AN ASSESSMENT OF THE TECHNICAL AND ECONOMIC FEASIBILITY OF THE DEVELOPMENT AND MANUFACTURE OF LIGHT RAIL VEHICLES IN MICHIGAN

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16. Abstract The objective of this study was to explore the economic, business, and technical feasibility of manufacturing and marketing light rail vehicles (LRV's) for the domestic and international market by engineering and manufacturing facilities in the State of Michigan, with emphasis on southeastern Michigan. The study is motivated by the potential for production and job opportunities inherent in the proposed Southeastern Michigan Transportation Authority (SEMTA) light rail subway and surface transit system.

The LRV market is shown to be of moderate size, but constrained by institutional and procedural factors which have caused it to be very cyclical in nature. It was concluded that the probability of a foreign LRV manufacturer being willing to assemble the SEMTA LRV's in Michigan is high. The impact on jobs would be slight (300-400 direct new jobs) and of short duration (3-4 yrs.). To generate a greater number of jobs on an on-going basis, it is suggested that diversification is needed into heavy rail passenger vehicles, small- and medium-sized buses, heavy maintenance, and railcar and bus refurbishment. To aid in the development of this capability in Michigan, it is suggested that a state-wide economic development corporation be created to spur development of technology-based industries in general, with a component that emphasizes non-automotive transportation, including, but not limited to rail passenger vehicle and small bus manufacturing.

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The opinions, findings, and conclusions in this publication are those of the authors and not necessarily those of the Michigan Transportation Commission.

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INTRODUCTION

The objective of this study was to explore the economic, business, and technical feasibility of manufacturing and marketing light rail vehicles for the domestic and international market by engineering and manufacturing facilities in the State of Michigan, with emphasis on southeastern Michigan. The purpose of the assessment was threefold: (1) to estimate the future market for light rail vehicles and related products and services; (2) to determine and evaluate the reasons why such vehicles and products should be manufactured in Michigan; and (3) to evaluate the probabilities of existing manufacturers locating in Michigan. The study was motivated by the potential for production and job opportunities inherent in the proposed Southeastern Michigan Transportation Authority (SEMTA) light rail subway and surface transit system.

The study assessment has been conducted in two parts: (1) a market analysis, and (2) an economic development analysis. The two parts were underway simultaneously because of schedule constraints.

The assessment was sponsored by the Bureau of Urban and Public Transportation, Michigan Department of Transportation. Oversight of the work was provided by a special task force appointed by Governor William G. Milliken for that purpose.[1]

The content of this report follows the outline set down by Exhibit A-1, "Scope of Work," for Contract No. MDOT-80-0606, May 14, 1980. The subsections parallel the five specific tasks named in the amendment.

1. PART ONE: MARKET ANALYSIS

The market analysis consisted of five tasks, the results of which are reported below. The thrust of the market analysis was to identify factors that will have the greatest influence on the development of this market, based upon findings in the literature and discussions with

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[1]See Appendix I.

industry and government authorities. Selected market factors were evaluated in the framework of market scenarios. Finally, market projections were made for a five- to ten-year time period.

Since it became apparent at the outset of the study that the manufacturing processes required for light rail vehicles (LRV's) are not significantly different from those required for heavy rail passenger cars, and that in almost every case those firms now in the market are manufacturers of both heavy and light rail equipment, the market projections presented in Section 1.5 include passenger railcars.

For the reader's reference, Figure 1 presents a taxonomy of the types of rail passenger cars that exist today.

1.1 Literature Search

A literature search was conducted to identify data that could support LRV and railcar market projections, to identify factors and forces influencing the market for LRV's, and to identify the characteristics of the railcar manufacturing business in general. An important market factor is the applicability of light rail transit to the urban transportation scene. In the United States, the growing interest in light rail transit appears to be based on its flexibility and relatively low cost.[2] LRV's can operate in subways, on conventional elevated structures, private rights-of-way, median strips, the side of a road, on city streets, in pedestrian malls, and over roadway grade crossings. As a result, LRV's can rather easily adapt to local conditions, and therefore require less costly construction than conventional rapid transit. To a large extent, their flexibility stems from overhead power collection as opposed to a third rail, and from their ability to handle passengers at either high or low platform stations, or at street level. LRV's are generally smaller and lighter than conventional rapid transit cars, although this is not always the case.

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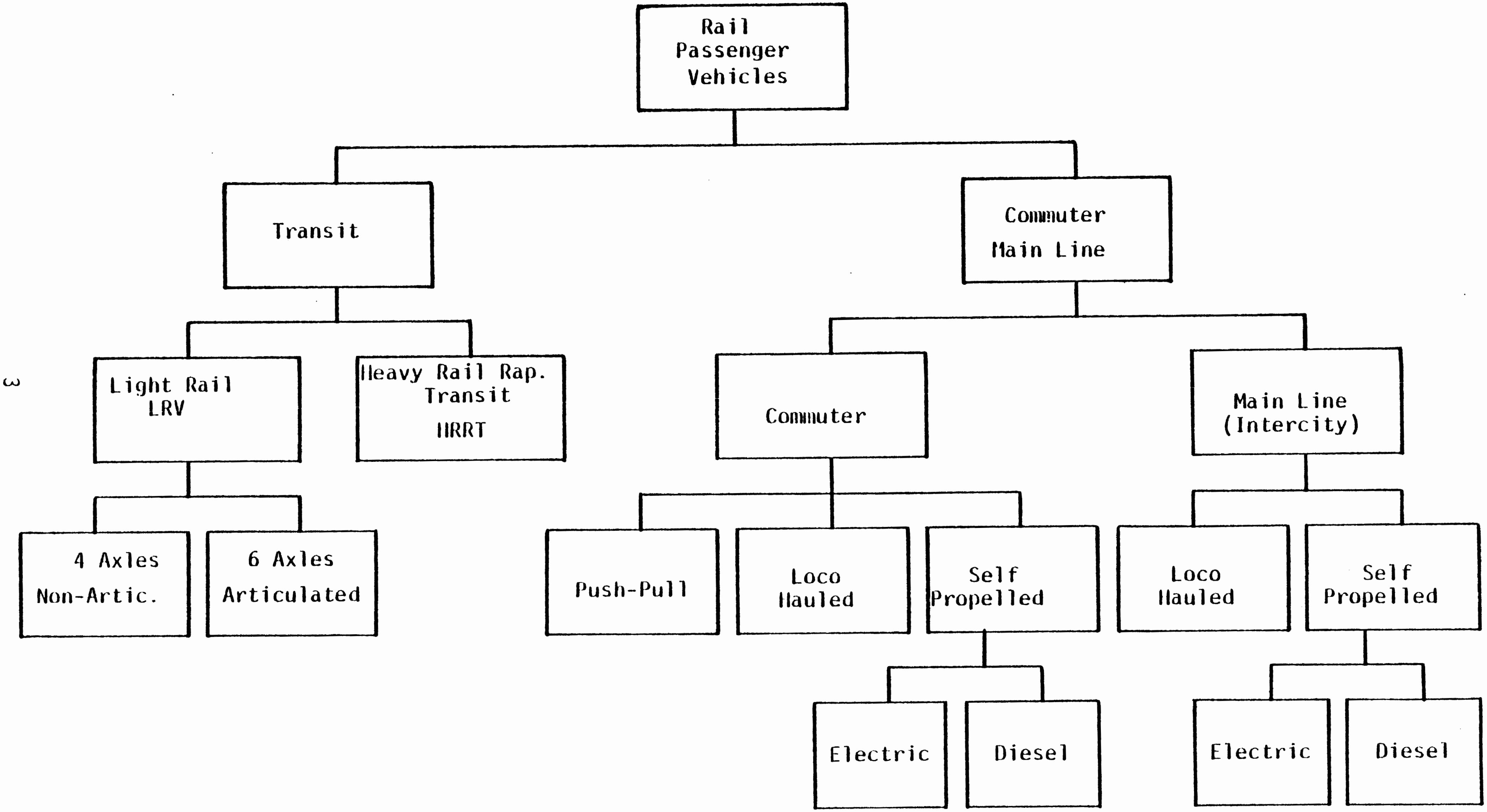
[2] C. J. Schlemmir, Vice President, Transportation Systems Business Division, GE. "A Manufacturer's View of the Transit Market." Paper presented at the APTA Rapid Transit Conference, June 17, 1980.

FIGURE 1. RAIL PASSENGER CAR TYPES (A TAXONOMY)



Control options for LRV's can range from manual operation to fully automatic computerized train control. They can be designed to operate as multiple-unit trains or singly, and they can be articulated. LRV's are characterized by their simplicity and proven design, and rest on several decades of operational and engineering experience in both the United States (the PCC--President's Conference Committee--car of the 1920's) and in Europe (modern articulated cars).

Instead of being a separate and distinct mode, light rail transit has been characterized as a "band" in the total rail transit spectrum that ranges from the simple streetcar to the conventional high-capacity rapid transit system. During this decade, cost factors may well control public transportation planning and decision making, and this would mean that light rail transit would be favored over conventional rapid transit for higher-capacity systems because of its lower construction cost, while buses would be favored over light rail transit for lower-capacity systems. Thus, light rail transit development would be pushed toward the higher end of its "band" in the total rail transportation spectrum.

However, there is often a tendency to use the maximum capacities as the required criteria for the introduction of a mode of public transit. Vuchic argues against that:

> "First it is not true that we must have 40,000 persons per hour for rail rapid transit, 20,000 for light rail transit, 10,000 for a busway, or 3,000 for a surface bus line. These figures represent the maximum capacities of the mode--the upper limits of the applications. Each one of these modes can be justified at much lower volumes. Light rail transit can effectively serve 2,000 to 3,000 persons per hour. Further, peak-volume in one direction is not the only criterion: system performance and service quality are often the dominant factors. If this is properly understood, it is then obvious that a great number of our cities have corridors or entire networks that are suitable for light rail transit."[3]

It has been noted that:

> "Non-capital-intensive improvements of transit, generally encompassed by the term 'transportation system management,' [TSM]

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[3]V. R. Vuchic, "Current Trends: Problems and Prospects of Light Rail Transit," Light Rail Transit: Planning and Technology, TRB Special Report 182 (1978), pp. 94-103.

have been undertaken in parallel with developments of light rail transit. They are an indispensable element to achieve high quality transit service. However, these measures alone without provision of modern transit modes and exclusive rights-of-way may not be sufficient. Experience outside of the U.S. shows that long- and short-term improvements are best applied simultaneously in a coordinated manner . . . [and] . . . good solutions of urban transportation problems have been achieved by using several different modes. Light rail is an excellent basic transit carrier in medium and large cities and has potential in special corridor situations."[4]

Transportation energy availability and cost can strongly influence public transit ridership and the demand for public transit vehicles of all types. It has been estimated[5] that given constant gasoline demand, a decrease in availability of three million barrels of crude oil per day would result in a 20% increase in transit ridership, which would translate into a need for 10,000 new buses, if buses were used exclusively. On the other hand, due to the increase of fuel-efficient cars in the American automotive fleet, and possibly due to as-yet-undetected changes in travel patterns and driving behavior, petroleum used for transportation in the United States is decreasing. At present, American refineries are carrying excess inventories of crude oil. It is estimated that this trend will continue.[6]

It is also estimated that the petroleum use of the total U.S. transportation sector is 10.113 million barrels per day (MMBD) and that the total passenger car use is 5.117 MMBD, or 27% of the total. If between now and the year 2000 the EPA-required gasoline mileage for new cars rises to 27.5 miles per gallon, total passenger car petroleum use will fall to 3.6 MMBD, despite increases in total vehicle miles traveled per annum and the size of the automotive fleet at present rates. But as the costs of petroleum and automobiles rise, and with it the costs of

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[4] E. S. Diamant, et al., Light Rail Transit: State of the Art Review (DeLeuw-Cather Co., 1976), DOT-UT-50009.

[5] "Energy, the Economy, and Mass Transit," Office of Technology Assessment, Congress of the United States (December 1975), OTA-T-15.

[6] "Workshop on Needs and Opportunities in Research and Development for Automotive Fuel Efficiency," Office of Technology Assessment, Congress of the United States, 10-12 September 1979. (In publication.)

car ownership, electrified public transportation can become an increasingly attractive alternative for a growing portion of automotive trip-making.

With regard to funding, the Federal government continues its commitment to public transit and has increased its estimated spending level to $3.4 billion in 1980.[7] With Public Law 96223 "Crude Oil Windfall Profits Act of 1980," $227 billion will be collected over the next ten years, of which alternative fuels development and public transit will share 15%, or $34 billion. All told, present sources of funding should sustain a funding level for transit rolling stock of $1 billion per year (Federal share).

1.2 Discussions with Industry and Government

A meeting was held on July 3, 1980, with Mr. Steve Teel, Director, Rail Technology and Deployment, UMTA, and Mr. Jeffrey Mora of that office.

Mr. Teel felt that railcar technology is highly complex, being the cause of some car builders going out of business. They also cited unreasonable requirements specified by transit authorities (TA's) and their consultants, who insist on vehicles that operate at full performance under "ANY" and "ALL" operating conditions, regardless of whether the transport authority was performing the required maintenance, and the car builder assuming total responsibility for late deliveries. Teel/Mora also attributed part of the failure to poorly written specifications, and to the poor relationship between operators and car-builders. They expect that this relationship will be improved within the next few years, thanks to steps now being taken by UMTA in conjunction with general managers of T.A.'s.

One step is the standardization of terms and conditions--UMTA has created a decision-making board composed of UMTA and T.A. general managers.

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[7] Subcommittee on Oversight and Review, Committee on Public Works and Transportation, U.S. House of Representatives, Urban Mass Transportation Administration's Technology Development and Equipment Procurement Programs (Washington, D.C.: U.S. Government Printing Office, March 1980), Committee Print 96-34.

Another step is better definitions and criteria to specify vehicle and component performance. This is part of the Rapid Transit Car Standardization Program. A similar program is well underway in regard to LRV's, for which the ACC was formed (Authorities Conference Committee), patterned after the old and successful PCC (President's Conference Committee). The participant authorities are Pittsburgh, Detroit, Portland, Buffalo, and Boston. Based on past experience, Teel was definitely against the establishment of a new railcar builder without the experience necessary to carry out a complete program, including testing and product support.

In regard to the international market, Teel's reaction was pessimistic in view of the fact that the European and Japanese markets have been closed to outsiders. The Central and South American markets which appear to be developing are being aggressively pursued by large European consortiums, strongly supported by their respective governments.

Teel made available market projections of railcar procurements developed by both the Office of Rail Technology and the Office of Capital Grants. These documents were briefly discussed and compared with other data. Teel also provided information regarding railcar manufacturing labor content, broken down in subsystems and components.

Also on July 3, 1980, a meeting was held with Mr. Robert Day, Director, Equipment Procurement, AMTRAK, and Ms. Barbara Clark, Congressional Affairs, AMTRAK.

Mr. Day discussed the future procurement of railcars by AMTRAK, including 400 to 800 single-level cars in the next five years. AMTRAK is extremely interested in having a second car builder in the U.S. Mr. Day cited the recent procurement of 150 Am Fleet II cars as an example of not being able to take advantage of competitive pricing.

Day said that AMTRAK was promoting the takeover of the Pullman Standard Illinois and/or Indiana plants by an established and reputable foreign car builder; however, market projections appear not to be attractive enough to encourage car builders to proceed with further negotiations. Day felt that present legal procedures could be overcome, provided market projections present a stable future picture. Pullman Standard is presently building an order of 284 bi-level long-distance passenger cars for AMTRAK, expected to be completed in mid-1981. Then Pullman Standard will close the plant. It is understood that some of the tooling is already up for sale.

Bombardier (Canada) and Japanese car builders have discussed the possibility of assuming the Pullman Standard plants, but have not gone forward.

Day discussed the refurbishment (rehabilitation or "rehab") of existing cars. Although AMTRAK is now contracting with refurbishment shops in Idaho, Kansas, Delaware, and Florida, this work will eventually be brought back to AMTRAK's Beech Grove, Indiana shop, once the project on group conversion to head-end power is completed. At that time it is expected that outside contract shops will no longer be required.

AMTRAK may also be looking for MU-type railcars for their newly assumed commuter operations, although refurbishment and conversion of 30 metroliner cars is also being considered.

In addition, AMTRAK, in conjunction with FRA, is evaluating high-speed rail technology and cars around the world (England, France, Germany, Japan, and Canada) for the Northeast Corridor Implementation Program. These vehicles would replace the existing metroliners (approximately 100 cars after 1985).

In discussions on July 15, 1980 with Nicholas Petruzzelli, International Investment Economist, Export-Import Bank, it was noted that "Ex-Im" has financed loans since 1934 to foreign governments covering many projects, including rail equipment. It is the practice of the bank to finance U.S.-made equipment only. The loans are payable in periods of up to five years, or extended payments between six and twelve years, depending on conditions. Petruzzelli said that "Ex-Im" is willing to finance loans for the purchase of U.S.-made rail passenger cars and would be pleased to discuss this matter in further detail. He noted that "Ex-Im" is presently in the process of reopening an office in the People's Republic of China.

Discussions were held with Helen Edge of the Railroad Progress Institute (RPI) on July 17, 1980. Ms. Edge is working on a draft proposal to further answer the language of the "Buy-America" provision of the Surface Transportation Act of 1980. Her proposal will also respond to the proposed increase from 50% to 70% local content requirement for foreign manufacturers to participate in the American market. The RPI proposal will include a 15% to 20% bid-price "handicap" instead of the present 10%. This figure has not been decided and RPI is receptive to suggestions. This figure is extremely important because of the irrelevancy of the 70% local content, if a foreign bidder is lower by more than 10% of a U.S. bid. Edge felt that the atmosphere in Congress is such that the chances for passing the "Buy-America" amendment are high. Edge supplied RPI market projection information.

The New York City Transit Authority (NYCTA) and L.T. Klauder (consultants) are presently working on the specifications for the new R-62 cars to replace 325 cars 50 feet long. Joe Sebastiano of the NYCTA indicated on July 18, 1980 that he hopes to release an RFP this fall, and place an order in early 1981. In addition, NYCTA and Parsons Brinckerhoff are preparing specifications for the "rehab" of their R-10 and R-16 (AFC-built) cars (300). The refurbished cars will then become the R-68. The work will be done, provided that the cost of "rehab" proves competitive with that of new cars.

David Harrison, State of Michigan, Washington Office, has indicated that the U.S. Senate has passed the 70% "Buy-America" amendment and that it will be considered by the House in September 1980.

As an indication of state-level interest in light rail, a May 22, 1980 survey of state transportation priorities was conducted by the Center for International Transportation Exchange (CITE).[8] This organization is a National Governor's Association Center of Excellence. The governors were asked to rank, in order of priority, five major transportation issues. The number one priority issue was "foreign experience with light rail for public transportation needs."

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[8]Director, Mr. Bud Thar, located at Michigan State University, East Lansing, Michigan.

1.3 Market Scenarios

The market projections presented in Section 1.5 are a tabulation of known system and vehicle procurement plans for new transit systems, extensions to existing systems, or the replacement of worn vehicles. For new systems and major extensions the procedures required by UMTA (needs studies, impacts statements, alternatives analyses, preliminary and final engineering, competitive bid, construction, and finally operation) can take eight to twelve years. Replacement acquisitions can occur within two to three years. These procedures tend to place an upper limit on the rate at which the urban rail transit market can grow and, perhaps, on the total realizable size of that market.

In this section, a market scenario approach is used to estimate the impacts of energy availability and the state of the economy on probable market growth or lack thereof. The methodology used for this purpose has been developed by the Office of Technology Assessment, The U.S. Congress,[9] and was used to estimate changes in transit ridership and the resulting demand for transit vehicles in different energy and state-of-the-economy scenarios.

The OTA report presents quantitative relationships showing the impact of energy constraints, economic conditions, and potential government policies on the demand for transit. The OTA approach was to develop regression equations, and then compare the relationships exhibited by the equations with results obtained from surveys and other types of studies. The equations usually produced estimates close to the results obtained in the other studies.

In general, OTA findings indicate that changes in the energy supply have a much greater impact on transit ridership than is true for even substantial changes in the unemployment rate. Also, alternative governmental actions are shown to have a substantial impact on potential transit ridership.

The analysis to follow used the OTA estimates for all relationships between transit ridership and several independent variables. The OTA

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[9] "Energy, the Economy, and Mass Transit," Office of Technology Assessment, Congress of the United States (December 1975), OTA-T-15.

assumption regarding improvement in vehicle fuel efficiency has been modified, however. Also, primarily because of the different time period, the OTA energy futures have been changed.

As is the case in the OTA report, analyses presented in this section use transit ridership as the dependent variable. These ridership estimates are translated in Section 1.5 to demand for both light and heavy rail vehicles.

Energy and Transit Ridership. The equation presented in the OTA report for estimating the effect of changes in the supply of oil on transit ridership is as follows:

$$TRP = 1.032\ (TVMT)^{-0.866} \qquad \text{(OTA, p. 66)}$$

where TRP = the annual rate of change in the number of transit revenue passenger,

and TVMT = the annual rate of change in vehicle miles traveled for all highway vehicles.[10]

The assumptions used in this report to prepare predictions for transit ridership, given different levels of assumed oil supply are as follows: (1) The U.S. oil supply for 1980 will amount to 18.86 million barrels per day (MMBD).[11] (2) Average fuel economy for all highway

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[10]The OTA study used vehicle miles traveled as a proxy for gasoline consumption. Gasoline consumption was not used because that series is based on wholesale sales, and use lags sales by an "unknown and variable amount" (p. 46).

[11]The source for this statistic is a table presented at an OTA workshop held in September 1979 ("Workshop on Needs and Opportunities in Research and Development for Automotive Fuel Efficiency," Office of Technology Assessment, Congress of the United States, 10-12 September 1979. In publication). The sources cited for the table are "Chrysler Corp.; based in part upon studies by the Department of Energy, General Motors Corp., and the American Petroleum Institute." Other data from that table are also used in this report. These are: the 1980 level of imported oil (8.143 MMBD), and 21.5 miles per gallon that would be obtained by all cars on the road if the EPA's 27.5 MPG program is achieved. A 3.5 percent annual improvement in MPG for all passenger cars would place the 1990 figure at about 31.25 MPG.

vehicles will improve by 3.5 percent per year from 1980 to 1990.[12] (3) The proportion of the U.S. oil supply that is now consumed by the transportation sector will remain unchanged through 1990.

Table 1 shows forecasts of changes in transit ridership associated with three assumed energy futures.

TABLE 1

Predicted Change in Transit Ridership[1]

Alternative Oil Supply Futures	To 1985	To 1990
Zero Growth	+0.9%	+1.7%
Substantial Decrease (29% Decrease by 1990)	+17.1%	+37.0%
Severe Decrease (43% Decrease by 1990)	+41.6%	+72.1%

[1]As used here, transit ridership includes rail and motor bus passengers. The base used is what the American Public Transit Association calls linked transit passenger rides. (See APTA, '78-'79 Transit Fact Book, p. 27.)

Zero growth in the oil supply is seen to have a very slight impact on the level of transit ridership. This result arises from the fact that total highway VMT is expected to increase by 3.5 percent each year. (According to the equation, transit ridership would remain constant if total highway VMT increased by 4 percent a year.)

A substantial decrease in the oil supply of almost 5.5 MMBD by 1990 is predicted to increase transit ridership by more than one-third by

[12]The OTA assumption of a 5 percent per year increase in MPG for all highway vehicles between 1976 and 1980 appears too high for the 1980 to 1990 time period. U.S. DOT statistics presented in Highway Statistics show that MPG for all highway vehicles increased by 1 percent or less per year between 1976 and 1978.

1990. The assumed rate of decrease in oil supply is associated with a zero growth rate in total highway VMT.

A severe decrease in the oil supply, amounting to slightly more than 8 MMBD by 1985 and no change in supply between 1985 and 1990, is about equal to the 1980 assumed level of imported oil. Given this energy scenario, total highway VMT would be expected to decrease by 4.3 percent per year through 1985, and then increase by about 3.5 percent per year between 1985 and 1990. In this situation, transit ridership is predicted to increase almost 42 percent by 1985.

Economic Conditions. The OTA analysis provides the following relationship between transit ridership and unemployment:

$$TRP = (UR)^{-0.49} \qquad \text{(OTA, p. 46)}$$

where TRP = the annual rate of change in transit revenue passengers,[13]

and (UR) = the annual change in the unemployment rate.

The equation was developed using national data for the years 1952-1974. Predictions from the equation show that the effect of an increase in the unemployment rate on transit ridership is not very large. As presented in the OTA report:

> "Several analyses of changes in transit ridership, as a function of changes in economic conditions (expressed as the unemployment rate) have revealed a relationship between the two. However, the relationship indicates that only a very small change in transit ridership results from rather large changes in the unemployment rate. The significance of these economically induced changes in ridership is far overshadowed by the changes in ridership induced by changing energy conditions" (OTA, p. 47).

Also, changes in transit ridership as a result of a decrease (or increase) in personal income is shown in the OTA report to be slight. A 2 percent decline in disposable income was shown to be associated with a 1 percent decrease in transit ridership (OTA, p. 44).

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[13]APTA changed this series to linked passenger trip rides after the OTA study was published. The only difference is that now originating free-fare rides are counted in the totals.

The OTA study also provides estimates of the boost in transit ridership which would be expected to follow from a decrease in transit fares or an increase in the price of gasoline. The price elasticity of transit ridership for large-fare decreases is shown in the OTA report to be around -.5. Using that relationship, a 50 percent reduction in transit fares would boost transit ridership by roughly 41 percent. When Atlanta reduced transit fares by 62 percent to 15 cents a ride, transit ridership increased an estimated 28 percent (OTA, p. 116).

The estimated effect of changes in the price of gasoline on transit ridership is small compared to that just seen for transit fare reduction. The OTA estimate for a 50 percent increase in the price of gasline shows that transit ridership will increase by less than 10 percent (OTA, p. 116).

Potential Governmental Action. The OTA study considered the likely impact on oil consumption and transit ridership of several potential public actions. An evaluation was conducted for actions which would serve to restrain the use of automobiles and also provide incentives for increased transit ridership. The strategy that maximizes both the increase in transit ridership and the net decrease in gasoline consumption is as follows (OTA, p. 83): (1) a free-fare public transit program, (2) a 50 percent increase in the real cost of gasline, (3) a $1.50 increase in parking fees in commuter destination areas, and (4) a 100 percent increase in the size of the transit fleet.

With these actions, OTA estimates show that between 1974 and 1980, transit ridership would increase a maximum of 120 percent. And, in 1980, the net decrease in oil consumption would exceed one million barrels per day (OTA, p. 91).

Other approaches by government are possible. The interstate highway system is the product of a policy decision to link all major cities in the U.S. through the construction of an efficient road network. In similar ways, transit service within major cities could be vastly improved. For instance, in a speech delivered in Pittsburgh on August 7 of this year, Congressman John Anderson proposed a plan calling for the "establishment by the end of the decade of a comprehensive bus or rail--preferably light rail--system for every urban area with a population of 200,000 or more." Of the 106 urbanized areas in 1970, only 10 have rail service.[14] If the residents of the remaining ninety-six urbanized areas were provided the same level of rail service as was available in 1970 to those in the ten areas with rail transit, rail ridership--mostly light rail--would more than double between now and 1990. Bus ridership would also show a substantial increase.

Conclusions. After decreasing each year since the mid-1940's, transit ridership increased in 1973--the year the oil embargo began. And, transit ridership has increased each year since 1973.[15]

The relationship between the supply of oil and transit ridership developed by OTA is based on a very short time period (1971-1974). As mentioned in the OTA report, the crisis in gasoline lasted for only three months and consmers apparently assumed that the crisis would not last very long (OTA, p. 69). Research is needed to ascertain consumer's expectations regarding travel behavior in the context of long-term energy shortages.

1.4 Competition

The results of this task are reported in Section 2.5 and Appendix II.

1.5 Market Projections

Most car builders with interest and potential to establish manufacturing facilities in Michigan already have a line of light and heavy rail passenger vehicles ready for production. This condition supports the rationale to evaluate the entire rail passenger vehicle market, which could provide greater quantity and business continuity.

Past, present, and future potential orders of vehicles for the Canadian and American markets, including LRV's, heavy rail rapid transit, and commuter/main line are shown in Tables 2, 3, and 4. This breakdown facilitates the evaluation of technology and labor content

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[14] Urban Mass Transportation Administration, Technical Notice 01, Februuary 3, 1977.

[15] Ridership for rail and motor bus, combined, increased by 7.1 percent in 1979 over the 1978 figure according to data supplied by APTA.

required by each type of vehicle. Table 5 is a summary of the preceding tables.

The projections were thoroughly discussed with representatives of government agencies and industry, with special consideration devoted to properties which have already demonstrated and/or justified through alternatives analysis, the need for mass transit systems. Properties with remote possibilities of justification were disregarded. Most properties were contacted directly.

In addition, the projections were also compared to UMTA provisions containing five-year authorizations, discretionary grants, and formula grant programs (capital and operating) for mass transit systems. These authorization bills were favorably reported by the Senate Committee on Banking, Housing, and Urban Affairs, and the House Committee on Public Works. Also, a draft, "Domestic Preference for Rail Car Industry," prepared by the Railway Progress Institute,[16] reports "that there may be up to six billion dollars in public funds spent for rail passenger transportation equipment over the next six years."

Figure 2 is a graphic description of the rail vehicles market over the period 1968 to 1980, and is presented for reference purposes.

Figures 3 and 4 are graphic descriptions of Figure 2, showing the projected number of vehicles to be purchased over the next five and fifteen years by categories and as a combined total, respectively. For reference purposes, rail vehicle orders between 1977 and 1980 are shown. The projections again indicate some of the problems pointed out by the industry as one of the major causes of inability to serve the market properly.[17] In this case, however, the apparent erratic direction of the market is due to the fact that it is based on the year in which the order will be placed. Actual production and delivery of the vehicles will occur over a longer period of time, somewhat balancing the cash flow and the allocation of resources of the car builder. The analysis

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[16]Report in progress.

[17]C. J. Schlemmir, Vice President, Transportation Systems Business Division, G.E., "A Manufacturer's View of the Transit Market." Paper presented at the APTA Rapid Transit Conference, 17 June 1980.

TABLE 2

Light Rail Transit Vehicles:
North America Market

Operating Authority	Order Status	Vehicle Type	Number of Vehicles	Remarks
Boston MBTA	1973	6-axle	130	Boeing USA
San Francisco MUNI	1973	6-axle	100	Boeing USA
Toronto (Canada)	1973	4-axle	196	UTC (Hawker Siddeley) Canada
Edmonton (Canada)	1974	6-axle	14	Siemens-DuWag Germany
Calgary (Canada)	1975	6-axle	27	Siemens-DuWag Germany
Cleveland GCRTA	1978	6-axle	48	Breda Italy
Philadelphia SEPTA	1979	4-axle	141	Kawasaki Japan
San Diego MTDB	1979	6-axle	14	Siemens-DuWag Germany
Buffalo NFTA	1980	4-axles 6-axles	25/35	
Boston MBTA	1981	4-axles 6-axles	40/70	Testing existing vehicles
Newark DOT	1981	4-axles	25	
Pittsburgh PAT	1980	N.A.	55	
Detroit SEMTA	1982	SLRV Type	87	Number of cars estimated on SLRV
Portland TRI MET	1983	6-axles	26	Waiting approval

TABLE 2--Continued

Operating Authority	Order Status	Vehicle Type	Number of Vehicles	Remarks
Denver	1983	6-axles	70	Project under study
San Jose	1984	4-axles	40	Alternative analysis underway
Honolulu	1984	N.A.	30	Waiting approval
Toronto (Canada)	1984	4-axles	100	Expansion and replace
Boston MBTA	1985	4-axles 6-axles	100 or 150	
Philadelphia SEPTA	1986	4-axles	120	
Vancouver (Canada)	1986	4-axles 6-axles	60 or 100	
Quebec City (Canada)	1990	4-axles 6-axles	20 or 50	
San Francisco MUNI	1990	6-axles	20	
Boston MUNI	1990	N.A.	20	
Sacramento	1990	6-axles	30	
Denver	1990		70	
Dayton	1990	N.A.	30	
New York City (42nd St.)	1990	N.A.	20	
Montreal (Canada)	1990	4-axles 6-axles	100 or 150	
Rochester	1990	N.A.	30	

did not include markets outside of Canada-U.S., Mexico, South America, Africa, and Asia. (Europe and Japan are effectively closed to U.S.-made

TABLE 2--Continued

Operating Authority	Order Status	Vehicle Type	Number of Vehicles	Remarks
Louisville	1990	4-axles 6-axles	29 or 30	
Dallas	1990	N.A.	50	
Chicago	1990	N.A.	70	
St. Louis	1990	N.A.	N.A.	
Houston	1990	N.A.	N.A.	

rail passenger cars.) Also, the study did not include the value of diversification opportunities, such as rail passenger car refurbishment, bus refurbishment, small- and medium-sized bus manufacturing, heavy-duty railcar maintenance, and potential components manufacturing--any of which would increase the market and help smooth its cyclical behavior and thus stabilize jobs and cash flow. Component and subsystem manufacturing to supply the railcar industry would be especially attractive if the components could be supplied to other industries as well.

Using the market scenarios approach discussed in Section 1.3, contingency market projections are presented in Table 6 which shows the maximum number of rail vehicles expected to be owned or leased in 1985 and 1990 according to four alternative futures. (See Section 1.3 for a discussion of these futures.)

A severe decrease in the oil supply is shown in Table 6 to be associated with a 72 percent increase in rail vehicles by 1990. Policy actions designed to maximize transit ridership, such as the OTA strategy of auto restraint combined with transit incentives, and Congressman Anderson's proposal, could be expected to result in a doubling of rail vehicles (and motor buses) sometime between 1985 and 1990.

TABLE 3

Heavy Rail Rapid Transit Vehicles:
North American Market Projections

Operating Authority	Order Status	Vehicle Type	Number of Vehicles	Remarks
Chicago CTA	1978	48' Long All Electric Stainless Steel	300	Budd Company USA
Miami Baltimore	1979	75' Long Stainless Steel	208	Budd Company USA
Washington WMATA	1979	75' Long Aluminum	94	Breda, Italy
Philadelphia SEPTA	1979	67' Long Stainless Steel	125	Kawasaki, Japan
Chicago CTA	1981	48' Long All Electric Stainless Steel	300	Option with Budd Company
Washington WMATA	1981	75' Long Aluminum	200	Option with Breda, Italy
Cleveland GCRTA	1981	75' Long Pantograph	60	Funded--Specifications in preparation
New York NYCTA	1981	60' Long (Length under study)	280	Funded--Specifications in preparation
New York NYCTA	1982	75' Long R-68	300	New cars purchased if overhaul costs too high
San Francisco BART	1982	75' Long	90	Funded--Specifications in preparation
San Francisco BART	1984	75' Long	60	Follow-on order
Los Angeles*	1984	75' Long	50*	
Chicago	1985	48' Long All Electric Stainless Steel	300	
New York	1985	75' Long	350	
Chicago CTA	1986	48' Long All Electric Stainless Steel	370	Follow-on from 1985
Montreal	1990	Same as present vehicles (rubber wheels)	N.A.	System expansion
Toronto	1990	Similar to present vehicles	N.A.	System expansion

*At this printing it was learned that the Los Angeles system order date has been changed from 1984 to 1983, and the quantity of vehicles increased from 50 to 120.

TABLE 4

Commuter/Main Line Rail Vehicles:
North American Market--Present and Projected

Operating Authority	Order Status	Vehicle Type	Number of Vehicles	Remarks
Connecticut DOT Amtrak	1979	Self-propelled diesel SPV-2000	13	Budd Company USA
Chicago CTA	1979	Loco. Hauled Push-Pull	34	Budd Company USA
Amtrak	1979	Loco. Hauled Medium Distance AM Fleet II	150	Budd Company USA
New Jersey DOT	1980	Push-Pull (Pullman MBTA)	57	Bombardier
Northern Indiana South Shore Line	1980	Electric MU Commuter	45	Funded RFQ out
New York MTA	1981	Electric MU Commuter	130	Funded
Michigan DOT Amtrak	1981	Self-propelled diesel SPV-2000	5/10	
Caltrans/S. Pacific	1981	Loco. Hauled Gallery Cars (RTA Type--Go Transit)	30/40	
Alaska	1981	Self-propelled diesel SPV-2000	10/20	
Amtrak	1981	Loco. Hauled Long Distance Single Level Coach/Sleep/Diner	200	
Philadelphia	1982	Commuter Electric M.V.	50	
Amtrak	1982	Commuter Electric M.V.	30	New cars or converted metro liners
Amtrak	1982	Loco. Hauled Long Distance Single Level Coach/Sleep/Diner	200	Follow-on order
Detroit SEMTA	1983	Loco. Hauled Push-Pull Double Deckers (RTA Type--Go Transit)	24	Ann Arbor and Pontiac routes; Mt. Clemens may follow
Caltrans S. Pacific	1983	Loco. Hauled Push-Pull Double Deck	20	Follow-on order
Via Rail	1983	Loco. Hauled Self-Propelled Long Distance	150/300	
Amtrak	1984	Loco. Hauled Long Distance Single Level Coach/Sleep/Diner	200	Follow-on order
Via Rail Canada	1985	Loco. Hauled Self-Propelled Long Distance	350	Follow-on order

TABLE 4--Continued

Operating Authority	Order Status	Vehicle Type	Number of Vehicles	Remarks
Amtrak	1986	Loco. Hauled Long Distance Single Level Coach/Sleep/Diner	200	Follow-on order
Montreal Regional Transit	1988	Commuter Loco. Hauled Electric M.V.	300	
Amtrak N.E. Corridor	1980	Metroliner MK II	60/100	Metroliner replacement FRA evaluation

TABLE 5

Summary of Rail Passenger Vehicles
North America Projections: 1980-85

Vehicle Type	1980	Additional Production To 1985
Light Rail	1,200	773
Rapid Transit	10,200	1990
Commuter/Main Line	5,500	1574
Total	16,900	4337

If a rapid expansion of rail travel occurs within the next five to ten years, it is expected that travel in LRV's will increase at a higher rate than travel in heavy rail vehicles. There are several reasons for this assumption. The implementation of a new heavy rail system reqires much more time than is true for a light rail system. Also, LRV systems cost less than heavy rail systems. Finally, extension of rail service to cities of medium size would favor LRV's because most of these cities would not have the trip density figures needed to justify heavy rail systems.

FIGURE 2. RAIL PASSENGER VEHICLES: NORTH AMERICAN MARKET (1968-1980)

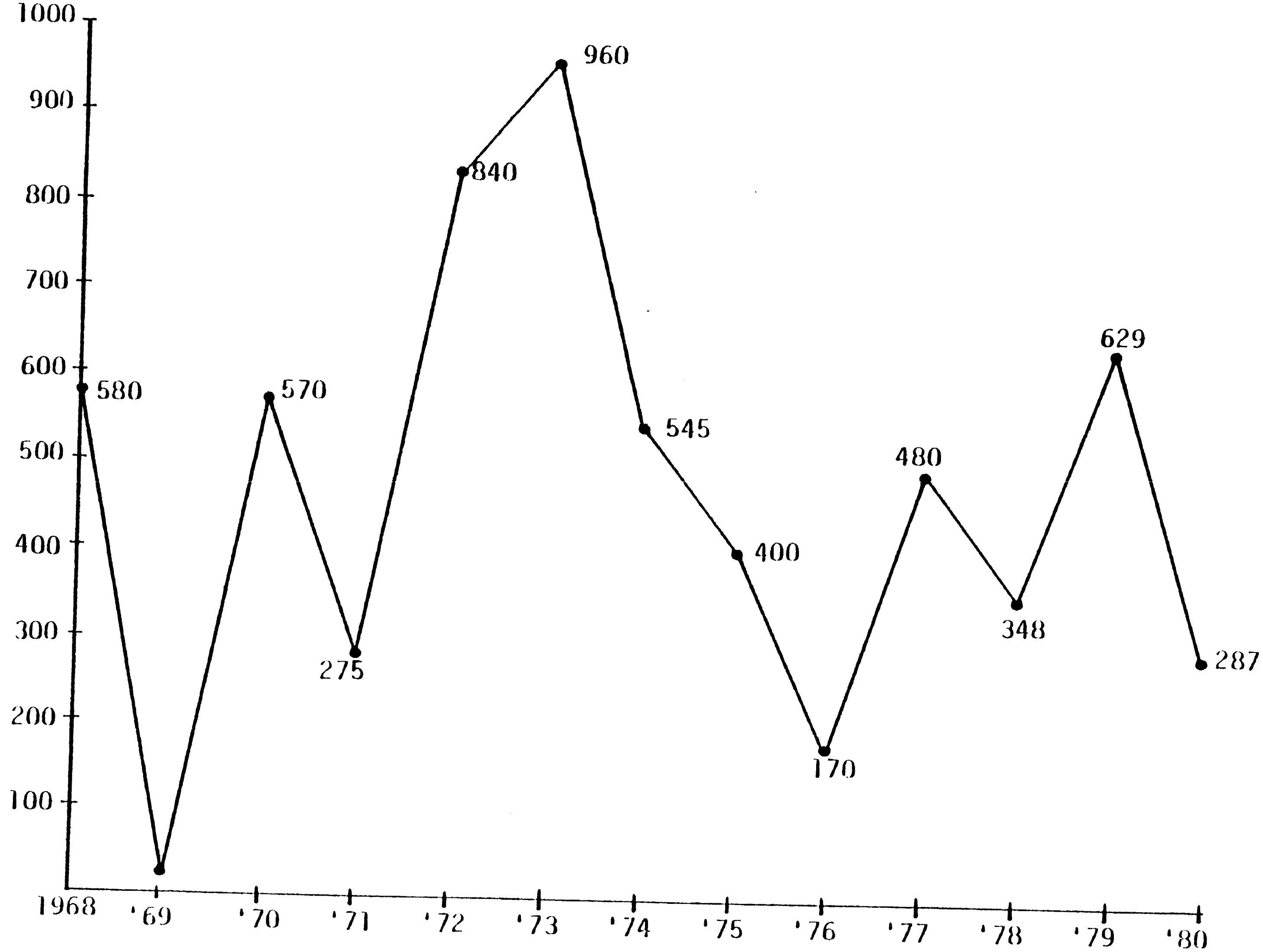

FIGURE 3. RAIL PASSENGER VEHICLES: NORTH AMERICAN MARKET--
COMBINED PRESENT AND PROJECTED (1977-1995)

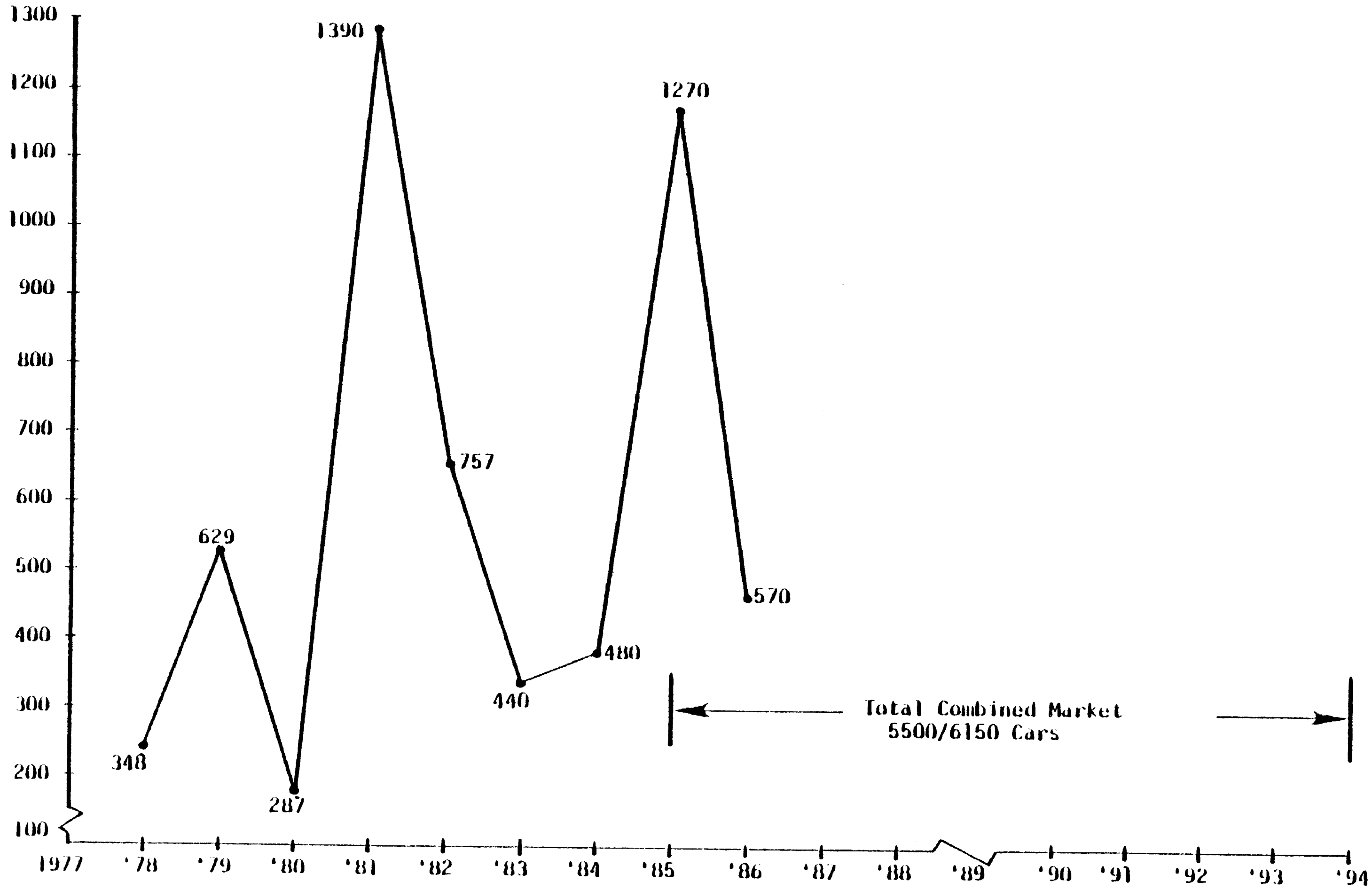

FIGURE 4. RAIL PASSENGER VEHICLES (ALL): NORTH AMERICAN MARKET--
PRESENT AND PROJECTED

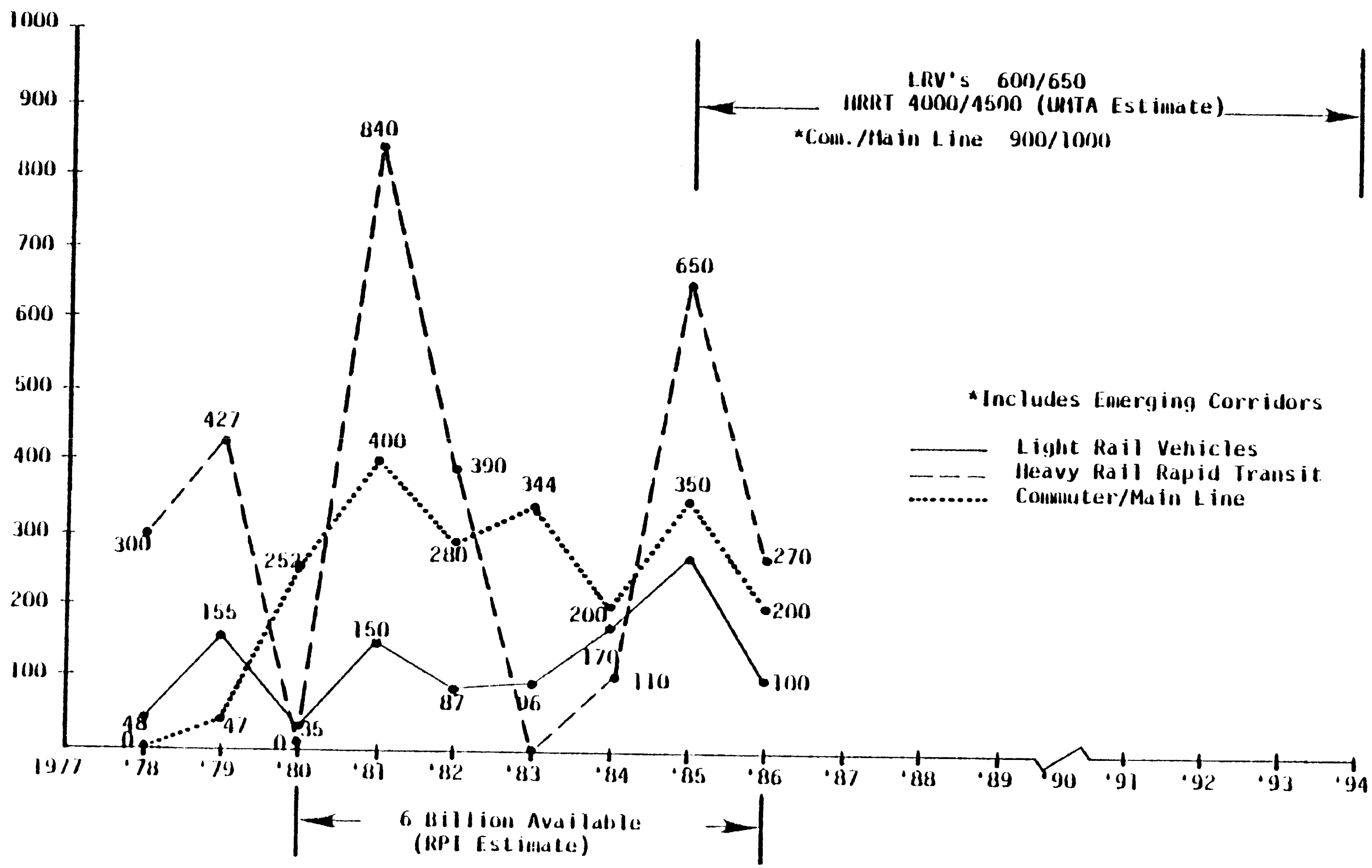

TABLE 6

Maximum Passenger Rail Vehicles Owned or Leased in the U.S. According to Alternative Futures[1]

Alternative Futures	1979[2]	1985	1990
Zero Growth in Oil Supply	10,481	10,575	10,659
Substantial Decrease in Oil Supply[3]	10,481	12,273	14,359
Severe Decrease in the Oil Supply[4]	10,481	14,841	18,038
Public Action in 1981 to Maximize Transit Ridership	10,481	--- 20,962	---

[1]The assumption used is that vehicles will increase at the same rate projected for transit ridership.

[2]APTA estimates.

[3]A 5.5 MBD reduction by 1990.

[4]An 8.13 MBD reduction by 1985 with no change between 1985 and 1990.

Using the production figures in Table 6, LRV's will account for about 28 percent of the rail vehicles produced by 1985. That percentage is assumed to represent the demand for LRV's between now and 1990. The results are summarized in Table 7.

With a substantial decrease in the supply of oil, LRV's owned or leased in the U.S. are projected by 1990 to reach a level of 2,044 vehicles--a figure more than twice as large as the 1979 estimates. The corresponding figure for heavy rail vehicles is 12,315, which represents about a 29 percent increase over the number of heavy rail vehicles owned or leased in the U.S. in 1979.

TABLE 7

The Maximum Potential Market for LRV's in the U.S.
According to Alternative Futures
(LRV's Owned or Leased)

Alternative Futures	1979	1985	1990
Zero Growth in Oil Supply	959	985	1,009
Substantial Decrease in the Oil Supply	959	1,460	2,044
Severe Decrease in the Oil Supply	959	2,179	3,073
Public Action in 1981 to Maximize Transit Ridership	959	--- 5,865 ---	

2. PART TWO: ECONOMIC DEVELOPMENT ANALYSIS

2.1 Literature Search

The literature search conducted for both parts of this study can be found in Section 1.1 and the Reference section.

2.2 Discussions with Industry and Government

This section details the discussions with government, industry, and other observers concerning the prospects and problems of light rail vehicle (LRV) manufacturing in the United States. Most of this section revolves around the nature of the market and the production technology. Concerning the former, procurement policies as exemplified by UMTA regulations, "Buy America" provisions, and local transit authority specifications dominate the examination. Discussions of production technology revealed little consensus among the manufacturers about possible conflicts with the needs of the market.

This section addresses the various issues involved, with the viewpoint of the observers summarized. The first section briefly describes the current situation in the passenger railcar market. This quite naturally leads to a discussion of the U.S. industry's competitive position and efforts by the Federal government to assist the domestic industry. All of this presents the environment in which any foreign car builder would have to operate. The last section examines the prospects of the foreign car builders as seen by domestic observers and the foreign car builders themselves. It also covers several other issues which may be of interest to potential car builders.

The Current Situation. There are no domestically-owned manufacturers of mass transit rail vehicles currently operating in the United States. Pullman-Standard is dismantling its rail passenger car building facilities. The Budd Company is primarily U.S.-managed and is manufacturing rail passenger vehicles (not LRV's), but it has been a wholly-owned subsidiary of Thyssen Aktiengesellschaft (Germany) since 1978. Boeing-Vertol (U.S.) has not produced an LRV since 1976. Two foreign-owned and managed firms are currently assembling mass transit rail vehicles in the U.S. Kawasaki (Japan) is assembling LRV's and rapid transit cars for Philadelphia. Franco-Belge (France)--which recently filed for bankruptcy--is assembling rapid transit cars for Atlanta. Another foreign firm, Breda (Italy), received the contracts for Cleveland LRV's and Washington, D.C. subway cars. Assembly plans for these contracts have not yet been finalized. A small order for LRV's for San Diego was won by the DuWag/Siemens consortium (Germany). Since this order was not funded by UMTA, the provisions of the "Buy America" Act (discussed in detail later) do not apply and assembly in the U.S. is not required. Bombardier (Canada) recently won a contract for commuter railcars from the State of New Jersey and announced that it will construct its first U.S. railcar assembly plant within the year (see Appendix III).[18] A number of foreign firms appear to have strong competitive positions in some imminent procurement decisions.

This situation naturally prompts several questions. Why is the U.S. presence in the rail mass transit market so negligible? What advantages do the foreign firms have in mass transit rail manufacturing? Why are foreign companies so interested and competitive in the U.S. market? What implications does this have for the industrial development of Southeast Michigan? The issues are quite involved but several factors seem to predominate the discussion and literature.

The Competitive Position of the U.S. Industry. In response to a request from the U.S. Senate's Subcommittee on Transportation and the Committee on Appropriations, the Comptroller General of the U.S. prepared a report.[19] This report attempted to assess, among other things, the reasons why U.S. Urban railcar manufacturers were not competitive. The report cited several reasons for the lack of domestic competition in the urban railcar market. Among the more important were the irregular timing of orders, the restrictive terms and conditions placed on the manufacturers by the transit authorities, and the small

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[18] "Canadian Company to Construct Its First Railcar Plant in the U.S.," American Metal Market (July 21, 1980).

[19] Comptroller General of the United States, General Accounting Office, "Problems Confronting U. S. Urban Railcar Manufacturers in the International Market," CED-79-66 (July 9, 1979).

size of most orders. Discussions with other parties also cited the complex technology involved, poorly written specifications, and poor communication between the transit authorities and the car builders as factors contributing to the demise of the domestic industry. The problem with most of these factors is that they do not explain the issue at hand--the relative decline of the domestic industry vis-a-vis the foreign competition. Irregular timing of orders, restrictive terms and conditions, complex technology, etc., affect all competitors for a given project--not just domestic builders. Although the Comptroller General's report and our discussions with industry and government did not explicitly arrive at the following conclusion, our efforts point to the small individual order size as being the key factor in the lack of domestic competitiveness. This conclusion deserves some justification.

Much of American industry is standardized and mass-production oriented. Many orders for LRV's and other urban passenger railcars are small and require customized production. This leads to a contradiction between the profitable capabilities of U.S. producers and the requirements of the market. One domestic producer indicated that it needed a 100-car order to be interested and a 300-car order to be truly profitable. From the North American market projections contained in Section 1.5 of this study, only 5 of 25 projected LRV orders to 1990 will be 100 or more cars. The average order size for LRV's using the highest estimated order to 1990 is 60 cars. The domestic situation contrasts sharply with the situation in other countries. Canada, a country with one-tenth the population of the U.S., has three passenger railcar manufacturers and a transit systems design, management, and development firm. Italy has at least two passenger car builders, while Belgium and Switzerland have three each, and Germany, France, and Japan have five or more. It is also interesting to note that since 1960, the average order size for 38 contracts of Swiss-built LRV's has been under twelve. One foreign firm indicated that it expects each order to be somewhat different in design. To the extent that these foreign firms are not capital-intensive, mass-production operations, we can conclude that capital-intensive, mass-production-oriented U.S. firms would be at a competitive disadvantage in the current LRV market situation.

There are, of course, some caveats involved. There is much we do not know about the foreign operations and about present and potential LRV manufacturing technology. There are indications that some of the foreign companies receive subsidies and some could be quite capital-intensive. It is also possible that unit labor costs are lower overseas, particularly for a low-volume operation. The possible importance of these factors is diminished, although not eliminated, by the "Buy America" provisions. This, in essence, requires a foreign builder to perform final assembly and source 51% of the components in the United States. This would substantially lessen any labor cost or government subsidy advantage a foreign firm may have. The only conclusion we can draw at this time is that U.S. firms appear to be uncompetitive and the nature of the LRV market is partially to blame.

Federal Efforts to Assist the U.S. Industry. Active Federal government efforts to assist the domestic industry have taken two forms. First, the Federal government, through the Urban Mass Transit Administration (UMTA), has attempted to make the market more attractive to domestic producers. Second, there are statutes which protect the U.S. market for domestic producers. Each of these will be examined in turn.

The Comptroller General's report[20] and discussions with UMTA have revealed several steps which UMTA has taken to assist potential domestic manufacturers. On the issue of order timing, there appears to be little UMTA can do. It encourages an orderly timing of bids, but UMTA has little control over the availability of local share funding and bid letting.

To counter the problem of poorly written or unreasonable transit authority specifications, UMTA is attempting to standardize terms and conditions. A decision-making board composed of UMTA officials and representatives of transit authorities has been formed. An account of actions taken to mid-1979 is contained on pages 15 to 18 of the Comptroller General's report.

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[20] Comptroller General of the United States, General Accounting Office, "Problems Confronting U. S. Urban Railcar Manufacturers in the International Market," CED 79-66 (July 9, 1979).

Several approaches have been taken on the issue of small order size. UMTA has encouraged joint authority purchases with some success. As indicated in Section 1.2, it is also trying to better define the specific criteria for vehicle and component performance.

None of the steps outlined above would hinder foreign competition. In fact, better order timing and specification are to the advantage of the foreign as well as the domestic manufacturer. Although larger order size may work to the advantage of domestic producers, this will not, per se, hinder the foreign competitors. UMTA is apparently trying to remake the market so that it conforms to the predominant American mass-production technology. It is not at all clear that this will be successful. The reluctance of domestic producers to enter the LRV market is based, in part, on their pessimistic assessment of the market. UMTA may be able to make the market marginally more attractive but there are considerable doubts on the part of the domestic manufacturers as to its ultimate viability.

The Federal government has several tools for protecting the domestic passenger railcar manufacturers. Probably the least effective is the U.S. tariff. Table 8 details the U.S. tariffs effective in mid-1980 after the first of five yearly cuts negotiated in the Tokyo Round of the General Agreements on Tariffs and Trade.

One industry source contended that very few rail vehicle importers paid the full 10.9% tariff for item 690.10, or the 18% tariff for item 690.15. Rather, the vehicles were imported in major subassemblies and the tariffs were 5.3% (for item 690.40) and 8.6% (for item 690.35), respectively. Therefore, the level of protection offered by tariffs is quite low. Additionally, tariffs will drop by almost 30% over the next four years as the Tokyo Round negotiations take effect.

The strongest protection is afforded the domestic producer by the "Buy America" provisions of the Surface Transportation Assistance Act of 1978. Current UMTA guidelines specify that final assembly must take place in the U.S. and that 51% of the value of the components must be of domestic origin. Waivers may be granted if one of the following four conditions is met:

TABLE 8

Relevant U. S. Tariffs

U.S. Tariff Schedule Number	Description	Tariff
690.05	Locomotives and Tenders	5.3% ad valorem
690.10	Self-propelled passenger or freight vehicles	10.9% ad valorem
690.15	Non-self-propelled rolling stock	18.0% ad valorem
690.25	Iron/steel axles parts	0.5% ad valorem
690.30	Iron/steel wheels parts	free
690.35	Parts: non-self-propelled rolling stock (item 690.15)	8.6% ad valorem
690.40	All other parts	5.3% ad valorem
682.45	Electric motors between 20 hp and 200 hp	4.4% ad valorem
692.50	Electric motors over 200 hp	5.8% ad valorem

(1) Application of "Buy America" would be inconsistent with public interest.

(2) Application would result in unreasonable cost after granting appropriate price adjustments to domestic products based on that portion of project cost likely to be returned to the U.S. and to the states in the form of tax revenue.

(3) Supplies are not available in the U.S. in sufficient and reasonably available quantities and of a satisfactory quality.

(4) Inclusion of domestic material will increase the cost of the overall project contract by more than 10%.

There are currently efforts underway in Washington to increase the local content requirement from 51% to 70%. In addition, supporters are seeking to raise the "bid price handicap" from 10% to 15% or 20%. Supporters feel the atmosphere in Congress is favorable and chances of passage are high.

The degree of protection offered by other countries to their domestic producers is probably higher than the protection offered by the U.S. The foreign manufacturers work extremely closely with their respective transit authorities, and the letting of the bid is often just a formality before full-scale production.

The Prospects for Foreign Car Builders. Our discussions with domestic and foreign sources revealed a striking lack of consensus about the prospects for foreign car builders in the U.S. market. Closer examination, however, indicated that the points of view expressed were largely a function of geography. Specifically, most domestic sources offered a pessimistic appraisal of LRV manufacturing while many foreign car builders expressed enthusiasm for the U.S. market.

The domestic perspective is shaped by past experiences and assessment of the future market. The disappointing experience with the Boeing-Vertol U.S. Standard Light Rail Vehicles seems to have sobered some government and industry officials. This is perhaps an overreaction to the days of unbridled optimism. In any case, the Boeing-Vertol experience has prompted UMTA to emphasize product reliability and quality. As a result, UMTA is now evaluating further procurements in terms of car builder experience. Any future procurement with Federal funds will have to be made from car builders with well-established and proven reputations.

Discussions with a major purchaser of rail passenger equipment indicate unhappiness with the present situation and a desire for more competition in the industry. There is a concern, however, about the number of competitors the market can sustain. Observers feel the market can support more competitors than it currently has, but there is no clear consensus on the optimal number of firms. The solution to this issue will depend, in part, on the technologies employed by various competitors.

In distinct contrast to prevailing domestic opinion, foreign producers see significant potential in the U.S. market. The U.S. market over the next ten years is considered to be very large in comparison with prospects in the home market. Many foreign home markets are now replacement-oriented whereas major new projects are planned for the U.S. This opinion is not universally held, however, since some firms find that terms of the "Buy America" provisions inhibit their profit potential. The number of firms with this view is quite small.

There are several other issues concerning potential foreign railcar builders which came up in the research and discussion. First, many foreign builders supply vehicles other than LRV's in their home market. It could be attractive for a foreign builder to do the same in the U.S., given the market and competitive situation. This would depend upon the capabilities and interests of each specific builder, so more concrete proposals are not possible at this stage.

Second, final assembly of passenger rail vehicles is a relatively low-value operation. Estimates of the value of final assembly to the total cost of the car range from 10% to 20%, depending on the type of vehicle. As a result, the industrial development potential of a final assembly plant is low. It is particularly low if the final assembly is just for one contract. As discussed in Section 2.3, final assembly of the SEMTA vehicles would keep about 100 workers busy for two to three years or would result in an average new annual employment for the 1980-85 time period of 60-75 new workers. Therefore, the industrial development efforts should ideally focus on developing a strong competitor committed to Michigan, producing a range of vehicles with a good Michigan supplier base. It is the long-term potential for Michigan as a passenger railcar supplier which is important.

Third, the potential for railcar repair, maintenance, and refurbishment ("rehab") should not be overlooked. A number of car builders already do this, and as rail passenger transportation is used more, the need for repair services will increase. "Rehab" of transit rolling stock in general (buses as well as rail passenger cars and LRV's) is becoming an increasingly attractive option for transit authorities and rail operators in view of the rapid increases in the prices of new equipment over the past six to seven years. Transit buses have tripled to $150,000 in that time period, while rail passenger vehicles have doubled to $80,000-$900,000. Bus "rehab" for $10,000-$20,000 per vehicle can extend its useful life of 10-12 years by an additional 3-5 years. A $10,000 "rehab" of a rail passenger vehicle can be worth as much as 15-20 years additional service for a 25-30 year-old vehicle. With growth in the rolling stock fleet, and with only 1-2 rail "rehab" sources and no bus "rehab" sources in Michigan, the potential of the "rehab" business is worth investigating. At a minimum, for a Michigan-based car assembler, this business can help to smooth the employment and cash-flow cycles.

Finally, the State of Michigan, the state's larger transportation authorities, and essential service agencies are consumers of large quantities of small- and medium-sized buses--primarily converted vans. At present, there is only one announced manufacturer of van conversions in Michigan. The drive-lines of the vans are designed for truck duty cycles and exhibit reduced durability in transit service, with typically 125,000 mile or three-year lives. Small- and medium-sized buses, designed specifically for transit service, could have greater lives and durability. Such a product could provide additional diversification for a Michigan manufacturer.

Besides the industrial development activities described under Tasks 2.3 and/or 2.4 of this report, research and discussion indicated two further services which Michigan authorities may provide. First, establishment of a foreign trade zone may prove useful to a foreign builder. There are currently two proposals for foreign trade zones in the Detroit area and two existing zones in the state. This would probably not be used for final assembly of vehicles for the U.S. market since U.S. tariffs are higher on assembled vehicles than parts, but it could be used to assemble vehicles for export. The foreign trade zone could also be desirable if the foreign car builder has machinery used in production that has a high tariff. The machinery can be placed tariff-free in the trade zone where domestic materials enter, are processed, and then shipped without tariffs. Second, Michigan authorities may be able to help a firm export its U.S.-made products with financing from the U.S. Export-Import Bank. This may be particularly important for a foreign firm operating in the U.S. that is unfamiliar with government services.

2.3 Industry Requirements and Locational Resources Analysis

Light rail vehicle assembly in Michigan can contribute in a small way to an economy sorely depressed by the slump in the auto industry. It can create jobs and it can provide additional tax revenues for state and local governments. The purpose of this section is to assess just how substantial this contribution would be.

Job Impact. In order to provide some range of possible employment effects, three different scenarios were adopted (see Table 9). The first focused on the job impact of the initial 87-car LRV SEMTA order, exclusively. This was considered to be the minimal program that could be guaranteed, and, as can be seen from Table 9, the number of direct jobs is fairly small, on the average, for the 1981-1984 period, only 62.1. It should also be remembered that the time pattern of the jobs would create problems. During the first three years about 100 jobs would be created, but in 1984 all of those employed would be laid off as the contract expires, creating unemployment dislocations and costs.

The number of indirect jobs was slightly larger, on the average, over the five-year period-- 75.2. Indirect jobs are the result of two economic phenomena. First, jobs are created when orders are placed with suppliers of parts and materials. Secondly, when both direct employees and indirect employees spend their wages, other jobs are created. Both of these are contingent on the economy's ability to increase its activity in response to this additional demand, a situation which Michigan with its current slump could easily do.

More, however, should be said about the supplier aspect of the indirect jobs created. If orders for parts and materials are placed with Michigan firms, the full impact would be felt in Michigan. If, on the other hand, supplies were ordered from outside Michigan, and even outside the U.S., many fewer jobs would be created. The number of indirect jobs should therefore be viewed as the maximum possible. Michigan certainly has a number of both current and potential suppliers

TABLE 9

Potential New Job Creation for Michigan Light Rail Assembly Facility

Scenario	2-4 Total New Employees Years 1971-1985			Average New Annual Employment Rate 1981-1985		
	Direct[1]	Indirect	Total[2]	Direct	Indirect	Total
87-Car SEMTA Order (1981-1983)	310.7	387.0	686.7	62.1	75.2	137.3
87-Car SEMTA Order (1981-1983) and Railcar Refurbishment[3] (1984-1985)	725.1	877.2	1602.3	145.0	175.4	320.4
Total U.S. LRV Market[4]	2760.8	3340.8	6101.4	552.3	668.0	1220.3

[1]Direct employment estimates are based upon:
(a) 10% labor content in cost of vehicle for final assembly.
(b) Average wage of $61,638 per year with a total compensation package of $21,000 per year in 1980 dollars.

[2]Total employment estimates are based uupon Michigan Department of Commerce, Office of Economic Development type II employment multipliers for other transportation.

[3]Refurbishment employment estimates are based upon estimates by Raul Bravo, consultant, that it takes up to twice as many employees to refurbish a rail vehicle as it does to assemble it. The reason for this is that the vehicle must be partly disassembled then reassembled. Also refurbishment involves a variety of vehicles and not just one type.

[4]Total U.S. LRV sales based upon Section 1.5 market forecasts.

for light rail vehicle assembly, as can be seen in Table 10. American Seating, for example, is currently the primary domestic supplier for cantilevered seats to the passenger rail vehicle market. However, electrical propulsion equipment, which accounts for a much larger proportion of vehicle cost, is currently purchased elsewhere. Michigan does have the capability of providing diesel propulsion through GM, Detroit Diesel Allison, which could be relevant for future options for diversification of a rail assembly plant.

The diversity and capabilities of the Michigan industrial base should be apparent from the potential list of suppliers in Table 10. Given an ongoing commitment to local assembly of rail vehicles on a substantial scale, it is probable that supply needs could be met locally.

The second scenario in Table 9 involves converting the assembly facility after the initial SEMTA contract to a railcar refurbishment operation of similar capacity. The substantial increase derives from two sources. First of all, the facility would not have to be abandoned at the end of three years. Secondly, refurbishment is approximately twice as labor-intensive, since the cars must be partly disassembled and then reassembled.

The final scenario in Table 9 is a hypothetical example which shows the job-generating potential of large-scale production. The assumption is that the Michigan facility would assemble over 700 LRV's in the five-year period, 1980-85. In this scenario the number of jobs created is quite substantial, involving a total of 552 new direct jobs and 668 indirect jobs. It is felt that the indirect job effects for this scenario are more realistic than for the first, since the scale involved would be an incentive for potential suppliers to come forth. With the first scenario, it is more likely that parts and materials would be sourced to traditional suppliers.

If a foreign prime contractor subcontracts to a local car assembler, and permits the assembler the latitude to locate its own suppliers, then many of these perhaps could be found locally. With regard to the quality of the employment, the optimum situation would be an entire package put together domestically, creating not only assembly

TABLE 10

Selected Potential Michigan Rail Manufacturing Suppliers

Manufacturer and Location	Product
ABEX Friction Products Div. Troy	Brake supplies
Aeroquip Corp. Jackson	Industrial hoses and rubber goods, hydraulic cylinders
American Seating Co. Grand Rapids	Cantilevered seats
Bendix Corp. Southfield	Electronics, compressors, brake supplies
The Budd Co. Troy	Metal fabrication
Douglas and Lomanson Co. Farmington Hills	Metal fabrication
Dura Corp. Southfield	Metal fabrication, electro-hydraulic and electro-mechanical actuators
Ex-Cell-O Corp. Troy	Machine tools, precision parts and assemblies
Flexfab, Inc. Hastings	Hose, airducting
Formsprag Co. Warren	Hydraulic couplings, aerospace components
Fruehauf Corp. Detroit	Metal fabrication, aerospace components
GM Transportation System Center Warren	Automatic vehicle guidance and control systems
Guardian Industries Corp. Northville	Glass products
Hegenscheidt Corp. Troy	Automated railroad wheel and axle shop
Ready Power Co. Detroit	Electrical equipment

TABLE 10--Continued

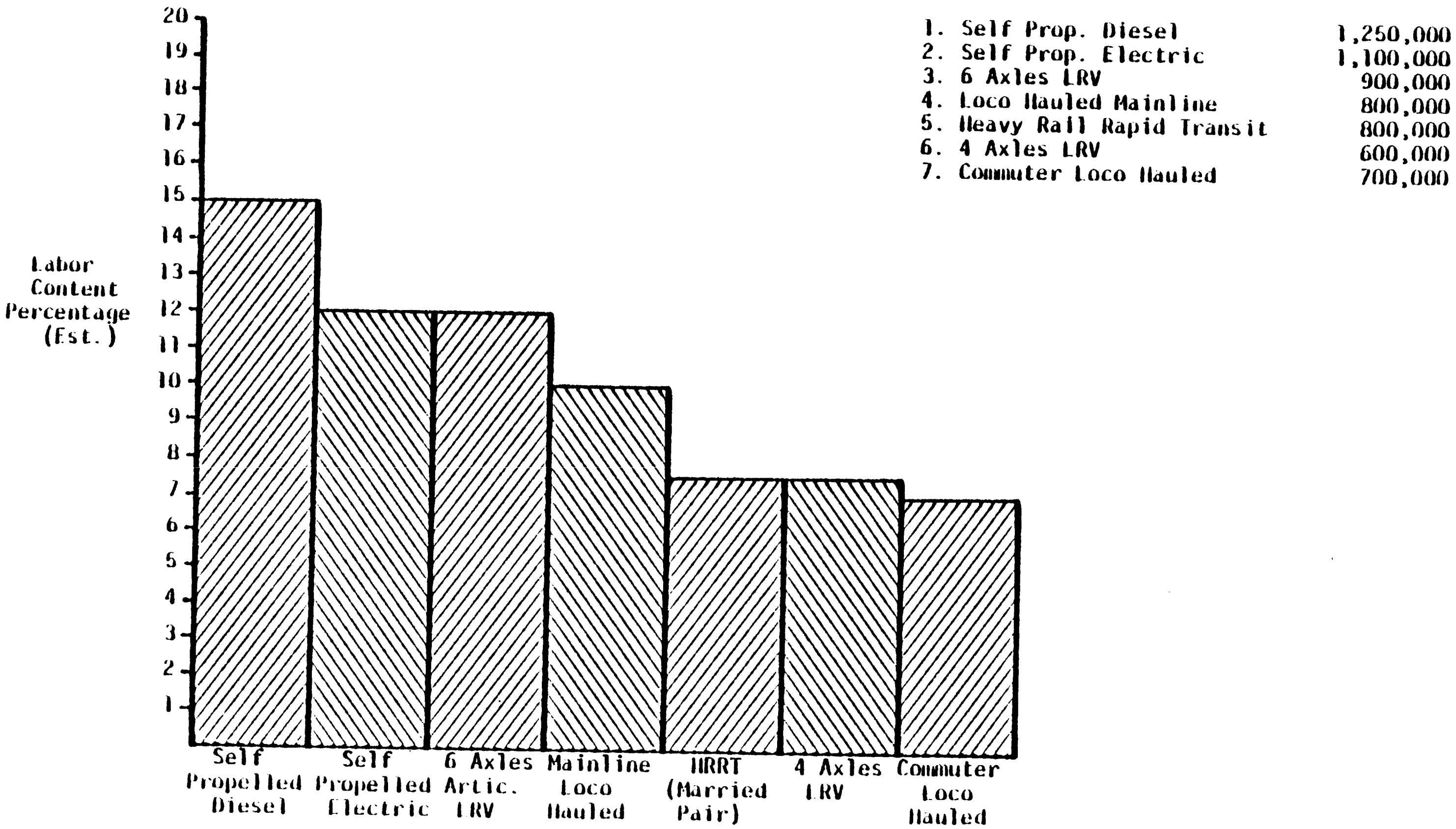
Manufacturer and Location	Product
Shatterproof Glass Corp. Detroit	Safety glass
Universal Electric Co. Owosso	Precision fractional hp electric motors
Jervis B. Webb Co. Farmington Hills	Forgings, electrical enclosures, castings, automatic equipment control
Whitehead and Kales Co. River Rouge	Railroad cars, structural steel fabrication

jobs, but also skilled technical jobs. However, for the size of orders under consideration, a fully integrated operation seems far beyond any realistic goals that could be achieved.

For future diversification potential, a number of possibilities exist, each with its own particular job impacts; but some fairly strong caveats are in order. Figures 5 and 6 illustrate the labor content for different types of rail vehicles and the variation of labor content with vehicle complexity. Self-propelled diesels would appear to be the most attractive as a possible diversification effort since they are both complex, with an index rating of 90 (second only to articulated LRV's), and have the highest labor content at 15% of vehicle value. However, it should be remembered that while all railcar assembly is related, some manufacturing approaches involve a higher degree of standardization and a mass-production orientation which may not be adaptable to the job-shop made-to-specification type of assembly facility envisioned for the SEMTA vehicles.

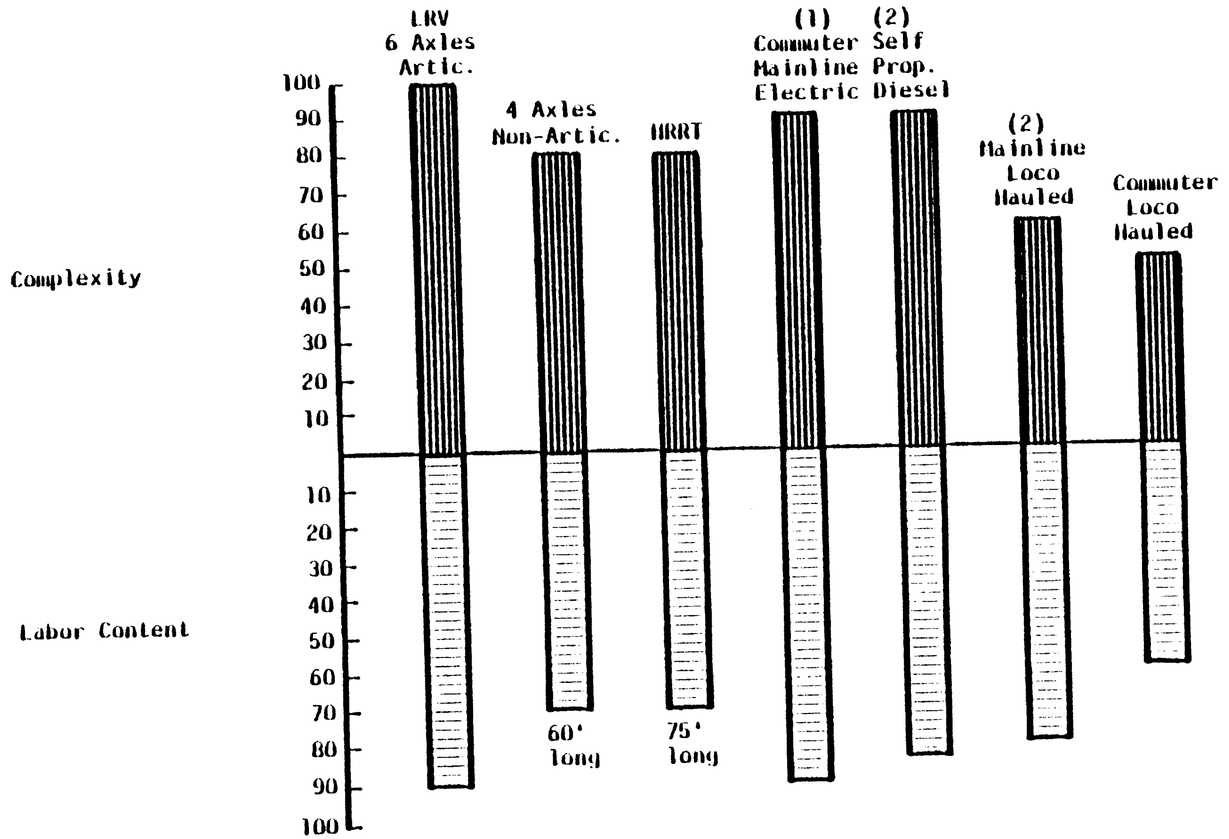
In sum, the proposed facility can be viewed as a very small contribution to the overall employment picture unless some related ongoing activities can be developed. These include heavy and light maintenance, refurbishing, and/or the manufacture of other rail vehicles and small- and medium-sized buses.

FIGURE 5. LABOR CONTENT AS A PERCENTAGE TOTAL VEHICLE COST--PASSENGER RAIL VEHICLES



Source: Estimates based on discussions with rail passenger vehicle manufacturers (R. Bravo)

FIGURE 6. COMPARATIVE MANUFACTURING COMPLEXITY AND LABOR CONTENT--PASSENGER RAIL VEHICLES



(1) Toilets - Water & Sewage Systems
(2) Toilets & Food Equipment - Water & Sewage Systems

Source: Estimates based on discussions with rail passenger vehicle manufacturers (R. Bravo)

Supplier Impact. Another way of determining the economic impact of a proposed industry is to assess the value of inputs into the manufacturing process and compare it to the potential supplier base. Table 11 contains a direct requirements comparison for motor vehicles and rail equipment including both passenger and freight. The comparison serves to highlight whether an economy based on motor vehicles, such as Michigan's, could absorb a diversification effort into rail vehicles without undue stress on its supplier network. It must also be remembered that with motor vehicles going through a period of transition with downsizing and materials substitution taking place at a rapid rate, that some of this supplier capacity will be freed for other markets.

It is fairly clear that the diminished demand for basic iron and steel products in automotive could be easily absorbed by railcars with this much larger value content of iron and steel. Rail vehicles have 29.2 percent basic iron and steel value in their final product, while motor vehicles have 7.9 percent and this latter value is falling. Care must be taken in using this figure, though, due to the preponderance of freight cars with their non-passenger oriented construction. Light rail passenger vehicles are not passive vehicles so that propulsion, electrical, and electronic components comprise a much larger component of costs than basic iron and steel. In addition, passenger-related items are more important, such as seating and air conditioning. Estimates in the range of 30 percent for propulsion, 10 percent for passenger-related, and 10-15 percent for electronics and electrical equipment are not uncommon in the industry.

Rail industry requirements for general industrial equipment would also not present a problem with Michigan's large capital goods sector. Problems might exist with aluminum, especially with its increasing use in automobiles. Rail vehicles are already using 2.7 percent aluminum content in the value of their finished product. Inputs from other rail equipment manufacturing, while not being available currently in Michigan, are located not far distant in the rail centers of Chicago and Western Pennsylvania.

In summary, few supplier bottlenecks seem to exist for a diversification into rail equipment manufacturing. If anything, it

TABLE 11

Inputs Into the Manufacture of Heavy and Light Rail Passenger and Freight Cars, and Motor Vehicles: A Comparison[1]

Major Input Categories	Inputs as a % of Final Sales ($) Motor Vehicles[2]	Rail and Street Cars[2]
MANUFACTURING		
Textiles		
Fabricated Textile Products	1.4%	
Rubber & Miscellaneous Plastics		
Tires and Inner Tubes	1.0%	
Reclaimed Rubber and Miscellaneous Rubber Products		1.5%
Primary Iron and Steel		
Blast Furnaces and Basic Steel	3.2%	17.5%
Iron and Steel Foundries	2.5%	10.1%
Iron and Steel Forgings	1.2%	1.6%
Primary Nonferrous Metals		
Primary Aluminum		1.6%
Aluminum Rolling and Drawing		1.1%
Screw Machine Products and Metal Stampings		
Metal Stampings	5.1%	
Other Fabricated Metal Products		
Hardware	1.6%	
Metalworking Machinery and Equipment		
Special Dies and Tools		1.3%
General Industrial Equipment		
Ball and Roller Bearings		2.8%
Blowers and Fans		1.0%
Power Transmission Equipment		1.2%
Machine Shop Products	1.0%	

TABLE 11--Continued

Major Input Categories	Inputs as a % of Final Sales ($): Motor Vehicles[2]	Inputs as a % of Final Sales ($): Rail and Street Cars[2]
Service Industry Machines		
Refrigeration Machinery	1.0%	
Miscellaneous Electrical Machinery		
Engine Electrical Equipment	1.1%	
Motor Vehicles and Parts	28.0%	
Other Transportation Equipment		
Shipbuilding and Repairing		2.3%
Railroad and Street Cars		10.4%
SERVICES		
Transportation, Communication, and Utilities		
Railroads	0.8%	0.8%
Motor Freight and Warehousing	0.7%	0.9%
Wholesale Trade	1.9%	2.5%
Real Estate		1.2%
Miscellaneous Business Services		
Research and Development		
Consulting		0.7%
Advertising	0.6%	
Transferred Imports	1.3%	
Scrap	0.5%	
Total Major Inputs	52.9%	58.5%
Value Added in Manufacturing	30.5%	27.7%

[1]Direct requirements as a percent of final sales come from the 1967 detailed Input-Output Matrix of the U.S. Economy, Department of Commerce, U.S. Bureau of the Census.

[2]Motor Vehicles is SIC Code 3711. Rail and Street Cars is SIC Code 3743; includes freight as well as passenger.

appears that increasing rail equipment production could absorb surplus capacity made available by changes in the automotive sector.

Tax Implications. Tax benefits from new jobs can provide local and state governments with additional revenues, but are not without cost when subsidies are involved to attract businesses. This section assesses such impacts as potential benefits and costs a light rail assembly facility would have on state and local governments.

Table 12 illustrates the tax impact that a light rail vehicle assembler, capable of assembling the entire U.S. LRV market of new cars between 1980 and 1985, would have on state and local finance. Admittedly this is an optimistic estimate and would have to be reduced considerably if orders for the facility were restricted to the 87-car SEMTA contract. A reduction of about 80% would have to be applied for the smaller scale operation. As can be readily seen, the tax benefits far outweigh the costs even at the local level. The state would receive additional revenues of $1,2300,691 at a cost of $66,712 in lost property tax, for a net gain of $1,163,979.

Additional considerations such as business taxes and service revenues also favor locating the facility in Michigan. Sample tax calculations which include provisions for tax abatement to attract a light rail assembler indicates that business taxes would contribute an additional $274,000 by 1985. For the local government, if the facility required no large additional capital outlays, such as would be the case for an existing facility, the costs of services borne by the firm are disproportionately higher than those borne by residential users. The implication, then, is that a new assembly plant would help subsidize services provided by the local government.

2.4 Locational Advantages Analysis

Logistics Advantages. On the basis of preliminary discussions with representative LRV producers, certain priorities in selecting a location for a U.S. assembly facility were ascertained.

In as much as there are three major Canadian producers or designers of LRV vehicles, Michigan's proximity to and accessibility from Canada

TABLE 12[1]

State and Local Tax Benefits Accruing to Assembling Light Rail Vehicles in Michigan for Total U.S. Market[2] (Annual)

Net Employment-Related Tax Benefits[3]		Net Business Tax Benefits	
Total Income[4]	$20,951,000		
Individual Income Tax	404,573	Property Taxes[5]	$ 66,246
Sales Tax	283,892	Single Business Tax[6]	207,423
Other Consumption Taxes	209,305	Sales Tax	373
Local Property Tax	1,054,489		
City Income	176,202	Total Net Business Taxes	$ 274,042
Total Net Employment-Related Tax	$2,128,461	TOTAL NET TAX	$2,402,503

[1]Assumes a facility costing $5 million, which was mentioned in American Metal Market, July 21, 1980 as the proposed cost of a facility contemplated by Bombardier, Inc. for the U.S. Also assumes a 12-year 50% reduction in property taxes as envisioned by the PA 198. Finally, assumes an average property tax of $53.37/$1000 assessed value, as reported in "Michigan's Advantages for Transportation Equipment Manufacturing," Office of Economic Development, Michigan Department of Commerce.

[2]Estimated in Section 1.5 for 1980-85.

[3]Tax and income multipliers provided by Michigan Department of Commerce, Office of Economic Development.

[4]Income based upon hourly wage rate of $8.32/hr.

[5]Includes tax abatement from P.A. 198.

[6]By 1985.

must be ranked as a significant advantage over other possible U.S. locations.

All three Canadian companies--Bombardier, UTDC, and Hawker Siddeley--are actively interested in penetrating the U.S. market. As the "Buy America" Act becomes strengthened and enforced, any foreign company wishing to supply LRV's to U.S. properties would need to consider locating an assembly operation in the U.S.

A logical and attractive location for penetrating the U.S. market would be one which offered proximity and accessibility to present locations in Canada, facilitating the movement of parts and subsystems. In this light, Michigan offers significant advantages. With its peninsula location along the St. Lawrence Seaway, the state offers the Canadian concerns low-cost shipping access from their present locations.

Michigan has five international seaports: Detroit, Port Huron, Bay City-Saginaw, Sault Ste. Marie, and Muskegon. In addition, there are other ports which could offer access to and from the State. An example would be the Port of Monroe, where recent dredging operations have increased the potential utilization of the port.

Access to seaway ports, coupled with the advantages of a foreign trade zone, could offer a company the opportunity to supply LRV's to foreign countries, particularly in Central and South America, without additional duties.

In addition, rail and highway linkage between Canada and the U.S. is extensive and widely used. The Ontario highway system provides immediate access to Michigan. Trucks and cars move between Ontario and Michigan over bridges at Detroit, Port Huron, and Sault Ste. Marie, and through a tunnel, at Detroit. By car ferry, tunnel, or bridge, railway freight has access to international transfer points at Detroit, Port Huron, and Sault Ste. Marie. Detroit's Metropolitan Airport is one of the major air terminals in the nation. Besides Detroit, twenty other points, including seven in the Upper Peninsula, have scheduled flight service. Detroit, Grand Rapids, and Sault Ste. Marie are all serviced by international airports.

Plant Requirements Survey. The results of a survey of plant requirements are presented in Table 13 and Table 14. The results covered a fairly wide range of facility sizes and types, from a small scale light rail vehicle assembly of 100-200 employees to a large scale heavy rail vehicle operation employing 1,800 and capable of producing 500 vehicles per year. Regarding the plant site, availability of rail access and truck were considered important. Electricity was also important since assembly requires joining techniques using welders. Gas was required primarily for heating. Water requirements, other than standard portable municipal water, included 60 psi industrial grade.

The facility itself is described in Table 13. The size of the facility varied from a 78,000 sq. ft., one story, 400 ft. by 180 ft. one for small scale light rail, up to a 1,700,000 sq. ft. also one story, facility for heavy rail. The height was standard at about 30 ft. or 25 ft. under crane. Load limit requirements on floor indicated that unlimited loading was necessary. Office space ranged from 6,000 sq. ft. for the smallest facility up to 340,000 sq. ft. for the largest. Bay size requirements were from 50 ft. by 1800 ft. to 134 ft. by 1800 ft. for the largest facility. Special requirements included overhead cranes, high intensity lighting, and compressed air lines.

Wage Costs and Labor Availability for Rail Related Occupations. In addition to suitable plant sites, the availability and cost of the skill grades of technical and production workers most relevant to rail vehicle manufacturing must be determined to assess the feasibility of rail production in Michigan. Wage surveys are available for various SMSA's through the Bureau of Labor Statistics and will be used to compare relative wage rates in areas around Michigan and outside. In addition, the Michigan Employment and Security Commission keeps up to date records of labor availability by skill type and these will also be discussed.

Table 15 presents wage comparisons for professional and technical skills in the areas of computer operators, drafters, and electronics technicians. The most meaningful comparisons are those between cities of similar nature such as large industrial cities compared to other large industrial cities, cities dominated by university or government functions with other comparable ones. Detroit, then, should be compared with Gary, Buffalo, and Philadelphia; Ann Arbor with Columbus. Minneapolis and Indianapolis are comparable with each other being large cities without a heavy industrial base, but do not have a parallel in Michigan except possibly Battle Creek which is, however, a much smaller city. Saginaw stands pretty much alone since it is a small industrial city, and the Upper Peninsula has no meaningful counterpart. It should

TABLE 13

Plant Requirements Survey: Plant Layout

Plant Requirements	Light Rail Vehicles		Heavy Rail Vehicles
	100-200 Emp.	600-800 Emp.	1800 Emp.
Floor Space (Sq. Ft.)	78,000	236,000	1,700,000
Manufacturing	90%	90%	80%
Number of Stories	One	One	One
Height of Stories	25 Ft. under Crane (Both)		30 Ft.
Type of Construction	Concrete Slab (8 in. x 10 in.)		Concrete and Concrete Block
Floor Load Capacity	Unlimited	Unlimited	Unlimited
Bay Size	---	---	6 @ 50 Ft. x 1800 Ft. 2 @ 134 Ft. x 1800 Ft.
Loading Dock	---	---	Five Minimum
Special Requirements	---	---	(1) Overhead Cranes 50 T Capacity (2-25% Hooks) 3-4 Minimum (2) Overhead High Intensity Lighting (3) Compressed Air Lines Throughout

TABLE 14

Plant Requirements Survey: Plant Site

Plant Requirements	Light Rail Vehicles		Heavy Rail Vehicles
	100-200 Emp.	600-800 Emp.	1800 Emp.
Plant Site Acreage	---	---	130 Acres
Rail Sidings	---	---	4
Trucking Volume	---	---	30/Day
How Rail Vehicles are Shipped	---	---	Truck and Rail Flat Car
Water Requirements	8 inch for Sprinklers 6 inch for Water Tests (Both)		Manufacturing: 60 Lb. Domestic: 25 Lb.
Sewer Requirements	For Heating	For Heating	300,000 Cu. Ft./Mo. Interruptable SVC.
Electric Power			
(a) Type of Service	440/480 VAC	600 VAC	In at 66,000 VAC Reduced to 13,200 then to 440 VAC
(b) Welding/Electric Furnaces	---	---	Yes
(c) Demand	---	---	6,000 KVA Demand 2,000,000 KWH/Mo.

also be pointed out that Michigan's wage structure is by no means homogeneous. Many sites exist in Michigan that have very attractive labor pools that are not high wage areas. Considerable wage differentials do exist.

1. Professional and Technical. With this in mind, Michigan's competitiveness can be assessed. Detroit is certainly competitive with respect to computer operators being significantly lower than Buffalo, lower than Gary, with only Philadelphia offering lower wages. Ann Arbor, Battle Creek, and the Upper Peninsula are only slightly higher than Columbus, Indianapolis, and Minneapolis. For drafters, Detroit has the highest wage, but it is not much different than Buffalo. Philadelphia is the only city that is substantially lower by almost $3.00 per hour. Drafting wages in Ann Arbor, Battle Creek, and Saginaw are slightly lower than Minneapolis and Indianapolis with Columbus and the Upper Peninsula at the bottom. Battle Creek has the highest rate in its city grouping with Minneapolis, Indianapolis, and Columbus in the middle and Ann Arbor with the lowest.

The conclusion that can be drawn is that in the professional technical area, Michigan is competitive neither being a consistently high-wage area nor a consistently lower-wage area.

1. Skilled Trades. In a skilled trades, the picture for Michigan is much the same (see Table 16). For the category of maintenance mechanic, Gary is highest with Detroit close behind, Philadelphia in the middle, and Buffalo significantly lower. Ann Arbor has the highest rate in this category within its city grouping, followed by Indianapolis, Battle Creek, and Minneapolis, Columbus, and the Upper Peninsula with the lowest. Tool and die makers receive higher wages in Detroit followed by Philadelphia in the middle with Buffalo significantly lower. In the smaller or non-heavy industry cities, Ann Arbor is highest followed closely by Columbus and Indianapolis, with Minneapolis and Battle Creek having the lowest. The differential in this category is not as high as in others. For material handlers, the only unskilled category treated, Detroit is still on top but Buffalo and Philadelphia have changed places with Philadelphia now having the lowest. In the other city groupings, Battle Creek, Minneapolis, and Saginaw are on top

TABLE 15

Wage Comparisons: Professional and Technical

Area	Date	Computer Operators	Drafters	Electronics Technicians
Michigan				
Ann Arbor	10/78	$5.69[1] ($6.27)	$7.09 ($7.82)	$6.62 ($7.30)
Battle Creek	06/78	$5.80 ($6.56)	$6.67 ($7.55)	$8.74 ($9.89)
Detroit	03/79	$7.62 ($8.14)	$9.71 ($10.37)	$9.70 ($10.36)
Saginaw	11/78	$7.83 ($8.58)	$6.69 ($7.33)	---
Upper Peninsula	06/78	$6.11 ($6.92)	$5.67 ($6.42)	---
Other				
Columbus, Ohio	10/79	$6.20 ($6.34)	$6.43 ($6.57)	$8.27 ($8.46)
Gary, Hammond, & E. Chicago, Indiana	10/79	$8.26 ($8.44)	$9.48 ($9.69)	$10.76 ($11.01)
Indianapolis, Indiana	10/79	$6.15 ($6.29)	$8.00 ($8.18)	$8.20 ($8.39)
Minneapolis-St. Paul, Mn.	01/79	$6.02 ($6.02)	$7.49 ($7.49)	$8.02 ($8.02)
Buffalo, N. Y.	10/79	$10.40 ($10.64)	$10.05 ($10.28)	$8.17 ($8.35)
Philadelphia, Pennsylvania	11/79	$6.27 ($6.35)	$7.37 ($7.46)	$7.86 ($7.96)

[1]Figures in parenthesis are all standardized to January 1980, using the overall U.S. average hourly increase in wage rates index, series 340, Business Conditions Digest.

[2]Sources for the data are Bureau of Labor Statistics, Area Wage Surveys.

and quite close, while Columbus is in the middle, with Ann Arbor and the Upper Peninsula significantly lower.

The conclusion is that while Detroit does reflect highest wages in this category, the state of Michigan certainly does not, especially in the lower skills category.

3. Summary. In conclusion, it can be stated that the State of Michigan is certainly competitive with other areas in terms of wage cost, with no clear indication that it could be unequivocally viewed as a high wage area. Significant differentials exist within the state by area. It should also be pointed out that there is a tendency for wage surveys to be biased upwards due to the inclusion of the high wage automotive sector in the statistics. Considerable differences exist between what the automotive companies pay and what labor of comparable quality is going for on the open job market.

Labor Availability for Selected Rail-Related Occupations in Michigan. Table 17 contains information on the available labor pool for a variety of railcar manufacturing trades. It is quite obvious that Michigan has a considerable pool of talent that could be made available to any prospective rail vehicle company. Many of these skilled and professional employees have been made available through structural changes that are going on in the automotive industry. Welders, for example, are one of the first trades targeted for automation through robotics. Metal trades are being freed up as a result of materials substitution toward light weight materials. The proposed light rail facility only requires about 100 employees, many of whom are assemblers requiring lower-levels of skills. Such a facility could easily be absorbed into any of the labor markets surveyed without taxing unduly the available pool of labor.

Tax Advantages. In recent years several studies comparing business tax burdens among the twenty to thirty most industrialized states have concluded that Michigan business tax liabilities are lowest. Figure 7 compares tax and other incentives offered by states.

The favorable tax climate, together with its natural attractiveness to business, may hold an additional attractiveness for the producers of

TABLE 16

Wage Comparisons: Selected Skilled Trades and Material Handlers

Area	Date	Maintenance Mechanics	Tool and Die Makers	Material Handlers
Michigan				
Ann Arbor	10/78	$9.71[1] ($10.70)	$9.83 ($10.84)	$5.68 ($6.26)
Battle Creek	06/78	$8.05 ($9.11)	$8.39 ($9.49)	$7.77 ($8.76)
Detroit	03/79	$9.95 ($10.62)	$10.23 ($10.93)	$8.02 ($8.56)
Saginaw	11/78	---	---	$7.61 ($8.34)
Upper Peninsula	06/78	$7.15 ($8.09)	---	$5.24 ($5.93)
Other				
Columbus, Ohio	10/79	$8.26 ($8.44)	$10.03 ($10.26)	$7.41 ($7.58)
Gary, Hammond, & E. Chicago, Indiana	10/79	$10.73 ($10.97)	$8.81 ($9.01)	$6.27 ($6.41)
Indianapolis, Indiana	10/79	$9.78 ($10.00)	$10.09 ($10.32)	$7.24 ($7.40)
Minneapolis-St. Paul, Mn.	01/80	$8.82 ($8.82)	$9.76 ($9.76)	$8.68 ($8.68)
Buffalo, N. Y.	10/79	$6.55 ($6.70)	$7.49 ($7.66)	$7.11 ($7.27)
Philadelphia, Pennsylvania	11/79	$8.42 ($8.52)	$9.06 ($9.17)	$6.61 ($6.69)

[1]Figures in parenthesis are all standardized to January 1980, using the overall U.S. average hourly increase in wages index, Series 340, Business Conditions Digest.

[2]Sources for the data are Bureau of Labor Statistics, Area Wage Surveys.

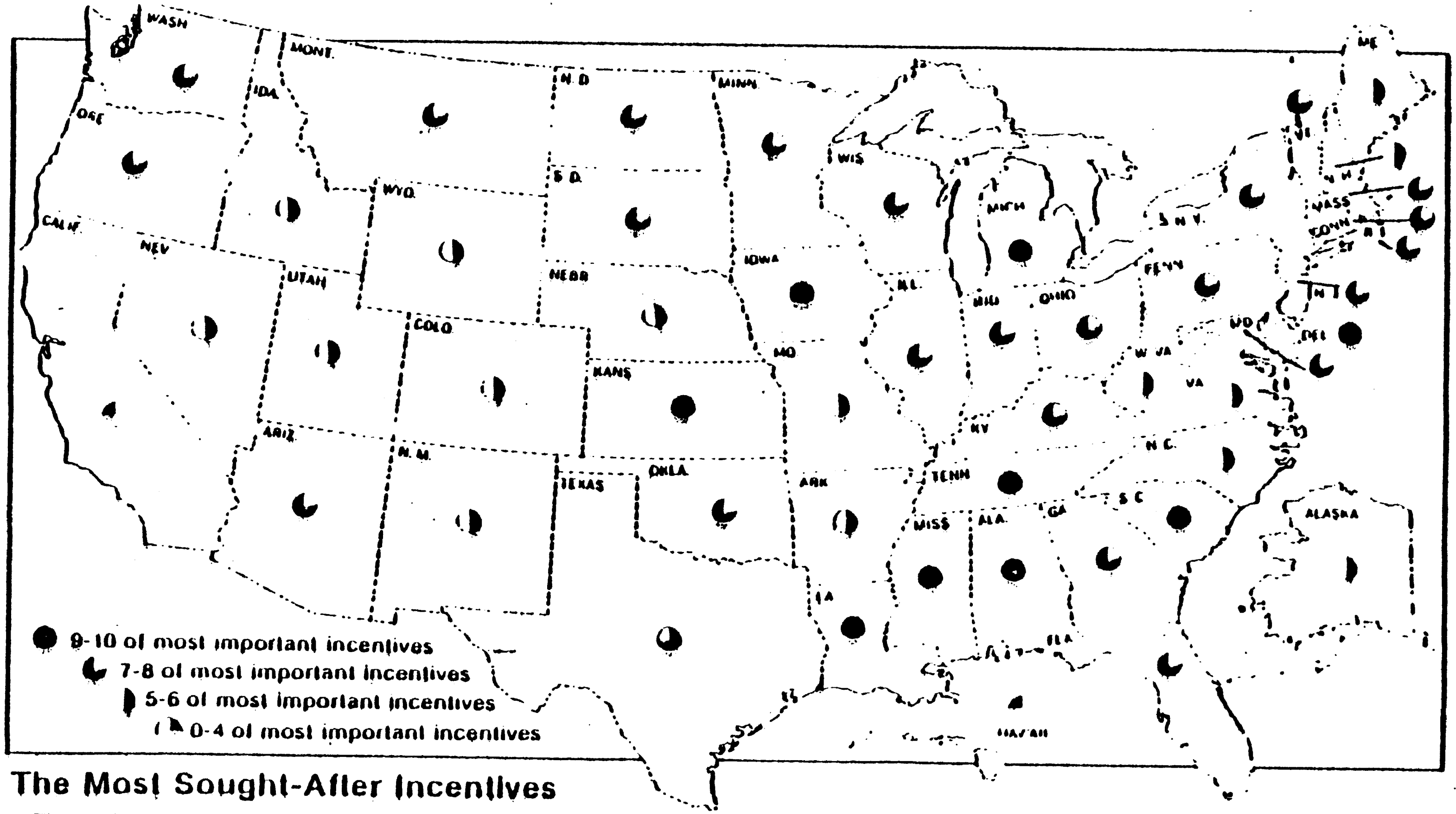
TABLE 17

Labor Availability for Selected Rail-Related Occupants in Michigan (First Quarter 1980)

Occupation Title	ACTIVE FILE APPLICANTS									
	Michigan		Detroit SMSA		Bay City SMSA		Muskegon SMSA		Saginaw SMSA	
	Applicants	Jobs	Applicants	Jobs	Applicants	Jobs	Applicants	Jobs	Applicants	Jobs
Electrical/Electronics Engineering	437	95	168	44	8	7	n/a	n/a	n/a	n/a
Mechanical Engineering	508	190	227	77	n/a	n/a	9	10	n/a	n/a
Machine Trade Occupations	36,416	2,361	18,601	933	900	46	6792	84	859	54
Rail Equipment Mechanics	26	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Transportation Equip. Assemblers	23,892	1,744	18,464	1,057	67	0	n/a	n/a	117	0
Arc Welders and Cutters	3,562	153	2,109	52	44	16	26	1	59	0
Welders, Cutters, NEC	2,887	85	1,890	37	n/a	n/a	31	1	41	3
Generators, Motors, Power Plants	21	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Wire Communication, Detection, and Signal Equipment	257	26	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Electrical Communication, Detection and Signal Equipment	147	6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Electrical and Electronics Products	392	35	176	17	n/a	n/a	n/a	n/a	n/a	n/a
Electrical Products, NEC	537	49	259	8	n/a	n/a	n/a	n/a	n/a	n/a

SOURCE: MESC Quarterly Job Openings Report, First Quarter 1980.

FIGURE 7. STATES OFFERING THE MOST SOUGHT-AFTER INCENTIVES



The Most Sought-After Incentives

The Industrial Development Research Council in 1977 produced a report on *The Industrial Facility Planner's View of Special Incentives.* One purpose of the report, which was based on the opinions of facility planners and real estate managers for some of the nation's largest manufacturing firms, was to determine which state and local business incentives are of most value to industry. The facility planners were asked to rank the incentives shown in our Legislative Climates dot charts in order of their importance to their firms. The following 10 incentives emerged as most important: —Tax exemption or moratorium on land, capital improvements. —State right-to-work law. —Tax exemption on manufacturers' inventories. —Corporate income tax exemption. —Industrial bond financing. —Tax exemption or moratorium in equipment, machinery. —Accelerated depreciation. —Sales/use exemption on new equipment. —State-supported training of industrial employees. —Tax exemption on raw materials used in manufacturing.

The accompanying map graphically illustrates those states which offer the most sought-after incentives. Only seven states offer (nine or 10) of the incentives, and only two states offer fewer than five of the incentives. (See charts, "Financial Assistance for Industry," "Tax Incentives for Industry," "Other Laws," and "Special Services for Industrial Development" for specific programs in each state.)

SOURCE: Industrial Development (January-February 1980).

LRV or transit cars. Market projections over the next ten years for LRV's and transit vehicles indicate an irregular pattern of procurement from as low as 35 LRV's in one year to as high as 270 at its peak. The predicted irregular procurement pattern for heavy rail vehicles is even more pronounced.

These forecast trends indicate that an LRV assembly facility may find itself having to keep large inventories. Although there is differentiation between particular property orders, there may still be substantial numbers of standard subsystems and components which would be inventoried.

If the production of LRV's would indeed require maintenance of large inventories, Michigan would have the significant advantage of not levying any property tax on the inventories.

Tables 18, 19, and 20 present the results of a theoretical comparison of the annual tax liability incurred as a result of maintaining LRV inventories in the five east North Central states.

Two scenarios are presented in Table 19: Case 1 assumes a plant assembling 50 LRV's a year through 1986, or roughly 40% of expected U.S. demand. The second scenario assumes a yearly production of 100 LRV's or 80% of the expected U.S. LRV market. Sales or demand follow a fixed percentage of U.S. demand. For Case 1 the average yearly deviation from normal inventories is 35 vehicles; in Case 2 it is 70 vehicles. Assuming a $75,000 average 1980 price per vehicle, the average annual value of inventories would be $26.25 and $52.5 million, respectively.

In Michigan the company would pay no property tax on the inventory in either case. In Ohio property taxes in Case 1 would exceed $700,000 a year and $1.4 million a year in Case 2. Indiana and Illinois would levy yearly taxes of over $500,000 in Case 1 and $1,000,000 in Case 2. Wisconsin offers the lowest yearly tax liabilities next to Michigan of under $125,000 in Case 1 or $250,000 in Case 2.

As pointed out earlier, the differentiation between transit property orders may reduce the possibility of inventorying vehicles but will probably not eliminate it completely, and the inventorying of subsystems and components is likely. The example outlined in Table 20

TABLE 18

Inventory Tax Calculation

---

1. Size of Plant necessary to service U.S. LRV market from 1978 to 1986.

Total number of vehicles required	1111
Average yearly output required	123

2. Target Michigan assembly plant

One car per week

Average Yearly Output:	50
Percent of U.S.:	41%

Two cars per week

Average Yearly Output:	100
Percent of U.S.:	82%

3. Inventory Calculation

Figures are based on the following assumptions:

(a) Even year round operation of plant
(b) Market time pattern of demand for target-sized Michigan plant follows natural demand but is reduced by the average percentage calculated in 2 above.
(c) Vehicles are valued at the average value between 6-axle articulated and 4-axle nonarticulated.

6-axle	$900,000
4-axle	$600,000
Average	$750,000

SOURCES: (1) Market demand projections, Section 1.5; (2) Average vehicle price, Section 1.5; and (3) Tax rates on inventory, Michigan's advantage for transportation equipment manufacture.

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therefore can be viewed as an indication of the type of savings which may accrue to a facility located in Michigan instead of other surrounding states.

Other Advantages. This section examines the tax liability of a hypothetical transportation equipment manufacturer employing 100 workers

TABLE 19

Inventory Tax Advantage for Michigan Plant Size

Year	CASE 1: 50 LRV Per Year Per Year			CASE 2: 100 LRV Per Year		
	Output (Veh.)	Sales (Veh.)	Deviation From Normal Inventory (Veh.)	Output (Veh.)	Sales (Veh.)	Deviation From Normal Inventory (Veh.)
1978	50	19	31	100	38	62
1979	50	63	18	100	126	36
1980	50	14	54	100	28	108
1981	50	61	43	100	122	86
1982	50	35	59	100	70	160
1983	50	39	69	100	78	138
1984	50	69	50	100	138	100
1985	50	109	-9	100	218	-18
1986	50	41	0	100	82	0
Yearly Average			35			70
Annual Value			$26,250,000			$52,500,000

and illustrates the special features of the single business tax and the Plant Rehabilitation and Industrial Development Districts Law. Assumptions covering plant, equipment, and inventory investment for property taxes are detailed in Table 21.

Table 22 summarizes the property taxes that our hypothetical rail equipment manufacturer would pay in Michigan and illustrates the savings available through the use of Act 198. By using Act 198, the hypothetical firm would save $58,240 per year for a total savings of $698,880 during the twelve-year property tax moratorium.

TABLE 20

Annual Property Tax on Inventory

States	50 LRV's/Year	100 LRV's/Year
Michigan	0	0
Indiana	$546,512	$1,093,024
Illinois	$581,884	$1,163,786
Ohio	$735,000	$1,470,000
Wisconsin	$124,897	$249,794

TABLE 21

Assumed Plant, Equipment, and Inventory Investment

Inventory Investment	Amount
Initial (1981) Plant and Equipment Investment	$5,000,000
Land	$3,000,000
Building	$2,000,000
Equipment	$2,700,000
Production Equipment	$2,365,000
Pollution Control Equipment	$200,000
Special Tools	$135,000
Assumed Initial Inventory	$2,135,000
1985 Investment in Plant and Equipment	$186,449
1985 Inventory Value	$5,216,000

NOTE: The property tax rate is $53.37 per $1,000 of assessed value, or $26.685 per $1,000 of market value. This is the 1976 statewise average rate. Liability both with and without Act 198 will be shown. Special tool exemption equals 5 percent of the value of machinery and equipment.

TABLE 22

Property Taxes

State Equalized Value[1]	Without Act 198	With Act 198
Land	$150,000	$150,000
Building	1,000,000	500,000
Machinery and Equipment[2]	1,182,500	591,250
TOTAL	$2,332,500	$1,241,250
TAX RATE	53.37 mills	53.37 mills
TAX LIABILITY	124,486	66,246

[1]SEV equals 50 percent of market value.

[2]Machinery and equipment are valued at original purchase price for simplicity. Pollution control equipment and special tools are exempted.

Sales Tax. The sales tax rate is 4 percent. All production machinery and equipment and material components are exempt. Therefore, the only sales tax paid would be for equipment and supplies used in administration. This is assumed to be 5 percent of machinery and equipment purchases. The sales tax for 1981 would be $4,730 ($2,365,000 x .05 x .04) and the sales tax for 1985 would be $373 ($186,448 x .05 x .04).

Single Business Tax. Tables 23 and 24 present hypothetical statements for a rail equipment manufacturer in 1981 and 1985. 1981 is assumed to be the first year of operation with the plant operating at full capacity. It is assumed that revenue, cost of materials and labor costs inflate, on average, just under 10 percent per year.

Table 25 presents the results of the single business tax calculation for 1981 and 1985, wages, salaries, FICA, etc., taxable income, and depreciation all came from the hypothetical income statements. Net interest was assumed. It was assumed that this plant

TABLE 23

Hypothetical Income Statement
(1981)

Income		Amount
Revenue		$27,532,124
Cost of Goods Sold		(25,889,302)
Materials	$23,756,174	
Labor	2,133,128	
Gross Profit		1,642,822
General Expenses		916,132
Depreciation	491,500	
Interest	424,632	
Net Income Before Taxes		726,690
Federal Income Tax		(290,676)
Net Income After Federal Tax		436,014

was the only U.S. plant of an independent U.S. subsidiary of a foreign corporation. Therefore, the allocation factor based on the property, payroll, and sales attributed to this Michigan plant is 1.0. The capital acquisition deduction is based on the assumptions in Table 21. Other exemptions, limitations, or deductions are assumed to be nongermane. Quite clear in the calculation is the working of the capital acquisition deduction and the substantial savings it produces in 1981. The firm may also carry forward $1,421,307 as a deduction in 1982.

Summary. Table 26 summarizes the tax liability for the hypothetical firm for the years 1981 and 1985. Without the capital acquisition deduction in 1981, the single business tax would have been $84,099. The total tax liability would have been $155,075 which is 21 percent of taxable income or 0.6 percent of revenues. As it is, the total tax liability is only $70,976 which is 9.8 percent of taxable

TABLE 24

Hypothetical Income Statement
(1985)

Income		Amount
Revenue		$64,461,063
Cost of Goods Sold		(58,417,451)
Materials	$55,431,072	
Labor	2,986,379	
Gross Profit		6,043,612
General Expenses		(572,126)
Depreciation	356,300	
Interest Expense	215,826	
Net Income Before Taxes		5,471,486
Federal Income Tax		(2,188,594)
Net Income After Federal Tax		3,282,892

income. By 1985, the total tax liability rises to $274,024, but this comprises only 5.0 percent of taxable income or 0.4 percent of revenues.

Alternative Michigan Locations. On the basis of the preliminary discussions with potential LRV assemblers in Michigan, it was felt useful to present four or five alternative locations within the state, comparing the advantages each offers. On a preliminary basis, five locations were identified. Because of the possible importance of location on the St. Lawrence Seaway, four of the cities are located on water: Detroit, Monroe, Port Huron, and Sault Ste. Marie. In addition, as a possible land-locked location, the city of Ypsilanti was selected. These locations all offer extensive transportation linkages with Canada. Sault Ste. Marie is also a designated foreign trade zone. Detroit is presently in the process of applying for foreign trade zone status.

TABLE 25

Single Business Tax Calculation

Single Business Tax	1981	1985
Wages, Salaries, FICA, etc.	$2,133,128	$2,986,379
Taxable Income	726,690	5,471,486
Net Interest (Pd. Less Received)	227,375	198,800
Depreciation on Federal Return	491,500	356,300
SUBTOTAL: Gross Tax Base	$3,578,693	$9,012,965
Allocation Factor	x 1.0	x 1.0
MICHIGAN TAX BASE	$3,578,693	$9,012,965
Capital Acquisition Deduction	5,000,000	186,449
TAX BASE	(1,421,307)[1]	$8,826,516
Small Business/Low Profit Exemption	--	--
ADJUSTED TAX BASE	--	8,826,516
Gross Receipts Limitation	--	--
Labor Intensity Deduction	--	--
NET TAX BASE	--	8,826,516
MULTIPLY BY TAX RATE	x .0235	x .0235
TAX LIABILITY	--	$207,423

[1]The capital acquisition deduction here exceeds the Michigan Tax Base. Therefore, the firm is allowed to carry forward a $1,421,307 deduction in 1982.

TABLE 26

State Tax Liabilities

State Tax Liabilities	1981	1985
Single Business Tax[1]	$ --	$207,423
Property Tax[2]	66,246	66,246
Sales Tax	4,730	373
TOTAL TAX LIABILITY	$70,976	$274,042

[1]Tax liability with capital acquisition deduction in 1981 is $0. Carry forward is $1,421,307.

[2]This is tax liability with Act 198. Without Act 198, tax liability is $124,486.

2.5 Target Company Strategy

A decision was made at the beginning of the study to investigate target company interests in Michigan as soon as they were identified, even though the background industry and market data to be produced by the study were obviously not yet in hand. The decision was made because we are dealing with an industry in which decisions to assemble in various locations are being considered by several companies. A valuable opportunity could be missed by delaying two or three months.

The procedure decided upon was to immediately inform the Michigan Department of Commerce, Office of Economic Development, of any leads uncovered and to work closely with them in following up on such leads.

In addition, this information was shared with the transportation agencies in Michigan in an effort to gain a better understanding of the meaning of these industry developments, both current and future.

In view of the fact that one objective of the study was to identify one manufacturer who might establish a plant in Michigan, it was surprising to discover a high level of interest in Michigan by several companies.

As a basis for evaluation of prospective manufacturers, three distinct types of organizational alternatives have been identified and outlined (Table 27).

Domestic Producers. Extensive discussions have been held with representatives of the Budd Company as a first-priority item in this investigation. Although Budd is a subsidiary of a German firm, it is virtually the only remaining domestic passenger railcar producer in the United States and it already has manufacturing facilities for other related products in Michigan.

Budd Company officials have investigated potentials for future orders for their vehicles in Michigan through contacts with both state and local transportation agencies. The company has outlined conditions under which they would consider production of rail passenger vehicles in Michigan and have discussed these conditions with representatives of the Michigan Department of Commerce, Office of Economic Development.

To date these discussions have not resulted in any specific actions or results; however, both the company and the public agencies have now defined the potentials and problems in fairly clear terms. At this point it would not be appropriate to view these negotiations in either an optimistic or pessimistic light. However, it is fair to say that they appear to be well along toward a conclusion on which both the corporation officials and the public agencies can agree.

Canadian Car Manufacturers. Intense interest in the United States market for rail passenger vehicles has been developing among Canadian car manufacturers recently. Michigan figures in this growing interest both as a potential market and as a possible location for manufacturing.

Preliminary contacts have been made with three Canadian companies:

(1) Bombardier
(2) U.T.D.C.
(3) Hawker Siddeley

Interest on the part of the Canadian companies in a possible Michigan manufacturing site has been indicated in a variety of ways, including personal visits, phone contacts, and letters and responses to a

TABLE 27

Organizational Alternatives

Organizational Alternatives	Advantages	Disadvantages
1. SPLIT ORGANIZATION		
A. Manufacturing	Flexibility of operations	"Name" of builder unknown?
	Produce own or other's vehicles	Time to organize and ready production could be long
	Overhaul/refurbish vehicles	Long learning curve
	Produce related products	Who would finance and set up plant?
	Concentrate on manufacturing programs	Liabilities?
B. Management/Product Development	Manage maintenance and operations programs	Integration problems?
	Provide consulting services to the industry (builders, suppliers, and operators)	
	Accomplish development programs without overhead burden	
2. ONLY MANUFACTURING ORGANIZATION	Able to produce or assemble for any car builder	Lack of credibility with customers
	Flexibility of operations	Difficult to manage?
	Customer's representative could be made part of the team, together with car builder and manufacturer for each respective order	
	Overhaul or refurbish existing vehicles	
	Produce other related components	
3. ESTABLISHED CAR BUILDER WITH FULL CAPABILITIES	Already known to the transit industry (customer's) credibility established	Would it be restricted to bid its own vehicles?
	Able to begin production within comparatively short time	Would it be able to keep plant operations going by incorporating other related projects
	Vehicle design and tooling already developed or on hand. (May/should have a complete line of vehicles.)	
	Could produce or assemble vehicles for foreign successful bidders (e.g., Budd/Tokyo car for Buffalo system)	

questionnaire. All three companies have shown at least preliminary interest in Michigan.

U.T.D.C. has expressed interest in both light rail vehicles and people movers in Michigan. Flexibility has been emphasized in their systems approach to getting vehicles engineered and assembled. Possibilities for a joint Michigan-Ontario development program have been discussed. U.T.D.C. interest in Michigan remains very high and will be further defined and developed.

<u>Potential Car Builders</u>. Table 28 contains a comparison of seven different potential railcar builders' evaluation on the basis of eighteen criteria. The criteria selected were considered the most important both from the standpoint of the specific needs of the system developers (SEMTA) and from the industrial development view.

TABLE 28

Preliminary Evaluation of Potential Car Builders Based on Eighteen Criteria

Decision Criteria	Bombardier	UTDC + Manuf.	H. Siddeley	New Mich. Organ. (W. Kales)	G. E.	Budd	UTDC/W. & Kales
1. Established Car Builder	Yes	No	Yes	Freight Only	Yes N/A	Yes	Yes
2. Types of Vehicles Developed Built:							
a. LRV	Yes	Yes	Dev. Only	No		No	Yes
b. HRRT	Yes	No	Yes	No	Yes	Yes	No
c. Mainline/Computer	Yes	No	Yes	No	Yes	Yes	No
d. DPM	No	Yes	No	No	Yes	No	Yes
e. Locomotives	Yes	No	No	No	Yes	No	No
f. Other Related Products	Yes(Rec.)	Bus	Freight Cars	Freight	Prop Eqp.	Hwy Trlrs.	Freight
3. Passenger Vehicles in Revenue Service	500+ Locos	150		None			
4. Recognized by Operators	Yes	Thru UTDC	Yes	No	Yes	Yes	Yes
5. Engineering Capabilities	Yes	Thru UTDC	Yes	No	Yes	Yes	Yes
6. Manufacturing Capabilities	Yes	No	Yes	No	Yes	Yes	Not for Pass.
7. Testing Facilities	No	Thru UTDC	No	No	Limited	Limited	Limited
8. Potential R&D Programs with Country of Origin	Yes	Yes	Yes	No	No	No	No
9. Potential Joint US/Country of Origin Consortiums for Foreign Market (C. & S. America)	Yes	Yes	Yes	No	No	No	No
10. Access to Other Markets (C. & America)	Good	Good	Yes	?	Good	Good	Maybe
11. Impact on Federal Agencies	Seems Pstv.	Seems Pstv.	Seems Pstv.	UMTA Not Very Recptv.	Postv.	Postv.	Maybe
12. Impact on Michigan Economy	Good	Very Good	Good	Excellent	Good	Good	Excellent
13. Impact on Mich. Labor Force	Fair	Very Good	Fair	Excellent	Good	Fair	Excellent
14. Impact on "Buy America"	Seems Pstv.	Seems Pstv.	Seems Pstv.	Excellent	Postv.	Postv.	Postv.
15. Impact on Vehicle Reliability	Excellent	Excellent	Fair	Excellent	Low-Poor	Excellent	Fair/Poor
16. Impact on Vehicle Cost Cost Reduction	Seems Pstv.	Good	Seems Pstv.	Poor	Postv.	Postv.	Poor
17. Business Reputation					Very Good	Very Good	?
18. Preferred Location							

3. CONCLUSIONS AND OPTIONS FOR INDUSTRIAL DEVELOPMENT

3.1 Discussion

In a state having the strongest industrial base in transportation equipment manufacturing, it may be effective to form a special organization to promote the industrial development of non-automotive transportation equipment manufacturing[21] and other technology-based industries.

This equipment category constitutes a growth industry with important federal, state, and local subsidy and involvement. Currently, Michigan has relatively little manufacturing activity in this category, except for transit coaches and, in fact, the United States is a net importer of these units (again, with the exception of transit coaches). There are strong national and state sentiments to increase domestic production of these vehicles. This is reflected in the "Buy America" requirements which are currently at 50 percent and are contemplated at 70 percent in the near future.

It has been suggested that Michigan should mount a creative development effort to work for regional leadership in this growing and diverse industry.

Michigan, like many other states, often finds itself in a reactive position regarding new industrial development opportunities, especially where new technology and public federal programs and monies are involved. Historical examples of this reaction effort include: (1) A national electronics laboratory built in Massachusetts in the early 1960's, (2) a nuclear research laboratory located in Illinois in the late 1960's, (3) a national transportation laboratory placed in the former Electronics Building in Massachuusetts in the early 70's, and (4) a solar energy research laboratory located in Colorado in the late 1970's.

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[21]"Non-automotive" includes light and heavy rail passenger cars, freight cars, small- and medium-sized buses, specialized essential service vehicles, and "people movers."

In each of these cases, an ambitious Michigan development effort was mounted, but did not succeed.

An organized effort could prepare in advance to capitalize on emerging technology-based manufacturing opportunities. New technical programs and products are expected to continue appearing, probably with increasing frequency and more comprehensive Federal support. National concerns about productivity, energy, defense, health, and industrial competition from other nations are behind this growing technology thrust.

A Michigan program to develop non-automotive transportation equipment manufacturing could be a logical first step in a broad-based, long-range program to anticipate technical change and organize to capitalize on it, rather than react to the initiatives of others.

Three options are available in addressing this problem-opportunity.

Option A: Not-For-Profit Development Organization. Under the auspices of the State of Michigan, a not-for-profit corporation could be formed to promote the development of non-automotive transportation equipment industry. At the state level, this organization would be analogous to the local economic development corporations. It would have a specific target industry focus at the outset and a broader technology-based industry objective in the long run. The geographic area would be statewide rather than a city, township, or county area. It would be similar in public purpose to a local economic development corporation.

Organization of a not-for-profit group could include representation from the Michigan Departments of Transportation and Commerce, as well as local transportation agencies such as Southeast Michigan Transportation Authority (SEMTA). It could include industry representation and technical support from universities.

Activities of this organization could include:

(1) Development of new Michigan manufacturing capacity to build vehicles in the non-automotive categories. This could be accomplished by promoting the diversification of established Michigan companies or the locattion of new facilities in the state.

(2) Conducting research to discover promising industrial growth opportunities in the non-automotive transportation field or in related industrial categories.

(3) Advising public agencies on the expenditure of funds available from state and Federal agencies for purchase or renovation of vehicles in this category.

(4) Participating in demonstration projects to confirm the usefulness and dependability of new vehicles or modifications.

(5) Sponsoring testing of new vehicles, components, or systems.

(6) Marketing new vehicles and systems to local, Federal, and state agencies in all states.

(7) Exploring and promoting cooperative projects with corporations or development organizations in other countries and provinces.

(8) Utilizing available facilities or building new facilities to conduct any of the activities requiring physical plants.

Option B: For-Profit Organization. Interested agencies at the state and local level could be instrumental in the formation of a profit-oriented industry group to capitalize on the emerging manufacturing opportunities in non-automotive transportation vehicles. However, it is unlikely that the public agencies could become active participants in such a group.

Potential participants could include (1) a manufacturer of rail vehicles in Michigan (example: Whitehead and Kales), (2) a foreign firm with an established reputation in rail passenger vehicles (example: Bombardier), (3) a Canadian provincial corporation with broad systems and testing capabilities (example: Urban Transit Development Corporation).

State and local agencies could support the growth of this corporation by contracting with it for vehicles and services such as refurbishment, repair, or testing, within the limits allowed by public purchasing procedures. This could lead to a stronger position in the national market for the corporation.

Option C: Limited Action Response to Light Rail Potential. The number of jobs at issue in light rail manufacturing does not appear to be large as compared with other industrial development potentials available in Michigan. A strong position in the industry nationally might yield 2,000 to 10,000 direct manufacturing jobs for Michigan.

Cyclicality has been a characteristic of the non-automotive vehicle manufacturing industry throughout its history. Drastic ups and downs in employment are common.

Profitability for manufacturers has been extremely difficult to achieve in recent years. The largest, oldest, and best established companies, such as Pullman Standard, Budd, and St. Louis Car, have had difficulty making a profit or achieving growth or even survival in this field.

For these reasons, a decision not to create a public agency for the single purpose to pursue the development potential in this field could be a reasonable option.

3.2 Summary

Option A. Non-profit corporation to promote diversification in the transportation manufacturing industry in Michigan appears to have the most appeal. However, its immediate potential appears to be limited by lack of industry volume and profitability. It is vulnerable to cyclicality and therefore it should logically have alternative long-range objectives.

Option B. This involves less commitment by government and thus might be more in line with the limited potential of this industry sector. However, except for channeling equipment orders into Michigan manufacturers, it amounts to not much more than jawboning to persuade private industry to pursue this manufacturing potential from bases in Michigan. As such, its chances for success and impact on jobs are not very significant.

Option C. To do nothing in the public sector, except to expedite the Michigan assembly of a Detroit light rail vehicle project, was the original objective of the transportation task force and still appears as a viable alternative. To do this assembly work, Whitehead and Kales in

River Rouge appears to be the most likely candidate with an excellent facility, experienced management, a trained and versatile labor force, and a need for additional work.

3.3 Conclusion

While any of these three options could make sense in a limited way, they all have discouraging shortcomings implying that more could and should be done if the proper direction and scope could be identified. Thinking along these lines leads to the revised approach which might be referred to as Option A-1.

Option A-1. This approach would place the responsibility for non-automotive transportation development in a non-profit corporation which would have a much broader responsibility in the field of technology-based industry development in Michigan. Non-automotive transportation could be a discrete component of technology-based potential and could have its own divisional status and program definition within the broader context of technology-based industry. Further, it could serve as a current and concrete example of development potential with which to test the feasibility of the broader technology-based industry development concept.

Using this approach, the state would have a much larger development job target to aim for and thus, justify the considerable organizational effort that would be required. At the same time, a strong push could be mounted to capitalize on the transportation industry potential which could be pursued to its ultimate limit.

Finally, regardless of how the transportation component evolved, the non-profit development corporation could continue work on technology-based industry with added experience, precedent, and momentum. When the next new industry opportunity appeared, Michigan would be organized and staffed to capitalize on it instead of having to create a new task force. Ideally, the Michigan group would be ahead of the rest of the country technically. Instead of being in the position of reacting to initiatives from Washington or other states, Michigan would have a developmental advantage to go along with the technical advantage that the state so often enjoys.

The technology-based industry idea is certainly not a new one and much work has been done to develop that organizational concept over the past several years. A group of industry and university specialists have been working in Ann Arbor since October 1978 on this idea. Discussions have been held with the Governor's staff (Taylor and Law) and with legislative committee staffs and the Michigan Department of Commerce.

Considerable program substance has been generated in which the light rail vehicle manufacturing and development potential might fit. Hopefully, a new institutional approach--the not-for-profit state development corporation--could be created to bridge the gap between our technological leadership and our developmental effort.

Seed financing for this developmental program could come from a special federal program for states and communities affected by the downturn in the auto industry. This program has been announced and Michigan's share has been identified.

3.4 Ongoing Activity

If effort is to be devoted to the implementation of Option A-1, Table 29 indicates the activities and decisions required through time to accomplish the indicated interrelated goals. With this final report, Goal A has been largely achieved. The analysis would indicate that Goal C has a high probability of accomplishment. The achievement of Goal B would be compatible with, and supportive of Goal C, and hopefully could develop other non-automotive transportation manufacturing opportunities.

TABLE 29

Preliminary Project Development Decision Chart

Preparation Activities	1980	1981	1982	1983	1984
GOAL A: ECONOMIC DEVELOPMENT AND MARKET ANALYSIS					
(1) Document Markets (2) Document Michigan Industrial Development Potential (3) Select Sites (4) Locate Michigan Partner	Convince an established car builder to locate an integrated plan in Michigan to serve the western hemisphere, or to associate with a Michigan assembler.				
GOAL B: STATE DEVELOPMENT CORPORATION					
(1) Incorporate Organization (2) Make Agreement with Foreign Corporation(s) (3) Negotiate Government Support (4) Diversification Strategy (5) Document Support from Michigan DOT and Commerce (6) Set Up Refurbishment and Maintenance (7) Small/Medium Bus Manufacturing		Implement Option A-1.			
GOAL C: MICHIGAN ASSEMBLY OF SEMTA ORDER					
(1) Set Specifications (2) Arrange Financing (3) Negotiate with UMTA (4) Negotiate with Car Builders			Assemble SEMTA cars in Michigan.		

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APPENDICES

APPENDIX I

THE TASK FORCE TO ESTABLISH LIGHT RAIL VEHICLE ASSEMBLY OR MANUFACTURING

Mr. James C. Kellogg, Acting Chief Administrative Officer
Bureau of Urban and Public Transportation

Mr. Larry E. Salci, SEMTA General Manager

Mr. William Cilluffo, Executive Assistant to Mayor Young

Mr. Conrad Mallett, Director
Detroit Department of Transportation

Mr. Emmett Motten, Director
Community and Economic Development, City of Detroit

Mr. Richard Farris, Vice President
Detroit Renaissance

Mr. Art Saltzman, Economic Development Section
Greater Detroit Chamber of Commerce

Mr. Trygve Vigmostad, Deputy Director
Office of Economic Development
Michigan Department of Commerce

Mr. Clifford Kleier, Director
Industrial Development Division
Michigan Department of Commerce

Mr. Al Ward, Special Assistant to the Governor

Mr. Donald Voelker, Assistant to the Director
Detroit Department of Transportation

Mr. Richard E. Buck, Assistant to the General Manager
SEMTA

Mr. Bill Ashbaker, Manager, SEMTA Development Section
Bureau of Urban and Public Transportation
Michigan Department of Transportation

Mr. Jesse Brown, Liaison for Southeastern Michigan
Bureau of Urban and Public Transportation

Mr. Larry Tokarski, SEMTA/D-DOT Merger, Liaison

APPENDIX II

WORLD WIDE RAIL PASSENGER CAR MANUFACTURING INDUSTRY
(PRELIMINARY)

<u>ACEC</u>
BP4
600 Charleroi
Belgium
71-442271
Telex: ACECB51227
A. F. Leriche, Marketing Manager
Transportation Division

Remarks: Builds LRV's.

<u>Alsthom-Atlantique</u>
Rail Transport Materials Division
Tour Neptune - Cedex 20
92086 Paris - La Defense - France
Tel. 778.13.28

Alsthom-Atlantic, Inc.
50 Rockefeller Plaza
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West Coast Office
50 California Street
San Francisco, California 94111
Telephone: (415) 391-2935
Tx. 278 638

Remarks: Looking at Ford (Mahwah, New Jersey) plant for buses. Looking at plants in Michigan, Indiana, and Pennsylvania for buses. Fantus involved in plant search.

Mr. Hennig, Export Manager
Maschinenfabrik
Augsberg - Nurnberg Aktiengesellschaft
WerkNurnberg
8500 Nurnberg 115

Katzwanger Strausse
101 W. Germany

Remarks: Contacted by Michian Department of Commerce and Michigan Department of Transportation.

<u>ANF Industrie</u>
Transports Urbains Division
Tour Aurore
Paris Defense 92080 France
Telex: 788-15-15
Mr. Grall, Sales Manager
P. Gilbert, Assistant Sales Manager

Remarks: Builds rail cars and bodies.

<u>ASEA, Inc.</u> (Sweden)
Transportation Systems Department
4 New King Street
White Plains, New York 10604
Telephone: (914) 428-6600
Telex: 137401
Olle Ewers, Manager
Transportation Systems Department

Remarks: Builds LRV's.

Transport Division
S-721 83 Vasteras
Sweden

Tel: + 46 21 100000
Lars O. Nilsson, Sales Manager

Remarks: Licensed high-speed locomotive design to GM for Amtrack use. Contacted by Michigan Department of Commerce and Michigan Department of Transportation.

BN Constructions Ferroviaires et Metalliques
(Formerly La Brugeoise et Nivelles)
General Transport Division
Rue de la Loi 74
Brussels, Belgium
02 230 12 25
Telex 61 736
J. D. Cremie, Marketing Manager
J. Olivier, Sales Manager
P. Lenssen, Technical Advisor
P. Van De Sijpe, Manager

Plant of Bruges
Vaartdijk 5
8200 Brugge
Belgium

Remarks: Contacted by Michigan Department of Commerce and Michigan Department of Transportation. Licensed cars to Bombardier, Ltd.

Bombardier Limited
Mass Transit Division
1350 Nobel Street
Boucherville, Quebec J4B1A1 Canada
Telephone: (514) 655-3830
Telex: 055-61576

Carl Bawby, Vice President of Marketing
Brian Winter, Director Marketing
Pat McLean, Manager Rail Passenger Equipment Sales
Robert Halperin, Manager Transit Equipment Sales

1505 Dickson Street
Montreal, Quebec Canada HIN 2H7

Remarks: Sales--$385 mm; employees--6,200. Contacted by Michigan Department of Transportation. License B.N. LRV's won $43.5 mm contract from New Jersey for 57 commuter railcars. Will construct U.S. rail assembly plant within a year.

Breda Construzione Ferroviarie S.P.A.
Export Director
Via Ciliegiole
51100 Pistoia Italy

Remarks: Contacted by Michigan Department of Commerce and Michigan Department of Transportation. Contract for 48 LRV's to Cleveland for $39 million. Contract for 90 HR cars for D. C. Metro--Toning Inc. of New York is representative (212) 490-3058. Will assemble Cleveland LRV's in FTZ near Cleveland or have GE do it (J. O. Hively, Cleveland Port Authority, July 25). Brown-Broveri, Canada is supplying traction motor and chopper controls (Mass Transit, January 1980, p. 45).

CIMT Lorraine
Campagnie Industrielle de Materiel de Transport
M. Smith Commercial Division
42, Avenue Raymond Poincave
75116 Paris, France
505 14 00
Telex: CIMTRAM 610 119 F

Commonwealth Engineering (Vic.) Pty. Ltd.
Frankston Road
Dandenong, Victoria
Australia

Remarks: Contacted by Michigan Department of Transportation.

DuWag
Dusseldorf Wagon

Mr. Grawenhoff, Export Manager
Waggonfabrik Uerdrugen A.G.
Werk Dusseldorf
4 Dussldorf 1, Postfach 8405
West Germany

Remarks: Contacted by Michigan Department of Commerce and Michigan Department of Transportation. Has contacts for Calgary, Edmonton and San Diego with Siemens. San Diego contract not Federally funded; therefore no "Buy America." SOURCE: Diane Enos, UMTA, (202) 426-4403, July 26, 1980.

Fiat Ferroviaia Savigliano S.P.A.
Export Director
Corso Ferrucci 122
10141 Torino
Italy

Remarks: Contacted by Michigan Department of Commerce and Michigan Department of Transportation.

Francorial--MTE
Mr. Dhaussy, Export Director
Department Transports Nouveaux
32 Quai National
92866 Puteaux France

Remarks: Contacted by Michigan Department of Commerce and Michigan Department of Transportation.

Hawker Siddeley Canada, Ltd.
Canadian Car Division

Keith G. Chapman, Director of Marketing
Paul C. Gillen, Marketing Representative
Box 67, Station F
Thunder Bay, Ontario Canada
Telephone: (807) 577-8431
Telex: 073-4560

7 King Street East
Toronto, Ontario Canada M5C 1A3
Telephone: (416) 362-2941
Telex: 06-217711

Remarks: Building 190 UTDC production cars for Toronto.

Can-Car Incorporated
Paul C. Gillen
Box 300
Thunder Bay, Ontario P7C 4V9
Telephone: (807) 577-9523

Remarks: Contacted by Michigan Department of Transportation.

Link-Hafmann-Busch
Waggon-Fahrzeug-Maschinen Gmblt
332 Salzgitter 41
Postfache 41 11 60
West Germany

Remarks: Contacted by Michigan Department of Transportation. Not interested because of "Buy America" letter of June 5, 1980 to Michigan Department of Transportation.

Kawasaki/Nissho-Iwai
Kawasaki Head Office
World Trade Center Building (Rollin Stock Group)
4-1, Hamat Sucho 12-chrome, Minato-ku
Tokyo, 105 Japan
Phone: 03-435-2588
Cable: KAWASAKIHEAVY TOKYO

Telex: J22672
Plants: Hyogo (Kobe), Utsunomiya and 18 other works.

Nissho-Iwai Offices

Alaska Chrome
Minato-Ku, Tokyo
Phone: 588-2111
Telex: J22233, J22234

Ima Bashi Chrome
Higashi-Ku, Osaka
Phone: 202-1201
Telex: J63264, J63361

Nissho-Iwai American Corporation
1211 Avenue of the Americas
New York, N.Y. 10036

Remarks: Claims an office in Detroit interested in joint ventures. Nisso-Iwai is trading company, Kawasaki is manufacturing firm.

They have both LRV and RT contracts for Philadelphia. LRV being assembled at Boeing-Vetrol, Philadelphia plant. Looking for RT assembly site, want it around Phildelphia. Contacted by Michigan Department of Transportation.

Metro-Cammell, Ltd.
Leigh Road
Birmingham B8 24J
021-327-4777
Telex: 33401
Directors
A.H. Sansome (Chairman)
D.B. Whitehorse (General Manager)
F. Jm. Bonneres (Chief Engineer)

Executives
E.V. Phillips (Supplies Control)
W.J. Wright (Sales Manager)

Remarks: 816 employees. Contacted by Michigan Department of Transportation.

Schindler Carriage Wagon Company, Ltd. (SWP)
CH-4133 Prattelon
Switzerland

Remarks: Contacted by Michigan Department of Transportation. Operates in North America through S.I.G.

Schweizerisch Wagons ' Aufzugefabrik A.G.
Swiss Car and Elevator (SWS)
Ch-8952 Schlieren
Switzerland

Remarks: Contacted by Michigan Department of Transportation. Operates in North America through S.I.G.

Siemens
Power Engineering Division
H. Eisele, Manager Rail Vehicle Prop.
Max Deterding, Division of Marketing
186 Wood Avenue, South
Iselin, New Jersey 08830 (201) 494-1000

Siemens AG, 2VW104
P.O. Box 103 D-8000 Munich 1
Fed. Republic of Germany

Mr. Wittmann, Export Manager
Siemens A.G.
Power Engineer Department
Werner-Von-Siemens-Strasse 50,
Post fache 325
8520 Erlangen 2,
West Germany

Remarks: Provided motive power for Edmonton, Calgary, San Diego, and Rio de Janero (DuWag cars).

S.I.G.
Swiss Industrial Company
Mr. Reithaar, Sales Director
CH-8212 Neuhausen Rhine Falls
Switzerland

Remarks: Contacted by Michigan Department of Commerce and Michigan Department of Transportation. Built 6 UTDC prototypes. Operates in North America for Schindler and Swiss car.

Societe Franco Belge De Materiel De Chemins De Fer
Jean Guy Marret
V.P. Sales Market
35, vue de Bassano
75008 Paris
France
01/723-55-24
Telex HERLI 290060

Remarks: Has Atlanta MARTA contract; assembly plant in Decatur, Georgia. Filed for bankruptcy in France (WSJ, July 2, 1980).

Societe Nationale des Chemins de Fer Vicina
(S.N.C.V.)
Direction Generale
14 rue de la Science
1040 Bruxelles
Belgium

Remarks: Contacted by Michigan Department of Transportation.

Thyssen Aktiengesellschaft
vorm August Thyssen-Hutte
Abt. MV
Postfach 110067, D-4100 Duisburg 11
Federal Republic of Germany

Thyssen, Incorporated
1114 Avenue of the Aermericas
New York, N.Y. 10036

Remarks: Owns the Budd Company.

Tokyu Car Corporation (Tokyu Sharyo Seizo K.K.)
1, Kamariya-cho
Kanazawa-ku
Yokohama 236, Japan
Phone 701-5151

Trade Department Tokyo
6th Floor, Yaesu Mitsui Building
7Yaesu 5-Chrome
Chuo-ku
Tokyo
Phone 272-7051
Telex: 022-2020

Remarks: Contacted by Michigan Department of Commerce and Michigan Department of Transportation.

Looking at Hammond, Indiana (RB, June 11, 1980). Telex from N. Henniger to B. Scott relayed to Mr. Krzyzowski indicated Tokyu interested in Detroit contract and potential partner. Will have presentation to SEMTA in July or August. Information relayed to R. Buck of SEMTA by M. Krzyzowski on July 3. Represented in U.S. by Mitsui.

Urban Transportation Development Corporation
Phil Stevenson, V.P. Corporation Marketing
Anton Hart, Assistant V.P., Product Sales
Allen Wright, Assistant V.P., Marketing Customer Service
20 Eglington Avenue, West
Toronto, Ontario M4R 1K8

Canada
(416) 484-8887

George Pastor
President, UTDC (USA)
6378 Dockster Terrace
Falls Church
Virginia 22041

Remarks: Contacted by Michigan Department of Transportation. Has Toronto contract, a system approach to mass transit. Six prototypes built by Swiss Industrial Corporation. 190-production built by Hawker-Siddeley, Canada.

Valmeet Oy
Export Director
Valmet Building
Punanotkonkatu 2
P.O. Box 131155
Helsinki, Finland

Remarks: Contacted by Michigan Department of Commerce and Michigan Department of Transportation.

Vickers Canada, Inc.
J.R. Howett, V.P. Ind. Sales
R.R. Hebert, Sales Manager
J. Crawford, Systems Manager
Industrial Division
5000 Notre Dame St. East
Montreal, Quebec
Canada
Telephone: (514) 256-2651
Telex: 05-828735

Remarks: Mass transit cars.

Waggonfabrik, Wegmann Company
Mr. Kuellmar, Export Manager
August Bodestrassel,
D-3500 Kassel
West Germany

Remarks: Contacted by Michigan Department of Commerce and Michigan Department of Transportation.

APPENDIX III

BOMBARDIER LTD. ANNOUNCEMENT
OF NEW MANUFACTURING PLANT

Canadian Company to Construct Its 1st Railcar Plant in the U.S.

By JOSEPH A. CONSTANCE

NEW YORK — Bombardier Ltd., Boucherville, Quebec, spurred on by its recent award of a $43.5-million contract from the state of New Jersey for 57 commuter railcars, will construct its first U.S. railcar assembly plant within the year.

Brian Winter, director of marketing, mass transit division, said a location for the approximately $5-million facility will be decided on by fall.

He said 100 workers will be initially employed to work on the New Jersey order at the new plant where the components will be assembled onto car shells fabricated at the firm's La Pucateiere, Canada, plant.

The firm is also considering establishing a second U.S. plant, possibly in the West, as it attempts to triple its railcar manufacturing capabilities in Canada and the U.S. within the next five years.

"Momentarily our plan is to only use the plant for units we are selling to U.S. entities, but we could use the facility for an order to another country if our other plants are backlogged," Winter explained.

Bombardier operates 15 plants in Canada and Europe, and it runs a small U.S. facility which cans oil lubricants, he said.

Another reason for setting up a U.S. assembly facility, Winter added, is the "Buy America" clause required under federal and state contracts.

This clause requires that 51 percent of components used by foreign manufacturers be produced by U.S. firms. The clause also obliges foreign companies to perform final assembly operations in the U.S. on U.S. contracts.

Last week the New Jersey Supreme Court upheld the original award made to Bombardier on June 12 by the state Department of Transportation.

The Budd Co., Troy, Mich., which also bid for the contract, had contested the award, but the court decided in the state's favor. The court did not make public its opinion.

Vickers Canada Inc., Montreal, also bid on the contract and was also turned down by the state.

Winter said Bombardier also plans to bid this fall on specifications for 130 self-propelled cars for the Long Island Rail Road. He said if the firm wins this contract, the U.S. facility would also assemble these cars.

"The new plant is warranted by the U.S. market which is very big," Winter noted. "Currently 50 percent of our railcar business is in the U.S., and Bombardier wants to expand that to between 70 and 80 percent within the next four years.

"There are plans to triple the manufacturing capabilities of the mass transit division within the next five years," he explained.

"We will need additional plant space," he stated. "So the company may establish another plant in the western U.S. or Canada."

The establishment of a U.S. assembly plant would also reduce the U.S. duty on imports, Winter stressed. "Currently there's an 18 percent import duty on finished products while there's only an 8.5 percent duty on components that are shipped to the U.S."

Last year Bombardier's sales totaled $300-million and to date in 1980, they amount to $425-million. The firm manufactures recreational equipment including snowmobiles and motorcycles, railcars and intercity trains, locomotives, diesel engines and street cars, and off-road vehicles for the woodcutting and other industries.

Winter said half of the sales are in transportation equipment and the remainder are in recreational products.

SOURCE: American Metal Market/Metal Working News (July 21, 1980), p. 5.