grain directly in car lots to terminals or to end users could do so by loading cars spotted for them on sidings on the main line. They would also be able to load cars spotted along the branch line in the 'do nothing' situation. It is questionable whether it would be possible or desirable to make arrangements to ship grain directly under the mini-train or trucking alternatives. However, the short line system would offer possibilities.

Costing Methodology

This section of the report reviews the costing methodology by grain handling and transportation alternatives. The methodology was consistent over the three areas and is detailed in the accompanying appendices.*

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* Information re appendices are available upon request.

-- Mini-train

The cost components of the alternatives were all expressed in annual payments. The cost components of the mini-train alternative include the following:

- power unit
- modified grain cars
- crew wages
- rail maintenance
- transloading facility
- rail right-of-way.

The crew costs considered a two man crew at a wage of $12,500 each per annum.

Rail maintenance costs were estimated as follows:

1) In the case of Area I (Lyleton) the required upgrading estimates* were expressed as an annual rate.

2) An additional $200 per mile of track per annum was also estimated. This was to account for inspection and minimum maintenance.

3) For Area II and Area III and for a sensitivity analysis of Area I the following** were con considered:

   - use of power unit to maintenance
   - annual cost of small maintenance car

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* Provided by CP Rail in a submission to the Grain Handling and Transportation Commission. See Appendix H. The level of upgrading was taken as sufficient to maintain the line for a period of up to ten years. See Page H.5, Point F.3.

** See Appendix I, Table I.9.

- additional wages charged to maintenance

- material costs

- equipment rental

- miscellaneous.

4) The standard maintenance charges were estimated at $1 thousand per track mile per year.

The power unit charges were estimated as follows:

1) cost of capital* was expressed as an annual cost.

2) annual hours of engine operation. This estimate was made considering total grain cars assigned to the line, total volumes handled, length of line and number of trips required.

The costs for the modified grain cars were estimated as follows:

1) cost of capital times the number of cars as annual cost.

2) cost of modification as an annual cost.

3) maintenance chages of $200 per car per year.**

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* All capital is assumed to be spread over 15 years at at 10.0 percent interest rate.

** Maintenance charges for the modified box cars include inspection, standard maintenance (i.e. greasing of bearings, adjustment of flap doors, etc.) and materials.

The rail-to-rail transloading facility costs are detailed in Appendix C.* These included the following:

- capital costs**
- operating costs per year.

The right-of-way costs were estimated as the composite salvage value of the track.***

Table V-5 summarizes the estimated annual costs of operation for the mini-train alternative in general terms.

-- Short Line Alternative

For the short line alternative the cost components were estimated on the following:

- power unit
- box car demurrage
- train crew
- annual rail maintenance
- right-of-way.

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* The Appendices are available upon request.

** Elevating equipment depreciated over 10 years and the rail siding over 15 years. A 10.0 percent interest rate was used.

*** Composite salvage value: the net value of the rail right-of-way considering salvage of steel, land, ties, bridge structures, labour and equipment and transport costs to resale markets. Following discussion with Canadian National Railway and CP Rail an average composite value of $72.50 per ton was estimated. This also represents the total recoverable value of the right-of-way and was set equal to the acquisition costs.

TABLE V-5

OPERATIONAL COST COMPONENTS

-- MINI-TRAIN ALTERNATIVE --

Components	Annual Cost in 1975 Dollars
Power Unit	
Capital	$10,518 times number of units
Operating	$5.45 per hour times number of hours
Crew	$12,500 per annum per person*
Modified Grain Cars	
Capital	$977 times number of units
Maintenance	$200 times number of units
Rail Maintenance	
No Upgrade	$1000 per mile per annum
With Upgrade	Upgrade costs as annual rate plus $200 per mile per annum
Transloading Facility	$65,902 per annum
Rail Right-of-way	Estimated salvage value expressed as an annual cost

* Total crew of two persons in all areas.

The power unit costs were estimated as follows:

1) annual cost of capital

2) annual operating charges based on estimates of grain handled, box cars per train, number of trips and mileage covered.

Box car demurrage charges were estimated as follows:

1) number of box cars required to move the grain volumes was estimated (i.e. total bushels divided by two thousand bushel capacity per car)

2) demurrage charges were estimated at $16 per box car (two days at $8.00 per day).

The train crew wages were estimated at $25 thousand per annum for a crew of two.

The rail maintenance costs per annum were estimated as per the mini-train alternative.

Table V-6 summarizes the cost estimates of the short line alternative as applied to each of the three areas.

-- <u>Trucking Alternative</u>

For the trucking alternative, the cost components were estimated on the following:

- truck transport
- loading/unloading
- road maintenance
- elevator alteration
- transloading facility
- track salvage.

TABLE V-6

OPERATIONAL COST COMPONENTS

-- SHORT LINE ALTERNATIVE --

Components	Annual Cost in 1975 Dollars
Power Unit	
Capital	$10,518 times number of units
Operating	$5.45 per hour times number of hours per annum
Crew	$12,500 per annum per person
Box Car Demurrage	$16.00 per box car
Rail Maintenance	
No Upgrade	$1000 per mile per annum
With Upgrade	Upgrade costs expressed annually plus $200 per mile per annum
Rail Right-of-Way	Estimated Salvage value expressed as an annual rate

The truck transport costs were calculated considering the following:

1) highway loading limitations and thus maximum payload

2) cost of tractor/trailer* as an annual value

3) fleet size requirements

4) total driving time

5) driver wages.

The load/unload costs were estimated on driver wages for downtime. A factor to account for load restrictions of two months at half load was also included.

Road maintenance was estimated as the additional maintenance requirements for the additional truck loadings. This amounted to $300 per mile per year for all highways capable of carrying 74 thousand pounds G.V.W. or less.**

Elevator alterations costs were estimated as follows:

- loading areas capital costs expressed as an annual cost

- annual maintenance of $200 per loading pad per year.

Truck to Rail transloading facility charges are described in

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* Trailer depreciated over seven years at 12.0 percent per annum.

** Canada Grains Council, 'Brandon Area Study'. 1974.

Appendix F.* These charges were expressed on the following:

- site depreciated over 15 years at 10.0 percent
- mechanical equipment depreciated over 10 years at 10.0 percent.

The salvage value of track was also included in the trucking alternative. It represents an income to the rail company and is a trade-off on the overall economics.

The salvage value to the present major rail companies would be relatively high because they have the equipment, labour and markets available to reuse the steel. An independent owner would not have these resources available and would have to make arrangements with a broker, the existing rail lines or an agent involved in the resale of useable materials. The cost of salvage, however, may be prohibitive. To the environmentalist, the salvage value would be negative due to the cost of removing bridges, land restoration, etc. For these reasons salvage is only considered in the trucking alternative and the value acrrues to the major rail companies.

Table V-7 summarizes the cost components for the trucking alternatives as applied to Area I, Area II and Area III.

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* The Appendices are available upon request.

TABLE V-7

OPERATIONAL COST COMPONENTS

-- TRUCKING ALTERNATIVE --

Component	Annual Costs in 1975 Dollars
Truck Transport	
Operational	Utilization cost* times fleet size
Load/Unload	Approximately 18 cents per ton**
Road Maintenance	$300 per mile per annum
Elevator Alteration	
Annual Capital	$660 per annum times number of elevators
Annual Maintenance	$200 per elevator per annum
Transloading Facility	$42,210 per annum
Track Salvage	$72.50 per ton of steel

* Includes payload considerations, trailer costs contingency and load restriction period factor.

* Composite load/unload charge across the three areas

TABLE V-8

OPERATIONAL COST COMPONENTS

-- DO NOTHING ALTERNATIVE --

Component	Annual Costs in 1975 Dollars
Operation	All on-line costs* less current maintenance.
Maintenance	
No Upgrade	$1000 per mile per annum
With Upgrade	Estimated upgrade costs expressed annually plus $200 per mile per annum

* As submitted to the Canadian Transport Commission re: Section 258 of the Railway Act.

-- <u>Do Nothing</u>

Annual costs of the do-nothing alternative were calculated as follows:

1) all on-line costs* less current maintenance per year,

2) upgrading requirements** if required expressed as an annual cost,

3) annual maintenance charges ($200 per track mile for Area I** and $1 thousand per track mile for Area II and Area III***).

Table V-8 summarizes the annual charges for the do nothing alternative as applied to Area I, Area II and Area III.

<u>Summary</u>

1. The evaluation methodology as applied to the four grain handling and transportation alternatives for the three areas was reviewed in this section.

2. The results of the application of the methodology are summarized in the next section.

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* From CP Rail Submission to the Canadian Transport Commission re: Section 258 of the Railway Act. Current maintenance submissions vary greatly from year to year and in many cases are not adequate to maintain the line. These were substituted by estimated charges.(See Table I.9, Appendix I (available upon request))

** For example, upgrading of Area I is required. Appendix H.

*** See Table I.9, Appendix I.

EVALUATION OF ALTERNATIVES

The objective of this section of the study is to summarize the results of applying the evaluation methodology to the four grain handling and transportation alternatives in each of the three areas. Total costs of moving grain to the main line are identified by alternative and compared. A comparison is also made of each alternative operating across the three areas.

Lyleton: Area I

The characteristics of the branch line and the grain handled in Area I have previously been discussed. Table V-9 shows a comparison of the annual costs for each alternative in Area I. The economic analysis considers all costs and benefits that accrue to any agent contributing. The agency paying or benefiting can also be identified. For example, the rail line receives the salvage value of the branch line for the trucking alternative. Additional road maintenance is suffered by the municipality and the elevator alteration costs are incurred by the Grain Companies

The total annual cost for the trucking alternative is $129,577, (column 1, Table V-9). This includes the direct trucking costs for a two truck fleet for 10 months of the year and three trucks during the peak periods. Elevator alterations, additional road maintenance, and transloading facility costs are also shown. The annual value of the rail bed salvage is shown as a system benefit of $40,027. The trucking alternative results in a system cost of 6.67 cents per bushel.

TABLE V-9

COMPARISON OF ANNUAL COSTS

-- AREA I --

	Trucking	Mini-Train	Short Line	Do Nothing
Truck Transport	106,304			
Elevator Cost	8,574			
Road Maintenance	12,510			
Transloading Facility	42,216	65,902		
Rail Maintenance	-	155,778	155,778	155,778
Salvage Value	(40,027)			
Box Cars		23,544		
Power Unit	10,518	10,518	10,518	
Power Unit Operating		4,251	3,270	
Crew		25,000	25,000	
Purchase of Rail Bed (Salvage Value)		40,027	40,027	
Box Car Demurrage			15,560	
On Line Cost*				118,672
Total	129,577	325,020	250,153	274,450
Cents Per Bushel	6.67	16.71	12.86	14.11
Assume average rail maintenance cost of $100/mile Then total cost =	129,577	206,642	131,775	156,072
Cents Per Bushel	6.67	10.62	6.77	8.02

* CP Rail Submission under Section 258 of Railway Act

The mini-train concept is shown in column 2 (Table V-9) at an annual cost of $325,020. This includes the annual cost of 20 modified box cars, the transloading facility, the power unit, and its operating costs, labour and the purchase of the rail bed. The annual cost of the capital investment required to upgrade the existing rail bed is translated to an annual maintenance cost of $155,778. The mini-train alternative results in a system cost of 16.71 cents per bushel.

The short line system costs are outlined in column 3 (Table V-9) and total $250,145 per year. This includes the rail bed maintenance, the power unit and its operation, labour, rail bed salvage and box car demurrage. Transloading facilities and box car modification costs are not required in this alternative. This alternative costs 12.86 cents per bushel.

The Do Nothing alternative, column 4 (Table V-9) costs include rail maintenance and on-line costs. This alternative nets out at $274,450 per annum or 14.11 cents per bushel.

An additional comparison is made at the bottom of Table V-9. These costs reflect the total system costs for each alternative that would be expected if this branch line did not require complete rebuilding. That is, having an annual maintenance cost of $1,000/mile. The system costs for the trucking alternative remain the same at 6.67 cents per bushel, while the mini-train costs are lowered to $206,642 per year (10.62 cents per bushels), the short line is lowered to $131,767 per year (6.77 cents per bushel) and the do nothing to $156,072 (8.02 cents per bushel).

Considering Area I, the following can be concluded:

1) for branch lines of relatively short distance and low volumes, trucking as described herein is a viable alternative to the current system if capital improvements are required to the branch line;

2) if capital improvements are not required, there is little to choose between the trucking and short line concept;

3) the mini-train concept is more expensive because of the capital required for the trans-loading facility and for the modified grain box cars;

4) neglecting the requirement for large capital requirements for rail bed, the short line concept would reduce the current rail subsidies substantially (approximately $140 thousand in Area I)*.

Note that the off-line costs for Area I were not considered as these will be incurred for any of the alternatives.

Cardston: Area II

The characteristics of the branch line and the grain handled in Area II have previously been discussed. Table V-10 shows a comparison of the annual costs of each alternative.

The total annual system costs for the trucking alternative are $279,108, or 8.90 cents per bushel. This includes the direct trucking cost for a six truck fleet operating year round, elevator alteration

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* Including required upgrading subsidy. Current maintenance submissions are not applicable.

TABLE V-10

SUMMARY TABLE

-- AREA III --

	Trucking	Mini-train	Short Line	Do Nothing
Truck Transport Cost	288,830			
Elevator Cost	23,148			
Road Maintenance	17,250			
Transloading Facility	42,216	65,902		
Rail Maintenance		95,000	95,000	95,000
Salvage Value	(99,166)			
Box Cars Cost		35,316		
Box Car Demurrage			25,088	
Power Unit		10,518	10,518	
Power Unit Operating		6,104	6,540	
Crew		25,000	25,000	
Purchase of Rail Bed (Salvage Value)		99,166	99,166	
On-line Cost*				287,906
Total	279,108	323,876	248,182	376,606
Handling cost in cents per bushel	8.90	10.33	7.91	12.01

* CP Rail Submission under Section 258 of Railway Act.

cost, additional road maintenance and the transloading facility cost. The salvage value of the rail bed is considered as a system benefit of $92,336.

The annual cost of the mini-train alternative is shown in column two (Table V-10). It includes the transloading facility, rail maintenance, box car conversion (30 cars), power unit and operating costs, labour and the annual rail bed salvage value. These total $323,876 per year or 10.33 cents per bushel.

The short line costs are summarized in column three (Table V-10) and total $248,182. The cost components are similar to the mini-train alternative except that the transloading facility and box car conversion are not required. However, box car demurrage is included at $25,088 per year. The short line alternative has a total system cost of 7.91 cents per bushel.

The Do Nothing alternative has a net system cost of $376,606 (12.01 cents per bushel) and is shown to be the most costly alternative.

The short line alternative is the least expensive handling system in this area. The total system costs for the trucking alternative are about $30 thousand per year more expensive, considering the salvage value to the rail company.

Considering the parameters of Area II, that is medium grain volumes and medium length of line the following can be concluded:

1) again the need for transloading facilities and grain cars results in a higher cost for the mini-train alternative;

2) the truck to rail transloading facility requirement also mitigates against the trucking alternative; and

3) the short line concept would considerably reduce the annual subsidy requirements by about $120 thousand if standard maintenance charges are considered or about $105 thousand under current maintenance.

Riverhurst - Main Centre: Area III

The branch line characteristics and annual grain volumes for Area III have previously been discussed. Table V-11 summarizes the costs for each alternative.

Column one (Table V-11) indicates that the trucking system has the highest annual cost of any of the four alternatives. This includes the direct trucking costs for a fleet of ten trucks operating one shift per day for ten months and a double shift during the peak months. Also included are elevator alteration costs, additional road maintenance, and transloading facility costs. The rail bed salvage value is considered as a total system benefit. Total system costs for the trucking alternative are $540,498 or 13.82 cents per bushel.

The mini-train costs are identified in column two (Table V-11) and total $366,242. This includes rail bed maintenance, box car conversion (40 cars required), the power unit and its operation, labour and rail bed acquisition costs. This alternative costs 9.37 cents per bushel.

The short line system costs summarized in column three (Table V-11) indicate that this is the least expensive system for this area. It totals $283,442 per year (7.25 cents per bushel) and is over $80 thousand

TABLE V-11

SUMMARY OF ANNUAL COSTS BY ALTERNATIVE

-- AREA III --

	Trucking	Mini-train	Short Line	Do Nothing
Truck Transport Cost	522,395			
Elevator Cost	22,291			
Road Maintenance	44,700			
Transloading Facility	42,216	65,902		
Rail Maintenance		119,000	119,000	119,000
Salvage Value	(91,104)			
Box Car Cost		47,088		
Box Car Demurrage			31,280	
Power Unit		10,518	10,518	
Power Unit Operation		7,630	6,540	
Crew		25,000	25,000	
Purchase of Rail Bed (Salvage Value)		91,104	91,104	
On-line Cost*				370,531
Total	540,498	366,242	283,442	489,531
Handling cost in cents per bushel	13.82	9.37	7.25	12.52

* Canadian National Railway Submission under Section 258 of Railway Act

less than the mini-train concept and over $200 thousand less than the continuance of the present system.

The Do Nothing alternative averages an annual cost of $489,531 or 12.52 cents per bushel.

Considering the parameters of Area III, that is high grain volumes and relatively long branch line length the following can be concluded:

1) in this branch line trucking to a common transloading facility is not an economically viable alternative to the existing system as the existing system is currently costed; and

2) the least costly alternative is the short line concept which in this instance almost halves the annual rail subsidy. That is a subsidy savings of about $200 thousand per annum can be realized under standard maintenance charges or $250 thousand under current maintenance submission.

<u>Area Cost Comparison By Alternative</u>

The objective of this section of the report is to examine the costs of each alternative across the three areas.

-- <u>Mini-train Operational Costs</u>

Table V-12 is a comparison of the mini-train operational costs in the three areas. The costs range from 9.4 cents per bushel in Area III to 16.7 cents per bushel in Area I. In other words as grain volumes increase, the unit costs of movement by mini-train decrease. The capital costs associated with the transloading facility and the grain cars decrease as utilization increases.

TABLE V-12

ANNUAL COST ESTIMATES FOR MINI-TRAIN OPERATION

AREA I, AREA II AND AREA III

(Dollars per Annum)*

Cost Component	Annual Cost in Dollars		
	Area I	Area II	Area III
Power Unit	14,769	16,622	18,148
Modified Cars			
Capital	19,544	29,316	39,088
Maintenance	4,000	6,000	8,000
Crew Wages	25,000	25,000	25,000
Rail Maintenance	155,778	95,000	119,000
Transloading Facility	65,902	65,902	65,902
Right-of-way	40,027	99,166	91,104
Net Annual Costs	325,020	337,006	336,242
Cents Per Bushel	16.7	10.7	9.4

* Source: Appendix I: Area I: Lyleton
Appendix J: Area II: Cardston
Appendix K: Area III: Riverhurst - Main Centre

This source is available upon request

The low operational costs, relatively high box car capacity and flexibility in number of cars result in little impact of distance on per bushel costs over the range examined.

-- Short Line Operational Costs

Table V-13 summarizes the short line operational costs across the three areas. Again as grain volumes increase, the short line unit costs per bushel decrease. A range of 7.3 cents to 12.9 cents per bushel is identified. It is noted, that the cost per bushel is always less than the mini-train because of the need for transloading facilities and modified grain cars for the mini-train alternative.

Again, over the ranges examined, distance has little impact on the per bushel costs.

-- Trucking Operational Costs

Table V-14 summarizes the trucking operational impacts across the three areas. For the trucking alternative, the unit per bushel costs increase as distance increases. The truck is a unit carrier (that is one trailer per tractor) and as such unit per bushel costs increase with distance. The unit costs range from 6.6 cents to 13.8 cents per bushel. It has already been demonstrated (Table V-9) that over short distances truck does compete with rail even when transloading facilities for the truck alternative are required.

-- Do Nothing Operational Costs

Table V-15 summarizes the operational costs of the current system over the three areas. The unit cost per bushel ranges from

TABLE V-13

SHORT LINE ALTERNATIVE ANNUAL COSTS

AREA I, AREA II AND AREA III

(Dollars per Annum)*

Cost Component	Annual Cost in Dollars		
	Area I	Area II	Area III
Power Unit	13,788	17,058	17,058
Box Car Demurrage	15,552	25,088	31,280
Crew Wages	25,000	25,000	25,000
Annual Maintenance	155,778	95,000	119,000
Rail Right-of-way	40,027	99,166	91,104
Net Annual Charges	250,145	261,312	283,442
Cents Per Bushel	12.9	8.3	7.3

* Source: Appendix I: Area I: Lyleton
Appendix II: Area II: Cardston
Appendix III: Area III: Riverhurst - Main Centre

This source is available upon request

TABLE V-14

SUMMARY OF TRUCKING ALTERNATIVE COSTS

AREA I, AREA II and AREA III

(Dollars per Annum)*

Cost Component	Annual Cost in Dollars		
	Area I	Area II	Area III
Trucking Costs	95,921	272,804	500,620
Load/Unload	10,383	16,026	21,775
Elevator Alterations			
Capital	6,574	17,748	17,091
Maintenance	2,000	5,400	5,200
Additional Road Maintenance	12,510	17,250	44,700
Transloading Facility	42,216	42,216	42,216
Rail Salvage	(40,027)	(99,166)	(91,104)
Net Annual Costs	129,577	272,278	540,498
Cents Per Bushel	6.6	8.7	13.8

* Source: Appendix I: Area I: Lyleton
Appendix J: Area II: Cardston
Appendix K: Area III: Riverhurst - Main Centre

This source is available upon request

TABLE V-15

SUMMARY OF ANNUAL COSTS FOR DO NOTHING ALTERNATIVE

AREA I, AREA II AND AREA III

(Dollars per Annum)*

Cost Component	Annual Cost in Dollars		
	Area I	Area II	Area III
Required Capital (for minimum standards)	148,298	--	--
On-Line Operation (less maintenance)	118,672	287,906	370,531
Maintenance ($200 per mile)	7,480	--	--
Maintenance ($1,000 per mile)	--	95,000	119,000
Net Annual Costs	274,450	382,906	489,531
Cents Per Bushel	14.1	12.2	12.5

* Source: Appendix I: Area I: Lyleton
Appendix J: Area II: Cardston
Appendix K: Area III: Riverhurst - Main Centre

This source is available upon request

12.2 cents to 14.1 cents per bushel. These costs are a function of the current major rail company costing formulae.

Summary

1. The annual costs by alternative for each of the three areas were compared in this section and are summarized in Table V-16.

2. Considering the parameters of each area, the following can be concluded:

   - the trucking alternative is viable for short distance low volume branch lines,

   - however, considering that salvage value accrues only to the national rail carriers, the short line is also a viable alternative and this is so because the short line alternative does not require a transloading facility;

   - in areas of medium to high grain volumes and medium to long distances the short line concept is least costly; and

   - in all areas, the short line concept will reduce the annual rail subsidies.

3. Considering the parameters of each grain handling and transportation alternative, the following can be concluded:

   - the trucking alternative costs tend to increase as distance increases as expressed on a per bushel unit basis. The truck is a unit carrier (one trailer) and as such, total per unit costs will increase as distance increases over the range examined.

   - Both the short line and mini-train alternatives exhibit lower unit per bushel costs as volumes increase. Over the range of distances examined, these rail alternatives can increase the size of

TABLE V-16

SUMMARY OF BRANCH LINE COSTS

Costs in Cents Per Bushel

Alternative	Area I	Area I*	Area II	Area III
Mini-train	16.71	10.62	10.75	9.37
Short Line	12.86	6.77	8.34	7.25
Trucking	6.67	6.67	8.69	13.82
Do Nothing	14.11	8.02	12.21	12.52

Total Costs in Thousands of Dollars

Alternative	Area I	Area I*	Area II	Area III
Mini-train	325.0	206.6	337.0	366.2
Short Line	250.1	131.8	261.3	283.4
Trucking	129.6	129.6	272.3	540.5
Do Nothing	274.5	156.1	382.9	489.5

* These system costs reflect a lower annual maintenance cost requirement of $1,000 per mile.

the train. Coupled with the relatively low per hour operational costs, there is little impact of distance on the rail per unit costs.

4. The next section examines the economics of each of the grain handling and transportation alternatives if the grain volumes and right-of-way acquisition costs vary in each area. A sensitivity analysis across each of the three areas is also conducted so that some generalized conclusions as to the "best" alternative can be drawn.

SENSITIVITY ANALYSIS

A detailed cost analysis of the four grain handling and transportation alternatives as these might be applied to each of the three areas has been presented. The objective of this section is to illustrate what happens to the economics of each alternative as the underlying parameters change.

Also, in order to draw conclusions as to overall alternative application, a sensitivity analysis which examines the economics across the three areas is also reported.

The major variables which were examined and are summarized in this section are:*

- grain volumes by area

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* These are also detailed in Appendices I, J and K for Areas I, II and III respectively. These Appendices are available upon request.

- right-of-way acquisition costs, and
- the operational costs over the three areas were compared.

Grain Volume Sensitivity

The operational economics of each of the four alternatives with respect to variations in grain volumes handled was examined. The sensitivity of each of the four alternatives in the three areas considered the following grain volume changes:

- decrease of 40 percent per annum,
- decrease of 20 percent per annum,
- increase of 20 percent per annum, and
- increase of 40 percent per annum.

Figure V-10 illustrates the impact of varying grain volumes on each of the four alternatives in Area I. The following can be concluded:

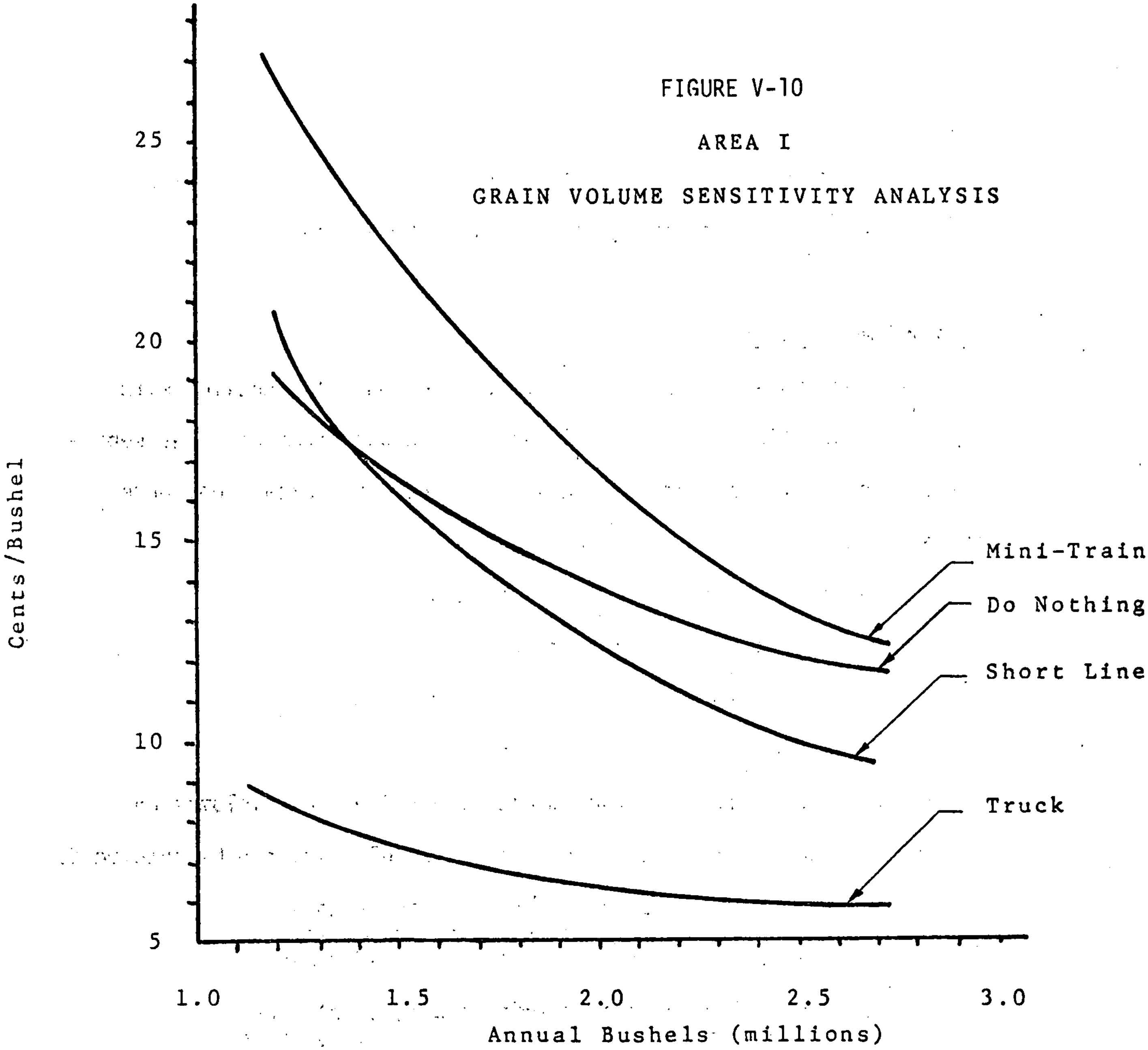
1) trucking is the least sensitive to changes in grain volumes. However some decreases in unit costs are realized as volumes increase.

2) The rail alternatives (mini-train, short line and do nothing) benefit substantially as grain volumes increase.

3) In the Lyleton area, because of the high capital requirements to maintain the branch line, trucking remains as the least costly alternative.

Figure V-11 illustrates the cost sensitivity of the four transport alternatives to changes in grain volume for Area II. The following can be concluded:

1) In Area II trucking is the least costly alternative up to about 3.0 million bushels per year. In other words, for branch lines of low to medium volumes (1.5 million to 3.0 million bushels per annum) and



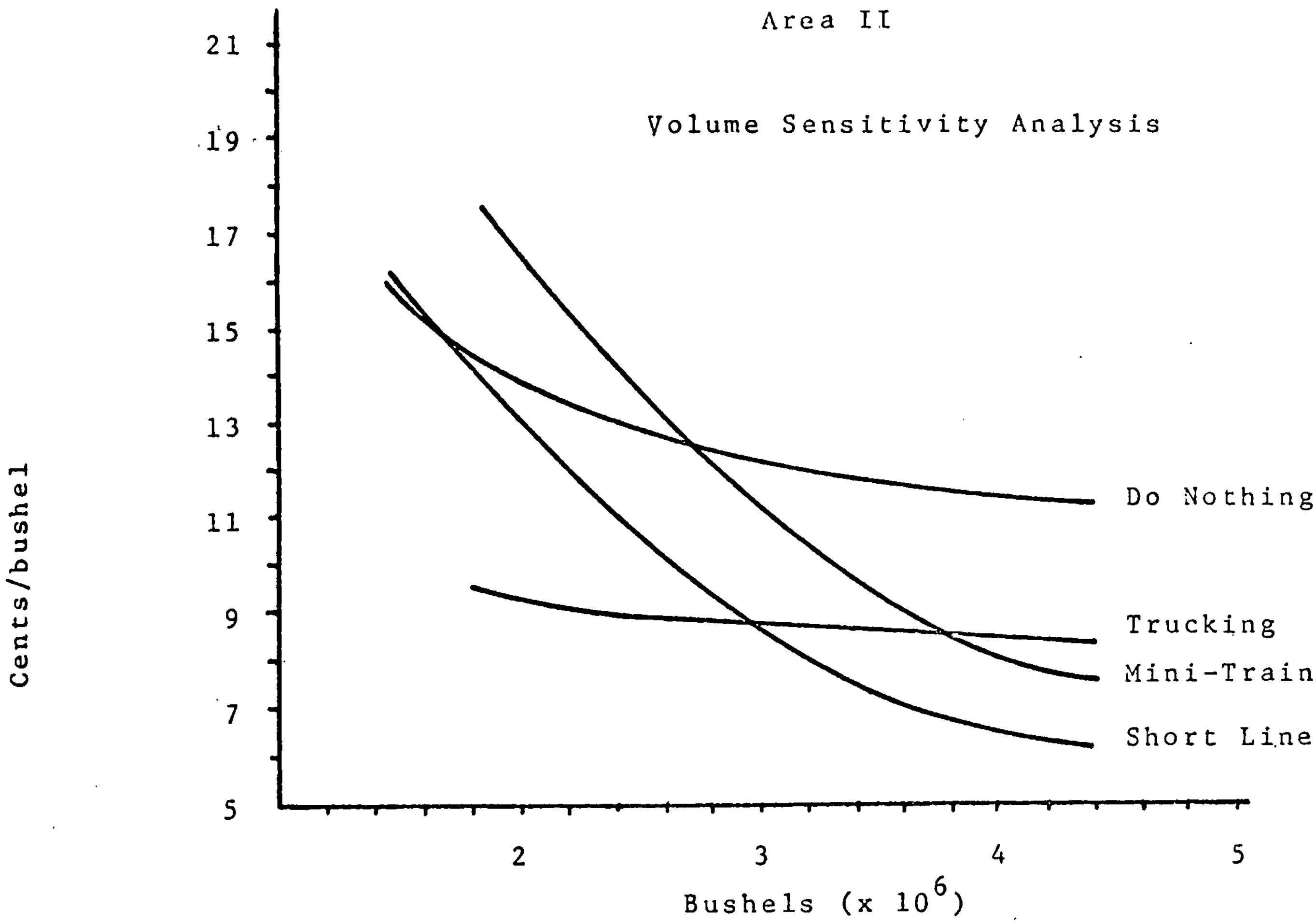
Net Transport Costs in Cents per Bushel

Transport Alternative	-40% (1.17mm bu)	-20% (1.56mm bu)	Actual (1.95mm bu)	+20% (2.33mm bu)	+40% (2.72mm bu)
Trucking	8.95	7.54	6.54	6.19	5.91
Mini-Train	27.33	20.83	16.71	13.96	12.17
Short Line	20.82	15.83	12.86	10.8	9.46
Do Nothing	19.45	16.11	14.11	12.76	11.82

FIGURE V-11

Area II

Volume Sensitivity Analysis



Net Transport Costs in Cents per Bushel

Transport Alternative	-40.0% (1.88mm bu)	-20.0% (2.51mm bu)	Actual (3.14mm bu)	+20.0% (3.76mm bu)	+40.0% (4.39mm bu)
Trucking	9.48	8.95	8.90	8.72	8.59
Mini Train	17.36	13.35	10.72	8.96	7.87
Short Line	13.22	10.16	8.34	7.11	6.24
Do Nothing	14.23	12.97	12.21	11.71	11.34

short to medium distances (30 miles to 90 miles) trucking as described in this report is a viable alternative.

2) The short line concept becomes the best alternative as grain volumes increase beyond 3.0 million bushels per year.

3) If volumes exceed about 3.8 million bushels per year, the mini-train concept becomes less costly than the trucking alternative.

4) Over the range of grain volumes examined, the do nothing alternative is the most expensive. However, in the very low range, the do nothing alternative is less costly than the mini-train.

Figure V-12 summarizes the sensitivity analysis of grain volumes for Area III. The following can be concluded:

1) For branch lines of long distance (over 95 miles) and high volumes (over 3.0 million bushels) the short line alternative is the least costly.

2) The mini-train alternative is the second choice in terms of costs over the range of volumes examined.

3) The distances are too great for trucking to be competitive because truck transloading facilities are required.

Right-of-Way Acquisition Costs

A major cost component that emerged in the analysis and applicable to the rail alternatives (short line and mini-train) was the right-of-way acquisition costs. The impacts on the economics of each of the four alternatives were examined for the following:*

1) Amortization of the salvage value of the rail bed over 15 years at 12 percent. Salvage value after 15 years was taken as zero.

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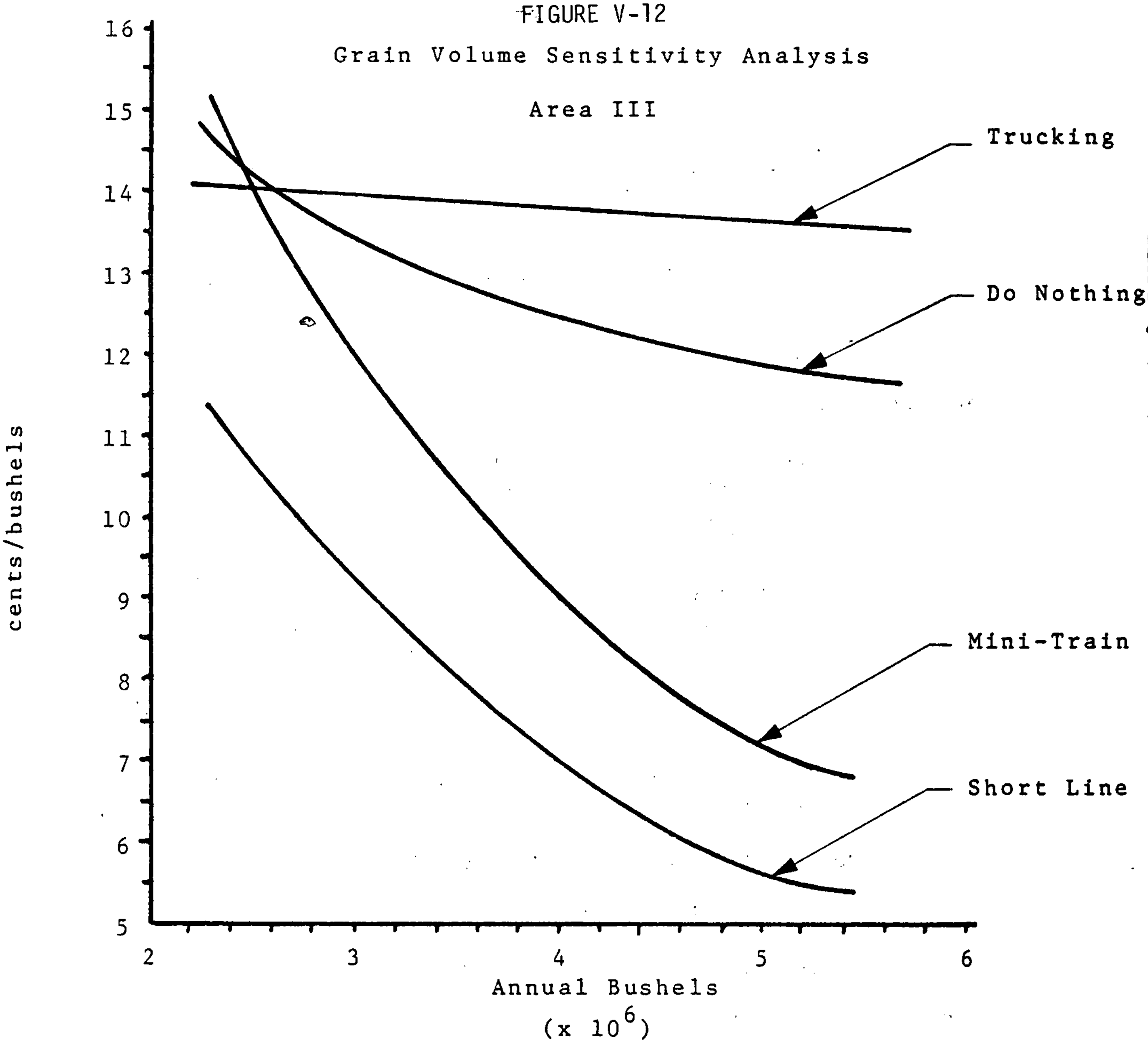
* In the base case, the annual value of the rail bed acquisition was considered to be the interest on the salvage value at 10 percent.

FIGURE V-12

Grain Volume Sensitivity Analysis

Area III



Net Transport Cost in Cents per Bushel

Transport Alternative	-40.0% (2.35mm bu)	-20.0% (3.13mm bu)	Actual (3.91mm bu)	+20.0% (4.69mm bu)	+40.0% (5.47mm bu)
Trucking	14.13	13.94	13.82	13.75	13.69
Mini-Train	15.08	11.66	9.37	7.84	6.92
Short Line	11.44	8.82	7.25	6.20	5.45
Do Nothing	14.55	13.28	12.52	12.01	11.65

2) Amortization of salvage over 15 years at 10 percent. Salvage value after 15 years is taken as zero.

3) Rental at nil cost per annum and a nil salvage value.

The impacts on the economics of the four alternatives for Area I are shown in Figure V-13*. The following can be concluded:

1) regardless of the railbed costing procedure trucking remains the least costly alternative for Area I if large capital outlays for the railbed are required,

2) under normal conditions (fair to good track condition) for short branch lines and low grain volumes, the short line concept is the least costly up to a rail right-of-way acquisition cost of about $37 thousand per annum or $1 thousand per track mile per year,

3) over this amount, the trucking alternative is the least costly.

Figure V-14 illustrates the cost sensitivity of the four alternatives to rail right-of-way costs for Area II. The following can be concluded: if right-of-way costs are below $110 thousand which is $1 thousand per mile per annum, then the short line concept is the least costly. Above this amount, trucking becomes the least costly alternative for Area II.

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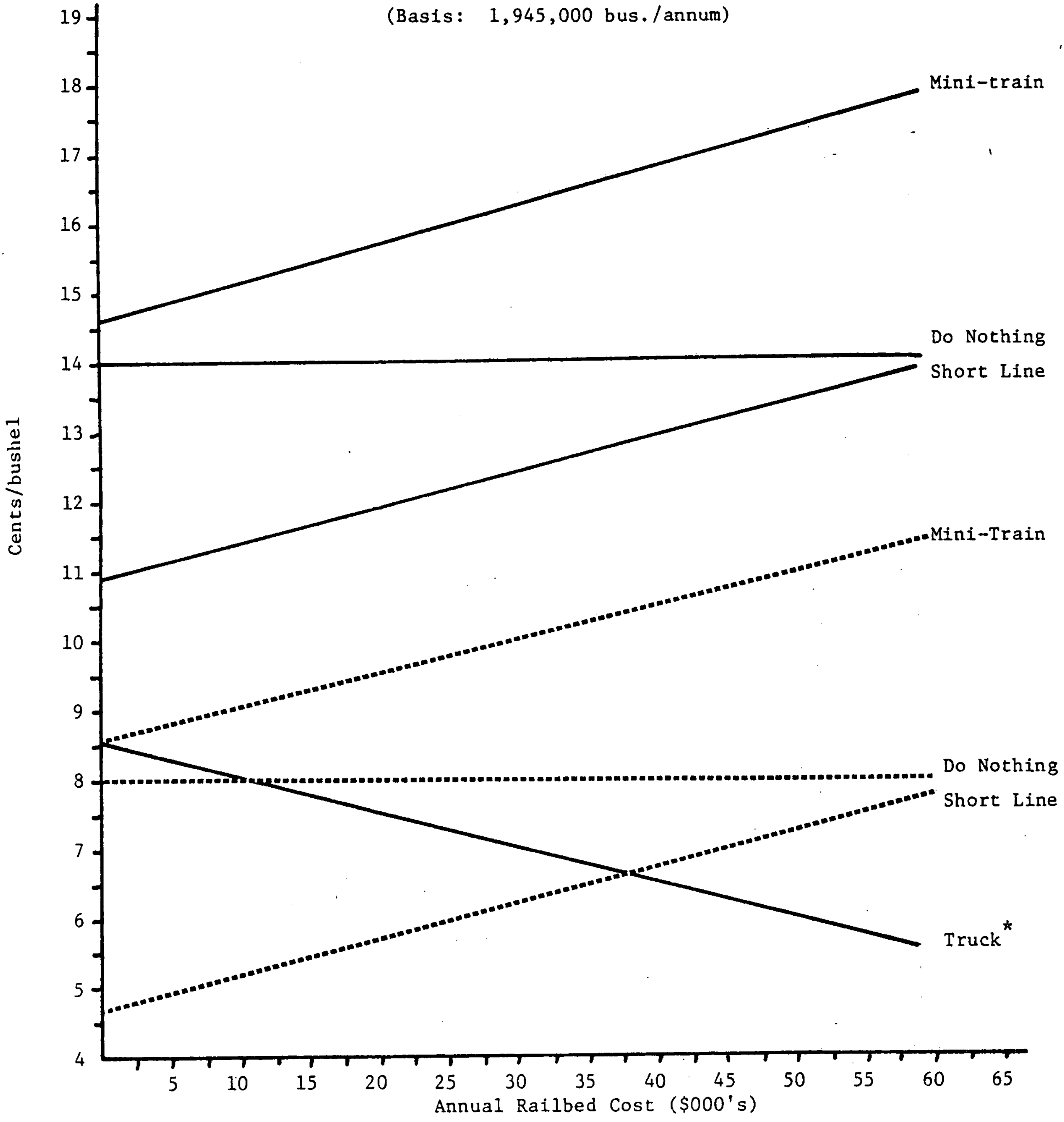
* Although the do nothing costs may vary for various railbed costing the following can be assumed:

- the railway currently owns the railbed and if maintained their investment will be constant in terms of ownership.
- the railways will not be relieved of this obligation over the study period.

FIGURE V-13

AREA I: LYLETON

SENSITIVITY TO ALTERNATE RAIL BED COSTING
(Basis: 1,945,000 bus./annum)



Maintenance Calculation at $1,000/yr.

Maintenance as per Railway submission to Hall Commission

*Handling costs for Trucking alternative are independent of required maintenance costs for other alternatives

FIGURE V-14

AREA II: CARDSTON

Sensitivity Analysis to Alternative Railbed Costing

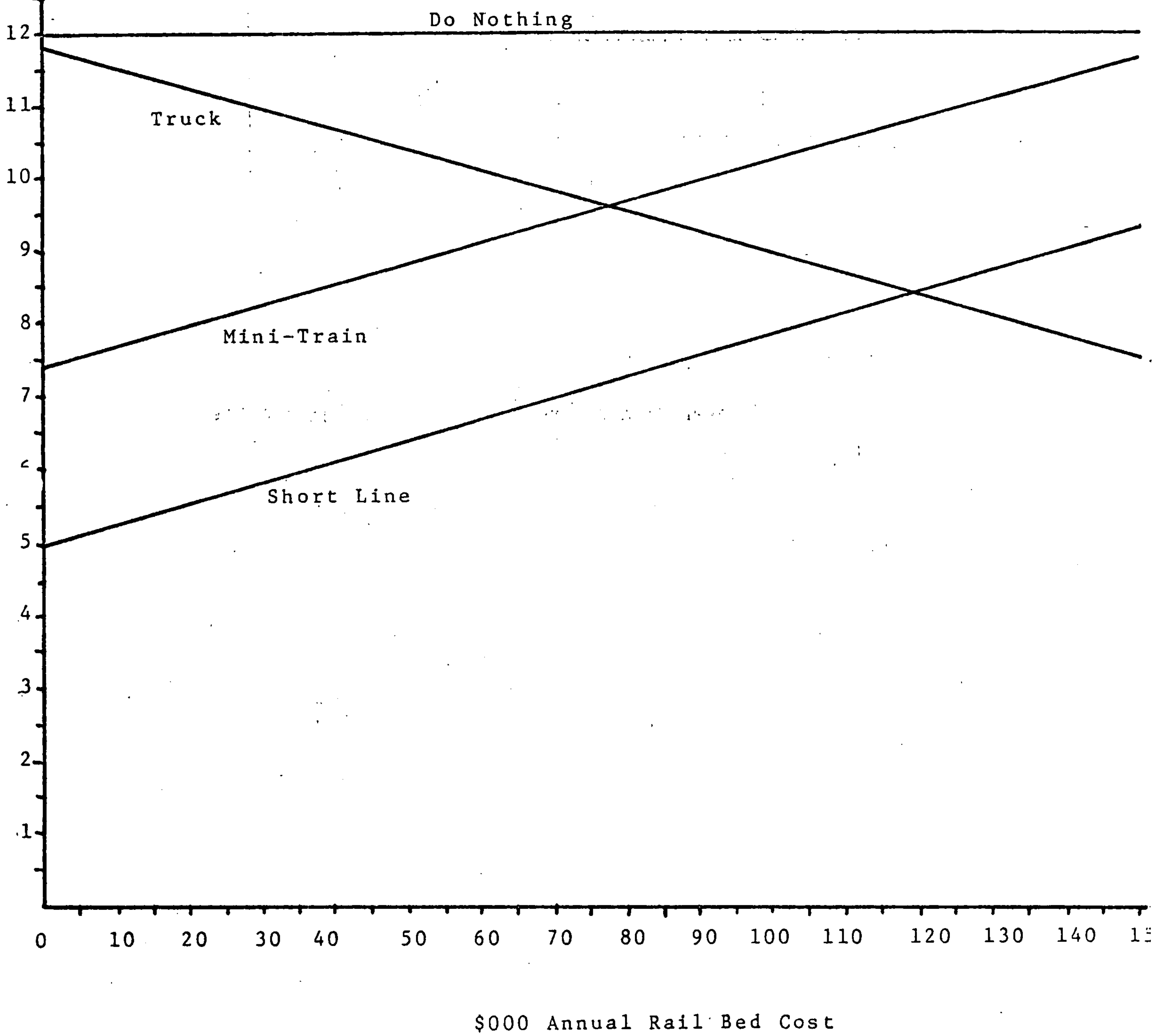


Figure V-15 illustrates the right-of-way acquisition cost sensitivity for Area III. The following can be concluded:

1) For areas of long distance and high volumes, the short line concept is the least costly for reasonable costs of acquisition,

2) Trucking to common transloading point is not a viable alternative under any reasonable railbed acquisition cost.

Operational Cost Comparison of the Three Areas

The overall economics of the four alternatives operating on typical branch lines is shown in Figure V-16. These economics are based on the following assumptions:

- composite salvage value of $10 thousand per mile*,

- average rail maintenance of $1 thousand per annum.

A number of conclusions can be deducted from the graph relative to the application of the grain handling and transportation alternatives on various branch lines. These are as follows:

1) Trucking from elevator points to transloading facilities is the least costly up to a transport product of about 2.5 million ton-miles per annum. This represents branch lines from 30 to 120 miles in length handling between 3.0 million and 0.8 million bushels respectively.

2) However, the cross hatched lines on the trucking, mini-train and short line curves are indicative of the wide variation that may exist because of varying rail acquisition and rail maintenance values.

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* The salvage value varies according to steel gauge.

FIGURE V-15

Area III

Sensitivity Analysis to Alternate Road Bed Costing

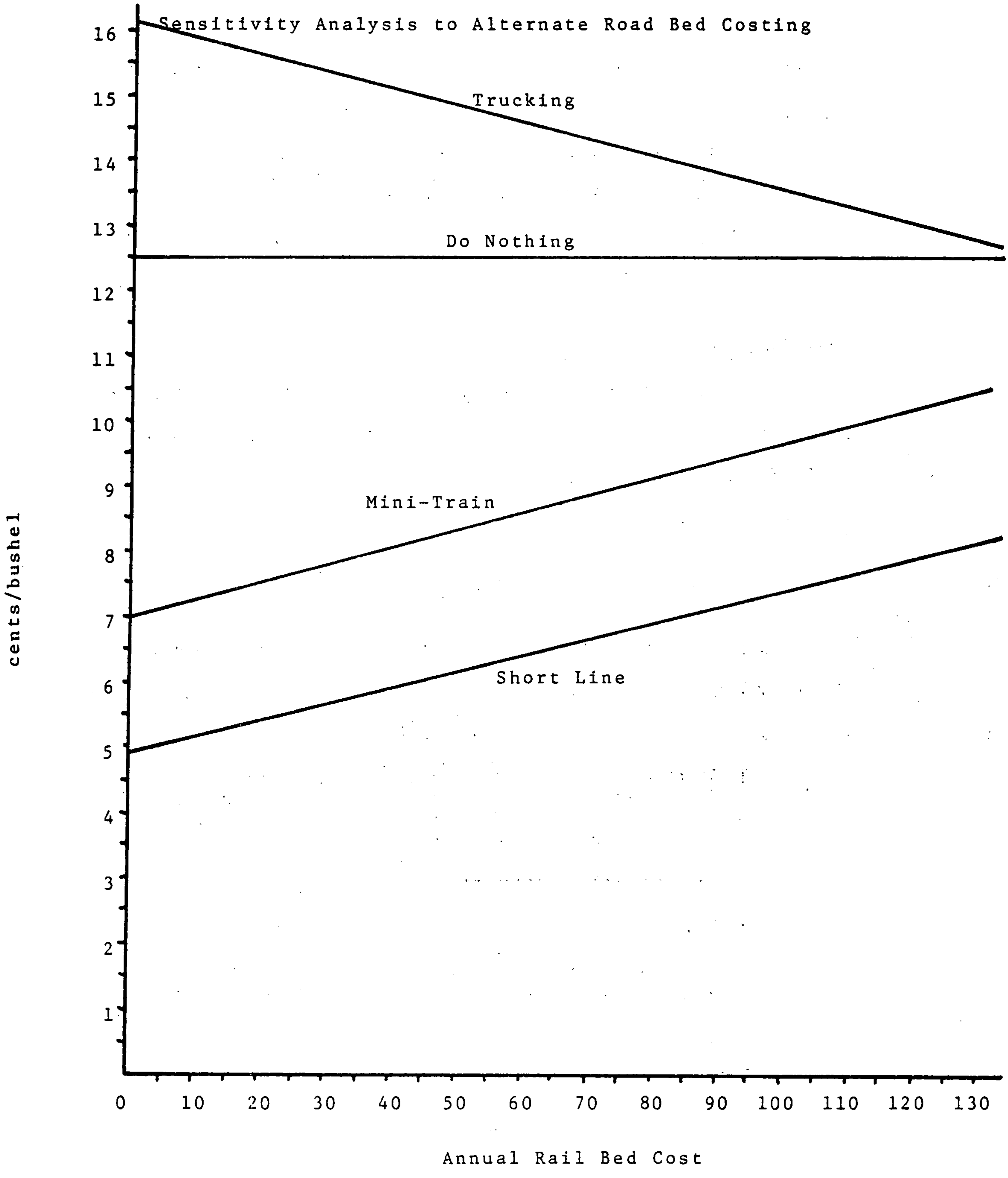
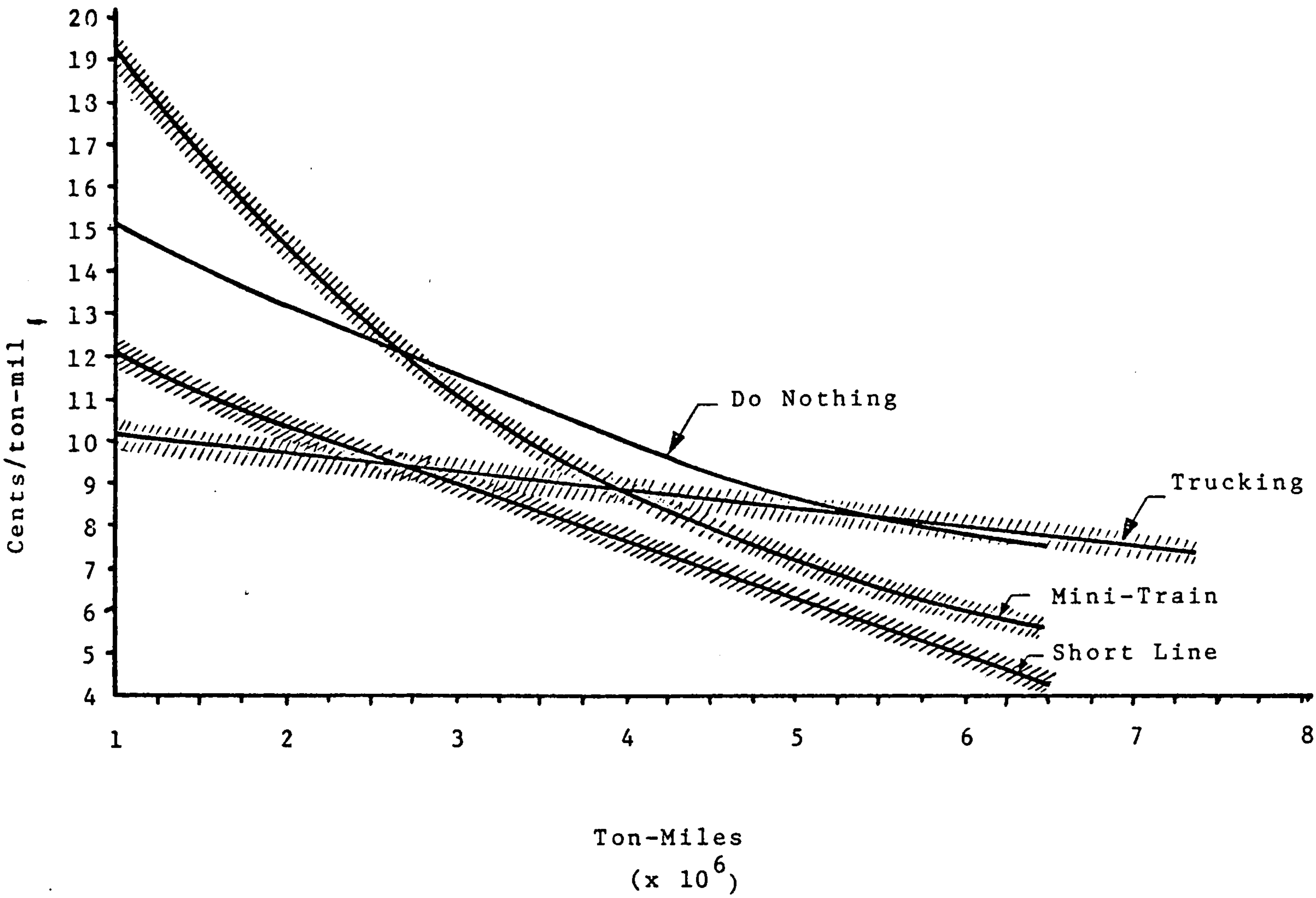


FIGURE V-16

OPERATIONAL COST COMPARISON

OF THE THREE AREAS



3) As the rail acquisition and rail maintenance costs increase, the range over which trucking is a viable alternative also increases.

4) In other words, if the existing trackage is in poor condition, then in all likelihood trucking is the least costly alternative.

5) On the other hand, if grain volumes are moderate to high in an area, the short line concept is applicable if the trackage is in reasonable condition. (Large capital outlays to maintain the track are not required).

6) In all applications the short line concept will reduce the annual subsidy requirements.

7) The need for transloading facilities and grain car conversion negates the desirability of the mini-train concept. In other words, the mini-train cannot compete with the short line because of the additional costs associated with the transloading facility and grain car modification.

8) The least desirable concept in economic terms is the continuation of the current system.

<u>Summary</u>

1. A series of sensitivity analyses were reported in this section. The operational cost variations that would arise due to changes in the underlying parameters were summarized.

2. For changes in grain volumes the following was concluded:

   - for low to medium grain volume on short to medium distance lines trucking is a viable alternative to the current system;

   - as grain volumes increase the short line concept is more attractive.

3. For changes in rail acquisition costs, the following can be concluded:

   - for acquisition costs of less than $1 thousand per mile per annum on short and medium length branch lines with annual grain volumes of 2.0 million bushels the short line concept is the most attractive alternative to the current system.

   - for high volume long distance branch lines, the short line is the least costly alternative for reasonable branch line acquisition costs.

4. The operational costs across the three Areas were examined. The following can be concluded:

   - for branch lines with a low transport product requirement (less than 2.5 million ton-miles per year), trucking is the desirable alternative.

   - for all other areas, the short line provides the best alternative to the current system.

CONCLUSIONS

This study has summarized a detailed analysis of grain handling and transportation alternatives for application to light traffic density branch lines. From the analysis, a number of conclusions can be developed. These are presented in this section of the study.

Technical Feasibility of Mini-Train

1. One of the basic questions to be answered in this study was the technical feasibility of a mini-train operation. The design of

the total system presented in this report is technically feasible.

2. For the mini-train the following was concluded:

   - the most attractive power unit is a used diesel electric switching locomotive,

   - the recommended grain car modifications for the mini-train system are:

     - longitudinal hoppering

     - seven trap doors along the bottom of each side of the box car,

   - the grain car will unload by gravity. It has a capacity of 1,500 bushels. It retains most of its stability,

   - a transloading facility with a capacity of ten thousand bushels per hour was designed.

3. The capital costs of the three components were estimated as follows:

- power unit and accessories	$80,000
- grain car purchase (unit)	$ 5,400
- grain car modification (unit)	$ 2,033
- transloading facility	$210,067

Technical Feasibility: Short Line and Trucking

1. The short line alternative is technically feasible. The capital cost of the power unit and accessories was estimated at $80 thousand.

2. The trucking alternative is technically feasible. The capital costs of this alternative are:

- truck tractor (annual)	\$15,600
- trailer	\$12,000
- elevator modifications (unit)	\$ 5,000
- transloading facility	\$66,575

<u>Grain Handling Implications</u>

1. If the short line concept is to be implemented on a branch line there will be virtually no change in the grain handling aspects.

2. If the mini-train or trucking alternative is implemented, there will be a number of restrictions placed on the grain handling and these are:

   - the modified grain cars (truck trailers) must be delivered to the transloading facility in multiples that equal the capacity of a covered hopper grain car.

   - the grade and type of grain of each unit transloaded to a hoppered grain car must be identical. While this may present no problem from one specific elevator, an appropriate marshalling may be required for a shipment coming from more than one elevator of the same grain company.

   - some grain quality may be lost at the transloading facility.

<u>Labour Implications</u>

1. No insurmountable labour problems are foreseen if a small number of branch lines were to have any of the alternatives imposed on them.

2. The greatest labour difficulty arises when a major rail company abandons a branch line. That is, the possible loss of jobs to the major rail unions due to the closing or transfer of the line to a third party can cause problems. However, if a limited number of lines are closed, personnel would be absorbed into positions on the overall network. Major job loss would only occur if a large number of lines were abandoned.

3. The operation of the transloading facility for the trucking and mini-train systems should be the responsibility of the existing grain companies. This is necessary from a quality control standpoint.

4. The operator of the short line rail, mini-train rail system, and the trucking system should ideally be a small independent company.

5. Effects on the grain grower would relate to the economics (cost per bushel handling and shipping) and to constraints on his ability to ship platform cars. Under all circumstances the grain grower would be able to load platform cars on the main line. However, on the branch line his ability to load platform cars could be impaired by the mini-train and trucking systems and possibly by the short line system depending on the authority of the third party operator.

Areas of Application

1. Considering the alternatives examined, two have possible application and these are the short line and trucking alternatives.

2. In economic terms, the mini-train concept is not a desirable altenrative because of the capital requirements for the modified grain cars and the transloading facility.

3. Trucking is a viable alternative to the current system when branch line grain volumes are low (under 2.0 million bushels per annum) and distances are relatively short (under 50 miles).

4. The short line concept is a viable alternative to the current system when grain volumes exceed 2.0 million annual bushels and distances are over 50 miles.

5. The short line concept reduces annual rail subsidy requirements.

6. Where there is an overlap of the trucking and short line concepts, the appropriate alternative will depend very much on the rail right-of-way acquisition costs, and the physical condition of the line.

CHAPTER 6

COMMERCIAL TRUCKING COSTS AND FEATURES

W.A. Scott

INTRODUCTION

The Grain Handling and Transportation Commission has considered many aspects of the total prairie system in terms of "components" with a view to presentation of alternative configurations in grain assembly. Commercial carriage is one component which could play an important role in grain assembly.

It is helpful to evaluate and quantify this component from the standpoint of the particular enterprise as a business with some emphasis on the entrepreneurial nature of the subject. This requires consideration of profit sensitivity of the particular activity in addition to consideration of cost sensitivity. Examination in this light helps to stimulate ideas regarding a means of assembling components, in order to demonstrate features of various combinations and, thereby, to give one a feel for practical least cost arrangements.

PURPOSE

This report correlates the latest information with existing studies in order to define the features of the commercial trucking enterprise. Costs and rates are analyzed and a methodology is presented for use in compiling the cost of moving grain by this mode as part of a specific area system.

EXECUTIVE SUMMARY

Commercial grain trucking has received relatively superficial consideration in major industry studies to date. The costs of this method of carriage have been analyzed through compilation of existing data in the form of a budget study. This analysis has included an allowance for profit and the results have been validated by cross checking, comparison and reconciliation with other studies and with existing trucking rates. Major findings and conclusions are as follows:

1) Commercial trucking offers a most attractive means of grain carriage in terms of natural gravitation to the lowest common cost denominator through the action of the profit incentive.

2) The intriguing nature of the commercial trucking element, from the cost standpoint, stems, from the high proportion of variable to fixed costs, and the inherent flexiblity and mobility of the business activity.

3) The viability of a commercial trucking enterprise in an area is dependent on sufficient volumes of movement coupled with favourable weather, load limits, road conditions, dispatch and protection from unprofitable competition.

4) Existing commercial trucking loading charges and rates for distances beyond 25 miles are generally reasonable and do allow for adequate profit; however, profits are extremely sensitive to operating time and slight rate changes when expressed in terms of cents per bushe. For example, a typical truck assigned to the movement of 500 thousand bushels over a distance of 40 miles would add $5 thousand per year to profit by an increase of one cent per bushel in the rate. Normal total fleet profit per truck would also likely be in the order of $5 thousand.

5) Rates based on time and mileage costs, as developed by budget analysis, would provide the customer with a more accurate billing for service and would ensure profit level maintenance to the carrier. This method of rate calculation would be especially advantageous in that it:

   a) provides for flexibility in assigning charges to specific hauls to take into consideration different load sizes and truck speeds;

   b) overcomes the inequities associated with existing mileage interval rates;

   c) allows for costs directly related to loading, unloading and waiting time;

   d) has potential to assist both customers and truckers in most efficient utilization as they would become more aware of the real cost components of the operation.

6) The cost of moving grain in an area can be readily estimated by the application of a mileage rate and a time rate which is dependent on truck utilization. These rates computed for 1974, based on single shift operation are $17.15 per hour plus 17.4 cents per running mile.

   Costs of trucking grain in the Lyleton area have been computed as an example:

   - the cost of moving grain by commercial truck from all points on the CP Rail Lyleton subdivision to destination at Deloraine totals $86,392. This works out to an average 4.44 cents per bushel ranging from 2.69 cents per bushel (.245 cents per bushel mile) for grain delivered from Goodland, a distance of 11.0 miles to 6.73 cents per bushel (.161 cents per bushel mile) for grain delivered from Lyleton, a distance of 41.7 miles. These costs include 40 minutes per trip for loading, unloading, checking and tarping as well as an allowance for profit and administration.

7) Cost structure is dependent on total truck utilization, overhead, and operational detail such as amount of waiting time versus driving time. The following listing presents an approximate breakdown for a truck fleet operating in elevator to elevator haul and single shift operation for 1974.

Item	Percent of Total Fleet Income
Wages	28.8
Fuel	10.9
Repairs & Cleaning	9.3
Tires	3.2
Depreciation	12.8
Tarping	0.4
License	5.5
Interest Recovery	6.1
Insurance	0.5
Administration	12.5
Profit	10.0
TOTAL	100.0

Rates per revenue mile on the above basis (not including stationary time expense) equal $1.49 considering an average travel speed of about 35 miles per hour.

8) It is recognized that the movement of grain by large commercial trucks will be less damaging to roads than similar movement by smaller farm trucks. This assumes that the commercial trucker would use discretion with regard to the timing of haul in regard to road conditions.

Further assessment of the cost and practicability of area rationalization to include replacement of either farm trucking or rail movement by commercial trucking would be centered on:

a) traffic patterns and road impact,

b) practical operational problems such as:

- dispatch and truck utilization,
- leakage in transit,
- elevator loading operation and cost,
- elevator unloading operation and marginal handling costs.

9) Existing policy and industry practice with regard to rate establishment would provide for fair minimum and maximum charges given:

a) control over entry of non-profitable (short-run) carriers,

b) the possibility of customer (e.g. elevator company) private carriage.

REVIEW OF MOST RECENT INDUSTRY STUDY - AREA 11

The most recent industry wide study, AREA 11, has lead to the compilation or discussion of all significant attempts to analyze the commercial grain trucking element in Western Canada.*

Rates charged for commercial trucking of grain in different operations through Saskatchewan and Alberta were summarized as indicated in Table VI-1. Curves A through D of Figure VI-1 present this data in form for quick visual reference. These curves are drawn through points representing middle of distance intervals for which rates have been established. This provides a more interesting and accurate description for comparative purposes than do straight line regresstion plots suggested in the Area 11 analysis. It should be

* Study by Canada Grains Council

TABLE VI-1

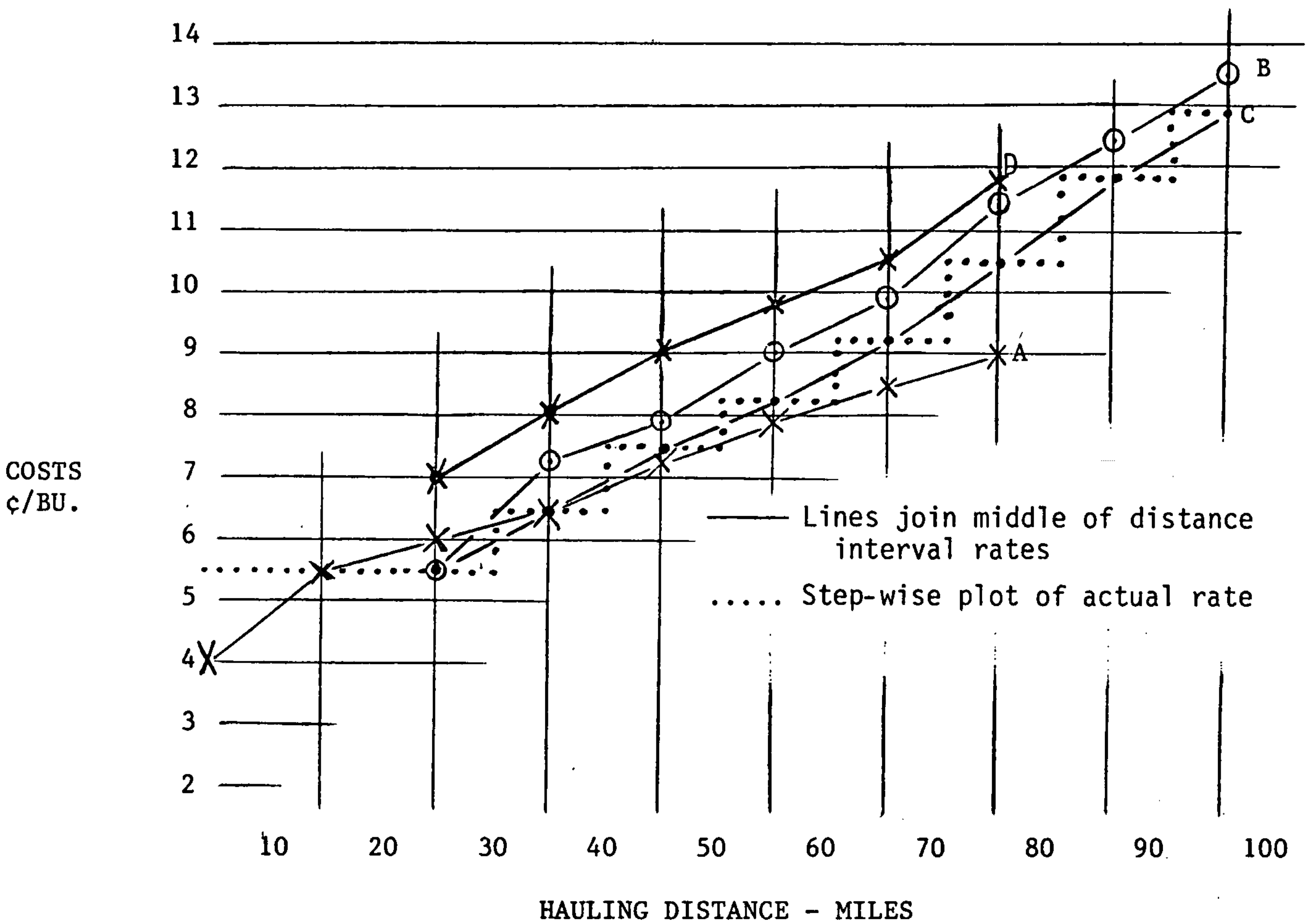
COMMERCIAL TRUCKING RATES CENTS PER BUSHEL
FOR GRAIN LOADED AT ELEVATOR OR PICKED UP ON FARM

MILES	Robin Hood Multifoods - S'toon Elev. & Farm		Sask. Pool Rape Seed 74		Can. Wht. Board S'toon & Moose Jaw 75		Can. Wht. Board Calgary 74	Can. Wht. Board Edmonton 74	Can. Wht. Board Lethbridge 74
	73	74	Elev.	Farm	Elev.	Farm	Elev.	Elev.	Elev.
0 - 10	3.0	4.0							
11 - 20	5.0	5.5							
21 - 30	5.5	6.0	5.6	6.4	5.6	7.8 (7.7)*	7.0	7.6	6.7
31 - 40	6.0	6.5	7.3	8.1	6.4	8.6 (8.5)	8.1	8.7	7.8
41 - 50	6.5	7.2	7.8	8.6	7.3	9.5 (9.6)	9.0	9.5	8.7
51 - 60	7.8	7.8	9.0	9.8	8.1	10.3 (10.7)	9.8	10.4	9.5
61 - 70	8.4	8.4	9.8	10.6	9.2	11.4 (11.8)	10.6	11.2	10.4
71 - 80	9.0	9.0	11.5	12.3	10.6	12.8 (13.2)	11.8	12.3	11.5
81 - 90			12.6	13.4	11.8	14.0 (14.3)			
91 - 100			13.7	14.5	12.9	15.1 (15.4)			

* Numbers in brackets are Saskatchewan Trucking Association rates as of Spring 1975 from brief to Commission, November 26, 1975.

FIGURE: VI-1

COMMERCIAL TRUCKING RATES - 1974



X———X A. Robin Hood Multifoods 1974 rates paid which included some portion of loads from farms.

O—— O B. 1974 Sask. Pool Rapeseed rates paid not including any allowance for farm loading which would have required addition of 1 to 1½¢/Bu.

.———. *C. 1974 Can. Wht. Board rates to Moose Jaw and S'toon not including any allowance for farm loading which would have been about 2.2¢/bushel extra.

X———X D. 1974 Can. Wht. Board rates--Calgary--about avg. of Calgary, Edmonton, and Lethbridge not including any allowance for farm loading which could be set at up to 2.8¢/Bu. (2 hrs. max.)

*Note: Almost indentical to Sask. Assoc. Brief 1975 Spring rates.

noted, however, that the actual shape of each function is step wise as illustrated by the dotted line running through the points of Curve C.

In addition, a proposal was made in this study, through a cursory analysis of two previous "custom commercial" trucking studies, that "under the degree of rationalization which may prevail in the foreseeable future a cost per bushel mile of 0.22 cents is accepted as a bench mark against which costs derived from other sources can be compared".

A study which was commissioned by the Grains' Group in 1971 titled, "Evaluation of Commercial Carriage of Grain"*, receives passing comments in comparison with commercial trucking studies as follows:

> "The latter study is not directly comparable to the former two in that a budget was used to establish costs -- the latter study while useful for reference purposes is, therefore, not used when attempting to establish actual commercial trucking costs".

The Area 11 study goes on to tabulate cost data which was compiled and combined from a number of commercial trucking firms in Alberta and also the Saskatchewan Trucking Association. The conclusion is drawn that a narrow margin exists between the indicated costs and the rates charged suggesting that there is "keen competition" between firms engaged in the trucking of grain. The information as compiled form this part of the Area 11 discussion is presented in Table VI-2.

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* Study by Trimac.

TABLE VI-2*

INDICATIVE COMMERCIAL TRUCK OPERATING COSTS PER RUNNING MILE IN GRAIN HAULING** PRAIRIE PROVINCES, 1973 AND 1974

Cost Category	Cost Per Running Mile	
	1973	1974
	-----cents-----	
Wages	9.5	13.0
Fringe Benefits including vacation	2.7	3.5
Fuel	7.1	9.2
Maintenance	4.0	5.3
Tires	2.0	3.0
Depreciation	3.9	4.8
Insurance, Taxes, Licenses	3.5	4.3
Overhead and Administration	4.8	5.7
Other	2.4	2.4
TOTAL	39.9	51.2

* This is Tabe XIII from Page 65 of the Area II Study.

** Costs apply to a tractor and 50,000 pound capacity trailer five axle combination unit travelling 120,000 miles per year. The per mile costs indicated refer only to those when travelling. Any loading or unloading costs are in addition to those listed. Costing date is December 1 of the respective years.

QUESTION ARISING FROM REVIEW OF THE AREA 11 STUDY

The Area 11 study failed to illustrate the justification for the final statement regarding costs and rates. It was also noted that the increases indicated from 1973 to 1974 tended to exceed levels one would expect based on statistical indices.

An analysis of the commercial trucking alternative should be carried out separately from that of custom trucking. Considering the vast differences in orientation of the business enterprise it would seem irrelevant to extricate custom trucking costs for use even as a "bench mark".

The Trimac study was reviewed and deemed a serious attempt to analyze the commercial trucking business. It was determined that the running mile costs (as defined for Table VI-2) would account for about 93.4 percent of total costs.* Thus, by applying an additional seven percent to allow for loading and unloading costs and allowing for 10 percent profit (as per Trimac analysis) the total rate per mile for the Area 11 compilation should be 60.9 cents, this is equal to .133 cents per bushel-mile or 2.7 cents per bushel for a 20-mile haul.

Commercial rates acknowledged by the Area 11 study regression analysis, considering a similar elevator to elevator haul situation, range from .241 to .382 cents per bushel mile which is equivalent to 4.8 cents to 7.6 cents per bushel for a 20-mile haul.

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* See Appendix A-1 for supporting calculations.

The Area 11 study conclusion would appear to be contradictory. The typical truck referred to by the Area 11 study would generate 55.08 million* bushel miles. A change by a figure of one in the second decimal place of cost per bushel-mile in cents results in a revenue difference of $5.508 for the typical truck. The difference between a rate of .133 cents and .382 cents per bushel-mile would create a sizeable profit opportunity.

FURTHER ANALYSIS

Several questions regarding commercial trucking activity remain unanswered such as:

1) What would reasonable rates be if an analysis of the business was based on the establishment of a fair rate of return on investment?

2) How do the existing surcharges for farm loading (ranging from zero to five cents per hundredweight) and the "mileage interval" relate to total rates, costs and profit?

3) What costing techniques lead to the most accurate, simple and flexible means of including the commercial trucking element as one component in grain assembly?

4) What are the major operational factors affecting cost and viability of commercial trucking?

In an attempt to provide some insight and develop a methodology for use in area analysis, the above questions will be answered under the following four subheadings.

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* 120 thousand miles ÷ 2 x 918 bushels = 55,080,000 bushel-miles.

Rates

The Trimac study contains sufficient breakdown of costs to provide a background for analysis of commercial trucking rates. In order to assess the "validity of this budget study" as a basis for further analysis it was decided to work gross figures of the Saskatchewan Fleet costs back to running mile costs for comparison with the independently assimilated data of the Area 11 study. The results of this "work-back" are shown in Table VI-3. Area 11 data from Table VI-2 is repeated for comparative purposes. Costs in the 1974 Trimac column have been estimated by the application of indices to update the 1971 data.

Table VI-3 illustrates the effect of utilization on truck unit costs. The Trimac Case II column of the table representing an average truck usage of 106 thousand miles should be the most directly comparable with the 120 thousand mile truck referred to in the Area 11 study summation.

There is good correlation between cost components of the 1974 Trimac Case II column and the 1974 Area 11 study column. Comparative total costs are 56.2 cents per mile and 51.2 cents per mile. The Trimac study budget would appear to be a very reasonable and a somewhat conservative estimate of costs.

It would seem reasonable to carry the discussion a step further by looking at the establishment of rates based on a "return on investment" analysis. The profit per truck of the Trimac Saskatchewan Fleet ranges from $3,470 to $6,700 depending on the truck usage.

TABLE VI-3

COMMERCIAL TRUCK OPERATING COSTS (CENTS)
PER RUNNING MILE IN GRAIN HANDLING

	BASED ON TRIMAC STUDY 1973			BASED ON TRIMAC STUDY 1974			AREA 11 STUDY	
	Case I	Case II	Case III	Case I	Case II	Case III	1973	1974
Wages including Fringe Benefits	13.5	13.5	13.5	18.2	18.2	18.2	12.2	16.5
Fuel	6.2	6.2	6.2	8.6	8.6	8.6	7.1	9.2
Maintenance	5.9	5.5	5.4	7.4	6.9	6.6	4.0	5.3
Tires	2.0	2.0	2.0	2.5	2.5	2.5	2.0	3.0
Depreciation	7.0	4.0	3.2	10.2	5.8	4.4	3.9	4.8
Insurance, Taxes, Licenses	3.9	2.3	1.8	4.8	2.8	2.2	3.5	4.3
Overhead and Administration	7.2	6.2	5.9	9.9	8.5	8.0	4.8	5.7
Other	2.8	1.6	1.2	5.2	2.9	2.2	2.4	2.4
TOTAL	48.5	41.3	39.2	66.8	56.2	52.7	39.9	51.2
INCREASE OVER 1971				(+38%)	(+36%)	(+34%)		

CASE I - Average annual truck mileage 60 thousand.
II - Average annual truck mileage 106 thousand.
III - Average annual truck mileage 139 thousand.

AREA 11 STUDY - Average annual truck mileage 120 thousand

Considered on the basis of an average investment of $17,300 per truck*, this would be 20 to 38 percent return in addition to interest. The tabulated costs included 9.0 percent interest on investment and it is quite possible that the total owner's equity in a commercial trucking enterprise would be in order of one-third to one-half (or less) of the fleet assets.** Normal profits based on costs and rates, as outlined in the Trimac study, could easily be between 40 and 100 percent return on owners' equity before income tax. This would indicate that the allowance of 10 percent of total revenue for profit is adequate for rate establishment.

The updated Case I rate per hour, including loading and unloading time and profit at 10 percent on total revenue, has been applied to several shipping points of the Trimac study. These updated Trimac rate schedule points*** have been plotted in Figure VI-2. The rate schedule as used for Canadian Wheat Board movement of grain to inland terminals at Saskatoon and Moose Jaw is also shown in Figure VI-2, for comparative purposes. Rates derived by updating the Trimac study fall fairly much in line with the rates paid by the Canadian Wheat Board in Saskatchewan movement during 1974; these, of course, are also in line with the Saskatchewan Trucking Association rate.

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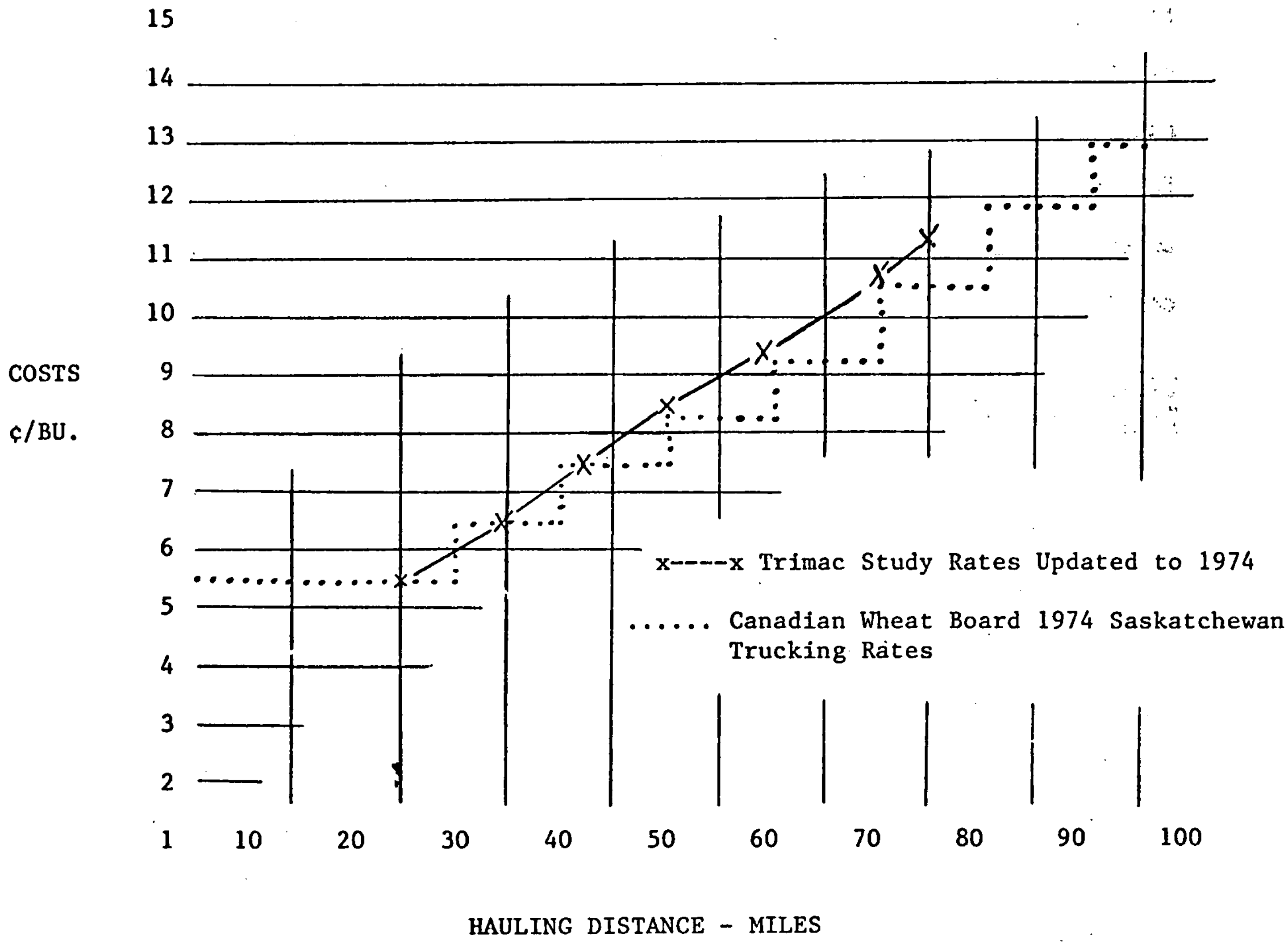
* See Appendix A-5 for calculation.

** See Appendix D for more complete discussion.

** These points plotted for the Case I analysis of the Trimac Study are based on the lowest level of utilization.

FIGURE: VI-2

Comparison of Trimac Study Rates Updated to 1974
and Canadian Wheat Board 1974 Saskatchewan Trucking Rates



The Trimac data includes a substantial allowance for profit from the standpoint of return on investment. An adjustment in this portion of the rate would not significantly alter the total rate figure, but the analysis does show that 1974 rates in the range indicated should allow for some contingencies and should lead to "keen competition"*. The updated Trimac budget will be considered valid for further analysis and development of a costing methodology.

Effect of Loading Charges, "Mileage Interval" Rates, and Slight Rate Changes or Discrepancies

-- Charges for Farm Loading

Farm loading time and charge effects on revenue expenses and profits were looked at by simply picking two different hauling distance points from the Trimac study.** One truck was considered to be operating in each case. Profit per year for the truck was compared in three different operating situations for each of the two hauls. The 1975 Saskatchewan Trucking Association rate of four cents per hundredweight (2.2 cents per bushel) for farm pick up was used in the calculations. The results in terms of profit for one year of one truck's operation are shown in Table VI-4.

Farm loading charges have significant impact on rates and trip or truck profit. The examples demonstrate that an additional 2.2 cents per bushel charge combined with one hour extra

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* Review of actual 1974 profits in trucking grain would indicate a somewhat less positive situation due to factors such as lower utilization and higher average interest and depreciation costs.

** This analysis is based on the low usage Case I column of the 1971 Saskatchewan Fleet Costs.

TABLE VI-4

ILLUSTRATION OF EFFECT OF ONE AND TWO HOUR EXTRA LOADING TIME ON SINGLE TRUCK PROFIT PER YEAR AT THE 1974 RATE OF FOUR CENTS PER HUNDREDWEIGHT FOR FARM PICKUP

Origin of Load	Type of Pickup	TIME ALLOWED FOR IN MINUTES			Additional Farm Loading	ANNUAL PROFIT* PER TRUCK ($) Based on 1971 Trimac Study Budget Operating Constantly In This Haul
		Primary Elevator Loading	Terminal Elevators Unloading	Tarping and Equipment Checking		
ASQUITH (25 Mi. Haul)	Primary Elevators	20	20	20	Nil	$3,440
	Farm		20	20	80	8,200
			20	20	140	390
KENASTON (49 Mi. Haul)	Primary Elevator	20	20	20	Nil	3,440
	Farm		20	20	80	7,300
			20	20	140	1,770

* Supporting calculations are contained at A-7 of the Appendix. Profit has been calculated by using average truck of fleet expenses as a base, therefore these profit figures are comparative only. It is further demonstrated on Page C-7 of the Appendix to this Report that based on 1974 costs, the four cents per hundredweight charge is reasonable assuming one hour extra loading time.

loading time (80 minutes total) more than doubled the profits*, whereas two hours extra loading time (140 minutes total) resulted in a substantial reduction in profit.

-- Mileage Interval Rates

The "mileage interval" concept can be examined by considering a single truck operating at either extremity of a mileage interval. The average truck of the Trimac study would be subject to a potential annual cost difference of $2,365 depending on whether it was operating at the high or low end of the mileage interval. Considering an average profit for the Case I fleet of $3,470, the interval factor could significantly affect the profit of an average truck. Mileage interval rates at 1974 levels cause discrepancies of approximately one cent per bushel to the customer in the hauls which are greater than 30 miles.

-- The Effect on Slight Rate Changes

It was formerly noted with respect to the average truck considered by the Area 11 study that a slight rate change such as .010 cents per bushel-mile (equivalent to one-quarter cent per bushel for a 25 mile haul) could affect truck revenue by over $5 thousand.

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* This example is merely used to demonstrate the sensitivity of truck profit to loading time and charges. It is further demonstrated on Page C-7 of the Appendix that based on 1974 costs, the 2.2 cents per bushel charge is reasonable assuming one hour extra loading time.

Even though the actual average truck would likely produce less than one-half the revenue miles of the Area 11 truck*, it can be seen that slight rate changes can cause total revenue differences in the same order of magnitude as the normal truck profit.

Costing Techniques and Methodology For Application To A System Rationalization Scenario

It has been established that commercial trucking rates for 1974 are in line with rates as calculated by updating the 1971 Trimac budget. This budget made adequate allowance for profit and it is apparent that slight rate changes have considerable influence on this portion of the total.

Existing methods of "job pricing" within the normal "mileage interval" and loading surcharge rates structure have been used to demonstrate that anomalous results may develop as follows:

1) farm loading charges have a very strong positive or negative influence on the profit margins depending on the time required to load the vehicle;

2) mileage interval rates do not reflect costs for specific hauls; this results in over or under charging with significant effects on profit potential of units operating continuously near the extremities of any given distance interval;

---

* Clayton and Sparks paper presented along with the Saskatchewan Trucking Association brief, entitled, "A Profile of Commercial Grain Trucking in Saskatchewan", considered that a single truck operating between an abandoned line elevator and an on-line elevator 40 miles apart could handle in the order of 500 thousand bushels per year by averaging three round trips per work day, this is equivalent to slightly less than 45 thousand miles per year for a single truck operating 180 days per year.

3) a further shortcoming of a per bushel rate structure is that it does not provide a means of allowing for partial loads or variable traffic speeds.

In order to provide for stable returns and reasonable rates, it would be necessary to charge for farm loading based on the amount of time involved in this part of the operation for each load. A variable rate based on distance of haul and total time would allow for a variety of circumstances. This type of rate establishment would tend to keep rates of commercial trucking in line with costs while ensuring profit level maintenance to the carrier.

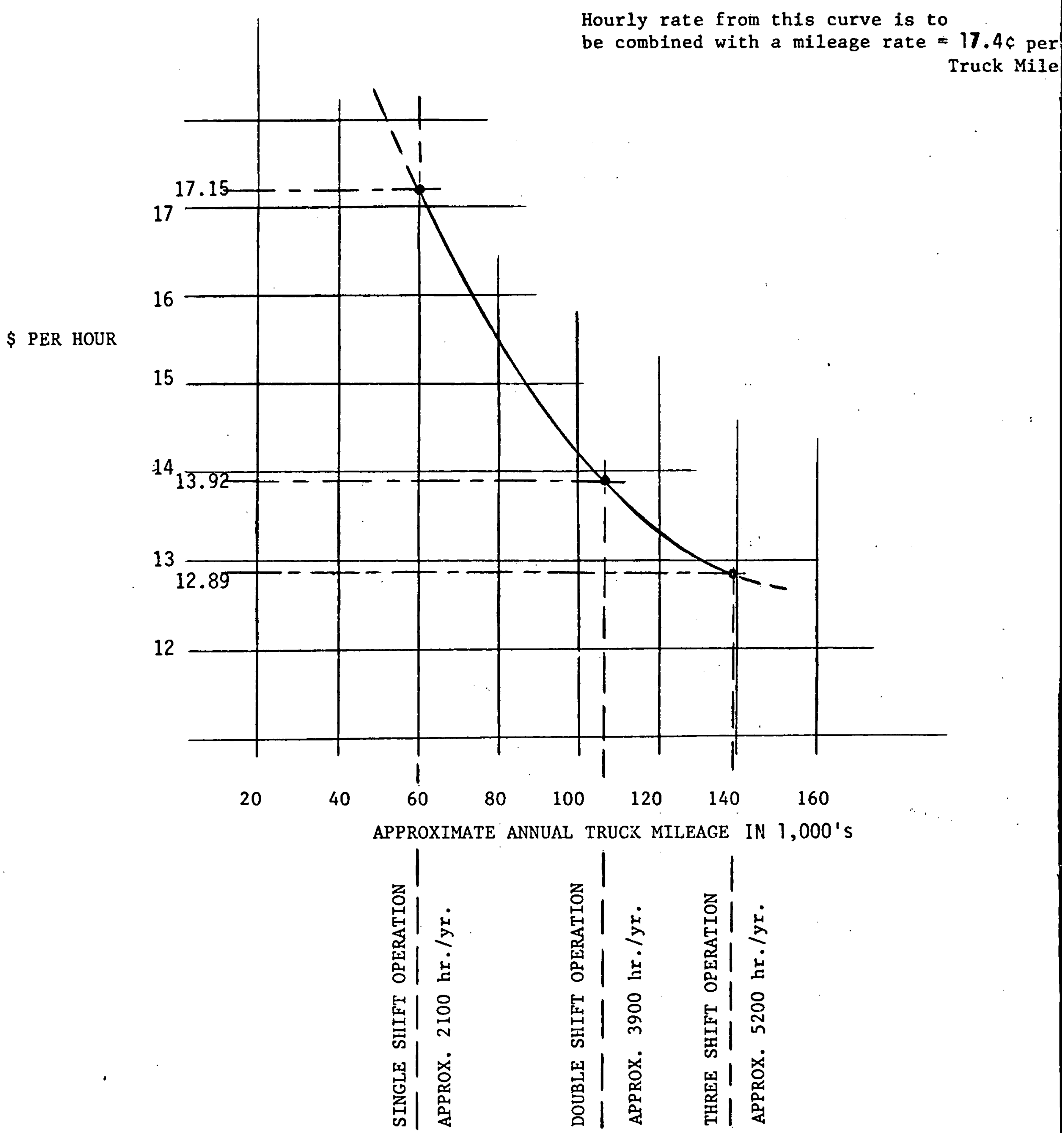
Time related and mileage related costs have been separated and compiled for three different levels of truck utilization as shown in B-1 of the Appendix based on the Trimac data updated to 1974. The results of this compilation have been plotted in Figure VI-3. By reference to the curve of Figure VI-3, an hourly rate can now be obtained for application to a particular trucking situation. The mileage related cost which is applied in conjunction with the hourly rate will not vary with utilization.

Time and mileage based rates offer the optimum in flexibility for use in the analysis of trucking costs. This method of rate establishment is compared with the time related rate determination of the Trimac Study in Appendix B.

A step by step outline of the methodology to be used in the application of time and mileage rates is contained in Appendix C. Included is a data table which has been completed for commercial trucking in the

FIGURE VI-3 TIME RATE VERSUS TRUCK UTILIZATION

BASED ON TRIMAC BUDGET UPDATED TO 1974



Lyleton area of the PMLP Mini-Train Study.* The costs of trucking have been recalculated by the application of time and mileage rates. Comments regarding the comparative results using this methodology versus the original Mini-Train Study methodology follow the Appendix C cost analysis.

The comparative analysis of Appendices B and C generally attest to the reasonableness of the time and mileage rates of Figure VI-3. These analyses also demonstrate the utility of a methodology which uses separate time and mileage components in cost determination.

Major Operational Factors Affecting the Cost and Viability of Commercial Trucking

It should be recognized that commercial trucking profits may be quite sensitive to certain factors on the negative side. The degree of management expertise and the predictability of variables such as the following will determine stability of the enterprise:

1) Weekly variance in grain volume affecting utilization and over-time;
2) Road restrictions and weather conditions;
3) The nature and stability of competition;
4) Dispatch complexity;
5) Legal constraints and public and customer acceptance;

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* A Feasibility Study -- Mini-Train Operation with Transloading Facilities, a report prepared for the Grain Handling and Transportation Commission by PMLP Consultants.

** This development of rates based on time and mileage may be somewhat over-simplified due to such factors as inclusion of depreciation in the budget as a strictly time related item.

6) Rapid or unrecognized cost increases;

7) Rate controls.

The foregoing discussion has intimated the establishment of rates based on trucking costs. This is not an unreasonable notion, however, the converse is not the case and rates do not likely determine cost. Rates will likely be based upon competition from other modes and from private carriage and upon the supply and demand of trucking services. The commercial trucker may, therefore, through skillful management have the means of overcoming shortfall due to periods of low revenue or high costs. For example, during times when higher volumes of business are available, an increase in truck utilization can have a strong positive influence on profit. The final sheets of Appendix C illustrate the usefulness to a trucker of studying the relationship between total cost and various components of cost. The example presented shows that return on investment might be increased by a factor of from two to five times through higher utilization of vehicles.

Cost analysis as presented in this report is based on the use of five axle semis. A recent announcement by the Saskatchewan Minister of Municipal Affairs projects the enforcement of load limits which are not compatible with the use of these larger trucks. Appendix Table VI-D.1 outlines existing highway load limits and the new proposed municipal restrictions.

Appendix D contains excerpts from other studies relating to financial structure and regulation in the trucking industry.

FUTURE WORK

This study has dealt almost strictly with costs and rates; further research and discussion may be justified with respect to:

1) Road impact and traffic safety;

2) Legal constraints;

3) Practical operational problems such as differences between loaded weights at primary elevators and the unloaded weights recorded at the terminals.*

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* In the report of the 1972 Canadian Wheat Board experiments in the movement of barley to inland terminals, it was noted that in more than 30 percent of the cases the difference in weights (averages and shortages exceeded the agreed tolerance of three bushels per truck load).

APPENDIX A

BUDGET BREAKDOWN, UPDATING AND ANALYSIS OF RATE EFFECTS

RUNNING MILE COSTS AS A PERCENTAGE OF TOTAL COSTS - DERIVED FROM TRIMAC STUDY

Sask. Fleet Costs - Case I - 51 Units

Gross Revenue	$ 1,769,260
Less Profit	176,930
TOTAL	$ 1,592,330

Loading and Unloading Costs

33,499 Trips x .667 hrs./trip x $4.69/hr=	$ 104,793
Therefore total running mile costs	$ 1,487,537

Running Mile Costs as a Percentage of Total Costs

$$\frac{1,487,537}{1,592,330} = \quad .... \quad 93.4\%$$

Area 11 Analysis Running Mile Cost .... 51.2¢

Rate Based on Above and
10% Profit Allowance ....

$$\frac{51.2¢ \times \frac{100}{93.4}}{0.9} = 60.9¢/\text{Mi.}$$

Cost Per Bushel Mile ....

$$\frac{60.9¢}{918 \text{ bu.} \times 2} = .133¢/\text{bu.mi.}$$

(Note: Factor of 2 allows for equal cost and mileage running empty)

Cost Per Bushel For 20 Mile Haul .... .133 x 20 = 2.66¢/bu.

Costs Per Running Mile - Derived From Trimac Study for 1971
Saskatchewan Fleet Costs

	$/Mi.			¢/Mi. 51 Units Case I 60,056 mi/tr	29 Units Case II 105,617 mi/tr	22 Units Case III 139,223 mi/tr
WAGES:	517,500 - 104,793 / 3,062,903 mi.			13.5	13.5	13.5
FUEL:	189,900			6.2	6.2	6.2
MAINTENANCE:						
(Repairs &	123,650	123,650	123,650			
Cleaning)	13,260	7,540	5,720			
	30,910	30,910	30,910			
	13,260	7,540	5,720			
	181,080	169,640	166,000	5.9	5.5	5.4
TIRES:	38,640					
	23,190					
	61,830			2.0	2.0	2.0
DEPRECIATION:						
	160,140	91,060	69,080			
	54,570	31,030	23,540			
	214,710	122,090	96,620	7.0	4.0	3.2
INSURANCE						
TAXES	112,200	63,800	48,400			
LICENCE	7,250	6,240	5,920			
	119,450	70,040	54,320	3.9	2.3	1.8
O.H. & ADMINISTRATION:						
	221,160	190,370	180,580	7.2	6.2	5.9
OTHERS:						
(Tarping	7,650	4,350	3,300			
Interest)	79,050	44,950	34,100			
	86,700	49,300	37,400	2.8	1.6	1.2
TOTAL:				48.5	41.3	39.2
Check Total						
Plus Waiting	104,793	104,793	104,793			
Plus Profit	176,930	152,300	144,460			
	1,769,260	1,522,790	1,448,610			

Updated (1971 to 1974) Costs for Case I of Trimac Saskatchewan Fleet

Index	ITEM		UPDATING 1971	1974
	Tractor			
1.45	Depr.		160,140	232,203
1.20	Lic.		112,200	134,640
1.39	Fuel		189,900	263,958
1.25	Rep.		123,650	154,562
1.25	Clean		13,260	16,575
1.25	Tires		38,640	48,300
			637,790	818,000
	Trailer			
1.45	Depr.		54,570	79,126
	Lic.			
1.25	Rep.		30,910	38,637
1.25	Clean		13,260	16,575
1.25	Tarp.		7,650	9,562
1.25	Tires		23,190	28,987
			129,580	172,900
			767,370	1,023,180
1.35	Wage		517,500	698,625
1.3 x 1.45	Int.		79,050	149,000
			1,363,920	1,870,805
1.50	Ins.		7,300	10,950
	Admin.	12.5%	221,160	303,510
	Prof.	10.0%	176,930	242,810
			1,769,260	2,428,070

NOTE: 1974 column is conservative (i.e. may be high). For example the following are compared with costs from Commission Mini-Train Study - late 1975 costs.

	Trimac Updated Cost 1974	Mini-Train Study Cost
Trailer	8,500 x 1.45 = $12,325	$12,000
Labour	4.69 x 1.35 = $6.33/Hr.	$6.50/Hr.

Costs per Running Mile - Derived From Trimac Study
Saskatchewan Fleet Costs Updated to 1974

	$/Mi.			¢/Mi. 51 Units Case I 60,056 mi/tr	29 Units Case II 105,617 mi/tr	22 Units Case III 139,223 mi/tr
WAGES:	698,625 - 141,470 / 3,062,903 mi.			18.2	18.2	18.2
FUEL:	263,958			8.6	8.6	8.6
MAINTENANCE: (Repairs & Cleaning)	154,562	154,562	154,562			
	16,575	9,425	7,150			
	38,637	38,637	38,133			
	16,575	9,425	7,150			
	226,349	212,049	202,995	7.4	6.9	6.6
TIRES:	48,300					
	28,987					
	77,287			2.5	2.5	2.5
DEPRECIATION:						
	232,203	132,037	100,166			
	79,126	44,993	34,133			
	311,329	177,030	134,299	10.2	5.8	4.4
INSURANCE	10,950	9,450	9,000			
TAXES						
LICENCE	134,640	76,560	58,080			
	145,590	86,010	67,080	4.8	2.8	2.2
O.H. & ADMINISTRATION:	303,510	258,890	244,700	9.9	8.5	8.0
OTHERS: (Tarping & Interest)	9,562	5,437	4,125			
	149,000	84,730	64,270			
	158,562	90,167	68,405	5.2	2.9	2.2
				66.8	56.2	52.7
TOTAL:						
Check Total						
Plus Waiting	141,470	141,470	141,470			
Plus Profit	242,810	207,110	195,760			
	2,428,020	2,071,130	1,957,613			

Calculation of Return on Investment for Average Truck of Trimac Study

Tractor cost new = $18,865

Tractor value old $18,865 x .20 = $ 3,773

Average investment per tractor of a mixed fleet

$$\frac{\$18,865 + \$3,773}{2} = \$11,319$$

Trailer cost new = $ 8,500

Trailer value old $8,500 x .4 = $ 3,400

Average investment per trailer of a mixed fleet

$$\frac{\$8,500 + \$3,400}{2} = \$5,950$$

Total average investment per unit $11,319 + $5,950 = $17,269

Investment Recovery

$$\frac{1,550}{17,269} = 9\%$$

Profit per Truck

$$\text{Case I} = \frac{176,930}{51} = \$3,470$$

$$\text{Case III} = \frac{144,460}{22} = \$6,570$$

ROI

$$\text{Case I} = \frac{3,470}{17,300} = 20\%$$

$$\text{Case III} = \frac{6,570}{17,300} = 38\%$$

Trimac Saskatchewan Rate Schedule
Point - to - Point

At the updated rate of $22.00/hour in place of $16.02/hour*.

To Saskatoon:

From	Miles	Trip Hours	Cost per Trip $	Cost per Bushel ¢
Asquith	25	2.24	49.28	5.4
Borden	34	2.69	59.18	6.4
Radisson	42	3.09	67.98	7.4
Viscount	50	3.49	76.78	8.4
Young	58	3.89	85.58	9.3
Humboldt	70	4.49	98.78	10.8
Hafford	75	4.74	104.28	11.3

Above results used to plot points of Figure VI-2.

*. $16.02/hr. is rate for 1971 Trimac compilation,
$22.00/hr. is rate for 1974 Trimac compilation = $\frac{\$2,428,020}{110,403 \text{ hrs.}}$

Truck Profit Assuming One Hour and Two Hours Extra Loading Time at a Rate of 2.2¢/Bu. = $20.20/918 Bu.

1. Example - Asquith - 25 mile haul

Normal no. of trips/year/truck $\frac{2,163}{2.24}$ = 966

Normal Revenue 966 x 35.88 = $34,660

Average Expenses Of Truck in Fleet* $\frac{1,769,260 \times .90}{51}$ = $31,220

Normal Profit/Truck (Based on ave. expenses of fleet) = $3,440
i.e. Close to average for fleet = $3,470

a) One hour extra loading time

No. of trips $\frac{2,163}{3.24}$ = 668

Revenue 668 (35.88 + 20.20) = $37,461

Savings as per mile operating expenses
(.0620 fuel + .0500 repairs + .0200 tires) = .1320

Expenses 31,220 - (966 - 668)(50)(.1320) = $29,250

Profit = $ 8,200

b) Two hour extra loading time

No. of trips $\frac{2,163}{4.24}$ = 510

Revenue 510 (35.88 + 20.20) = $28,600

Expenses 31,220 - (966 - 510)(50)(1,320) = $28,210

Profit = $390

---

* More precise figures might be derived by the technique of time and mileage split as illustrated at Page B-4 for use in calculating rates based on this split, however, these figures serve the purpose in illustrating the effect of loading time on truck profit given a standard charge per hundredweight.

2. Example - Kenaston - 49 miles

Normal no. of trips/year/truck	$\frac{2,163}{3.44} = 629$
Normal Revenue	(629 x 55.11) = $34,660
Average Expenses of Truck in Fleet	$\frac{1,769,260 \times .90}{51}$ = $31,220
Normal Profit/Truck (Based on use of average expenses of fleet)	= $ 3,440

a) One hour extra loading time

No. of trips	$\frac{2,163}{4.44} = 487$
Revenue	487 (55.11 + 20.20) = $36,675
Expenses	31,220 - (629 - 487)(98)(.1320) = $29,383
Profit	= $ 7,300

b) Two hours extra loading time

No. of trips	$\frac{2,163}{5.44} = 398$
Revenue	398 (55.11 + 20.20) = $30,000
Expenses	31,220 - (629 - 398)(98)(.1320) = $28,230
Profit	= $ 1,770

Effect of "Mileage Interval" Rates on Costs and Profit

Assume rate is constant over a ten mile range.

Costs of a ten mile haul according to Trimac 1971

$$= \frac{10 \text{ mi.}}{40 \text{ mi./hr.}} \times \$16.02/\text{hr.} \times \frac{90}{100} = \$3.60$$

Trucks hauling average of $\frac{33{,}499}{51} = 657$ trips/year

Possible affect on profit = possible total cost difference low to high end of interval. 657 x 3.60 = $2,365

APPENDIX B

TIME AND MILEAGE RATES DEVELOPMENT
AND COMPARISON WITH
TIME BASED RATE

Time and Mileage Related Rates for 1974 Based on
Updated Trimac Study Used to Produce fig. 3

Item	Index	Cost $ Case I (60,000 mi./yr.) Mileage	Time	Case II (106,000 mi./yr.) Mileage	Time	Case III (139,000 mi./yr.) Mileage	Time
Tractor							
Depr.	1.45		232,203		132,037		100,166
Lic.	1.20		134,640		76,560		58,080
Fuel	1.22	263,958		263,958		263,958	
Repairs	1.25	154,562		154,562		154,562	
Cleaning	1.25		16,575		9,425		7,150
Tires	1.25	48,300		48,300		48,300	
Trailer							
Depr.	1.45		79,126		44,993		34,133
Repairs	1.25	38,637		38,637		38,637	
Cleaning	1.25		16,575		9,425		7,150
Tarping	1.25		9,562		5,437		4,125
Tires	1.25	28,987		28,987		28,987	
Wage Burden	1.35		698,625		698,625		698,625
Int. Recovery 1.3 x	1.45		149,000		84,730		64,280
Insurance	1.50		10,950		9,450		9,000
Admin.	12.5%		303,510		258,890		244,700
Profit	10.0%		242,810		207,110		195,760
		534,444	1,893,576	534,444	1,536,686	534,444	1,423,176
		$.164/mi.	$17.15/hr.	$.174/mi.	$13.92/hr.	$.174/mi.	$12.89/hr.

Note: Total Hours = 110,403

Total Miles = 3,062,903

DISCUSSION OF TIME & MILEAGE RATES VERSUS STRICTLY TIME RELATED RATE

The rate schedule of the Trimac study was strictly time related. In the compilation of truck fleet time the loading time was assumed constant at two-thirds of an hour per trip. Actual truck operation under conditions of varying haul distance would result in a proportionately lower hourly cost for shorter distance hauls as the avoidable costs (fuel, repairs and maintenance) would decrease to a greater extent than would the total time per trip, therefore the uniform hourly rate assumption of the Trimac study would not accurately reflect the real variation in trip costs with respect to distance.

The effect of the decreasing avoidable costs with decreasing distance may be shown by application of the time and mileage rates forumla to the shortest and longest haul distances of the Trimac study. Table VI-B.1 displays the results of the application of the time and mileage rates formula to specific points and compares these results with the strictly time related rates of the Trimac study.

Loading and unloading time constituted only about 20 percent of the total time in the Trimac study as all grain was loaded at the elevator. The differences between columns of Table VI-B.1 are therefore not highly significant on a per bushel basis, however, these results do demonstrate the validity of rate establishment related to time and mileage factors.

TABLE VI-B.1

TIME AND MILEAGE RELATED RATES CALCULATION
COMPARED TO TIME BASED RATE CALCULATION

Total Rate Per Trip - $
Case I of Trimac Study 1971

TO: Saskatoon

FROM:	Miles	Trip Hours	Time Based	Time & Mileage Related
Saskatoon	4	1.19	19.06 (2.08)*	15.76 (1.72)
Asquith	25	2.24	35.88 (3.91)	34.30 (3.74)
Hafford	75	4.74	75.93 (8.27)	78.45 (8.55)

* Numbers in brackets are resultant rates in cents per bushel.

TIME AND MILEAGE RATES DEVELOPMENT FOR USE IN CALCULATIONS PAGE B-5

ITEM	$ COST RELATED TO MILEAGE	TIME
TRACTOR		
Depr.		160,140
Lic.		112,200
Fuel	189,900	
Repairs	123,650	
Cleaning		13,260
Tires	38,640	
TOTAL TRACTOR	352,190	285,600
TRAILER		
Depr.		54,570
Repairs	30,910	
Cleaning		13,260
Tarping		7,650
Tires	23,190	
TOTAL TRAILER	54,100	75,480
TOTAL TRACTOR TRAILER		517,500
WAGE BURDEN		
Int. Recovery		79,050
Ins.		7,250
Admin.		221,160
Profit		176,930
	406,290	1,362,970
TOTAL FOR CHECK		/1,769,260

Total hrs. = 110,403
Total mi. = 3,062,903

Rate/hr. $\frac{1,362,970}{110,403}$ = $12.3545/hr.

Rate/mi. $\frac{406,290}{3,062,903}$ = $.1326/mi.

Rate used by Trimac Study;

$\frac{1,769,260}{110,403}$ = $16.02/hr.

Saskatoon:

4 miles & 1.19 hours = $19.06/trip --(From Trimac Study based on $16.02/hr.)

Rate - (12.3545 x 1.19) + 8 (.1326)--(Time and mileage rate)
= $15.76

Asquith:

25 miles & 2.24 hours = $35.88

Rate - (12.3545 x 2.24) + 50 (.1326)
= $34.30

Hafford:

75 miles & 4.74 hours = $75.93

Rate - (12.3545 x 4.74) + (150) (.1326)
= $78.45

NOTE: above results used to compile table VI-B.1

APPENDIX C

TIME AND MILEAGE RATES

APPLICATION AND COMPARATIVE CHECKING

APPLICATION OF TIME AND MILEAGE RATES

Time and mileage based rates are used in the development of costs for an area as follows:

1) Determine the location, quantities and destination of grain in the area;

2) Define and map the road system which will be used including routing from each location to destination, load limits, mileage and estimate average truck speeds for each portion of road;

3) Considering the restricting load limits for the route, decide on quantity of grain to be moved per trip*, estimate the total loading and unloading, tarping and checking time required per trip and compute the number of trips required.

4) Determine the time required per trip by totalling the time required to traverse each portion of road in both loaded and unloaded direction plus the loading, unloading, tarping and checking time;

5) Add up total route mileage travelled per trip in both loaded and in empty directions;

6) Determine the truck fleet required and the total average mileage and hours of use per unit per year;

7) Considering the utilization figure from the previous step, select the appropriate time rate from the graph Figure VI-3.

8) Apply mileage rate and time rate to the grain movement by multiplying this computed total rate per trip times the number of trips.

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* In the case of different load limits throughout different times of the year, it will be necessary to split the total movements into different trip cost portions in order to allow for varying road restrictions throughout the year. Review the make up of grain quantities in the area and compute the average bushel weight or assume an average figure such as 56 pounds per bushel based on judgement.

COMPARATIVE CHECK ON RATES

One of the areas used in the Mini-Train Study* has been selected and the cost of trucking has been recalculated according to this latest procedure as shown in Table VI-C.1.

The cost as calculated by the application of 1974 time and mileage rates totals $86,392 for the area as compared to the PMLP application of 1975 costs to total $106,304. The difference is accentuated when one considers that the PMLP calculation does not include an allowance for overhead, administration and profit.

The following comparative listing illustrates the higher costs used in the PMLP analysis.

COST - PER REVENUE** MILE

Truck Annual Mileage (Approximately)	Trimac Updated to 1974	PMLP 1975	Area 11 1974
60,000	1.14	1.63	
80,000		1.45	
106,000	95.8		
120,000			.91
139,000	89.4		

* A Feasibility Study -- Mini-Train Operation with Transloading Facilities, a report prepared for the Grain Handling and Transportation Commission by PMLP Consultants.

** Revenue miles are assumed to equal one-half total truck mileage. No allowance is included for overhead and administration and profit in the figures shown.

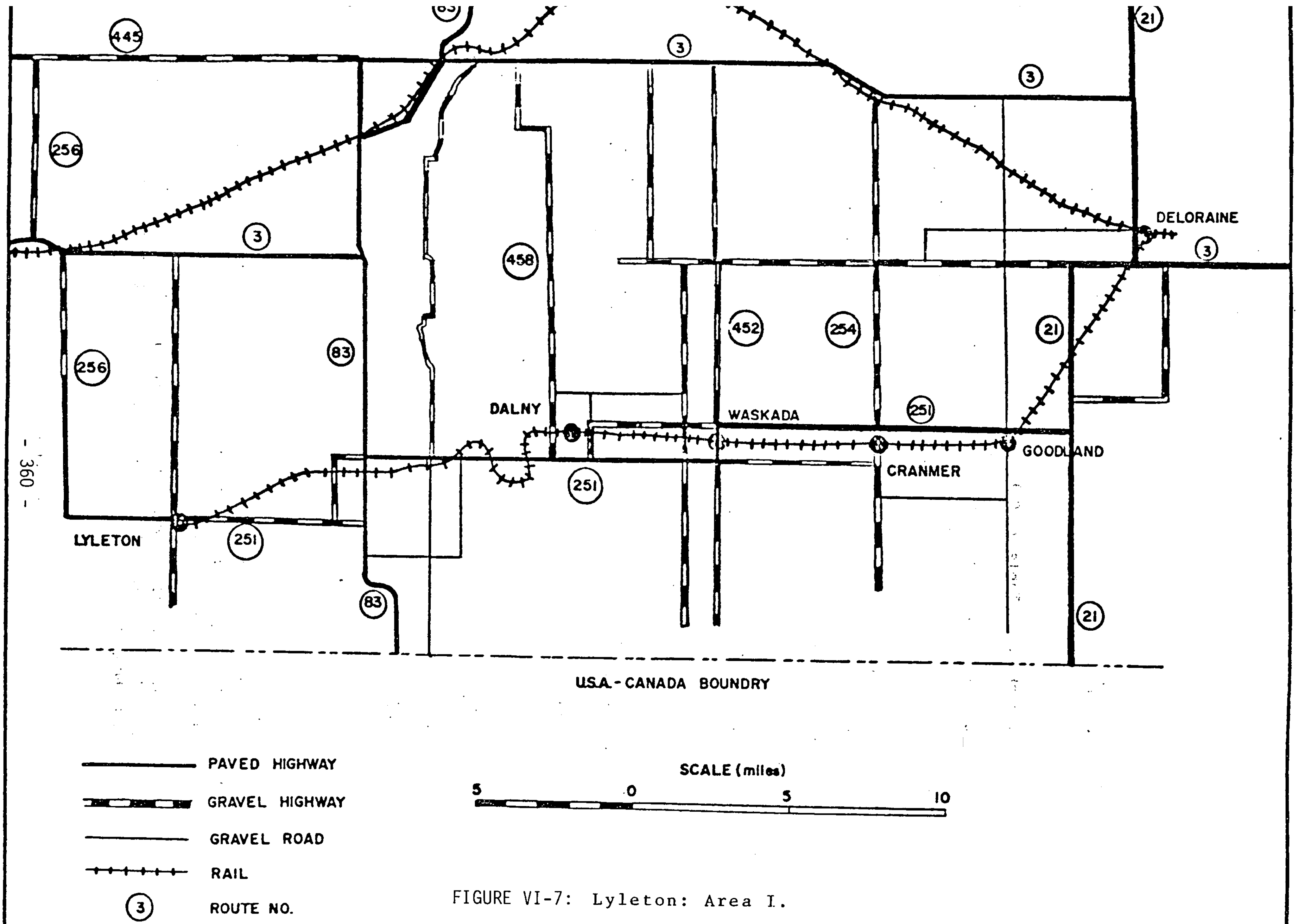

FIGURE VI-7: Lyleton: Area I.

TABLE C-1

LYLETON AREA COMMERCIAL TRUCKING COST

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
LOCATION	DESTINATION	BU./YR.	LOAD LIMIT LBS. GVW	AVG. SPEED MPH	MILES OF ROAD	TOTAL MILES/TRIP	BU./TRIP	NO. OF TRIPS	STAT. HRS./TRIP	DRIVE HRS./TRIP	TOTAL HRS./TRIP	TOTAL HRS./YEAR	NO. OF TRUCK	TRUCK MI./YEAR	RATE $/HR.	RATE $/MI.	TOTAL $/TRIP	TOTAL $/YR.	¢/Bu.	¢/Bu.Mi
Lyleton	Deloraine	500,000	74,000	40	41.7	83.4	918*	545	.667*	2.085	2.752	1,500		45,453	17.15	.174	61.71	33,632	6.7	.161
Dalny	Deloraine	240,000	74,000	40	26.9	53.8	918	262	.667	1.345	2.012	528		14,096	17.15	.174	43.87	11,493	4.8	.178
Waskada	Deloraine	600,000	74,000	40	20.9	41.8	918	654	.667	1.045	1.712	1,119		27,337	17.15	.174	36.63	23,956	4.0	.191
Carnmar	Deloraine	170,000	74,000	40	15.5	31.0	918	186	.667	.775	1.442	268		5,766	17.15	.174	30.12	5,603	3.3	.213
Goodland	Deloraine	435,000	74,000	40	11.0	22.0	918	474	.667	.550	1.217	577	2	10,428	17.15	.174	24.70	11,708	2.7	.245

* This is a weighted average unit capacity from Trimac Study based on 50,000 lbs. net weight.

** This represents an allowance for 20 minutes unloading at elevators combined with 20 minutes tarping and checking time per load.

The annual fixed cost of the Trimac Study tractor and trailer unit (60,000 miles per year Fleet) is approximately $18,000 as compared to approximately $23,000 fixed costs for the PMLP unit. This includes the items defined in the PMLP analysis -- capital, interest, maintenance, tires, licensing and insurance. The difference is accounted for by a 20 percent allowance for contingencies on fixed costs as defined in the PMLP analysis and by the higher costs of leasing versus ownership.

The PMLP variable costs include a further 10 cents per mile to cover lease charges. The Fuel costs for the Trimac Study updated to 1974 are lower. This is partly offset by higher labour per mile figures of the updated Trimac analysis. The PMLP analysis also includes an additional 10 percent contingency allowance on variable costs.

The following compilation of costs shows how the above differences in the cost per revenue mile of the two studies can be reconciled.

	TRIMAC STUDY UPDATED TO 1974	PMLP* 1975
Fixed Costs	$18,000	$23,000 (-$5,000 Referred to in discussion page)
Variable Costs per running mile -- fuel and labour	27¢	29¢
Approximate Cost - excluding administration and profit based on 30,000 revenue miles	----------$1.20**	------------

* Reference in Appendix D-4 of Mini-Train Study.

** $\frac{\$18{,}000}{30{,}000\text{ mi.}} + (30¢/\text{mi. x } 2) = \$1.20/\text{mi.}$

Upon review of the above discussion, it would appear that the rates based on the Trimac Study updated to 1974 are reasonable. Even considering the fact that the PMLP data is based on late 1975 costs the resultant revenue-mile rates would appear to be at least 20 percent higher according to the following analysis.

Allow 12½ percent for overhead and administration plus 10 percent for profit on the total fixed plus variable cost of $1.20.

-- i.e. $\frac{1.20}{.775}$ = $1.56 and multiply by 1.12 to update to 1975

-- i.e. 1.56 x 1.12 = $1.75

compared to PMLP cost plus overhead and administration

i.e. $\frac{1.63 \div .775}{1.75} = 120\%$.

The PMLP analysis is high due to allowance for contingencies as well as the higher costs of leasinb but it should be noted* that the 1.12 updating factor inserted in the above calculation also makes the updated Trimac rate more conservative for comparative purposes.

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* See comparative data bottom of page 344.

<u>Reconciliation of Lyleton Area Table C-1</u>
<u>Computed Total, PMLP Computed Total</u>
<u>and Cost per Revenue Mile Rates</u>

A. Computed totals -- adjustment and comparison.

Table C-1	Computed Total = \$86,392
PMLP	Computed Total = \$106,304

Adjusted Table C-1 result to allow for lower payload used in PMLP analysis and to update the costs:

$$86{,}392 \times \frac{25.7}{23.3} \times 1.12 = \$106{,}725$$

Adjusted PMLP result to allow for profit and administration and \$1.70 versus \$1.63 rate per revenue mile:

$$\frac{106{,}304 \times \frac{1.63}{1.70}}{.775} = \$131{,}518$$

Ratio of adjusted totals:

$$\frac{131{,}518}{106{,}725} = 1.23$$

NOTE: This is higher than the 120% factor of revenue-mile comparison page C-4 because of the 40 m.p.h. used in cost table C-1 versus the revenue-mile cost derived on average speed of 35 m.p.h. in the Trimac budget.

B. Comparison of costs based on revenue-mile calculation

PMLP Transport Cost Total = \$95,921
based on \$1.70 per revenue
mile and 23.2 ton payload.

Table C-1 Transport Cost Total
based on $1.14 per revenue mile, 25.5 * payload and
103,080 total miles:

$$\frac{103,080}{2} \times 1.14 = \$58,756$$

Adjusted PMLP transport cost to allow for greater payload of Table C-1 analysis:

$$95,921 \times \frac{23.2}{25.7} = \$86,590$$

Ratio of total transport costs calculated on a revenue-mile basis:

$$\frac{86,590}{58,756} = \underline{\underline{1.47}}$$

Ratio of transport costs on a revenue-mile basis:

$$\frac{1.70}{1.14} = \underline{\underline{1.49}}$$

C. Total cost based on revenue mile calculation for comparison with Time and Mileage rates calculated result of table C-1.

Table C-1 computed total = $86,392

Total cost on a revenue-mile basis = transport cost + stationary time + profit & administration.

$$\frac{58,756 + (1414.7 \times 6.33)}{.775} = \$87,369$$

This works out to a slightly higher figure than the table result of $86,392 due to improved efficiency at 40 m.p.h. average speed in table C-1 as compared to budget based $1.14 per revenue mile at an average speed of approximately 35 m.p.h.

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* PMLP used 55.6 lb./bu. in Lyleton area; for comparative purposes the table C-1 calculation uses payload $\frac{918 \times 55.6}{2,000} = 25.5$ ton.

COMPARATIVE CHECK ON LOADING AND UNLOADING CHARGES

The following tables provide a comparative illustration of loading and unloading charges for elevator and farm hauling by commercial truck.

Considering Elevator to Elevator Haul with 20 minutes loading, 20 minutes unloading including tarping and checking

TRUCK ANNUAL MILEAGE	BASED ON TIME AND MILEAGE RATE THEORY 1974	PMLP 1975
60,000	$\frac{\$17.02 \times .667}{918 \text{ bu.}} = 1.2¢/\text{bu.}$	40 minutes of driver time @ $6.50/hr. and 23.25 tons/load
106,000	$\frac{\$13.80 \times .667}{918 \text{ bu.}} = 1.0¢/\text{bu.}$	is $.18/ton or $.18/36 bu.
139,000	$\frac{\$12.77 \times .667}{918 \text{ bu.}} = 0.9¢/\text{bu.}$	= 0.5¢/bu.

Extra Farm Loading Charges

Based on Time and Mileage Rate Theory and annual truck mileage of 60,000 1974	Industry Charges 1974: Sask. Pool Rape Seed	Industry Charges 1974: Can. Wht. Board Movement S'toon & Moose Jaw	Industry Charges 1974: Can. Wht. Board Movement Alberta Maximum
$\frac{\$17.02 \times 1^{*}}{918 \text{ bu.}} = 1.9¢/\text{bu.}$	0.8¢/bu.	2.2¢/bu.	2.8¢/bu.

This analysis indicates that the PMLP study which considers only the additional labour (driver waiting time) understates the real loading cost; however the remaining part of this cost is absorbed in the cost per revenue-mile calculation.

The current 2.2¢/bu. charge for farm loading as suggested by the Saskatchewan Trucking Association appears to be in line with rates which would be charged on a time related basis.

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* This allows for one hour additional loading time for a total of one hour and twenty minutes at the farm.

PROBLEM OUTLINE

Assume that the rate for grain haul from elevators on the Lyleton subdivision to Deloraine was based upon normal competition or single shift truck operation whereby total annual revenue available would be \$86,392 to move all the grain as computed in Table I of page C-4.

Using the typical budgets established for 1974 operation, determine savings (or extra profit) available through double shift operation.

ANALYSIS

Profit for single shift operation = 10% of 86,392 = \$ 8,640

On an investment in vehicles of

$$\frac{3991 \text{ Hrs. of work}}{2100 \text{ Hrs. per turck}} \times \$17,300 = \$32,880$$

Therefore R.O.I. is .... $\frac{8,640}{32,880}$ = 26% (plus 9% interest allowed for in budget)

Cost of performing work by double shift = (3991 Hrs. x \$13.92/Hr.) + (\$.174/Mi. x 103,080 Mi)

Minus profit allowance of 10% = 73,490 - 7,349

= \$66,140

Profit for double shift operation at single shift rate:

\$86,392 - 66,140 = \$20,250

On an investment in one vehicle:

i.e. $\frac{3,991}{3,990} \times 17,300 = \$17,300$

Therefore R.O.I. is: $\frac{20,250}{17,300}$ = 117% (plus 9% interest allowed for in budget)

The effect of operating by employment of overtime would be to reduce the R.O.I. as follows:

Cost of performing work by double shift would increase by:

$$3991 \text{ Hrs. } \times \frac{\$6.33}{2}/\text{Hr.} = \$12,630$$

And R.O.I. would be $\frac{20,250 - 12,630}{17,300}$ = 44% (plus 9% interest allowed for in budget).

NOTE: A more detailed analysis would require consideration of each budget item as it might be affected by second shift (night) or overtime operation. The above analysis, for example, is based on a theoretical budget in which depreciation is time related, therefore, some adjustment of profit figures would be appropriate to allow for extra mileage related depreciation in the case of higher vehicle utilization.

APPENDIX D

HIGHWAY LOAD LIMITS AND
INDUSTRY FINANCIAL STRUCTURE AND REGULATION

LOAD LIMITS* - POUNDS

	Primary Highways	Secondary Highways	New Limits on Municipal Roads
** Steering Axle	10,000	10,000	
Single Axle w. Duals	20,000	18,000	
Total for "Single Axle Truck"	30,000	28,000	28,000
Set of Tandem Axles w. Duals	35,000	32,000	
Total for Tandem Truck	45,000	42,000	42,000
Total for Five Axle Semi	80,000	74,000	58,000

* This is an outline of Saskatchewan highway load limits and "new limits" proposed for Municipal roads according to latest information - March, 1977.

** This represents an allowable load of 500 pounds per inch of time width and a 10 inch tire size.

COMMERCIAL TRUCKING - FINANCIAL STRUCTURE - COST STRUCTURE - REGULATION

The following are excerpts from other studies relating to trucking in general. These quotes support statements of the foregoing analysis with respect to investment, cost and enterprise flexibility. Some insight into regulation of the industry is also provided.

From: "The Canadian Trucking Industry: Issue Arising out of Current Information"

Canadian Transport Commission
Economic and Social Analysis Branch
ESAB 75 - 5
April 1975

"The trucking industry differs from other industries in that a relatively small amount of capital is required to initiate operations. Trucking firms' principal assets are vehicles, not inventories. The capital investment required by owners is rather small in proportion to the value of equipment purchased. Many trucking firms finance the acquisition of their required capital assets (i.e. trucks), through loans from various financial institutions. Compared to other modes of transport, the average percentage debt to equity of trucking firms is relatively low. This indicates the degree of leverage in the capital structure of the industry. The other modes (air, water and rail) because of their high initial fixed costs have much higher percentage debt to equity figures. For example, truck transport firms have on the average 41.1 percentage debt to equity compared to rail with 74.1, air with 527.8 and water with 367.2. In comparison with the total for all transportation industries, whose average percentage debt to equity is 127.8, trucking firms rely to a much greater degree on equity financing.

"Operating ratios (the ratio of operating costs to operating revenues), tended to be lower for smaller trucking firms. This may be due to the fact that smaller firms had lower overhead and administration costs. Operating ratios for the industry varied between 92% and 96%.

"Return on invested capital in trucking varied from a low of 10.6% in 1966 to a high of 12.8% in 1968.

"Current ratios (the ratio of current assets to current liabilities), which give an indication of liquidity, ranged from 1.01 in 1964 to 0.97 in 1969. These ratios were considerably lower than those calculated for other industries; however, the Quebec Tariff Bureau ... made the following comments:

> 'It is often said that a sound financial condition demands a minimum ratio (current) of 2 to 1 for commercial and industrial businesses, since the total of current assets should be twice the amount of current liabilities, while it can be 1 to 1 for public service companies, such as trucking, because they do not have any inventory to sell except supplies for their usage, which are not subject to fluctuations in the selling price; percentage wise, this means that the current assets should equal at least 100% of the current liabilities in the trucking industry.'

"A large proportion of the costs in the Canadian trucking industry is variable. Although the precise proportions of fixed and variable costs have not been determined, and may vary within sectors of the trucking industry, it is expected that the proportion of variable costs to total costs is considerably higher for the trucking industry than for most other transportation industries.

"Trucking enterprises have proportionally lower fixed and higher variable costs than do the railways because the major infrastructure (i.e., the roads and highways) is provided largely at public expense.

Railroads on the other hand must invest considerable capital for roadbed, track construction and maintenance."

From: "Selected Papers on Prairie Transportation"

University of Saskatchewan 1971
Chapter 8
Freight Rate Regulation in Canada

M. Prabhur
Assistant Professor of Law
University of Saskatchewan, Saskatoon

"Truck... cost characteristics are entirely different than railways with small investment and no fixed plant comparable to the railroad permanent way, and a small margin between variable and fixed costs.

"Confinement of their operations principally to short-haul, high rated, small shipments has been necessitated by the peculiar nature of operating costs experienced by the trucking industry; these are only marginally lower than total costs which include cost of the vehicle, cost of licence, etc.

"The small amount of investment required to operate a trucking business has two very significant effects on the industry itself and on its ability to compete with other modes not experiencing similar cost characteristics. In the first place, unlike the railways, the ratio of capital investment to gross revenue in trucking is small, so that there is a very small margin between variable costs, i.e., those costs directly attributable to the movement concerned, and fully allocated costs, with the result that freight classification has really no place in the highway rate structure. In consequence the prospects of achieving economies of scale are remote. Secondly, almost anyone with a small amount of capital to buy or hire, purchase or lease a truck -- and with physical ability to drive a heavy vehicle, can enter the industry and make a living, unless restrained by regulatory controls, and just as easily fold the business when times are bad and realize a substantial part of the investment if any has been made. These characteristics mark out trucking as a distinct industry epitomizing the classical mode of 'perfect competition'. Trucking has thus remained, in the main, a small scale industry with a very large number of extremely mobile independent organizations each owning a few trucks, each with its own operating characteristics and costs and its own specialized freight traffic and area of operation. It also includes a larger and more diverse group of private carriers which comprises everything from nation-wide corporations down to individuals owning a single vehicle.

"The economic effects of this diversity of the industry are two fold; firstly, the ease of entry results in a tendency for overcapacity to develop and persist, leading to ruinous competition which in turn leads to deterioration in stability of service and safety, evasion of regulation, financial irresponsibility, and even bankruptcy. Secondly, the ability of such an industry to withstand competition from other modes such as the railways and water carriers, is limited in the short run, though in the long run they may be the most economical agency of transport; so that predatory pricing or selective pricing backed by the financial 'leverage' that the stronger modes have, could easily drive the small truckers out of business.

"Although perfect competition assumes this constant exit from and entry by newcomers into it, it places the industry in a state of continuous instability and depresses the rates to such an extent that in the long run higher costs are likely to prevail.

"The principal controls imposed on the trucking industry are those restricting entry and those regulating rates. Entry into common carriage is restricted in all provinces by the requirement of a licence to operate, licence in most cases being granted only on proof of 'public convenience and necessity'. This restriction is designed to prevent overcapacity and it protects established firms to some extent from the evils of cut-throat competition which would otherwise prevail.

"If control of entry into the industry is not sufficiently flexible, competition is restricted and existing firms are in a position to earn more than normal profits, which is detrimental to the interests of the users and the public. The only restraint in such a situation will come from shippers who could substitute their own transport.

"If the private carrier finds it economic to use his own truck to haul his goods, nothing should be done to prevent it, and in fact the right to this alternative is a healthy check upon any probable tendencies of regulated carriers to exploit the user; it would also force regulated carriers to prune costs and achieve efficiency as far as possible and thus make private carriage less attractive to the shipper.

"The MacPherson Commission as an alternative to restricting entry preferred:

> 'Lively and sympathetic highway traffic boards adequately supplied with the necessary data to examine and advise prospective entrants to the commercial trucking industry

if it appears to the public authorities that there are too many trucking companies and that this situation is chronic.... Concentration upon regulation of operations, with freedom of entry based upon knowledge, will promote the type of atomistic competition which brings adequate resources to bear in the provision of road transport at prices for service related to costs and normal returns to enterprise. Incentives to efficiency and the attendant returns are encouraged without the regulatory boards being responsible for any degree of monopoly profit.

'...under ordinary circumstances the interests of both the industry and the public can better be served by a system of control of minimum rates devised in such a manner, having regard to the latest techniques in cost accounting, that they reflect the most efficient units in the industry, with sufficient flexibility to enable common carriers to determine their rates in any manner they deem necessary to meet competition not only from contract and private carriers but also from other modes of transport. Where necessary, these common carriers should be permitted to reduce their charges to out-of-pocket expenses for any empty back hauls they would have to make, thus making private carriage uneconomical.

'The device of maximum rate control is unimportant in highway rate regulation because of the inherently competitive nature of the industry and the checks afforded by private trucking.'

"Opinions on the need for controlling rates differ and advocates on both sides can be found. The MacPherson Commission felt that it is better to scrap all rate regulations.

"The Federal Motor Vehicles Act empowers provincially constituted traffic boards to determine or 'regulate the tariffs and tolls to be charged by a federal carrier for extra-provincial transportation in that province .... in the like manner and subject to the like terms and conditions as if the extra-provincial transport in that province were local transport'. The federal Government may exempt any carrier or any part of its operation from provincial control. Where they have been so exempted, Part III of the National Transportation Act may be applied to them. The scheme of regulation is similar to that for railways; the tariff or rates may be filed with the Canadian Transport Commission directly or through Traffic Bureaus and the Commission may disallow rates if they are non-compensatory or take advantage of a monopoly situation, or prejudice public interest."

CHAPTER 7

TRANSPORTATION RELATED DISTORTIONS IN THE CANADIAN FLOUR MILLING INDUSTRY

T.G. Johnson

EXECUTIVE SUMMARY

The objectives of this study are:

1) to describe the past and current market conditions of the flour milling industries and the likely conditions in the near future;

2) to describe the regional distribution of flour mills in Canada, the probable cause of this distribution and the probable effect of current and future trends on this distribution;

3) to describe the present operating practices of Eastern and Western mills as they relate to the movement of wheat into the mills and to the movement of products from the mills to the market;

4) to estimate the differential impact of a) freight rates, b) subsidies, c) Canadian Wheat Board practices and d) regulations, on Western versus Eastern mills; and

5) to estimate the degree of distortion of locational advantage, if any, created by a) differences and level of freight rates, b) subsidies, c) Canadian Wheat Board practices and d) regulations.

The study employs location theory as a basis for predicting the 'natural' geographic distribution of milling activity in Canada. The actual current distribution situation of the industry is described and compared with that which is predicted by theory.

The operating practices are described in detail so that the mechanics of the various distortions can be appreciated. These distortions are then described and quantified within this operational context.

A measurement of total distortion is estimated for each market for flour and millfeeds as well as the overall average under present markets shares. These distortions are in terms of the difference in net effective subsidy to Eastern versus Western mills.

It is estimated that under present market shares a Western flour mill receives a net effective subsidy of 10 cents on the average hundredweight of flour (and the resulting by-products) produced. This compares with 59 cents per hundredweight for an Eastern mill. This 49 cents per hundredweight difference represents the average distortion of locational advantage from the West to the East. The export market for flour is only slightly distorted (8 cents per hundredweight in favour of Eastern mills). However, it is possible that Western mills are being excluded from the Eastern domestic market by these distortions since they favour Eastern mills by almost 40 cents per hundredweight.

The analysis indicates that removal of the "at and east" rail freight rates would be extremely damaging to Western mills, increasing the overall distortion from 49 cents per hundredweight to 58 cents per hundredweight, and the distortion in the export market from 8 cents per hundredweight to 45 cents per hundredweight.

The study indicates that the locational characteristics of the industry are very sensitive to transportation related distortions.

INTRODUCTION

The terms of reference of the Grain Handling and Transportation Commission instruct it to consider the implications of possible changes in the system to the region's "economic development opportunities in terms of agricultural processing, manufacturing and natural resource development". One area which has been identified as requiring investigation under this instruction is the effect of the present grain handling and transportation system on the locational advantages of flour mills in Canada and the predicted effect of various changes in the system. The specific objectives of this study are:

1) to describe the past and current market conditions of the flour milling industries and the likely conditions in the near future;

2) to describe the regional distribution of the flour mills in Canada, the probable cause of this distribution and the probable effect of current and future trends on this distribution;

3) to describe the present operating practices of Eastern and Western mills as they relate to the movement of wheat into the mills and to the movement of products from the mills to the market;

4) to estimate the differential impact of a) freight rates, b) subsidies, c) Canadian Wheat Board practices and d) regulations, on Western versus Eastern mills; and

5) to estimate the degree of distortion of locational advantage, if any, created by a) differences and level of freight rates, b) subsidies, c) Canadian Wheat Board practices, and d) regulations.

LOCATION THEORY

In this section, location theory will be discussed very briefly as it applies to this study.

Location theory suggests that industries may be divided into three types depending on the type of location decisions that they make. Industries are said to be input oriented if in the long-run they locate new capacity near the source of inputs (raw products, energy, labour, water, etc.). Similarly, industries are said to be market oriented if new capacity is located near potential markets. The third type of industry is bound to neither input sources nor the market and is called foot-loose.

Location theory implies that there exists some natural advantage in locating a firm in some areas over others. For example, a manufacturing firm located near the market for its product has a locational advantage if:

1) the manufacturing process involves a significant weight increase;

2) the freight rates are higher for the product than for the raw material;

3) the process results in a product which is more difficult to store and/or transport than the raw material; and/or

4) by-products of the process are more profitably disposed of at that location than at another.

If the reverse conditions exist for an industry, then those firms located near the source of raw material will have a locational advantage.

Firms in other industries have natural location advantages if they are located near a cheap or abundant source of inputs (other than raw products). Many industries, for example, must be situated near a source of labour.

Locational advantages are not static, however. A number of factors tend to increase or decrease the locational advantages of an era. Some of these factors include:

1) changes in technology in the manufacturing industry;
2) changes in technology in the transportation industry;
3) changes in the freight structure;
4) changes in market demand;
5) changes in supply of raw materials or inputs;
6) changes in government regulation of the industry; and/or
7) changes in subsidy levels or qualifications.

In the short-run, when capacity cannot be increased, decreased or relocated, changes in the determinants of locational advantage will affect, instead, the profitability of firms. By definition, the effect of these changes will vary with the location of the firms in the industry, improving the profitability of some relative to others.

Location theory also implies that there are 'natural' locational advantages. Any variation from a 'natural' locational advantage is a distortion. Anderson defines a distortion as "....an effect different from that produced by the standard equilibrium model of pure competition with containable allowances for inter-firm deviations from that model."* Anderson cautions however that in some cases "....the aberrations from the classical model are too large to enable the word 'distortions' to be properly contained...".** In particular "....the transport function in Canada has such long historical ties to the public purse and to agriculture, such deep involvements with public policy, that one is constrained to enquire 'Distortions from what?'".**

Despite the difficulties involved in describing the 'natural' competitive environment of many industries, it is possible and indeed very useful to explore the effects of certain 'distortions' (or groups of 'distortions') on the locational advantage of firms. This then will be the general approach taken in this paper.

AN OVERVIEW OF THE CANADIAN FLOUR MILLING INDUSTRY

In the crop year 1974-75, Canadian flour mills ground 88,889,000 bushels of wheat into 39,020,000 hundredweights of flour (Tables VII - 1 and VII - 2). Of the 39.0 million hundredweights of flour milled, 8.1 million was exported and 30.9 million was used domestically.

As of July, 1975, there were 42 flour mills in Canada (Table VII - 3). This compares to the 101 mills in 1954. A majority of Canadian flour

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* F.W. Anderson, "Grain Movement Subsidies in Canada and Economic Distortions" in Transportation Subsidies--Nature and Extent, ed., Karl M. Ruppenthal, (Vancouver, B.C.: Centre for Transportation Studies, U.B.C., 1974) p. 49.

** Ibid.

TABLE VII-1

Millings of Total Non-Feed Wheat
By Eastern and Western Mills
(1954-55 to 1974-75)

Year	Bushels Milled			% Milled	
	East	West	Total	East	West
1954-55	44,172,101	48,234,667	92,406,768	47.8	52.2
1955-56	44,281,262	47,488,763	91,770,025	48.3	51.7
1956-57	42,599,738	42,549,635	85,149,373	50.0	50.0
1957-58	46,863,878	45,425,019	92,288,897	50.8	49.2
1958-59			90,142,957		
1959-60	44,408,179	46,981,622	91,389,801	48.6	51.4
1960-61	43,093,826	46,637,329	89,731,155	48.0	52.0
1961-62	43,877,946	44,362,634	88,240,580	49.7	50.3
1962-63	44,475,418	34,313,914	78,789,332	56.4	43.6
1963-64	51,961,658	59,708,919	111,670,577	46.5	53.5
1964-65	49,295,438	37,913,804	87,209,242	56.5	43.5
1965-66	52,338,991	45,587,004	97,925,995	53.4	46.6
1966-67	51,616,827	38,467,819	90,084,646	57.3	42.7
1967-68	49,283,320	35,485,830	84,769,150	58.1	41.9
1968-69	54,984,800	30,063,791	85,048,591	64.7	35.3
1969-70	60,898,328	29,659,004	90,557,332	67.2	32.8
1970-71	59,918,301	27,549,027	87,467,328	68.5	31.5
1971-72	60,335,633	27,788,128	88,123,761	68.5	31.5
1972-73	60,246,365	26,143,748	86,390,113	69.7	30.3
1973-74	59,529,258	25,130,842	84,660,100	70.3	29.7
1974-75	61,220,000	27,669,000	88,889,000	68.9	31.1

SOURCE: Statistics Canada, "Grain Trade of Canada" 1954-55 to 1973-74, Cat. No. 22-201, Ottawa, and "Grain Milling Statistics", July and August 1975, Cat. No. 32-003, Ottawa.

TABLE VII - 2

Exports and Domestic Use of Canadian Milled Flour

Year	Wheat Flour Produced Including Low Grades	Wheat Flour Exported	Wheat Flour Used Domestically
		(Hundredweight)	
1930-31	31,296,684	13,331,259	17,965,425
1931-32	28,677,748	10,551,844	18,125,904
1932-33	29,425,215	10,526,401	18,898,814
1933-34	29,286,824	10,691,087	18,595,737
1934-35	27,770,497	9,310,608	18,459,889
1935-36	29,246,262	9,758,677	19,487,585
1936-37	27,928,060	8,870,303	19,057,757
1937-38	25,220,747	7,074,926	18,145,821
1938-39	29,786,702	9,024,320	20,762,382
1939-40	34,845,490	13,291,479	21,554,011
1940-41	38,368,633	20,166,101	18,202,532
1941-42	39,015,252	20,003,325	19,011,927
1942-43	46,237,411	24,647,421	21,589,990
1943-44	47,635,513	26,390,167	21,245,346
1944-45	48,284,414	27,290,711	20,993,703
1945-46	52,018,498	28,261,547	23,656,951
1946-47	56,033,374	33,116,617	22,916,757
1947-48	47,353,004	26,776,683	20,576,321
1948-49	39,944,794	20,947,620	18,997,174
1949-50	39.708,032	19,896,136	19,811,896
1950-51	46,315,153	24,356,912	21,958,241
1951-52	46,771,184	22,258,324	24,512,860
1952-53	46,776,625	24,609,199	22,167,426
1953-54	40,769,909	20,142,824	20,627,085
1954-55	40,606,599	17,692,945	22,136,654
1955-56	40,148,750	17,391,300	22,757,450
1956-57	37,623,446	14,582,431	23,041,015
1957-58	40,819,678	17,556,886	23,262,792
1958-59	39,826,493	16,141,267	23,685,226
1959-60	40,344,578	16,073,893	24,270,685
1960-61	39,914,644	15,513,836	24,400,808
1961-62	39,539,651	13,892,676	25,646,975
1962-63	35,505,220	11,854,458	23,650,762
1963-64	50,103,569	23,873,978	26,229,591
1964-65	39,107,358	13,714,069	25,393,289
1965-66	43,531,263	16,576,117	26,955,146
1966-67	39,978,571	13,848,208	26,130,363
1967-68	37,755,841	10,734,857	27,020,984
1968-69	37,621,151	10,705,452	26,156,699
1969-70	39,640,459	11,723,205	27,917,254
1970-71	38,534,863	10,802,813	27,732,050
1971-72	39,071,806	10,745,908	28,325,898
1972-73	38,049,127	10,154,053	27,895,074
1973-74	37,377,341	8,173,422	29,203,919
1974-75	39,020,000	8,132,989	30,887,011

TABLE VII - 3

Flour Mills In Canada By Province
(1954-1975)

Year	Nova Scotia	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Canada
1954	--	5	58	11	10	14	3	101
1956	--	4	45	7	9	11	2	78
1958	--	4	41	7	9	10	2	73
1960	--	4	38	7	8	9	2	68
1962	--	4	37	8	7	9	3	68
1964	--	4	37	6	6	10	4	67
1966	--	5	34	6	7	9	4	65
1968	--	5	28	6	6	9	4	58
1970	1	5	24	6	6	8	4	54
1972	1	4	21	5	6	6	2	45
1975	1	4	20	5	5	6	1	42

SOURCE: Statistics Canada, "Flour Mills", Cat. No. 32-215, Ottawa. Statistics Canada, "Flour Mills and Feed Mills in Canada", Cat. Nos. 32-401,501, 503, and 504, Ottawa.

mills are located in the East with the bulk of these in Ontario.

The industry has operated far below capacity for many years (Table VII - 4). At present the industry is operating between 20 percent and 25 percent below capacity. Western mills represent a disproportionately large share of this excess capacity.* The obvious question then is 'what locational advantages exist in the flour milling industry which might explain this excess capacity?'.

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* Tangri, Om P. and E.W. Tyrchniewicz, "The Removal of the Crow's Nest Pass Rates on Grain and Grain Products Moving to Eastern Canada for Domestic Consumption: Implications for Industrial Development and Expansion in the Prairie Provinces, Especially Manitoba", August, 1971.

TABLE VII - 4

Percentage of Mill Capacity In Operation
1953-54 to 1973-74

Year	Percentage of Capacity
1953-54	70.1
1954-55	71.7
1955-56	73.7
1956-57	69.3
1957-58	74.7
1958-59	76.2
1959-60	78.0
1960-61	82.6
1961-62	81.5
1962-63	70.0
1963-64	94.3
1964-65	76.7
1965-66	85.4
1966-67	78.8
1967-68	80.2
1968-69	73.9
1969-70	77.7
1970-71	76.9
1971-72	75.9
1972-73	76.0
1973-74	74.4

SOURCE: Statistics Canada, "Grain Trade of Canada", 1954-55 to 1973-74, Cat. No. 22-201, Ottawa.

An examination of the technical features of the flour milling industry suggests that it may be quite market oriented for domestic use of flour but that for export flour, the mill located near the raw material may have the locational advantage. The following features support the argument with respect to the domestic market.

1) Domestic flour moves exclusively by rail (or truck over short distances). Wheat, on the

other hand, can also be moved by water. Since there is no competition between rail and water for flour traffic one would expect freight rates on flour to be higher than those on wheat.

2) Domestic orders are usually relatively small and are filled with bagged flour. Since bagged flour is more difficult to load and unload from box cars than wheat and since bagged flour is unable to exploit the more efficient hopper cars as wheat does, one would expect still higher freight rates.

3) The domestic consumers of flour often take delivery in less-than-carload-lots. The local miller has a decided advantage in supplying such a market because of the extra cost and inconvenience of less-than-carload-lots.

In the case of the export market for flour, factor 3) above does not hold. Factors 1) and 2) are offset by the advantages that the Western mill has in being located in the wheat growing area.

1) The flour mill located in the wheat production area does not require as large an inventory of wheat as a mill located elsewhere. Wheat can be drawn from farms or primary elevators quickly.

2) These mills have the choice of rail, commercial trucking or direct delivery by producer to move grain to the mill.

3) There is significant weight reduction involved in the milling of wheat into flour. The milling process yields an average of one hundredweight of flour for every 2.3 bushels of wheat milled. This involves a weight reduction of 27.5 percent (from 138 pounds to 100 pounds.

This hypothesis is largely borne out by the facts. Domestic flour use is almost entirely supplied by local mills. Production for the export market is centered in the west, at the source of the raw material, rather than in British Columbia or on the seaway as might be expected if the industry was market oriented with respect to the export market.*

Given this feature of the Canadian milling industry, it is possible to explain the distribution of excess capacity observed in Canadian mills. Table VII -1 illustrates the trends in the domestic and export markets for Canadian flour over the last 40 years. The peak year for Canadian flour mills was experienced in 1946-47 when over 56 million hundredweights of flour were milled. Of this total, 33 million were exported and 23 million were used domestically. Since the 1946-67 crop year, exports have gradually declined.

As Table VII - 1 indicates, exports have become fairly stable (although they do exhibit minor declines) at just over 10 million hundredweights per year.** This trend has been partially offset by increases in the domestic use of flour. Over all, however, Canadian flour production has declined some 30 percent from its peak of 56 million hundredweights in 1946-47 to 39 million hundredweights in 1974-75.

Since Western mills have traditionally produced flour for the export market, and since this market has declined significantly the disproportionately high amount of overcapacity in Western mills is explained. Table VII -1 illustrates the shift in level of production

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* Almost half of the production of Western mills has traditionally been exported. Only 15 percent of Eastern milled flour is exported on the other hand (see Tangri and Tyrchniewicz, op. cit.)

** This decline in exports is occurring despite the fact that the world trade in flour has increased each year. The net result has been a considerable drop in Canada's share of the world flour market.

from the West to the East since 1954-55.

There is no evidence that the trends observed above will be reserved in the near future. It does appear though, that they may be moderating (particularly the decline in exports).

Given this overview of the industry, it is now possible to understand more fully the intricacies of the flour milling operating practices. In the next section, the present operating practices of Canadian flour mills are examined. The discussion emphasizes the differences between the practices of Eastern and Western mills in order to facilitate the comparative cost analyses that follow.

DESCRIPTION OF THE PRESENT OPERATING PRACTICES OF EASTERN AND WESTERN MILLS

One of the predominant elements of the present flour milling industry is the part played by the Canadian Wheat Board. The Canadian Wheat Board purchases all milling wheat from the farmer at the point of delivery. This ownership is maintained until the wheat is sold to foreign buyers at Vancouver or Thunder Bay, or, in the case of domestic buyers, until the wheat is about to be milled. In the latter case, the Canadian Wheat Board pays all freight, storage and carrying charges on the wheat until it is milled. Domestic mills pay the Canadian Wheat Board 'in-store Thunder Bay' for the wheat plus (or minus) freight and handling to their mill. Storage and carrying charges on wheat stored in Canadian mills are paid for out of Canadian Wheat Board funds.

The Canadian Wheat Board functions as an extension of the producer. It purchases the wheat, takes responsibility for transporting it to the terminals, pays for inspection, elevation, cleaning, etc. Each year the costs of the Canadian Wheat Board are deducted from the surplus generated from selling the wheat and the difference is paid to the producer as a final payment.

A second participant in the system is the federal government. The federal government affects the industry in a number of ways. Firstly, it enforces the current two price system for domestically used milling wheat. The domestic mill is required to pay \$3.25 for spring wheat and between \$3.25 and \$5.75 for durum depending on the world price. If the world price rises above the maximum prices to millers (\$3.25 for spring wheat and \$5.75 for durum) the Canadian Government makes up the difference to a maximum of \$1.75 per bushel. The ceiling prices to producers then are \$5.00 per bushel for spring wheat and \$7.50 per bushel for durum.

Secondly, the Federal Government regulates certain freight rates. In the West, the statutory grain rates reduce transportation costs to flour mills on much of their product. In the East, the "at and east" subsidy reduces the rail freight charges on grain and flour shipped to eastern seaports.

Thirdly, the Federal Government subsidizes users of the St. Lawrence Seaway by charging tolls which do not cover the full costs of the Seaway.

Finally, the Federal Government subsidizes producers and/or some buyers of feedstuffs through the Feed Freight Assistance Program and indirectly through corn tariffs.

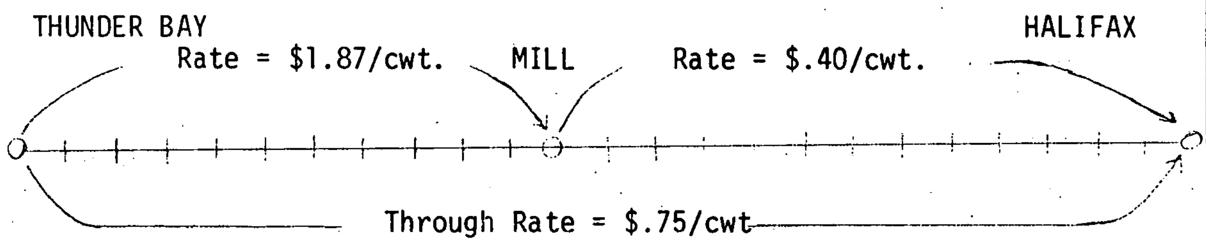
The details of the programs and the distortions that they create will be discussed in a later section.

Eastern Mills

Eastern Mills, those east of Thunder Bay, purchase milling wheat, basis in-store Thunder Bay plus freight and handling costs to their mills. The mills have the choice of moving this wheat by water, rail or a combination of water and rail. The choice of transportation mode is closely related to the market for the flour. Wheat milled for domestic markets usually moves via water from Thunder Bay to the mills while wheat milled for the export market moves by water to the Bay ports and by rail from there to the mills. This anomaly is created by the 'at and east' subsidy which only applies to export grain and flour.

Export bound flour is returned to rail and is shipped to a sea-port for export. Under the 'milling in transit' (M.I.T.) privilege, flour is effectively shipped at through rates from the Bay port to the point of export. The mills pay the railway a 'stop-off' fee plus the difference between the through rate and the rate already paid on the flour portion from the Bay port to the mills. The millfeed portion is effectively shipped at the rail rate in force from the Bay port to the mills. Figure VII - 1 illustrates how M.I.T. works to the advantage of mills.

Eastern millfeeds qualify for Feed Freight Assistance in Eastern Quebec and the Maritimes. Virtually all millfeeds are sold locally, however. The price realized then is almost entirely determined by the price of U.S. corn.



Charges	No Milling in Transit	Milling in Transit
Thunder Bay - Montreal	$1.87/cwt.	$1.87/cwt.
Stop-off fee*	--	$ .03/cwt.
Montreal - Halifax	$ .40/cwt.	$ .75 - 1.87 = -$1.12
	$2.27/cwt.	$ .78/cwt.

* Statutory Export Stop-off Fee = $ .03/cwt.

FIGURE VII-1 A Description of the Milling in Transit Privilege (Export Flour)

Western Mills

Western mills purchase wheat from the Canadian Wheat Board basis 'in-store Thunder Bay' less the statutory freight rate from the primary elevator to Thunder Bay. The mills have the choice of exercising the 'milling in transit' privilege, trucking the grain from the primary elevator to the mills or of offering a premium to producers who deliver directly to the mills. In the first situation, the mills pay the domestic freight rate from the primary elevator to the mills. East bound flour would qualify under the 'milling in transit' privilege. A 'stop-off fee' is paid on this portion of the product. The net freight charge on the movement of flour from the mills to Thunder Bay is then equal to the statutory rate between the primary elevator and Thunder Bay, less the domestic rates already charged for the movement of the flour portion from the primary elevator to the mills. In addition, the mills must pay a 3.0 cent 'diversion charge' to the Canadian Wheat Board which is used to compensate the primary elevator company for its loss of terminal elevator revenues on the grain.

In the second situation, the mills save the 'stop-off fee' and any difference in the statutory rate associated with the mill as compared to the primary elevator. Instead the mills pay for the cost of trucking the grain. If this cost is less than the 'stop-off fee' plus the difference in statutory rates at the mill as compared to the primary elevator, then this alternative is more attractive.

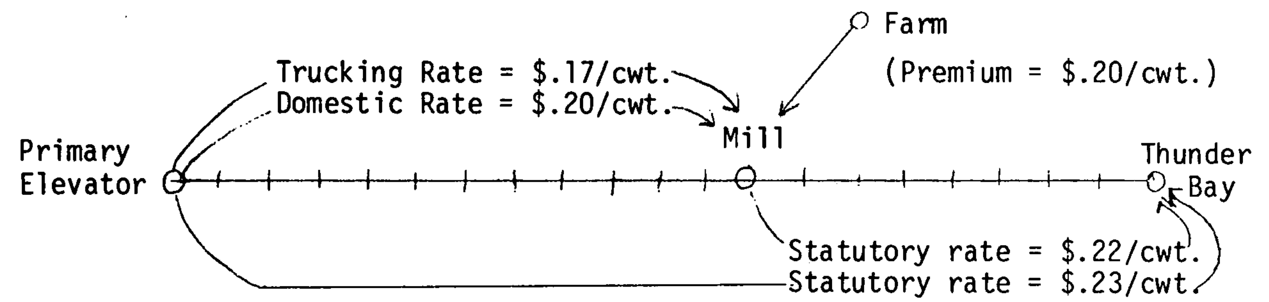
If the third alternative is chosen, that of encouraging direct producer delivery, the mills can offer a premium of up to the cost of commercial trucking plus the 'diversion charge'. Figure VII - 2 compares these three alternatives.

Once the wheat is milled, the flour is sold in one of three markets:

1) the local market
2) the Eastern domestic market, or
3) an export market through Vancouver or an Atlantic port.

Flour exported through Vancouver and all flour shipped to Thunder Bay moves at statutory rates. From Thunder Bay, export bound flour moves via rail to Atlantic ports at the 'at and east' freight rates. Flour moving into eastern markets moves at domestic rail rates east of Thunder Bay.

Millfeeds are usually sold locally or are exported through Vancouver. Despite the fact that the Western millfeeds are eligible for statutory rates to Thunder Bay and for Feed Freight Assistance into Maritime markets, Western mills no longer are able to compete in this market.



Charge	M.I.T.	Trucking From Primary Elevator	Producer Delivery
Primary elevator - mill			
-- Rail Freight	$ .20/cwt.		
-- Truck Freight		$ .19/cwt.*	
-- Mill door premium			$ .22/cwt.*
Diversion Charge	$ .03/cwt.	$ .03/cwt.	
Stop-off Fee	$ .18/cwt.		
Mill - Lakehead	$ .23 -$ .20 = $ .03/cwt.	$ .22/cwt.	$ .22/cwt.
TOTAL CHARGES	$ .44/cwt.	$ .44/cwt.	$ .44/cwt.

* This is the maximum amount considered by the Western miller. If wheat can be secured at a lower truck freight charge or mill door premium savings are made over the M.I.T. option.

FIGURE VII-2: A comparison of Western Mills' alternative means of procuring milling wheat.

DISTORTIONS IN THE FLOUR MILLING INDUSTRY

There are several ways in which the present situation in the flour milling industry might be considered distorted.

Canadian Wheat Board

The Canadian Wheat Board, in its "in-store Thunder Bay" price of milling wheat, includes a number of costs which it incurs. These costs are associated with the service rendered by the Board (including inspection, freight, terminal elevation, cleaning, Canadian Wheat Board administrative costs, etc.). Western mills buy milling wheat at this price less freight. They must, therefore, pay for these other services despite the fact that they do not receive them. Mills must have their wheat cleaned and inspected at their own cost and lose that part of their locational advantage of operating in the wheat producing area. It is estimated that the value of these services is about 7½ cents per bushel of grain purchased from primary elevators and 13¼ cents per bushel of wheat purchased directly from the producer. On the average this means an overcharge of approximately 10 cents per bushel or 23 cents per hundredweight of flour. Eastern mills, on the other hand, are overcharged less than half of this or approximately 11 cents per hundredweight of flour. See the Appendix for an analysis of Canadian Wheat Board overcharges to Canadian mills.

Mill Diversion Charge

When Western mills receive wheat from primary elevator companies, the Canadian Wheat Board collects, on behalf of the grain company, 3.0 cents per bushel "diversion charge" in lieu of terminal elevator revenues.* This in effect requires the Western mill to pay for still more services which it does not receive.

Storage and Carrying Charges

One of the natural advantages of locating a mill near the source of milling wheat is the reduced need for storage. It is estimated that the year round average storage and 'bought to arrive'** requirement of a Western mill is less than one month. Eastern mills on the other hand require much higher storage levels. During the summer, the mills must have one month's supply of wheat in store and another month's supply in 'bought to arrive' position. Due to the closing of shipping during the winter, Eastern mills require a total of six months' supply in storage and in transit. This requirement declines by one month's supply, each month, until the end of March, at which time they require the minimum two months' supply again. This requires Eastern mills to have an average of three months' supply in storage and 'bought to arrive'.

Based on storage costs of over 1.0 cents per bushel per month and carrying charges of 3.44 cents per bushel per month,*** the monthly

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* Mills are required to pay an additional 1.5 cents per bushel "diversion charge" if the wheat that they secure contains less than 1 percent dockage. Since wheat in primary elevators seldom contains less than 1 percent dockage, this additional 1.5 cents per bushel is ignored in this analysis.

** The term "bought to arrive' refers to wheat in transit.

*** The carrying charges are based on a price of wheat of $3.75 per bushel and an interest rate of 11 percent, i.e. $3.75 x .11 ÷ 12 months.

cost of storing wheat is estimated at 4.44 cents per bushel. This results in a cost of 10.21 cents per hundredweight of flour for each month that a mill must store wheat. This would result in a 20.42 cents per hundredweight advantage involved in milling near the source of wheat. Since the Canadian Wheat Board pays all of the storage and carrying costs, the Western mills lose this comparative advantage. In effect, the Western farmer pays the cost of equalizing the storage costs of Eastern and Western mills.

Statutory Grain Rates

The statutory grain rates limit the freight rates applicable to most grain movement in Western Canada to ½ cent per ton-mile. Specifically, the rate applies to all grain and grain products moving by rail to Thunder Bay or to Churchill and all grain and grain products moving to Vancouver and Prince Rupert for export. The recently released report of the Commission on the Cost of Moving Grain by Rail suggests that the statutory rates are less than compensatory.

The effect of these rates on locational advantage in the flour milling industry is unclear. It is quite obvious that the West Coast area itself is discriminated against since the statutory rates apply to eastward, but not westward movements of grain and grain products to domestic users. The effect on the locational advantage of mills in the area is less clear, however, since the rates apply equally to the raw and the finished product. One would expect that this discrimination simply results in higher flour costs to consumers in British Columbia.

There are two other possible mechanisms by which this distortion might affect locational advantage. First, it is possible that a proportionate increase in these rates might amplify any locational advantages now existing. Since Eastern mills must move the raw product (including the flour portion of the millfeed portion) at the statutory rate while Western mills must move only the flour at the statutory rates (marketing at least some of the millfeeds locally), an increase in these rates may favour the Western mills.

Secondly, an increase in the statutory rates would mean that the options of commercial trucking from the primary elevator to the mill or of offering a premium for producer deliveries would be less expensive relative to the increased rail freight rates. Since these options are open only to Western mills, the effect of increasing the statutory rates may be to improve the position of Western mills relative to Eastern mills.

Feed Freight Assistance

The Feed Freight Assistance Program, while important to the milling industry in the past, will now play a much smaller role. In the East, millfeeds are usually sold locally. Mills outside the areas designated under the program are therefore unaffected. Only one Eastern mill (at Halifax) operates within the designated area and even here the millfeed buyer likely captures most of the subsidy paid.

Western mills market their millfeeds locally, in the British Columbia market and in the export market. Of these, only millfeeds sold into the British Columbia market are eligible for subsidy under the Feed Freight Assistance Program. Again, the feeder would capture most of the benefits since the major substitute, feed grains from the prairies, is also eligible under the program.

At and East Subsidy

The 'at and east' is a Federal subsidy paid directly to the railways in return for rate concessions on export bound grain and flour. To receive the subsidy, the railway must move the grain or flour from an inland port (Thunder Bay or East) into export position in a Maritime or St. Lawrence port. In return for charging the shipper the same freight rate that was in effect on September 30, 1966, the government pays the difference between the above rate and the compensatory rate as estimated by the Canadian Transport Commission.

The 'at and east' subsidy, while available and used by both Eastern and Western mills, favours the Western mills to a greater extent than the Eastern mills. This statement is based on two arguments.

First, Western mills, in order to sell to the export market through Eastern ports, must use the rail service since bagged flour cannot easily be shipped by lake vessels into export position. Eastern mills on the other hand may employ either rail or water. Compensatory rail freight rates would be considerably higher than present water rates.*

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* It is quite possible that water rates would increase somewhat if the 'at and east' were abolished.

Secondly, Western mills receive a larger total benefit from the program since they export a larger proportion of their total production than do their Eastern counterparts.

Seaway Tolls

The present seaway tolls do not cover the full cost of the St. Lawrence Seaway. It has been suggested that users of the seaway should bear the operating costs of the seaway and share in the retirement of the debt incurred during its construction.

The effect of the low seaway tolls is almost entirely in favour of Eastern mills since Western mills do not ship flour by water.* Eastern mills are very heavily dependent on lake freight for the movement of wheat to be milled for domestic markets.

Corn Tariff

The next distortion to be examined is that caused by the Canadian tariff on United States corn. At present, this tariff adds 8 cents per bushel to the price of United States corn bought by Canadian feeders.

As producers of feedstuffs, for the Eastern market, the Eastern flour mills receive direct benefits from this tariff. As long as domestic production of feedstuffs are less than domestic consumption, the tariff increases the price of domestic feedstuffs by an amount equal to the level of the tariff.

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* To the extent that the railways compete with lake vessels, the lower lake freight rates may reduce the rail freight rates somewhat. The magnitude of this indirect effect is likely very small.

Under the new Feed Grains Policy, it is likely that Western mills also benefit from this tariff on domestic sales of millfeeds because the increase in the corn-competitive formula price will affect feed grain prices throughout Canada. The millfeeds which are exported are not affected by the tariff.

Stop-Off Fee Subsidy

Both Eastern and Western mills are subsidized through the stop-off fee on export movements of flour. However, the mechanism through which this subsidy is administered and the level of subsidy is different. The railways presently charge 18 cents per hundredweight stop-off fee on domestic flour shipments. In the East, the maximum allowable stop-off fee on export flour is set at 3 cents per hundredweight. In the West, the railways are free to charge the full 18 cents per hundredweight. The government then reimburses the Western mill 7.5 cents per hundredweight of export flour. As a result, the Eastern mill is subsidized 15 cents per hundredweight while the Western mill is subsidized only 7.5 cents per hundredweight.*

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* In 1975 the stop-ff fee was increased from 9 cents to 10.5 cents per hundredweight and then to 16 cents per hundredweight. The 7.5 cents per hundredweight subsidy was based on the 10.5 cents per hundredweight charge. The subsidy, however, was not increased to reflect the increase to 16 cents per hundredweight. The railways, on July 6, 1976 increased stop-off fees to 18 cents per hundredweight.

QUANTIFICATION OF DISTORTIONS IN THE FLOUR MILLING INDUSTRY

The distortions discussed in the last section each shift some of the competitive advantage associated with one location to other locations. The extent (and the direction) of these shifts vary from one market to another. The most satisfying means of analyzing these shifts in competitive advantage would be to determine the exact competitive advantage of each mill, in each market, with and without the distortion. In the absence of the large amount of detailed information necessary for such an approach, it is possible, instead, to estimate the changes in competitive advantage using partial budgets to compare costs.

This will be the approach taken in this section. Without attempting to determine the actual cost levels of firms, the changes in costs due to the distortions identified earlier will be estimated for two representative firms (one in Saskatoon and another in Montreal).

Assumptions

The analysis in this section is based on a number of assumptions about the practices of firms in the industry, the markets and costs. Each assumption is based on other analyses, interviews with members of the industry or analysis undertaken in this paper.

1) Western mills purchase milling wheat and market flour as follows:

Disposition	From Elevators Rail	From Elevators Truck	From Producers	Total
Local Market	0%	35%	35%	70%
Export Market	20%	5%	5%	30%
TOTAL	20%	40%	40%	100%

2) Western mills sell their millfeeds as follows:

Prairies	5.6%
British Columbia	15.3%
Export through Vancouver	79.1%

3) Eastern mills market their flour and millfeeds as follows:*

	Flour	Millfeeds
Eastern Canada	85%	85%
Export	15%	15%

4) Each 2.3 bushels of wheat (60 pounds per bushel) are milled into 100 pounds of flour and 38 pounds of millfeeds. All values are expressed in hundredweights of flour equivalents (i.e. 100 pounds of flour, 2.3 bushels of wheat and 38 pounds of millfeeds).

5) The mill diversion premium is assumed to be 3 cents per bushel or 6.9 cents per hundredweight of flour.

6) Storage and carrying charges are assumed to be 4.44 cents per bushel per month. Translated into average cost per hundredweight of flour, this amounts to 10.21 cents for each month's supply of wheat that a mill must maintain on the average throughout the year.

7) Initially it is assumed that the statutory rates represent only one-half of the costs of moving grain. This suggests that the subsidy involved in the rates is 22 cents per hundredweight (Saskatoon to Thunder Bay).

8) The 'at and east' subsidy is assumed to reduce freight rates by 69.35 cents per hundredweight of flour, for flour moving by rail from Thunder Bay to Halifax.**

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* These percentages are based on figures in the Canadian Livestock Feed Board, Annual Report, Crop Year 1973-74.

** The Canadian Millers Association, "Elimination of the Subsidy on the Movement of Flour and Grain for Export Through Eastern Ports," a submission to the Minister of Transport, February 16, 1976.

It is assumed that this subsidy benefits only Western mills since Eastern mills have the option of using an all water route. Rough budgets indicate that there would be little or no increase in freight costs involved in switching from water-rail to all water transportation.*

9) The corn tariff is assumed to represent a 5.43 cents subsidy per hundredweight of flour equivalent, to millers selling millfeeds in the Eastern market. This is based on an 8 cent per bushel increase in the price of United States corn which results in an equivalent increase in the price of millfeeds.

10) The Canadian Government at present charges 1.2 cents per bushel seaway tolls. It is arbitrarily assumed here that this represents only 50 percent of the seaway costs. The subsidies involved then are 1.2 cents per bushel of wheat or 2.76 cents per hundredweight of flour equivalent.

11) The stop-off fee on export movements involves a 15 cents subsidy to Eastern mills and a 7.5 cents subsidy to Western mills. Since it has been assumed that two-thirds of export flour employs the Milling in Transit privilege, the average stop-off subsidy on export flour from Western mills is 5 cents per hundredweight.

Effective Subsidy

Given these initial assumptions, it is possible to estimate the effective subsidy on flour and millfeeds moving into each market. Table VII-5 summarizes these subsidies. This table demonstrates wide variations in the level of subsidy. The most subsidized flour market is the export of Eastern milled flour (56.50 cents per hundredweight). Flour sold in the West actually is burdened by a negative

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* Canada Grains Council, Appendices to Eastern Grain Movement Report, (Winnipeg: 1975).

TABLE VII-5

Summary of Effective Subsidies to Eastern and Western Mills

	Eastern Mills					Western Mills						
	Flour			Millfeeds		Flour			Millfeeds			
	East	West	Export	East	Export	East	West	Export	East	West	B.C.	Export
C.W.B. Overcharge	-11.13	-11.13	-11.13	N/A	N/A	-22.75	-24.02	-19.78	N/A	N/A	N/A	N/A
Mill Diversion Charge	N/A	N/A	N/A	N/A	N/A	- 4.14	-3.45	- 5.75	N/A	N/A	N/A	N/A
Storage & Carrying	30.63	30.63	30.63	N/A	N/A	10.21	10.21	10.21	N/A	N/A	N/A	N/A
Statutory rates	22.00	22.00	22.00	8.36	8.36	22.00	--	22.00	8.36	N/A	N/A	8.36
At and East Subsidy	N/A	N/A	--	N/A	N/A	N/A	N/A	37.00	N/A	N/A	N/A	N/A
Seaway Tolls	2.76	2.76	--	N/A	N/A	--	N/A	--	2.76	N/A	N/A	N/A
Corn Tariff	N/A	N/A	N/A	5.43	--	N/A	N/A	N/A	5.43	5.43	5.43	--
Stop-off Subsidy	N/A	N/A	15.00	N/A	N/A	N/A	N/A	5.00	N/A	N/A	N/A	N/A
TOTAL	44.26	44.26	56.50	13.79	8.36	5.32	-17.26	48.68	16.55	5.43	5.43	8.36

subsidy of 17.26 cents per hundredweight. Table VII - 6 estimates the net effective subsidy and the distortion in favour of Eastern mills for each market for the flour and millfeeds and for the present marketing situation.

Table VII - 6 indicates that the most distorted single market is the Western market for flour. If Eastern and Western mills were to compete for the Western market, the locational advantage of the Western mill would be shifted away by the amount of 61.52 cents per hundredweight.

TABLE VII - 6

Net Effective Subsidies in Various Markets and the Related Distortion

Market	Net Effective Subsidy Eastern Mills	Net Effective Subsidy Western Mills	Distortion in favour of Eastern mills
	....	$ / cwt.	....
Export market for flour	56.50	48.68	7.82
Eastern market for flour	44.26	4.82	39.44
Western market for flour	44.26	-17.26	61.52
Eastern market for millfeeds	13.79	16.55	- 2.76
Present market shares	59.07	10.26	48.81

Given the present markets of Eastern and Western mills, the combined and weighted distortion in favour of Eastern mills is 48.81 cents per hundredweight under the initial assumptions.* This estimate must be interpreted with a great deal of care. It must be remembered that this estimate of distortion is strictly static. The present market shares are symptoms of the distortions in each market. Changes in any of the component distortions would result in changes in the markets and market shares. The combined and weighted distortion simply indicates the relative cost differences imposed on mills in Saskatoon compared to Montreal as a result of transportation related distortions.

It is interesting to note that while a Saskatoon mill in total is presently being discriminated against by the amount of 49 cents to 60 cents per hundredweight of flour, its competitive advantage in the export market is only reduced by approximately 8 cents per hundredweight. The export market is the only market in which Eastern and Western mills are presently competing to any significant extent.

Another interesting observation is that Canadian mills are at present receiving a net subsidy in the export market. It must be remembered, however, that many of the effective subsidies considered in this paper also apply to the wheat sold to foregin mills with whom Canadian mills must compete for foreign flour markets. It is beyond the scope of this study to determine the effect of transportation related distortions on the competitiveness of Canadian mills with

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* This distortion is based on an interpretation of Canadian Wheat Board overcharges favourable to Eastern mills. Using an alternate set of assumptions, this distortion is as high as 59.68 cents per hundredweight. See the Appendix for an elaboration of this point.

foreign mills for export markets. Therefore the net effective subsidies in the export market should not be interpreted as an indication that the competitiveness of Canadian mills is increased relative to foreign mills.

ANALYSIS OF ALTERNATIVE SCENARIOS

The preceding analysis estimates the total distortion in the present system. This distortion is measured in terms of the net subsidy per hundredweight of flour to Western versus Eastern mills. The same framework may be used to predict the effect of changes in subsidies, regulations and Canadian Wheat Board practices on the short run profitability of mills located in Saskatoon and Montreal. It must be stressed that this analysis applies to the short run situation only. In the long run, two types of changes would occur which this analysis is less capable of predicting. First, the location of milling activity would shift as locational advantages were altered. Second, markets and market shares would change as relative advantages in each market were altered. This analysis suggests the direction in which these changes would occur but not the extent. The calculation of distortion under present market shares is particularly misleading if it is considered in any light other than in the very short run.

The following section predicts the effects of two different sets of assumptions about subsidies, regulations and Canadian Wheat Board practices. First, it will be assumed that the "at and east" subsidy and the related freight rate freeze is ended. The second scenario involves the removal of:

1) The Canadian Wheat Board overcharges,

2) Mill diversion charges, and

3) The payment of storage and carrying charges by the Canadian Wheat Board.

In each case, all other assumptions will remain unchanged.

Removal of "At and East" Subsidy

Table VII -7 summarizes the net effective subsidy in the various markets for flour and millfeeds under the assumption that the "at and east" subsidy is removed. Given the information in Table VII -7, the distortion in any market can be calculated. Table VII - 8 lists the distortions (in cents per hundredweight of flour equivalent) in some of the markets for Canadian flour and millfeed and the aggregated distortion assuming present market shares.

Table VII - 8 indicates substantial distortions in favour of Eastern mills in each market for flour. The aggregated distortion is 58.23 cents per hundredweight of flour.* By comparing Tables VII - 6 and VII - 8, it is possible to determine the impact of the removal of the "at and east" program.

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* Again it is important to note that assumptions upon which this estimate is based, are the most favourable possible for Eastern mills and thus 58.23 represents a minimum. The corresponding maximum is about 69.11. The actual distortion would fall somewhere within this range.

TABLE VII-7

Summary of Effective Subsidies to Eastern and Western Mills
(No At and East Subsidy)

	Eastern Mills					Western Mills						
	Flour			Millfeeds		Flour			Millfeeds			
	East	West	Export	East	Export	East	West	Export	East	West	B.C.	Export
C.W.B. Overcharge	-11.13	-11.13	-11.13	N/A	N/A	-22.75	-24.02	-19.78	N/A	N/A	N/A	N/A
Mill Diversion Charge	N/A	N/A	N/A	N/A	N/A	- 4.14	-3.45	- 5.75	N/A	N/A	N/A	N/A
Storage & Carrying	30.63	30.63	30.63	N/A	N/A	10.21	10.21	10.21	N/A	N/A	N/A	N/A
Statutory rates	22.00	22.00	22.00	8.36	8.36	22.00	--	22.00	8.36	N/A	N/A	8.36
At and East Subsidy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Seaway Tolls	2.76	2.76	--	N/A	N/A	--	N/A	--	2.76	N/A	N/A	N/A
Corn Tariff	N/A	N/A	N/A	5.43	--	N/A	N/A	N/A	5.43	5.43	5.43	--
Stop-off Subsidy	N/A	N/A	15.00	N/A	N/A	N/A	N/A	5.00	N/A	N/A	N/A	N/A
TOTAL	44.26	44.26	56.50	13.79	8.36	5.32	-17.26	11.68	16.55	5.43	5.43	8.36

TABLE VII-8

Net Effective Subsidies in Various Markets and the Related Distortion (No At and East Subsidy)

Market	Net Effective Subsidy: Eastern Mills	Western Mills	Distortion In Favour Of Eastern Mills
	....	¢/cwt.	....
Export market for flour	56.50	11.68	44.82
Eastern market for flour	44.26	4.82	39.44
Western market for flour	44.26	-17.26	61.52
Eastern market for millfeeds	13.79	16.55	- 2.76
Present market shares	59.07	- .84	58.23

Such a comparison indicates that the removal of the "at and east" subsidy and the associated freight rate freeze would increase the distortion in favour of Eastern mills in the export market for flour from 7.82 cents per hundredweight to 44.82 cents per hundredweight -- an increase of 473 percent.

The effect of this change on the aggregate situation (assuming present market shares) would be to increase the distortion in favour of Eastern mills by 9.42 cents for each hundredweight of flour produced. This represents an increase of 19.3 percent.

Removal of Canadian Wheat Board Overcharges, Mill Diversion Charges and Canadian Wheat Board Payment of Storage and Carrying Charges

Table VII-9 summarizes the net effective subsidy in each market for flour and millfeeds in second alternative scenario. Under these assumptions, the effective subsidy decreases in each of the Eastern mill's flour market but increases in each of the Western mill's flour market. As a result, the competitive position of Western mills is vastly improved.

Table VII-10 summarizes the levels of distortion which would result if the three market imperfections above were removed. Under these conditions, the competitive advantage of the Western mill in the export market for flour would be increased by 27 cents per hundredweight over that of the Eastern mill. Overall, the Eastern mill would still be the biggest benefactor of the imperfections, receiving 12.63 cents more subsidy on each hundredweight of flour milled. This is largely due to higher subsidies received on locally marketed flour and millfeeds than those received by the Western mill.

The differences between Tables VII-8 and VII-10 very vividly point out the consequences of removing some distortions while leaving others. The removal of the "at and east" subsidy in the absence of any other changes would compound an already serious overall distortion of locational advantage. Removal of the Canadian Wheat Board overcharge, the mill diversion charge and the payment of carrying and storage costs by the Canadian Wheat Board, on the other hand, would tend to moderate the present distortion. One consequence, however,

TABLE VII - 9

Summary of Effective Subsidies to Eastern and Western Mills

(No Canadian Wheat Board Overcharge, Etc.)

	Eastern Mills					Western Mills						
	Flour			Millfeeds		Flour			Millfeeds			
	East	West	Export	East	Export	East	West	Export	East	West	B.C.	Export
C.W.B. Overcharge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mill Diversion Charge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Storage & Carrying	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Statutory Rates	22.00	22.00	22.00	8.36	8.36	22.00	--	22.00	8.36	N/A	N/A	8.36
At and East Subsidy	N/A	N/A	--	N/A	N/A	N/A	N/A	37.00	N/A	N/A	N/A	N/A
Seaway Tolls	2.76	2.76	--	N/A	N/A	--	N/A	--	2.76	N/A	N/A	N/A
Corn Tariff	N/A	N/A	N/A	5.43	--	N/A	N/A	N/A	5.43	5.43	5.43	--
Stop-off subsidy	N/A	N/A	15.00	N/A	N/A	N/A	N/A	5.00	N/A	N/A	N/A	N/A
TOTAL	24.76	27.76	37.00	13.79	8.36	22.00	--	64.00	16.55	5.43	5.43	8.36

would be to make an abrupt reversal in the direction of distortion in the export flour market.

These examples stress the importance of carefully examining the impact of changes in a system such as this.

TABLE VII—10

Net Effective Subsidies in Various Markets and The Related Distortion

Market	Net Effective Subsidy		
	Eastern Mills	Western Mills	Distortion in favour of Eastern mills
	..... ¢/cwt.		
Export market for flour	37.00	64.00	-27.00
Eastern market for flour	24.76	22.00	2.76
Western market for flour	24.76	--	24.76
Eastern market for millfeeds	13.79	16.55	- 2.76
Present market shares	39.57	26.94	12.63

CONCLUSIONS

Summary

This study has attempted to estimate the level of distortions from the 'natural' locational advantage in the Canadian flour milling industry. It is felt that this objective has been achieved with fair success. It is estimated that under present market shares, a flour mill in Saskatoon receives a net effective subsidy of approximately ten cents on each hundredweight of flour (and the resulting by-products) produced. This compares with an estimate of 59 cents per hundredweight for a mill in Montreal. This 49 cents per hundredweight difference is considered a minimum. The difference could be as high as 60 cents per hundredweight.

Limitations

Caution must be exercised in the application of this study. The study is valid only within the context in which it was designed.

First, it is important to recall that the study does not attempt to determine the total costs of production or even the total transportation costs. It simply attempts to estimate the change in costs that would occur if certain imperfections were removed. It is impossible, therefore, to determine domestic market boundaries, for example.

A second point to remember is that the study deals in the relative rather than the absolute in many cases. An obvious example is the inclusion of the statutory rates. It is probable that the statutory rates represent a subsidy to producers and that if the rates were relaxed, the producers rather than the millers would pay the larger freight bill. This source of distortion is real, however, and has been included since producers would be willing to sell their wheat to a local milling at a lower price rather than pay the higher freight bill. The net effective subsidy figures are therefore relative. It is the difference between the comparable figure for Eastern and Western mills which is important.

Third, it is very important to keep in mind that the study deals with only two milling locations--Saskatoon and Montreal. As a result, one must be careful when making broad generalizations. The situation portrayed by the Montreal mill, for example, may be atypical of a mill in Halifax. The study is intended to be illustrative rather than exhaustive.

Next, the accuracy of the estimates is dependent upon the accuracy of the assumptions. The most suspect assumptions are:

1) those regarding the costs of Canadian Wheat Board services;
2) those regarding the Canadian Wheat Board services received by Eastern and Western mills;
3) that Eastern mills receive no benefit from the "at and east" rates;
4) that the statutory rates represent 50 percent of real costs; and
5) that the present seaway tolls represent 50 percent of real costs.

These assumptions are undoubtedly inaccurate to some extent. However, since there is no way of determining the magnitude or even direction of the inaccuracies involved, it is expected that they do not bias the results of the study significantly.

Finally, it must be pointed out that the study assumes a static situation. Sources of wheat and markets for flour and millfeeds are assumed to remain unchanged. It is likely that a change such as the relaxation of statutory rates would result in a change in the source of milling wheat for Western mills. Increased rail freight rates would allow a Western mill to pay higher truck freight and/or premiums to producers. Abolition of diversion charges would tend to reduce direct deliveries since premiums would be reduced. These shifts in sources would only occur if they saved the mill money. The assumption that sources of wheat are static, therefore, results in an underestimate of the size of the distortion.

Conclusions

Upon examination of specific components of the total distortion, several conclusions become obvious.

1) As a result of distortions in the industry, it is likely that Western flour consumers pay more for flour while Eastern and foreign consumers pay less than under a non-distorted market.

2) The locational advantage in the export market for flour is only slightly distorted in favour of a Montreal mill. It is therefore unlikely that the share of this market held by a Saskatoon mill has been reduced substantially by the distortions. This observation is of particular importance since this market is the only one in which there is any significant competition between Eastern and Western mills.

3) The Eastern market for flour is quite substantially distorted. It is possible in fact that this distortion (approximately 39 cents per hundredweight) protects Eastern mills from competition from Western mills. Removal of this distortion might allow Western mills to compete effectively.

4) The most distorted market is the Western market for flour. The competitive ability of Eastern mills is increased by over 61 cents per hundredweight of flour relative to their Western counterparts. Eastern mills are unable to compete in this market despite the distortion, however.

5) Only one element clearly distorts the system in favour of Western mills--the "at and east" subsidy. (See Table VII -11).

6) The major sources of distortion in favour of Eastern mills are the payment of storage and carrying charges by the Canadian Wheat Board, the statutory rates, and the Canadian Wheat Board overcharge.

This study indicates that Western mills are discriminated against by present policy and practices. However, this discrimination occurs largely in the local domestic market for flour and millfeeds. Removal of the distortions discussed in this paper could, in total, have a detrimental effect on Western mills if the subsidies involved were not also removed from export wheat.

TABLE VII-11

Summary of Effective Subsidies to Eastern and Western Mills By Source

Source of Distortion	Effective Subsidy Eastern Mills	Western Mills	Distortion in favour of Eastern mills
Canadian Wheat Board Overcharge	-11.13	-22.75	11.63
Mill Diversion Charge	--	- 4.14	4.14
Storage & Carrying	30.63	10.21	20.42
Statutory Rates	30.36	13.22	17.15
At and East Subsidy	--	11.10	-11.10
Seaway Tolls	2.35	--	2.35
Corn Tariff	4.62	1.13	3.49
Stop-off Subsidy	2.24	1.40	.84
TOTAL	59.07	10.26	60.71

Complete removal of distortions would increase the competitive advantage of Western mills over Eastern mills only marginally in the export market. At the same time, the absence of subsidies could substantially impair the Canadian industry's ability to compete with foreign millers in the world market. The one possible exception to this observation is the possibility that Western mills could compete with Eastern mills for the Eastern domestic market. Total removal of distortions would improve Western mills' competitive ability relative to Eastern mills' by approximately 40 cents per hundredweight. An increase in competitive ability of this magnitude would certainly expand the boundaries of the Western mill's market area.

The study suggests that selective removal of distortions must be considered very carefully. Removal of the "at and east" rates for example would:

1) significantly increase the discrimination against Western mills in total;

2) seriously impair the competitiveness of Western mills relative to Eastern mills for the export market; and,

3) damage the Canadian milling industry's ability, in total, to compete in the world market.*

This study indicates the sensitivity of locational advantage in the Canadian Flour milling industry to subsidies, regulation and Canadian Wheat Board practices. The administration of these policies has inadvertently shaped the locational pattern (in the longer-run) and profitability (in the short-run) of Canadian mills. It is important

* This is assuming that the corresponding subsidies on wheat sold to foreign mills are not altered.

that the results of these policies be critically compared with regional development objectives and that contradictions be removed.

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APPENDIX

ESTIMATION OF CANADIAN WHEAT BOARD

AGAINST CANADIAN MILLS

It is extremely difficult to accurately quantify the value of the various services which the Canadian Wheat Board provides while marketing Western Canadian wheat. One rough approximation of these values is the costs incurred by the Canadian Wheat Board while providing these services. Table VII - A.1 lists the costs which the Canadian Wheat Board deducts from operating surplus before the final payments to producers are determined.* These costs are less than perfect indicators of the value of Canadian Wheat Board services in two respects. First, the categories are somewhat ambiguous, often including several services. Second, the per bushel costs are averages over all wheat in the pool. This results in an underestimation of the cost of performing the service since the average includes wheat which did not receive the service as well as that which did.

In view of the lack of better estimates, these costs are used here to approximate the value of Canadian Wheat Board services. Table VII - A.1 lists the various costs which the Canadian Wheat Board includes in the price of a bushel of wheat.**

Each entry in the table indicates the value of that service to the mill in question. In the case of Western mills, the value of the

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* These cost categories and average costs are taken from the Canadian Wheat Board, Report To Producers on the 1974-75 Crop Year, page 14.

** It is a matter of debate whether Canadian Wheat Board costs represent a reduction in returns to producers or an increase in price to consumers. This analysis will proceed as if the cost represents an increase in price to consumers. Since the objective of this analysis is to determine the relative effect of the Canadian Wheat Board on Eastern and Western mills, it is largely an irrelevant question.

TABLE VII - A.1

Estimation of Canadian Wheat Board Over-Charges Against Canadian Mills

Canadian Wheat Board Operating Costs	Costs per Bushel	Value of Services Received: Eastern Mills	Value of Services Received: Western Mills, Purchased from Elevators	Value of Services Received: Western Mills, Purchased from Producers
	$/Bus.	$/Bus.	$/Bus.	$/Bus.
Carrying charges on wheat stored in country elevators	.0534	.0534	.0534	--
Storage on wheat stored in terminal elevators	.0198	.0198	--	--
Net interest paid to agency on agency wheat stocks	.0057	.0057	.0057	.0057
Country elevator administrative charges	.0050	.0050	.0050	.0025
Bank interest, exchange and net interest on other Board accounts	.0401	--	--	--
Demmurrage	.0083	--	--	--
Net additional freight on wheat shipped from country station to terminal positions	.0020	.0020	--	--
Handling, stop-off and diversion charges on wheat warehoused in interior terminals	.0027	.0027	--	--
Trucking from primary elevators into interior terminals	.0036	.0036	--	--
Drying charges	.0136	.0136	.0136	.0136
Administrative and general expenses	.0149	.0149	.0149*	.0149*
TOTAL VALUE OF SERVICES RECEIVED		.1207	.0926	.0367
TOTAL CANADIAN WHEAT BOARD COSTS PER BUSHEL	.1691	.1691	.1691	.1691
CANADIAN WHEAT BOARD OVERCHARGE		.0484*	.0765**	.1324**

* This figure is a high estimate

** This figure is a low estimate

service varies, depending on the means of obtaining the grain. The total of each column represents an estimate of the value of services provided by the Canadian Wheat Board in each situation. By subtracting this total from the total Canadian Wheat Board costs, one arrives at a rough estimate of overcharges.

The first cost component in Table VII - A.1 (carrying charges on wheat stored in country elevators) is the payments to country elevators for storage and carrying charges. Western mills do not benefit from this service when producers deliver directly to the mill. Eastern mills and Western mills buying grain from country elevators do benefit from this service.

The second component, storage on wheat in terminal elevators, is of benefit to Eastern mills only since wheat purchased by Western mills is never stored in terminal elevators.

Net interest paid to agents on agency wheat stocks is interpreted as carrying charges on wheat stocks in Canadian mills. Under this interpretation, all mills receive and pay for this service and the charge is therefore included in Table VII - A.1.

Country elevator administrative charges are monies paid (one-half cent per bushel) for paperwork incurred by country elevators. This service is received on all wheat milled. In the case of direct producer deliveries to Western mills, the Canadian Wheat Board pays only .25 cents to the mill. Therefore, the Western mills receive .25 cents less service. The .25 cents entered under producer delivered grain indicates that the Western mill (while paying the full .5 cents for the service) receives only .25 cents of service (paying the other .25 cents out of pocket).

The next cost category, bank interest, exchange and net interest on other Board accounts, involves services of a general nature. It is therefore very difficult to estimate the value of these services to Canadian mills. The service involved in the exchange portion is clearly of no value to any Canadian mill. It will be assumed initially that the other services in this category are also of no value to Canadian mills.

The demurrage item in Table VII - A.1 is one of the easier items to handle. This cost is entirely composed of ocean vessel demurrage which is of no value to any Canadian mill.

The next three items--additional freight, interior terminal charges and interior trucking costs--are relevant only to Eastern mills since none of these costs are incurred by wheat purchased by Western mills.

The cost of drying is charged to both Eastern and Western mills. While Western mills often acquire wheat which requires drying, the Canadian Wheat Board makes an allowance for the cost of drying this wheat. Therefore, both Eastern and Western mills pay for the service only when the service is received.

Administrative and general expenses are difficult to allocate to the consumers of milling wheat. This category of costs undoubtedly includes components which vary with the distance between the producer and the consumer (the mills).* It is difficult to argue that wheat delivered to the mill by the producer should incur the same charge for these types of services as wheat sold to Eastern mills. At the same time there are other components which are rightfully charged on a flat, per bushel basis.** In Table VII- A.1 Canadian mills are all charged administrative and general expenses. It should be remembered that this overestimates the value of services received by Western mills relative to Eastern mills (possibly by a large part of the charge for this component).

The estimates of overcharges in Table VII-A.1 are very crude. It is speculated here that the estimates exaggerate the overcharge for Eastern mills relative to Western mills. Table VII-A.2 illustrates these estimates and compares them with estimates which are more generous to the Western mills. It is likely that the two sets of calculations represent the extremes. The actual situation is probably closer to that represented by the alternate assumptions in Table VII-A.2***.

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* Services of this type include arrangements for carriers, costs of ownership, etc.

** This group includes such services as research, producer information, etc.

*** This is particularly so if one considers that this methodology underestimates the costs of most of these services. If only those buyers who used a service were required to pay for them, the unit charge for the service would be higher.

TABLE VII - A.2

The relative Canadian Wheat Board Overcharges under two sets of assumptions

	Original Assumptions*		Alternate Assumptions**	
	(¢/bus.)	(¢/cwt. of flour)	(¢/bus.)	(¢/cwt. of flour)
Eastern Mill Overcharge	4.84	11.13	.83	1.91
Western Mill Overcharge on:				
- wheat purchased from elevators	7.65	17.60	8.14	18.72
- wheat purchased directly from producers	13.24	30.45	14.73	33.88
- weighted average***	9.89	22.75	10.61	24.40
Difference in Overcharge (Western - Eastern)	5.05	11.62	9.78	22.49

* These calculations are based on the assumptions used in Table VII - A.1

** These calculations are based on the assumption that Eastern mills receive the full benefit of the bank interest, exchange, etc.,and that Western mills receive no benefit from administrative expenses.

*** These figures represent a weighted average of the figures for the two sources of wheat for Western mills. The weights used are .6 and .4 for wheat from elevators and wheat delivered directly by producers respectively. These weights are based on projection made by a Western miller.

The analysis above estimates the average subsidy per hundredweight of flour received by Western versus Eastern mills. These subsidies are distributed unevenly over the different markets for flour. In order to determine the effects of distortion in any given market, one must isolate the level of effective subsidy on flour moving into that market. The following assumptions are made to facilitate this analysis.

1) The Western mill receives milling wheat from three sources and sells flour in two markets. Table VII - A.3 illustrates the present 'supply of milling wheat' and 'disposition of flour' situation for Western mills.

TABLE VII - A.3

Supply of milling wheat and disposition of flour
--The present situation for Western Mills

	Supply of Milling Wheat			
	From Elevators		From	
Disposition	Rail	Truck	Producers	Total
Local Market	0%	35%	35%	70%
Export Market	20%	5%	5%	30%
TOTAL	20%	40%	40%	100%

2) For purposes of comparison it is assumed that if flour was sold in the Eastern market, the source of milling wheat would be in the same proportions as the totals (i.e. 20% by rail, 40% by truck and 40% directly from the producer).

Given these assumptions, the Canadian Wheat Board overcharges against Western mills are estimated in Table VII - A.4

TABLE VII - A.4

Canadian Wheat Board Overcharges against Western Mills
--three markets

	Market		
	East	West	Export
Portion of wheat purchased from elevators	60%	50%	83%
Portion of wheat purchased from producers	40%	50%	17%
Weighted average overcharge			
- original cost assumptions	22.75	24.02	19.78
- alternate cost assumptions	24.78	26.30	21.30

This rather crude analysis suggests a substantial element of discrimination against Western mills in present Canadian Wheat Board practices. The degree of discrimination would appear to fall between 11 cents and 25 cents per hundredweight of flour depending on how one interprets the meaning of the various Canadian Wheat Board cost categories and what market one is considering.