Wisconsin Coastal Zone Management Program

COASTAL ZONE

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PROCEDURES FOR EVALUATION OF THE HARBOR ASSISTANCE PROGRAM OF THE WISCONSIN DEPARTMENT OF TRANSPORTATION

September 1982

by:

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PROCEDURES FOR EVALUATION OF THE HARBOR ASSISTANCE PROGRAM OF THE WISCONSIN DEPARTMENT OF TRANSPORTATION

OVERVIEW

The purpose of this report is to describe the theory and methodology underlying the approach to be used in the development, testing and application of a harbor assistance project impact and evaluation procedures. The need for this results from the desire of the Wisconsin Department of Transportation to improve the basis upon which it selects projects for grant award under its Harbor Assistance Program. This program provides state funds on a cost-sharing basis to assist programs for development of harbors, within the overall framework of promoting a rational and efficient transportation network throughout the state.

The economic goals of the statewide Harbor Assistance Program are basically identical to those of any public works or assistance program. Foremost among the goals is that of the promotion of economic efficiency, whereby maximum use of available resources committed to providing transportation services is achieved. A closely related objective is the minimization of both construction and operational costs in order to promote economic efficiency. A third major goal is to maximize the positive economic and social impacts that result from a well-developed transportation system. Achievement of these goals is to be obtained within a framework that also recognizes less economically oriented objectives such as safety, environmental quality and energy efficiency.

The proposed evaluation methodology is based on two aspects of the Harbor Assistance Program, its goals and the processes of the program. That is, the point of departure in developing the methodology is the recognition that the goals and procedures of the assistance program are well defined. Therefore, the methodology should incorporate this and be designed to evaluate whether or not applications are reasonable, the degree to which the applications meet the goals of the program and particularly to measure the efficiencies, costs and impacts of any application. In the methods and procedures described in this volume, these three terms have very specific meanings. Cost refers to the initial capital investment and annual operations and maintenance expenditures that will be incurred by the project described in the application. Economic efficiencies are the reduced operating costs (resource costs) over the project life

that are a direct result of implementing the project. Impacts are those distributional economic effects arising from the project that are neither economic costs nor efficiencies.

Economic Efficiencies - Theory

The basic economic benefit derived from port and harbor improvements is the reduction in the value of resources required to produce port and harbor services. The measurement of the efficiencies resulting from port and harbor improvements stems from the recognition that efficiencies arise from the competitive position of each port and harbor. Each port and harbor is partially a spatial monopoly as a result of its geographical location and therefore can exhibit some monopoly behavior in terms of pricing policy. However, competition from surrounding ports and harbors will severely limit the ability of any particular port to exercise any significant market power, at least in the long run.

For example, the Port of Duluth-Superior has a competitive advantage in the transshipment of iron ore. A slight relative increase in the costs of utilizing this port would most likely have only a negligible effect on traffic. However, any significant and permanent increase in costs would quite likely lead to a substantial decrease in traffic through the port. Thus, a small decrease in depth at the port might have only a negligible effect, while a 2-3 foot decrease in depth may virtually close the port.

Price Effect

This example illustrates one of the basic components of the economic efficiencies arising from port improvements; the price effect. This efficiency represents the change in the economic cost of utilizing a port. This change represents an economic efficiency gain when resources are used more effectively in the provision of port services. In the dredging example, the decreased depth of the port channel would require either that vessels light-load or that smaller vessels be utilized. In either case, more resources in the form of vessels would be required to ship the same amount of tonnage as was shipped with the deeper channel. Some primary examples of cost reduction efficiencies are: a reduction in total trip time by alleviating port congestion, i.e., adding more berths at a port; and reducing costs by allowing vessels to be more fully loaded, i.e., channel deepening.

The price or cost reduction effect is reflected in Figure 1a. As demand shifts from D_t to D_{t+1}, the costs of using the existing facilities increase, for example, increased congestion

means that the price will rise to reflect these increased costs. The project shifts the cost curve to the right, decreasing unit costs from P_1 to P_2, with resource savings of the shaded area.

Output Effect

The other main component of economic efficiencies is the quantity or output effect. This efficiency results from the savings in resources by not using a more costly mode or route for the shipment of goods. In the example of the Port of Duluth-Superior, if all facilities in the port were fully utilized, movement of a larger quantity of ore would require the use of some other port, for example, Milwaukee; the use of a different mode, for example an all rail shipment; or expansion of the facilities at Duluth-Superior to process the increased tonnage. The economic efficiencies arise from the competitive position of Duluth-Superior in that it can provide necessary services to process this increased tonnage at a lower cost than the other alternatives noted.

The resulting measure of efficiency is shown in Figure 1b. In Figure 1b, the result of the project is simply a shift to the right along the long run cost curve from point A to point B, based on the equilibrium condition that Price=Marginal Cost=Average Cost. That is, the project would lead to an expansion of facilities, allowing additional throughput or volume at the same cost as before. The area ABED represents the gross benefits, area CDEB represents cost, and their difference, shaded area ABC, the "net" benefits for the period under consideration. The measure is price times the change in quantity less the (variable) costs of providing the change in quantity.

These two effects are combined in Figure 1c. The proposed project would shift the cost curve to the right, i.e., the proposed project would allow any given volume to be processed at a lower marginal cost. The most immediate impact of the project is likely to be shown in the price effect. Volume at the port is Q_1 with costs of P_1 without the proposed improvement. When the proposed project is implemented costs immediately drop to P_2, with immediate cost savings of P_1-P_2 for each unit of cargo currently utilizing the port. However, the decreased costs will make it economically efficient for additional cargo to utilize the port, and volume will increase from Q_1 to Q_2 with a resulting price increase from P_2 to P_2. The resulting benefits are then the price effect for existing traffic $(P_1-P_2)xQ_1$ plus the output effect, $(P_2(Q_2-Q_1)$ minus the costs of providing the additional output, C_2, plus the increased consumer surplus, the area ABD which approximately equals $1/2(P_1-P_2)$ x (Q_2-Q_1). This last benefit

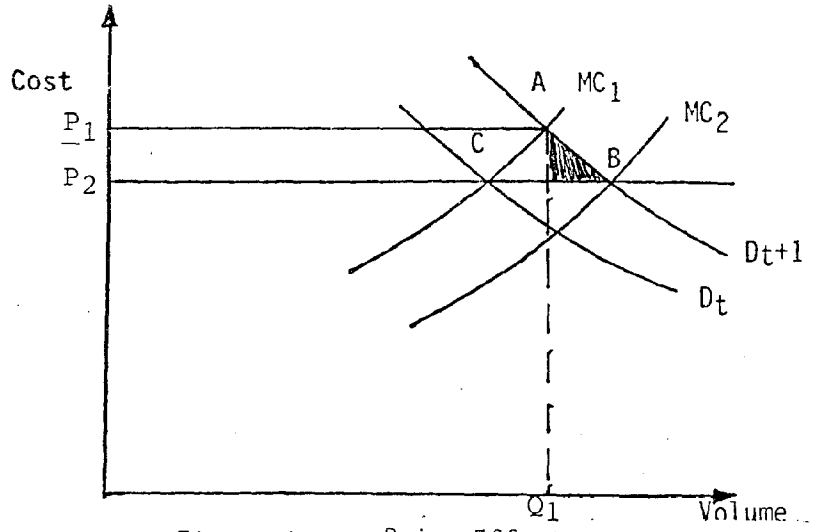

Figure 1.a: Price Effect

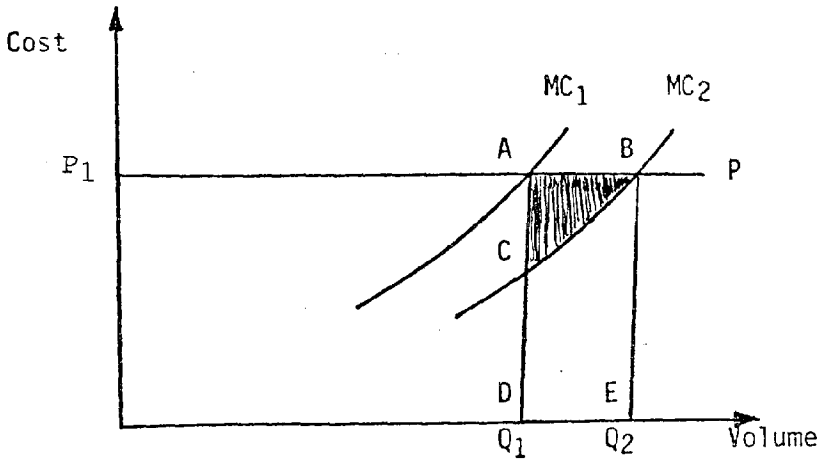

Figure 1.b: Quantity Effect

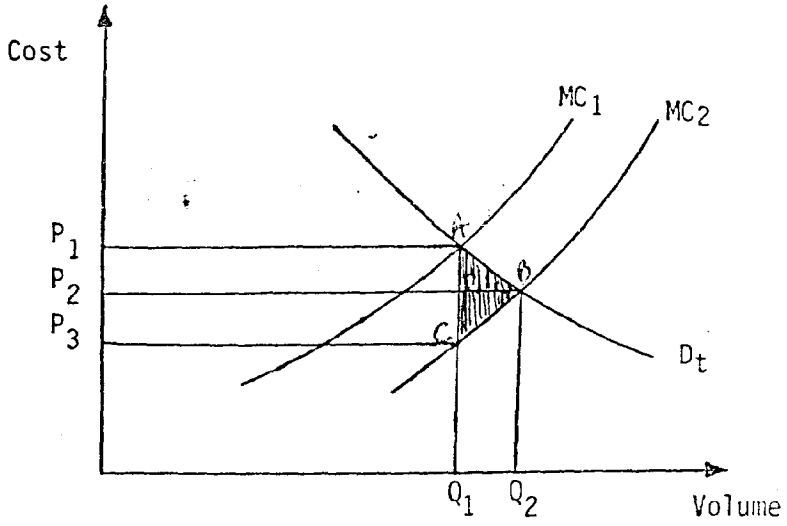

Figure 1.c: Price and Output Effect

component, consumer surplus, results from the effect of reduced price on each unit of additional volume. As illustrated in Figure 1c, the resulting total efficiencies can then be computed as:

$$(P_1-P_2)\ Q_1 + 1/2\ (P_1-P_2)(Q_2-Q_1) + (P_2-C_2)(Q_2-Q_1)$$

where C_2 are the production costs of producing Q_2-Q_1, i.e., the area CBQ_2Q_1 of Figure 1c.

(For brevity, this is referred to as the benefit computation equation.) This represents the cost savings on the without project traffic (the price effect), plus the change in consumer surplus resulting from the project, plus the net additional revenues on induced traffic (output effect).

For most projects to be proposed, either the output or price effect will vastly dominate the total efficiencies. For example, a channel deepening project will significantly influence costs, but is unlikely to significantly increase output, except insofar as traffic shifts between ports. That is, improvements to existing facilities will predominantly influence costs at the port but are unlikely to create any new traffic for the region. On the other hand, new types of facilities, for example, a new grain elevator, are more likely to affect output, with only a small price effect. In slightly different terminology, projects will generally be oriented towards servicing existing markets at lower cost or to servicing new markets with the prevailing price structure. For the former types of projects, demand can be viewed as completely inelastic, while for the latter, demand could be viewed as completely elastic, which will greatly simplify the measurement of efficiencies.

Economic Impacts

The development of the procedure to address social and economic impacts is based on the view that these impacts must be linked to the evaluation procedures described above. The direct economic impact results from price and quantity changes. The analysis of secondary impacts should start with these changes as datum and then follow their possible impacts through the socio-economic structure. Three methods frequently used in this type of analysis are economic multipliers, interregional trade multipliers and input/output models.

The three methods are conceptionally quite similar, but the latter two, although theoretically rich, are data poor for all but the largest geographic areas, such as the nation. While techniques exist for "disaggregating" data to the SMSA or county level for these techniques, the potential for generating large

errors throught these techniques is also well documented. The economic multiplier method is a straight-forward technique that can be applied using readily available data and is the technique that will be used in this analysis. Because the economic multiplier methods yield only gross impacts, economic multipliers shall be generated for state, regional and local areas to provide a basis on which the impacts on port improvements can be compared. The results could provide a dollar basis of impacts, for example, net income, that are comparable to the efficiencies computed in the economic evaluation. It will also be possible to translate this effect into other relevant information such as the number of jobs created, using the same data which provides the multipliers. Certain non-quantifiable factors, safety and environmental quality, for example, will be discussed in relation to standard technical criteria.

Economic Analysis

Implementation of this methodology will be accomplished through a series of steps discussed in detail in the remainder of this report, with supporting documentation in the Appendices. Each step is designed to be self-explanatory and to assist in the preparation of standardized report methods. The steps are generally grouped into five categories: i) development of project life and total project costs, ii) projected traffic that will benefit from the proposed project, iii) computation of the unit savings applicable to traffic that will benefit from the project, iv) discounting of benefits and costs and computation of the benefit-cost ratio, and v) computation of project impacts.

Economic Efficiencies

The procedures and steps to be accomplished can be briefly summarized. Development of the project life and total project costs, requires a specification of the evaluation period and a check of project costs to insure that all costs necessary for efficient use of the project have been included.

Defining the project traffic base requires three steps. The first step will be the identification of commodities or commodity types that might potentially be susceptible to use of the proposed project. It is expected that commodities would, in general, be identified at the two-digit SIC level, although more or less aggregation might be desirable for some specific projects or commodities. The traffic base for the harbor is projected for each year of the project life. This will yield a time series of traffic through the harbor.

The second step is to determine commodity flows in relation to the project. This will form the basis of the traffic which might benefit from the project by determining the commodity flow through the existing harbor facilities using the projected traffic flows from the earlier step.

The third step is the determination of traffic that will actually benefit from the proposed project. In the simplest case of capacity expansion, this would be the difference between current capacity and projected traffic. However, certain harbor-wide projects will benefit all traffic through the harbor, or very specialized projects may affect all the traffic over a certain dock. This corresponds to a time series of Q_2 in terms of the benefit computation equation.

The next two steps will compute the unit savings that should be associated with the traffic projections developed above. This requires that for all traffic estimated, annual expected changes in transportation costs be estimated for each year of project life. In terms of the benefit computation equation, this represents P_1 minus P_2, for each period of evaluation. The without-project condition may deteriorate over time, affecting P_1. For example, siltation of a harbor due to a failure to dredge would reduce the without-project harbor depth. For each type of project, potential rates of decline are included for incorporation into the without-project condition reflecting possibly higher costs or a lower level of economic activity, i.e., closure of a dock or channel.

In the use of this methodology, no evaluation of induced traffic need be made due to the fact that we deal mostly with smaller projects where no significant change in the commodity flow is expected. In the event that a DOT grant program is part of a relatively significant investment, this change in infrastructure will always occur in a situation where a special study, one of which necessarily has considered the induced traffic, has been done.

At this point, all information pertinent to the computation of economic efficiencies will have been developed. The next series of steps will combine this information to obtain estimated benefits. The benefits are computed per the benefit computation equation. The price and quantity information for each year and for the with and without-project conditions are taken from the earlier steps and used in the formula:

$$(P_1-P_2)xQ_1+1/2(P_1-P_2)(Q_2-Q_1)+(P_2-C_2)(Q_2-Q_1)$$

The final step in the evaluation of efficiencies is the discounting of benefits and costs to a common time frame and computation of a benefit-cost ratio.

Economic Impacts

The remaining steps represent the development of the economic multipliers and the estimation of socio-economic impacts by regions. Computation of the multipliers is accomplished through methods similar to those described in the Port Economic Impact Kit developed by the Maritime Administration. Briefly, the multipliers are developed using the "concentration technique" to determine basic and non-basic employment in a given region. This split between basic and non-basic employment is used to determine the income split between basic and non-basic employment in a given region. This split is then used to generate the income multiplier. The total impact would then be the income multiplier times the yearly benefit of a project, discounted to the base year.

As noted earlier, a problem associated with the use of economic multipliers is that they yield only gross impacts. That is, the method implicitly provides a comparison between some type of investment and no investment at all. Since, by definition and construction, any investment has a multiplier of at least 1.0, ignoring possible leakages, any investment will be large in comparison to no investment at all. While gross impacts are important in the decision making process, their value would be greatly enhanced if they could be compared to the impacts of other types of investments.

To provide a basis for comparison, economic impact multipliers are developed at state, regional and local levels. These multipliers will then be used to determine economic impacts for a typical investment in any particular region. Comparison between the project impacts and the impacts in other regions would indicate net project impacts as well as the relative distribution of impacts throughout the various regions based on the origins and destinations fo traffic using the project.

The remaining steps consist of the application of these multipliers in order to compute impacts. The direct output of this analysis would reflect the increased income of each region due to the multiplier effect. This impact can be expressed in alternative forms, or alternative types of impacts derived by using ratios between income and other variables. For example, one could compute employment/income and sales/income ratios to determine the overall employment and sales impact for each region. Effective tax rates can also be computed. While a

variety of impacts can be hypothesized, it is believed that only income, employment, output and taxes will show a sufficiently large impact to allow measurement.

Implementation of this procedure will be through a tabular framework, constructed for each proposed project, region, and time period. The primary inputs into the tables would be project costs and benefits. The tables would be set up to disaggregate the total multiplier impact into region specific impacts through a sequential process. This process can be envisioned as something similar to IRS tax forms. Given a few basic inputs, the table will contain any other relevant information, i.e., the value of multiplier, and instructions on the computation of all values.

The application of these to the economic evaluation of projects is described in detail in the remainder of this report. To the extent possible, each step is self-contained and self-explanatory. However, due to the possible wide variety and location of projects, appendices have been attached that contain relevant data and methods required to accomplish some steps. The appendices are constructed so that any data or computations can easily be incorporated into the relevant steps. An example of applying the methodology is also shown and is rather loosely based on the Port of Kenosha. The example is purely illustrative, although, in several instances, it illustrates where specific types of data can be found.

STEP 1

PURPOSE: Determine project life and all costs associated with the project.

DATA REQUIREMENTS:

1. Appendix A
2. Available special studies related to the project

RECOMMENDED ACTION: Completion of this step will result in the determination of two important parameters of the economic evaluation, the project life, or period of evaluation, and the total costs associated with the project. Development of the project life can be relatively complex, although several practical considerations related to benefit-cost analysis greatly simplify this task.

Project Life

Probably the most important aspect of benefit-cost analysis in this regard is the discounting procedure, which serves to provide a useful estimate of the longest period of evaluation that is economically useful. Federal water resources are generally limited to a 50 year evaluation period, which is the longest project life that should be considered in the application of this methodology. For discounting purposes, a rate of 7 percent will be used in this analysis.

A different project life may also be applicable, although use of a 50 year project life is generally preferred. A shorter project life may simply result from the fact that the project is not constructed to last 50 years. In these cases, special studies related to the project should explicitly set forth the project life. In other cases, the actual project life may be uncertain. For these cases it is suggested that a 50 year project life be utilized, with some sensitivity analysis of the project economics based on differential project lives. For example, the project might be evaluated using 30, 40 and 50 year project lives to determine if the economic evaluation is sensitive to the project life.

To provide a common basis of comparison between all project applications, a 25 year minimum evaluation period is also specified for all projects, with one posible exception noted in Appendix A. The reason for this minimum period of evaluation is to allow for the comparison of projects with roughly similar lifetimes. If a project had an estimated life of less than 25 years, then the cost estimates of the project should include the costs of reconstructing the project at some time in the future to

provide for an evaluation period of greater than 25 years. The evaluation period should be a multiple of the actual project life. For example, if a project had an estimated life of 15 years, the project cost would include the present value of rebuilding the project in the 16th year to last an additional 15 years, yielding an evaluation period of 30 years, i.e., 2 times 15 years. A project with only a 9 year project life would need to be reconstructed twice, in the tenth and nineteenth years to yield an evaluation period of 27 years, i.e., 3 times 9 years. In general, operations and maintenance costs associated with a project are estimated to insure that the project can have a 50 year life.

Project Costs - Operations and Maintenance

Given the estimated project life, it is then necessary to determine all costs associated with the project that will maintain the project over this lifetime and will allow the project to actually realize the benefits that will be computed for the project. Generally, annual operations and maintenance costs (O&M) associated with maintaining a structure for its estimated life are based on some percentage of the construction cost of the project. Depending on the particular type of project annual O&M costs are estimated at 2.5, 5.0 or 7.5 percent of the initial construction cost. For most projects, annual O&M costs should be estimated at 5 percent of the initial construction cost of the project. For high operations and maintenance type projects, mainly grain elevators, an annual estimate of 7.5 percent is used. The lower estimate is used for projects where only the maintenance portion of annual costs is relevant. These are cases where the operations portion of the costs are closely associated with the productive process, for example in the ship building industry where the dock must be maintained but is not operated independently of the process of constructing vessels. As a rule of thumb, the 5 percent estimate should be used, except where higher costs are expected as a result of such things as a need for cleanliness or lower costs are expected as a result of the facility not actually being operated in the normal sense.

Project Costs - Site Development

The final portion of this step is the determination that all relevant project costs have been included in the estimated costs. The real test of whether all costs have been included is the ability to actually realize benefits to the project given the estimated project costs. If not, then additional costs must be included. The main area where costs may not be accurately included is where the project cited in the application is an intimate portion of a larger project. For example, construction of a new dock wall itself has no beneficial impact unless the

accompanying facilities are also constructed. These costs must be included to allow for a correct comparison of project benefits and costs.

In formal economic terminology, the estimated costs must include the costs of any limitational input. That is, the costs of all necessary inputs must be included in the cost estimate, even if they are not formally a part of the application. This will insure that project benefits are compared to all costs necessary to realize these benefits. In general, development type projects are the most likely to have project costs that are not fully reflected in the project cost estimate, e.g., the land side development of a facility that will utilize the project. Improvement or maintenance projects will generally already have developed the necessary infrastructure to utilize the project without incurring additional costs for facility development associated with the project.

The data necessary for estimating these additional costs, generally site development costs, is given in Appendix A. Exhibit 1.1 shows an example of the application of this method in estimating site development costs. Unit costs are based on 1978 dollars and then adjusted to current levels based on the Engineering News Record Cost Index. Table A.4 of Appendix A contains a work sheet for developing any additional project costs not adequately described in the application.

Project Costs - Discounting

Exhibit 1.2 presents a tabular format for determining the allocation and the present value of project costs in the first year of the project life. The table is laid out to account for projects that have a significant construction period before the first year of project life. Where this is the case, expenditures per year should be entered in column 3 from the construction schedule. If this is not available, then the expenditures should be assumed to be constant each year. Thus, a project with a three year construction schedule would expend one-third of project construction costs in each year. Construction costs are to include both those from the application and any additional costs from Table A.4 of Appendix A.

Operations and maintenance costs will be constant expenditures and are computed according to the formula in Exhibit 1.2. All yearly present values computed at a 7 percent discount rate would then be summed to obtain the present value at the beginning of the project life and are comparable to the benefits computed later. It is expected that most projects that will be considered will have a construction period of less than one year, in which case all construction costs should be entered in year zero.

Cost Allocation

Cost allocation is based on the project application. The application will show any non-state, non-local costs, i.e., federal grants, and the expected state share of the costs. The local share is then the total present value of costs less the state, non-local share and the non-state, non-local share.

EXHIBIT 1.1

Example of Estimating Site Development Costs

Item	Quantity	1978[4] Unit Cost	1978 Total Cost
General Site Preparation, Clearing, Grading, Drainage	11.5 Acres	$40,000/Acre	$ 460,000
Lighting	11.5 Acres	10,000/Acre	115,000
Perimeter Fencing	1,150 Ft.[1]	10/Ft.	11,500
Paving	11.5 Acres[2]	6,000/Acre	69,000
Buildings	3,450 Ft.^{2} [3]	25/Ft.^{2}	86,250
		SUBTOTAL	$ 741,750
Utilities, Engineering and Contingency		25% of Subtotal	185,438
		1978 TOTAL	$ 927,188
1978-1982 Cost Increase from ENR	1.315	1982 TOTAL	$1,219,252

1) Estimated at 100 feet per acre.

2) Estimated at 100 feet per acre, 24 feet wide at a cost of $60 per foot.

3) Estimated at 300 ft.^{2} per acre.

4) From Mid America Port Study, Main Report, Chapter 17.

EXHIBIT 1.2

COMPUTATION OF PRESENT VALUE OF PROJECT COSTS AND SHARES
AT 7% DISCOUNT RATE

	Costs		
Year Before Start of Project	Discount Value	Times Costs Incurred In Year	Equals Present Value
7	1.6057814		
6	1.5007383		
5	1.4025517		
4	1.310796		
3	1.225043		
2	1.144899		
1	1.70000		
0	1.0000		
Cost to Rebuild Project[1]			
Annual O$M Costs[2]			
25 Yr. Project Life	11.6537		
30 Yr. Project Life	12.4091		
40 Yr. Project Life	13.3318		
50 Yr. Project Life	13.809		
SUM			

	Shares Costs Contributed[3]	Cost Share[4]
Local Costs		
State Non-local Costs		
Non-state Non-local Costs		

1) If project is to be rebuilt during evaluation period, discount value is $(1/1/07)^n$, where n is year rebuilding takes place. For example, rebuilding after 15 year life, discount factor is .3387 = $(1/1.07)^{16}$.

2) Complete only one line.

3) From Application, except local which is computed as residual.

4) Costs Contributed ÷ Sum.

EXHIBIT 1.3

EXEMPLARY COST COMPUTATION AT A 7% DISCOUNT RATE

Year Before Start of Project	Costs: Discount Value	Costs: Times Costs Incurred In Year	Equals Present Value
7	1.606	0	0
6	1.501	0	0
5	1.403	0	0
4	1.311	0	0
3	1.255	0	0
2	1.145	0	0
1	1.070	0	0
0	1.000	48,000	48,000

Cost to Rebuild Project[1)]

Annual O$M Costs[2)]

25 Yr. Project Life	11.654	N/A	
30 Yr. Project Life	12.409	N/A	
40 Yr. Project Life	13.332	N/A	
50 Yr. Project Life	13.809	2,400	33,142
SUM			81,142

	Shares Costs Contributed[3)]	Cost Share[4)]
Local Costs	42,742	.527
State Non-local Costs	38,400	.473
Non-State Non-local Costs	0	.000

1) If project is to be rebuilt during evaluation period, discount value is $(1/1.07)^n$, where n is year rebuilding takes place. For example, rebuilding after 15 year life, discount factor is .3387 = $(1/107)^{16}$.

2) Complete only one line.

STEP 2

PURPOSE: Determine projected commodity flows expected to use the harbor for each period of the project life.

DATA REQUIREMENTS:

1. "Waterborne Commerce of the United States," Part 2 or 3
2. Project life from Step 1
3. Table of commodity growth rates - Exhibit 2.2
4. Port and dock records of applicant if available
5. Available special studies

RECOMMENDED ACTION: This step will determine the commodity flows expected to utilize the harbor over the project life. Computation of commodity flows requires four separate pieces of data--the project life, the traffic base, the commodity growth rates over the project life, and harbor capacity constraints. The project life was established in Step 1.

Identifying Commodities

Next, the types and traffic levels of commodities using the harbor project shall be identified. The necessary level of detail cannot be specified without reference to the particular harbor and project under evaluation. For highly specialized projects, a very detailed classification of commodity types may be needed, although in general, identification and classification of commodities at the two-digit Standard Industrial Classification (SIC) level will be adequate. In some cases, a modified two-digit classification may be desireable. For example, one might wish to distinguish between grain and other agricultural products within SIC 01.

For purposes of identifying commodity types, projects can be grouped into three categories: (i) port-wide or general harbor type projects, (ii) dock(s) specific projects, and (iii) new or commodity specific projects. The first type of project would effect the entire port, for example, channel deepening throughout the port. The second type of project would affect only some portion of the port, for example, channel deepening in only a portion of the port. The last type of project would normally affect only a small number of docks, for example, a specific new dock facility.

Identification of commodity types for the first two types of projects can be accomplished using the "Waterborne Commerce of the United States," Part 2 or 3, published by the Corps of Engineers or by using data available to the local port authority.

Exhibit 2.1 shows an example of using "Waterborne Commerce of the United States - Part 3" to determine commodity types. Several years have been included to check for annual fluctuations or any peculiarities that may be present in the data. For example, the 1978 tonnage level is not representative of traffic due to the large change in commodity 14. One could select the five year average as the base year traffic, where such peculiarities are present. Otherwise, the most recent year should be used.

Exhibit 2.2 shows a slightly more aggregate grouping based on the correspondence between two-digit SIC codes and the four-digit Waterborne Commerce Statistical Center commodity codes. After selecting the base year traffic, commodities should be grouped according to Exhibit 2.2. The groups in Exhibit 2.2 are used for commodity projections. The only real difference is the last group, MISCELLANEOUS COMMODITIES, which combines several commodities that are shipped in relatively small quantities on the water.

Projected Harbor Traffic

The harbor traffic base is aggregated by the groups in Exhibit 2.2 so that they can be applied to the commodity growth rates shown in Exhibit 2.3 by commodity and traffic type and by shipment and receipt. Exhibit 2.4 shows how this information is put together.

EXAMPLE

In the example of Exhibit 2.4, the base tonnage for food and kindred products is taken from the example in Exhibit 2.1 and is assumed to be exported for foreign use. The annual growth rates are taken from Exhibit 2.3 for food and kindred products, shipped foreign. Since the base traffic is assumed to be average shipments, annual growth of 2.9 percent from 1977-1985 will increase shipments to 67,538 tons. Similarly, 2.9 percent annual growth from 1985-1990 increases shipments to 77,916 tons. After 1990, the growth rate is 1.6 percent annually, resulting in projected traffic of 84,352 and 91,320 tons in 1995 and 2000, respectively. Similar computations are shown for the remaining products.

It is necessary to remember that the growth rates presented here represent annual growth rates and, thus, for every five year period, the formula for determining fifth year tonnage is:

$$T_5 = T_o(1 + g_i)^5$$

where,

T_5 = fifth year tonnage

T_o = tonnage in base case, or in fifth year preceding

g_i = annual growth rate for commodity i

In the event of a 10 year horizon, T_{10} is evaluated similarly to T_5, where the exponent is 10. Any other time frame is analogous.

The output of this step represents the projected commodity flow through the entire harbor, assuming there are no constraints in the harbor. In the next several steps, potential constraints in the harbor will be checked to ascertain the traffic that can actually be processed through the the harbor in future years.

EXHIBIT 2.1

Kenosha Harbor Tonnage

Commodity (2-digit SIC)	1975	1976	1977	1978	1979	Average
01	1,475	14,771	3,090	3,079	3,576	5,198
09	555	174	271	322	880	440
14	7,616	0	0	22,691	12,656	8,593
20	42,833	59,525	60,636	61,205	52,144	55,289
22	2,678	1,851	600	1,489	7,823	2,888
24	2,143	2,577	784	1,443	2,206	1,831
26	0	114	60	79	1,582	367
28	618	256	261	408	824	473
32	4	4	0	3,739	15	752
33	555	433	46	24	639	339
34	6	143	0	22	12	37
35	95	351	1,318	4,414	6,041	2,444
37	530	4,088	13,360	84	23	3,617
08, 25, 27, 30, 31, 36, 38, 39 & 41	10	91	28	12	46	37
Total	59,118	84,378	80,454	99,011	88,455	82,283

SOURCE: "Waterborne Commerce of the United States - Part 3," annual volumes 1975-79, Corp of Engineers.

EXHIBIT 2.2

Commodity Groupings for Use in Traffic Projections

SIC Group Number(s)	Commodity Name	Waterborne Commerce[1] Statistical Center Code
01	FARM PRODUCTS	
	Corn	0103
	Wheat	0107
	Soybeans	0111
	Other Farm Products	0101, 0102, 0104, 0105, 0106, 0112, 0119, 0121, 0122, 0129, 0131, 0132, 0133, 0134, 0141, 0151, 0161, 0191
10	METALLIC ORES	
	Iron Ore and Concentrates	1011
	Other Ores (including Bauxite)	1021, 1051, 1061, 1091
11	COAL	
	Coal and Lignite	1121
13	CRUDE PETROLEUM	
	Crude Petroleum	1311
14	NONMETALLIC MINERALS	
	Sand, Gravel and Crushed Rock	1442
	Limestone	1411
	Phosphate Rock and Other Fertilizers	1471, 1479
	Sulphur	1492, 1493
	Other Nonmetallic Minerals	1412, 1451, 1494, 1499, 1491
20	FOOD AND KINDRED PRODUCTS	
	Vegetable Oils	2091
	Grain Mill Products	2041, 2042, 2049
	Other Food Products	2011, 2012, 2014, 2015, 2021, 2022, 2031, 2034, 2039, 2061, 2062, 2081, 2092, 2094, 2095, 2099
24	LUMBER AND WOOD PRODUCTS	
	Logs (including Pulpwood)	2411, 2415
	Rafted Logs	2412
	Lumber and Plywood	2421, 2431
	Other Lumber and Wood Products	2413, 2414, 2416, 2491

EXHIBIT 2.2 (Con't.)

SIC Group Number(s)	Commodity Name	Waterborne Commerce Statistical Center Code
26	PULP PAPER AND ALLIED PRODUCTS	
	Pulp	2611
	Other Pulp and Paper Products	2621, 2631, 2691
28	CHEMICALS	
	Sodium Hydroxide	2810
	Crude Tar, Oil and Gas Products	2811
	Alcohols	2813
	Benzene and Toluene	2817
	Sulphuric Acid	2818
	Other Chemicals	2816, 2819, 2812, 2821, 2822, 2823, 2831, 2841, 2851, 2861, 2876, 2891
	Nitrogenous Chemical Fertilizers	2871
	Potassic Chemical Fertilizers	2872
	Phosphatic Chemical Fertilizers	2873
	Other Fertilizer Products	2879, 2875
29	PETROLEUM AND COAL PRODUCTS	
	Gasoline	2911
	Jet Fuel and Kerosene	2912, 2913
	Distillate	2914
	Residual	2915
	Other Petroleum and Coal Products, nec.	2916, 2917, 2918, 2921, 2951, 2991
32	STONE, CLAY, GLASS, AND CONCRETE PRODUCTS	
	Cement	3241
	Other Stone, Clay, Glass Products	3271, 3211, 3251, 3281, 3291
33	PRIMARY METALS PRODUCTS	
	Coke	3313
	Iron and Steel Primary Forms	3314
	Steel Mill Products (shapes, plates, pipe and tube)	3315, 3316, 3317, 3311, 3312, 3318,
	Primary Metals	3311, 3312, 3318, 3319, 3321, 3322, 3323, 3324
40	WASTE AND SCRAP	
	Metal Scrap	4011, 4012
	Other Scrap	4022, 4024, 4029

EXHIBIT 2.2 (Con't.)

SIC Group Number(s)	Commodity Name	Waterborne Commerce Statistical Center Code
	MISCELLANEOUS COMMODITIES	
08	Forest Products	0841, 0861
09	Fish	0911, 0912, 0913, 0931
19	Ordnance	1911
21	Tobacco	2111
22	Textiles	2211, 2212, 2311
25	Furniture	2511
27	Printed Matter	2711
30	Rubber Products	3011
31	Leather	3111
34	Fabricated Metal	3411
35	Machinery	3511, 3611
37	Transportation Equipment	3711, 3721, 3731, 3791
39	Instruments, Optical Goods, etc.	3811
41	Miscellaneous Manufactures	3911
	Water	4111
	Commodity, nec.	4112
	LCL Freight	4113, 9999
	Department of Defense Cargo	
	Water Improvement Materials	4118

1) Details of Waterborne Commerce Statistical Center Codes are contained in "Waterborne Commerce of the United States."

EXHIBIT 2.3

Wisconsin Port Traffic Projections
Annual Growth Rates - %

Commodity (Sic)		GREAT LAKES Shipped				GREAT LAKES Received				UPPER MISSISSIPPI RIVER	
		Domestic		Foreign		Domestic		Foreign			
		1977-90	91-03	1977-90	91-03	1977-90	91-03	1977-90	91-03	1977-90	91-03
Farm Products	(01)	0.3	0.0	4.3	2.9	0.3	0.0	0.4	0.3	4.3	3.1
Metallic Ores	(10)	5.2	2.5	3.2	0.1	5.2	2.5	1.4	2.5	1.7	1.3
Coal	(11)	1.9	2.1	4.8	1.8	1.8	2.1	5.4	0.1	1.8	2.1
Crude Oil	(13)	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.1	0.4	0.9
Non-metallic Minerals	(14)	4.0	2.1	2.8	2.8	4.2	2.2	1.6	1.9	-2.4	-1.1
Food & Kindred Products	(20)	0.0	0.0	2.9	1.6	0.0	0.0	3.0	4.0	4.2	1.9
Lumber & Wood Products	(24)	-0.8	0.0	17.3	0.1	-0.8	0.0	-1.6	-0.6	3.0	0.6
Pulp & Paper Products	(26)	0.2	0.1	2.5	2.0	0.2	0.1	0.1	-0.1	0.9	0.6
Chemicals	(28)	3.2	3.7	2.2	0.5	3.2	3.9	0.3	2.0	4.0	3.3
Petrol/Coal Products[1]	(29)	-0.4	0.2	-3.0	-3.0	0.0	0.2	0.0	0.0	0.9	1.1
Stone, Clay, Cement	(32)	2.6	1.7	6.2	3.7	2.7	1.7	3.0	0.6	1.5	0.6
Primary Metals	(33)	0.9	1.0	1.8	0.5	0.9	0.7	2.7	0.9	1.7	1.5
Waste & Scrap	(40)	1.9	0.8	4.1	0.2	2.5	1.0	5.4	4.6	2.6	0.2
Other	(-)	2.4	2.2	6.2	5.1	2.4	2.3	2.0	1.2	0.2	0.3
All Commodities		3.9	3.2	4.3	2.1	3.8	2.2	1.6	2.0	3.8	2.4

1) Not elsewhere classified.
Source: National Waterways Study, "Traffic Forecasting Methodology and Demand Projections," Institute for Water Resources, April, 1980.

EXHIBIT 2.4

Exemplary Growth Rate Usage

Commodity	Base Tonnage[1]	Growth Rate 1977-1990[3]	After 1990[3]	Traffic[5] 1985	1990	1995	2000	2035
Food & Kindred Products (20)	55,289[1]	2.9%	1.6%	67,538[4]	77,916	84,352	91,320	169,164
All Other	26,994[2]	1.6%	2.0%	30,166	32,658	36,057	39,810	79,618
Total	88,283	N/A	N/A	97,704	110,574	120,409	131,130	248,782

1) Taken from Exhibit 2.1, average for group 20.

2) From Exhibit 2.1, total less group 20.

3) From Exhibit 2.3, group 20 assumed to be exports (foreign shipped) and all other imports (foreign received).

4) Computed as 55,289 growing 2.9% for 7 years (1977-1985) = $(1.029)^7$ x 55,289. All other projected traffic computed in a similar fashion using appropriate growth rate and time increments.

5) Relevant periods of analysis assumed to be 5 year increments, see text.

STEP 3

PURPOSE: Determine commodity flows for traffic through the port without the project.

DATA REQUIREMENTS:

1. Information from Steps 1 and 2.
2. Available special studies
3. Available port and dock records of applicant
4. Appendix B

RECOMMENDED ACTION: The purpose of this step is the actual specification of the levels of traffic, by appropriate commodity type, that would use the port in the absence of the proposed project. The basic input for this determination will be the identification of commodity types developed in Step 2, projected traffic from Step 2, and the computed capacity constraints for the port from Appendix B.

Harbor Traffic

Given the unconstrained traffic flows from Step 2, the application of the computed capacity constraints will determine the traffic that can move through the port in the absence of the project for each year of the project life. Exhibit 3.1 shows how this may be accomplished. Given the commodity groupings, the corresponding port capacity is ascertained as described in Appendix B. For each project year in Exhibit 3.1, the projected tonnage is taken from Exhibit 2.4 for the corresponding year. Actual tonnage is then the lower of capacity, column (2) or the projected tonnage for that year, column (3).

Project Traffic

The next step is to determine the projected commodity flows that should be associated with the project described in the application. The major difficulty in developing the commodity flow will be for projects which affect a significant, but small portion of the harbor. Rather obviously, harbor wide improvements will affect 100 percent of the traffic. Similarly, for dock specific projects, data should be available from the dock user or owner, or should be readily identifiable from the data developed in Step 1 based on the use of the dock. For new projects, special studies will often provide the necessary data base.

For any remaining projects, there are several methods available for determining the traffic levels. For reasons of simplicity, it is recommended that in these instances the traffic expected to utilize the proposed project should be computed as (1) the proportion of (new) capacity the project represents, if dock capacities are available, or (2) each dock should receive a equal proportion of traffic. For example, the capacity of grain elevators is usually readily available. In this case, if no specific information is available, the traffic allocated to the proposed project should be the ratio of the capacity of the "new" elevator to the total grain capacity of the port. Where capacities are not readily available, or docks are rather similar, for example general cargo docks, the traffic allocated to the project would be the number of affected docks divided by the number of docks in the port that handle the relevant types of commodities. It is not expected that the two methods will yield the same answer. Whenever possible, Method 1 should be used.

At this point, traffic levels through the harbor without the project in place have been determined. Also, the particular types of commodities that require further consideration have been identified. This will serve as input to the next step to determine the levels of traffic with the project and the potential traffic that might benefit from the project.

One important point has been ignored in Exhibit 3.1. Capacity is treated as totally determined in the base year. However, in some cases, capacity may change from period to period due to changing conditions at a harbor or facility. For example, docks may be retired, dredging curtailed, or new facilities or equipment may be scheduled to begin operations in the near future. Capacity estimates should reflect any known or foreseeable conditions that will influence port/harbor capability to operate at current levels. In this event, Exhibit 3.1 would be expanded to a series of tables with capacity defined for each period of time, based on operating characteristics and facilities expected for each time period.

Exhibit 3.2 has been included to show computations of port based on the formulas of Appendix B and hypothetical data that is roughly consistent with the Port of Kenosha. As was noted in Appendix B, the three capacity methods do not yield the same answer and the storage capacity of the port is the limiting capacity. It should be noted that the berth capacity has been transformed into tons per year by multiplying the average vessel size (10,000 in Exhibit 3.2) by the formula for berth capacity from Appendix B. As can be noted from Exhibits 2.4 and 3.2, the port capacity far exceeds the projected year 2035 tonnage for this example, so that all projected tonnage can be processed through the port. This example is based on a project that would

repair one of two docks in the port and it is not expected that the dock can continue to move traffic without the necessary repairs. Based on the earlier discussion, the capacity of each dock would be 354,703 tons (one-half of 709,406), with each dock expected to handle one-half of the tonnage in each year (see Exhibit 4.2).

EXHIBIT 3.1

PROJECTED PORT PROJECT TONNAGE
COMMODITY - _____

(1) Project Year	(2) Harbor/Port Capacity	(3) Year-Projected Tonnage	(4) Year-Actual Tonnage
0			
1			
5			
10			
15			
20			
25			
30			
35			
40			
45			
50			
TOTAL			

(2) Source: Appendix B
(3) Source: Exhibit 2.4
(4) Lower of columns (2) or (3)

EXHIBIT 3.2

Exemplary Port Capacity Computations

	Berth Capacity	Handling Capacity
Hours (HRS.)	24	24
Days (DYS)	270	270
Berths (n)	4	N/A
Equipment (EQ)	N/A	2
Service Rate (μ)	.02	N/A
Handling Rate (HRH)	N/A	200
Utilization Efficiency (u)	.70	.50
Average Vessel Size	10,000	N/A
Capacity	3,628,800 tons	1,296,000 tons

	Storage Capacity
Storage Area - Sq. Ft. (TSA)	827,640
Storage Area/Ton (NAPT)	10
Days in Storage (DWTM)	7
Storage Utilization (CSU)	.9
Proportion of Area Used in Storage (PROP)	.2
Days Available (DYS)	270
Capacity	709,406 tons

STEP 4

PURPOSE: Determine actual commodity flows through the harbor under with project conditions.

DATA REQUIREMENTS:

1. Commodity flows from Steps 2 and 3
2. Port/dock capacities from Appendix B

RECOMMENDED ACTION: This step will utilize information on projected traffic, and port and project capacities to determine the traffic that may benefit from the project. Exhibit 4.1 shows a tabular display of how this may be computed. Lines 1 and 2 are taken directly from Exhibit 3.1 and simply indicate the projected traffic levels and the constrained without project traffic levels by commodity type (which may be all commodities for certain types of projects). Line 3 represents the addition to capacity provided by the project (which might be zero for some types of projects). Line 4 represents any additional traffic that might move if there were no constraints. Line 5 is then the additional traffic that can move by providing the project.

At this point, the necessary information on quantities has been produced, that is the Q_1's and Q_2's of the benefit computation equation are contained implicitly in Exhibit 4.1. Line 2 of Exhibit 4.1 represents the time series of Q_1's. Line 4 represents the time series of Q_2's, while Line 5 represents Q_2-Q_1. It should be noted that there are many types of projects for which Line 5 will be zero. That is, the project does not allow for higher traffic levels, but simply moves this traffic more efficiently than is currently the case. This is quite consistent with the methodology and will not yield zero benefits, since price effects on the traffic will still be present.

EXAMPLE

Exhibit 4.2 is provided as an example based on the earlier exhibits for tonnage and capacity. The project traffic is one-half of that projected for the port (Exhibit 2.4). Although the facility will not be useful without the project, traffic will continue to use the port so that there is no new traffic and projected and constrained traffic are equal. Project capacity was discussed in Step 3 and is shown as one-half the port capacity since there are two docks in the port. Thus, there is no potential new traffic through the port and lines 4 and 5 of Exhibit 4.2 are zero. This is exactly the case cited above, where the project does not handle "new" traffic, but can handle existing traffic at a lower relative cost in the with project

condition. This yields no potential new traffic for any year of the project, and since traffic is less than project capacity, all projected traffic will move through the port.

EXHIBIT 4.1

COMPUTATION OF PROJECT TRAFFIC
COMMODITY - _____

	Year-	Year-	Year-	Year-	Year-	Year-	Year-	Year-	Year-	Year-	Year-
1. Unconstrained Traffic											
2. Constrained Without Project Traffic (Q_1)											
3. With Project Capacity											
4. With Project New Traffic (Q_2) (Lower of Lines 1 or 3)											
5. New Traffic ($Q_2 - Q_1$) (Lower of Lines 3 or 4)											

1. Source: Exhibit 3.1, Column 3
2. Source: Exhibit 3.1, Column 4
3. Source: Appendix B or project application

EXHIBIT 4.2

EXEMPLARY COMPUTATION OF PROJECT TRAFFIC
COMMODITY - ALL COMMODITIES

	Year-1985	Year-1990	Year-2000	Year-2035
1. Unconstrained Traffic	48,852	55,287	65,565	124,390
2. Constrained Without Project Traffic (Q_1)	48,852	55,287	65,565	124,390
3. With Project Capacity	354,703	354,703	354,703	354,703
4. With Project Traffic (Q_2) (Lower of Lines 1 or 3)	0	0	0	0
5. New Traffic ($Q_2 - Q_1$) (Lower of Lines 3 or 4)	0	0	0	0

1. Source: Exhibit 3.1, Column 3
2. Source: Exhibit 3.1, Column 4
3. Source: Appendix B or project application

STEP 5

PURPOSE: Determine current and future transportation impacts on commodity movements without the project.

DATA REQUIREMENTS:

1. Commodity movements from Steps 3 and 4
2. Special studies as available
3. Appendix C

DISCUSSION: The purpose of this step is to develop basic information on transportation costs necessary to compute transportation savings accruing to any proposed project. Because the nature of savings is the difference between costs with and without the project in place, the amount of necessary information is greatly reduced, once the nature of the project effects are visible. For example, a channel deepening project will affect the line haul shipping costs, but no other components of the total transportation costs such as handling or the cost of moving the commodity to the port. On the other hand, it is not necessary to exactly specify current costs for certain types of projects. They can simply be set equal to zero. That is, without the project all current costs will be incurred, plus some additional cost to compensate for the lack of the project. A simple example would be a project that decreased time at a dock by one hour per vessel. The only issue is the value of the one hour time saving by implementing the project. All other components of transport costs will be the same regardless of the project. Thus, the focus of this step is to delineate the necessary basic transportation cost information, by project type and time period that will allow the computation of transportation savings.

RECOMMENDED ACTION: This step will identify the relevant without project transportation impacts on movements identified in Steps 3 and 4 that may benefit from the proposed project. As should be clear from the above discussion, this step is intimately related to Step 6, determining alternative transport costs for these movements. That is, the two steps are related in the sense that taken together they identify only those components and costs among all transport factors that will be affected by the proposed project.

Project Types

In setting forth the without project transportation impacts, three types of projects can be conceptually considered. The first type of project is represented by channel deepening or straightening, for example, where cost savings would accrue

regardless of the amount of traffic through the port. The second type of project is related to reduced congestion. For example, adding additional berths at a dock to reduce congestion at the dock. The third type of project is one which eliminates or significantly alters an unnecessary component of total transportation or production costs. For example, a project that would eliminate a portion of the handling of commodities, such as a conveyor system.

In many cases, especially for the larger ports such as Milwaukee or Duluth-Superior, there will be special studies which will have calculated transportation impacts and costs. These can be used in the case of these ports, and as guidelines for nearby ports. Also, these studies will be most helpful in determining alternative routing in Step 6. Other relevant information might be obtained by contacting dock operators.

Project Impacts - Physical Effects

For many of the projects to be evaluated with this methodology, there is no need to explicitly consider alternate routes or modes, so that Step 5 is to a large extent a restatement of the reason for the application. A good example of this type of project is maintenance dredging. Generally, maintenance dredging will not increase tonnage through a port, but will allow the tonnage to be shipped at a lower cost by allowing vessels to load to a greater draft. Since $Q_1 = Q_2$, the with and without project tonnages are the same; only the prices associated with this tonnage change. Thus, $Q_2 - Q_1 = 0$ and the benefit evaluation equation reduces to $Q_2(P_1 - P_2)$. As will be described in the next step, this is easier to compute directly, rather than to compute each variable separately and to take the difference.

As will become clear in Step 6, generally, the dredging example is a fairly normal case. For general harbor improvements, this is virtually always true. For the other two types of projects cited above, this is also likely to be true. Thus, what this step requires is a determination of the transportation cost component(s) that will be affected by the proposed project. Exhibit 5.1 shows a tabular format for determining these effects.

Exhibit 5.1 is simply a general listing of possible transportation cost components. It should also clarify why this step is not really necessary for the dredging example. The only real effect of a dredging project would be reflected in Line 4, with the explanation denoting the change in channel depth. For the other lines in Exhibit 5.1, there is no effect and hence they can be ignored.

For the second type of projects, congestion, the effects could appear in one of two lines or possibly both lines. Congestion might affect Lines 3 or 5 by decreasing the amount of time a vessel spends in port. They might also appear in Lines 2 or 6 if congestion is sufficient to cause cargo to be shipped through an alternative port or an alternative dock in the same port. In this event, Lines 2 or 6 would reflect the increased truck or rail haul to the alternative dock in miles. This case would also correspond to the third type of project cited above. For example, these lines might reflect decreased waiting time at a berth, or a truck haul to some other port.

Again, it should be noted that the declining base case may make it necessary to compute Exhibit 5.1 for various years of the project life, since the differential effect of the project may vary as the without project condition declines in efficiency. For example, the without project channel depth may be decreasing due to lack of maintenance dredging. Also, differences between commodities may make it necessary to compute Exhibit 5.1 for each commodity the project may affect.

EXAMPLE

Continuing our earlier example based on the Kenosha application, we hypothesis that all port traffic will continue to utilize the Port of Kenosha, but will need to be hauled from one dock to the other dock in the port due to the manner in which the storage facilities in the port are configured. The result is that Exhibit 5.2, Line 3, shows that loading at the port would require transportation from one dock to the other in the without project condition. Thus, Exhibit 5.2 shows an effect in Line 3 of an additional truck charge between the two docks in the port.

EXHIBIT 5.1

PROJECT EFFECTS ON TRANSPORTATION COST COMPONENTS

	(1) No	(2) Yes	(3) Explanation of Effect
1. Is loading charge at inland origin affected?			
2. Is truck/rail charge to port affected?			
3. Is unloading/storage/loading at origin port affected?			
4. Is line-haul vessel cost affected?			
5. Is unloading/storage/loading at destination port affected?			
6. Is truck/rail charge to inland destination affected?			
7. Is unloading charge at inland destination affected?			
8. Will project affect industrial production at any dock?			

NOTE: Complete explanation only where costs are affected, and see Appendix C for cost effects for use in Step 6. Explanation may be in dollars, where charges are known, or a physical quantity such as miles or vessel draft.

EXHIBIT 5.2

PROJECT EFFECTS ON TRANSPORTATION COST COMPONENTS - KENOSHA

	(1) No	(2) Yes	(3) Explanation of Effect
1. Is loading charge at inland origin affected?	x		
2. Is truck/rail charge to port affected?	x		
3. Is unloading/storage/loading at origin port affected?		x	Trucking between docks
4. Is line-haul vessel cost affected?	x		
5. Is unloading/storage/loading at destination port affected?	x		
6. Is truck/rail charge to inland destination affected?	x		
7. Is unloading charge at inland destination affected?			
8. Will project affect industrial production at any dock?	x		

NOTE: Complete explanation only where costs are affected, and see Appendix C for cost effects for use in Step 6. Explanation may be in dollars, where charges are known, or a physical quantity such as miles or vessel draft.

STEP 6

PURPOSE: Identify transportation costs associated with transportation impacts identified in Step 5.

DATA REQUIREMENTS:

1. Appropriate published tariffs
2. Appendix C
3. Information on transportation impacts from Step 5

RECOMMENDED ACTION: This step will compute the cost of impacted transportation components for shipping the cargoes in question in the event that the project were not completed. In conjunction with the efforts of Step 5, the output of this task will identify the least cost alternative to the use of the project in question. Using the costs identified in Appendix C, the output of Tasks 2 through 6 will describe traffic using the project, and the cost savings associated with implementation of the project.

Transportation Costs - Alternative Ports/Docks

Identification of the costs of transportation via alternative route or mode should consider which waterborne route is the most reasonable alternative first. In effect, this implies selection of the most likely port or dock which would handle the cargo in question, alternative to the port or dock effected by the project being considered. This was a main goal of Step 5, to determine how cargo will move in the absence of the proposed project. If alternative ports will not be utilized, then proceed to the next section in this step.

The use of an alternative port will have three types of potential cost impacts. The first type results from a differential access cost, i.e., truck-haul, between two ports or docks. If this is the only impact, cost savings can be computed using section C.6.5 to estimate the differential truck costs to reach each port/dock. The second type of cost impact from using an alternative port/dock would result from different channel depths. This cost impact can be estimated using the equation in C.3 for deep draft vessels or C.4 for shallow draft vessels (see sections C.3.3, C.5.2 and C.6.1, as applicable).

The third type of cost impact from using an alternative port/dock would result from a differential length-of-haul on the water. This cost impact can also be computed using variations of the equations in C.3 and C.4. Since channel depth is not changing, the last term in each equation changes. However, the different length-of-haul will effect ton-miles (TM) in the equation. This

variable, (TM), should be replaced by the change in ton-miles resulting from the different length-of-haul on the water (see Sections C.3.3 and C.5.2).

It should be noted that implicit in the above discussion is the idea that port charges and components of transportation costs do not vary substantially as the routing of cargo is altered. Strictly speaking, this is probably not true. However, the competitive nature of ports and harbors should enforce a tendency for these costs towards equality so that any differences can usually be safely ignored. That is, each port must be responsive to the competitive threat posed by other area ports so that differences in port charges should be relatively slight.

The case where differential charges are likely to be present is where the project is part of a larger development project designed to attract cargo frm other ports. While potentially troublesome, projects of this type will usually have been thoroughly studied to determine if, in fact, the cost structure of the development will allow a pricing structure that will attract this tonnage. In this case, information from these studies should be utilized. In other cases, the assumption of equal port charges should be a good approximation for computing efficiencies.

Transportation Costs - Alternative Modes

Consideration of alternative modes of transportation here means truck and rail almost exclusively. Pipeline transport of chemicals and petroleum products should only be considered in those rare instances where the pipeline is operative. In this case, pipeline costs can always be obtained from the terminal or pipeline operator. As with all modes, the costs considered in this step should be only for existing rights-of-way and not include highways or rail lines in the preliminary planning process.

Appendix C contains generic information for the computation of unit savings when applicable. Rail and truck costs may be determined from special studies. Available rail tariffs may be used, although these will not be entirely accurate after the rail deregulation of late 1981, and as discussed in Appendix C, are difficult to use. The Interstate Commerce Commission publishes data on truck charges for regulated movements. For the majority of movements, however, it will be necessary to determine the commodity specific line-haul cost per ton-mile from general transportation studies, such as those contained in Appendix C, or special studies and apply these to the base tonnage and the

mileage from the route most likely to be used for rail or truck. (See Sections C.6.4 and C.6.5, respectively.) Any modal transfer charges involved should be added. (See Section C.6.6).

Transportation Costs - Same Port/Mode

This is the case where traffic uses the same port and same mode in both the with and without project conditions. In general, this is the most likely cost evaluation procedure applicable to projects. Based on the impacts set forth in Step 5, all cost impacts can be computed using the procedures set forth in Appendix C. For channel deepening, see C.3 and C.4 for deep draft and shallow draft projects, respectively. For projects affecting production facilities such as vessel repair docks, see C.8. Other types of improvements are discussed in C.9 and C.10.

Transportation Costs - Summary

The unit prices should be computed as discussed above and in Appendix C, and entered in Exhibit 6.1 as appropriate. When applicable, the savings can be computed directly as discussed in Appendix C, so that the first two columns of Exhibit 6.1 do not need to be filled in. Exhibit 6.2 continues the Kenosha-based example. From Exhibit 5.2, the transportation impact, (P_1), of trucking between docks is estimated at $.65 per ton based on Appendix C. Since this is eliminated by the project, $P_2 = 0$ and $P_1 - P_2 = \$.65$.

It is important to note that Exhibit 6.1 can reflect all of the possible cost effects cited above. For example, a shipment might be trucked to an alternative dock that has less channel depth. In this instance, both Lines 3 and 4 would be completed to reflect these cost impacts.

EXHIBIT 6.1

Computation of Unit Savings and Prices

	(1) Without Project Price - P_1	(2) With Project Price - P_2	(3) Unit Savings (P_1-P_2)
1. Loading charge at inland origin			
2. Truck/rail charge to port			
3. Unloading/storage/loading at origin port			
4. Line-haul vessel costs			
5. Unloading/storage/loading at destination port			
6. Truck/rail charge to inland destination			
7. Unloading charge at inland destination			
8. Other - _____			
9. Total			

(1) Source: Appendix C, per Exhibit 5.1
(2) Source: Appendix C, per Exhibit 5.1
(3) Column (2) minus column (1) or Appendix C per Exhibit 5.1
x No effect, per Exhibit 5.1.
NC If Column (3) is computed directly, enter NC in Columns (2) and (3).

EXHIBIT 6.2

COMPUTATION OF UNIT SAVINGS AND PRICES - KENOSHA

		(1) Without Project Price - P_1	(2) With Project Price - P_2	(3) Unit Savings (P_1-P_2)
1.	Loading charge at inland origin	x	x	0
2.	Truck/rail charge to port	x	x	0
3.	Unloading/storage/loading at origin port	.65	0	.65
4.	Line-haul vessel costs	x	x	0
5.	Unloading/storage/loading at destination port	x	x	0
6.	Truck/rail charge to inland destination	x	x	0
7.	Unloading charge at inland destination	x	x	0
8.	Other - _____	x	x	0
9.	Total	x	x	.65

(1) Source: Appendix C, per Exhibit 5.1
(2) Source: Appendix C, per Exhibit 5.1
(3) Column (2) minus column (1) or Appendix C per Exhibit 5.1
x No effect, per Exhibit 5.1.
NC If Column (3) is computed directly, enter NC in Columns (2) and (3).

STEP 7

PURPOSE: Computation of project benefits.

DATA REQUIREMENTS:

Price and quantity information from Steps 4 and 6.

RECOMMENDED ACTION: The project benefit in any given year is equivalent to the cost savings resulting from the implementation of the project as opposed to the least costly method of transporting cargoes without the project. In other words, the opportunity cost of the project is the difference between waterborne transportation cost with the project and the cost of the cheapest transportation method without the project. This net difference is to be determined from the information developed in the previous tasks and should be calculated for each reference period. These benefits will be discounted to a common time frame in Step 8.

Computing Benefits

Gross benefits per year are computed from the benefit computation equation.

$$(P_1-P_2)\ Q_1 + 1/2(P_1-P_2)(Q_2-Q_1) + (P_2-C_2)(Q_2-Q_1)$$

where, prices, P_1, P_2 and P_1-P_2 are determined from Steps 5 and 6, and quantities Q_1 and Q_2 are determined from Step 4. Generally, P_1 and Q_1 refer to the without project condition and P_2 and Q_2 refer to the with project condition, and the time subscript is ignored at present. In some cases, parts of this formula will be zero, i.e., if $P_1 = P_2$ or $Q_2 = Q_1$, so that the formula simplifies to:

$$(P_1-P_2)Q \text{ or } P(Q_2-Q_1)$$

where, $Q = Q_1 = Q_2$, $P = P_1-C_1 = P_2 - C_2$.

The first of these simplified equations represents the gross cost savings from the project being considered, while the latter reflects the gross value of increased throughput.

Exhibits 7.1 through 7.4 show how to compute benefits based on the informataion developed earlier. Exhibits 7.1 to 7.3 are simply tabular computations of the three terms in the benefit computation equation. If either of the two simpler equations are applicable, then only one of these exhibits will need to be

completed. Exhibit 7.4 simply sums up Exhibits 7.1 to 7.3 to obtain total gross transportation benefits accruing to the project.

Salvage Value

Before proceeding to the discounting of benefits, one last potential area of benefits must be considered and included in Exhibit 7.4. This is the possible salvage value of the project in the final year of the project life. It is expected that for most projects, salvage value will be zero. For example, a dredging project has no salvageable aspects. However, other types of projects will. The main salvage value to compute will generally be the value of land that will become "available" when the project life expires. This value can be taken from the project application or obtained from local officials. Another possibility is that equipment on the site itself may be salvageable to some extent for use in some other type of endeavor when the project life expires. Where such value can be identified and quantified, it should be included in the total benefits for the last year of the project and explained in the footnote to Exhibit 7.4.

EXAMPLE

Exhibit 7.5 shows the benefit computation for the Kenosha based example. For reasons of simplicity, only three years are shown, the first three years for which tonnage was computed in Exhibit 4.2. The first year of project life is assumed to be 1985 and thus 1990 is the 6th year and 2000 the 16th year. Of course, a complete computation would also show computations for each year of the project life, which is assumed as 50 years in this example. Quantities are taken from Exhibit 4.2, and the price differential was cited in the text of Steps 5 and 6 and shown in Exhibit 6.2.

EXHIBIT 7.1

Computation of Benefits - Price Effect

Project Year	(1) P_1-P_2	x	(2) Q_1	=	(3) Benefits
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31-35					
36-40					
41-45					
46-50					

(1) Source: Exhibit 6.1, Column (3)
(2) Source: Exhibit 4.1, Line 2

NOTE: IT IS IMPORTANT TO CHECK THAT THE QUANTITIES OF COLUMN (2) ARE MEASURED IN THE SAME UNITS AS THE DOLLARS PER UNIT ARE MEASURED IN COLUMN (1), WHICH IS USUALLY DOLLARS PER TON.

EXHIBIT 7.2

Computation of Benefits - Quantity Effects

Project Year	(1) P_2	x	(2) Q_2-Q_1	=	(3) Benefits
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31-35					
36-40					
41-45					
46-50					

(1) Source: Exhibit 6.1, Column (2)
(2) Source: Exhibit 4.1, Line 5

NOTE: IT IS IMPORTANT TO CHECK THAT THE QUANTITIES OF COLUMN (2) ARE MEASURED IN THE SAME UNITS AS THE DOLLARS PER UNIT ARE MEASURED IN COLUMN (1), WHICH IS USUALLY DOLLARS PER TON.

Exhibit 7.3

Computation of Benefits-Surplus

Project Year	(1) 1/2	x	(2) P_1-P_2	x	(3) Q_2-Q_1	=	(4) Benefits
1	.5						
2	.5						
3	.5						
4	.5						
5	.5						
6	.5						
7	.5						
8	.5						
9	.5						
10	.5						
11	.5						
12	.5						
13	.5						
14	.5						
15	.5						
16	.5						
17	.5						
18	.5						
19	.5						
20	.5						
21	.5						
22	.5						
23	.5						
24	.5						
25	.5						
26	.5						
27	.5						
28	.5						
29	.5						
30	.5						
31-35	.5						
36-40	.5						
41-45	.5						
46-50	.5						

(2) Source: Exhibit 6.1, Column (3)
(3) Source: Exhibit 4.1, Line 5

NOTE: IT IS IMPORTANT TO CHECK THAT THE QUANTITIES OF COLUMN (2) ARE MEASURED IN THE SAME UNITS AS THE DOLLARS PER UNIT ARE MEASURED IN COLUMN (1), WHICH IS USUALLY DOLLARS PER TON.

EXHIBIT 7.4

Total Benefits

Project Year	Price Effect Exhibit 7.1 Column 3	Output Effect Exhibit 7.2 Column 3	Consumer Surplus Exhibit 7.3 Column 4	(1)* Total
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31-35				
36-40				
41-45				
46-50				

(1) Sum of other 3 columns

* Includes project salvage value of $_____ in year ____, the last year of project life.

EXHIBIT 7.5

Exemplary Computation of Benefits-Price Effect - Kenosha

Project Year	(1) P_1-P_2	x	(2) Q_1	=	(3) Benefits
1	.65		48,852		31,754
2	.65				
3	.65				
4	.65				
5	.65				
6	.65		55,287		35,937
7	.65				
8	.65				
9	.65				
10	.65				
11	.65				
12	.65				
13	.65				
14	.65				
15	.65				
16	.65		65,565		42,617
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31-35					
36-40					
41-45					
46-50					

(1) Source: Exhibit 6.1, Column (3)
(2) Source: Exhibit 4.2, Line (2)

STEP 8

PURPOSE: Determine discounted benefits associated with the proposed project.

DATA REQUIREMENTS:

1. Benefits from Step 7

RECOMMENDED ACTION: Once annual project benefits have been computed, it is necessary to discount benefits to a common time-frame, in this instance the first year of the project life. The interest rate selected for purposes of discounting is 7 percent.

Discounting Benefits

Exhibit 8.1 presents a tabular format for discounting benefits, although the use of a computerized discounting program is acceptable. The exhibit is laid out as if benefits are computed for each year, which is unlikely. The first step in completing the table is to fill in the computed benefits for each available year of the project life from Exhibit 7.4. The next step is to interpolate between available years to fill in the remaining years. For example, if first year benefits are $10 and fifth year benefits are $50, then in four years benefits increase $40 or $10 per year. Hence, benefits in the second year are $20, in the third year $30 and the fourth year $40. This process is continued throughout the project life. Then for each year of the project life, the benefits are multiplied by the discount value to obtain the present value of benefits. These values are then summed to obtain the present value of all project benefits. Thus, the example above would be computed as follows:

Year	Discounted Value	Times Benefits	Equals Present Value
1	.9345744	$10	$ 9.345794
2	.8734386	20	17.468772
3	.8162978	30	24.488934
4	.7628952	40	30.515808
5	.7129861	50	35.649385
Sum			$117.47

The table is set forth annually for 30 years. For projects with evaluation periods over 30 years, the table is set up to eliminate interpolation. The above process would still be undertaken for the first 30 years, but the discount value for each five year period over 30 years already accounts for each year in the five year period, so that benefits for the last year

of the five year period can be multiplied by the relevant discount factor. For example, a project with a 40 year life having benefits of $100 in year 35 and $120 in year 40 would be discounted as $100 times .538631 and .3840362 times $120. If a 35 year value were not available, then it would be interpolated as outlined above.

EXAMPLE

Returning to our earlier, Kenosha based example, Exhibit 8.2 shows this computation for the three years cited in Exhibit 7.5 and for which tonnage was computed in Exhibit 2.4. To complete the discounting process, the exhibit would need to be computed for all 50 years of the project life and then summed to obtain the present value of benefits. Based on the method cited above, one can interpolate between the first and the sixth years to compute benefits for the intervening years. Since benefits increase $4,183 over the five year period, they are increasing by $837 per year. Hence, year 2 benefits are $32,591 and have a present value of $28,466. After completing each year, the last column of Exhibit 8.2 would then be summed to obtain the total present value of benefits. In the example, this is approximately $550,000. (As noted earlier, this computation can be greatly simplified using a computerized discounting program, such as those available on financial type hand calculators.)

EXHIBIT 8.1

Discounted Benefits at 7 Percent

Year	Discount Value at 7%	Times Benefits	Equals Present Value
1	.9345794		
2	.8734386		
3	.8162978		
4	.7628952		
5	.7129861		
6	.6663422		
7	.6227497		
8	.5820091		
9	.5439337		
10	.5083491		
11	.4750928		
12	.4440119		
13	.4149644		
14	.3878171		
15	.3624460		
16	.3387345		
17	.3165744		
18	.2958638		
19	.2765083		
20	.2584190		
21	.2416131		
22	.2257131		
23	.2109469		
24	.1971465		
25	.1842492		
26	.1721954		
27	.1608383		
28	.1504822		
29	.1405828		
30	.1313671		
31-35	.5386310		
36-40	.3840362		
41-45	.2738689		
46-50	.1952244		
Sum			

EXHIBIT 8.2

Exemplary Discounted Benefits

Project Year	Discount Value at 7%	Times Benefits	Present Value
1	.9345794	31,754	$ 29,676
2			
3			
4			
5			
6	.6663422	35,937	23,946
7			
8			
9			
10			
11			
12			
13			
14			
15			
16	.3387345	42,617	14,436
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31-35			
36-40			
41-45			
46-50			
Sum		Approximately	$550,000

STEP 9

PURPOSE: Determine project benefit-cost ratio and project net benefits.

DATA REQUIREMENTS:

1. Project costs from Step 1
2. Project benefits from Step 8

RECOMMENDED ACTION: This step simply combines the cost and benefit information developed from earlier steps, and summarizes the economic efficiencies of the proposed project. Exhibit 9.1 shows a tabular format for computing the benefit-cost ratio, net present value of benefits and the annualized net present value of benefits. Exhibit 9.2 shows an exemplary application for our Kenosha based example. Discounted benefits were taken from Exhibit 8.2 and the discounted costs from Exhibit 1.3. The difference between the two represents the net present value of the project (line 3) and their quotient, the benefit-cost ratios of the project (line 4). The annualized net present value of benefits (line 5) is computed as the net present value of benefits divided by the appropriate annuity factor. This represents the worth of the project shown as a constant income flow over the project life.

EXHIBIT 9.1

Net Project Benefits at 7% Discount Rate

1. Discounted Benefits (Exhibit 8.1)
2. Discounted Costs (Exhibit 1.2)
3. Net Present Value (Line 1 - Line 2)
4. Benefit/Cost Ratio (Line 1 divided by Line 2)
5. Annualized Net Present Value[1]

---

[1] Line 3 divided by annuity factor based on project life.

If project life = 25 years, annuity factor = 11.654
If project life = 30 years, annuity factor = 12.409
If project life = 40 years, annuity factor = 13.332
If project life = 50 years, annuity factor = 13.809

For any project life, the annuity factor is the sum of the discount values in Exhibit 8.1 through the project life. Thus for a two year project, the annuity factor is 1.808018 = .9345794 + .8734386.

EXHIBIT 9.2

Exemplary Net Project Benefits

1.	Discounted Benefits (Exhibit 8.1)	= $550,000
2.	Discounted Costs (Exhibit 1.2)	= 71,142
3.	Net Present Value (Line 1 - Line 2)	= 478,858
4.	Benefit/Cost Ratio (Line 1 - divided by Line 2)	= 7.73
5.	Annualized Net Present Value[1]	= 34,677

---

[1] Line 3 divided by annuity factor based on project life.

If project life = 25 years, annuity factor = 11.654
If project life = 30 years, annuity factor = 12.409
If project life = 40 years, annuity factor = 13.332
If project life = 50 years, annuity factor = 13.809

For any project life, the annuity factor is the sum of the discount values in Exhibit 8.1 through the project life. Thus, for a two year project, the annuity factor is 1.808018 .9345794 + .8734386.

STEP 10

PURPOSE: Determine parameter values for computing economic impacts of projects.

DATA REQUIREMENTS:

1. Appendix D
2. Benefits from Step 9
3. Project application
4. Traffic from Step 4

RECOMMENDED ACTION: This step will develop the basic parameters needed to compute two aspects of economic impacts resulting from the project. The first aspect is the regional or multiplier impacts created by the project. The second aspect is the distribution of benefits and impacts by various regions.

Types of Impacts

Four types of regional or multiplier impacts are considered - income, sales, employment and taxes. Exhibit 10.1 shows these parameters for selected projected and for the entire state, based on 1978 data. Appendix D contains a description of how these parameters were computed and how they may be computed for other areas. To briefly summarize these parameters, the income multiplier is based on the "concentration" technique and indicates how much income results from a $1.00 increase in basic income in a particular region. The income/sales multiplier shows the amount of gross sales that will result from $1.00 of income. The wage per worker shows how much income is necessary to support one average full-time worker in a particular area. The effective tax rates show federal, state and sales tax paid on every dollar of income for a particular region. Computation of these parameters is rather staight forward, although they can require a significant amount of computation. As noted above, Appendix D fully describes the methods for computing these parameters.

Distribution of Benefits and Impacts

Determining the distribution of benefits and impacts is more complex and represents two inter-related steps. The method presented here is known not to be exact, but will yield fairly reliable estimates of the distribution of benefits and impacts for most projects. The first step is to determine the distribution of benefits based on the origins/destinations of the traffic that will utilize the proposed project. The next step is to adjust this distribution to reflect the fact that a

project, and its direct employment impact, are felt within the port area. For example, one would suspect that the preponderance of benefits accruing to a grain elevator are not felt at the port where the elevator is located, but in the areas where the grain is grown. However, due to the direct employment impact at the elevator, some benefits will accrue to the local area. It is the purpose of this second step to adjust the distribution of impacts to reflect this known local effect.

The computation of these two steps to determine the allocation of benefits by region is fully discussed in Appendix D. Basically, the allocation procedure works as follows. An initial distribution of benefits is estimated based on the origins and destinations of traffic (in tons) that will use a project. If the origin or destination is within the port county, then the traffic is considered to have a local impact. If neither the origin or destination is within the port county, then it is allocated to the non-port region of the state, if either the origin or destination is within the state. If neither of these conditions is met, then the traffic is allocated to the non-state region. By examining the traffic through the project, project tonnage is allocated to one of thse three regions, in the order they have been cited.

In the Kenosha example, assume a project has traffic which is such that one-third of the traffic should be allocated to each region, e.g., one-third local, one-third state and one-third non-state. The next step is to adjust this initial distribution to account for known local impacts of the project. This computation is illustrated in Exhibit 10.2. Based on the benefits computed in Step 9, average annual benefits are computed using an annuity factor. Using the state income multiplier from Exhibit 10.1, the annualized income associated with the benefits is computed (Line 5). This figure is then divided by average wage per worker to determine the total number of jobs created (Line 7). The number of full-time jobs at the project site is then subtracted from total employment to obtain the number of jobs that will be created by the project that do not represent direct employment from the project (Line 9). These remaining jobs are allocated by region according to the benefit allocation proportions determined by the distribution of traffic origins and destinations, in our example, one-third each locally, state-wide but non-port and out-of-state. Then a new distribution of benefits is determined based on the total number of jobs created and the distribution of where those jobs are located. This is shown in Exhibit 10.2. Total job creation is 6.02, of which four will be employment at the project, leaving 2.02 jobs that will be created as a result of the multiplier effect. These remaining jobs are then allocated by region based on the original distribution of benefits based on the origin/

destinations of traffic. A new distribution of benefits and impacts is then computed based on the just computed distribution of jobs. That is, the new proportion of local benefits is one-third of the 2.02 jobs plus the four jobs at the project, all divided by 6.02, or .776 of benefits are now allocated locally. As shown in the exhibit, the benefit proportions for the remaining two areas are computed similarly. This new distribution is then used in the next step to allocate benefits between the various areas that may be impacted.

EXHIBIT 10.1

Parameters for Estimating Regional Impacts of Projects

Area	(1) Income Multiplier	(2) Sales/Income Multiplier	(3) Wage Per Worker	(4) Effective Tax Rates Federal	(5) State	(6) Sales
STATE	2.22	6.523	$14,677	.1867	.0473	.0217
Milwaukee SMSA	2.28	5.386	15,993	.1891	.0487	.0217
Milwaukee	2.82	5.438	16,006	.1894	.0475	.0217
Kenosha	1.78	5.767	15,794	.1871	.0478	.0217
Manitowoc	1.99	6.180	13,127	.1864	.0451	.0217
Marinette	1.59	7.102	14.037	.1873	.0422	.0217
Crawford	1.47	10.009	13,158	.1809	.0408	.0217
Sheboygan	1.87	6.812	13,248	.1870	.0459	.0217
Door	1.62	6.330	13,866	.1844	.0434	.0217
Ashland	1.69	5.520	11,863	.1920	.0396	.0217
Lacrosse	2.15	5.536	13,066	.1888	.0451	.0217
Douglas	1.80	10.663	13,309	.1925	.0445	.0217
Out of State	2.22	6.523	14,677	.1867	.0473	.0217

(1) Source: Appendix D, Table D.3
(2) Source: Appendix D, Table D.5
(3) Source: Appendix D, Table D.8
(4) Source: Appendix D, Table D.10
(5) Source: Appendix D, Table D.10
(6) Source: Appendix D, Table D.10

EXHIBIT 10.2

Exemplary Computation of Distribtuion of Benefits

1.	Discounted Benefits (Exhibit 9.1, Line 1)	$550,000
2.	Annuity Factor (Exhibit 9.1, Footnote; or computed)	13.809
3.	Annualized Benefits (Line 1 div. Line 2)	$ 39,829
4.	Income Multiplier (Exhibit 10.1, Column 1)	2.220
5.	Income (Line 3 times Line 4)	$ 88,420
6.	Wage per Worker (Exhibit 10.1, Column 3)	$ 14,677
7.	Total Jobs Created (Line 5 div. Line 6)	6.020
8.	Less Project Employment (from application)	4.000
9.	Equals Total Non-Project Employment (Line 7-Line 8)	2.020
10.	Initial Local Benefit Proportion	.333
11.	New Local Benefit Proportion ((Line 10 times Line 9) + Line 8) div. Line 7)	.776
12.	Initial State, Non-Port Benefit Proportion	.333
13.	New State, Non-Port Benefit Proportion (Line 12 times Line 9 divided by Line 7)	.112
14.	Initial Non-State Benefit Proportion	.333
15.	New Non-State, Benefit Proportion (Line 14 times Line 9 div. Line 7)	.112

STEP 11

PURPOSE: Compute and summarize project benefits and impacts.

DATA REQUIREMENTS:

1. Impact parameters from Step 10
2. Benefits from Step 9
3. Costs from application and Step 1

RECOMMENDED ACTION: This represents the last step in the evaluation and impact assessment. Based on the benefits, costs and estimated impact parameters, this step will compute all relevant information needed to summarize the economic efficiencies and impacts resulting from the application. Computation of all this information will require the completion of three tables. The first, Exhibit 11.1, computes the allocation of costs and benefits for the project. These benefit and cost shares are primary input into Exhibits 11.2 and 11.3, the Wisconsin Harbor Assistance Program Economic Impact Summary and its accompanying Work Sheet.

Benefit/Cost Allocation

In Exhibit 11.1, benefits and costs are allocated by region based on information developed in Exhibits 10.2, 9.1 and 1.2 as well as the project application. The first step in Exhibit 11.1 is to determine the value of benefits assigned to each region. This is accomplished using the benefit proportions developed in Exhibit 10.2 and multiplying these by the total project benefits. These figures are then entered into Lines 1, 11 and 21 of Exhibit 11.3, respectively as they will be used for further computations. The next step in Exhibit 11.1 is to determine cost shares allocated to each region using information from Exhibit 1.2 and the project application. Total project costs were computed in Exhibit 1.2, and the state and non-state portions of cost are specified in the application. Non-state costs are to be considered any non-local or non-state funding from any governmental unit. The difference between total costs and state plus non-state costs represent the local costs. Thus, any contributions from local industry are to be considered a local cost.

Economic Efficiencies and Impacts

The next step is the completion of Exhibit 11.3, the Work Sheet for computing the economic efficiencies and impacts. This exhibit is self-explanatory and represents a step by step procedure to compute the summary information necessary for

Exhibit 11.2. For each line in Exhibit 11.3, the proper entry is either from an earlier exhibit, and is so referenced, or requires some type of computation, in which case the line contains explicit instructions as to the type of computation and the data needed for the computation. For example, in Line 1, the entry is taken directly from Exhibit 11.1 and in Line 3, the proper entry is the difference between Lines 1 and 2.

Completion of Exhibit 11.3 provides all the necessary data to complete the summary of Exhibit 11.2. One will notice that Exhibit 11.2 consists of two very similar tables. The first page of the exhibit is to be completed based on the computations of Exhibit 11.3. The second page of Exhibit 11.2 simply contains the line number of Exhibit 11.3 that contains the appropriate entry for Exhibit 11.2. For example, the appropriate entry for Exhibit 11.2, Line 5, Column A is taken directly from Exhibit 11.3, Line 6. As can be seen, not all possible entries in Exhibit 11.2 will be made. However, all economically meaningful estimates will be entered in the exhibit.

EXAMPLE

Following Exhibit 11.3, three exhibits are presented that continue the application of our Kensosha-based example. All information contained in these exhibits has been developed earlier, except for the cost allocation. The example assumes that the state will bear $38,200 of the project cost (80% of construction costs), leaving the port area to bear $42,942. This is the difference between the state share and the total project costs of $81,142 set forth in Exhibit 9.2. Following these two exhibits is Exhibit 11.6 which presents an example of a short narrative that should accompany the economic summary.

EXHIBIT 11.1

ALLOCATION OF BENEFITS/COSTS BY REGION

	(1) Benefits Proportion[1]	(2) Project Benefits[2]	(3) Benefits Allocated To Each Area[3]
1. Local Area			
2. State Non-Local			
3. Non-State			

	Cost Allocation Shares[4]	Project Costs[5]	Costs Allocated To Each Area[6]
4. Local			
5. State Non-Local			
6. Non-State[5]			

1) Source: Exhibit 10.2, Lines 11, 13 and 15, respectively.

2) Source: Exhibit 9.1, Line 1.

3) Column 1 times Column 2.

4) Source: Exhibit 1.2, cost shares.

5) Source: Exhibit 1.2, sum of all costs.

6) Project costs by area times cost shares.

PROJECT _____
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WISCONSIN HARBOR ASSISTANCE PROGRAM
ECONOMIC IMPACT SUMMARY

Analysis by: _____
Date: __ - __ - __

	A	B	C	D	E	F	G	H	I
						STATE		PROJECT	
	Port Area	State Non-Local	State (A+B)	Out-of-State	Total (C+D)	Expected Change	Net Impact (C-F)	Expected Change	Net Impact (E-H)
1. Discounted Benefits						-	-	-	-
2. Discounted Costs						-	-	-	-
3. Net Present Value						-	-	-	-
4. Benefit/Cost Ratio						-	-	-	-
5. Annualized Net Present Value						-	-	-	-
6. Annualized Income									
7. Annualized Sales									
8. Annualized Federal Taxes									
9. Annualized State Taxes									
10. Annualized Excise Taxes				-	-			-	-
11. Employment (# of Jobs)									

PROJECT _____
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WISCONSIN HARBOR ASSISTANCE PROGRAM
ECONOMIC IMPACT SUMMARY

Analysis by:
Date:

Work Sheet Line Key

	A	B	C	D	E	F	G	H	I
						STATE		PROJECT	
	Port Area	State Non-Local	State (A+B)	Out-of-State	Total (C+D)	Expected Change	Net Impact (C-F)	Expected Change	Net Impact (E-H)
1. Discounted Benefits	1	11	31	21	36	-	-	-	-
2. Discounted Costs	2	12	32	22	37	-	-	-	-
3. Net Present Value	3	13	33	23	38	-	-	-	-
4. Benefit/Cost Ratio	4	14	34	24	39	-	-		
5. Annualized Net Present Value	6	16	35	26	40	-	-		
6. Annualized Income	10	20	41	30	44	42	43	45	46
7. Annualized Sales	48	50	53	52	56	54	55	57	58
8. Annualized Federal Taxes	72	74	75	77	78	79	80	81	82
9. Annualized State Taxes	84	86	87	89	90	91	92	93	94
10. Annualized Excise Taxes	97	100	101	-	-	104	105	-	-
11. Employment (# of Jobs)	60	62	63	65	68	66	67	69	70

EXHIBIT 11.3

PROJECT_____
APPLICATION#_____
ALTERNATIVE#_____
VERSION#_____

WISCONSIN HARBOR ASSISTANCE PROGRAM
ECONOMIC ANALYSIS WORK SHEET

1. Port area discounted benefits (from Exhibit 11.1, Line 1, column 3) $_____
2. Port area discounted costs (from Exhibit 11.1 , line 4, column 3) $_____
3. Port area net present value (line 1 - line 2 $_____
4. Port area benefit/cost ratio B/C (line 1/line 2) _____
5. Annuity factor (from Exhibit 9.1, footnote or compute _____
6. Port area annualized net present value (line 3/line 5) $_____
7. Port area annualized benefits (line 1/line 5) $_____
8. Port area annualized cost (line 2/ line 5) $_____
9. Port area income multiplier (from Exhibit 10.1, column 1) _____
10. Net change in port area income (line 7 x line 9) $_____
11. Non-port/state discounted benefits (from Exhibit 11.1, line 2, column 3) $_____
12. Non-port/state discounted costs (from Exhibit 11.1, line 5, column) $_____
13. Non-port/state net present value (line 11 - line 12) $_____
14. Non-port/state benefit/cost ratio B/C (line 11/line 12) _____
15. Annunity factor (same as line 5) _____
16. Non-port/state annualized net present value (line 13/line 15) $_____
17. Non-port/state annualized benefits (line 11/line 15) $_____
18. Non-port/state annualized costs (line 12/line 15) $_____
19. State income multiplier (from Exhibit 10.1, column 1) 2.22
20. Net change in non-port/state area income (line 17 x line 19) $_____

EXHIBIT 11.3 (Con't.)

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WISCONSIN HARBOR ASSISTANCE PROGRAM
ECONOMIC ANALYSIS WORK SHEET

21. Out-of-state discounted benefits (from Exhibit 11.1, line 3, column 3) $ _____

22. Out-of-state discounted costs (from Exhibit 11.1, line 6) $ _____

23. Out-of-state net present value (line 21 - line 22) $ _____

24. Out-of-state benefit/cost ratio B/C (line 21/line 22) (omit if line 22 = 0.0) _____

25. Annunity factor (same as line 5) _____

26. Out-of-state annualized net present value (line 23/line 25) $ _____

27. Out-of-state annualized benefits (line 21/line 25) $ _____

28. Out-of-state annualized costs (line 22/line 25) $ _____

29. Out-of-state income multiplier (Exhibit 10.1, column 1) 2.22

30. Net change in out-of-state income ((line 27 x line 29) $ _____

31. Total state discounted benefits (line 1 + line 11)

32. Total state discounted costs (line 2 + line 12)

33. State net present value (line 31 less line 32)

34. State benefit/cost ratio B/C (line 31/line 32)

35. Total state annualized net present value (line 33/line 25)

36. Total project discounted benefits (line 31 + line 21)

37. Total project discounted costs (line 32 + line 22)

38. Project net present value (line 36 less line 37)

39. Project benefit/cost ratio B/C (line 36/line 37)

40. Total project annualized net present value (line 38/line 25)

EXHIBIT 11.3 (Con't.)

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WISCONSIN HARBOR ASSISTANCE PROGRAM
ECONOMIC ANALYSIS WORK SHEET

41. Total change in state income (line 10 + line 20) $ _____

42. Average expected change in state income (line 37 ÷ line 25 X line 29) $ _____

43. Net change in state income (line 41 - line 42) $ _____

44. Total change in project area income (line 30 + line 41) $ _____

45. Average expected change in project area income ((line 37 x line 29 ÷ line 25) $ _____

46. Net change in project area income (line 44 - line 45) $ _____

47. Port area sales/income ratio (from Exhibit 10.1, column 2) _____

48. Port area sales change (line 10 x line 47) $ _____

49. State sales/income ratio (from Exhibit 10.1, column 2) 6.523

50. Non-port/state sales change (line 20 x line 49) $ _____

51. Out-of-state sales/income ratio (Exhibit 10.1, column 2) 6.523

52. Out-of-state sales change (line 50 x line 51) $

53. Total state sales change (line 48 + line 50) $

54. Average expected state sales impact (line 42 x line 49) $

55. Net state sales change (line 53 - line 54) $

56. Total project area sales change (line 52 + line 53) $

57. Average expected project area sales change (line 45 x line 51) $

58. Net project area sales change (line 56 - line 57) $

59. Port area average annual wage (from Exhibit 10.1, column 3)

60. Port area employment change (line 10/line 59)

61. State average annual wage (from Exhibit 10.1, column 3) $ 14,677

62. Non-port/state employment change (line 20/line 61)

EXHIBIT 11.3 (Con't.)

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VERSION # _____

WISCONSIN HARBOR ASSISTANCE PROGRAM
ECONOMIC ANALYSIS WORK SHEET

63. Total state employment change (line 60 + line 62) _____.__

64. Out-of-state average annual wage (from (Exhibit 10.1, Column 3). $ _____

65. Out-of-state employment change (line 30/ line 65) _____.__

66. Average expected state employment change (line 42/line 61) _____.__

67. Net change in state employment (line 63 - line 66) _____.__

68. Total project area employment (line 63 + line 65) _____.__

69. Average expected project area employment change (line 45/line 64) _____.__

70. Net change in project area employment (line 68 - line 69) _____.__

71. Effective federal port area tax rate (Exhibit 10.1, column 4) 0._____

72. Port area federal personal tax (line 10 x line 71) $_____

73. Effective federal state area tax rate (Exhibit 10.1, column 4) 0.1867

74. Non-port/state federal personal tax (line 20 x line 73)

75. State/federal personal tax (line 72 + line 74)

76. Effective federal nation wide tax rate (from Exhibit 10.1, column 4) 0.1867

77. Out-of-state federal personal tax (line 30 x line 76) $

78. Project area federal personal tax (line 75 + line 77) $

79. Average expected state federal personal tax (line 42 x line 73) $

80. Net change in state federal personal tax (line 75 - line 79) $

81. Average expected project federal personal tax (line 76 x line 45) $

82. Net change in project area federal personal tax (line 78 - line 81) $

83. Port area effective state income tax rate (Exhibit 10.1, column 5)

84. Port area state personal income tax (line 10 x line 83) $

EXHIBIT 11.3 (Con't.)

PROJECT _____
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VERSION # _____

WISCONSIN HARBOR ASSISTANCE PROGRAM
ECONOMIC ANALYSIS WORK SHEET

85. Statewide effective state income tax rate (from Exhibit 10.1, Column 5), 0.0473

86. Non-port/state personal state income tax (line 20 x line 85) $ _____

87. State area personal state income tax (line 84 + line 86) $ _____

88. Out-of-state income and other tax rate (from Exhibit 10.1, Column 5). 0.0473

89. Out-of-state personal income and other tax (line 30 x line 88) $ _____

90. Project area personal state income tax (line 86 + line 89) $ _____

91. State area average expected state income tax (line 42 x line 85) $ _____

92. Net change in state area state income tax (line 87 - line 91) $ _____

93. Project area expected personal state income tax (line 45 x line 88) $ _____

94. Net change in project area state income tax (line 90 - line 93) $ _____

95. Port area disposable income (line 10 - line 72 - line 84) $ _____

96. Port area personal consumption expenditure due to project (line 95 x 0.90945*)

97. Port area state excise tax due to project (line 96 x 0.0217**)

98. Non-port/state disposable income (line 20 - line 74 - line 86) $ _____

99. Non-port/state personal consumption expenditure due to project (line 98 x 0.90945*) $

100. Non-port/state excise tax due to project (line 99 x 0.0217**)

101. Annual change in state excise tax (line 97 + line 100)

102. Average expected disposable income (line 42 - line 79 - line 91) $

103. Average expected personal consumption expenditure (line 102 x 0.90945*)

104. Average expected state excise tax (line 103 x 0.0217**)

105. Net change in state excise tax (line 101 - line 104)

*Personal consumption proportion of disposable income factor.
**Adjusted state sales tax and other taxes.

PROJECT KENOSHA EXAMPLE
APPLICATION # _____
ALTERNATIVE # _____
VERSION # _____

EXHIBIT 11.4
WISCONSIN HARBOR ASSISTANCE PROGRAM
ECONOMIC IMPACT SUMMARY

8-17-82
Analysis by: _____
Date: __ - __ - __

	A	B	C	D	E	F	G	H	I
						STATE		PROJECT	
	Port Area	State Non-Local	State (A+B)	Out-of-State	Total (C+D)	Expected Change	Net Impact (C-F)	Expected Change	Net Impact (E-H)
1. Discounted Benefits	426,800	61,600	488,400	61,600	550,000	-	-	-	-
2. Discounted Costs	42,942	38,200	81,142	0	81,142	-	-	-	-
3. Net Present Value	383,858	23,400	407,258	61,600	468,858	-	-	-	-
4. Benefit/Cost Ratio	9.94	1.61	6.02	N/A	6.78	-	-	-	-
5. Annualized Net Present Value	27,798	1,695	29,492	4,461	33,953	-	-	-	-
6. Annualized Income	55,014	9,903	64,917	9,903	74,820	13,045	61,872	13,045	51.775
7. Annualized Sales	317,266	64,597	381,863	64,597	446,460	89,093	361,770	85,093	36,367
8. Annualized Federal Taxes	10,293	1,849	12,142	1,849	13 991	3,436	9,706	2,436	11,555
9. Annualized State Taxes	2,630	468	3,098	468	3,566	617	2,481	617	2,949
10. Annualized Excise Taxes	831	150	981	-	-	197	784	-	-
11. Employment (# of Jobs)	3.48	.67	4.15	.67	4.82	.89	3.26	.89	3.93

EXHIBIT 11.5

PROJECT KENOSHA EXAMPLE
APPLICATION # _____
ALTERNATIVE # _____
VERSION # _____

WISCONSIN HARBOR ASSISTANCE PROGRAM
ECONOMIC ANALYSIS WORK SHEET

1.	Port area discounted benefits (from Exhibit 11.1, Line 1, column 3).	$ 426,800	11.	Non-port/state discounted benefits (from Exhibit 11.1, Line 2, column 3).	$ 61,600
2.	Port area discounted costs (from Exhibit 11.1, line 4, column 3)	$ 42,942	12.	Non-port/state discounted costs (from Exhibit 11.1, Line 5, column 3)	$ 38,200
3.	Port area net present value (line 1 - line 2)	$ 383,858	13.	Non-port/state net present value (line 11 - line 12)	$ 23,400
4.	Port area benefit/cost ratio B/C (line 1/line 2)	9.94	14.	Non-port/state benefit/cost ratio B/C (line 13/line 12)	1.61
5.	Annuity factor (from Exhibit 9.1, footnote, or compute).	13.809	15.	Annuity factor (same as line	13.809
6.	Port area annualized net present value (line 3/line 5)	$ 27,798	16.	Non-port/state annualized net present value (line 13/line 15)	$ 1,695
7.	Port area annualized benefits (line 1/line 5)	$ 30,907	17.	Non-port/state annualized benefits (line 11/line 15)	$ 4,461
8.	Port area annualized cost (line 2/line 5)	$ 3,104	18.	Non-port/state annualized costs (line 12/line 15)	$ 2,766
9.	Port area income multiplier (from Exhibit 10.1, column 1)	1.78	19.	State income multiplier (from Exhibit 10.1, Column 1).	2.22
10.	Net change in port area income (line 7 x line 9)	$ 55,014	20.	Net change in non-port/state area income ((line 17 x line 19) -	$ 9,903

EXHIBIT 11.5 (Con't.)

PROJECT KENOSHA EXAMPLE
APPLICATION # _____
ALTERNATIVE # _____
VERSION # _____

WISCONSIN HARBOR ASSISTANCE PROGRAM
ECONOMIC ANALYSIS WORK SHEET

21.	Out-of-state discounted benefits (from Exhibit 11.1, Line 3, Column 3).	$ 61,600	
22.	Out-of-state discounted costs (from Exhibit 11.1, line 6)	$ -0-	
23.	Out-of-state net present value (line 21 - line 22)	$ 61,600	
24.	Out-of-state benefit/cost ratio B/C (line 21/line 22) (omit if line 22 = 0.0)	N/A	
25.	Annuity factor (same as line 5)	13.809	
26.	Out-of-state annualized net present value (line 23/line 25)	$ 4,461	
27.	Out-of-state annualized benefits (line 21/line 25)	$ 4,461	
28.	Out-of-state annualized costs (line 22/line 25)	$ -0-	
29.	Out-of-state income multiplier (Exhibit 10.1, Column 1).	2.22	
30.	Net change in out-of-state income ((line 27 x line 29)	$ 9,903	
31.	Total state discounted benefits (line 1 + line 11)		$488,400
32.	Total state discounted costs (line 2 + line 12)		$ 81,142
33.	State net present value (line 31 less line 32)		$407,258
34.	State benefit/cost ratio B/C (line 31/line 32)		6.02
35.	Total state annualized net present value (line 33/line 25)		$29,492
36.	Total project discounted benefits (line 31 + line 21)		$550,000
37.	Total project discounted costs (line 32 + line 22)		$ 81,142
38.	Project net present value (line 36 less line 37)		$468,858
39.	Project benefit/cost ratio B/C (line 36/line 37)		6.78
40.	Total project annualized net present value (line 38/line 25)		$33.953

EXHIBIT 11.5 (Con't)

PROJECT KENOSHA EXAMPLE
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WISCONSIN HARBOR ASSISTANCE PROGRAM
ECONOMIC ANALYSIS WORK SHEET

41.	Total change in state income (line 10 + line 20)	$ 64,917
42.	Average expected change in state income (line 37 ÷ line 25 x line 29)	$ 13,045
43.	Net change in state income (line 41 - line 42)	$ 51,872
44.	Total change in project area income (line 30 + line 41)	$ 74,820
45.	Average expected change in project area income ((line 37 x line 29 ÷ line 25)	$ 13,045
46.	Net change in project area income (line 44 - line 45)	$ 61,775
47.	Port area sales/income ratio (from Exhibit 10.1, column 2)	5.767
48.	Port area sales change (line 10 x line 47)	$ 317,266
49.	State sales/income ratio (from Exhibit 10.1, column 2)	0.523
50.	Non-port/state sales change (line 20 x line 49)	$ 64,597
51.	Out-of-state sales/income ratio (from Exhibit 10.1, column 2)	0.523
52.	Out-of-state sales change (line 50 x line 51)	$ 64,597
53.	Total state sales change (line 48 + line 50)	$381,863
54.	Average expected state sales impact (line 42 x line 49)	$ 85,093
55.	Net state sales change (line 53 - line 54)	$296,770
56.	Total project area sales change (line 52 + line 53)	$446,460
57.	Average expected project area sales change (line 45 x line 51)	$ 85,093
58.	Net project area sales change (line 56 - line 57)	$361,367
59.	Port area average annual wage (from Exhibit 10.1, column 3)	$ 15,794
60.	Port area employment change (line 10/line 59)	3.48
61.	State average annual wage (from Exhibit 10.1, column 3)	$ 14,677
62.	Non-port/state employment change (line 20/line 61)	.67

PROJECT KENOSHA EXAMPLE
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EXHIBIT 11.5 (Con't.)

WISCONSIN HARBOR ASSISTANCE PROGRAM
ECONOMIC ANALYSIS WORK SHEET

63.	Total state employment change (line 60 + line 62)	4.15	
64.	Out-of-state average annual wage (from Exhibit 10.1, column 3)	$ 14,677	
65.	Out-of-state employment change (line 30/ line 65)	.67	
66.	Average expected state employment change (line 42/line 61)	.89	
67.	Net change in state employment (line 63 - line 66)	3.26	
68.	Total project area employment (line 63 + line 65)	4.82	
69.	Average expected project area employment change (line 45/line 64)	.89	
70.	Net change in project area employment (line 68 - line 69)	3.23	
71.	Effective federal port area tax rate (Exhibit 10.1, column 4)	0.1871	
72.	Port area federal personal tax (line 10 x line 71)	$ 10,293	
73.	Effective federal state area tax rate (from Exhibit 10.1, column 4)	0.1867	
74.	Non-port/state federal personal tax (line 20 x line 73)		$ 1,849
75.	State/federal personal tax (line 72 + line 74)		$ 12,142
76.	Effective federal nation wide tax rate (Exhibit 10.1, Column 4).		0.1867
77.	Out-of-state federal personal tax (line 30 x line 76)		$ 1,849
78.	Project area federal personal tax (line 75 + line 77)		$ 13,991
79.	Average expected state federal personal tax (line 42 x line 73)		$ 2,436
80.	Net change in state federal personal tax (line 75 - line 79)		$ 9,706
81.	Average expected project federal personal tax (line 76 x line 45)		$ 2,436
82.	Net change in project area federal personal tax (line 78 - line 81)		$ 11,555
83.	Port area effective state income tax rate (Exhibit 10.1, Column 5)		0.0478
84.	Port area state personal income tax (line 10 x line 83)		$ 2,630

PROJECT KENOSHA EXAMPLE
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WISCONSIN HARBOR ASSISTANCE PROGRAM
ECONOMIC ANALYSIS WORK SHEET

85.	Statewide effective state income tax rate (from Exhibit 10,1m Column 5).	0. 0473
86.	Non-port/state personal state income tax (line 20 x line 85)	$ 468
87.	State area personal state income tax (line 84 + line 86)	$ 3,098
88.	Out-of-state income and other tax rate (from Exhibit 10.1, Column 5).	0.0473
89.	Out-of-state personal income and other tax (line 30 x line 88)	$ 468
90.	Project area personal state income tax (line 86 + line 89)	$ 3,566
91.	State area average expected state income tax (line 42 x line 85)	$ 617
92.	Net change in state area state income tax (line 87 - line 91)	$ 2,481
93.	Project area expected personal state income tax (line 45 x line 88)	$ 617
94.	Net change in project area state income tax (line 90 - line 93)	$ 2,949
95.	Port area disposable income (line 10 - line 72 - line 84)	$ 42,091
96.	Port area personal consumption expenditure due to project line 95 x 0.90945*)	$ 38,280
97.	Port area state excise tax due to project (line 96 x 0.0217**)	$ 831
98.	Non-port/state disposable income (line 20 - line 74 - line 86)	$ 7,586
99.	Non-port/state personal consumption expenditure due to project (line 98 x 0.90945*)	$ 6,899
100.	Non-port/state excise tax due to project (line 99 x 0.0217**)	$ 150
101.	Annual change in state excise tax (line 97 + line 100)	$ 981
102.	Average expected disposable income (line 42 - line 79 - line 91)	$ 9,992
103.	Average expected personal consumption expenditure (line 102 x 0.90945*)	$ 9,087
104.	Average expected state excise tax (line 103 x 0.0217**)	$ 197
105.	Net change in state excise tax (line 101 - line 104)	$ 784

*Personal consumption proportion of disposable income factor.
**Adjusted state sales tax and other taxes.

EXHIBIT 11.6

Exemplary Harbor Assistance Evaluation: Kenosha

The City of Kenosha requested $38,400 as the state share of an estimate $48,000 project to repair the north dock in the City. Remaining cost will be provided by the City of Kenosha. This is one of two docks in the City. The dock wall is in an advanced state of deterioration and without repair will be unusable in the near future.

Step 1 - Project Life and Cost

Estimated project life with associated operations and maintenance costs of 5 percent yearly is 50 years. O&M costs will be incurred by local interests. The present value of this cost stream is $81,142. Based on a state share of $38,400 for initial construction, costs are allocated 47.3 percent to the state and 52.7 percent locally, with zero non-state costs.

Steps 2, 3, and 4 - Projected Tonnage

The project in question, as it concerns the repair of the north dock wall, is clearly a dock specific project. The port, in total handles an average of slightly over 88,000 tons a year. Most of this is shipment of frozen food products. There is no detail available to discern the share of tonnage crossing the dock in question. However, as all tonnage through the Port of Kenosha crosses either the north or south dock at the mouth of Pike Creek, and as these docks are basically similar, it is reasonable to assume that one-half of the port's tonnage normally crosses the north dock (the dock needing repairs). This allocation is used as the project tonnage for the dock in question. Based on annual growth rates for food and kindred products, annual growth of this tonnage will be 2.9 percent until 1990 and 1.6 percent thereafter. Projected tonnage for selected years is shown below. A check of port and dock capacity indicates these traffic levels can be processed throughout the project life.

EXHIBIT 11.6 (Con't.)

Projected Tonnage - Selected Years

Year	Port Tonnage	Project Tonnage
1985	97,704	48,852
1990	110,574	55,287
1995	120,409	60.205
2000	131,130	65,565
2035	248,780	124,390

Steps 5 - 9 - Project Benefits

The only cost affected by this project in a significant manner results from the need to transport cargoes to the alternative dock from the storage site. This would be done by truck, using standard 20 ton vehicles. Current tonnage levels are such that the dock operators, Morelli Overseas Export Service, Inc., could operate one truck full-time. Per Appendix C, a reasonable estimate for the cost of the within port movement in question is $.65 per ton, which would correspond to a truck haul of about 10 miles or about one hour for the movement between the docks.

The present value of the discounted benefits is $550,000, and the project has no salvage value. Based on the project costs cited earlier, the benefit-cost ratio of this project is 7.73, with net annual benefits of $34,677. The economic efficiencies of this project are summarized in Exhibit 11.4.

Steps 10 and 11 - Project Impacts

Project impacts are estimated to be significantly positive. Due to the large net benefits, net impacts are significantly positive. Generally, net impacts are about 80 percent of the total expected impacts, indicating rather large impacts stemming from the project. Project impacts are summarized in Exhibit 11.4 and the parameters used for these estimates are shown below.

Additional Impact Variables

Project Site:	Kenosha
Project Type:	Dockwall Repair
Application Number:	N/A
Alternative Number:	N/A
Version Number:	N/A

EXHIBIT 11.6 (Con't.)

	Local	Non-Local State	Non-State
Benefit-Income Multiplier	1.78	2.22	2.22
Sales-Income Multiplier	5,767	6,523	6,523
Annual Wages per Worker	$15,794	$14,677	$14,677
Federal Personal Income Tax Rate	.1355	.1355	.1355
Federal Social Insurance Tax Rate	.0516	.0512	.0512
State Personal Income Tax Rate	.0478	.0473	.0473
State Excise Tax	.0217	.0217	--

APPENDIX A - PROJECT LIFE AND COST

APPENDIX A

PROJECT LIFE AND COST

A.1 Introduction

The purpose of this appendix is to set forth the rationale, data and methods underlying the determination of project life and the development of complete project costs. In general, four types of costs should be considered, land-side development, shore/bank development, waterway/channel development and operations and maintenance costs. Due to the nature of the application process, shore/bank development or waterway/channel development are the normal project costs included in the application, as a result of the detailed cost proposal that forms the basis of the application.

A.2 Project Life

In general, the project life is limited to 50 years. There is no minimum project life; however, if the project life is less than 25 years, the analysis must be completed for a minimum of 25 years, except as noted below.

There are two primary reasons for using a maximum 50 year project life. The discounting process is of prime importance. The present value of money 50 years in the future is worth only a small faction of its current value. For example, consider two simple projects, one lasting exactly 50 years and one which lasts forever, both requiring an expenditure of $1 per year. Using a 7 percent discount rate, the expenditure stream for the first project is equivalent to a current expenditure of about $13.80, while the expenditure stream for the other is equivalent to a current one time expenditure of about $14.29. Thus, the present value of all expenditures after the 50th year is only about 3.4 percent of the total possible present value of spending $1 per year forever. The net effect is that the vast majority of costs (and benefits) that might be associated with a project will be accounted for in the first 50 years of the project life, no matter how long the project might actually last.

The second reason is the different manner in which benefits and costs accrue to a project. In general, most of the project costs will be incurred before any benefits are realized from the project. Thus, a fairly accurate cost estimate will generally only need to consider economic parameters over a very short time horizon. However, the benefits of the project will generally be growing over time, but with increasing uncertainty about the likelihood that they will actually be realized. The use of a 50 year maximum project life decreases at least the extreme uncertainty of events far into the future.

Two exceptions to this general procedure are possible, and will be applicable to only a very small portion of possible projects. The first exception is to the 50 year maximum project life. The best example of this exception is the evaluation of federal flood control projects, where the life of the project is matched against the event the project is designed to prevent, e.g., the 100 year flood in most cases. The use of this longer project life is a result of the fact that this event has a probability of occurring in any year of the project life and not simply the last year. Generally, this length of project life is associated with the prevention of some catastrophic event that is not related to navigation functions.

The other exception is to the minimum evaluation period. If the project life were actually less than 25 years and was not expected to be maintained after its initial construction, then a shorter evaluation period would be acceptable. An example of this would be emergency repairs to a dock that is being phased out of service, but whose current replacement is not yet in service. Examples of either of these two exceptions occur rather infrequently and stem from extenuating circumstances surrounding the project. In either case, the burden of proof is on the applicant to show that the project is an exception to the general rule of using an evaluation period between 25 and 50 years. Or alternatively, any "typical" navigation or harbor project should be evaluated over a period ranging from 25 to 50 years, with "typical" projects represented by such things as dredging, dockwall or pier construction or on-land facility construction. As noted, exceptions to the general rule are expected to be few, if not actually non-existent.

A.3 Project Costs - Operations and Maintenance

The two costs most likely to be missing from the application are annual operations and maintenance costs and the land-side site development necessary to provide a complete and functional transportation facility. The general procedure for estimation of annual operations and maintenance costs is that these costs, on average, are some percentage of initial construction costs, usually 5 percent for the typical project. Due to the wide range of possible projects, two other estimates of operations and maintenance costs may be applicable. For high maintenance projects, these costs are estimated at 7.5 percent. High maintenance projects are those that require such things as extra cleanliness or highly complex facility equipment that are not associated with the typical waterway/port facility. The other extreme is the case where the facility is not operated independently of the production process, so that operations are zero. In this instance, operations and maintenance costs are estimated at 2.5 percent of initial construction costs. The best example of this type of facility is a vessel repair dock, where the dock is operated as part of the productive process. In a sense, these are somewhat special cases where the "commodity"

originates and terminates at the same facility, rather than being transshipped through a facility. As noted, the general rule is that operations and maintenance costs should be estimated as 5 percent of the initial construction cost, except in the cases where relatively high maintenance costs are expected or the facility operations costs are so closely related to the productive process that operations costs are internalized in the productive process.

A.4 Project Costs - Development

The determination of appropriate site development costs sometimes can be a difficult procedure. The main reason for this is that one must first determine whether benefits can be computed independently for any portion of a project. A project which included both dredging and dockwall development might exhibit benefits for both, independently of the construction of the other. However, it is likely that benefits for the two components are closely tied together, e.g., a 27 foot channel serving no docks has a very limited potential for benefits. For improvement or expansion of existing harbor facilities, it is usually the case that site development or land-side development costs will be zero. That is, in these instances it is normally the case that the harbor infrastructure will be sufficiently developed so that site development costs will have been incurred at some point in the past.

The inclusion of site development costs will normally be associated with what might be referred to as development types of projects. These would be new projects or replacement projects located in an area where the existing port/harbor infrastructure has not been developed to provide for immediate access to the waterway. As noted above, the real test for including these costs is whether or not project benefits can be realized without incurring site development costs. Rather clearly, for new projects or replacement projects located at new sites the answer is no and site development costs must be included in the cost estimates to allow for a proper comparison with project benefits.

A.4.1 Project Costs - Facilities

Basic data for computing site or facility development costs is taken from the Mid-America Port Study, Chapter 17 and then updated to 1982 price levels. Table A.1 presents estimated costs for the development of conceptual terminals by facility type and size in 1978 dollars. These costs are developed based on engineering relationships that relate terminal handling and storage capacity to the inputs needed to process this capacity tonnage. It is important to note that these are generic costs for a "typical" terminal and can vary substantially between ports due to differing requirements. However, they are relatively good order of magnitude estimates and can be used where

port/harbor specific data is unavailable. Table A.2 shows the design handling rates for each facility and the classification scheme for designating a facility as large or small. It is generally expected that the applicant will have access to better cost estimates for terminal development from prospective users of the project, and costs from Table A.1 should be used only where more site specific costs are unavailable. These costs should be increased by 31.5 percent to reflect cost increases from 1978 to 1982 per the Engineering News Record Cost Index.

A.4.2 Project Costs - Site Development

The more likely costs to be omitted are those associated with general site development, rather than those for specific facilities. That is, firms generally do rather detailed studies before making any type of commitments to expend the amounts of money shown in Table A.1. In Table A.3, unit costs are presented for general preparation of a site adjacent to the waterway that would require site development before the facility can actually be placed in operation. Table A.4 presents a tabular format for computing site development costs that should be added to those project costs shown in the application.

To the extent possible, the quantities needed to complete Table A.4 should be based on the actual terminal development. However, it is expected that in many cases, the specific quantities will not always be readily apparent, for example the amount of fencing or roads that will actually be placed at the site. The following estimates can be used where other information is unavailable:

(i) Acres - Table A.1 for corresponding facility type
(ii) Feet of fencing or roads - 100 linear feet per acre
(iii) Buildings - 300 square feet per acre

The estimates for fencing and roads is based on the approximate length of the sides of a square acre, about 200 feet. Since the roads or fencing will not apply to each acre of the site, one-half of this distance has been used, i.e., only about one-half of the acreage will actually have fencing and roads on it. The estimate for buildings is based on the need for small office shop area on a one acre site. While the increase in building size for increasing acreage may not be proportional, this also does not represent much office or shop space, even for a relatively large terminal.

TABLE A.1

Estimated Costs and Land Requirements of Conceptual Terminals
(1978 Dollars)

Facility Type	Small (S) or Large (L)	Load (L) or Unload (U)	Annual Throughput (000 st)	Instantaneous Storage Capacity[1] (000 st)	Total Area (Acres)	Apron Upgrading Cost[2] ($ mil)	Storage Upgrading Cost[2] ($ mil)	New Facility Cost[2,3] ($ mil)
Grain	S	L	598	34	4.8	1.6	12.7	14.6
	S	U	281	23	4.1	1.8	8.4	10.4
	L	L	1,709	98	6.9	3.8	35.8	40.1
	L	U	2,345	58	6.9	4.5	21.3	26.2
Ores	-	L	12,814	995	39.5	4.2	6.1	15.5
	-	U	6,332	1,145	32.1	6.5	3.6	14.7
Coal	S	L	712	16	11.3	1.1	2.1	4.1
	S	U	469	131	12.4	1.3	1.8	4.2
	L	L	7,119	161	36.5	3.1	6.0	12.8
	L	U	4,690	1,311	76.7	4.4	8.0	16.4
Crude Petroleum	S	L	339	23	6.1	1.0	3.2	4.2
	S	U	339	82	16.9	0.9	9.3	10.2
	L	L	678	47	11.4	1.0	6.3	7.3
	L	U	678	165	33.7	0.9	19.0	19.9
Petroleum Products	S	L	339	23	7.5	1.0	5.0	6.0
	S	U	339	82	18.7	0.9	16.2	17.1
	L	L	678	47	12.0	1.0	10.1	11.1
	L	U	678	165	34.7	0.9	32.5	33.4

TABLE A.1 (Continued)

Facility Type	Small (S) or Large (L)	Load (L) or Unload (U)	Annual Throughput C_B (000 st)	Instantaneous Storage Capacity[1] (000 st)	Total Area (Acres)	Apron Upgrading Cost[2] ($ mil)	Storage Upgrading Cost[2] ($ mil)	New Facility Cost[2,3] ($ mil)
Industrial Chemicals	S	L	570	19	7.5	1.0	5.0	6.0
	S	U	570	138	18.7	0.9	16.2	17.1
	L	L	1,139	79	12.0	1.0	10.1	11.1
	L	U	1,139	277	34.7	0.9	32.5	33.4
Fertilizer	-	L	5,126	398	41.5	2.1	38.6	48.5
	-	U	2,111	765	31.8	4.0	32.2	42.2
Break-Bulk	-	-	53	4	3.0	1.7	1.3	3.2
Lumber & Wood Products	-	-	212	17	4.7	1.7	2.5	4.5
Sugar & Molasses[4]	-	L	152	-	3.2	0.9	1.3	2.1
	-	U	383	-	3.7	0.9	1.1	2.9
Primary Metal Products	-	-	159	12	3.0	1.7	1.3	3.1
Scrap Metals	-	-	127	10	1.0	1.7	0.4	2.1
Construction Materials	-	L	1,538	119	5.0	0.3	0.6	1.0
	-	U	844	153	5.5	0.3	0.6	1.0

1 Amount which can be stored at any instant, i.e., capacity with no turnover of storage facilities.

2. 1978 dollars

3. Total cost does not include financial or real estate costs

4. Costs and land requirements for sugar and mollasses represent separate conceptual terminals for each commodity.

Source: Mid-American Ports Study, p. 246

TABLE A.2

Conceptual Terminal Commodity Handling Rates

		Design Handling Rate H (stph)	
		Load	Unload
Grain	- Small	700	400
	Large	2000	2000
Ores			
Bauxite		5000	3000
Coal	- Small	500	4000
	Large	5000	4000
Crude Petroleum and Petroleum Products[1]	- Small	125	125
	Large	250	250
Industrial Chemicals[1]	- Small	210	210
	Large	420	420
Fertilizer		2000	1000
Break-Bulk		25	25
Lumber Wood Products		100	100
Sugar		-	400
Molasses		56[2]	56[2]
Metal Products		75	75
Scrap Metal		60	60
Non-Metallic Minerals		600	400

1) Handling rates correspond to 600 gpm (small) and 1200 gpm (large).

2) Assuming a density of 52 pcf at which 1 bbl = 0.14 st

Source: Mid-America Port Study, P. 238
gpm = gallons per minute
stph = short tons per hour
pcf = pounds per cubic foot
bbl = barrels

TABLE A.3

Unit Costs for Conceptual Terminal Storage Areas

Item	1978 Unit Cost	1982 Unit Cost
General Site Preparation[1]	$40,000/acre	52,600/acre
Lighting	10,000/acre	13,150/acre
Fencing	10/LF	13/LF
Roads[2]	60/LF	79/LF
Paving	80,000/acre	105,200/acre
Railroads[3]	125/LF	164/LF
Buildings	25/SF	33/SF
Utilities, engineering, miscellaneous costs and contingency	25% of total	25% of total

[1] Includes clearing, grading, drainage, fill, compaction.

[2] 24 ft. wide, 3 inch bituminous pavement.

[3] Single track. Includes ballast, ties and rail.

Source: Mid-America Port Study, p. 241
LF = linear feet
SF = square feet

TABLE A.4

Computation of Terminal/Site Development Costs

I. 1. Terminal Costs (Table A.1, if applicable)[1] _____

2. Times .315 to adjust to 1982 price level _____

3. Terminal Costs from application _____

4. Total Terminal Costs (1+2+3) _____

II. Site Development Costs[2]

	Quantity	1982 Unit Cost	Total
1. General Site Preparation		$ 52,600/acre	
2. Lighting		13,150/acre	
3. Fencing		13/LF	
4. Roads		79/LF	
5. Paving		105,200/acre	
6. Railroads		164/LF	
7. Buildings		33/SF	
8.	subtotal		
9. Utilities, engineering, contingency		25% of total	
10. Total sige development cost (8 + 9)			_____

III. Total Development Cost (I.4 + II.10) _____

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1) Only those costs not included in I.3.

2) Compute only if I.4 is zero, and site development costs are not included in application

LF = linear feet
SF = square feet

APPENDIX B - FACILITY CAPACITY

APPENDIX B

FACILITY CAPACITY

B.1 Introduction

The purpose of this appendix is to set forth the methods and data underlying the development of facility capacities. The use of the computations is to insure that port/harbor facilities are sufficient to process the tonnage/vessels projected for the port, harbor or the project. While a variety of possible capacity measures could be considered, this appendix is limited to the three most likely types of port/harbor constraints, number of berths, equipment to process tonnage over a dock and storage area for commodities.

The determination of facility capacity can be a rather complex process involving rather complicated modeling of facility processes. While this modeling process might be more analytically satisfying, it is also expensive, time-consuming and a far more precise determination of capacity than is needed. For present purposes, a simple and intuitively clear method for determining capacity will suffice.

B.2 Berth Capacity

Based on the number of vessel berths or the ability to move tonnage over a dock, facility capacity can be determined as the number of hours the facility is in operation annually times the amount of services provided hourly times the number of pieces of equipment providing the service. For example, a facility with conveyors with a loading rate of 400 tons per hour, open 24 hours per day, would have an annual technical capacity of 7,008,000 (2 x 400 tons x 24 hours x 365 days) tons. A similar capacity figure could be computed for vessels serviced per year based on the number of berths, service time per vessel and annual operating hours.

Use of this simple concept will, in most cases, substantially overstate capacity, necessitating that empirical adjustments be made. A variety of reasons could be cited. For example, the computations do not allow for any downtime, i.e., maintenance at the facility, account for the nine month shipping season for ports in Wisconsin or account for the need to limit vessel delay, hence to redue voluntarily berth occupancy. Most of these operational constraints can be easily accounted for, without complicating the basic computation of capacity.

Determining capacity limits based on the number of vessels that can be serviced requires that three major operational constraints be accounted: (i) the length of the shipping season, (ii) maximum facility utilization to limit vessel delay, and (iii) maintenance and other downtime at the facility. The following formula will adequately account for these considerations:

$$\text{Berth Capacity} = \text{HRS} \times \text{DYS} \times n \times \mu \times u$$

where,

HRS = operating hours per day
DYS = operating days per year
n = number of berths
μ = service rate per hour
u = maximum facility utilization

The first two terms, HRS and DYS, yield the number of hours a facility operates annually. Generally, these should be 24 hours and 270 days, although where better (regional) estimates are available for the number of operating days, they should be used. A 24 hour operating day should be used unless a physical, economic or institutional reason will not allow a facility to operate around the clock. That is, the computed capacity should reflect what can be accomplished in a 24 hour day and not existing hours of operations. Multiplying by the number of berths, n, yields the number of berth-hours available per year.

The service rate per hour, μ, represents the rate at which vessels utilize the berths. For example, if a vessel normally used a berth for 10 hours, then $\mu = .1$, i.e., 1/number of hours to service vessel. In general, information on service time can be gathered from dock or vessel operators, or, if necessary, estimated from the handling capacity of loading and unloading equipment at the facility. Practical service rate is on the order of 70 percent of rated service rate.

The maximum facility utilization, u, represents the berth occupancy ratio above which vessel delays become excessive. For a given maximum ratio of vessel waiting time to service time, and for a given number of berths, maximum facility utilization can be obtained by consulting Tables C.12 and C.13. Generally, a waiting to service time ratio of .25 is used, which would result in the following values of u:

	n=1	2	3	4	5	6	7	n=8
break bulk	.25	.50	.60	.70	.75	.78	.80	.82
specialized berth	.40	.60	.70	.75	.80	.83	.85	.87

B.3 Equipment Capacity

A similar type of computation can be used to compute the potential annual tonnage that can be processed over a dock. The earlier formula would be modified to the following:

$$\text{Ton Capacity} = HRS \times DYS \times EQ \times HRH \times u$$

where,

EQ = number of pieces of handling equipment

HRH = rated handling capacity per hour of equipment, and

all other variables are as before.

Each variable corresponds to similar variables in the earlier formula. HRS x DYS yields the annual hours of operation. When multiplied by EQ, this yields the available equipment hours per year. This is then multiplied by the rated handling rate in tons per hour and then adjusted downward to reflect a utilization of less than 100 percent. Generally, the information required to compute this formula is available from dock operators.

B.4 Storage Area Capacity

For determining capacity constraints resulting from storage limitations, the following formula can be used for GENERAL CARGO.

$$THR = \frac{TSA * DYS * PROP}{NAPT * DWTM * CSU}$$

where,

THR = throughput (tons)

TSA = total storage area (ft.xft.) for THR throughput

NAPT = average net area required to store 1 ton (ft.xft./ton)
= 1/(cargo density of 100 cu.ft./ton) * (stacking height)
= 10 ft.xft. per ton of general cargo

DWTM = dwell time (days). Depends on free time or length of time the cargo can be left in storage without incurring charges. Typically, a dwell time of seven days can be used for planning purposes.

CSU = cargo storage utilization or proportion of cargo using storage. This proportion is assumed to be 90 percent, typical of the ratio observed at efficient ports. Again, this ratio would probably fluctuate depending upon trade routes, type of cargo, frequency of ship calling, etc.

PROP = proportion of storage area actually used (.200). The actual values taken by the variables listed above must be used if obtainable from the terminal operator.

DYS = shipping season

The same equation is used for general cargo and DRY BULK cargo storage. The values of parameters are, however, different.

The average net area (NAPT) required to store one ton of dry bulk cargo is calculated assuming a cargo density of .025 ton/ft.^{3}, a height of 30 feet for stacks and a 45 degree angle of repose, leading to a NAPT of 1.4 ft.xft./ton.

Other parameter values for dry bulk cargo used for general planning purposes at Wisconsin ports are a dwell time (DWTM) of 20 days, a cargo storage utilization (CSU) of 100 percent (all cargo goes to storage), and a proportion (PROP) of net area used to total area of .30. Hence: THR = 3.85 TSA.

Storage requirements for CONTAINERIZED CARGO depends upon the storage method used. Two methods are typically used, the chassis method and the yard-stacking method. In the chassis operation, containers are stored and moved through the yard on wheeled trailer chassis suitable for transporting the container via highways. In the yard-stacking option, containers are stacked in the yard without individual trailer chassis. Usually, containers are stacked two or three high. In the chassis method, 50 40-foot or seventy-five 20-foot containers per acre can be stored. For the yard-stacking method, ninety 40-foot or one hundred thirty-five 20-foot containers per acre can be accommodated.

The equation used to calculate containerized throughput for a given storage area is as follows:

$$THR = \frac{TSA \times NCPA \times DYS}{((43{,}500) * DWTM * CSU)}$$

where,

TSA = total storage area (ft.xft.) for THR throughput expressed in TEU's (Twenty foot Equivalent Units)

NCPA = average number of containers per acre. There are about 43,500 ft.xft. in an acre. As stated above, NCPA depends upon container size.

DWTM = dwell time. Dwell time varies depending upon free time, trade routes and lines, and whether or not the containers are inbound or outbound, loaded or empty. Typical dwell time observed is eight days for loaded inbound containers, five days for outbound loaded containers and 12 to 15 days for empty containers. Overall, an average of eight days can be used for analytical purposes.

CSU = carago storage uitlization. Can be taken as 100 percent unless otherwise observed at the terminal.

DYS = annual days of operation.

For liquid types of commodities, storage requirements can generally be ignored. This is due to the fact that most liquid bulk facilities are constructed for relatively easy capacity expansion due to the ability to increase pumping capacity. More than berthing space or pumping capacity, storage limitations should be viewed as a major constraint.

The formulas presented are for specific facilities. To obtain port capacity, one could then sum over all types of facilities. However, three problems are present for which must be accounted. First, the formulas treat each facility as if it is totally independent of other facilities in the port. This is not likely to be true where certain types of facilities are grouped together, for example, if all general cargo facilities are adjacent to each other. In this event those docks could conceivably be considered interchangeable, hence maximum facility utilization would be increased. Second, all handling equipment at a facility may not have the same handling capacity. In this event, an average handling rate for equipment can be used, or the equation can be disaggregated to compute throughput for each type of equipment and then summed to obtain dock capacity.

Third, and the most serious problem, is that each type of constraint can be expressed in tons, but there is no guarantee that each constraint will yield the same maximum tonnage. Thus, each constraint must be checked to ascertain which of the three constraints is actually binding.

Regarding the assessment of storage need, surge conditions must not be ignored. This is the case for a facility receiving only occasional shipments, in which case, storage should be designed to receive one, two or three of those loads, depending upon shipping patterns.

APPENDIX C - COMPUTATION OF UNIT SAVINGS

APPENDIX C

COMPUTATION OF UNIT SAVINGS

C.1 Introduction

The purpose of this appendix is to provide the necessary detail for estimating the basic parameters used in the estimation of benefits. This appendix sets forth the sources and methods used to obtain parameter estimates that are applicable for general types of port and harbor projects. Due to the wide variety of possible projects, numerous methods are detailed in this appendix for use in estimating benefits.

B.2 Special Studies

The simplest method of determining savings is the use of special studies. For example, one of the 1983 applications was for assistance in the construction of grain facilities at Milwaukee, Wisconsin. The Port of Milwaukee elevator has been the subject of several detailed studies and these were used as a basis for the estimation of benefits. According to a Battelle Columbus Laboratories' study entitled "The Economic and Financial Feasibility of Constructing and Operating a Grain Export Elevator at the Port of Milwaukee," July 1981, the differential bid price between Chicago and Milwaukee elevators was 24 cents per bushel, and 10 cents per bushel between Illinois River terminals and Milwaukee. It was deemed unlikely that Milwaukee could directly compete with Chicago due to its locational advantage for Illinois and Indiana grain. However, it is virtually certain that they could effectively compete for a substantial portion of tonnage presently being shipped via the Illinois Waterway that originates north of the Illinois Waterway. The benefit per bushel was computed as one-half the bid price differential, or 5 cents per bushel, due to the fact that the Milwaukee elevator will compete at the margin with Illinois Waterway terminals. That is, some of the grain that would switch to the Milwaukee elevator could save 10 cents per bushel, while the last grain that would be attracted to the Milwaukee elevator would have almost no savings by using the new elevator. Assuming uniform grain production patterns and that grain will flow to the elevator offering the profit maximizing bid price given the production area of the grain, the average savings for each unit attracted to a new elevator will be one-half the average bid price differential. In this case, it is not necessary to compute the with and without project prices and then the differential, because the price differential is already known.

In general, project specific special studies are likely to be available for only the larger types of development projects. When they are available, the information they contain should be used to the largest possible extent. Where project specific

special studies are not available, it is frequently the case that general studies are available that will contain useful information in the estimation of benefits. For example, The Great Lakes Cooperative Port Planning Study and The Upper Mississippi River Basin Study both contain a wide range of information which is useful in the evaluation of harbor assistance projects.

Probably the most difficult problem that one might face in estimating benefits is the case where line-haul rates must be estimated. A host of possible methods for determining rates are available, all of which have some type of shortcoming. Of the two, the estimation of water rates is the easiest. Estimation of water rates includes both deep draft and shallow draft rates, which will be discussed in that order.

C.3 Cost Effects - Deep Draft Vessels

The major need for estimating deep draft vessel rates arises from channel deepening project, or maintenance dredging. Although it is possible to directly estimate expected vessel costs at various channel depths, a simpler method for estimating the savings resulting from increased channel depth is presented here and recommended for use in estimating benefits. The annual vessel transportation savings per ton resulting from an increase in channel depth, or conversely, the total annual vessel transportation cost losses per ton resulting from a decrease in depth due to reduced maintenance can be expressed as follows:

$$S + f_1 * TM * \left(\frac{1}{V_b} + \frac{1}{V_1} + \left(\sum_i f_{2,1} * DT_i\right) * \frac{1}{L}\right) * \left(e^{-.145C_{w/o}} - e^{-.145C_w}\right)$$

where,

S = Total annual vessel transport cost savings (1981 dollars). Use changes in the Engineering News Record Cost Indices to update for any new year.

f_1 = Portion of total ton-mileage affected by a change in dredged depth (% divided by 100).

TM = Total ton-mileage corresponding to the terminal or dock in question (ton-miles).

V_b = Vessel speed in ballast (mph).

V_1 = Vessel speed loaded (mph).

f_2 = Portion of total affected ton-mileage using the Soo Locks, the Welland Canal and the St. Lawrence Seaway (% divided by 100).

DT_i = Delay time due to lockages and reduced speed in channels (hours) at Soo Locks, Welland Canal and St. Lawrence Seaway.

L = Average haul distance weighted by tons (miles).

C_w = Depth with dredging project, new or maintenance (ft.).

$C_{w/o}$ = Depth without dredging project (ft.).

Unit savings are thus S/T, i.e, savings per ton.

C.3.1 Simplified Formula - Deep Draft Vessels

Before discussing the method and data underlying the generation of this formula, it is instructive to discuss exactly what it is that the formula is attempting to estimate, and how each of the terms in the formula relates to the estimation of vessel savings. The following discussion is meant to clarify the rationale behind the formula. A very detailed analysis of the efficiencies of increased channel depth would proceed as follows: A statistical analysis of actual draft versus maximum draft for vessels utilizing a port or harbor would be undertaken and then compared with the distribution of the Great Lakes fleet of vessels. If the channel depth at a port or harbor were say 21 feet, then the probability of a vessel having an actual draft over 21 feet is zero, while the probability of a vessel using the port having a maximum possible draft of over 21 feet is determined by the distribution of vessel size for the Great Lakes fleet. For example, a fleet of two vessels having maximum drafts of 15 feet and 27 feet would yield a probability of 50 percent that a vessel using the port could load to a depth greater than 21 feet if additional depth were provided, although no vessel could actually have a draft greater than 21 feet. If the channel depth were increased to 27 feet then both vessels could potentially load to their maximum depth. Thus the probability that a vessel utilizing the port cannot load to its maximum depth decreases from 50 percent to zero. The cost efficiencies could then be computed as the savings of loading the larger vessel to its maximum draft, rather than 21 feet, times the "adjusted" probability that cargo will be shipped on the larger vessel. (The "adjusted" probability is to account for the fact that larger vessels carry more cargo. In the above example, if the two vessels were transporting cargo along the same routes, each vessel would not carry 50 percent of the cargo. The correct distribution would reflect the weighted average of each vessels' capacity.)

EXAMPLE

In this simple example, direct computation of the cost efficiencies would present no problems. However, real world examples would involve hundreds of vessels with different routes and destinations. Direct computation of efficiencies in this case is difficult and very time-consuming. To simplify this task, the method developed for the estimation of efficiencies incorporates the above considerations into the above formula. The basic formula is rather simple, however, accounting for delays and reduced speeds at the Soo Locks and Welland Channel complicates the formula somewhat. If we ignore the effects of the Soo Locks, the formula can be stated as follows:

Savings per year = (Ton-Miles times savings per ton-mile per hour) times hours. Using the above notation, this formula is:

$$S = TM * (e^{-.145C_{w/o}} - e^{-.145C_w}) * (\frac{1}{V_b} + \frac{1}{V_l})$$

Ignoring the exponential terms for the moment, the first and last term of this equation could be combined and yield ton-miles times hour for the entire vessel trip. When multiplied by the exponential terms, the hours, miles and tons will offset each other yielding a dollar figure.

In terms of the simple example cited above, the exponential terms, $e^{-.145C_{w/o}}$ and $e^{-.145C_w}$, represent the savings or losses incurred by changing the existing channel depth ($C_{w/o}$) to the new channel depth (C_w), measured in dollars per ton-mile per hour. The difference between the exponential terms is an estimate of the change in transport costs due to the use of vessels loaded to greater depths, where vessel depths are infinitely variable. Thus, the efficiencies of increasing channel depth from 21 feet to 27 feet can be simply computed using this formula rather than computing the savings individually for vessels having maximum drafts of 22 feet, 23 feet and so on up to 27 feet, and then adding them up to obtain total efficiencies. The exponential terms represent an estimate of the unit savings resulting from summing small changes of increased depth, rather than looking at one foot changes in depth and then summing.

The rationale behind the formula can be illustrated with a simple example. Suppose that channel depth is increased from 21 feet to 27 feet and that the difference in vessel cost per unit of time were $1.00 between 21 foot and 27 foot draft vessels. Using $1.00 as a measure of savings might be a good first approximation, but this $1.00 would not reflect the savings of 24 foot draft vessels that could now use the port. If one disaggregates the process to compute savings for 24 foot and 27

foot draft vessels, then the question is immediately raised of looking at 22, 23, 25 and 26 foot draft vessels. If one disaggregates further, then why not undertake the analysis in terms of half feet or inches and get very detailed in the analysis. Rather obviously, no matter how small the change is that is examined, there is always a smaller change that could be substituted. The exponential function represents an analysis where infintessimal changes in vessel size are examined and then summed to obtain cost efficiencies. The idea is shown in Figures A.1a, A.1b and A.1c. In Figure A.1a, our estimated savings are the $1.00 per ton for an hypothesized 1,000,000 tons of cargo. In Figure A.1b, our esimated savings (shaded area) are based on a disaggregation of vessel size, where 24 foot vessels would save 50 cents and 27 foot vessels would save $1.00.

The difference between the two figures and the estimated savings results from the fact that not all vessels will realize the $1.00 savings. In this example, half would save $1.00 and the other half 50 cents per ton. Thus the estimated savings drop from $1,000,000 to $750,000 (500,000 tons times $1.00 plus 500,000 times 50 cents). In Figure A.1c, the analysis is undertaken in one foot increments, with savings of 16 2/3 cents per ton per foot of increased draft and with each vessel type carrying 1/6th of the tonnage. In this case, savings would be estimated at $583,333. As the analysis is disaggregated more, the computed savings will continue to drop towards $500,000 (as this example is set up). The exponential function used in the estimate of savings resulting from increased channel depth is an estimate of what Figure A.1c would look like if vessel depth could be continuously changed (based on actual vessel costs). That is it would represent the integral of a regression equation of the points x and o in Figure A.1c.

C.3.2 Deep Draft Vessel Cost Parameters

Returning to the formula, the variable f_1 representing the portion of total ton-mileage affected by a change in water depth can be obtained as a first approximation of estimating the frequency of vessels that have a mid-summer draft in excess of maximum allowable draft resulting from not undertaking the project. This approximation is adequate provided that average haul distance for smaller vessels does not differ significantly from the average haul distance for larger vessels. In other cases, Waterborne Commerce dock to dock statistics should be consulted to relate vessel draft (size) with haul distance. An interview of the dock or terminal operator can also provide an estimate of f_1.

Figure A.1a
All 27' Draft Vessels

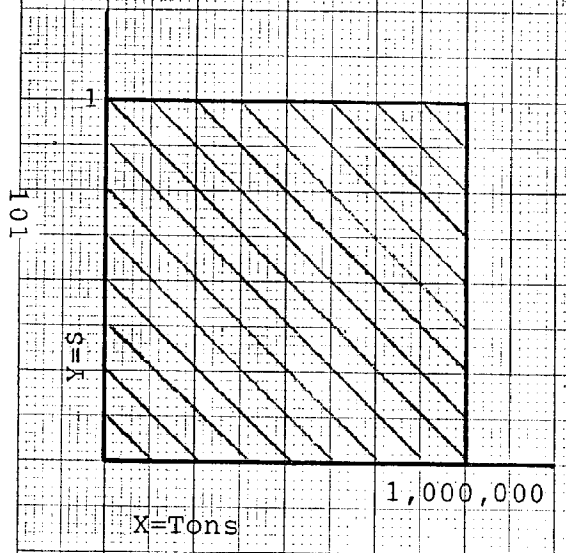


Figure A.1b
50% 27', 50% 24' Draft Vessels

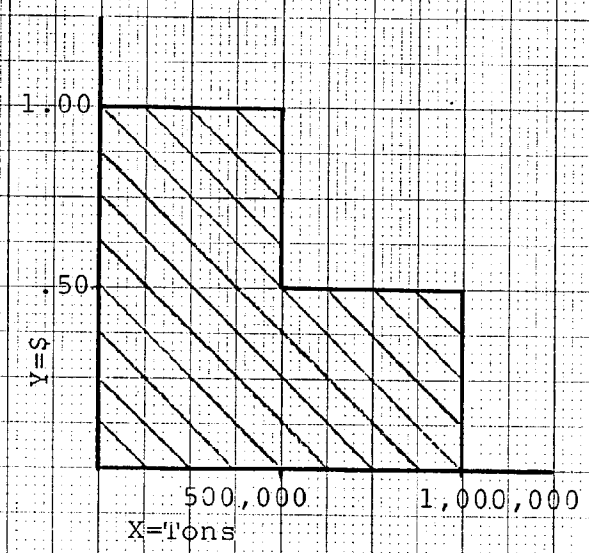
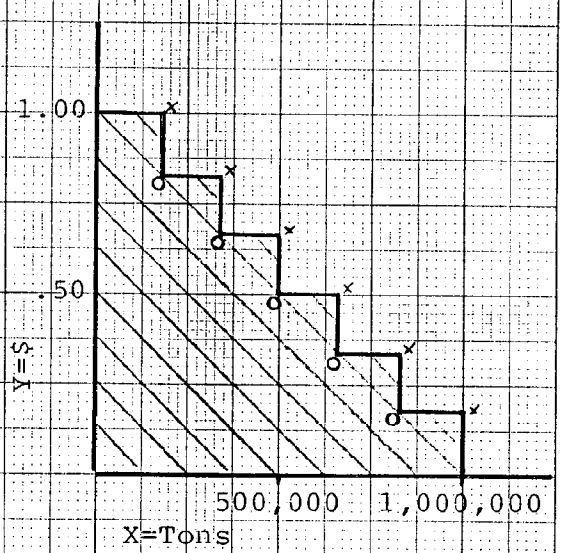


Figure A.1c
22'-27' Draft Vessels,
16 2/3% each



The variable TM representing the total ton-mileage for the project can be obtained as a first approximation by multiplying the total annual tonnage (T), from Step 4, by the average haul distance (L). A more precise evaluation can be performed using Waterborne Commerce Statistical Data, dock to dock summaries, if available.

Vessel speeds in ballast (V_b) and loaded (V_l) can be assumed equal to 15 and 14 mph, respectively. These values are typical for Great Lakes vessels.

The portion of total affected ton-mileage, $f_{2,i}$, using the Soo Locks ($f_{2,1}$), the Welland Canal ($f_{2,2}$) and the St. Lawrence Seaway ($f_{2,3}$) can be obtained from the terminal operator or from Waterborne Commerce statistics, or implied from the length of haul.

The vessel transportation savings model is sensitive to round trip delay time at locks and in channels (DT). Round trip delays are estimated to be approximately 12 hours at the Soo Locks system, and 36 hours for the Welland Canal as well as for the St. Lawrence Seaway.

The sum of $f_{2,i}*DT_i$ can be simplified if the proportion of total affected ton-mileage being delayed at locks or in channels can be estimated and multiplied with the estimated average delay experienced.

The average haul distance (L) can be obtained by using Waterborne Commerce statistics or by interviewing the terminal operator. Due to shipping patterns on the Great Lakes and the types of commodities that will be considered, a fairly close approximation of L should be relatively easy.

Before turning to the remaining term, the exponential, note that all of the above variables are defined in physical units, but do not include dollars, i.e., computation of the formula excluding the exponential terms will yield ton-miles per unit of time.

Transportation cost savings per ton-mile per time unit can be obtained by integrating, over the interval $C_{w/o}$ to C_w, which is what the exponential terms represent. The derivation of this function and the data from which the function is estimated is described below in C.3.4.

C.3.3 Deep Draft Vessels - Alternative Ports

Although the previous discussion of this equation is oriented towards the cost savings of channel deepening, two other cost effects can be computed using variations of this basic formula. These impacts would result from use of some alternative port or dock for shipment and would arise from differing change depths or differing lengths-of-haul on the waterway.

For an alternative port having a different channel depth, the equation of C.3 can be applied directly, with $C_{w/o}$, the channel depth at an alternative port and C_w, the channel depth at the applicant port. If the water length-of-haul varies, then the equation is modified to:

$$S = f_1 * T(M_1-M_2) * (\frac{1}{V_b}+\frac{1}{V_1} + (\sum_i f_{2,i} * DT_i) * \frac{1}{L}) * e^{-.145C_w}$$

where,

T = tons shipped through alternative port
M_1 = length-of-haul via alternative port
M_2 = length-of-haul via current port

All other variabls are as defined in C.3. Hence: Savings per ton = S/T.

C.3.4 Estimating Procedure - Unit Savings for Deep Draft Vessels

The estimated exponential terms, are based on operating characteristics, budgetary and operating costs, and hourly vessel cost per ton for typical vessels operating on the Great Lakes. Vessel operating characteristics and costs for the Great Lakes fleet, as presented in this report, originate from the Office of Ship Operations at the Maritime Administration.

VESSEL CHARACTERISTICS - The Great Lakes fleet is divided into several classes for purposes of economic analysis. Vessel characteristics of the Great Lakes fleet include such factors as draft, length (over-all), deadweight, and approximate vessel capacity per inch of draft, as presented in Table C.1. From Class II (smaller vessels) to Class X (larger vessels), draft increases from 21 feet-2 inches to 27 feet-10 inches, overall length from 450 feet to 1,000 feet, deadweight from 9,050 long tons to 59,000 long tons, gross tonnage from 5,494 long tons to 32,930 long tons, and approximate capacity per inch of draft from 51 long tons to 246 long tons.

VESSEL BUDGET AND OPERATING COSTS - The costs presented in this appendix apply to the vessel classes defined above. These costs reflect the operating and budgetary costs of modern self-unloading Great Lakes bulk carriers. The vessel operating expense estimates are based on average operating costs for prototype vessels and do not reflect any particular operator's experience, maintenance practices, insurance or casualty record. Budgetary costs are construction contract prices (replacement

TABLE C.1

VESSEL OPERATING CHARACTERISTICS
OF USA GREAT LAKES' FLEET

Vessel Class	Mid-Summer Draft	Representative Vessel Characteristics				
		Length Over All (feet)	Trip Capacity at Mid-Summer Draft		Approximate Capacity Per Inch of Draft	
			LT[1]	ST[2]	LT	ST
II	21- 2	450	9,050	10,150	51	57
III	21- 7	500	11,750	13,150	65	73
IV	22- 4	560	14,100	15,800	72	81
V	25- 7	625	20,150	22,550	91	102
VI	26- 4	700	23,200	26,000	102	114
VII	27- 4	730	26,850	30,050	110	123
VIII	28- 6	806	32,000	35,858	125	140
IX	27-10	858	44,500	49,850	179	200
X	27-10	1,000	59,000	66,100	246	276

1) Measurement unit is 2,240 lb/ton

2) Measurement unit is 2,000 lb/ton

Source: Maritime Administration, Office of Ship Operations

cost) for delivery in December 1979. Changes and options, owner's costs and interest costs during construction are not included.

Table C.2 presents the estimated daily cost at sea and in port for each vessel class, including fixed charges, wages, subsistence, fuel, insurance, maintenance and repairs, other charges and overhead.

Daily fixed charges were calculated based on a length of season of 275 days, a capital recovery factor of .1371, an interest rate of 13 and 5/8 percent, and a 50 year economic life. Daily fixed charges range from $7,500 for Vessel Class II to $27,930 for Vessel Class X.

Wages include base, overtime and other expenses such as taxes, contributions to vacation, welfare plans, etc. Wages were based on a 32-man crew, automated to a 2-man engine watch at wage rates effective June 1979. Daily wage costs amount to $4,250.

Subsistence includes the cost of all edibles, delivery charges and loading costs and amounts to 5 percent of wages. Daily subsistence costs amount to $192 or $6 per crew member. Fuel costs were based on spot prices of $18.35/bbl for Bunker "C" and $32.34/bbl for marine diesel fuel. The share of fuel cost in total vessel daily cost at sea ranges from 12 percent for Vessel Class II to 25 percent for Vessel Class X.

Insurance costs reflect insurance costs for Hull and Machinery (H&M), Protection and Indemnity (P&I) and port risk for the operating period between April 1 and December 31. Insurance rates for operating during an extended season are not included. Insurance costs represent about 5 percent of total cost of vessel operation.

Maintenance and repair costs include repair work not recoverable from insurance, with a reserve for special surveys, dry docking, inspection and lay-up. The share of maintenance and repair costs to total cost ranges from 2.6 percent for Vessel Class X to 3.8 percent for Vessel Class II.

Other charges include stores, supplies and equipment, tug charges and lay-up charges. Store, supplies and equipment charges include the cost of all consumable stores, supplies and expendable equipment other than edibles, fuel and water. These charges range from 1.6 percent of total cost for Vessel Class X to 3.4 percent for Vessel Class II.

Overhead represents 12 percent of daily operating expenses.

TABLE C.2

ESTIMATED OPERATING COST OF BULK CARRIERS
(in thousands of 1979 dollars per day)

Vessel Class	II	III	IV	V	VI	VII	VIII	IX	X
Budget Cost[1] ($ Million)	15	18	21	26	29	32	36	46	56
Capital Cost[2]/Year ($ Million) (CRF = 13.71%; 50 years[3])	2.057	2.469	2.880	3.566	3.977	4.389	4.937	6.309	7.680
• Fixed Charges per day ($ Thousand) 275 day Navigation Season	7.48	8.98	10.47	12.97	14.46	15.96	17.95	22.94	27.93
• Operating Expenses per day ($ Thousand)									
Wages & Subsistence	4.44	4.44	4.44	4.44	4.44	4.44	4.44	4.44	4.44
Fuel • at sea	2.10	3.36	7.11	7.76	8.73	9.15	10.58	13.26	13.26
• in port	.49	.65	.97	1.13	1.29	1.29	1.62	1.62	1.62
Insurance	.79	.95	1.10	1.38	1.55	1.70	1.92	2.47	3.07
Maintenance & Repairs	.64	.75	.88	.89	.92	.92	1.06	1.25	1.39
Other Charges[4]	.58	.63	.68	.68	.71	.72	.77	.83	.88
Subtotal • at sea	8.55	10.13	14.20	15.15	16.35	16.93	18.77	22.25	23.04
• in port	6.94	7.42	8.06	8.52	8.91	9.07	9.81	10.61	11.40
• Overhead Charge per day[5] ($ Thousand)	1.00	1.17	1.61	1.71	1.85	1.91	2.10	2.49	2.58
TOTAL DAILY COST ($ Thousand)									
• at sea	17.03	20.28	26.28	29.83	32.66	34.80	38.82	47.68	53.55
• in port	15.42	17.57	20.14	23.20	25.22	26.94	29.86	36.04	41.91

1) For delivery - December 1979 (Source: MarAd)

2) Assuming no salvage value

3) Source: Buffalo Engineer District

4) Stores, Supplies and Equipment (40%); Tug Charges (30%); Layup (30%)

5) 12% of daily operating expenses assuming 87% of time at sea and 13% in port (Source: MarAd)

VESSEL COSTS FOR ALTERNATIVE PROJECT DEPTHS - Hourly vessel costs per ton of capacity are calculated for alternative project depths based on total operating costs (Table C.2), and capacity utilization (Table C.3). Capacity utilization is based on maximum vessel draft and vessel capacity per inch of draft (Table C.1), which is a function of vessel shape. Depending upon vessel design, significant variations in capacity per inch of draft are observed, even for vessels of similar deadweight or of similar draft. A common or typical value of the block coefficient (coefficient accounting for vessel shape) was used (.85) to provide for consistent and comparable estimates for analytical purposes. The estimates presented in Table C.4 are commensurate with ranges presented in Greenwood's guide to Great Lakes Shipping.

Hourly vessel costs per ton are presented as Table C.4. Table C.4 includes, for Vessel Classes II through X, vessel draft, total daily cost at sea, hourly vessel costs fully loaded (no draft restrictions) and hourly vessel costs at sea for alternative project depths ranging from 18 feet to 29 feet or alternative draft limitations ranging from 16 feet-6 inches to 27 feet-6 inches, assuming that a 1 foot-6 inch clearance is required in protected areas.

Costs presented in Table C.4 also assume that water depths greater than available at Low Water Datum are not utilized by vessels.

Average differential vessel operating costs resulting from changes in dredged depth can be derived directly from Table C.4. After adjustment for inflation between 1979 and 1981, according to the ENR composite index, differential costs are presented in Table C.5 for unit (ft.) increments in dredged depths. An exponential fit is determined to facilitate the integration of transportation savings between dredged depth without the dredging project and with it. For increments over 1 foot, the column can be summed from the without to the with project depth.

The exponential fit is as follows:

$$D(c) = 145.0e^{-.145c} \text{ (in mils per ton-mile)}$$

where,

$D(c)$ = average differential vessel hourly operating cost (mils per ton-mile) per unit change (in dredged depth of 1 ft.)

c = dredged depth

Hence, anticipated differential vessel operating cost (S) for a change in depth from depth without dredging ($C_{w/o}$) to depth with dredging (C_w) can be expressed as follows:

TABLE C.3

VESSEL CAPACITY UTILIZATION BY ALTERNATE PROJECT DEPTH

Vessel Class	Capacity Utilization at Project Depth* (Feet) of											
	29	28	27	26	25	24	23	22	21	20	19	18
II	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.955	.867	.820	.752	.684
III	1.00	1.00	1.00	1.00	1.00	1.00	.944	.928	.862	.795	.730	.664
IV	1.00	1.00	1.00	1.00	1.00	1.00	.949	.888	.827	.765	.704	.643
V	1.00	1.00	.995	.941	.887	.833	.779	.725	.671	.617	.563	.509
VI	1.00	1.00	.956	.904	.851	.798	.746	.693	.641	.588	.535	.483
VII	1.00	.959	.910	.860	.811	.762	.712	.663	.614	.564	.515	.466
VIII	.953	.906	.859	.812	.765	.719	.672	.625	.578	.531	.484	.437
IX	.984	.936	.887	.839	.790	.742	.694	.645	.597	.549	.500	.452
X	.983	.933	.883	.833	.783	.733	.683	.633	.583	.533	.483	.433

* Subtract 1'6" from project depth to obtain maximum vessel draft at Low Water Datum

TABLE C.4

HOURLY VESSEL COST (IN MILLS) AT SEA PER TON (ST)
CARRIED AS A FUNCTION OF ALTERNATIVE PROJECT DEPTH

Vessel Class	Vessel Draft	($000) Total Daily Cost at Sea	No Draft Restrictions	Hourly Cost at Sea Per Short Ton Carried at Project Depth (Feet) of											
				29	28	27	26	25	24	23	22	21	20	19	18
II	21- 2	17.03	70.0	70.0	70.0	70.0	70.0	70.0	70.6	70.6	73.3	78.9	85.4	93.1	102.3
III	21- 7	20.28	64.2	64.2	64.2	64.2	64.2	64.2	64.2	64.6	69.2	74.5	80.7	88.0	96.7
IV	22- 4	26.28	69.3	69.3	69.3	69.3	69.3	69.3	69.3	73.1	78.1	83.8	90.6	98.5	107.8
V	25- 7	29.83	55.1	55.1	55.1	55.4	58.5	62.1	66.1	70.7	76.0	82.1	89.3	97.8	108.2
VI	20- 4	32.66	52.4	52.4	52.4	54.8	57.9	61.5	65.6	70.2	75.6	81.7	89.1	97.9	108.4
VII	27- 4	34.80	48.2	48.2	50.3	53.0	56.1	59.5	63.3	67.7	72.7	78.5	85.5	93.6	103.5
VIII	28- 6	38.82	45.1	47.4	49.8	52.5	55.6	59.0	62.8	67.2	72.2	78.1	85.0	93.2	103.3
IX	27-10	47.68	39.9	40.5	42.6	44.9	47.5	50.5	53.7	57.4	61.8	66.8	72.6	79.7	88.2
X	27-10	53.55	33.8	34.3	36.2	38.2	40.5	43.1	46.1	49.4	53.3	57.9	63.4	69.9	78.0

* Subtract 1'6" from project depth to obtain maximum vessel draft at Low Water Datum and use Table 11 to derive percent of potential trip capacity utilized

$$S = .001 \int_{C_w}^{C_{w/o}} D(x)\,Dc = \int_{C_w}^{C_{w/o}} .145e^{-.145x}dx = [e^{-.145C_{w/o}} - e^{-.145C_w}]$$

C.4 Cost Effects - Shallow Draft Vessels

For shallow-draft channel deepening, a similar type of formula can be derived. The estimated formula is based on operating characteristics, budgetary and operating costs, and hourly tow cost per ton for typical tows operating on the Mississippi River System.

Tow operating characteristics and costs for the Mississippi fleet originate from the U.S. Army Corps of Engineers, Office of the Chief of Engineers, Planning Division of the Directorate of Civil Works.

Tables C.6 through C.8 present an update of operating and capital cost based on information collected from barge and towing companies by the Corps of Engineers in 1979. The estimates are general in nature and may vary with specific operations.

TABLE C.5

Average Differential Vessel Operating Costs Resulting From Changes in Dredged Depth
(1981 mils per ton-mile)

Depth (ft.) From	Depth (ft.) To	Differential Cost 1)	Exponential Fit 2)
18	19	11.4	10.8
19	20	9.4	9.3
20	21	8.0	8.0
21	22	6.8	7.0
22	23	5.8	6.0
23	24	5.0	5.2
24	25	4.4	4.5
25	26	3.9	3.9
26	27	3.5	3.4
27	28	2.9	2.9
28	29	2.6	2.5

1) 1981 costs calculated based on 1979 costs and a 1.21 correction factor for inflation (ENR composite index).

2) coefficient of determination $r^2 = .99$.

Soure: Computed by Contractor.

C.4.1 Operating Costs - Towboats

More specifically, Table C.6 presents the estimated operating costs of towboats on the Mississippi and Gulf Waterway System. Investment and operating costs are presented as a function of towboat horsepower (one category for harbor towboat and 10 categories for line haul towboats of horsepower ranging from 800 to 10,000 hp). Investment costs ranges from $910,000 for a 1,000 hp towboat to $6,000,000 for a 10,000 hp towboat. Operating costs, which include wages and fringe benefits, fuel, maintenance and repairs, supplies, subsistance and insurance, range from $706,000 to $4,319,000 per year. Resulting hourly towboat costs, assuming 345 days of operations per year range from $112 per hour to $690 per hour.

C.4.2 Operating Costs - Barges

Table C.7 presents the estimated operating cost of barges. Quotations are provided for the following barge types: deck; open hopper; covered hopper; tank single skin; tank double skin with coils; tank double skin coiled and lined; cylindrical tank

TABLE C.6

ESTIMATED OPERATING COSTS OF TOWBOATS ON THE MISSISSIPPI/GULF WATERWAY SYSTEM
JANUARY 1981

TYPE	% Chg. Fm 79	Harbor	Line Haul				
HORSEPOWER		400-600	800-1200	1400-1600	1800-2000	2800-3400	4000-4400
INVESTMENT (Average new cost)	+20	425,000	910,000	1,200,000	1,800,000	2,880,000	3,600,000
FIXED COSTS:							
Depreciation: (10%-20 year life)		40,375	86,450	114,000	171,000	273,600	342,000
Return on investment (10% Investment)		42,500	91,000	120,000	180,000	288,000	360,000
Administration & supervision	+14	27,360	49,020	58,900	73,900	102,600	119,700
Sub-total		110,235	226,470	292,900	424,900	664,200	821,700
OPERATING COSTS:							
Wages & fringe benefits	+14	159,600	250,800	285,000	307,800	370,500	370,500
Fuel*	+117	169,050	338,100	507,150	642,400	1,048,100	1,420,000
Maintenance and repairs	+17	23,400	40,950	46,800	52,650	81,900	105,300
Supplies	+20	8,400	21,600	27,600	30,000	44,400	50,400
Subsistence	+14	--------	20,520	22,800	26,200	34,200	34,200
Insurance	+20	12,000	24,000	32,400	42,000	63,600	90,000
Other	+20	1,200	9,600	12,000	12,000	12,000	12,000
Sub-total		373,650	705,570	933,750	1,113,050	1,654,700	2,082,400
TOTAL COSTS: (Annual)		483,885	932,040	1,226,650	1,537,950	2,318,900	2,904,100
HOURLY OPERATING COSTS: (345 days)		58	112	148	186	280	351
TOTAL COSTS: (Annual without fuel)		314,835	593,940	719,500	895,550	1,270,800	1,484,100
HOURLY OPERATING COSTS		38	72	87	108	153	179

*Fuel cost based on 98¢/gallon and use of one gallon per horsepower/day (345 days/year)

Source: U.S. Army Corps of Engineers, Institute for Water Resources, Navigation Analysis Center, Casey Building, Fort Belvoir, V.A. 22060

TABLE C.6 (Continued)

ESTIMATED OPERATING COSTS OF TOWBOATS ON THE MISSISSIPPI/GULF WATERWAY SYSTEM
JANUARY 1981

TYPE	% Chg. Fm 79	Line Haul				
HORSEPOWER		5000-6000	6100-7000	7100-8000	8100-9000	10,000
INVESTMENT (Average new cost)	+20	3,840,000	4,560,000	4,680,000	5,040,000	6,000,000
FIXED COSTS:						
Depreciation (10%-20 years)		364,800	433,200	444,600	478,800	570,000
Return on investment (10% investment)		384,000	456,000	468,000	504,000	600,000
Administration & supervision	+14	144,800	166,400	184,700	201,800	224,600
Sub-total		893,600	1,055,600	1,097,300	1,184,600	1,394,600
OPERATING COSTS:						
Wages & fringe benefits	+14	399,000	444,600	444,600	444,600	444,600
Fuel*	+117	1,859,600	2,197,800	2,535,800	2,873,900	3,381,000
Maintenance and repairs	+17	117,000	134,600	152,100	175,500	187,200
Supplies	+20	54,000	60,000	62,400	66,000	68,400
Subsistence	+14	39,000	39,900	42,200	43,300	43,300
Insurance	+20	102,000	120,000	150,000	156,000	180,000
Other	+20	12,000	12,000	13,200	13,200	14,400
Sub-total		2,583,500	3,008,900	3,400,300	3,772,500	4,318,900
TOTAL COSTS: (Annual)		3,477,100	4,064,500	4,497,600	4,957,100	5,713,500
HOURLY OPERATING COSTS: (345 days)		420	491	543	599	690
TOTAL COSTS: (Annual without fuel)		1,617,500	1,866,700	1,961,800	2,083,200	2,332,500
HOURLY OPERATING COSTS:		195	225	237	252	283

*Fuel cost based on 98¢/gallon and use of one gallon per horsepower/day (345 days/year)

TABLE C.7

ESTIMATED OPERATING COSTS OF BARGES ON THE MISSISSIPPI/GULF WATERWAY SYSTEM
JANUARY 1981

TYPE	% Chg. Fm 79	DECK		OPEN HOPPER		COVERED HOPPER	
SIZE		130 x 35'	195 x 35'	175 x 26'	195 x 35'	175 x 26'	195 x 35'
INVESTMENT (Average new cost)	+20	213,600	270,000	211,200	264,000	246,000	300,000
FIXED COST:							
Depreciation (10%-20 year life)		20,292	25,650	20,064	25,080	23,370	28,500
Return on investment (10% investment)		21,360	27,000	21,120	26,400	24,600	30,000
Administration & supervision	+14	798	912	798	912	912	1,026
Sub-total		45,450	52,650	41,982	52,392	48,882	59,526
OPERATING COST:							
Maintenance and repair	+17	4,680	5,265	4,914	5,616	5,265	5,850
Insurance	+20	3,360	3,840	3,360	3,840	4,080	4,440
Supplies	+20	360	480	360	480	360	480
Sub-total		8,400	9,585	8,634	9,936	9,705	10,770
TOTAL COSTS: (Annual)		50,850	62,235	50,616	62,328	58,587	70,296
HOURLY OPERATING COSTS: (355 days)		5.97	7.30	5,94	7.32	6.88	8.25

TABLE C.7 (Continued)

ESTIMATED OPERATING COSTS OF BARGES ON THE MISSISSIPPI/GULF WATERWAY SYSTEM
JANUARY 1981

TYPE	% Chg. Fm 79	TANK--SINGLE SKIN			TANK--DOUBLE SKIN WITH COILS		
SIZE		195 x 35'	240 x 50'	290 x 50'	195 x 35'	240 x 50'	290 x 50'
INVESTMENT (Average new cost)	+20	428,400	690,000	894,000	492,000	804,000	1,104,000
FIXED COST:							
Depreciation (10%-20 year life)		40,698	65,550	84,930	46,740	76,380	104,880
Return on investment (10% investment)		42,840	69,000	89,400	49,200	80,400	110,400
Administration & supervision	+14	2,394	3,534	4,332	2,500	3,876	4,700
Sub-total		85,932	138,084	178,662	98,440	160,556	219,980
OPERATING COST:							
Maintenance and repair	+17	15,210	22,230	25,740	15,210	23,400	26,910
Insurance	+20	7,560	12,000	16,080	8,640	14,040	19,200
Supplies	+20	1,800	2,400	3,000	1,800	2,400	3,000
Sub-total		24,570	36,630	44,820	25,650	39,840	49,110
TOTAL COSTS: (Annual)		110,502	174,714	223,482	124,090	200,496	269,090
HOURLY OPERATING COSTS: (355 days) (8520 hrs.)		12.96	20.50	26.20	14.56	23.50	31.60

TABLE C.7 (Continued)

ESTIMATED OPERATING COSTS OF BARGES ON THE MISSISSIPPI/GULF WATERWAY SYSTEM
JANUARY 1981

TYPE	% Chg. Fm 79	DOUBLE SKIN TANK, COILED, LINED	CYLINDRICAL TANK PRESSURE	CYLINDRICAL REFRIGERATED
SIZE		195 x 35'	195 x 35'	280 x 50'
INVESTMENT (Average new cost)	+20	540,000	1,008,000	2,520,000
FIXED COST:				
Depreciation (10%-20 year life)		51,300	95,760	239,400
Return on investment (10% investment)		54,000	100,800	252,000
Administration & supervision	+14	2,394	3,190	7,520
Sub-total		107,694	199,750	498,920
OPERATING COST:				
Maintenance and repair	+17	15,210	16,380	35,100
Insurance	+20	9,600	17,040	42,840
Sub-total		24,810	33,420	77,940
TOTAL COSTS: (Annual)		132,504	233,170	576,860
HOURLY OPERATING COSTS: (355 days)		15.55	27.36	67.70

Source: U.S. Army Corps of Engineers, Institute for Water Resources, Navigation Analysis Center, Casey Building, Fort Belvoir, V.A. 22060

pressure; and cylindrical refrigerated. Within each category a further distinction is provided concerning the barge size such as regular (175'x26'), jumbo (195'x35'), tanker (240'x50'), and super tanker (290'x50', however, not used on the Upper Mississippi River). Investment cost or average new cost ranges from $211,000 for a regular open hopper barge to $1,000,000 for a jumbo cylindrical tank pressure barge. Operating costs, which include maintenance and repairs, insurance and supplies, range from $9,000 to $33,000 per year. Resulting hourly barge costs (fixed and operating) range from $5.94 per hour to $27.36 per hour.

C.4.3 Operating Costs - Fuel Adjustment

Table C.8 is provided to permit the adjustment of the fuel cost component of towboat cost according to potential changes in fuel price per gallon. Table C.6 is based on a fuel price of $.98/gallon (as of January 1981) and the consumption of one gallon per horsepower day.

C.4.4 Tow Cost - Shallow Draft Vessels, General Formula

Based upon these cost tables, and based upon typical tow characteristics for liquid bulk, chemicals and dry bulk material transport, the following general formula for tow cost per ton-hour can be derived:

$$C = \frac{(TS * BC) + FC + TB}{TS \times FL \times BL(d)}$$

where,

C = tow operating cost per ton-hour ($/ton-hour)
TS = tow size (barges)
BC = barge operating cost ($/hour)
TB = towboat operating cost ($/hour), excluding fuel
FC = fuel cost ($/hour)
FL = fraction of loaded barges (% divided by 100)
BL(d) = barge ladings (tons per loaded barge at water depth d)

The towboat operating cost (TB), excluding fuel cost is derived from Table C.6. A power fit was determined for the set of data as follows:

$$TB = 1.37\ HP^{.58}$$

where,

HP = towboat horsepower (hp)
TB = towboat operating cost ($/hour) excluding fuel

TABLE C.8

ESTIMATED ANNUAL FUEL COST FOR TOWBOATS
Fuel cost based on c/gallon and consumption of one gallon per horsepower/day (345 days/year). IDLE/DOWN TIME is include

Cost per Gallon	HORSEPOWER	400-600	800-1200	1400-1600	1800-2000	2800-3400	4000-4400	5000-6000	6100-7000	7100-8000	8100-9000	10,000
	.90	155,300	310,500	465,800	590,000	962,600	1,304,100	1,707,800	2,018,300	2,328,800	2,639,300	3,105,000
	1.00	172,500	345,000	517,500	655,500	1,069,500	1,449,000	1,897,500	2,242,500	2,587,500	2,932,500	3,450,000
	1.10	189,800	379,500	569,300	721,100	1,176,500	1,593,900	2,087,300	2,466,750	2,846,300	3,225,800	3,795,000
	1.20	207,000	414,000	620,400	786,600	1,283,400	1,738,800	2,277,000	2,691,000	3,105,000	3,519,000	4,140,000
	1.30	224,300	448,500	672,800	852,200	1,390,400	1,883,700	2,466,800	2,915,300	3,363,800	3,812,300	4,485,000
	1.40	241,500	483,000	724,500	917,700	1,497,300	2,028,600	2,656,500	3,139,500	3,622,500	4,105,500	4,830,000
	1.50	258,800	517,500	776,300	983,300	1,604,300	2,173,500	2,846,300	3,363,800	3,881,300	4,398,800	5,175,000
	1.60	276,000	552,000	828,000	1,048,800	1,711,200	2,318,400	3,036,000	3,588,000	4,140,000	4,692,000	5,520,000
	1.70	293,300	586,500	879,800	1,114,400	1,818,200	2,463,300	3,225,800	3,812,300	4,398,800	4,985,300	5,865,000
	1.80	310,500	621,000	931,500	1,179,900	1,925,100	2,608,200	3,415,500	4,036,500	4,657,500	5,278,500	6,210,000
	1.90	327,800	655,500	983,300	1,245,500	2,032,100	2,753,100	3,605,300	4,260,800	4,916,,300	5,571,800	6,555,000
	2.00	345,000	690,000	1,035,000	1,311,000	2,139,000	2,898,000	3,795,000	4,485,000	5,175,000	5,865,000	6,900,000

Source: Computed by Contractor

Fuel cost (FC) is calculated assuming a consumption of one gallon per horsepower-day and a price of $.98 per gallon. Hence:

$$FC = \$.041 \text{ hp, in dollars per hour}$$

The values taken by all other variables are specific to the type of commodity transported. Three groups are distinguished in this report: liquid bulk (petroleum); chemicals; and dry bulk (coal, grain). The following assumptions used for commodity specific variables are derived from the Berger report "Projection of Tow Size and Towboat Horsepower by Scenarios of Future Development," which was a part of the Upper Mississippi River Master Plan. The following formulas should be used to calulate tow operating cost per ton-hour as they represent the processing of the general formula presented above.

C.4.4.1 Tow Costs/Liquid Bulk

The following assumptions are used to represent the characteristics of liquid bulk tows on the Upper Mississippi River:

TS = 4.3 tanker barges
BC = $20.50 per hour for 240'*50' single skin tank barge
FL = .80 (fraction of loaded barges)
BL(d) = 2500*(d - clearance -do)/(9 - do), with 1.5 foot clearance and draft empty do = 1.5 feet
= 333 (d - 3) (with water depth (d) in feet and barge lading (BL) in tons)

Towboat horsepower can be expressed as a function of tow size as follows:

$$HP = 570\ TS^{1.32}$$

Hence, tow operating cost per ton-hour can simply be expressed as follows for liquid bulk movements:

$$Clb = .307/(d - 3)$$

C.4.4.2 Tow Costs - Chemical Products

The following assumptions are used to represent the characteristics of tows carrying chemical products:

TS = 2.5 barges
BC = $27.36 per hour, assuming cylindrical tank pressure barges
FL = 0.80 (fraction of loaded barges or tows)
BL(d) = 2500 * (d - clearance - do)/(9 - do)
= 333 (d - 3)

Towboat horsepower (HP) can be expressed as a function of average tow size as follows:

$$HP = 570\ TS^{1.137}$$

Hence, tow operating cost per ton-hour can simply be expressed as follows for chemical product movements:

$$Ccp = .208/(d - 3)$$

C.4.4.3 Tow Costs - Dry Bulk

The following assumptions are used for dry bulk:

TS = 8.8 barges (jumbo), between Lock 2 and Lock 11 on the Upper Mississippi River
BC = $7.80 per hour, or average of covered and open hopper jumbo barges ($8.25 and $7.32 per hour, respectively)
FL = 0.70 (fraction of loaded barges or tows)
BL(d) = 1500 * (d - clearance - do)/(9 - do), with 1.5 foot clearance and draft empty (do) = 1.5 feet
= 200 (d - 3) (with water depth (d) in feet and barge lading in tons)

Towboat horsepower (HP) can be expressed as a function of average tow size (TS) as follows:

$$HP = 254\ TS^{1.062}$$

Hence, tow operating cost per ton-hour can simply be expressed as follows for dry bulk movements:

$$Cdb = .246/(d - 3)$$

C.5 Unit Savings - Upper Mississippi River Tow Transport Costs

C.5.1 Shallow Draft - Channel Depth

The total annual tow transport cost savings resulting from an increase in depth, or conversely the total annual transportation cost losses resulting from a decrease in depth due to reduced maintenance can generally be expressed in a form analogous to deep draft savings as follows:

$$S = TM \times \left(\frac{1}{Vu} + \frac{1}{Vd}\right) * \left(\frac{k}{dw/o-3} - \frac{k}{dw-3}\right)$$

where,

S = total annual tow transport cost savings ($ 1981)
TM = total ton-mileage corresponding to the terminal or dock in question (ton-miles)

Vu = average tow speed upstream, including delays
Vd = average tow speed downstream, including delays
f = frequency of locks per miles (number of locks/mile)
DT = anticipated delay (service and waiting) time at typical lock (for one round trip)
k = tow cost factor ($/tonxft.), by commodity
d = channel depth
dw = channel depth with dredging project (new or maintenance)
dw/o = channel depth without dredging project

The variable TM, representing the total annual ton mileage for the terminal or dock can be obtained as a first approximation by multiplying the total annual terminal throughput from Step 4 by the average haul distance. If needed, a more precise evaluation can be performed using dock to dock commodity flow summaries available from the Waterborne Commerce Statistical Center.

According to the Vessel Characteristics Survey of the U.S. Army Corps of Engineers, St. Louis District, 1979, tow speed upbound as well as downbound is not significantly sensitive to commodity type on the Upper Mississippi River. Hence, the following values of Vu (tow speed upstream) and Vd (tow speed downstream) can be used for analytical purposes:

	Tow Speed without Delays	Tow Speed with Delays*
Vu (mph)	5.49	2.90
Vd (mph)	7.51	3.15
Average (mph)	6.33	3.01

* 1981 conditions

If tows are expected to encounter delays (at locks in most cases), the with delay speeds should be used. Tow speeds without delays are used only when the tow will not encounter significant delays.

The tow cost factors (k) were calculated for barges carrying liquid bulk, chemicals and dry bulk. Assuming that any new dredging would only increase channel depth to 9 feet, the formula can be simplified to:

Commodity Type	Annual Savings Per Ton from Increasing Channel Depth $d_{w/o}$ to 9 Feet, with Delays
Liquid Bulk	$TM * .6623 * \left(\frac{.307(9-d_{w/o})}{6(d_{w/o}-3)}\right)$
Chemicals	$TM * .6623 * \left(\frac{.208(9-d_{w/o})}{6(d_{w/o}-3)}\right)$
Dry Bulk	$TM * .6623 * \left(\frac{.246(9-d_{w/o})}{6(d_{w/o}-3)}\right)$

For many projects of this type, the average length-of-haul for movements, miles, can be obtained from the Port Director or Dock Operator. If not, miles can be obtained from "Waterborne Commerce of the United States - Part 2." Tonnage for each year is computed in Step 4 and their product will yield ton-miles per year for use in this formula. Annual savings are then divided by (T) to obtain unit savings, i.e., S/T.

It should be noted that for both deep and shallow draft vessels, the previous tables contain sufficient information to directly estimate the line-haul cost of any particular movment. In general, the need for estimating line-haul water rates will be associated with shallow draft movements on the Upper Mississippi River. Where normally only a small and well-specified number of movments need to be considered, it might be desireable to compute the cost or possibly to obtain it from the terminal operator or carrier.

C.5.2 Shallow Draft - Alternative Ports

As with the basic equation used for the evaluation of deep draft cost impacts, the above equations can also be used to compute savings resulting from the use of alternative ports. If only channel depth is affected, then the above equations can be applied directly, with $d_{w/o}$ the channel depth at the alternative port and d_w the channel depth at the existing port.

A more likely case is that only the length-of-haul changes. In this instance, the basic equation becomes:

$$S = (TM_1 - TM_2) * \left(\frac{1}{V_u} + \frac{1}{V_a}\right) * \frac{k}{d-3}$$

where,

TM_1 = ton-miles via the alternative port
TM_2 = ton-miles via the current port
d = channel depth

All other variables are as defined in C.5.1. Hence, unit savings = S/T, i.e., savings per ton.

C.6 Cost Savings - Rail/Barge Alternatives

However, in most instances, either the total charge is unnecessary to determine, or the exact origins or destinations of the movements may not be known. In these cases, which are more likely to be the prevailing cases, Table C.9 can be used for computing barge costs. Table C.9 is taken from a study prepared for the Institute for Water Resources and is based on 1979 barge rates. The increase from 1979 to 1981 is approximately 8 percent per year, for an increase of 16.6 percent to adjust these figures to 1981 levels. Documentation for Table C.9 is available from the Institute for Water Resources, Navigation Analysis Center, Fort Belvoir, Virginia, (202) 325-0574.

C.6.1 Cost Savings - Alternative Ports

The table can be used in one of two ways. If the alternative routing to the proposed project is via another port but still on the waterway, then the increase or decrease in the barge rate is the waterway miles between the two ports divided by 100 times slope/100 miles from Table C.9 for the appropriate commodity. For example, suppose that for some reason a movement of ore from Burnside, Louisiana, normally destined for Winona, Wisconsin, is forced to use some downstream facility that is 50 miles away. The the barge rate will decrease by 15.7 cents (50 miles divided by 100 times $.2696 times 1.166). Of course, this would be more than offset by the increased truck haul between Winona and the downstream facility. If this were 30 miles at a cost of 6 cents per ton-mile, then the increased cost of using the alternative dock would be $1.64 ($1.80-$.157), the increased truck costs less the decrease in the barge rate of 15.7 cents per ton. Note that these physical units, i.e., miles, would be reflected in Exhibit 5.1. The line-haul charges would reflect a decrease of 50 miles while the truck/rail charge to inland destination would reflect an increase of 30 miles.

C.6.2 Cost Savings - Alternative Transportation Modes

The second method of using this table is when the alternative routing is via the same origin and destination, but the shipment is all rail or all truck. In this event, the barge rate must be computed for comparison with rail or truck costs. Due to the

TABLE C.9

Regression Statistics Barge Rate Study (1979 Data)

Commodity Class	No. of Observations	R^2	Intercept	Slope/ 100 Miles
Corn	33	.72	1.84	.3064
Wheat	21	.75	1.34	.3885
Soybeans	30	.78	1.64	.3014
Grain Mill Products	20	.45	2.45	.2076
Ores	50	.51	1.67	.2696
Coal	66	.71	1.15	.3070
Crude Oil	14	.70	.49	.3881
Sand & Gravel	15	.70	1.31	.2493
Non-Metallic Minerals	20	.63	1.14	.3025
Salt	14	.64	1.56	.1676
Oils, Fats, Sugars	27	.46	3.23	.3274
Coal Tars	21	.87	1.35	.4452
Petroleum Coke	22	.72	2.07	.2597
Alcohols	27	.69	1.29	.6614
Benzene	29	.82	1.71	.4132
Basic Chemicals, Net	36	.40	2.66	.3795
Nitrogenous Fertilizers	105	.36	2.84	.2566
Phosphatic Fertilizers	24	.37	2.15	.1945
Gasoline, Jet Fuel, Kerosene	36	.70	1.16	.3031
Residual Fuel Oil	30	.73	1.05	.2996
Distillate Fuel Oil	59	.83	.42	.4469
Lub Oils	57	.77	.34	.4864
Naptha, Solvents	21	.67	2.80	.4097
Asphalt, Tar	21	.50	3.02	.3992
Crude Iron Products	61	.49	2.22	.3860
Finished Iron Products	81	.55	3.30	.5867
Scrap	44	.19	4.69	.2327
Miscellaneous Finished Products	19	.37	4.07	.4241
Miscellaneous Bulk Products	30	.77	- .25	.6826

Source: Barge Line-haul Rate Study Regression Analysis, Institute for Water Resources, Navigation Analysis Center, Dec. 1981.

length of haul associated with waterway movements, in virtually all cases rail, not truck, will be the relevant alternative mode.

C.6.3 Barge Costs

In using Table C.9 to compute barge rates, the most important consideration is the ability to obtain a rail rate to compare with the barge movement. Where the true origin and destination of a shipment are known, one might attempt to find the applicable tariff. Exhibit C.1 is one possible starting point. Tariff Guide No. 10 contains the citation for relevant rail and truck tariffs that are available from the tariff bureaus. The Guide may be ordered from the Academy of Advanced Traffic, Inc. One might also contact a railroad freight agent to obtain a few rail rates, or possibly hire a rate expert to obtain the correct rail rates. In general, ascertaining rail rates is a rather difficult and complicated task for anyone unfamiliar with the structure of tariffs and it is recommended that expert help be obtained if specific rail rates are needed.

The more likely case is that neither origins or destinations can be sufficiently specified to obtain a tariff citation or that the legally applicable tariff is not economically applicable. That is, some rail tariff is applicable for any point to point rail movement and by law is published. However, many of these rates, commonly called "paper" rates, exist only by law, and no traffic moves under these rates.

C.6.4 Rail Costs

Because of this, it is suggested that rail rates be computed based on the following formula taken from a U.S. Department of Transportation study (see Table C.10).

$$\begin{aligned} \ln \text{rate} = {} & 1.734 + \underset{(F=305)}{.476}\ \ln \text{miles} + \underset{(26)}{.0002}\ \text{miles} - \underset{(251)}{.352}\ \ln \text{weight} \\ & + \underset{(7.1)}{.26\times10^{-6}}\ \text{weight} - \underset{(81)}{.181}\ \ln \text{Den} - \underset{(1441)}{.624}\ \text{MPriv} - \underset{(861)}{.378}\ \text{MPub} \\ & + \underset{(65)}{.087}\ \ln \text{Val} - \underset{(25)}{.070}\ \text{Im/ex} - \underset{(18)}{.043}\ \text{RCO} + \underset{(260)}{.336}\ \text{L} - \underset{(172)}{.167}\ \text{DT2} \\ & + \underset{(20)}{.054}\ \text{OT1} - \underset{(13.3)}{.055}\ \text{OT2} - \underset{(93)}{.154}\ \text{OT5} - \underset{(14)}{.118}\ \text{CHEM} + \underset{(48)}{.231}\ \text{IRON} \\ & - \underset{(39)}{.095}\ \text{Coal} + \underset{(9.9)}{.062}\ \text{GMill} \end{aligned}$$

$R^2 = .837$, $F = 984$, $SE = .253$, $N = 3649$

If information on certain variables is available, they could be used along with the average values by commodity type shown in Table C.10. It would seem more likely that very little would be known about these variables, so that the average rate per ton shown at the bottom of Table C.10 should be used. Variables cited in Table C.10 are:

ln	= natural log of variable
Rate	= $ per hundred weight
Miles	= length of rail haul in miles
Weight	= weight of shipment in pounds
Den	= commodity density in pounds per cubic foot
MPriv	= multiple car shipment, privately owned cars
MPub	= multiple car shipment, railroad owned cars
Val	= commodity value
Im/ex	= shipment is for import or xport
RCO	= 1, if two railroads could compete for the movement, zero otherwise
L	= 1, if commodity is liquid, zero otherwise
DTZ	= 1, if destination is Southern Territory, zero otherwise
OT1	= 1, if origin is Official Territory, zero otherwise
OT2	= 1, if origin is Southern Territory, zero otherwise
OT5	= 1, if origin is Mountain Pacific Territory, zero otherwise
CHEM	= 1, if shipment is chemicals
IRON	= 1, if shipment is iron product
COAL	= 1, if shipment is coal
GMill	= 1, if shipment is grain mill products

This is certainly a rather significant amount of information to generate about a movement whose true origin and destination cannot be well specific. Generally, this type of information is only available in a rail tariff, so that usually the average values shown in Table C.10 are the only readily available values.

To return to our point of departure in discussing rail rates, we need to tie the "average" rail rate to some computed barge rates. Where actual origins and destinations are known, this is no problem as the rates can be computed directly. In other cases, it is suggested that the corresponding barge rate be computed based on a 30 percent waterway circuity factor. Thus, the barge rate associated with the typical coal movement would be based on a length of haul of 664 miles (1.3 times 510.8 miles from Table C.10) and the relevant equation from Table C.9.

One final adjustment needs to be made to use these figures in computing benefits. Barge rates tend to be cost based, while rail rates generally are not. The best general estimate of costs available is the 80 percent-20 percent split developed by the ICC

TABLE C.10

Average Values of Variables for Computing Rail Rates for Eight Bulk Commodities

	Coal	Petroleum	Chemicals	Iron	Products-Grain Mill	Grain	Cement	Fertilizer
In Miles	6.1387	6.5638	6.5991	6.3848	6.4795	6.3304	6.1491	6.5460
Miles	510.8	799.2	847.5	686.2	776.5	628.0	523.6	814.9
lnWeight	12.048	11.877	11.973	11.769	11.310	12.196	11.936	11.852
Weight	198,950	155,571	166,836	137,115	94,695	219,695	169,846	147,036
lnDen	4.0260	4.1110	4.0374	4.6543	3.6087	3.7333	4.3820	4.0508
MPriv	.1405	.0415	.0779	.0405	.0010	.1430	.0292	.0066
MPub	.3260	.0692	0.0000	.1247	.0170	.2154	.0365	0.0000
lnVal	-3.9120	-3.5489	-2.0624	-1.0490	-1.8711	-3.1388	-2.5257	-3.0093
Ex/Im	.1165	.0069	.0701	.0043	.0330	.3626	0.0000	.0033
RCO	.0879	.4464	.3065	.6951	.7453	.3661	.5073	.2924
L	0.0000	.8304	1.0000	0.0000	.0869	0.0000	0.0000	.2060
DT2	.3214	.1038	.3429	.1493	.2288	.1548	.3285	.0166
OT1	.3812	.1073	.1766	.7367	.4525	.3137	.1715	.0997
OT2	.3711	.1488	.2468	.0757	.1129	.0536	.3066	.6645
OT5	.1910	.3183	.0286	.0757	.0450	.0959	.1934	.0166
Chemicals	0	0	1.0000	0	0	0	0	0
Iron	0	0	0	1.0000	0	0	0	0
Coal	1.0000	0	0	0	0	0	0	0
GMill	0	0	0	0	1.0000	0	0	0
sample size N	2377	289	385	938	1001	1699	274	301
Average Rate ($ ton)	$8.44	$21.93	$22.75	$22.27	$28.51	$12.77	$12.40	$17.83
Estimated Cost ($ Ton)	$6.75	$17.54	$18.20	$17.82	$22.81	$10.22	$ 9.92	$14.26

Source: U.S.D.O.T., "Rail Rate Models for Bulk Commodities," Report No. SS-221-U1-74, September 1981.

ISSUED JANUARY 1977

EXHIBIT C.1

TARIFF GUIDE NO. 10

Naming: Major Rail, Motor Carrier, Piggyback and
Freight Forwarder Agency Tariffs, Both Class and Commodity,
Applying Throughout the United States

By E. Albert Ovens, Executive Vice President

ACADEMY OF ADVANCED TRAFFIC, INC.

1 WORLD TRADE CENTER, NEW YORK, 10048
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Rail Exparte Increases from November 30, 1977 through October 1, 1981

Exparte Tariff	Effective Date	Increase [a]
X-343	11-30-77	5%
X-349	6-17-78	2% between South and all territories; 4% all others.
X-357-A	2-23-79 [b]	8% within South; 8% between South and East (does not include Illinois Rate Committee Territory); 7% all others.
X-366-A [c]	10-15-79	11.1% between South and all territories; 12.5% within West; 12.5% between West and East (includes Illinois Rate Committee Territory); 13.7% within East (includes Illinois Rate Committee Territory).
X-375-C [c]	7-12-80 [d]	9.9% between South and all territories; 13.9% all others.
X-336	12-31-80	5%
RCCR X003 [c]	10-1-81	8.4%

a/ Generally applicable to line haul commodity rates. Actual increase may vary with commodity and application of tariff involved.

b/ Date of change in tariff application. Original tariff effective 12-15-78.

c/ Absorbs prior fuel adjustment or general increases published in other tariffs.

d/ Effective 9-1-80 when from or to East.

* *

Total percentage increase to be applied to X-336 rate level

Application	Cumulative increase
Within South:	49.4%
Between South and East:	49.4%
Between South and West(including Illinois Rate Committee Territory):	48.4%
Within West:	55.8%
Between West and South:	48.4%
Between West and East(including Illinois Rate Committee Territory):	55.8%
Within East:	57%
Between East and South:	49.4%
Between East and West(including Illinois Rate Committee Territory:	55.8%

for variable and fixed costs, respectively. Therefore, we want to compare the barge rate to 80 percent of the estimated rail rate.

C.6.5 Truck Costs

For estimating truck costs, a figure of 6 cents per ton-mile is applicable. This figure was obtained from a monthly report issued by the U.S. Department of Agriculture for trucking agricultural products. For short intra-port truck movements, a cost of $.65 per ton is applicable, based on truck rental costs per hour. For these short movements, using a cents per ton-mile will greatly underestimate truck costs. The $.65 figure is the lowest possible truck cost per ton, due to loading and unloading time for trucking commodity. (For further information, contact Freeman Buxton, Office of Transportation, USDA, Washington, D. C., 20250; phone (202) 447-6236).

C.6.6 Transfer Costs

The last piece of information possibly needed to complete a rail-barge comparison is handling charges. These are shown in Table C.11 and represent average charges associated with typical rail and barge movements. Where better data is available, it should be used. For example, access charges to or from the waterway may or may not be applicable, depending on the specific movement and ports considered. This should be determined on a movement by movement basis.

C.7 Decreasing Channel Depth

The benefits resulting from an increase in channel depth have been translated into vessel transportation cost savings due to the more efficient loading of those vessels or tows which have sufficient draft to fully exploit increased depth. The methodology recommended for benefit calculations was presented for Great Lakes vessels and for Mississippi tows, assuming known dredging requirements to maintain a given channel depth. However, budgetary constraints may not allow maintenance dredging at sufficient levels to maintain current channel depths. The methodology below be applied to future years to determine the without project channel depth.he benefit equation for inflation (all benefits are in 1981 dollars).

C.7.1 Estimation of the Rate of Decrease of Depth

Analysis of changes in dredge depth involves the determination of the rate of decrease of depth of a harbor. This involves the application of available rates of siltation for the area in question. Rates of siltation are generally progressive in that the rate decreases annually in the absence of dredging to zero when natural depth (if any) is reached.

TABLE C.11

GENERIC HANDLING COSTS PER TON

Commodity	Water Charges			Rail Charges	
	Access	Load	Unload	Load	Unload
Grain	$2.73	$1.95	$1.66	$1.84	$2.40
Petroleum	.95	.86	1.93	1.77	1.77
Coal	1.91*	.46	.54	.17	.48
Chemicals	3.85	1.25	1.80	1.34	1.33
Minerals	1.03	1.45	1.30	1.44	1.29
Iron & Steel	1.66	2.45	2.18	1.91	1.60
Other	2.45	2.44	2.44	1.42	2.66

* Western coal is $13.40.

Source: Comprehensive Master Plan for the Management of the Upper Mississippi River System, Navigation/Transportation Studies Appendix, Upper Mississippi River Basin Commission, September 1981, Table 3.15.

Siltation rates are often available from either the Corps of Engineers, various harbor authorities, or private dock operators. If not, the following procedure could be used to estimate an upper bound for annual siltation rates. The upper bound generally corresonds to the first year rates since rates decrease concurrently with depth.

For a wharfside area, the volume of annual dredging (in cubic yards for example) would be divided by the product of the dredged length alongside the dock and the dredged width (or dredged area).

For a channel, the approach is analogous in that the volume of material dredged should be divided by the total area dredged. Where the entire channel is dredged, this latter figure, or denominator is simply the product of the length of the channel and its width.

Generally, annual siltation rates can then be estimated as follows:

$$MAXSR = \frac{1}{n} \times \frac{d(i)}{x(i)y(i)}$$

where,

MAXSR = maximum rate of siltation in yards of depth per year
d = cubic yards dredged at each dredging event, i
x = length of area dredged in yards at each event, i
y = width of area dredged in yards at each event, i
n = period of records reviewed, in number of years

Where budgetary constraints are present, d(i) can be estimated as the dredging budget divided by dredging cost per cubic yard, currently about $8. The area to be dredged, x(i)y(i), can be obtained from local authorities and n = 1 year. Using these figures to compute the amount of siltation that is dredged yearly, DR, then the change in channel depth is MAXSR - DR, i.e., the decrease in depth due to siltation less the amount of dredging. The channel depth is then the existing depth minus (MAXSR - DR).

C.8 Benefits - Production Facilities, Vessel Construction

A very different type of benefit that appears at several proposed 1983 projects results from dredging or dockwall construction to provide areas of expansion for the ship building industry. In these cases, the commodity "shipped" is the vessel itself, so that some type of standard commodity type of benefit will not apply. Therefore, a slightly broader measure of benefits was used for these projects, namely the profitability of these operations or the excess of sales over payments to factors used in the production of vessels.

Information on the ship building industry is not available at the county or state level due to disclosure reasons. However, the competitive nature of the industry suggest that national level data should be a good approximation of the industry within the state. Data on the industry was obtained from the 1977 Survey of Manufacturers - Industry Series, Table 5a, the most current data available. For SIC 3731 (Ship Building and Repairing) and SIC 3732 (Boat Building and Repairing) the information taken from the Survey of Manufacturers is presented below.

SIC	Value of Shipments(1)	Payroll(1)	Cost of Materials(1)
3731	$6,495.1	$2,494.0	$2,670.1
3732	1,822.6	445.8	984.7

(1) Millions of dollars.

After netting out labor and materials costs, approximately 21.5 percent of the value of shipments is still unaccounted for. This represents the implicit rental of and rate of return to capital goods used in the production of vessels. Of this remainder, 94 percent was ascribed to the rental price of capital goods, with 6 percent of the remaining value attributed as benefits to the project. This figure (6%) was based on two related, but independent studies. The first was a study by the Contractor showing an approximate 6 percent after tax return to capital in the business sector of the U.S. economy. The second is a study by B. M. Fraumeni and D. W. Jorgenson entitled "The Role of Capital in U.S. Economic Growth, 1948-1976," contained in Capital Efficiency and Growth, edited by G. M. von Furstenberg (Ballinger Publishing, 1980). For SIC 37 (Transportation Equipment & Ordinance, except motor vehicles) they show an average return of 5.35 percent, over the period 1948-1976. Although this figure is lower then the 6 percent used, over the 1953-1976 period the corresponding rate implied in the study is 5.95 percent. Overall, the 6 percent figure seemed a fairly reasonable approximation to the rate-of-return.

Based on these data, the per unit benefit can be computed as follows: For every dollar of sales by the ship building industry, 78.5 cents will be spent on materials and labor. Of the remaining 21.5 cents, 94 percent represents the implicit rental price of capital goods, with the remaining 6 percent representing the additional value created by each dollar of sales that is not accounted for as payments to factor inputs (labor, capital and materials). Thus, 1.29 cents (.06 times 21.5 cents) of each dollar of sales represents the benefit (value) that can be attributed to projects whose main purpose is the provision of additional dock space or associated services for the ship building industry. For example, if a particular project were to increase the production capability such that an additional

$1,000,000 of vessels could be constructed annually, $987,100 of increased sales would represent factor payments, while $12,900 (.215 times .06 times $1,000,000) would represent the benefit to the project.

C.9 Benefits - Dock Wall Extension/Repair or Available Berths

Queuing theory is suggested as the most appropriate means to estimate the impact of investment alternatives on vessel waiting times. Dock wall extension or repair and the construction of a new berth represent investment alternatives which will increase the overall terminal capacity by providing more berthing space to vessels.

Annual benefits can be estimated by calculating the savings in vessel waiting costs at the terminal as follows:

$$B = V * \lambda * 365 * (1/\mu) * ((n_2) - R(n_1)); \text{ or}$$

$$B = V * \lambda * 365 * (1/\mu) \ (R(n_2, u_2) - R(n_1, u_1))$$

where,

B = annual savings in vessel and cargo holding costs (1981 dollars per year)
V = vessel or tow cost per hour, including cargo holding cost ($/day)
λ = vessel arrival rate (average number of vessels per day)
μ = vessel service rate (average number of vessels served per day at one berth), or inverse of vessel service time
R(n,u) = waiting to service time ratio as a function of the number of berths (n) and facility utilization (u)

Vessel and tow cost per hour, excluding cargo holding costs can be obtained from the vessel cost information presented earlier. The costs must be updated where necessary to 1981 or 1982 dollars, etc., depending upon the base used for project cost estimations. Cargo holding cost can be obtained by calculating the opportunity cost of idling the cargo. The daily opportunity cost is the product of the value of the cargo times the daily interest rate which fluctuates over time. Currently, September 1982, this value is about .00033 (.12/365 days).

The daily arrival vessel/tow arrival rate can be obtained by dividing the total number of vessels/tows calling at the port by 365 days. The annual number of vessel/tow calls can be obtained from the terminal operator.

The vessel service rate (μ) can be obtained by calculating the inverse of vessel service time. Hence, a service time of 0.5 days corresponds to a service rate of two vessels per day. Information on average service rate can be obtained from the terminal operator.

Queuing theory can be a good substitute for expensive simulation models as a means to calculate anticipated vessel/tow waiting time, provided that the proper Erlang distributions are used to represent the pattern of vessel arrival and service time. Extensive research performed by UNCTAD's shipping division indicate that: (i) for break-bulk/general cargo operation, an Erlang 2 distribution best describes the service distribution, while an Erlang 1 or negative exponential distribution best describes the arrival pattern; and (ii) for specialized terminals serviced by specialized vessels/tows, such as petroleum, coal, iron ore, salt, etc., the arrival distribution is less likely to follow an Erlang 1 distribution due to a smaller fleet and a more limited number of operations; instead, an Erlang 2 distribution is proposed, not only for the arrival pattern, but also for the service distribution. Since advanced theory is required to solve for the general steady state solution, extensive computational results have been tabulated. The tabulation presented as Table C.12 or break-bulk/general cargo/non-specialized terminals and as Table C.13 for specialized terminals.

The ratios R(n,u) of waiting time to service time can be extracted from the above mentioned tables provided that the number of berths (n) and the facility utilization (u) are known or can be determined. The number of berths in the without project condition (n_1) can be obtained from the dock operator, as well as the number of berths after improvements (n_2). Once the arrival rate (λ), the service rate (μ) and the number of berths (n) are known, the facility utilization (u) can be calculated as follows:

$$u = \lambda/(n * \mu)$$

For typical project sizes, this value is shown in Tables C.12 and C.13. Interpolation is required for values of utilization not shown on Tables C.12 and C.13.

C.10 Analysis of Minor Harbor Improvements

Minor harbor improvements include all improvements which help expedite the servicing of vessels or tows, hence, help reduce waiting time. Typical improvements include the procurement of a faster crane, the enlargement of a storage area, or diminishing congestion at any point in the cargo handling process. Project costs relating to minor improvements are generally lower than costs relating to dredging or dock wall extension.

C.10.1 Increased Number of Berths

The equation used to determine the impact of an increase (decrease) in the number of berths can be used again.

$$B = V * \lambda * 365 * (1/\mu)(R(n,u2) - R(n,u1))$$

TABLE C.12
AVERAGE WAITING TIME OF VESSELS IN THE QUEUE M/E2/n IN UNITS OF AVERAGE SERVICING TIME (General cargo and non-specialized berths)

Utilisation	Number of berthing points													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
0.10	.08	.01	0	0	0	0	0	0	0	0	0	0	0	0
0.15	.13	.02	0	0	0	0	0	0	0	0	0	0	0	0
0.20	.19	.03	.01	0	0	0	0	0	0	0	0	0	0	0
0.25	.25	.05	.02	0	0	0	0	0	0	0	0	0	0	0
0.30	.32	.08	.03	.01	0	0	0	0	0	0	0	0	0	0
0.35	.40	.11	.04	.02	.01	0	0	0	0	0	0	0	0	0
0.40	.50	.15	.06	.03	.02	.01	.01	0	0	0	0	0	0	0
0.45	.60	.20	.08	.05	.03	.02	.01	0	0	0	0	0	0	0
0.50	.75	.26	.12	.07	.04	.03	.02	.01	.01	.01	0	0	0	0
0.55	.91	.33	.16	.10	.06	.04	.03	.02	.02	.01	.01	.01	0	0
0.60	1.13	.43	.23	.14	.09	.06	.05	.03	.02	.02	.02	.01	.01	.01
0.65	1.38	.55	.30	.19	.12	.09	.07	.05	.04	.03	.03	.02	.02	.02
0.70	1.75	.73	.42	.27	.19	.14	.11	.09	.07	.06	.05	.04	.03	.03
0.75	2.22	.96	.59	.39	.28	.21	.17	.14	.12	.10	.08	.07	.06	.05
0.80	3.00	1.34	.82	.57	.42	.33	.27	.22	.18	.16	.13	.11	.10	.09
0.85	4.50	2.00	1.34	.90	.70	.54	.46	.39	.34	.30	.26	.23	.20	.18
0.90	6.75	3.14	2.01	1.45	1.12	.91	.76	.65	.56	.50	.45	.40	.36	.33

Source: UNCTAD secretariat, "UNCTAD/SHIP/185: GE. 79.55289"

TABLE C.13

AVERAGE WAITING TIME OF VESSELS IN THE QUEUE
E2/E2/n IN UNITS OF AVERAGE SERVICING TIME
(for specialized berths)

Utilisation	Number of berthing points							
	1	2	3	4	5	6	7	8
0.10	.02	0	0	0	0	0	0	0
0.15	.03	.01	0	0	0	0	0	0
0.20	.06	.01	0	0	0	0	0	0
0.25	.09	.02	.01	0	0	0	0	0
0.30	.13	.02	.01	0	0	0	0	0
0.35	.17	.03	.02	.01	0	0	0	0
0.40	.24	.06	.02	.01	0	0	0	0
0.45	.30	.09	.04	.02	.01	.01	0	0
0.50	.39	.12	.05	.03	.01	.01	.01	0
0.55	.49	.16	.07	.04	.02	.02	.02	.01
0.60	.63	.22	.11	.06	.04	.03	.02	.01
0.65	.80	.30	.16	.09	.06	.05	.03	.02
0.70	1.04	.41	.23	.14	.10	.07	.05	.04
0.75	1.38	.58	.32	.21	.14	.11	.09	.07
0.80	1.87	.83	.46	.35	.26	.20	.16	.13
0.85	2.80	1.30	.75	.57	.44	.35	.29	.23
0.90	4.36	2.00	1.20	.94	.73	.59	.49	.41

Source: UNCTAD secretariat, "UNCTAD/SHIP/185: GE.79.55289"

Tables C.12 and C.13 can again be consulted using the column corresponding to the number of interchangeable berths at the terminal.

C.10.2 Improvements in Vessel Cycle Time

The main problem to solve is to determine the impact of minor improvement measures on service time ($1/\mu$) at the given berth if only one berth is available, or on average, service time across all berths (a 10 percent decrease in service time at one berth corresponds to a 5 percent decrease in service time at a dual berth terminal).

$$(1/\mu)_2 = (k/n)\ (1/\mu)_1 * CT_1/CT_2 \text{ for faster crane}$$

$$(1/\mu)_2 = (k/n)\ (1/\mu)_1 * HR_1/HR_2 \text{ for faster conveyor}$$

where,

$1/\mu$ = servicing time (vessels or tows per day)
n = number of berths
k = number of berths benefiting from improvement
CT = crane cycle time (number of cycles per hour)
HR = conveyor handling rate (tons per hour)

C.10.3 Improvements in Storage Facilities

The lack of storage space or its unacceptable use for long term storage of general cargo, containers or bulk commodities represent a major constraint to efficient servicing of the vessel/tows. Storage constraints typically reduce the rate of transfer or commodities from apron to storage, resulting in the idling of both apron cranes and vessels/tows.

The impact of an anticipated increase in traffic on storage requirements can be assessed by investigating the relationship that exists between annual throughput and storage requirement. To the extent possible, the relationship should be adjusted to reflect the annual operating situation. For instance, if given the present annual throughput, the storage area is congested, the linear relationship between storage requirement and annual throughput can be established immediately. The increase in vessel servicing time ($1/\mu$) resulting from the improvements to the storage area can be assessed as follows:

$$(1/\mu)_2 = (k/n)\ (1/\mu)_1 * MAX(SR1,ES)/MAX(SR2,ES)$$

where,

$(1/\mu)_2$ = servicing time assuming larger/improved storage space
$(1/\mu)_1$ = servicing time with anticipated average traffic increase over the planning horizon and no improvement in storage.
k = number of berths where storage is expanded/improved.

If the same storage area is used by all berths, k=n

n = total number of interchangeable berths

SR_i = storage requirements with existing traffic (SR1), with average anticipated traffic (SR2)

ES = existing storage. If existing storage (ES) is apparently sufficient (given operating conditions) to accommodate existing traffic then MAX(SR2,ES) = ES, and the increase in storage has no impact on service time

It should be verified that: (i) other measures can be used to improve storage efficiency such as better stacking, lower dwell time, better utilization of available space, etc.; and (ii) that the existing or future handling equipment can accommodate the anticipated increase in traffic throughput.

The following equations are presented to enable the calculation of storage requirement as a function of annual throughput cargo density, stacking height, dwell time, cargo storage utilization and storage space utilization. Typical values are presented, but it is strongly suggested to estimate the actual values of determining parameters by visiting the terminal or contacting the terminal operator. Also, the methodology is valid if throughput is handled in a very discrete fashion, namely ten large shipments a year for instance. When shipments are large and infrequent, the storage area should be such that the total tonnage handled can be accommodated in storage. This is most particularly true for dry bulk cargo where storage is designed to accommodate one, two or three vessel, etc., vessel loads.

The following equations can be used to estimate storage requirements as a function of anticipated traffic levels, and assuming a fairly continuous (not discrete) flow of commodities.

General Cargo

$$TSR = THR * NAPT * DWTM * \frac{CSU}{(DYS * PROP)}$$

where,

TSR = total storage requirement (ft.xft.) for THR throughput

THR = throughput (tons)

NAPT = average net area required to store 1 ton (ft.xft./ton)
= 1/((cargo density of 100 cu.ft./ton)* (stacking height)
= 10 ft.xft. per ton of general cargo

DWTM = dwell time (days). Depends on free time or length of time the cargo can be left in storage without incurring charges. Typically, a dwell time of seven days can be used for planning purposes

CSU = cargo storage utilization or proportion of cargo using storage. This proportion is assumed to be 90 percent, typical of the ratio observed at efficient ports. Again, this ratio would probably fluctuate depending upon trade routes, type of cargo, frequency of ship calling, etc.

PROP = proportion of storage area actually used (.200). The actual values taken by the variables listed above should be used if obtainable from the terminal operator

DYS = annual days of operation

Bulk Cargo

The same equation is used for general cargo and dry bulk cargo storage. The values of parameters are, however, different.

The average net area (NAPT) required to store one ton of dry bulk cargo is calculated assuming a cargo density of .025 ton/cu. ft., a height of 30 feet for stacks and a 45 degree angle of repose, leading to a NAPT of 1.4 ft.xft./ton.

Other parameter values for dry bulk cargo used for general planning purposes at Wisconsin ports are a dwell time (DWTM) of 20 days, a cargo storage utilization (CSU) of 100 percent (all cargo goes to storage), and a proportion (PROP) of net area used to total area of .30. Hence: TSR = .26 THR.

Containerized Cargo

Storage requirements for containerized cargo depends upon the storage method used. Two methods are typically used, the chassis method and the yard-stacking method. In the chassis operation, containers are stored and moved through the yard on wheeled trailer chassis suitable for transporting the container via highways. In the yard-stacking option, containers are stacked in the yard without individual trailer chassis. Usually, containers are stacked two or three high. In the chassis method, fifty 40-foot or seventy-five 20-foot containers per acre can be stored. For the yard-stacking method, ninety 40-foot or one hundred thirty-five 20-foot containers per acre can be accommodated.

The equation used to calculate space requirements is the following:

$$TSR = THR * \frac{(43,500)}{NCPA} * DWTM * \frac{CSU}{DYS}$$

where,

TSR = total storage requirements (ft.xft.) at THR throughput expressed in TEU's (Twenty foot Equivalent Units)

NCPA = average number of containers per acre. There are about 43,500 ft.xft. in an acre. As stated above, NCPA depends upon container size

DWTM = dwell time. Dwell time varies depending upon free time, trade routes and lines, and whether or not the containers are inbound or outbound, loaded or empty. Typical dwell time observed is eight days for loaded inbound containers, five days for outbound loaded containers and 12 to 15 days for empty containers. Overall, an average of eight days can be used for analytical purposes.

CSU = cargo storage utilization. Can be taken as 100 percent unless otherwise observed at the terminal

DYS = annual days of operation

APPENDIX D - PROJECT IMPACT PARAMETERS

APPENDIX D

PROJECT IMPACT PARAMETERS

D.1 Introduction

The purpose of this appendix is to set forth the methods for estimating project impact parameters. Due to the large number of impacts, a series of steps must be accomplished. The first step is the delineation and allocation of benefit shares. This information is used to allocate benefits to the port area, the non-port/state area and the non-state area. Next, economic base multipliers are generated by region. When applied to a computed allocation of benefits, this will indicate the income effects of the project by region. Based on this computed increase in income, sales/income ratios, employment/income ratios and effective tax rates are computed which, when applied to the increased income by area, will determine the project impacts. These computations are undertaken in Step 11 of the main report and are toally based on project benefits and costs. This appendix simply sets forth methods of estimating parameters that when applied to benefits or costs yield an estimate of other types of project effects.

D.2 Defining Impact Areas

The first step in determining impacts is the delineation of areas where these impacts may take place. This step is closely interrelated with the identification of commodities (Step 2 of main text) that might use the proposed project, as the impact area will be largely determined by the commodities identified. As a general rule, the economic impact area will be rather small because any port or harbor will be able to completely capture the majority of the benefits resulting from harbor improvements. While a small geographic unit will not encompass all of the economic activity related to a particular harbor, it will in general capture the vast majority of the activity. For this reason, the local impact area should generally be limited to one county or a group of economically related counties such as a Standard Metropolitan Statistical Area (SMSA). For purposes of convenience, two other areas are defined for impact purposes, the non-local/state area and the non-state area. Smaller areas could be used, but in general, data limitations will not allow the analysis with the use of smaller areas.

The purpose of defining impact areas is to determine how project benefits, and hence impacts are allocated between areas. This can be a rather difficult task and a variety of methods might potentially be used. However, most of these methods are complex and data hungry, which precludes their use in the evaluation of small port/harbor improvements. The method presented here was developed to account for two known phenomenon about port

projects. First, for certain types of projects, for example a grain elevator, a significant portion of project impacts will occur outside the port. Second is the recognition that some benefits and impacts must accrue to a port simply because a project must physically be located somewhere. Thus, while significant benefits and impacts from a grain elevator will occur in non-port areas, the port will experience certain employment due to the elevator and should capture enough project benefits to support this employment.

To encompass both these considerations, a two step procedure is used to estimate the benefit shares for each of the three regions cited above. The first step is to derive an initial relative distribution of benefits based on the origins and destinations of traffic using the project in the base year. This traffic is allocated to one of the three regions and then the proportion of benefits to be allocated to each region is based on the tonnage allocated to the region divided by total tonnage.

The allocation of tonnage is based on a sequential process that examines the origin/destination of project traffic. Each movement should be allocated to one of the three regions by the following process:

(1) If the final origin or destination of the movement is in the port county, the movement should be allocated to the local area.

(2) If (1) does not hold for either the origin or destination; but the origin or destination is still in the State of Wisconsin, then the movement should be allocated to the non-local/state area.

(3) If neither (1) nor (2) holds, the movement should be allocated to the non-state area, i.e., the movement neither originates nor terminates in the state.

EXAMPLE

Consider the Kenosha-based example used in the main report. The initial allocation of benefits was hypothesized as one-third local, one-third non-local/state and one-third non-state. For simplicity, suppose the tonnage through Kenosha consisted of six movements of about 15,000 tons each with the following origin-destination pairs for each movement:

a. Minneapolis, Minnesota to Europe
b. Kenosha, Wisconsin to Europe
c. Montreal, Canada to Kenosha, Wisconsin
d. Madison, Wisconsin to Montreal, Canada
e. Europe to Rockport, Illinois
f. Europe to Madison, Wisconsin

Based on the above discussion, two of these movements, b and c, fulfill rule (1) and would be allocated to the port area. Of the remaining four, movements d and f originate in the state, but outside the port area, so they are allocated to the non-port/state area. The remaining two movements both originate and terminate outside the state and hence are allocated to the non-state area. By hypothesis, each movement was 15,000 tons, so 30,000 tons is allocated to each area, yielding an initial estimate of the distribution of benefits of one-third to each region.

To adjust this distribution to more fully reflect local impacts, we must use some of the information on impacts that will be developed later in this appendix. By combining project benefits with the state income multiplier, and the state average wage per full time employee, the number of jobs created by the project can be determined. This process was described in Exhibit 10.2, and yielded 6.02 jobs for our Kenosha-based example. Based on the project application submitted, the project will account for four of these jobs, leaving 2.02 jobs created outside the immediate project. These jobs are allocated between regions by the initial estimate of the distribution of benefits, i.e., one-third for each region or .67 jobs per region. The new distribution of benefits is computed based on this allocation of jbos. The port area will have 4.67 jobs, or a 77.6 percent share of benefits, and each of the remaining areas will have .67 jobs or an 11.2 percent share of benefits (.67/6.02).

D.3 Income Multiplier

The remainder of this appendix is devoted to methods for estimating specific types of impact parameters. The first parameter to be estimated is an economic base or income multiplier utilizing the "concentration" technique. Application of this technique is rather straight forward but can require a good deal of computation. Two data sources are required:

1. U.S. Department of Commerce, Bureau of the Census, County Business Patterns , available from Superintendent of Documents, U.S. Government Printing Office, Washington, D. C., 20402

2. U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Measurement Division, Local Area Personal Income , available from National Technical Information Service, Springfield, Virginia, 22161.

This technique, also known as developing location quotients, is used to determine the basic and non-basic shares of employment in each industry by comparing the port community or region's employment distribution to national employment distribution. The underlying assumption is that if a community is highly specialized relative to the nation in the production of a

particular commodity, that commodity is presemed to be an export item from the region. If a region's share of employment for a particular industry exceeds the national average, then the excess above the national average is basic employment in the region, which supports the non-basic (or local) employment of the region.

There are some problems with this approach. The most significant is that the technique understates basic employment, and hence overstates the multiplier, because it does not adequately reflect differences in product mix. For this reason, the most disaggregate level of data available should be used in these computations. However, even data disaggregated to the four-digit SIC level, groups together several different products and often several brands of each product. This product mix factor causes the concentration technique to understate the volume of exports. As a result, the employment multiplier and the estimate of secondary impacts will normally be overstated. Nevertheless, this approach is an inexpensive way to estimate the employment multiplier as long as its limitations are recognized. Since our impacts are between the state and various regions, this problem will be partially offset.

D.3.1 Basic and Non-Basic Employment

Computation of the income multiplier proceeds in a two-step manner. The first step is to compute basic and non-basic employment shares. The second step is to apply these shares to data on income to determine the income multiplier.

Income is generally a better predictor of future economic impacts than employment. Moreover, the employment multiplier excludes the effects of non-labor income (interest, dividends, and transfer payments) which is primarily basic and supports non-basic employment. (Transfer payments alone currently account for close to 15 percent of total personal income nationwide.) Using an income multiplier to capture this additional component of the basic sector is therefore a more theoretically justifiable approach. The reason that the income multiplier is not computed initially is that the available income data are too highly aggregated to use the indirect techniques for determining distributions between the basic and non-basic sectors. (For example, at the state level, the multiplier based on 2-digit SIC's is about four times as large as the more disaggregate multiplier.)

To calculate the number of basic employees for each SIC industry, it is necessary to apply the national percentage of employment in the industry to total employment in the region and compare this number to actual area employment in the same SIC. If actual

employment is greater than the calculated number, the difference (actual minus calculated) is basic employment. Table D.1 illustrates the application of this technique for Door County. Door County was selected for purposes of tractability, it is the shortest computation for any of the income multipliers derived.

EXAMPLE

Table D.1 is an example of an arithmetically simple but rather detailed computation. Two problems must be dealt with before computing basic employment, due to the manner in which the data is made available. However, before looking at these problems, it is rather simple to show how the data is to be processed when these problems have been accounted for. SIC 58 is an industry where problems do not appear. Total employment in this SIC is totally accounted for by the 4-digit SIC's 5812 and 5813, shown in Table D.1 (570=451+119). Therefore, if SIC 58 has any basic employment, it will appear in one of the two 4-digit SIC's and SIC 58 can be ignored. For SIC 5812, predicted (non-basic) employment is 418 (7,715 times .0541). That is, an average community employs .0541 of its labor force in SIC 5812 (3,804,948 divided by 70,289,236). Since Door County employs 451 in SIC 5812, this leaves 33 employees (451-418) that are basic employment. A similar computation for SIC 5812 predits non-basic employment of 38 leaving 81 basic jobs (119-38). If all SIC's were as "clean" as SIC 58, then basic employment would be computed as follows:

$$\text{Basic Employment}_i = \text{Actual Employment}_i - (\text{Total Employment} \times \text{U.S. Employment}_i / \text{U.S. Total Employment})$$

where, the i denotes a specific 4-digit SIC, and no basic employment is computed for 1, 2 or 3-digit SIC's. Of course, if basic employment computes as a negative number, then basic employment is zero.

Having stated this, one needs only to look at Table D.1 and it becomes clear that the "nice" example of SIC 58 holds true for only a mall proportion of the industries shown. The first problem to deal with is the fact that exact employment is not disclosed for a large number of industries. This problem is dealt with by transforming column 1 into column 2, Imputed Employment. If column 1 contains a letter, then the lower limit of the employment range of that letter is entered in column 2, as follows:

EXHIBIT D.1

Computation of Basic Employment by Industrial Sector

SIC code	Industry	Number of employees for week including March 12	Door County Imputed	United States Employment	United States Proportion	Door County Predicted	Door County Basic
	DOOR						
	Total	7 715					
--	Agricultural services, forestry, fisheries	(A)	0	265,068	.0038	29	0*
--	Mining	(A)	0	826,326	.0118	91	0*
--	Contract construction	374	374	4,129,819	.0588	N/C	18*
15	General contractors and operative builders	126	126	1,166,724	.0166	128	-
151	General building contractors	(B)	20	850,541	.0121	93	-
16	Heavy construction contractors	51	51	788,653	.0112	87	-
162	Heavy construction, except highway	(B)	20	601,506	.0086	66	-
17	Special trade contractors	197	197	2,157,086	.0307	237	-
171	Plumbing, heating, air conditioning	70	70	469,275	.0067	52	18
--	Manufacturing	4 080	4 080	20,612,389	.2933	N/C	3311*
20	Food and kindred products	88	88	1,538,341	.0219	169	-
27	Printing and publishing	64	64	1,193,051	.0170	131	-
31	Leather and leather products	(C)	100	243,759	.0035	N/A	N/A (1)
314	Footwear, except rubber	(C)	100	143,905	.0020	N/A	N/A (1)
3143	Men's footwear, except athletic	(C)	100	54,096	.0008	6	94 (1)
34	Fabricated metal products	331	331	1,621,812	.0231	178	41 (2)
342	Cutlery, hand tools, and hardware	(B)	20	171,935	.0024	N/A	N/A
3429	Hardware, nec	(B)	20	108,945	.0015	12	8 (2)
346	Metal forgings and stampings	(C)	100	284,987	.0041	N/A	N/A
3469	Metal stampings, nec	(C)	100	105,248	.0015	12	88 (2)
349	Misc. fabricated metal products	(B)	20	207,497	.0038	N/A	N/A
3496	Misc. fabricated wire products	(B)	20	36,279	.0005	4	16 (2)
36	Electric and electronic equipment	(F)	500	1,827,937	.0260	N/A	N/A
362	Electrical industrial apparatus	(F)	500	221,801	.0032	N/A	N/A
3621	Motors and generators	(F)	500	103,956	.0015	11	489
37	Transporation equipment	(H)	2 500	1,863,233	.0265	N/A	N/A
373	Ship and boat building and repairing	(H)	2 500	229,524	.0033	N/A	N/A
3731	Ship building and repairing	(H)	2 500	175,797	.0025	19	2481
3732	Boat building and repairing	(C)	100	53,270	.0008	6	94
--	Transportation and other public utilities	139	139	4,344,603	.0618	N/C	0*
--	Wholesale trade	207	207	4,837,359	.0688	N/C	0*
50	Wholesale trade-durable goods	114	114	2,703,743	.0385	297	-
508	Machinery, equipment, and supplies	50	50	1,059,755	.0151	116	-
51	Wholesale trade-nondurable goods	93	93	1,879,307	.0267	206	-
--	Retail trade	1 530	1 530	14,480,933	.2060	N/C	246 (3)
52	Building materials & garden supplies	122	122	514,401	.0073	56	27 (3)
521	Lumber and other building materials	70	70	278,824	.0040	31	39 (3)
53	General merchandise stores	130	130	1,958,699	.0279	215	-
531	Department stores	(B)	20	1,588,438	.0226	174	-
54	Food stores	243	243	2,072,238	.0295	227	- (4)

EXHIBIT D.1 (con't.)

SIC code	Industry	Number of employees for week including March 12	Door County Input	United States Employment	United States Proportion	Door County Predicted	Door County Basic
541	Grocery stores	223	223	1,773,761	.0252	195	28 (4)
55	Automotive dealers & service stations	233	233	1,907,292	.0271	209	-- (4)
551	New and used car dealers	116	116	846,206	.0120	93	23 (4)
554	Gasoline service stations	85	85	707,587	.0101	78	7 (4)
58	Eating and drinking places	570	570	4,169,770	.0593	458	-- (5)
5812	Eating places	451	451	3,804,948	.0541	418	33 (5)
5813	Drinking places	119	119	343,121	.0049	38	51 (5)
59	Miscellaneous retail	171	171	1,795,768	.0255	197	--
591	Drug stores and proprietary stores	60	60	471,814	.0067	52	8
-	Finance, insurance, and real estate	193	193	4,871,825	.0693	N/C	0*
60	Banking	(B)	20	1,357,671	.0193	149	--
602	Commercial and stock savings banks	(B)	20	1,254,647	.0178	138	--
--	Services	1 122	1 122	15,567,801	.2215	N/C	82*
70	Hotels and other lodging places	166	166	997,295	.0142	109	57 (6)
701	Hotels, motels, and tourist courts	(C)	100	936,011	.0133	103	-- (6)
72	Personal services	72	72	947,337	.0135	104	--
80	Health services	537	537	4,734,389	.0674	520	--
801	Offices of physicians	103	103	659,153	.0094	72	31
805	Nursing and personal care facilities	(C)	100	870,602	.0124	96	4
806	Hospitals	(E)	250	2,439,947	.0347	269	--
83	Social services	59	59	891,356	.0127	N/A	N/A
831	Social services nec	59	59	701,115	.0100	77	--
86	Membership organizations	59	59	1,232,200	.0175	135	--
89	Miscellaneous service	54	54	751,019	.0107	82	--
--	Nonclassifiable establishments	35	35	353,113	.0050	39	--

Employment Codes: A:0-19; B:20-99; C:100-249; E:250-499; F:500-999; G:1,000-2499; H:2,500-4,999; I:5,000-9,999; J:10,000-24,999; K:25,000-49,999; L:50,000-99,999; M:100,000 or more.

Footnotes: * - Total by major industry group, summed over SIC's.
N/C- Not computed. Not needed for predicted by industry, if any SIC's are listed.
N/A- Not applicable. Where exact employment is not disclosed and a more detailed SIC has the same employment level. See (2) below.

(1) For SIC 31 and its subcategories of 314 and 3143, best estimate of employment is 100, due to disclosure problems. Since most detailed SIC has allimputed employment, all basic employment will appear in SIC 3143, and 31 and 314 do not need to be computed

(2) Actual employment available for SIC 34 only of 331 employees. Imputed employment levels for the more detailed categories, 3429, 3469 and 3496, only total 140 employees. These three 4-digit SIC's show basic employment of 8,88 and 16, respectively, or 112 total basic employment. SIC 34 predicts basic employment of 153 or 41 jobs plus the 112 in SIC's 3429, 3469 and 3496.

(3) This is similar to problem in (1) above, except that exact employment is disclosed. However, within SIC 52, only 70 of the 122 jobs are allocated to a more detailed SIC. For SIC 521, basic employment is 39, but for SIC 52 in total would be estimated as 66 or the 39 shown for SIC 521 and the 27 shown for SIC 52.

(4) This is similar to problem in (3) above, except all basic employment is accounted in 3 digit SIC's. For example in SIC 54, only 223 of the 243 jobs shown are allocated to the more detailed SIC 541. SIC 541 has basic employment of 28 (223-195), while based on SIC 54, only 16 basic jobs are estimated. Since this is less than for SIC 541, all basic employment is shown for SIC 541 and no basic employment for SIC 54. This is also true of SIC 55, where the 3-digit SIC's accounting for all basic employment.

(5) This is similar to (3) and (4) above except that SIC's 5812 and 5813 totally account for employment in SIC 58, i.e., 119 + 451=570. In this instance, there is no need to compute anything for SIC 58, because any basic employment will occur in SIC's 5812 and 5813 which totally account for employment in SIC 58.

(6) This problem is the reverse of (4) above. The 3-digit SIC shows no basic employment. However, because 3-digit SIC 701 does not account for all jobs in SIC 70, computations for SIC 70 show basic employment of 57 jobs.

Sources: Employment for Door County, column 1, and United States, column 3, are taken directly from County Business Patterns, 1978, U.S. Department of Commerce. For column 2, employment is imputed for any SIC where exact employment is not disclosed, based on the minimum employment per the letter codes. For example, if employment is "B", then actual employment is between 20 and 99, and imputed employment is shown as 20. Column 4 is computed as column 3 ÷ 70,289,236, total U.S. employment. Column 5 is column 4 X 7,715, total employment in Door County. Column 6 is computed as column 1 minus column 5, subject to the footnotes above and any negative numbers are entered as zero.

Letter	Employment Range	Imputed Employment
A	0- 19	0
B	20- 99	20
C	100- 249	100
E	250- 499	250
F	500- 999	500
G	1,000- 2,499	1,000
H	2,500- 4,999	2,500
I	5,000- 9,999	5,000
J	10,000-24,999	10,000
K	25,000-49,999	25,000
L	50,000-99,999	50,000
M	100,000 or more	100,000

If this was the only problem, the computations shown for SIC 58 could be completed for all SIC's, using column 2 as actual employment and ignoring column 1. However, for most SIC's, employment at the 2-digit level is not the sum of the 3 or 4-digit SIC's included in the table, so that some employment is not specifically accounted for. Depending on how many jobs are not allocated to a 3 or 4-digit SIC, this problem is dealt with in one of two ways.

The first method is illustrated in SIC 70 and its sub-group 701. Basic employment for SIC 701 is computed as zero, at least partially because its employment is imputed as 100. However, this leaves 66 jobs of SIC 70 unaccounted for and when basic employment is computed for SIC 70, 57 basic jobs are revealed (see note (6)).

The second method is illustrated by SIC 52 (see note (3)). Computation of basic employment for SIC 521 shows there is basic employment. However, since SIC 521 accounts for only 70 of the 122 jobs of SIC 52, basic employment is then computed for SIC 52 and yields basic employment of 66, or the 27 shown in Table D.1 plus the 39 shown for SIC 521. A similar problem occurs in SIC 54 and 541. However, basic employment in SIC 541 accounts for all basic employment computed in this SIC group. That is, SIC 541 has basic employment of 28 (223-195) which includes the basic employment of SIC 54 of 16 (243-227) so basic employment for SIC 54 is shown as zero.

Computation of basic employment in this case is based on the formula cited above. However, the computation must begin with the most disaggregate industry classification and then work to the more aggregate classifications to insure that all employment has been accounted for. Thus, one first computes basic employment for 4-digit SIC's. Then one computes basic employment for the corresonding 3-digit SIC's and subtracts computed employment for the 4-digit SIC's. Then one computes basic employment for the corrsonding 2-digit SIC and subtracts out

basic employment n the 4-digit and 3-digit SIC's to obtain basic employment for Table D.1. Industry group 34 is a good example of this process. Each 4-digit SIC (3429, 3469 and 3496) shows basic employment. However, the disaggregate groups do not totally account for all employment in SIC 34 due to disclosure problems. Thus basic employment for SIC 34 is 153 (331-178), which appears in Table D.1 as 41 (SIC 34) + 8(SIC 3429) + 88(SIC 3469) + 16(SIC 3496) = 153.

After the process has been repeated for each local SIC industry, the results are summed (the "*" numbers in Table D.1), and all employment is assigned to either the basic or non-basic sector. The economic base multiplier itself is calculated by dividing total employment by basic employment. For the purposes of this analysis, basic and non-basic employment should be summed for each of the major industrial divisions - agriculture, forestry, and fisheries; mining; contract construction; manufacturing; transportation, communications and utilities; wholesale and retail trade; finance, insurance, and real estate; and services which will be applied to determine income shares.

The next step is to determine the percentage of basic and non-basic employment in each major industry division for which income data are reported. Major industry divisions and corresponding 2-digit SIC's are:

Industry	SIC
Agriculture	01
Agricultural services, forestry and fisheries	07-09
Mining	10-14
Contract construction	15-17
Manufacturing	20-39
Transportation, communications, and public utilities	40-49
Wholesale and retail rade	50-59
Finance, insurance, and real estate	60-69
Services	70-89
Government	-

The allocation of employment to the basic and non-basic sectors should be aggregated to correspond to these industry divisions, as noted above. Table D.2 is an example of the BEA income data available for the state and port counties.

D.3.2 Computing the Income Multiplier

The income multiplier is calculated by determining the basic and non-basic components of personal income by place of residence. First, personal income by place of work is divided acording to the employment data. Income for each major industry division above is divided into basic and non-basic components according to the relative percentage of employment in each sector. For

TABLE D.2

COMPUTATION OF INCOME MULTIPLIER - ASHLAND

	Percent Basic	Income ($000) Total	Basic
Labor and Proprietors' Income By Place of Work	45.5	80,466	36,624
Farm	75.0	1,380	1,035
Manufacturing	69.9	18,227	12,747
Mining	0	0	0
Contract Construction	41.4	4,455	1,844
Agricultural Services, Forestry	0	1/	0
Wholesale Trade	0	2,609	0
Retail Trade	10.0	8,230	826
Finance, Insurance, Real Estate	0	2,077	0
Transportation, Community, Utilities	22.5	9,922	2,232
Services	49.1	22,655	11,114
Federal - Civil and Military	100	2,742	2,742
State and Local Government	50	8,168	4,084
Contributions - Social Insurance	45.5	4,545	2,069
Residence Adjustment	100	-7,712	-7,712
Dividends, Interest, Rent	50	10,529	5,265
Transfer Payments	100	25,216	25,216
Total Personal Income	59.1	103,954	61,463
Income Multiplier			1.6914

1/ Less than 50, computes to 1.

Source: Attachment D-1

TABLE D.2

COMPUTATION OF INCOME MULTIPLIER - CRAWFORD COUNTY

	Percent Basic	Income ($000) Total	Basic
Labor and Proprietors' Income By Place of Work	56.8	57,390	32,609
Farm	75	12,200	9,150
Manufacturing	76.4	14,028	10,724
Mining	0	(D) 1/	0
Contract Construction	0	1,817	0
Agricultural Sercices, Forestry	0	(D) 1/	0
Wholesale Trade	7.9	1,496	126
Retail Trade	34.4	8,314	3,204
Finance, Insurance, Real Estate	28.0	1,985	556
Transportation, Community, Utilities	0	2,441	2,441
Services	28.3	6,473	1,835
Federal - Civil and Military	100	1,366	1,366
State and Local Government	50	6,414	3,207
Contributions - Social Insurance	56.8	2,603	1,879
Residence Adjustment	100	970	970
Dividends, Interest, Rent	50	12,363	6,182
Transfer Payments	100	16,079	16,079
Total Personal Income	68.1	84,199	57,319
Income Multiplier			1.47

1/ (D) - total is $756,000.

Source: Attachment D-1

TABLE D.2

COMPUTATION OF INCOME MULTIPLIER - DOOR DOUNTY

	Percent Basic	Income ($000) Total	Basic
Labor and Proprietors' Income By Place of Work	52.5	130,794	68,719
Farm	75	12,557	9,418
Manufacturing	81.2	58,217	47,244
Mining	0	645	0
Contract Construction	7.8	6,476	502
Agricultural Services, Forestry	0	924	0
Wholesale Trade	0	3,311	0
Retail Trade	16.1	15,004	2,412
Finance, Insurance, Real Estate	0	2,508	0
Transportation, Community, Utilities	0	3,435	0
Services	7.8	14,685	1,152
Federal - Civil and Military	100	3,021	3,021
State and Local Goverment	50	9,939	4,970
Contributions - Social Insurance	52.5	6,398	3,362
Residence Adjustment	100	-2,689	-2,689
Dividends, Interest, Rent	50	31,029	15,515
Transfer Payments	100	24,375	24,375
Total Personal Income	61.7	177,111	109,282
Income Multiplier			1.62

Source: Attachment D-1

TABLE D.2

COMPUTATION OF INCOME MULTIPLIER - DOUGLAS COUNTY

	Present Basic	Income ($000) Total	Basic
Labor and Proprietors' Income By Place of Work	41.8	208,594	87,180
Farm	75	2,478	1,859
Manufacturing	56.8	27,578	15,673
Mining	0	(L)	0
Contract Construction	33.3	12,067	4,016
Agricultural Services, Forestry	0	169	0
Wholesale Trade	63.0	(D)-16,115 1/	10,159
Retail Trade	48.3	22,306	10,776
Finance, Insurance, Real Estate	9.5	(D)-5,412 2/	513
Transportation, Community, Utilities	24.4	57,340	13,988
Services	33.0	(D)-23,823 1/	7,859
Federal - Civil and Military	100	3,214	3,214
State and Local Goverment	50	38,083	19,042
Contributions - Social Insurance.	41.8	11,883	4,962
Residence Adjustment	100	13,845	13,845
Dividends, Interest, Rent	50	29,248	14,624
Transfer Payments	100	50,972	50,972
Total Personal Income	55.6	290,776	161,659
Income Multiplier			1.80

1/ 1977 income plus 1979 income ÷ 2, 1978 values were not disclosed.

2/ Residual, 1977, 1978 and 1979 values not disclosed.

(L) Less than 50.

Source: Attachment D-1.

TABLE D.2

COMPUTATION OF INCOME MULTIPLIER - KENOSHA COUNTY

	Percent Basic	Income ($000) Total	Basic
Labor and Proprietors' Income By Place of Work	42.2	699,802	295,145
Farm	75.0	8,816	6,612
Manufacturing	55.1	372,702	205,432
Mining	N/A	(D)	0
Contract Construction	14.4	53,108	7,674
Agricultural Services, Forestry	N/A	(D)	0
Wholesale Trade	21.3	17,104	3,635
Retail Trade	16.2	57,732	9,339
Finance, Insurance, Real Estate	6.9	13,591	937
Transportation, Community, Utilities	18.7	29,166	5,465
Services	34.0	78,255	26,606
Federal - Civil and Military	100	5,437	5,437
State and Local Government	50	61,239	30,620
Contributions - Social Insurance	42.2	36,134	-15,240
Residence Adjustment	100	110,020	110,020
Dividends, Inrerest, Rent	50	100,244	50,122
Transfer Payments	100	119,311	119,311
Total Personal Income		993,243	559,358
Income Multiplier			1.78

(1) Not Disclosed.

Source: Attachment D-1

TABLE D.2

CALCULATION OF INCOME MULTIPLIER - LACROSSE COUNTY

	Percent Basic	Income ($000) Total	Basic
Labor and Proprietors' Income By Place of Work	38.0	543,008	206,092
Farm	75.0	14,240	10,680
Manufacturing	52.9	159,401	84,309
Mining	0	110	0
Contract Construction	14.3	36,860	5,259
Agricultural Services, Forrestry	0	1,049	0
Wholesale Trade	31.3	42,569	13,344
Retail Trade	24.5	65,492	16,013
Finance, Insurance, Real Estate	0	14,961	0
Transportation, Community, Utilities	9.8	43,398	4,259
Services	35.6	99,087	35,310
Federal - Civil and Military	100	7,995	7,995
State and Local Government	50	57,846	28,923
Contributions - Social Insurance	38.0	28,963	10,993
Residence Adjustement	100	-45,336	-45,336
Dividends, Interest, Rent	50	82,075	41,038
Transfer Payments	100	80,913	80,913
Total Personal Income	46.5	631,697	293,700
Income Multiplier			2.15

Source: Attachment D-1.

TABLE D.2

COMPUTATION OF INCOME MULTIPLIER - MARINETTE

	Precent Basic	Income ($000) Total	Basic
Labor and Proprietors' Income By Place of Work	55.5	202,917	112,678
Farm	75	11,216	8,412
Manufacturing	74.2	113,865	84,489
Mining	95.0	12 1/	11
Contract Construction	4.0	4,315	173
Agricultural Services, Forestry	0	510	0
Wholesale Trade	27.8	6,819	1,899
Retail Trade	11.0	19,315	2,127
Finance, Communities, Utilities	0	4,348	0
Transportation, Community, Utilities	18.1	6,628	1,203
Services	15.8	14,048	2,216
Federal - Civil and Military	100	2,454	2,454
State and Local Goverment	50	19,387	9,694
Contributions - Social Insurance	55.5	10,503	5,832
Residence Adjustment	100	-24,176	-24,176
Dividends, Interest, Rent	50	28,179	14,090
Transfer Payments	100	43,916	43,179
Total Personal Income	63.1	240,333	151,603
Income Multiplier			1.59

1/ Less than 50, not disclosed, computes to 12.

Source: Attachment D-1

TABLE D.2

CALCULATION OF INCOME MULTIPLIER - SHEBOYGAN COUNTY

	Percent Basic	Income ($000) Total	Basic
Labor and Proprietors' Income By Place of Work	42.7	629,613	269,029
Farm	75	25,294	18,971
Manufacturing	62.6	300,835	188,178
Mining	0	233	0
Contract Construction	13.9	38,231	5,311
Agricultural Services, Forestry	0	1,174	0
Wholesale Trade	19.6	28,780	5,628
Retail Trade	12.2	53,981	6,560
Finance, Insurance, Real Estate	0	22,070	0
Transportation, Community, Utilities	12.4	23,831	2,945
Services	8.5	71,801	6,111
Federal - Civil and Military	100	6,267	6,267
State and Local Government	50	58,116	29,058
Contributions - Social Insurance	42.7	32,449	13,865
Residence Adjustment	100	-543	-543
Dividends, Interest, Rent	50	107,398	53,699
Transfer Payments	100	87,198	87,198
Total Personal Income	53.5	791,217	423,248
Income Multiplier			1.87

Source: Attachment D-1

TABLE D.2

Calculation of Income Multiplier for State of Wisconsin

	Percent (1) Basic	Income (000's $) (2) Total	(3) Basic
Labor and Proprietors' Income by Place of Work	34.03	27,316,796	9,295,561
Farm	75.00	1,103,392	827,544
Manufacturing	53.07	9,807,843	5,205,313
Mining	9.01	48,887	4,403
Contract Construction	3.68	1,605,182	59,083
Agricultural Services, Forestry	16.02	81,666	13,085
Wholesale Trade	10.62	1,554,280	165,058
Retail Trade	7.44	2,668,137	198,569
Finance, Insurance, and Real Estate	6.42	1,315,173	84,489
Transportation, Communication, and Utilities	9.49	1,647,497	156,566
Services	12.96	3,837,944	497,341
Other			
Federal - Civilian and Military	100	521,425	521,425
State and Local Government	50	3,125,370	1,562,685
Contributions for Social Insurance	34.03	(1,397,643)	(475,800)
Residence Adjustment	100	421,810	421,810
Dividends, Interest, and Rent	50	4,498,609	2,249,305
Transfer Payments	100	4,349,641	4,349,641
Total Personal Income		35,191,213	15,840,517
Income Multiplier			2.22

(1) Computed from Table D-1.
(2) Source: Attachment D-1.
(3) Column 2 times Column 1.

example, Table D.1 shows 4080 jobs in manufacturing of which 3311 are basic employment in Door County, or 81.2 percent of manufacturing income is basic employment. Since farm and government emplyment are not covered in the County Business Patterns data, income for these industries is treated separately. Farm activity (and income) tends to be basic; it is reasonable to assume that at least 75 percent of total farm income is basic income. This figure is consistent with data on exports and domestic consumption of food products.

Federal Government, civilian and military income is generally considered completely basic, although a small portion of federal income, related to such things as the postal service, could be considered non-basic. State and local government income can be split equally between the basic and non-basic sectors. The sum of basic and non-basic income for all industries is labor and proprietary income by place of work.

The remaining elements of the personal income by place of residence calculation are divided according to the asumptions detailed below. Personal contributions for social insuarance are divided in the same proportion as labor and proprietors' income. The residence adjustment, which accounts for people who live and work in different counties, is basic income. Dividends, interest, and rent are derived from both local and non-local sources, and are considered 50 percent basic and 50 percent non-basic. Transfer payments represent monies paid to individuals by federal and state government (social security, welfare, etc.) and thus should be considered basic. The sum of these four components plus labor and proprietary income is total personal income by place of residence. The income multiplier is calculated by dividing total income by basic income. For each area the entire process is shown in Table D.2. Table D.3 shows the income multipliers for each port region based on 1978 data.

D.4 Effect on Sales

The next step is to develop a parameter to relate the income changes to the increased sales necessary to support this income change. The means for making this comparison is the development of sales/income ratio which will convert the income change in changes in sales.

The methodology described below is based on the limited published data, money, and time available to most applicants. Information to calculate payroll/sales ratios for individual counties is published in the census of business (construction industries, manufacturers, retail trade, wholesale trade, selected services, and transportation) conducted every five years. The collection of data from the different censi for two or more years at the county level is difficult except for transportation and construction which are not available by county.

TABLE D.3

Income Multipliers

Area	Multiplier
State of Wisconsin	2.22
Milwaukee SMSA	2.28
Milwaukee County	2.82
Kenosha County	1.78
Manitowoc County	1.99
Marinette County	1.59
Crawford County	1.47
Sheboygan County	1.87
Door County	1.62
Ashland County	1.69
LaCrosse County	2.15
Douglas County	1.80

Source: Table D.2.

Table D.4 shows sales and payroll data for 1978 taken from the census. Sales are then divided by the payroll to obtain a sales/income ratio by industry. Because not all industry categories are available, the multipliers are weighted by state personal income by industrial sector. Income for available industries is summed and then normalized, i.e., industry income divided by total income. The sales/income ratio is then multiplied by the normalized income for each industry. The sum of these computations is the sales/income ratio for the area. (While this method does not cover all industries, the industries in Table D.4 cover about 90 percent of non-government labor and proprietary income.) Table D.5 shows sales/income ratios for selected areas in the state.

Collection of data from the various census can be a rather tedious task and the census are not always readily available. An alternative method of computation is shown in Table D.6. The method is conceptually the same as that shown above. The difference is the use of national level data that is readily available for manufacturing, construction and trade sectors from the Survey of Current Business . This method is not recommended except in cases where the census are not available or large areas are being analyzed. (At the county level, this method can be quite inaccurate and must be used with a great deal of caution.)

D.5 Employment Impact

The next step is to determine the employment parameters associated with income changes. The method for determining the employment impact is to develop employment/income ratios. These are then applied to the income impacts from Step 15 to determine employment impacts. Two alternative methods of computing employment/income ratios are presented.

The preferred method of computing the employment/income relationship is via the use of the various business censi. Each census contains data by county, on payrolls and employment. Dividing total payrolls by employment yields the average yearly wage per employee. For a variety of reasons, this figure must be adjusted to obtain a realistic estimate of the annual wage. The first adjustment results from the fact that the data is for 1977 so that wage increases must be accounted for. While implicit wage deflators are not always readily available, the Survey of Current Business contains implicit price deflators by industrial secotr. (Table 7.10 for agriculture and Table 7.22 for other sectors of the National Income and Product Accounts.) The adjustment shown in Table D.7 is the increase in the implicit price deflator from 1977 to 1978.

TABLE D-4

Computation of Sales Multiplier - Ashland County

Industry	Sales	÷	Payroll	=	Sales Payroll Ratio
Agriculture	4,566,000		266,000		17.165
Construction [1/]	N/A		N/A		3.903
Manufacturing	68,900,000		13,300,000		5.180
Transportation [1/]	N/A		N/A		3.375
Wholesale Trade	17,066,000		940,000		18.155
Retail Trade	54,473,000		5,956,000		9.146
Services	4,101,000		1,148,000		3.572

Industry	Personal Income 000's $	Normalized	Ratio
Agriculture	1,380	.020	.343
Construction	4,455	.066	.258
Manufacturing	18,227	.270	1.399
Transportation	9,922	.147	.496
Wholesale Trade	2,609	.039	.708
Retail Trade	8,230	.122	1.116
Services	22,655	.336	1.200
TOTAL	67,478	1.000	5.52

[1/] For State of Wisconsin, county number not available.

Sources on Page 174.

TABLE D-4

Computation of Sales Multiplier - Crawford County

Industry	Sales	+ Payroll	= Sales/ Payroll Ratio
Agriculture	32,632,000	1,565,000	20.85
Construction[1/]	N/A	N/A	3.903
Manufacturing	1,414,200,000	265,500,000	5.35
Transportation[1/]	N/A	N/A	3.375
Wholesale Trade	20,958,000	1,711,000	12.25
Retail Trade	45,555,000	5,006,000	9.10
Services	4,154,000	920,000	4.52

Industry	Personal Income 000's $	Normalized	Ratio
Agriculture	12,200	.260	5.421
Construction	1,817	.039	.152
Manufacturing	14,028	.299	1.599
Transportation	2,441	.052	.178
Wholesale Trade	1,596	.034	.416
Retail Trade	8,314	.178	1.620
Services	6,473	.138	.623
TOTAL	46,869	1.000	10.009

Sources on Page 174.

TABLE D-4

Computation of Sales Multiplier - Door County

Industry	Sales	÷	Payroll	=	Sales/ Payroll Ratio
Agriculture	28,585,000		2,343,000		12.200
Construction [1/]	N/A		N/A		3.903
Manufacturing	207,100,000		39,200,000		5.283
Transportation [1/]	N/A		N/A		3.375
Wholesale Trade	23,516,000		1,934,000		12.159
Retail Trade	76,062,000		9,101,000		8.358
Services	12,634,000		3,312,000		3.815

Industry	Personal Income 000's $	Normalized	Ratio
Agriculture	12,557	.111	1.354
Construction	6,476	.057	.222
Manufacturing	58,217	.512	2.705
Transportation	3,435	.030	.101
Wholesale Trade	3,311	.029	.353
Retail Trade	15,004	.132	1.103
Services	14,685	.129	.492
TOTAL	113,685	1.000	6.33

Sources on Page 174.

TABLE D-4

Compuration of Sales Multiplier - Douglas County

Industry	Sales	÷ Payroll	= Sales/ Payroll Ratio
Agriculture	5,692,000	306,000	18.601
Construction[1]/	4,362,260	1,117,593	3.903
Manufacturing	258,300,000	12,500,000	20.664
Transportation[1]/	307,503,000	91,114,000	3.375
Wholesale Trade	452,445,000	11,328,000	39.940
Retail Trade	890,197,000	111,672,000	7.972
Services	12,002,000	3,822,000	3.140

Industry	Personal Income 000's $	Normalized	Ratio
Agriculture	2,478	.015	.287
Construction	12,067	.075	.293
Manufacturing	27,578	.172	3.547
Transportation	57,340	.357	1.205
Wholesale Trade	16,991	.106	4.224
Retail Trade	22,306	.139	1.107
Services	21,888	.136	
TOTAL	160,648	1.000	10.663

Sources on Page 174.

TABLE D-4

Computation of ales Multiplier - Kenosha County

Industry	Sales	÷	Payroll	=	Sales/ Payroll Ratio
Agriculture	27,543,000		2,408,000		11.438
Construction 1/	4,362,000		1,117,593		3.903
Manufacturing	1,480,300,000		246,200,000		6.013
Transportation 1/	307,503,000		91,114,000		3.375
Wholesale Trade	175,292,000		13,814,000		12.689
Retail Trade	331,930,000		43,469,000		7.636
Services	30,318,000		9,435,000		3.213

Industry	Personal Income 000's $	Normalized	Ratio
Agriculture	8,816	.014	.163
Construction	53,108	.086	.336
Manufacturing	372,702	.604	3.633
Transportation	29,166	.047	.160
Wholesale Trade	17,104	.028	.352
Retail Trade	57,732	.094	.715
Services	78,255	.127	.408
TOTAL	616,883	1.000	5.767

Sources on Page 174.

TABLE D-4

Computation of Sales Multiplier - LaCrosse County

Industry	Sales	+	Payroll	=	Sales/ Payroll Ratio
Agriculture	33,938,000		1,806,000		18.792
Construction 1/	N/A		N/A		3.903
Manufacturing	467,300,000		111,800,000		4.180
Transportation 1/	N/A		N/A		3.375
Wholesale Trade	428,476,000		28,561,000		15.002
Retail Trade	347,114,000		45,012,000		5.490
Services	53,723,000		16,086,000		3.340

Industry	Personal Income 000's $	Normalized	Ratio
Agriculture	14,240	.031	.583
Construction	36,300	.080	.312
Manufacturing	159,401	.346	1.446
Transportation	43,398	.094	.317
Wholesale Trade	42,569	.092	1.380
Retail Trade	65,492	.142	.780
Services	99,087	.215	.718
TOTAL	461,047	1.000	5.536

Sources on Page 174.

TABLE D-4

Computation of Sales Multiplier - Manitowoc County

Industry	Sales	÷ Payroll	= Sales/ Payroll Ratio
Agriculture	73,527,000	4,261,000	17.25
Construction[1/]	4,362,260,000	1,117,593,000	3.903
Manufacturing	756,800,000	167,700,000	4.513
Transportation[1/]	307,503,000	91,114,000	3.375
Wholesale Trade	163,479,000	11,249,000	14.533
Retail Sales	207,973,000	25,029,000	8.309
Services	19,333,000	5,799,000	3.334

	Personal Income		
Industry	000's $	Normalized	Ratio
Agriculture	32,074	.084	1.441
Construction	22,618	.059	.230
Manufacturing	216,826	.565	2.548
Transportation	14,794	.039	.130
Wholesale Trade	16,627	.043	.629
Retail Trade	38,389	.100	.831
Services	42,676	.111	.371
TOTAL	384,004	1.000	6.180

Sources on Page 174.

TABLE D-4

Computation of Sales Multiplier - Marinette County

Industry	Sales	+	Payroll	=	Sales/ Payroll Ratio
Agriculture	21,439,000		768,000		27.915
Construction [1/]	N/A		N/A		3.903
Manufacturing	408,900,000		79,900,000		5.118
Transportation [1/]	N/A		N/A		3.375
Wholesale Trade	67,317,000		4,148,000		16.229
Retail Trade	101,129,000		12,293,000		8.227
Services	7,680,000		2,217,000		3.464

Personal Income

Industry	000's $	Normalized	Ratio
Agriculture	11,216	.063	1.759
Construction	4,315	.024	.094
Manufacturing	113,765	.646	3.306
Transportation	6,628	.038	.128
Wholesale Trade	6,819	.039	.633
Retail Trade	19,315	.110	.905
Services	14,048	.080	.277
TOTAL	176,206	1.000	7.102

Sources on Page 174.

TABLE D-4

Computation of Sales Multiplier - Milwaukee SMSA

Industry	Sales	÷ Payroll	= Sales/ Payroll Ratio
Agriculture	107,702,000	7,732,000	13.923
Construction[1/]	4,362,260,000	1,117,593,000	3.903
Manufacturing	12,554,300,000	3,042,500,000	4.126
Transportation[1/]	307,503,000	91,114,000	3.375
Wholesale Trade	9,868,487,000	493,142,000	20.011
Retail Trade	4,679,786,000	624,452,000	6.822
Services	1,072,824,000	386,591,000	2.775

Industry	Personal Income 000's $	Normalized	Ratio
Agriculture	35,393	.004	.058
Construction	579,843	.068	.226
Manufacturing	3,993,930	.470	1.940
Transportation	658,143	.077	.261
Wholesale Trade	702,384	.083	1.655
Retail Trade	884,516	.104	.710
Services	1,641,181	.193	.536
TOTAL	8,494,590	1.000	5.386

Sources on Page 174.

TABLE D-4

Calculation of Sales Multiplier - Sheboygan County

Industry	Sales	÷ Payroll	= Sales Payroll Ratio
Agriculture	57,220,000	2,672,000	21.415
Construction[1/]	N/A	N/A	3.903
Manufacturing	1,121,000,000	222,500,000	5.038
Transportation[1/]	N/A	N/A	3.375
Wholesale Trade	357,639,000	17,049,000	20.977
Retail Trade	278,288,000	36,844,000	7.553
Services	44,155,000	14,907,000	2.962

Industry	Personal Income 000's $	Normalized	Ratio
Agriculture	25,294	.051	1.092
Construction	38,231	.078	.304
Manufacturing	300,835	.610	3.073
Transportation	23,831	.048	.162
Wholesale Trade	28,780	.058	1.217
Retail Trade	53,981	.110	.831
Services	22,070	.045	.133
Total	493,022	1.000	6.812

Sources on Page 174.

TABLE D-4

Computation of State Sales Multiplier

(000's $)

Industry	(1) Sales	(2) Payroll	(3) Sales/ Payroll Ratio
Agriculture	3,467,821	181,680	19.088
Construction	4,362,260	1,117,593	3.903
Manufacturing	38,725,300	7,317,800	5.292
Transportation	307,503	91,114	3.375
Wholesale Trade	19,648,057	1,111,980	17.669
Retail Trade	14,427,034	1,788,047	8.069
Services	2,307,897	792,707	2,911

Industry	(4) Personal Income 000's $	(5) Normalized	(6) Ratio
Agriculture	1,103,392	.050	.948
Construction	1,605,182	.072	.282
Manufacturing	9,807,843	.441	2.335
Transportation	1,649,497	.074	.250
Wholesale Trade	1,554,280	.070	1.236
Retail Trade	2,668,137	.120	.969
Services	3,837,944	.173	.503
TOTAL	22,226,275	1.000	6.523

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(1) Source: 1977 Census of Agriculture, of Manufacturing, of Transportation, of Wholesale Trade, of Retail Trade, of Construction, and of Services.

(2) Source: Same as (1).

(3) Column (1) divided by Column (2).

(4) Source: Local Area Personal Income, 1974-79, Attachment D-1.

(5) Column (4) divided by total of Column (4), i.e., $.050 = \frac{1,103,392}{22,226,275}$

(6) Column (5) times Column (3).

TABLE D-5

Sales/Income Ratios

Area	Ratio
State	6.523
Manitowoc County	6.180
Crawford County	10.009
Kenosha County	5.767
Sheboygan County	6.812
Milwaukee SMSA	5.386
Door County	6.330
Douglas County	10.663
Ashland County	5.520
Milwaukee County	5.438
Marinette County	7.102
Racine County	5.469
Lacrosse County	5.536

Source: Table D-4

TABLE D-6

ALTERNATIVE COMPUTATION OF SALES/INCOME MULTIPLIERS

Industry	Sales[1] (Millions of $'s)	Employment[1] Persons (000's $)	Employment[1] Hourly Wage	Sales/Income Ratio[2]
Manufacturing				
Durables	798,057	12,274	$6.58	4.75
Non-durables	698,515	8,231	5.53	7.38
Retail Sales		14,573	4.20	6.29
Wholesale Trade	754,105	4,969	5.88	12.41
Construction	205,457	4,229	8.66	2.70

Industry	Personal Income (000's $)[3]	Personal Income Normalized	Weighted[4] Sales/Income Ratio
Manufacturing			
Durables	6,667,127	42.6	2.025
Non-durables	3,140,716	20.1	1.482
Retail Sales	2,668,137	17.1	1.073
Wholesale Sales	1,554,280	9.9	1.234
Construction	1,605,182	10.3	.277
TOTAL	15,635,442	100.0	6.091

1) Source: Survey of Current Business, July 1980.

2) Sales divided by (Persons x hourly wage x 2080 hours/year = total wage bill).

3) Source: Attachment D-1.

4) Sales/income ratio times normalized income.

D.5.1 Full-Time Equivalent Employment

The second adjustment results from under-employment, i.e., part-time workers, in several sectors. National data on hours worked per week by sector for 1978 were taken from the Survey of Current Business . The adjustment shown in Table D.7 is 40 hours divided by hours worked per week. This adjustment is to obtain yearly wages on the basis of full-time jobs rather than number of employees. (Data was not available for agriculture, so no adjustment was made. In port counties, agricultural income is so small that any adjustment would have a negligible impact.) The last adjustment is the normalization of income for the sectors for which data is available, as explained earlier. Multiplying the payroll/employment ratio by the inflation, hours and income normalization factors, and then summing across industries yields the average yearly wage for an average employee in the area.

D.5.2 Annual Wage Per Full-Time Equivalent Worker

Because the basic data in Table D.7 is per employee, whereas the changes in income are for both labor and proprietary income, one additional adjustment is made in Table D.8. The average yearly wage is increased by the ratio of labor and proprietary income to labor income. This data is taken from Local Area Personal Income for 1978 (Attachment D.1). The result is a yearly wage per worker that is comparable to the personal income multipliers computed earlier.

As noted, the various censi are not always readily available. In this instance, it may be necessary to combine several sources of data on employment and payrolls. One source would be the basic employment form utilized for income multipliers, which also includes payroll information. At the county level, this information is not always fully disclosed, so that some supplemental data might be needed. For example, the national level data from the Survey of Current Business might be used for some industries. Generally, this method would use whatever data sources on employment and payrolls are available, including any available census, County Business Patterns , the Survey of Current Business and any studies of the local area. Implementation of this method would follow the format in Table D.7, but would use whatever data sources can be readily obtained.

D.6 Tax Impact Parameters

The next step is to determine effective tax rates. Ratio analysis can be used to determine federal and state income taxes, federal contributions for social insurance funds and sales tax impacts.

TABLE D-7

COMPUTATION OF AVERAGE WAGE PER EMPLOYEE
ASHLAND COUNTY

	Payroll	Employment	Payroll/Employment Ratio
Agriculture	$ 266,000	253	1,051
Construction	N/A[1)]	N/A[1)]	13,852[1)]
Manufacturing	13,300,000	1,400	9,500
Transportation	N/A[1)]	N/A[1)]	10,938[1)]
Wholesale Trade	940,000	95	9,895
Retail Trade	5,956,000	918	6,488
Services	1,148,000	170	6,753

	Personal Income (000's $)	Normalized
Agriculture	1,380	.020
Constructgion	4,455	.066
Manufacturing	18,227	.270
Transportation	9,922	.147
Wholesale Trade	2,609	.039
Retail Trade	8,230	.122
Services	22,655	.336
Sum	67,478	1.000

	P/E Ratio	Times Inflation Adjustment	Times Hrs. Adjustment	Times Normalized	Average Salary
Agriculture	1,051	1.135	1.000	.020	23.87
Construction	13,852	1.084	1.087	.066	1,077.25
Manufacturing	9,500	1.065	.990	.270	2,704.41
Transportation	10,938	1.054	1.000	.147	1,694.74
Wholesale Trade	9,895	1.045	1.018	.039	410.52
Retail Trade	6,488	1.054	1.290	.122	1,076.22
Services	6,753	1.071	1.220	.336	2,964.71
				1.000	9,951.69

1) For State of Wisconsin, county numbers not available.

Source: 1977 Census of Agriculture, of Manufacturing, of Construction, of Transportation, of Wholesale Trade, of Retail Trade and of Services.

TABLE D-7

COMPUTATION OF AVERAGE WAGE PER EMPLOYEE
CRAWFORD COUNTY

	Payroll	Employment	Payroll/Employment Ratio
Agriculture	$ 1,565,000	2,641	593
Construction	N/A[1)]	N/A[1)]	13,852[1)]
Manufacturing	264,500,000	18,200	14,533
Transportation	N/A[1)]	N/A[1)]	10,938[1)]
Wholesale Trade	1,711,000	185	9,249
Retail Trade	5,006,000	860	5,821
Services	920,000	162	5,679

	Personal Income (000's $)	Normalized
Agriculture	12,200	.260
Construction	1,817	.039
Manufacturing	14,028	.299
Transportation	2,441	.052
Wholesale Trade	1,596	.034
Retail Trade	8,314	.178
Services	6,473	.138
Sum	46,869	1.000

	P/E Ratio	Times Inflation Adjustment	Times Hrs. Adjustment	Times Normalized	Average Salary
Agriculture	593	1.135	1.000	.260	174.99
Construction	13,852	1.084	1.087	.039	636.55
Manufacturing	14,533	1.065	.990	.299	4,581.54
Transportation	10,938	1.054	1.000	.052	599.49
Wholesale Trade	9,249	1.045	1.018	.034	334.53
Retail Trade	5,821	1.054	1.290	.178	1,408.80
Services	5,679	1.071	1.220	.138	1,024.00
				1.000	8,759.90

1) For State of Wisconsin, county numbers not available.

Source: 1977 Census of Agriculture, of Manufacturing, of Construction, of Transportation, of Wholesale Trade, of Retail Trade and of Services.

TABLE D-7

COMPUTATION OF AVERAGE WAGE PER EMPLOYEE
DOOR COUNTY

	Payroll	Employment	Payroll/Employment Ratio
Agriculture	2,343,000	2,756	850
Construction	N/A[1)]	N/A[1)]	13,852[1)]
Manufacturing	39,200,000	3,500	11,200
Transportation	N/A[1)]	N/A[1)]	10,938[1)]
Wholesale Trade	1,934,000	196	9,867
Retail Trade	9,101,000	1,377	6,609
Services	3,312,000	387	8,558

	Personal Income (000's $	Normalized
Agriculture	12,557	.111
Construction	6,476	.057
Manufacturing	58,217	.512
Transportation	3,435	.030
Wholesale Trade	3,311	.029
Retail Trade	15,004	.132
Services	14,685	.129
Sum	113,685	1.000

	P/E Ratio	Times Inflation Adjustment	Times Hrs. Adjustment	Times Normalized	Average Salary
Agriculture	850	1.135	1.000	.111	107.11
Construction	13,852	1.084	1.087	.057	930.35
Manufacturing	11,200	1.065	.990	.512	6,046.06
Transportation	10,938	1.054	1.000	.030	345.86
Wholesale Trade	9,867	1.045	1.018	.129	304.41
Retail Trade	6,609	1.054	1.290	.132	1,186.20
Services	8,558	1.071	1.220	.129	1,442.51
				1.000	10,362.50

1) For State of Wisconsin, county numbers not available.

Source: 1977 Census of Agriculture, of Manufacturing, of Construction, of Transportation, of Wholesale Trade, of Retail Trade and of Services.

TABLE D-7

COMPUTATION OF AVERAGE WAGE PER EMPLOYEE
DOUGLAS COUNTY

	Payroll	Employment	Payroll/Employment Ratio
Agriculture	306,000	560	546
Construction	N/A[1)]	N/A[1)]	13,852[1)]
Manufacturing	12,500,000	1,000	12,500
Transportation	N/A[1)]	N/A[1)]	10,938[1)]
Wholesale Trade	11,328,000	771	14,693
Retail Trade	111,672,000	18,747	5,957
Services	3,822,000	650	5,880

	Personal Income (000's $	Normalized
Agriculture	2,478	.015
Construction	12,067	.075
Manufacturing	27,578	.172
Transportation	57,340	.357
Wholesale Trade	16,991	.106
Retail Trade	22,306	.139
Services	21,888	.136
Sum	160,648	1.000

	P/E Ratio	Times Inflation Adjustment	Times Hrs. Adjustment	Times Normalized	Average Salary
Agriculture	546	1.135	1.000	.015	9.57
Construction	13,852	1.084	1.087	.075	1,226.01
Manufacturing	12,500	1.065	.990	.172	2,262.47
Transportation	10,938	1.054	1.000	.357	4,114.91
Wholesale Trade	14,693	1.045	1.018	.106	1,653.13
Retail Trade	5,957	1.054	1.290	.139	1,124.58
Services	5,880	1.071	1.220	.136	1,017.46
				1.000	11,408.00

1) For State of Wisconsin, county numbers not available.

Source: 1977 Census of Agriculture, of Manufacturing, of Construction, of Transportation, of Wholesale Trade, of Retail Trade and of Services.

TABLE D-7

COMPUTATION OF AVERAGE WAGE PER EMPLOYEE
KENOSHA COUNTY

	Payroll	Employment	Payroll/Employment Ratio
Agriculture	2,408,000	1,605	1,500
Construction	N/A[1)]	N/A[1)]	13,852[1)]
Manufacturing	246,200,000	17,700	13,910
Transportation	N/A[1)]	N/A[1)]	10,938[1)]
Wholesale Trade	13,814,000	1,143	12,086
Retail Trade	43,469,000	7,146	6,063
Services	9,435,000	1,645	5,736

	Personal Income (000's $	Normalized
Agriculture	8,816	.014
Construction	53,108	.086
Manufacturing	372,702	.604
Transportation	29,166	.047
Wholesale Trade	17,104	.028
Retail Trade	57,732	.094
Services	78,255	.127
Sum	616,883	1.000

	P/E Ratio	Times Inflation Adjustment	Times Hrs. Adjustment	Times Normalized	Average Salary
Agriculture	1,500	1.135	1.000	.014	23.84
Construction	13,852	1.084	1.087	.086	1,403.69
Manufacturing	13,910	1.065	.990	.604	8,733.50
Transportation	10,938	1.054	1.000	.047	541.85
Wholesale Trade	12,086	1.045	1.018	.028	359.99
Retail Trade	6,063	1.054	1.290	.094	774.96
Services	5,736	1.071	1.220	.127	950.67
				1.000	12,917.00

1) For State of Wisconsin, county numbers not available.

Source: 1977 Census of Agriculture, of Manufacturing, of Construction, of Transportation, of Wholesale Trade, of Retail Trade and of Services.

TABLE D-7

COMPUTATION OF AVERAGE WAGE PER EMPLOYEE
LACROSSE COUNTY

	Payroll	Employment	Payroll/Employment Ratio
Agriculture	1,806,000	1,381	1,308
Construction	N/A[1)]	N/A[1)]	13,852[1)]
Manufacturing	111,800,000	9,400	11,894
Transportation	N/A[1)]	N/A[1)]	10,938[1)]
Wholesale Trade	28,561,000	2,248	12,705
Retail Trade	45,012,000	8,025	5,609
Services	16,086,000	2,416	6,658

	Personal Income (000's $	Normalized
Agriculture	14,240	.031
Construction	36,860	.080
Manufacturing	159,401	.346
Transportation	43,398	.094
Wholesale Trade	42,569	.092
Retail Trade	65,492	.142
Services	99,087	.215
Sum	461,047	1.000

	P/E Ratio	Times Inflation Adjustment	Times Hrs. Adjustment	Times Normalized	Average Salary
Agriculture	1,308	1.135	1.000	.031	46.01
Construction	13,852	1.084	1.087	.080	1,305.75
Manufacturing	11,894	1.065	.990	.346	4,338.85
Transportation	10,938	2.054	1.000	.094	1,083.69
Wholesale Trade	12,705	1.045	1.018	.092	1,243.45
Retail Trade	5,609	1.054	1.290	.142	1,082.93
Services	6,658	1.071	1.220	.215	1,870.42
				1.000	10,971.10

1) For State of Wisconsin, county numbers not available.

Source: 1977 Census of Agriculture, of Manufacturing, of Construction, of Transportation, of Wholesale Trade, of Retail Trade and of Services.

TABLE D-7

COMPUTATION OF AVERAGE WAGE PER EMPLOYEE
MANITOWOC COUNTY

	Payroll	Employment	Payroll/Employment Ratio
Agriculture	4,261,000	3,044	1,400
Construction	N/A[1)]	N/A[1)]	13,852[1)]
Manufacturing	167,700,000	80,680	11,408
Transportation	N/A[1)]	N/A[1)]	10,938[1)]
Wholesale Trade	11,249,000	1,149	14,694
Retail Trade	25,029,000	4,442	5,635
Services	5,799,000	1,077	5,384

	Personal Income (000's $	Normalized
Agriculture	32,074	.084
Construction	22,618	.059
Manufacturing	216,826	.565
Transportation	14,794	.039
Wholesale Trade	16,627	.043
Retail Trade	38,389	.100
Services	42,676	.111
Sum	384,004	1.000

	P/E Ratio	Times Inflation Adjustment	Times Hrs. Adjustment	Times Normalized	Average Salary
Agriculture	1,400	1.135	1.000	.084	116.92
Construction	13,852	1.084	1.087	.059	961.37
Manufacturing	11,408	1.065	.990	.565	6,791.66
Transportation	10,938	1.054	1.000	.039	444.13
Wholesale Trade	14,694	1.045	1.018	.043	456.12
Retail Trade	5,635	1.054	1.290	.100	765.90
Services	5,384	1.071	1.220	.111	781.88
				1.000	10,318.00

1) For State of Wisconsin, county numbers not available.

Source: 1977 Census of Agriculture, of Manufacturing, of Construction, of Transportation, of Wholesale Trade, of Retail Trade and of Services.

TABLE D-7

COMPUTATION OF AVERAGE WAGE PER EMPLOYEE
MARINETTE COUNTY

	Payroll	Employment	Payroll/Employment Ratio
Agriculture	$ 768,000	1,353	568
Construction	N/A[1]	N/A[1]	13,852[1]
Manufacturing	79,900,000	6,400	12,484
Transportation	N/A[1]	N/A[1]	10,938[1]
Wholesale Trade	4,148,000	448	9,259
Retail Trade	12,293,000	2,224	5,527
Services	2,217,000	380	5,834

	Personal Income (000's $	Normalized
Agriculture	11,216	.063
Construction	4,315	.024
Manufacturing	113,865	.646
Transportation	6,628	.038
Wholesale Trade	6,819	.039
Retail Trade	19,315	.110
Services	14,048	.080
Sum	176,206	1.000

	P/E Ratio	Times Inflation Adjustment	Times Hrs. Adjustment	Times Normalized	Average Salary
Agriculture	568	1.135	1.000	.063	40.59
Construction	12,852	1.084	1.087	.024	391.73
Manufacturing	13,484	1.065	.990	.646	8502.98
Transportation	10,938	1.054	1.000	.038	438.09
Wholesale Trade	9,259	1.045	1.018	.039	384.14
Retail Trade	5,527	1.054	1.290	.110	826.70
Services	5,834	1.071	1.220	.080	609.85
				1.000	11,194,08

1) For State of Wisconsin, county numbers not available.

Source: 1977 Census of Agriculture, of Manufacturing, of Construction, of Transportation, of Wholesale Trade, of Retail Trade and of Services.

TABLE D-7

COMPUTATION OF AVERAGE WAGE PER EMPLOYEE
MILWAUKEE SMSA

	Payroll	Employment	Payroll/Employment Ratio
Agriculture	7,732,000	6,093	1,269
Construction	N/A[1)]	N/A[1)]	13,892[1)]
Manufacturing	3,042,500,000	204,100	14,907
Transportation	N/A[1)]	N/A[1)]	10,938[1)]
Wholesale Trade	493,142,000	33,665	14,649
Retail Trade	624,452,000	100,204	6,232
Services	386,571,000	47,271	8,178

	Personal Income (000's $	Normalized
Agriculture	35,393	.004
Construction	579,843	.068
Manufacturing	3,993,930	.470
Transportation	658,143	.077
Wholesale Trade	702,384	.083
Retail Trade	884,516	.104
Services	1,641,181	.193
Sum	8,494,590	1.000

	P/E Ratio	Times Inflation Adjustment	Times Hrs. Adjustment	Times Normalized	Average Salary
Agriculture	1,269	1.135	1.000	.004	59.92
Construction	13,892	1.084	1.087	.068	1,114.14
Manufacturing	14,907	1.065	.990	.470	7,389.81
Transportation	10,938	1.054	1.000	.077	893.22
Wholesale Trade	14,649	1.045	1.018	.083	1,288.92
Retail Trade	6,232	1.054	1.290	.104	882.31
Services	8,178	1.071	1.220	.193	2,063.99
				1.000	13,692.00

1) For State of Wisconsin, county numbers not available.

Source: 1977 Census of Agriculture, of Manufacturing, of Construction, of Transportation, of Wholesale Trade, of Retail Trade and of Services.

TABLE D-7

COMPUTATION OF AVERAGE WAGE PER EMPLOYEE
SHEBOYGAN COUNTY

	Payroll	Employment	Payroll/Employment Ratio
Agriculture	2,672,000	2,274	1,175
Construction	N/A[1)]	N/A[1)]	13,852[1)]
Manufacturing	222,500,000	17,400	12,787
Transportation	N/A[1)]	N/A[1)]	10,938[1)]
Wholesale Trade	17,049,000	1,551	10,992
Retail Trade	36,844,000	6,217	5,926
Services	14,907,000	1,853	8,045

	Personal Income (000's $	Normalized
Agriculture	25,294	.051
Construction	38,231	.078
Manufacturing	300,835	.610
Transportation	23,831	.048
Wholesale Trade	28,780	.058
Retail Trade	53,981	.110
Services	22,070	.045
Sum	493,022	1.000

	P/E Ratio	Times Inflation Adjustment	Times Hrs. Adjustment	Times Normalized	Average Salary
Agriculture	1,175	1.135	1.000	.051	68.02
Construction	13,852	1.084	1.087	.078	101.90
Manufacturing	12,787	1.065	.990	.610	8,224.23
Transportation	10,938	1.054	1.000	.048	553.38
Wholesale Trade	10,992	1.045	1.018	.58	678.23
Retail Trade	5,926	1.054	1.290	.110	886.36
Services	8,045	1.071	1.220	.045	473.02
				1.000	10,985.14

1) For State of Wisconsin, county numbers not available.

Source: 1977 Census of Agriculture, of Manufacturing, of Construction, of Transportation, of Wholesale Trade, of Retail Trade and of Services.

TABLE D-7

COMPUTATION OF AVERAGE WAGE PER EMPLOYEE - STATE OF WISCONSIN

Industry	Payroll[1]	Employment[1]	Payroll/Employment Ratio
Agriculture	$ 181,680,000	165,838	$ 1,098
Construction	1,117,593,000	80,680	13,852
Manufacturing	7,317,800,000	535,000	13,678
Transportation	91,114,000	8,330	10,938
Wholesale Trade	1,111,980,000	86,408	12,869
Retail Trade	1,788,047,000	300,152	5,957
Services	792,207,000	106,625	7,430

	PERSONAL INCOME[2]	
Industry	(000's $)	Normalized
Agriculture	1,103,392	.050
Construction	1,605,182	.072
Manufacturing	8,807,843	.441
Transportation	1,649,497	.074
Wholesale Trade	1,554,280	.070
Retail Trade	2,668,137	.120
Services	3,837,944	.173
Sum	21,226,275	1.000

Industry	P/E Ratio	Times[3] Inflation Adj.	Times[4] Hrs. Adj.	X Normalized Income	Equals Weighted Salary
Agriculture	1,096	1.135	1	.050	$ 62.20
Construction	13,852	1.084	1.087	.072	1173.02
Manufacturing	13,678	1.065	.990	.441	6359.84
Transportation	10,938	1.054	1	.074	853.12
Wholesale Trade	12,869	1.045	1.018	.070	958.31
Retail Trade	5,957	1.054	1.290	.120	971.94
Services	7,430	1.071	1.220	.173	1679.52
					12,068.00

1) Source: 1977 Census of Agriculture, of Manufacturing, of Construction, of Transportation, of Wholesale Trade, of Retail Trade and of Services

2) Attachment D-1.

3) Ratio of 1978 to 1977 Implicit Price Deflator for Gross Domestic Product from National Income and Product Accounts, Tables 7.10 and 7.22.

4) Hours per week from Survey of Current Business divided by 40 hours per week.

TABLE D-8

WAGE PER WORKER BY AREA

Area	Average 1978 Yearly Wage Per Employee	X	Propriatary Income Adj.[1]	=	Wage Per Worker
Ashland County	$ 9,952		1.192		$11,863
State	12,068		1.216		14,677
Milwaukee County	13,853		1.155		16,006
Douglas County	11,408		1.167		13,309
Racine County	12,798		1.179		15,093
Kenosha County	12,917		1.223		15,794
Manitowoc County	10,318		1.272		13,127
Milwaukee SMSA	13,692		1.168		15,993
LaCrosse County	10,971		1.191		13,066
Sheboygan County	10,985		1.206		13,248
Crawford County	8,760		1.502		13,158
Door County	10,363		1.338		13,866
Marinette County	11,914		1.254		14,037

1) Adjustment factor of the ratio of personal income to wage and salary disbursement from Local Area Personal Income for 1978, see Attachment D to this appendix.

D.6.1 Personal Income Taxes

Personal income taxes can be calculated by determining the effective tax rate on wages and salaries. U.S. Internal Revenue Service, Statistics of Income, Individual Income Tax Returns , published annually, shows total income tax paid as a percent of adjusted gross income, by state, and this can be used to estimate individual income taxes paid to the federal government. For 1978, this tax rate was 13.55 percent for the state. A breakdown by county is not available.

Similar information can be obtained for the state department of revenue and is available at the county level for 1980. The effective rate of contribution for social income can be computed from information contained in Local Area Personal Income . (Attachment D.1). Table D.9 shows the computations for effective state income tax rates by selected areas. Table D.10 shows the effective tax rates on federal income, state income and contributions to social insurance programs, by selected areas.

D.6.2 Sales Tax

Computation of sales tax revenue requires the estimation of two parameters, the effective sales tax rate and the proportion of disposable income spent.

A regression of personal consumption expenditures on disposable income using national level data, indicates that 90.945 percent of disposable income represents personal consumption expenditures. Thus, in the main report, sales tax impacts are computed by first multiplying the increase in disposable income by .90945 to yield expenditures subject to the sales tax. Multiplying expenditures by the sales tax rate yields the expected increase in sales tax receipts due to the projecat.

The sales tax rate in the State of Wisconsin is 5 percent. However, there are numerous commodity exemptions to the tax so that the effective rate is less than 5 percent. The effective sales tax rate of 2.17 percent was estimated based on data in Statistics of Income, Individual Income Tax Returns , Tables 5.1 and 5.2. Table 5.2 shows various deductions for itemized tax returns by state. For the State of Wisconsin, the average sales tax deduction per return is $336.13. From Table 5.1, a total of 1,968,083 returns were filled from the State of Wisconsin, yielding an estimated sales tax paid of $661,528,528. Table 5.1 shows adjusted gross income of all state returns of $30,541,036,000. Dividing estimated tax paid by adjusted gross income yields an effective sales tax rate of 2.17 percent of income.

Table D.11 contains a summary of all parameters estimated using the techniques described in this appendix. For projects not in any county set forth in Tble D.11, each of these parameters will need to be computed to describe the economic impacts in Step 11 of the main report.

TABLE D.9

Effective State Tax Rates

Area	1980 Adjusted Gross Income	1980 Net Tax Liability	Effective State Tax Rate
State	$32,619,913,042	$1,542,362,193	.0473
Brown County	1,272,768,936	60,641,927	.0476
Douglas County	253,068,715	11,257,204	.0445
Kenosha County	904,870,297	43,244,651	.0478
Kewaunee County	117,370,662	5,142,764	.0438
Manitowoc County	541,783,729	24,451,471	.0451
Milwaukee County	7,530,145,636	357,498,062	.0475
Milwaukee SMSA	11,487,809,139	559,800,289	.0487
Ozaukee County	656,713,810	34,435,343	.0524
Racine County	1,392,943,068	68,444,133	.0491
Washington County	651,167,414	30,677,821	.0471
Waukesha County	2,649,782,279	137,189,063	.0518
LaCrosse County	593,369,302	26,736,086	.0451
Sheboygan County	713,396,706	32,770,437	.0459
Crawford County	74,879,319	3,055,148	.0408
Door County	158,618,235	6,877,410	.0434
Asheland County	76,828,200	3,044,156	.0396
Marinette County	211,775,076	8,935,388	.0422

Source: Wisconsin Department of Revenue, Research & Analysis Division

TABLE D.10

Effective Area Tax Rates

Area	Effective Federal Income Tax Rate (1)	Effective Rate Contributions for Social Insurance (2)	Effective Federal Tax Rate (3)	Effective State Income Rate (4)
State	.1355	.0512	.1867	.0473
Brown County	.1355	.0531	.1886	.0476
Douglas County	.1355	.0570	.1925	.0445
Kenosha County	.1355	.0516	.1871	.0478
Kewaunee County	.1355	.0435	.1790	.0438
Manitowoc County	.1355	.0509	.1864	.0451
Milwaukee County	.1355	.0539	.1894	.0475
Milwaukee SMSA	.1355	.0536	.1891	.0487
Ozaukee County	.1355	.0520	.1875	.0524
Racine County	.1355	.0516	.1891	.0491
Washington County	.1355	.0508	.1863	.0471
Waukesha County	.1355	.0529	.1884	.0518
Crawford County	.1355	.0454	.1809	.0408
Sheboygan County	.1355	.0515	.1870	.0459
Door County	.1355	.0489	.1844	.0434
Ashland County	.1355	.0565	.1920	.0396
Marinette County	.1355	.0518	.1873	.0422
LaCrosse County	.1355	.0533	.1888	.0451

(1) Source: Statistics of Income, Individual Income Tax Returns, 1978. Internal Revenue Service, Table 5.1 for State of Wisconsin.

(2) Source: Local Area Personal Income - 1974-1979. U.S. Department of Commerce, from individual county tables, ratio of personal contributions for social insurance to total labor and proprietor's income.

(3) Source: Column (1) plus Column (2)

(4) Source: Table D.9

TABLE D.11

Parameters for Estimating Regional Impacts of Projects

Area	Income Multiplier	Sales/Income Multiplier	Wage Per Worker	Effective Tax Rates		
				Federal	State	Sales
STATE	2.22	6.523	$14,677	.1867	.0473	.0217
Milw. SMSA	2.28	5.386	15,993	.1891	.0487	.0217
Milw. City	2.82	5.438	16,006	.1894	.0475	.0217
Kenosha City	1.78	5.767	15,794	.1871	.0478	.0217
Manitowoc	1.99	6.180	13,127	.1864	.0451	.0217
Marinette	1.59	7.102	14.037	.1873	.0422	.0217
Crawford	1.47	10.009	13,158	.1809	.0408	.0217
Sheboygan	1.87	6.812	13,248	.1870	.0459	.0217
Door	1.62	6.330	13,866	.1844	.0434	.0217
Ashland	1.69	5.520	11,863	.1920	.0396	.0217
Lacrosse	2.15	5.536	13,066	.1888	.0451	.0217
Douglas	1.80	8.492	13,309	.1925	.0445	.0217

ATTACHMENT D

ATTACHMENT D

Table 5.—Personal Income for States and Counties of the Great Lakes Region, 1974–79

(Thousands of dollars)

	State of Wisconsin						Adams, Wisconsin					
	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]
Labor and proprietors' income by place of work[3]												
By type												
Wage and salary disbursements	15,347,134	16,176,057	17,928,902	19,896,433	22,461,966	25,177,057	15,045	17,306	19,735	21,083	24,249	27,776
Other labor income	1,207,451	1,424,135	1,677,181	1,980,039	2,279,344	2,645,280	1,022	1,221	1,625	1,978	2,242	2,622
Proprietors' income[4]	1,903,358	2,059,770	2,013,257	2,281,364	2,577,486	3,145,907	4,335	6,648	2,350	4,662	6,124	6,314
Farm	675,947	719,241	603,645	813,921	931,139	1,322,743	2,041	4,222	−233	324	2,199	1,944
Nonfarm[4]	1,227,811	1,339,459	1,483,612	1,567,443	1,646,288	1,823,164	2,294	2,426	3,243	3,738	3,925	4,370
By industry												
Farm	820,216	868,905	669,531	967,130	1,103,392	1,548,139	2,946	5,192	10	1,916	3,320	3,406
Nonfarm	17,642,777	18,789,987	20,949,809	23,290,706	26,215,404	29,420,105	17,456	19,983	23,700	25,707	29,295	33,306
Private	15,065,218	15,937,445	17,831,949	19,977,716	22,568,609	25,496,051	11,562	13,041	15,605	16,805	19,344	22,253
Agricultural services, forestry, fisheries, and other[5]	49,988	53,335	62,783	70,865	81,666	94,191	111	127	118	144	171	207
Mining	39,303	39,928	40,031	44,307	48,887	55,332	0	0	0	0	0	0
Construction	1,054,256	1,042,964	1,209,936	1,421,638	1,605,182	1,773,890	(D)	(D)	(D)	(D)	(D)	1,062
Manufacturing	5,667,170	6,863,873	7,669,621	8,565,265	9,807,843	11,087,533	3,342	3,332	3,950	4,064	4,983	5,999
Nondurable goods	2,123,790	2,245,032	2,538,934	2,805,504	3,140,716	3,455,789	1,857	2,233	3,042	3,241	3,967	4,724
Durable goods	4,543,380	4,618,841	5,130,687	5,759,761	6,667,127	7,631,744	1,485	1,099	908	823	1,016	1,275
Transportation and public utilities	1,132,959	1,169,169	1,317,039	1,480,521	1,649,497	1,888,171	(D)	(D)	(D)	(D)	(D)	(D)
Wholesale trade	1,022,590	1,191,539	1,292,068	1,407,398	1,554,280	1,780,977	84	387	396	545	(D)	(D)
Retail trade	1,970,275	2,065,067	2,199,433	2,408,560	2,668,137	2,993,387	2,459	2,776	3,223	3,409	3,767	4,330
Finance, insurance, and real estate	766,289	849,527	997,751	1,159,188	1,315,173	1,468,317	405	392	498	568	580	581
Services	2,362,348	2,722,043	3,043,287	3,419,974	3,837,944	4,354,253	(D)	(D)	(D)	(D)	(D)	(D)
Government and government enterprises[6]	2,577,559	2,852,542	3,117,860	3,312,990	3,646,795	3,924,054	5,894	6,942	8,095	8,902	9,951	11,053
Federal, civilian	316,815	348,412	395,614	426,026	464,752	493,880	3,182	3,842	4,825	5,061	5,347	5,707
Federal, military	50,908	50,907	55,403	53,668	56,673	57,829	100	109	115	114	119	125
State and local	2,209,836	2,453,223	2,666,843	2,833,296	3,125,370	3,372,345	2,612	2,991	3,155	3,727	4,485	5,221
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	18,462,993	19,658,892	21,619,340	24,257,836	27,318,796	30,968,244	20,402	25,175	23,710	27,623	32,615	36,712
Less: Personal contributions for social insurance by place of work	995,118	1,052,462	1,136,423	1,226,155	1,397,643	1,629,869	1,100	1,237	1,463	1,482	1,701	1,956
Net labor and proprietors' income by place of work	17,467,875	18,606,430	20,482,917	23,031,681	25,921,153	29,338,375	19,302	23,938	22,247	26,141	30,914	34,756
Plus: Residence adjustment	288,485	292,854	324,787	373,550	421,810	453,649	3,706	3,362	3,628	4,393	4,659	5,194
Net labor and proprietors' income by place of residence	17,756,360	18,899,284	20,807,704	23,405,241	26,342,963	29,792,024	23,008	27,300	25,875	30,534	35,573	39,950
Plus: Dividends, interest, and rent[7]	3,188,899	3,492,323	3,585,824	4,028,262	4,498,609	5,202,290	4,894	5,461	5,968	7,143	8,048	9,417
Plus: Transfer payments	2,721,509	3,379,006	3,667,100	3,939,940	4,349,641	4,982,165	7,511	9,322	10,119	10,734	12,153	14,161
Personal income by place of residence	23,666,768	25,770,613	28,060,628	31,373,443	35,191,213	39,976,479	35,413	42,083	41,962	48,411	55,774	63,528
Per capita personal income (dollars)	5,183	5,616	6,087	6,756	7,515	8,470	3,286	3,703	3,597	4,178	4,675	5,372

	Ashland, Wisconsin						Barron, Wisconsin					
	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]
Labor and proprietors' income by place of work[3]												
By type												
Wage and salary disbursements	39,196	44,244	49,548	56,277	67,483	73,150	68,393	74,125	84,681	97,961	112,725	129,497
Other labor income	2,930	3,594	4,428	5,327	6,308	7,152	5,441	6,751	8,309	10,228	11,755	13,905
Proprietors' income[4]	5,274	5,768	6,255	5,591	6,675	7,782	24,868	29,726	26,530	36,781	44,330	56,843
Farm	625	977	990	433	1,243	1,654	12,939	16,848	12,362	22,219	29,057	39,429
Nonfarm[4]	4,649	4,791	5,275	5,158	5,432	6,128	11,929	12,878	14,168	14,562	15,273	17,414
By industry												
Farm	737	1,098	1,103	554	1,380	1,837	15,814	19,927	15,232	25,362	32,589	44,068
Nonfarm	46,663	52,508	59,138	66,641	79,086	86,247	82,888	90,675	104,288	119,608	136,222	156,177
Private	38,643	43,617	50,090	56,854	68,176	74,247	70,647	76,898	89,500	102,478	115,965	132,971
Agricultural services, forestry, fisheries, and other[5]	0	0	0	(D)	(L)	(D)	429	(D)	(D)	(D)	392	(D)
Mining	(D)	0	0	0	0	0	470	(D)	(D)	(D)	470	(D)
Construction	1,958	2,139	3,184	3,709	4,455	(D)	5,440	5,023	6,129	7,501	8,418	8,705
Manufacturing	12,400	10,679	13,637	16,558	18,227	20,491	24,887	26,176	31,760	37,974	44,482	51,486
Nondurable goods	5,817	5,482	6,046	6,538	6,979	7,113	10,968	11,545	13,426	16,614	18,320	21,325
Durable goods	6,583	5,197	7,591	10,020	11,248	13,378	13,919	14,631	18,334	21,360	26,162	30,161
Transportation and public utilities	6,903	7,803	8,699	9,032	9,922	10,760	6,277	6,887	7,750	8,884	9,233	11,171
Wholesale trade	1,929	2,554	2,725	2,466	2,609	3,118	3,966	6,228	6,614	6,896	7,296	8,334
Retail trade	6,406	6,495	7,168	7,754	8,230	9,340	15,572	15,642	17,419	18,813	21,209	23,774
Finance, insurance, and real estate	(D)	1,232	1,357	(D)	2,077	2,513	3,456	3,839	4,545	5,168	5,812	6,456
Services	7,884	12,715	13,320	15,465	22,655	23,496	10,150	11,887	13,985	16,105	18,053	21,387
Government and government enterprises[6]	8,020	8,891	9,048	9,787	10,910	12,000	12,241	13,777	14,788	17,130	20,257	23,206
Federal, civilian	1,888	2,268	2,367	2,471	2,590	2,751	1,741	1,875	2,260	2,438	2,667	2,834
Federal, military	128	137	140	143	152	152	300	315	325	330	345	352
State and local	6,004	6,486	6,541	7,173	8,168	9,097	10,200	11,587	12,203	14,362	17,245	20,020
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	47,400	53,606	60,241	67,195	80,466	88,084	98,702	110,602	119,520	144,970	168,811	200,245
Less: Personal contributions for social insurance by place of work	2,709	3,087	3,528	3,825	4,545	5,288	5,053	5,432	6,015	6,593	7,527	8,740
Net labor and proprietors' income by place of work	44,691	50,519	56,713	63,370	75,921	82,796	93,649	105,170	113,505	138,377	161,284	191,505
Plus: Residence adjustment	−3,036	−4,079	−4,846	−5,748	−7,712	−7,081	2,660	2,779	2,614	2,816	3,064	3,123
Net labor and proprietors' income by place of residence	41,655	46,440	51,867	57,622	68,209	75,715	96,309	107,949	116,119	141,193	164,348	194,628
Plus: Dividends, interest, and rent[7]	7,342	7,851	8,198	9,397	10,529	12,221	19,579	21,829	22,991	26,426	29,707	34,636
Plus: Transfer payments	16,841	20,112	21,634	23,363	25,216	28,522	25,851	31,566	34,252	37,068	40,805	46,126
Personal income by place of residence	65,838	74,403	81,699	90,382	103,954	116,458	141,739	161,344	173,262	204,687	234,860	275,390
Per capita personal income (dollars)	3,985	4,431	4,829	5,240	6,146	6,822	3,886	4,379	4,694	5,453	6,227	7,266

See footnotes at end of tables.

Table 5.—Personal Income for States and Counties of the Great Lakes Region, 1974–79—Continued

(Thousands of dollars)

	Bayfield, Wisconsin						Brown, Wisconsin					
	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]
Labor and proprietors' income by place of work[3]												
By type												
Wage and salary disbursements	15,242	16,629	18,174	19,744	22,435	25,330	608,092	657,811	721,510	824,308	934,635	1,035,[illegible]
Other labor income	399	1,117	1,331	1,571	1,786	2,132	45,463	54,616	64,496	77,427	89,076	101,44[illegible]
Proprietors' income[4]	5,190	5,409	5,331	6,261	7,786	8,673	51,641	57,109	62,033	66,193	75,325	87,57[illegible]
Farm	1,868	1,304	893	912	2,052	2,466	10,586	11,492	10,685	13,066	19,335	25,71[illegible]
Nonfarm[4]	3,322	3,605	4,438	5,349	5,734	6,212	41,055	45,617	51,348	53,127	55,990	61,860
By industry												
Farm	2,146	2,100	1,170	1,216	2,394	2,914	12,835	13,904	12,932	15,523	22,096	29,346
Nonfarm	19,285	21,055	23,666	26,360	29,613	33,225	692,361	755,632	845,107	952,405	1,076,340	1,195,114
Private	14,015	15,029	17,304	19,416	21,795	24,771	615,683	668,637	751,150	848,477	958,742	1,064,114
Agricultural services, forestry, fisheries, and other[5]	276	187	272	521	556	583	1,845	1,393	2,330	2,504	2,948	[illegible]
Mining	0	0	0	0	0	(L)	533	597	945	897	1,382	[illegible]
Construction	1,884	1,818	2,274	2,821	2,827	3,066	45,514	46,817	53,066	64,263	70,022	74,[illegible]
Manufacturing	3,404	3,169	3,421	3,500	3,757	4,762	239,621	266,769	294,645	331,681	375,336	413,[illegible]
Nondurable goods	927	1,131	1,140	1,231	(D)	(D)	176,264	194,371	215,724	242,050	276,367	300,[illegible]
Durable goods	2,477	2,038	2,281	2,269	(D)	(D)	53,357	72,398	78,921	89,621	98,969	112,[illegible]
Transportation and public utilities	1,795	1,997	2,288	2,464	2,885	3,475	79,301	79,951	86,835	97,692	110,704	124,[illegible]
Wholesale trade	589	727	788	956	924	902	34,367	59,758	67,861	72,975	84,847	95,[illegible]
Retail trade	2,737	2,911	3,294	3,725	4,055	4,668	84,319	85,191	95,579	109,601	122,568	137,267
Finance, insurance, and real estate	486	526	724	903	1,051	1,221	18,360	21,409	25,811	30,670	35,791	37,[illegible]
Services	2,844	3,694	4,243	4,526	5,740	6,061	91,823	106,152	124,128	138,094	155,444	177,268
Government and government enterprises[6]	5,270	6,026	6,362	6,944	7,818	8,455	76,678	86,995	93,957	103,928	118,198	131,000
Federal, civilian	600	694	745	1,022	1,282	1,363	9,023	9,826	11,288	12,550	13,800	14,564
Federal, military	93	101	104	110	117	117	1,955	1,998	2,094	2,086	2,301	2,595
State and local	4,577	5,231	5,513	5,812	6,419	6,975	65,700	75,171	80,575	89,292	102,097	113,741
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	21,431	23,155	24,836	27,576	32,007	36,140	705,196	769,536	858,039	967,928	1,099,036	1,224,460
Less: Personal contributions for social insurance by place of work	1,178	1,271	1,434	1,506	1,703	1,959	39,263	42,456	46,500	50,960	58,350	68,262
Net labor and proprietors' income by place of work	20,253	21,884	23,402	26,070	30,304	34,181	665,933	727,080	811,539	916,968	1,040,686	1,156,198
Plus: Residence adjustment	4,825	6,289	7,460	8,092	9,680	10,322	−30,035	−32,003	−35,059	−40,499	−44,843	−34,386
Net labor and proprietors' income by place of residence	25,078	28,173	30,862	34,162	39,984	44,503	635,898	695,077	776,480	876,469	995,843	1,121,812
Plus: Dividends, interest, and rent[7]	6,038	7,259	7,545	8,626	9,698	11,290	111,831	121,024	124,390	139,640	155,853	179,981
Plus: Transfer payments	10,396	12,668	13,894	15,075	16,647	18,854	79,909	99,209	111,081	119,061	133,208	152,744
Personal income by place of residence	41,512	48,100	52,301	57,863	66,329	74,647	827,638	915,310	1,011,951	1,135,170	1,284,904	1,454,537
Per capita personal income (dollars)	3,441	3,863	4,175	4,393	5,013	5,719	4,919	5,356	5,846	6,496	7,266	8,150

	Buffalo, Wisconsin						Burnett, Wisconsin					
	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]
Labor and proprietors' income by place of work[3]												
By type												
Wage and salary disbursements	18,019	19,617	21,106	23,299	27,781	31,937	12,584	13,849	15,821	17,557	20,318	23,143
Other labor income	1,120	1,404	1,656	1,992	2,516	2,990	942	1,180	1,445	1,772	2,033	2,418
Proprietors' income[4]	17,393	14,451	15,719	16,964	20,541	29,332	5,055	4,749	5,909	7,524	8,524	10,293
Farm	12,993	9,330	9,925	10,860	14,246	22,104	2,581	2,000	2,265	2,692	3,374	4,651
Nonfarm[4]	4,400	5,121	5,794	6,104	6,295	7,228	2,474	2,749	3,644	4,932	5,150	5,642
By industry												
Farm	14,456	10,901	11,378	12,451	16,036	24,473	2,809	2,243	2,488	2,936	3,649	5,017
Nonfarm	22,076	24,571	27,103	29,804	34,802	39,786	15,772	17,535	20,687	24,027	27,226	30,837
Private	15,655	17,678	19,845	22,425	26,607	30,814	12,153	13,350	16,183	19,287	22,030	25,222
Agricultural services, forestry, fisheries, and other[5]	120	183	180	287	322	396	(D)	196	167	191	206	(D)
Mining	171	105	101	88	85	96	(D)	0	0	0	0	(D)
Construction	(D)	1,398	1,886	1,719	2,599	2,579	1,272	1,426	1,971	2,252	2,412	2,468
Manufacturing	1,869	1,970	1,905	2,541	3,411	3,665	3,745	4,333	5,247	6,544	7,711	9,023
Nondurable goods	1,365	1,240	1,080	1,513	2,157	2,011	395	461	594	629	795	911
Durable goods	504	730	825	1,028	1,254	1,654	3,350	3,872	4,653	5,915	6,916	8,112
Transportation and public utilities	2,974	3,192	3,620	4,558	5,439	7,027	1,084	1,050	1,235	1,464	1,679	1,777
Wholesale trade	588	2,166	2,512	2,742	3,226	3,932	209	240	345	378	443	487
Retail trade	5,004	4,666	5,328	5,797	6,287	7,039	2,943	3,090	3,317	3,847	4,203	4,854
Finance, insurance, and real estate	898	1,021	1,150	1,154	1,289	1,503	633	590	931	1,130	1,315	1,386
Services	(D)	2,977	3,163	3,539	3,949	4,577	2,000	2,425	2,970	3,481	4,061	4,769
Government and government enterprises[6]	6,421	6,893	7,258	7,379	8,195	8,972	3,619	4,185	4,504	4,740	5,196	5,615
Federal, civilian	1,949	1,926	2,138	1,854	1,973	2,096	379	437	509	539	567	602
Federal, military	127	130	138	141	147	153	80	88	92	94	102	101
State and local	4,345	4,837	4,982	5,384	6,075	6,723	3,160	3,660	3,903	4,107	4,527	4,912
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	36,532	35,472	38,481	42,255	50,838	64,259	18,581	19,778	23,175	26,963	30,875	35,854
Less: Personal contributions for social insurance by place of work	1,399	1,537	1,624	1,709	2,009	2,311	1,012	1,109	1,215	1,326	1,443	1,661
Net labor and proprietors' income by place of work	35,133	33,935	36,857	40,546	48,829	61,948	17,569	18,669	21,960	25,637	29,432	34,193
Plus: Residence adjustment	8,932	9,121	10,134	11,733	12,872	14,460	3,158	3,323	3,646	4,216	4,879	5,556
Net labor and proprietors' income by place of residence	44,065	43,056	46,991	52,279	61,701	76,408	20,727	21,992	25,606	29,853	34,311	39,749
Plus: Dividends, interest, and rent[7]	8,050	9,149	9,557	11,003	12,390	14,462	5,660	6,550	6,949	8,102	9,129	10,664
Plus: Transfer payments	8,587	10,618	11,704	12,364	13,375	15,162	9,513	11,496	12,717	14,051	15,558	17,426
Personal income by place of residence	60,802	62,823	68,252	75,646	87,466	106,032	35,900	40,038	45,272	52,006	58,998	67,839
Per capita personal income (dollars)	4,347	4,475	4,752	5,108	5,942	7,227	3,427	3,708	4,109	4,616	5,187	5,959

See footnotes at end of tables.

Table 5.—Personal Income for States and Counties of the Great Lakes Region, 1974–79—Continued

(Thousands of dollars)

	Calumet, Wisconsin						Chippewa, Wisconsin					
	1974[1]	1975[2]	1976[3]	1977[3]	1978[3]	1979[3]	1974[1]	1975[2]	1976[3]	1977[3]	1978[3]	1979[3]
Labor and proprietors' income by place of work[4]												
By type												
Wage and salary disbursements	81,509	73,339	81,489	95,181	110,247	121,679	95,275	108,982	122,581	134,270	151,822	168,871
Other labor income	8,309	8,161	9,729	12,077	14,455	17,453	5,814	7,636	9,246	10,779	12,296	13,933
Proprietors' income[5]	16,730	19,425	18,598	22,539	25,835	34,183	28,429	28,740	31,221	33,356	36,626	46,218
Farm	10,985	12,676	10,952	15,555	19,078	25,113	14,407	13,063	14,007	16,538	18,910	26,333
Nonfarm[6]	5,745	6,749	7,646	6,984	6,757	9,070	14,022	15,677	17,214	16,818	17,716	19,885
By industry												
Farm	12,477	14,277	12,457	17,301	20,230	28,513	16,825	15,657	16,427	19,184	21,883	30,241
Nonfarm	94,071	86,648	97,359	112,496	132,073	155,785	112,693	129,701	146,621	159,221	178,861	198,781
Private	86,813	78,120	88,136	102,546	121,010	144,603	78,574	91,355	104,942	114,153	128,363	143,973
Agricultural services, forestry, fisheries, and other[7]	273	(D)	(D)	(D)	(D)	520	(D)	(D)	(D)	(D)	(D)	(D)
Mining	89	(D)	(D)	(D)	(D)	521	0	(L)	124	(D)	(D)	(D)
Construction	3,158	3,461	3,999	4,787	5,430	6,389	5,869	6,418	8,029	9,183	10,892	12,206
Manufacturing	64,899	53,849	59,679	69,860	83,320	100,733	29,699	35,015	40,497	45,909	52,418	57,108
Nondurable goods	5,674	5,421	4,892	5,385	6,702	8,871	17,395	21,272	24,304	27,148	30,046	29,680
Durable goods	59,225	48,428	54,787	63,975	76,618	91,136	12,304	13,743	16,193	18,761	22,372	27,428
Transportation and public utilities	1,754	1,794	2,212	2,662	3,235	3,711	5,866	6,034	5,877	5,779	6,181	7,192
Wholesale trade	1,890	3,732	4,573	5,856	7,247	9,069	3,207	7,025	8,163	7,538	8,697	11,094
Retail trade	7,247	7,005	8,017	9,229	10,432	11,757	16,085	16,118	18,065	19,159	20,893	23,681
Finance, insurance, and real estate	1,113	1,234	1,580	1,526	1,819	2,155	(D)	(D)	(D)	(D)	(D)	(D)
Services	6,390	6,454	7,466	7,896	9,015	10,715	14,790	17,372	20,020	21,709	24,104	25,911
Government and government enterprises[8]	7,258	8,528	9,223	9,950	11,063	12,182	34,119	38,346	41,679	45,068	50,498	54,808
Federal, civilian	1,062	1,234	1,330	1,375	1,372	1,467	2,183	2,486	2,871	2,826	3,186	3,385
Federal, military	222	235	237	239	253	253	423	445	459	462	491	503
State and local	5,974	7,059	7,656	8,336	9,437	10,462	31,513	35,415	38,349	41,780	46,821	50,920
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	106,548	100,925	109,816	129,797	152,292	185,321	129,518	145,358	163,048	178,405	200,744	229,022
Less: Personal contributions for social insurance by place of work	5,374	4,956	5,231	5,961	7,089	8,288	6,320	7,240	7,810	8,099	9,153	10,578
Net labor and proprietors' income by place of work	101,174	95,969	104,585	123,836	145,203	177,016	123,198	138,118	155,238	170,306	191,591	218,444
Plus: Residence adjustment	10,866	16,185	18,903	19,170	19,517	20,862	21,632	18,690	16,154	19,327	20,638	21,309
Net labor and proprietors' income by place of residence	112,040	112,154	123,488	143,006	164,720	197,878	144,830	156,808	171,392	189,633	212,229	239,753
Plus: Dividends, interest, and rent[9]	22,198	23,329	23,751	26,525	29,728	34,501	27,055	29,154	30,108	34,136	38,275	44,457
Plus: Transfer payments	11,079	15,910	15,869	16,556	18,347	21,193	32,247	40,089	44,053	46,212	50,823	58,098
Personal income by place of residence	**145,317**	**151,393**	**163,108**	**186,087**	**212,795**	**253,572**	**204,132**	**226,051**	**245,553**	**269,981**	**301,327**	**342,308**
Per capita personal income (dollars)	**5,095**	**5,240**	**5,741**	**6,453**	**7,272**	**8,623**	**4,196**	**4,560**	**4,963**	**5,414**	**6,027**	**6,815**

	Clark, Wisconsin						Columbia, Wisconsin					
	1974[1]	1975[2]	1976[3]	1977[3]	1978[3]	1979[3]	1974[1]	1975[2]	1976[3]	1977[3]	1978[3]	1979[3]
Labor and proprietors' income by place of work[4]												
By type												
Wage and salary disbursements	54,865	52,141	58,364	61,800	68,785	77,732	93,495	97,386	107,639	115,217	125,262	141,153
Other labor income	4,366	4,497	5,360	5,872	6,548	7,553	6,827	7,752	9,309	10,885	12,099	14,073
Proprietors' income[5]	24,527	25,233	27,997	31,107	37,553	50,539	27,523	31,934	24,326	34,187	34,881	43,913
Farm	14,910	15,296	17,192	20,083	26,212	37,629	14,400	17,230	8,666	17,313	17,216	24,127
Nonfarm[6]	9,617	9,937	10,805	11,024	11,341	12,910	13,123	14,704	15,660	16,874	17,665	19,786
By industry												
Farm	17,135	17,685	19,436	22,535	28,958	41,220	18,490	21,605	12,737	21,781	22,251	30,730
Nonfarm	66,623	64,186	72,285	76,244	83,928	94,704	109,355	115,467	128,537	138,508	149,991	168,409
Private	55,711	51,546	58,668	61,386	67,060	75,953	92,753	96,831	108,883	117,627	126,660	143,023
Agricultural services, forestry, fisheries, and other[7]	368	(D)	(D)	1,057	(D)	942	(D)	(D)	(D)	(D)	(D)	(D)
Mining	579	(D)	(D)	718	(D)	938	(D)	(D)	(D)	(D)	(D)	(D)
Construction	2,621	2,565	3,263	3,913	4,492	(D)	6,310	6,624	8,722	11,266	10,818	11,241
Manufacturing	15,249	14,035	15,887	15,199	17,044	20,537	29,494	28,670	32,408	34,733	36,253	40,894
Nondurable goods	7,702	7,583	7,814	7,090	7,174	8,518	16,439	17,641	18,779	19,765	20,085	22,113
Durable goods	7,547	6,452	8,073	8,109	9,870	12,019	13,055	11,029	13,629	14,968	16,168	18,781
Transportation and public utilities	3,778	3,740	4,342	4,676	4,943	5,115	10,279	10,586	11,786	13,275	15,806	18,881
Wholesale trade	3,305	5,948	6,528	7,764	(D)	(D)	7,053	9,413	11,018	9,776	11,016	12,117
Retail trade	11,884	9,239	10,052	10,788	11,673	13,332	20,124	19,546	20,554	21,272	23,255	26,686
Finance, insurance, and real estate	10,859	6,235	7,355	7,056	7,657	8,245	2,332	2,706	3,389	4,458	4,851	5,558
Services	7,068	8,511	9,621	10,215	11,025	(D)	15,483	17,849	19,627	21,563	23,608	26,357
Government and government enterprises[8]	10,912	12,640	13,617	14,858	16,868	18,751	16,592	18,636	19,654	20,881	23,331	25,386
Federal, civilian	1,377	1,517	1,659	1,692	1,818	1,932	2,164	2,361	2,646	2,804	3,247	3,450
Federal, military	244	262	265	268	285	286	417	424	437	439	454	485
State and local	9,291	10,861	11,693	12,898	14,765	16,533	14,011	15,851	16,571	17,638	19,620	21,451
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	83,758	81,871	91,721	98,779	112,886	135,924	127,845	137,072	141,274	160,289	172,242	199,139
Less: Personal contributions for social insurance by place of work	4,011	3,801	4,114	4,206	4,669	5,396	6,590	6,877	7,498	7,759	8,480	9,837
Net labor and proprietors' income by place of work	79,747	78,070	87,607	94,573	108,217	130,528	121,255	130,195	133,776	152,530	163,762	189,302
Plus: Residence adjustment[10]	4,960	8,237	11,134	16,105	18,851	20,172	23,480	25,199	28,003	32,611	38,460	42,242
Net labor and proprietors' income by place of residence	84,707	86,307	98,741	110,678	127,068	150,700	144,735	155,394	161,779	185,141	202,222	231,544
Plus: Dividends, interest, and rent[9]	17,714	19,670	20,822	24,164	27,213	31,748	30,134	33,802	34,666	39,164	43,970	51,156
Plus: Transfer payments	19,499	23,675	25,443	27,559	30,265	34,423	29,462	36,309	39,349	42,299	47,056	53,411
Personal income by place of residence	**121,420**	**129,602**	**145,006**	**162,401**	**184,546**	**216,871**	**204,331**	**225,505**	**235,794**	**266,604**	**293,248**	**336,111**
Per capita personal income (dollars)	3,863	4,021	4,554	5,035	5,703	6,704	4,832	5,310	5,633	6,331	6,957	7,965

Table 5.—Personal Income for States and Counties of the Great Lakes Region, 1974–79—Continued

(Thousands of dollars)

	Crawford, Wisconsin						Dane, Wisconsin					
	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]
Labor and proprietors' income by place of work[3]												
By type												
Wage and salary disbursements	25,327	27,060	30,583	33,817	38,218	42,659	1,253,963	1,344,608	1,497,410	1,674,609	1,886,693	2,069,967
Other labor income	1,806	2,114	2,676	3,174	3,604	4,123	72,861	87,642	105,688	127,019	145,837	166,051
Proprietors' income[4]	13,785	14,941	11,893	13,997	15,568	19,281	109,464	123,561	114,238	137,755	139,189	169,969
Farm	9,009	9,806	6,561	8,967	10,385	13,384	29,189	35,350	15,339	30,937	26,127	46,089
Nonfarm	4,776	5,135	5,332	5,030	5,183	5,897	80,275	88,211	98,899	106,818	113,062	123,880
By industry												
Farm	10,486	11,393	8,044	10,587	12,200	15,773	37,581	44,298	23,561	40,085	36,431	59,632
Nonfarm	30,432	32,722	37,108	40,401	45,190	50,290	1,398,707	1,511,513	1,693,575	1,899,298	2,135,288	2,346,355
Private	25,234	27,026	31,116	33,672	37,410	41,513	933,201	1,005,450	1,134,647	1,293,744	1,467,293	1,630,095
Agricultural services, forestry, fisheries, and other[5]	(D)	(D)	(D)	(D)	(D)	(D)	8,369	7,770	8,718	7,911	8,623	9,493
Mining	(D)	(D)	(D)	(D)	(D)	(D)	3,018	2,954	2,984	3,172	3,744	4,107
Construction	1,754	1,547	1,763	1,680	1,817	2,003	104,342	100,929	116,553	137,625	158,922	169,571
Manufacturing	8,700	9,178	11,431	12,522	14,028	15,440	214,544	228,002	264,656	298,720	333,285	358,857
Nondurable goods	1,136	1,368	1,478	1,477	1,551	(D)	128,452	142,327	161,580	179,420	192,185	195,854
Durable goods	7,564	7,810	9,953	11,045	12,477	(D)	86,092	85,675	103,076	119,300	141,100	163,003
Transportation and public utilities	1,631	1,610	1,976	2,234	2,441	2,861	70,615	76,074	86,772	98,952	114,058	128,039
Wholesale trade	1,318	1,505	1,475	1,494	1,596	1,879	80,193	96,771	97,993	100,904	111,540	125,181
Retail trade	5,517	7,270	7,492	7,514	8,314	9,147	151,109	157,433	175,105	195,407	219,160	243,002
Finance, insurance, and real estate	1,113	927	1,134	1,583	1,985	2,077	88,062	100,755	120,903	144,014	164,996	187,578
Services	3,802	4,545	5,330	5,995	6,473	7,168	212,949	234,762	259,963	307,039	352,965	404,167
Government and government enterprises[6]	5,198	5,696	5,992	6,729	7,780	8,777	465,506	506,063	559,028	605,554	667,995	716,260
Federal, civilian	851	901	1,067	1,118	1,197	1,272	40,504	45,441	53,061	58,651	61,758	65,625
Federal, military	144	152	158	161	169	174	3,224	3,337	3,494	3,735	3,926	4,376
State and local	4,203	4,643	4,767	5,450	6,414	7,331	421,778	457,285	502,473	543,168	602,311	646,259
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	40,918	44,115	45,152	50,988	57,390	66,063	1,436,288	1,555,811	1,717,336	1,939,383	2,171,719	2,405,987
Less: Personal contributions for social insurance by place of work	1,853	1,985	2,228	2,322	2,603	3,015	72,508	77,850	83,541	88,305	100,190	116,018
Net labor and proprietors' income by place of work	39,065	42,130	42,924	48,666	54,787	63,048	1,363,780	1,477,961	1,633,795	1,851,078	2,071,529	2,289,969
Plus: Residence adjustment	400	532	661	804	970	1,231	−73,532	−78,246	−82,551	−95,066	−104,843	−103,338
Net labor and proprietors' income by place of residence	39,465	42,662	43,585	49,470	55,757	64,279	1,290,248	1,399,715	1,551,244	1,756,012	1,966,686	2,186,631
Plus: Dividends, interest, and rent[7]	7,639	8,761	9,371	10,992	12,363	14,422	233,495	256,243	268,572	306,444	344,029	397,517
Plus: Transfer payments	10,268	12,515	13,181	14,339	16,079	18,343	163,052	201,432	218,359	235,924	263,242	304,966
Personal income by place of residence	57,372	63,938	66,137	74,801	84,199	97,044	1,686,795	1,857,390	2,038,175	2,298,380	2,573,957	2,889,114
Per capita personal income (dollars)	3,688	3,966	4,107	4,547	5,137	5,974	5,536	6,133	6,591	7,346	8,067	8,889

	Dodge, Wisconsin						Door, Wisconsin					
	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]
Labor and proprietors' income by place of work[3]												
By type												
Wage and salary disbursements	174,697	201,939	218,437	236,764	274,294	321,659	50,755	58,749	69,145	79,609	97,786	110,419
Other labor income	13,889	17,957	20,528	23,578	27,606	33,462	4,475	5,804	7,501	9,187	11,349	13,274
Proprietors' income[4]	36,892	40,915	34,586	48,357	49,111	68,784	13,285	13,562	12,851	17,555	21,159	23,659
Farm	21,717	24,415	16,873	29,866	29,739	47,032	6,517	5,634	4,168	7,802	10,933	12,256
Nonfarm	15,175	16,500	17,713	18,491	19,372	21,752	6,768	7,928	8,683	9,753	10,226	11,403
By industry												
Farm	26,563	29,605	21,711	35,168	35,704	54,855	7,835	7,045	5,484	9,244	12,557	14,383
Nonfarm	198,915	231,206	251,840	273,531	315,307	369,050	60,680	71,070	84,013	97,107	118,237	132,959
Private	170,091	198,732	216,827	234,894	271,168	320,302	52,605	62,057	74,237	86,082	105,277	118,287
Agricultural services, forestry, fisheries, and other[5]	(D)	(D)	(D)	(D)	(D)	(D)	237	270	409	844	924	1,005
Mining	(D)	(D)	(D)	(D)	(D)	(D)	491	472	659	576	645	651
Construction	8,834	18,690	19,747	22,802	26,372	30,475	4,247	4,241	4,584	5,488	6,476	7,615
Manufacturing	101,811	106,939	115,306	123,180	143,714	175,124	23,903	29,574	37,881	44,325	58,217	64,536
Nondurable goods	28,951	31,865	36,098	38,905	42,885	47,978	3,498	3,145	3,255	3,412	3,497	3,600
Durable goods	72,860	75,074	79,208	84,275	100,829	127,146	20,405	26,429	34,626	40,913	54,720	60,936
Transportation and public utilities	7,666	10,232	11,359	12,981	14,885	15,838	2,341	2,280	2,325	2,812	3,435	3,915
Wholesale trade	5,443	12,555	13,051	13,726	15,096	17,511	1,582	2,570	2,713	2,989	3,311	3,534
Retail trade	21,612	20,361	22,621	25,485	28,759	32,676	10,137	10,947	12,176	13,588	15,004	16,829
Finance, insurance, and real estate	(D)	5,777	7,022	7,681	8,646	9,679	1,607	1,737	1,988	2,365	2,580	2,960
Services	18,432	21,895	25,162	26,192	30,712	34,831	8,060	9,966	11,502	13,095	14,685	17,232
Government and government enterprises[6]	28,824	32,474	35,013	38,637	44,139	48,748	8,075	9,013	9,776	11,025	12,960	14,672
Federal, civilian	1,970	2,203	2,187	2,538	2,949	3,133	1,160	1,202	1,389	1,572	1,977	2,101
Federal, military	616	646	662	670	708	723	943	882	973	991	1,044	1,223
State and local	26,238	29,625	31,864	35,429	40,482	44,892	5,972	6,929	7,414	8,462	9,939	11,358
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	225,478	260,811	273,551	308,699	351,011	423,905	68,515	78,115	89,497	106,351	130,794	147,352
Less: Personal contributions for social insurance by place of work	11,375	13,102	13,709	14,332	16,649	19,413	3,649	4,214	4,732	5,233	6,398	7,457
Net labor and proprietors' income by place of work	214,103	247,709	259,842	294,367	334,362	404,492	64,866	73,901	84,765	101,118	124,396	139,895
Less: Residence adjustment	39,041	35,401	41,378	47,193	53,057	47,887	4,554	2,710	399	−1,067	−2,689	−1,944
Net labor and proprietors' income by place of residence	253,144	283,110	301,220	341,560	387,429	452,379	69,420	76,611	85,664	100,051	121,707	137,951
Plus: Dividends, interest, and rent[7]	50,824	54,927	55,957	62,749	70,317	81,658	20,785	22,804	24,013	27,612	31,029	36,036
Plus: Transfer payments	32,706	41,797	45,587	48,238	53,043	60,578	14,840	17,885	20,103	22,197	24,375	27,391
Personal income by place of residence	336,674	379,834	402,764	452,547	510,789	594,615	105,045	117,300	129,780	149,860	177,111	201,378
Per capita personal income (dollars)	4,692	5,214	5,564	6,178	6,911	8,029	4,727	5,202	5,617	6,209	7,184	8,074

See footnotes at end of tables.

Table 5.—Personal Income for States and Counties of the Great Lakes Region, 1974–79—Continued

(Thousands of dollars)

	Douglas, Wisconsin						Dunn, Wisconsin					
	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]
Labor and proprietors' income by place of work[3]												
By type												
Wage and salary disbursements	120,597	134,452	147,520	158,026	178,806	209,731	46,218	53,265	60,011	67,909	78,911	92,474
Other labor income	8,591	10,356	11,584	13,530	15,288	18,125	2,580	3,414	4,202	4,991	5,828	7,123
Proprietors' income[4]	10,079	10,522	11,618	12,692	14,500	16,388	24,125	23,330	22,997	28,615	31,760	44,261
Farm	1,194	1,179	1,134	869	2,204	2,917	15,929	14,616	13,426	18,713	21,580	32,612
Nonfarm[5]	8,885	9,343	10,484	11,823	12,296	13,471	8,196	8,714	9,571	9,902	10,180	11,649
By industry												
Farm	1,418	1,417	1,357	1,113	2,478	3,274	18,345	17,203	15,828	21,344	24,541	36,518
Nonfarm	137,849	153,913	169,365	183,135	206,116	240,970	54,578	62,806	71,382	80,171	91,958	107,340
Private	108,339	120,701	133,496	145,441	164,819	196,826	35,600	42,820	49,777	55,483	63,118	74,930
Agricultural services, forestry, fisheries, and other[6]	(D)	(D)	(D)	176	169	184	433	492	485	523	594	678
Mining	82	(D)	(D)	(L)	(L)	(L)	(L)	(L)	(L)	0	0	0
Construction	(D)	8,781	11,997	(D)	12,067	14,111	2,349	2,515	3,563	4,425	4,759	5,233
Manufacturing	20,931	27,647	24,930	25,563	27,578	34,917	9,301	11,178	13,223	15,321	18,384	21,803
Nondurable goods	8,471	10,765	9,443	9,126	9,086	10,489	7,390	8,144	8,928	9,688	11,088	12,614
Durable goods	12,460	16,882	15,487	16,437	18,492	24,428	1,911	3,034	4,295	5,633	7,296	9,189
Transportation and public utilities	31,360	35,208	41,866	48,701	57,340	69,862	2,745	2,475	3,041	3,236	3,693	4,496
Wholesale trade	10,866	9,215	10,248	11,939	(D)	20,291	2,965	5,636	6,399	6,234	7,820	9,891
Retail trade	16,228	17,885	19,272	20,890	22,306	25,907	10,289	10,190	11,292	12,753	14,100	15,983
Finance, insurance, and real estate	(D)	(D)	(D)	(D)	(D)	5,405	1,704	2,020	2,413	2,800	3,005	3,464
Services	16,622	18,327	20,923	21,507	(D)	26,139	6,801	8,297	9,351	10,191	10,763	13,382
Government and government enterprises[7]	29,510	33,212	35,869	37,694	41,297	44,144	17,978	19,986	21,605	24,688	28,840	32,410
Federal, civilian	1,698	1,817	2,140	2,200	2,503	2,659	1,191	1,194	1,374	1,431	1,626	1,728
Federal, military	640	632	675	673	711	780	238	257	266	269	289	288
State and local	27,172	30,763	33,054	34,821	38,083	40,705	16,549	18,535	19,965	22,988	26,925	30,394
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	139,267	155,330	170,722	184,248	208,594	244,244	72,923	80,009	87,210	101,515	116,499	143,858
Less: Personal contributions for social insurance by place of work	7,367	8,183	10,065	10,616	11,883	13,921	3,107	3,514	3,853	4,046	4,621	5,328
Net labor and proprietors' income by place of work	131,900	147,147	160,657	173,632	196,711	230,323	69,816	76,495	83,357	97,469	111,878	138,530
Plus: Residence adjustment	8,940	9,069	11,734	9,772	13,845	13,177	12,230	12,441	13,038	14,868	16,621	17,953
Net labor and proprietors' income by place of residence	140,840	156,216	172,391	183,404	210,556	243,500	82,046	88,936	96,395	112,337	128,499	156,483
Plus: Dividends, interest, and rent[8]	20,968	23,729	23,594	25,836	29,248	33,943	15,049	16,881	17,464	19,964	22,448	26,185
Plus: Transfer payments	32,334	38,811	43,151	46,389	50,972	57,604	17,392	21,388	23,699	25,411	27,931	31,844
Personal income by place of residence	**194,142**	**218,756**	**239,136**	**255,629**	**290,776**	**335,047**	**114,487**	**127,205**	**137,558**	**157,712**	**178,878**	**214,512**
Per capita personal income (dollars)	**4,353**	**4,866**	**5,284**	**5,707**	**6,595**	**7,686**	**3,724**	**4,029**	**4,308**	**4,872**	**5,370**	**6,238**

	Eau Claire, Wisconsin						Florence, Wisconsin					
	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]
Labor and proprietors' income by place of work[3]												
By type												
Wage and salary disbursements	265,838	272,231	285,467	322,113	358,597	388,102	3,258	3,698	3,881	4,646	5,314	5,859
Other labor income	17,833	22,781	24,804	30,878	34,921	38,863	196	256	295	361	416	453
Proprietors' income[4]	22,841	23,193	24,337	30,178	32,943	38,444	1,461	1,701	1,603	2,046	2,356	2,772
Farm	5,922	5,551	4,149	6,460	8,108	11,246	525	717	577	873	1,129	1,400
Nonfarm[5]	16,919	17,642	20,188	23,718	24,835	27,198	936	984	1,026	1,173	1,227	1,372
By industry												
Farm	7,362	7,096	5,589	8,037	9,881	13,573	605	803	655	959	1,226	1,531
Nonfarm	299,150	311,109	329,019	375,132	416,580	451,836	4,310	4,852	5,124	6,094	6,860	7,553
Private	254,922	261,366	275,261	318,074	354,128	385,162	2,815	3,107	3,360	4,058	4,436	4,802
Agricultural services, forestry, fisheries, and other[6]	(D)	(D)	(D)	(D)	(D)	(D)	(L)	(L)	61	(D)	(D)	93
Mining	(D)	(D)	(D)	(D)	(D)	(D)	0	0	0	0	0	0
Construction	21,358	20,889	21,634	24,177	26,996	29,874	246	258	250	(D)	188	216
Manufacturing	90,856	86,197	81,696	102,543	105,716	105,174	748	764	792	875	1,029	1,089
Nondurable goods	57,011	64,624	64,062	81,251	82,023	79,792	181	210	196	168	176	141
Durable goods	33,845	21,573	17,634	21,292	23,693	25,382	567	554	596	707	853	948
Transportation and public utilities	26,967	27,114	29,297	32,994	37,876	41,527	(L)	0	(L)	(L)	(L)	(L)
Wholesale trade	19,616	18,782	19,412	21,119	22,065	26,531	158	94	114	576	(D)	823
Retail trade	38,028	41,387	47,783	52,007	63,745	72,616	687	974	1,053	1,090	1,155	1,279
Finance, insurance, and real estate	(D)	(D)	(D)	(D)	(D)	(D)	241	220	245	324	343	337
Services	45,314	52,555	60,252	68,235	77,602	87,791	696	755	816	919	925	932
Government and government enterprises[7]	44,228	49,743	53,758	57,058	62,452	66,674	1,495	1,745	1,764	2,036	2,424	2,751
Federal, civilian	4,345	4,686	5,302	5,942	6,518	6,925	175	271	233	276	342	363
Federal, military	632	660	687	693	737	755	(L)	(L)	(L)	(L)	(L)	(L)
State and local	39,251	44,397	47,769	50,423	55,197	58,994	1,294	1,445	1,501	1,727	2,044	2,350
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	306,512	318,205	334,608	383,169	426,461	465,409	4,915	5,655	5,779	7,053	8,086	9,084
Less: Personal contributions for social insurance by place of work	16,974	17,160	17,707	19,396	21,853	25,470	276	310	315	336	374	427
Net labor and proprietors' income by place of work	289,538	301,045	316,901	363,773	404,608	439,939	4,639	5,345	5,464	6,717	7,712	8,657
Plus: Residence adjustment	−38,735	−36,155	−33,461	−39,440	−42,601	−44,095	4,160	4,157	4,799	5,397	6,303	7,415
Net labor and proprietors' income by place of residence	250,803	264,890	283,440	324,333	362,007	395,844	8,799	9,502	10,263	12,114	14,015	16,072
Plus: Dividends, interest, and rent[8]	43,110	47,784	49,967	57,102	63,819	73,827	1,590	1,719	1,921	2,208	2,459	2,860
Plus: Transfer payments	46,396	58,048	64,725	68,667	76,097	87,608	2,466	2,831	3,190	3,509	3,914	4,517
Personal income by place of residence	340,309	370,722	398,132	450,102	501,923	557,279	12,855	14,052	15,374	17,831	20,388	23,449
Per capita personal income (dollars)	4,759	5,114	5,455	6,104	6,640	7,250	3,675	3,981	4,227	4,463	5,237	5,985

Table 5.—Personal Income for States and Counties of the Great Lakes Region, 1974–79—Continued

[Thousands of dollars]

	Fond du Lac, Wisconsin						Forest, Wisconsin					
	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]
Labor and proprietors' income by place of work[3]												
By type												
Wage and salary disbursements	265,152	275,311	306,973	336,825	377,540	425,255	11,174	11,679	13,699	15,441	16,029	18,892
Other labor income	20,101	23,285	27,730	32,726	37,162	42,572	734	844	1,075	1,271	1,328	1,592
Proprietors' income[4]	45,497	51,533	44,592	58,709	61,866	81,027	2,000	2,332	2,455	2,954	3,610	4,003
Farm	22,010	25,244	17,346	31,258	33,041	48,731	425	589	505	783	1,246	1,379
Nonfarm[5]	23,487	26,289	27,246	27,451	28,825	32,296	1,575	1,743	1,950	2,171	2,364	2,624
By industry												
Farm	25,219	28,681	20,546	34,763	36,979	53,914	555	729	641	934	1,414	1,589
Nonfarm	305,531	321,448	358,749	393,497	439,589	494,940	13,353	14,126	16,588	18,732	19,533	22,898
Private	268,056	278,456	312,401	344,320	385,182	436,117	9,269	9,473	11,723	13,441	13,628	16,412
Agricultural services, forestry, fisheries, and other[6]	1,137	632	737	1,071	1,154	1,338	63	84	63	149	152	161
Mining	1,114	1,007	1,048	1,001	1,099	2,129	0	0	0	−100	−76	−76
Construction	18,078	17,608	19,924	24,622	26,867	29,539	315	490	782	1,150	1,182	1,087
Manufacturing	120,769	120,265	140,253	154,673	171,617	194,109	4,582	4,012	5,370	6,071	5,648	6,511
Nondurable goods	26,840	30,198	33,169	36,086	42,899	47,322	69	108	112	73	79	91
Durable goods	93,929	90,067	107,084	118,587	128,718	146,787	4,513	3,904	5,258	5,998	5,569	6,420
Transportation and public utilities	27,994	28,339	29,489	31,557	38,542	46,302	911	963	1,144	1,173	1,159	1,474
Wholesale trade	12,838	16,430	16,920	18,796	19,780	22,541	221	344	342	436	458	520
Retail trade	36,981	38,162	40,367	43,220	47,806	54,093	1,360	1,487	1,640	1,681	1,809	2,273
Finance, insurance, and real estate	8,137	9,578	11,404	12,632	15,017	15,441	410	454	522	592	720	771
Services	41,008	46,435	52,259	56,748	63,300	70,625	1,407	1,639	1,860	2,289	2,576	3,691
Government and government enterprises[4,6]	37,475	42,992	46,348	49,177	54,407	58,823	4,084	4,653	4,865	5,291	5,905	6,486
Federal, civilian	3,057	3,437	3,666	3,738	4,142	4,401	1,304	1,491	1,551	1,660	1,766	1,876
Federal, military	789	817	844	854	903	930	66	67	68	71	78	77
State and local	33,629	38,738	41,838	44,585	49,362	53,492	2,714	3,095	3,246	3,560	4,061	4,533
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	330,750	350,129	379,295	428,260	476,568	548,854	13,908	14,855	17,229	19,666	20,947	24,487
Less: Personal contributions for social insurance by place of work	17,328	18,204	20,172	21,410	24,104	28,154	833	892	1,004	1,066	1,121	1,285
Labor and proprietors' income by place of work	313,422	331,925	359,123	406,850	452,464	520,700	13,075	13,963	16,225	18,600	19,826	23,202
Plus: Residence adjustment	105	2,114	2,091	2,796	4,578	5,620	1,359	1,482	1,708	2,021	2,446	2,773
Net labor and proprietors' income by place of residence	313,527	334,039	361,214	409,646	457,042	526,320	14,434	15,445	17,933	20,621	22,272	25,975
Plus: Dividends, interest, and rent[7]	57,429	63,205	64,664	72,735	81,432	94,467	3,390	3,700	3,878	4,458	5,005	5,818
Plus: Transfer payments	53,479	67,870	72,791	77,233	84,846	96,241	6,827	8,496	9,366	10,041	11,095	12,594
Personal income by place of residence	424,435	465,114	498,669	559,614	623,320	717,028	24,651	27,641	31,177	35,120	38,372	44,387
Per capita personal income (dollars)	4,866	5,306	5,701	6,324	7,006	8,079	2,902	3,387	3,788	4,088	4,379	5,031

	Grant, Wisconsin						Green, Wisconsin					
	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]
Labor and proprietors' income by place of work[3]												
By type												
Wage and salary disbursements	77,297	85,906	97,674	110,643	126,972	143,400	73,423	79,276	88,760	93,679	106,222	119,247
Other labor income	4,909	5,877	7,557	9,528	11,423	13,321	5,244	6,618	7,793	8,606	10,200	11,940
Proprietors' income[4]	44,750	44,300	41,285	51,728	47,467	68,951	26,396	27,897	30,729	33,523	35,542	50,233
Farm	30,316	28,171	24,614	34,612	29,759	48,841	16,590	16,886	18,672	22,454	24,018	37,147
Nonfarm[5]	14,434	16,129	16,671	17,116	17,708	20,110	9,806	11,011	12,057	11,069	11,524	13,086
By industry												
Farm	33,554	31,643	27,857	38,162	33,748	54,068	19,029	19,499	21,089	25,099	26,997	41,092
Nonfarm	93,402	104,440	118,659	133,737	152,114	171,604	86,034	94,292	106,193	110,709	124,967	140,328
Private	64,830	72,434	84,413	96,538	110,289	125,940	74,769	80,709	91,106	95,585	109,169	124,020
Agricultural services, forestry, fisheries, and other[6]	862	950	1,086	1,112	1,402	1,603	775	(D)	(D)	662	(D)	580
Mining	1,398	469	528	339	392	408	(D)	153	114	(D)	(D)	(D)
Construction	5,199	5,469	6,703	8,454	9,794	11,255	3,045	3,921	5,098	6,247	6,714	6,452
Manufacturing	8,800	9,157	13,890	18,501	24,930	30,437	22,732	23,227	25,330	24,150	28,424	33,090
Nondurable goods	2,955	4,007	4,842	4,166	4,699	5,423	9,693	10,732	10,211	10,905	12,607	14,152
Durable goods	5,845	5,150	9,048	14,335	20,231	25,014	13,039	12,495	15,119	13,245	15,817	18,938
Transportation and public utilities	9,722	11,184	12,393	14,241	14,417	14,229	(D)	(D)	(D)	(D)	(D)	(D)
Wholesale trade	4,447	8,575	9,526	9,619	10,348	12,140	5,935	9,075	11,493	12,083	13,269	16,465
Retail trade	19,927	19,976	21,738	23,089	25,339	29,611	20,311	19,516	22,187	24,129	28,447	32,554
Finance, insurance, and real estate	3,164	3,490	4,057	5,052	5,665	6,410	2,433	2,688	3,079	3,416	3,998	4,479
Services	11,311	13,164	14,492	16,131	18,002	19,847	16,522	17,341	18,383	19,391	21,440	23,549
Government and government enterprises[4,6]	28,572	32,006	34,246	37,199	41,825	45,664	11,265	13,583	15,087	15,124	15,798	16,308
Federal, civilian	2,024	2,242	2,459	2,611	2,965	3,151	1,038	1,162	1,294	1,462	1,580	1,680
Federal, military	456	469	496	503	530	547	219	234	239	241	256	256
State and local	26,092	29,295	31,291	34,085	38,330	41,966	10,008	12,187	13,554	13,421	13,962	14,372
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	126,956	136,083	146,516	171,899	185,862	225,672	105,063	113,791	127,282	135,808	151,964	181,420
Less: Personal contributions for social insurance by place of work	5,451	5,987	6,505	6,882	7,855	9,059	5,060	5,390	5,787	6,038	6,941	8,083
Net labor and proprietors' income by place of work	121,505	130,096	140,011	165,017	178,007	216,613	100,003	108,401	121,495	129,770	145,023	173,337
Plus: Residence adjustment	34,068	32,436	35,753	41,531	45,183	48,988	9,304	9,075	10,816	13,130	14,935	16,502
Labor and proprietors' income by place of residence	155,573	162,532	175,764	206,548	223,190	265,601	109,307	117,476	132,311	142,900	159,958	189,839
Plus: Dividends, interest, and rent[7]	32,515	36,742	38,263	43,836	49,300	57,513	28,812	31,908	33,165	37,977	42,606	49,629
Plus: Transfer payments	28,583	34,620	38,117	41,234	45,129	51,626	15,844	19,332	20,926	22,427	24,667	29,488
Personal income by place of residence	216,671	233,894	252,144	291,618	317,619	374,740	153,963	168,716	186,402	203,204	227,231	267,956
Per capita personal income (dollars)	4,391	4,720	4,973	5,685	6,240	7,413	5,423	5,862	6,491	7,010	7,767	9,011

Footnotes at end of tables.

Table 5.—Personal Income for States and Counties of the Great Lakes Region, 1974–79—Continued

[Thousands of dollars]

	Green Lake, Wisconsin						Iowa, Wisconsin					
	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]
Labor and proprietors' income by place of work[3]												
By type												
Wage and salary disbursements	43,125	43,518	47,199	55,010	63,644	72,420	26,135	28,954	31,348	35,347	41,543	49,323
Other labor income	4,372	4,645	5,393	6,553	8,021	9,282	1,810	2,233	2,620	3,172	3,778	4,620
Proprietors' income[4]	13,352	14,773	12,977	16,135	16,859	20,796	20,179	21,717	18,454	21,016	20,908	27,470
Farm	7,754	8,843	6,985	10,129	10,525	13,666	14,619	15,721	11,618	14,264	13,811	19,435
Nonfarm[5]	5,598	5,930	5,992	6,006	6,334	7,130	5,560	5,996	6,836	6,752	7,097	8,035
By industry												
Farm	8,529	9,676	7,771	10,986	11,487	14,916	17,108	18,387	14,104	16,986	16,872	23,455
Nonfarm	52,320	53,260	57,798	66,712	77,037	87,582	31,016	34,517	38,318	42,549	49,357	57,958
Private	46,994	47,204	51,320	59,743	69,122	78,834	23,573	26,147	29,489	33,498	39,632	47,707
Agricultural services, forestry, fisheries, and other[6]	189	171	141	215	239	(D)	559	547	514	575	669	801
Mining	589	688	735	803	685	(D)	488	431	468	488	522	587
Construction	4,069	4,700	5,655	7,493	7,975	9,440	2,312	2,270	2,807	3,376	4,977	6,865
Manufacturing	24,884	23,194	25,760	30,152	35,935	40,355	2,031	2,066	2,916	3,601	4,858	6,383
Nondurable goods	9,205	8,707	9,182	11,109	13,002	13,964	1,313	1,439	1,546	1,718	2,275	2,709
Durable goods	15,679	14,487	16,578	19,043	22,933	26,391	718	627	1,370	1,883	2,583	3,674
Transportation and public utilities	2,846	2,999	3,044	3,493	4,465	4,955	4,356	4,935	5,199	5,956	6,916	7,760
Wholesale trade	741	1,619	1,623	1,740	2,122	2,541	1,400	3,034	3,285	4,005	4,738	5,675
Retail trade	7,311	7,120	7,442	8,411	9,341	10,686	6,822	6,087	6,541	6,594	7,068	8,353
Finance, insurance, and real estate	1,408	1,528	1,748	1,923	2,127	2,324	1,403	1,538	1,863	2,122	2,309	2,549
Services	4,957	5,185	5,172	5,513	6,233	7,474	4,202	5,239	5,896	6,781	7,575	8,734
Government and government enterprises[7]	5,326	6,056	6,478	6,969	7,915	8,748	7,443	8,370	8,829	9,051	9,725	10,251
Federal, civilian	612	678	806	787	904	960	920	960	1,045	1,157	1,310	1,393
Federal, military	151	157	163	163	171	178	149	157	161	163	169	169
State and local	4,563	5,221	5,509	6,019	6,840	7,610	6,374	7,253	7,623	7,731	8,246	8,689
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	60,849	62,936	65,569	77,698	88,524	102,498	48,124	52,904	52,422	59,535	66,229	81,413
Less: Personal contributions for social insurance by place of work	3,112	3,178	3,314	3,691	4,280	4,981	1,861	2,038	2,163	2,345	2,767	3,198
Net labor and proprietors' income by place of work	57,737	59,758	62,255	74,007	84,244	97,517	46,263	50,866	50,259	57,190	63,462	78,215
Plus: Residence adjustment	3,029	3,622	4,453	4,259	4,136	4,658	10,616	9,888	9,771	10,597	11,660	12,239
Net labor and proprietors' income by place of residence	60,766	63,380	66,708	78,266	88,380	102,175	56,879	60,754	60,030	67,787	75,122	90,454
Plus: Dividends, interest, and rent[8]	15,280	17,198	17,981	20,582	23,094	26,815	12,822	14,162	14,611	16,650	18,724	21,846
Plus: Transfer payments	11,961	14,919	16,189	17,503	19,623	22,426	10,358	12,551	13,509	14,221	15,570	17,853
Personal income by place of residence	**88,007**	**95,497**	**100,878**	**116,351**	**131,097**	**151,416**	**80,059**	**87,467**	**88,150**	**98,658**	**109,416**	**130,153**
Per capita personal income (dollars)	**5,112**	**5,501**	**5,799**	**6,650**	**7,440**	**8,435**	**4,167**	**4,509**	**4,542**	**5,034**	**5,667**	**6,845**

	Iron, Wisconsin						Jackson, Wisconsin					
	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]
Labor and proprietors' income by place of work[3]												
By type												
Wage and salary disbursements	8,692	9,263	10,238	12,489	13,850	15,412	31,473	33,562	37,274	42,725	46,927	54,982
Other labor income	670	736	854	1,108	1,253	1,391	2,253	2,853	3,452	4,409	5,001	5,754
Proprietors' income[4]	1,490	2,012	1,953	2,310	2,615	3,061	10,928	9,957	8,516	10,404	12,723	15,048
Farm	−53	63	−40	79	276	367	6,693	5,731	3,717	4,758	6,976	8,622
Nonfarm[5]	1,543	1,949	1,993	2,231	2,339	2,694	4,235	4,226	4,799	5,646	5,747	6,426
By industry												
Farm	103	231	126	260	478	614	8,397	7,558	5,444	6,648	9,099	11,365
Nonfarm	10,749	11,780	12,919	15,647	17,240	19,250	36,257	38,814	43,798	50,890	55,552	64,419
Private	8,349	9,182	10,243	12,717	13,812	15,370	30,067	31,976	36,595	43,110	46,780	54,761
Agricultural services, forestry, fisheries, and other[6]	0	(L)	(L)	(L)	(L)	(L)	493	404	511	806	1,077	1,118
Mining	−116	(L)	(L)	(L)	(L)	(L)	(D)	(D)	(D)	(D)	(D)	(D)
Construction	490	777	629	921	(D)	(D)	6,388	6,829	8,111	8,976	8,556	11,169
Manufacturing	3,670	3,677	4,554	5,914	6,205	6,201	5,685	5,433	5,991	6,528	7,222	8,200
Nondurable goods	136	155	187	211	(D)	(D)	2,874	2,925	3,181	3,173	3,159	3,298
Durable goods	3,534	3,522	4,367	5,703	(D)	(D)	2,811	2,508	2,810	3,355	4,063	4,902
Transportation and public utilities	489	480	484	539	(D)	(D)	1,622	1,636	1,760	3,284	3,560	3,783
Wholesale trade	277	329	366	367	419	530	736	1,356	1,428	1,520	1,672	2,007
Retail trade	2,133	2,251	2,234	2,506	2,850	3,490	6,337	6,476	7,085	8,523	10,052	12,155
Finance, insurance, and real estate	270	285	386	545	539	593	994	1,172	1,361	1,385	1,540	1,576
Services	1,136	1,385	1,619	1,923	1,992	2,326	(D)	(D)	(D)	(D)	(D)	(D)
Government and government enterprises[7]	2,400	2,598	2,676	2,930	3,428	3,880	6,190	6,838	7,203	7,780	8,772	9,658
Federal, civilian	292	330	382	331	391	416	679	732	875	919	1,026	1,091
Federal, military	103	101	107	109	113	126	174	175	181	186	194	208
State and local	2,005	2,167	2,187	2,490	2,924	3,338	5,337	5,931	6,147	6,675	7,552	8,359
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	10,852	12,011	13,045	15,907	17,718	19,864	44,654	46,372	49,242	57,538	64,651	75,784
Less: Personal contributions for social insurance by place of work	700	764	821	926	1,022	1,177	2,188	2,284	2,504	2,758	3,044	3,531
Net labor and proprietors' income by place of work	10,152	11,247	12,224	14,981	16,696	18,687	42,466	44,088	46,738	54,780	61,607	72,253
Plus: Residence adjustment	5,863	4,708	4,184	4,766	4,958	5,728	3,257	3,460	4,070	4,517	4,931	5,306
Net labor and proprietors' income by place of residence	16,015	15,955	16,408	19,747	21,654	24,415	45,723	47,548	50,808	59,297	66,538	77,559
Plus: Dividends, interest, and rent[8]	3,456	3,649	3,735	4,222	4,741	5,521	7,688	9,120	9,347	10,555	11,878	13,849
Plus: Transfer payments	6,300	7,354	8,141	8,978	10,129	11,381	11,039	13,365	14,405	15,406	17,193	19,361
Personal income by place of residence	**25,771**	**26,958**	**28,284**	**32,947**	**36,524**	**41,317**	**64,450**	**70,033**	**74,560**	**85,258**	**95,609**	**110,769**
Per capita personal income (dollars)	3,812	3,995	4,201	4,805	5,556	6,536	4,085	4,405	4,757	5,288	5,673	6,444

Table 5.—Personal Income for States and Counties of the Great Lakes Region, 1974–79—Continued

(Thousands of dollars)

	Jefferson, Wisconsin						Juneau, Wisconsin					
	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]
Labor and proprietors' income by place of work[3]												
By type												
Wage and salary disbursements	179,597	184,876	203,590	229,658	260,684	299,698	36,522	35,097	39,983	45,225	52,344	58.9
Other labor income	13,710	15,954	18,987	22,976	26,232	30,910	2,785	2,928	3,666	4,507	5,468	5.[illegible]
Proprietors' income[4]	27,307	33,299	25,247	35,920	35,152	45,428	12,429	13,286	12,285	17,532	18,153	23.[illegible]
Farm	9,371	13,830	4,681	14,813	12,955	20,606	6,842	6,839	5,717	10,632	10,862	15.[illegible]
Nonfarm[4]	17,936	19,469	20,566	21,107	22,197	24,822	5,587	6,447	6,568	6,900	7,291	8.[illegible]
By industry												
Farm	13,828	18,601	9,118	19,677	18,434	27,805	7,614	7,668	6,490	11,480	11,814	16.[illegible]
Nonfarm	206,786	215,528	238,706	268,877	303,634	348,231	44,122	43,643	49,444	55,784	64,151	72.[illegible]
Private	183,812	189,989	212,162	240,169	271,311	312,554	33,940	32,849	37,895	44,000	51,131	58.[illegible]
Agricultural services, forestry, fisheries, and other[5]	(D)	(D)	(D)	1,220	(D)	(D)	(D)	323	337	(D)	(D)	[illegible]
Mining	(D)	(D)	(D)	71	(D)	(D)	(D)	(L)	(L)	(D)	(D)	[illegible]
Construction	10,485	10,314	11,518	14,143	16,138	17,358	1,369	1,405	1,406	1,928	2,230	2.[illegible]
Manufacturing	99,627	103,825	119,830	136,367	153,533	180,041	14,001	12,139	14,425	16,776	20,552	24.[illegible]
Nondurable goods	36,559	41,188	43,819	47,747	52,658	61,747	1,109	1,902	2,219	3,011	3,616	4.[illegible]
Durable goods	63,068	62,637	76,011	88,620	100,875	118,294	12,892	10,237	12,207	13,765	16,936	19.[illegible]
Transportation and public utilities	9,180	8,142	8,730	9,328	11,615	11,302	2,547	2,509	2,822	3,162	3,480	4.[illegible]
Wholesale trade	8,572	10,505	10,024	12,010	12,460	14,617	819	1,719	1,728	1,593	1,790	2.[illegible]
Retail trade	27,199	26,442	28,179	29,584	33,745	39,452	7,324	8,181	9,448	9,904	11,143	12.[illegible]
Finance, insurance, and real estate	(D)	4,941	5,919	7,069	8,134	8,941	937	924	1,121	1,334	1,539	1.[illegible]
Services	23,151	24,873	26,905	30,377	34,136	38,879	4,334	5,635	6,588	6,778	7,520	7.[illegible]
Government and government enterprises[6]	22,974	25,539	26,544	28,708	32,323	35,677	10,182	10,794	11,549	11,784	13,020	14.[illegible]
Federal, civilian	2,052	2,290	2,574	2,654	2,866	3,045	2,894	3,186	3,587	3,338	3,630	3.[illegible]
Federal, military	553	578	600	606	640	654	686	181	201	162	168	1[illegible]
State and local	20,369	22,671	23,370	25,448	28,817	31,978	6,602	7,427	7,761	8,284	9,222	10.0[illegible]
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	220,614	234,129	247,824	288,554	322,068	376,036	51,736	51,311	55,934	67,264	75,965	88.[illegible]
Less: Personal contributions for social insurance by place of work	12,248	12,720	13,510	14,681	16,752	19,528	2,581	2,662	2,922	3,132	3,625	4.[illegible]
Net labor and proprietors' income by place of work	208,366	221,409	234,314	273,873	305,316	356,508	49,055	48,649	53,012	64,132	72,340	84.6
Plus: Residence adjustment	24,142	27,414	30,947	35,917	41,674	45,672	2,563	3,812	4,058	4,994	5,628	6.[illegible]
Net labor and proprietors' income by place of residence	232,508	248,823	265,261	309,790	346,990	402,180	51,618	52,461	57,070	69,126	77,968	90.9[illegible]
Plus: Dividends, interest, and rent[7]	44,834	48,870	49,664	55,483	62,103	71,996	10,649	11,740	12,043	13,666	15,371	17.5[illegible]
Plus: Transfer payments	36,072	45,088	48,946	51,803	56,481	64,762	14,266	17,500	18,906	20,042	22,241	25.[illegible]
Personal income by place of residence	313,414	342,781	363,871	417,076	465,574	538,938	76,533	81,701	88,019	102,834	115,580	134.2[illegible]
Per capita personal income (dollars)	4,955	5,374	5,659	6,422	7,168	8,270	4,020	4,292	4,601	5,277	5,798	6.6[illegible]

	Kenosha, Wisconsin						Kewaunee, Wisconsin					
	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]
Labor and proprietors' income by place of work[3]												
By type												
Wage and salary disbursements	449,915	459,180	472,192	484,556	572,326	688,715	36,294	38,031	39,886	40,926	48,718	56.4[illegible]
Other labor income	56,809	66,014	67,647	70,764	84,856	109,003	2,827	3,284	3,597	4,239	5,093	5.[illegible]
Proprietors' income[4]	30,820	33,957	33,983	41,348	42,620	49,357	13,414	13,682	14,250	15,869	19,451	25.5[illegible]
Farm	3,389	4,489	686	7,084	6,631	9,775	8,967	8,789	8,853	10,659	13,987	19.4[illegible]
Nonfarm[4]	27,431	29,468	33,297	34,264	35,989	39,582	4,447	4,893	5,397	5,210	5,464	6.1[illegible]
By industry												
Farm	5,167	6,396	2,456	9,025	8,816	12,646	10,150	10,061	10,044	11,959	15,446	21.3[illegible]
Nonfarm	532,377	552,755	571,366	587,643	690,986	834,429	42,385	44,936	47,689	49,075	57,816	66.4[illegible]
Private	478,677	491,832	506,799	523,664	624,310	765,959	35,366	35,898	38,895	40,067	47,704	55.4[illegible]
Agricultural services, forestry, fisheries, and other[5]	562	572	579	(D)	(D)	3,030	131	134	253	385	424	4[illegible]
Mining	0	0	(L)	(D)	(D)	(L)	(D)	(D)	(D)	(D)	(D)	(D[illegible]
Construction	24,023	24,336	27,236	30,653	53,108	89,748	1,707	1,906	2,711	3,154	3,899	4.[illegible]
Manufacturing	320,066	317,177	315,859	314,311	372,702	454,609	19,577	19,334	18,386	17,717	22,200	25.9[illegible]
Nondurable goods	19,310	20,000	23,420	26,152	29,625	30,374	2,687	2,951	3,253	6,339	5,556	4.8[illegible]
Durable goods	300,756	297,177	292,439	288,159	343,077	424,235	16,890	16,383	15,133	11,378	15,644	21.[illegible]
Transportation and public utilities	19,741	19,264	21,721	26,488	29,166	31,515	(D)	(D)	(D)	(D)	(D)	(D[illegible]
Wholesale trade	11,434	13,703	13,917	14,801	17,104	19,077	1,154	2,243	2,745	2,341	2,307	3.[illegible]
Retail trade	42,973	46,492	49,703	52,617	57,732	65,313	5,621	5,257	5,485	5,906	7,062	8.0[illegible]
Finance, insurance, and real estate	8,336	9,705	10,960	12,420	13,591	14,870	1,048	1,099	1,362	1,518	1,633	1.9[illegible]
Services	51,442	60,583	66,805	69,938	78,255	87,788	3,874	4,417	5,108	5,521	6,198	6.7[illegible]
Government and government enterprises[6]	53,700	60,923	64,567	63,979	66,676	68,470	7,019	8,038	8,794	9,008	10,112	11.0[illegible]
Federal, civilian	3,078	3,252	3,698	3,908	4,363	4,635	1,104	1,198	1,469	1,219	1,470	1.5[illegible]
Federal, military	944	1,003	1,023	1,018	1,074	1,075	272	270	287	291	301	3[illegible]
State and local	49,678	56,658	59,846	59,053	61,239	62,760	5,643	6,570	7,038	7,498	8,341	9.1[illegible]
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	537,544	559,151	573,822	596,668	699,802	847,075	52,535	54,997	57,733	61,034	73,262	87.7[illegible]
Less: Personal contributions for social insurance by place of work	29,116	30,239	29,788	30,171	36,134	42,188	2,511	2,636	2,683	2,679	3,184	3.6[illegible]
Net labor and proprietors' income by place of work	508,428	528,912	544,034	566,497	663,668	804,887	50,024	52,361	55,050	58,355	70,078	84.1[illegible]
Plus: Residence adjustment	61,790	69,498	84,904	108,026	110,020	99,133	8,868	9,668	12,930	16,938	19,523	20.5[illegible]
Net labor and proprietors' income by place of residence	570,218	598,410	628,938	674,523	773,688	904,020	58,892	62,029	67,980	75,293	89,601	104.6[illegible]
Plus: Dividends, interest, and rent[7]	72,048	79,036	80,459	89,936	100,244	115,824	13,567	14,979	15,620	17,910	20,139	23.4[illegible]
Plus: Transfer payments	69,723	86,377	100,779	116,417	119,311	134,087	10,083	12,507	14,081	15,012	15,988	18.3[illegible]
Personal income by place of residence	711,989	763,823	810,176	880,876	993,243	1,153,931	82,542	89,515	97,681	108,215	125,728	146.46[illegible]
Per capita personal income (dollars)	5,823	6,175	6,572	7,176	7,994	9,095	4,147	4,516	4,919	5,347	6,159	7,16[illegible]

See footnotes at end of tables.

Table 5.—Personal Income for States and Counties of the Great Lakes Region, 1974–79—Continued

[Thousands of dollars]

	La Crosse, Wisconsin						Lafayette, Wisconsin					
	1974[1]	1975[2]	1976[3]	1977[3]	1978[3]	1979[3]	1974[1]	1975[2]	1976[3]	1977[3]	1978[3]	1979[3]
Labor and proprietors' income by place of work[4]												
By type												
Wage and salary disbursements	289,249	314,219	358,495	399,646	455,940	516,093	20,627	24,693	27,079	29,856	33,831	37,496
Other labor income	21,520	26,195	31,540	37,395	44,139	51,127	1,193	1,825	2,234	2,691	2,997	3,268
Proprietors' income[5]	34,894	32,279	39,009	40,936	42,929	52,478	26,348	26,708	21,491	27,888	27,466	41,999
Farm	8,894	7,494	7,728	9,375	12,664	16,172	21,677	21,680	16,358	22,909	22,365	36,258
Nonfarm[6]	26,000	24,785	31,281	31,561	30,265	36,306	4,671	5,028	5,133	4,979	5,101	5,741
By industry												
Farm	10,172	8,866	9,014	10,781	14,240	18,231	24,272	24,460	18,951	25,749	25,557	40,447
Nonfarm	335,491	363,827	420,030	467,196	528,768	601,467	23,896	28,766	31,853	34,686	38,737	42,316
Private	289,887	312,351	364,284	407,856	462,927	530,616	16,778	20,725	23,400	25,541	28,446	31,000
Agricultural services, forestry, fisheries, and other[6]	603	755	788	942	1,049	1,175	330	325	315	426	(D)	(D)
Mining	344	330	284	133	110	129	279	1,410	1,652	2,045	(D)	(D)
Construction	20,625	21,109	25,559	32,746	36,860	41,174	1,322	1,371	1,424	1,453	1,573	1,793
Manufacturing	97,714	104,244	123,829	133,570	159,401	179,075	2,130	3,005	3,839	4,459	5,834	5,373
Nondurable goods	31,090	33,551	44,385	43,963	55,161	63,540	844	1,226	1,225	1,248	(D)	(D)
Durable goods	66,624	70,693	79,444	89,607	104,240	115,535	1,286	1,779	2,614	3,211	(D)	(D)
Transportation and public utilities	33,787	30,009	37,826	42,150	43,398	54,667	2,472	2,989	3,662	3,577	4,312	5,102
Wholesale trade	26,646	30,855	33,728	37,368	42,569	49,163	1,728	3,374	3,601	4,190	4,646	5,424
Retail trade	43,490	48,375	54,351	59,305	65,492	73,189	5,267	4,733	4,846	4,899	5,348	6,405
Finance, insurance, and real estate	8,452	9,256	11,063	13,321	14,961	16,111	968	1,124	1,358	1,477	1,656	1,827
Services	58,226	67,418	76,856	88,321	99,087	115,933	2,282	2,394	2,703	3,015	3,467	3,415
Government and government enterprises[10]	45,604	51,476	55,746	59,340	65,841	70,851	7,118	8,041	8,453	9,145	10,291	11,316
Federal, civilian	4,677	4,995	5,580	5,908	6,886	7,318	691	788	874	950	1,054	1,121
Federal, military	956	980	1,020	1,044	1,109	1,181	137	145	150	150	157	157
State and local	39,971	45,501	49,146	52,388	57,846	62,352	6,290	7,108	7,429	8,045	9,080	10,038
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	345,663	372,693	429,044	477,977	543,008	619,698	48,168	53,226	50,804	60,435	64,294	82,763
Less: Personal contributions for social insurance by place of work	19,010	20,262	22,972	25,145	28,963	33,840	1,462	1,713	1,810	1,875	2,116	2,434
Net labor and proprietors' income by place of work	326,653	352,431	406,072	452,832	514,045	585,858	46,706	51,513	48,994	58,560	62,178	80,329
Plus: Residence adjustment	−27,467	−30,073	−34,954	−39,277	−45,336	−51,004	9,039	9,237	10,620	11,872	13,580	15,251
Net labor and proprietors' income by place of residence	299,186	322,358	371,118	413,555	468,709	534,854	55,745	60,750	59,614	70,432	75,758	95,580
Plus: Dividends, interest, and rent[7]	52,785	58,539	62,960	73,486	82,075	94,900	13,235	15,209	15,678	17,841	20,109	23,503
Plus: Transfer payments	51,146	62,495	68,037	73,591	80,913	93,136	9,118	10,676	11,259	12,630	14,012	15,828
Personal income by place of residence	403,117	443,392	502,115	560,632	631,697	722,890	78,098	86,635	86,551	100,903	109,879	134,911
Per capita personal income (dollars)	4,781	5,118	5,875	6,358	6,892	7,708	4,389	4,839	4,799	5,587	6,189	7,656

	Langlade, Wisconsin						Lincoln, Wisconsin					
	1974[1]	1975[2]	1976[3]	1977[3]	1978[3]	1979[3]	1974[1]	1975[2]	1976[3]	1977[3]	1978[3]	1979[3]
Labor and proprietors' income by place of work[4]												
By type												
Wage and salary disbursements	36,292	39,102	42,365	47,107	52,773	59,264	54,942	59,475	68,562	78,099	89,136	95,460
Other labor income	2,325	2,895	3,416	4,099	4,745	5,472	4,222	4,952	6,142	7,490	8,705	9,843
Proprietors' income[5]	11,160	11,800	7,115	12,119	14,190	15,470	9,664	9,943	10,458	11,814	13,990	16,219
Farm	5,613	5,964	746	5,153	6,879	7,220	3,763	3,825	3,436	4,524	6,328	7,678
Nonfarm[6]	5,547	5,836	6,369	6,966	7,311	8,250	5,901	6,118	7,022	7,290	7,662	8,541
By industry												
Farm	8,015	8,536	3,167	7,805	9,859	11,085	4,500	4,617	4,181	5,342	7,247	8,867
Nonfarm	41,762	45,261	49,729	55,520	61,849	69,121	64,328	69,753	80,981	92,061	104,584	113,655
Private	33,759	36,480	41,024	46,828	51,945	58,034	55,824	60,063	70,589	80,352	91,001	98,255
Agricultural services, forestry, fisheries, and other[6]	187	228	248	281	325	350	(D)	(D)	(D)	326	488	559
Mining	0	0	0	72	80	(D)	(D)	(D)	(D)	(D)	(L)	(L)
Construction	1,488	1,639	2,289	2,742	3,156	(D)	2,567	2,998	3,972	4,369	5,290	5,204
Manufacturing	9,885	10,576	11,419	12,961	15,521	17,272	29,549	30,637	37,278	42,821	49,020	52,229
Nondurable goods	2,883	2,957	3,479	3,711	4,772	5,224	14,531	15,106	18,560	20,699	24,089	25,314
Durable goods	7,002	7,619	7,940	9,250	10,749	12,048	15,018	15,531	18,718	22,122	24,931	25,915
Transportation and public utilities	2,992	3,157	2,978	3,430	3,954	4,589	2,198	2,332	2,463	2,910	3,363	3,647
Wholesale trade	3,287	4,424	5,412	5,986	6,186	6,782	2,398	2,909	2,990	2,714	2,743	3,049
Retail trade	8,907	8,659	9,584	11,461	11,711	13,126	8,085	8,582	9,324	10,247	11,303	12,586
Finance, insurance, and real estate	1,278	1,512	1,739	1,811	2,146	2,286	2,572	2,909	3,731	4,380	5,102	5,800
Services	5,735	6,285	7,355	8,084	8,866	(D)	7,801	9,536	10,691	12,580	13,687	15,175
Government and government enterprises[10]	8,003	8,781	8,705	8,692	9,904	11,087	8,504	9,690	10,292	11,709	13,583	15,400
Federal, civilian	1,143	984	1,106	1,184	1,275	1,355	918	948	980	1,094	1,139	1,211
Federal, military	1,198	1,486	1,085	207	168	168	220	227	230	237	252	257
State and local	5,662	6,311	6,514	7,301	8,461	9,564	7,366	8,515	9,082	10,378	12,192	13,932
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	49,777	53,797	52,896	63,325	71,708	80,206	68,828	74,370	85,162	97,403	111,831	122,522
Less: Personal contributions for social insurance by place of work	2,543	2,701	2,949	3,154	3,527	4,088	3,854	4,137	4,615	5,058	5,757	6,701
Net labor and proprietors' income by place of work	47,234	51,096	49,947	60,171	68,181	76,118	64,974	70,233	80,547	92,345	106,074	115,821
Plus: Residence adjustment	2,546	2,714	3,143	3,830	4,404	4,710	5,732	6,057	6,759	8,113	9,060	10,064
Net labor and proprietors' income by place of residence	49,780	53,810	53,090	64,001	72,585	80,828	70,706	76,290	87,306	100,458	115,134	125,885
Plus: Dividends, interest, and rent[7]	9,439	10,403	10,551	11,811	13,251	15,422	11,790	12,963	13,151	14,711	16,471	19,122
Plus: Transfer payments	14,088	17,554	19,154	20,355	22,570	25,727	17,581	21,629	22,963	24,947	27,636	32,082
Personal income by place of residence	73,307	81,767	82,795	96,167	108,406	121,977	100,077	110,882	123,420	140,116	159,241	177,089
Per capita personal income (dollars)	3,811	4,122	4,221	4,699	5,445	6,230	3,943	4,375	4,970	5,472	6,152	6,907

Table 5.—Personal Income for States and Counties of the Great Lakes Region, 1974–79—Continued

(Thousands of dollars)

	Manitowoc, Wisconsin						Marathon, Wisconsin					
	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]
Labor and proprietors' income by place of work[3]												
By type												
Wage and salary disbursements	232,016	243,243	275,303	301,314	338,805	380,081	309,755	334,554	380,148	440,635	497,386	545,728
Other labor income	20,620	24,262	29,280	33,874	38,529	44,663	25,194	30,072	36,099	44,475	51,482	58,446
Proprietors' income[4]	36,983	40,986	40,728	48,515	53,698	66,228	42,665	48,972	52,821	57,507	70,410	87,307
Farm	17,105	19,023	18,131	25,167	29,140	38,711	18,770	21,983	22,429	25,438	36,424	49,705
Nonfarm[4]	19,878	21,963	22,597	23,348	24,558	27,517	23,895	25,989	30,392	32,069	33,986	37,602
By industry												
Farm	19,486	21,576	20,520	27,781	32,074	42,555	22,571	26,069	26,306	29,671	41,153	55,819
Nonfarm	270,133	286,915	324,791	355,922	398,958	448,417	355,043	387,529	442,762	512,947	578,125	635,662
Private	242,984	256,893	293,438	323,360	363,259	410,200	314,470	341,112	392,762	459,696	518,986	571,064
Agricultural services, forestry, fisheries, and other[4]	679	637	777	1,144	1,208	1,335	(D)	966	1,108	(D)	1,445	1,546
Mining	391	589	455	642	941	1,080	(D)	829	889	(D)	858	1,034
Construction	15,208	14,119	16,484	18,840	22,618	24,703	17,798	19,541	22,412	29,348	33,984	37,521
Manufacturing	146,201	150,701	175,858	192,759	216,826	242,348	143,373	149,872	175,710	204,716	228,354	241,798
Nondurable goods	21,938	22,962	26,504	29,838	31,583	34,353	56,852	60,295	70,715	82,144	87,478	93,080
Durable goods	124,263	127,739	149,354	162,921	185,243	207,995	86,521	89,577	104,995	122,572	140,876	148,718
Transportation and public utilities	10,804	11,075	11,786	13,019	14,794	19,820	23,084	23,440	26,020	30,177	33,942	38,201
Wholesale trade	10,395	13,804	15,097	15,664	16,627	19,052	19,986	27,227	31,315	35,867	40,781	47,536
Retail trade	28,133	29,192	31,912	34,840	38,389	43,750	37,050	39,655	44,122	47,848	54,565	60,487
Finance, insurance, and real estate	5,205	5,580	6,915	8,296	9,180	10,007	28,976	32,144	36,410	44,604	52,180	61,381
Services	25,968	31,196	34,154	38,156	42,676	48,105	42,542	47,438	54,776	64,993	72,777	81,460
Government and government enterprises[4,5]	27,149	30,022	31,353	32,562	35,699	38,217	40,573	46,417	50,000	53,251	59,139	64,598
Federal, civilian	2,312	2,429	2,729	2,829	3,362	3,573	5,166	5,917	6,933	7,019	7,456	7,922
Federal, military	893	903	944	945	996	1,056	1,044	1,071	1,120	1,138	1,207	1,256
State and local	23,944	26,690	27,680	28,788	31,341	33,588	34,363	39,429	41,947	45,094	50,476	55,410
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	289,619	308,491	345,311	383,703	431,032	490,972	377,614	413,598	469,068	542,618	619,278	691,481
Less: Personal contributions for social insurance by place of work	15,749	16,716	18,110	19,301	21,933	25,597	20,416	22,008	24,344	27,450	31,273	36,528
Net labor and proprietors' income by place of work	273,870	291,775	327,201	364,402	409,099	465,375	357,198	391,590	444,724	515,168	588,005	654,953
Plus: Residence adjustment	15,759	14,065	15,899	19,202	22,935	27,328	678	−1,877	−3,933	−8,361	−9,850	−9,966
Net labor and proprietors' income by place of residence	289,629	305,840	343,100	383,604	432,034	492,703	357,876	389,713	440,791	506,807	578,155	644,987
Plus: Dividends, interest, and rent[6]	54,939	59,948	62,027	70,202	78,501	90,788	56,834	63,178	65,006	73,160	81,797	94,700
Plus: Transfer payments	48,240	59,124	62,788	67,984	74,993	85,789	51,877	64,899	70,329	75,446	84,039	97,947
Personal income by place of residence	**392,808**	**424,912**	**467,915**	**521,790**	**585,528**	**669,280**	**466,587**	**517,790**	**576,126**	**655,413**	**743,991**	**837,634**
Per capita personal income (dollars)	**4,753**	**5,130**	**5,658**	**6,315**	**7,043**	**7,937**	**4,517**	**4,954**	**5,494**	**6,136**	**6,843**	**7,591**

	Marinette, Wisconsin						Marquette, Wisconsin					
	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]
Labor and proprietors' income by place of work[3]												
By type												
Wage and salary disbursements	96,633	103,205	117,410	137,527	161,855	188,997	12,336	12,658	14,203	15,808	18,315	20,738
Other labor income	8,222	9,618	11,968	14,934	18,301	21,944	894	996	1,250	1,480	1,727	1,986
Proprietors' income[4]	14,978	16,634	16,721	20,264	22,761	27,254	6,098	6,753	3,266	5,856	6,021	7,834
Farm	5,549	6,482	5,495	8,479	10,362	13,359	4,082	4,633	707	2,959	2,954	4,341
Nonfarm[4]	9,429	10,152	11,226	11,785	12,399	13,895	2,016	2,120	2,559	2,897	3,067	3,493
By industry												
Farm	6,244	7,228	6,190	9,239	11,216	14,484	6,029	6,717	2,643	5,082	5,347	7,483
Nonfarm	113,589	122,229	139,909	163,486	191,701	223,711	13,299	13,690	16,076	18,062	20,716	23,075
Private	99,295	106,158	122,948	144,579	169,860	199,192	10,179	10,217	12,297	13,997	16,146	18,038
Agricultural services, forestry, fisheries, and other[4]	(D)	(D)	426	(D)	510	548	94	122	117	141	160	176
Mining	(D)	(D)	(L)	(D)	(L)	(L)	0	0	144	145	160	(D)
Construction	3,425	2,811	3,102	3,601	4,315	4,449	(D)	(D)	(D)	(D)	(D)	1,364
Manufacturing	62,084	64,142	76,804	93,818	113,865	135,024	4,010	3,649	4,446	5,130	5,699	6,637
Nondurable goods	26,222	29,041	33,519	41,312	47,051	51,605	2,078	2,277	2,687	3,120	3,208	3,493
Durable goods	35,862	35,101	43,285	52,506	66,814	83,419	1,932	1,372	1,759	2,010	2,491	3,144
Transportation and public utilities	4,380	4,704	5,169	5,849	6,528	7,781	745	776	925	999	1,101	1,306
Wholesale trade	3,863	4,979	5,578	6,350	6,819	7,710	391	412	374	587	(D)	(D)
Retail trade	13,930	15,738	16,531	17,707	19,315	22,978	1,979	2,090	2,573	2,887	3,179	3,588
Finance, insurance, and real estate	2,487	2,912	3,387	3,951	4,348	4,805	359	378	464	605	780	800
Services	8,611	10,482	11,939	12,785	14,048	15,876	(D)	(D)	(D)	(D)	(D)	(D)
Government and government enterprises[4,5]	14,294	16,071	16,961	18,907	21,841	24,519	3,120	3,473	3,779	4,065	4,570	5,037
Federal, civilian	1,361	1,481	1,716	1,838	2,089	2,219	617	584	703	704	751	797
Federal, military	309	329	344	348	365	371	76	85	86	89	97	98
State and local	12,624	14,261	14,901	16,721	19,387	21,929	2,427	2,804	2,990	3,272	3,722	4,142
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	119,833	129,457	146,099	172,725	202,917	238,195	19,328	20,407	18,719	23,144	26,063	30,558
Less: Personal contributions for social insurance by place of work	6,773	7,253	7,920	8,928	10,503	12,239	890	905	1,002	1,084	1,217	1,399
Net labor and proprietors' income by place of work	113,060	122,204	138,179	163,797	192,414	225,956	18,438	19,502	17,717	22,060	24,846	29,159
Plus: Residence adjustment	−11,061	−12,110	−14,599	−18,446	−24,176	−30,755	8,545	8,988	10,261	11,345	12,942	14,380
Net labor and proprietors' income by place of residence	101,999	110,094	123,580	145,351	168,238	195,201	26,983	28,490	27,978	33,405	37,788	43,539
Plus: Dividends, interest, and rent[6]	19,709	21,390	22,148	25,150	28,179	32,699	5,980	6,973	7,088	7,984	8,990	10,508
Plus: Transfer payments	27,384	33,470	36,545	39,670	43,915	49,923	8,095	9,886	10,931	12,240	13,547	15,451
Personal income by place of residence	**149,092**	**164,954**	**182,273**	**210,171**	**240,333**	**277,823**	**41,058**	**45,349**	**45,997**	**53,629**	**60,325**	**69,498**
Per capita personal income (dollars)	**4,032**	**4,361**	**4,743**	**5,382**	**6,112**	**7,091**	**4,133**	**4,346**	**4,417**	**5,012**	**5,619**	**6,281**

See footnotes at end of tables.

Table 5.—Personal Income for States and Counties of the Great Lakes Region, 1974–79—Continued

(Thousands of dollars)

	Milwaukee, Wisconsin						Monroe, Wisconsin					
	1974[1]	1975[1]	1976[1]	1977[1]	1978[1]	1979[1]	1974[1]	1975[1]	1976[1]	1977[1]	1978[1]	1979[1]
Labor and proprietors' income by place of work[1]												
By type												
Wage and salary disbursements[1]	5,139,605	5,284,746	5,762,330	6,260,439	6,922,410	7,661,095	74,413	80,928	91,496	101,439	114,239	130,350
Other labor income	427,256	471,807	541,240	626,220	704,856	806,844	5,036	6,083	7,662	9,339	10,994	13,172
Proprietors' income[1]	278,024	304,237	335,826	351,115	370,999	404,303	22,024	20,205	20,584	24,437	27,834	36,405
Farm	1,120	1,277	−1,140	25	115	−102	13,228	10,303	9,920	13,747	16,917	24,029
Nonfarm[1]	276,904	302,960	336,966	351,090	370,884	404,405	8,796	9,902	10,664	10,690	10,917	12,376
By industry												
Farm	2,545	2,910	400	1,713	2,012	2,347	15,265	12,489	11,984	16,006	19,447	27,308
Nonfarm	5,822,240	6,057,880	6,638,996	7,236,061	7,996,253	8,869,895	86,208	94,727	107,758	119,219	133,620	152,619
Private	5,141,719	5,319,986	5,816,507	6,396,444	7,108,890	7,946,814	53,875	58,178	66,348	75,133	85,419	100,278
Agricultural services, forestry, fisheries, and other[2]	5,158	5,401	6,135	5,289	5,956	6,845	(D)	343	317	(D)	366	440
Mining	1,799	1,398	1,464	2,133	2,282	2,178	(D)	189	217	(D)	214	258
Construction	285,651	258,704	301,398	332,017	361,526	385,066	3,333	3,152	3,715	4,495	4,764	5,290
Manufacturing	2,270,498	2,353,636	2,520,965	2,761,703	3,098,062	3,436,802	14,896	14,872	19,097	24,127	29,757	36,308
Nondurable goods	516,919	527,147	583,488	620,574	683,419	733,105	3,975	3,996	4,822	6,163	6,589	7,549
Durable goods	1,753,579	1,826,489	1,937,477	2,141,129	2,414,643	2,703,697	10,921	10,876	14,275	17,964	23,168	28,759
Transportation and public utilities	427,927	427,295	467,657	507,985	559,152	662,936	7,731	8,169	9,234	10,076	11,087	13,360
Wholesale trade	415,140	413,439	451,325	487,676	526,729	593,748	3,440	5,997	6,079	6,463	6,475	7,669
Retail trade	549,577	525,764	569,866	612,317	671,299	725,928	12,767	12,289	13,023	13,588	15,195	17,517
Finance, insurance, and real estate	340,587	365,387	420,312	481,838	538,921	597,873	2,518	3,175	3,712	4,072	4,558	5,172
Services	845,282	968,962	1,077,385	1,205,486	1,344,963	1,535,388	8,722	9,992	10,954	11,727	13,003	14,264
Government and government enterprises[1,3]	680,521	737,894	822,489	839,617	887,363	923,081	32,333	36,549	41,410	44,086	48,201	52,341
Federal, civilian	120,451	132,362	148,667	164,207	177,161	188,267	19,192	21,556	25,044	26,268	27,903	29,649
Federal, military	12,987	12,535	15,470	14,135	14,674	13,440	1,153	1,499	2,095	1,981	2,163	2,468
State and local	547,083	592,997	658,352	661,275	695,528	721,374	11,988	13,494	14,271	15,837	18,135	20,224
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	5,824,885	6,060,790	6,639,396	7,237,774	7,998,265	8,872,242	101,473	107,216	119,742	135,225	153,067	179,927
Less: Personal contributions for social insurance by place of work	323,866	335,311	358,434	383,299	430,770	503,426	5,159	5,556	6,284	6,540	7,397	8,500
Net labor and proprietors' income by place of work	5,501,019	5,725,479	6,280,962	6,854,475	7,567,495	8,368,816	96,314	101,660	113,458	128,685	145,670	171,427
Plus: Residence adjustment	−782,789	−837,543	−948,602	−1,066,617	−1,227,645	−1,407,415	−1,328	−1,629	−2,042	−2,518	−2,781	−3,406
Net labor and proprietors' income by place of residence	4,718,230	4,887,936	5,332,360	5,787,858	6,339,850	6,961,401	94,986	100,031	111,416	126,167	142,889	168,021
Plus: Dividends, interest, and rent[1]	860,992	909,874	906,767	988,823	1,099,556	1,268,014	16,987	19,287	20,159	23,178	26,048	30,370
Plus: Transfer payments	689,245	836,219	911,461	974,635	1,073,165	1,225,445	23,701	35,954	31,239	33,288	36,259	40,894
Personal income by place of residence	**6,268,467**	**6,634,029**	**7,150,588**	**7,751,316**	**8,512,571**	**9,454,860**	**135,674**	**155,272**	**162,814**	**182,633**	**205,196**	**239,285**
Per capita personal income (dollars)	**6,012**	**6,529**	**7,036**	**7,746**	**8,538**	**9,630**	**4,165**	**4,655**	**4,848**	**5,416**	**6,046**	**6,940**

	Oconto, Wisconsin						Oneida, Wisconsin					
	1974[1]	1975[1]	1976[1]	1977[1]	1978[1]	1979[1]	1974[1]	1975[1]	1976[1]	1977[1]	1978[1]	1979[1]
Labor and proprietors' income by place of work[1]												
By type												
Wage and salary disbursements	40,388	45,546	49,120	54,417	61,426	67,314	76,934	81,700	92,300	103,162	115,437	124,565
Other labor income	3,165	3,994	4,663	5,462	6,210	6,952	5,533	6,457	7,843	9,346	10,565	11,765
Proprietors' income[1]	16,911	18,096	18,086	22,372	25,450	31,081	8,809	9,939	11,665	12,922	13,863	15,465
Farm	9,878	10,309	8,955	12,155	14,876	19,383	−218	−156	41	−6	167	200
Nonfarm[1]	7,033	7,787	9,131	10,217	10,574	11,698	9,027	10,095	11,624	12,928	13,694	15,268
By industry												
Farm	11,057	11,575	10,147	13,460	16,339	21,283	1,206	1,369	1,488	1,581	1,949	2,486
Nonfarm	49,407	56,061	61,722	68,791	76,747	84,064	90,070	96,727	110,320	123,849	137,914	149,313
Private	41,192	46,570	51,595	58,103	64,953	71,325	74,361	79,276	92,083	104,372	116,335	126,081
Agricultural services, forestry, fisheries, and other[2]	236	257	290	(D)	335	(D)	(D)	470	484	631	706	(D)
Mining	197	249	227	(D)	816	(D)	(D)	436	426	533	520	(D)
Construction	3,008	3,267	3,830	5,188	6,076	6,480	6,079	6,196	7,317	9,477	11,108	11,982
Manufacturing	19,051	20,952	24,461	27,397	29,936	32,914	25,451	23,814	28,625	31,505	35,309	36,099
Nondurable goods	11,247	12,923	13,738	14,603	15,466	16,323	20,413	19,128	23,257	25,344	27,415	26,690
Durable goods	7,804	8,029	10,723	12,794	14,470	16,591	5,038	4,686	5,368	6,161	7,894	10,009
Transportation and public utilities	3,596	3,570	4,107	4,008	4,306	4,627	5,984	6,239	7,135	7,573	8,244	8,793
Wholesale trade	1,516	4,515	3,303	3,973	4,220	4,753	3,468	4,491	4,490	4,790	5,128	5,684
Retail trade	7,206	6,837	7,250	7,504	8,335	9,706	14,425	17,093	19,375	20,769	22,445	24,623
Finance, insurance, and real estate	1,085	1,209	1,486	1,977	2,010	2,223	3,156	3,561	4,606	5,679	6,739	7,747
Services	5,297	5,714	6,641	7,084	8,919	9,446	15,078	16,976	19,625	23,315	26,136	29,973
Government and government enterprises[1,3]	8,215	9,491	10,127	10,688	11,794	12,739	15,709	17,451	18,237	19,477	21,579	23,232
Federal, civilian	1,321	1,477	1,539	1,656	1,838	1,953	2,721	3,049	3,205	3,554	4,013	4,264
Federal, military	208	222	232	230	249	248	211	230	239	245	265	265
State and local	6,686	7,792	8,356	8,802	9,707	10,538	12,777	14,172	14,793	15,678	17,301	18,703
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	60,464	67,636	71,869	82,251	93,086	105,347	91,276	98,096	111,808	125,430	139,863	151,799
Less: Personal contributions for social insurance by place of work	3,032	3,389	3,556	3,857	4,368	5,062	5,358	5,718	6,266	6,772	7,654	8,885
Net labor and proprietors' income by place of work	57,432	64,247	68,313	78,394	88,718	100,285	85,918	92,378	105,542	118,658	132,209	142,914
Plus: Residence adjustment	15,622	16,714	18,771	21,613	26,033	30,375	−1,892	−1,582	−1,656	−1,915	−1,847	−1,952
Net labor and proprietors' income by place of residence	73,054	80,961	87,084	100,007	114,751	130,660	84,026	90,796	103,886	116,743	130,362	140,962
Plus: Dividends, interest, and rent[1]	12,985	15,304	16,231	18,834	21,183	24,684	19,478	22,653	22,933	25,426	28,486	33,014
Plus: Transfer payments	17,094	20,758	22,829	24,557	27,625	32,056	21,937	27,304	30,316	33,219	37,205	42,434
Personal income by place of residence	**103,133**	**117,023**	**126,144**	**143,398**	**163,559**	**187,400**	**125,441**	**140,753**	**157,135**	**175,388**	**196,053**	**216,412**
Per capita personal income (dollars)	**3,841**	**4,286**	**4,521**	**5,189**	**5,766**	**6,579**	**4,585**	**4,971**	**5,479**	**5,962**	**6,618**	**7,389**

Table 5.—Personal Income for States and Counties of the Great Lakes Region, 1974–79—Continued

[Thousands of dollars]

	Outagamie, Wisconsin						Ozaukee, Wisconsin					
	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]
Labor and proprietors' income by place of work[3]												
By type												
Wage and salary disbursements	436,699	464,717	528,821	578,834	645,876	766,713	171,419	169,990	200,688	227,180	261,830	301,114
Other labor income	34,953	41,634	50,619	58,311	66,537	81,800	14,405	15,686	19,864	23,880	28,295	33,393
Proprietors' income[4]	48,592	55,515	55,190	63,951	72,326	86,803	24,914	28,476	28,931	35,003	36,570	42,209
Farm	15,261	18,115	14,406	19,709	25,800	35,494	4,009	5,270	2,872	5,876	5,648	8,144
Nonfarm[4]	33,331	37,400	40,784	44,242	46,526	51,309	20,905	23,206	26,059	29,127	30,722	34,065
By industry												
Farm	17,908	20,956	17,063	22,610	29,053	39,770	5,211	6,560	4,075	7,193	7,329	10,085
Nonfarm	502,336	540,910	617,567	678,486	755,686	895,546	205,527	207,592	245,408	278,870	319,366	366,631
Private	455,405	487,037	559,825	618,429	689,363	823,962	186,051	185,252	219,572	250,508	287,015	330,677
Agricultural services, forestry, fisheries, and other[5]	1,023	(D)	(D)	(D)	(D)	2,046	989	725	888	1,169	1,251	1,564
Mining	2,289	(D)	(D)	(D)	(D)	4,046	148	124	81	55	67	61
Construction	44,297	51,274	59,726	71,398	75,517	89,434	13,168	13,394	16,294	19,075	20,648	21,873
Manufacturing	194,429	200,926	234,267	235,010	272,012	349,478	109,768	100,523	122,094	136,945	162,264	190,657
Nondurable goods	123,247	127,349	150,861	142,374	164,761	220,939	21,239	22,462	25,761	29,540	32,851	35,605
Durable goods	71,182	73,577	83,406	92,636	107,251	128,539	88,529	78,061	96,333	107,405	129,413	155,052
Transportation and public utilities	31,908	31,018	34,995	43,504	45,960	47,805	6,829	7,281	8,287	9,302	9,058	10,159
Wholesale trade	32,420	40,221	45,813	51,236	57,947	66,708	8,227	10,519	11,862	13,885	16,867	20,175
Retail trade	55,577	56,310	62,971	70,945	78,261	89,344	20,115	22,529	25,199	27,368	29,165	33,330
Finance, insurance, and real estate	25,427	28,477	32,997	40,265	45,280	51,151	4,756	5,946	7,245	8,765	9,391	10,318
Services	68,035	75,515	85,331	101,730	109,200	123,950	22,051	24,211	27,622	33,944	38,306	42,540
Government and government enterprises[3,6]	46,931	53,873	57,742	60,057	66,323	71,584	19,476	22,340	25,836	28,362	32,351	35,954
Federal, civilian	4,694	5,376	6,029	5,646	6,503	6,909	1,288	1,467	1,650	1,790	2,086	2,216
Federal, military	1,265	1,303	1,358	1,376	1,455	1,530	560	595	524	648	689	707
State and local	40,972	47,194	50,355	53,035	58,365	63,145	17,628	20,278	23,562	25,924	29,576	33,031
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	520,244	561,866	634,630	701,096	784,739	935,316	210,738	214,152	249,483	286,063	326,695	376,716
Less: Personal contributions for social insurance by place of work	28,490	30,695	33,738	36,124	40,800	47,705	11,865	11,967	13,371	14,683	16,987	19,827
Labor and proprietors' income by place of work	491,754	531,171	600,892	664,972	743,939	887,611	198,873	202,185	236,112	271,380	309,708	356,889
Residence adjustment	−4,330	−4,983	−6,293	3,772	4,209	−19,061	125,730	149,944	162,238	189,732	213,183	242,055
Labor and proprietors' income by place of residence	487,424	526,188	594,599	668,744	748,148	868,550	324,603	352,129	398,350	461,112	522,891	598,944
Plus: Dividends, interest, and rent[7]	80,792	92,135	95,125	107,209	119,652	138,223	57,250	62,532	65,732	74,901	83,123	95,610
Plus: Transfer payments	61,441	76,671	82,974	88,688	99,122	113,309	24,154	33,553	35,658	38,743	43,918	51,489
Personal income by place of residence	629,657	694,994	772,698	864,641	966,922	1,120,082	406,007	448,214	499,740	574,756	649,932	746,043
Per capita personal income (dollars)	5,094	5,515	6,150	6,775	7,472	8,590	6,521	6,949	7,631	8,414	9,271	10,396

	Pepin, Wisconsin						Pierce, Wisconsin					
	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]
Labor and proprietors' income by place of work[3]												
By type												
Wage and salary disbursements	10,944	11,473	12,456	13,839	16,217	18,593	44,570	48,346	53,005	59,661	67,899	76,921
Other labor income	700	813	927	1,084	1,304	1,554	2,547	3,477	4,212	5,008	5,804	6,826
Proprietors' income[4]	6,557	5,903	6,073	7,398	8,398	11,330	19,858	16,414	18,190	21,596	22,629	32,364
Farm	4,614	3,832	3,719	4,864	5,761	8,283	11,342	7,482	8,146	10,472	11,146	19,482
Nonfarm[4]	1,943	2,071	2,354	2,534	2,637	3,047	8,516	8,932	10,044	11,124	11,483	12,882
By industry												
Farm	5,118	4,376	4,229	5,422	6,384	9,100	13,044	9,307	9,851	12,338	13,244	22,230
Nonfarm	13,083	13,813	15,227	16,899	19,535	22,377	53,931	58,930	65,556	73,927	83,088	93,881
Private	10,171	10,535	11,726	13,081	15,148	17,474	36,984	39,800	45,026	51,289	57,351	65,512
Agricultural services, forestry, fisheries, and other[5]	(D)	175	240	269	309	306	285	263	345	(D)	(D)	(D)
Mining	0	0	0	0	0	0	200	193	236	(D)	(D)	(D)
Construction	(D)	527	733	824	916	1,083	3,021	2,814	3,248	4,170	4,828	5,253
Manufacturing	2,386	1,752	1,692	1,692	2,214	2,590	7,734	9,049	10,924	12,548	14,857	17,008
Nondurable goods	1,107	576	548	701	1,090	1,246	4,364	4,099	4,641	5,556	6,278	7,336
Durable goods	1,279	1,176	1,144	991	1,124	1,344	3,370	4,950	6,283	6,992	8,579	9,672
Transportation and public utilities	707	753	826	971	1,074	1,417	2,357	2,252	2,673	3,186	3,375	4,007
Wholesale trade	494	1,719	2,023	2,283	2,506	2,990	1,614	5,536	5,668	6,531	7,086	8,720
Retail trade	3,338	2,391	2,490	2,697	2,966	3,275	11,497	8,779	9,545	10,921	11,930	13,284
Finance, insurance, and real estate	615	701	871	1,209	1,415	1,627	2,309	2,514	3,041	3,623	4,138	4,613
Services	1,911	2,517	2,851	3,136	3,748	4,186	7,967	8,400	9,346	9,666	10,318	11,576
Government and government enterprises[3,6]	2,912	3,278	3,501	3,818	4,387	4,903	16,947	19,130	20,530	22,638	25,737	28,369
Federal, civilian	321	334	391	368	422	448	1,153	1,354	1,476	1,548	1,732	1,841
Federal, military	82	83	88	88	91	96	224	237	246	252	264	263
State and local	2,509	2,861	3,022	3,362	3,874	4,359	15,570	17,539	18,808	20,838	23,741	26,265
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	18,201	18,189	19,456	22,321	25,919	31,477	66,975	68,237	75,407	86,265	96,332	116,111
Less: Personal contributions for social insurance by place of work	804	833	900	947	1,099	1,268	3,127	3,327	3,518	3,695	4,163	4,793
Net labor and proprietors' income by place of work	17,397	17,356	18,556	21,374	24,820	30,209	63,848	64,910	71,889	82,570	92,169	111,318
Plus: Residence adjustment	1,764	1,860	2,068	2,301	2,525	2,840	33,445	35,667	40,732	45,676	53,012	59,726
Labor and proprietors' income by place of residence	19,161	19,216	20,624	23,675	27,345	33,049	97,293	100,577	112,621	128,246	145,181	171,044
Plus: Dividends, interest, and rent[7]	4,089	4,648	4,897	5,679	6,381	7,447	14,839	16,831	17,700	20,528	23,090	26,970
Plus: Transfer payments	4,546	5,885	6,056	6,603	7,325	8,376	15,763	18,933	20,976	23,015	25,309	29,005
Personal income by place of residence	27,796	29,749	31,577	35,957	41,051	48,872	127,895	136,341	151,297	171,789	193,580	227,019
Per capita personal income (dollars)	3,743	3,906	4,153	4,716	5,293	6,194	4,446	4,684	5,116	5,675	6,384	7,475

See footnotes at end of tables.

Table 5.—Personal Income for States and Counties of the Great Lakes Region, 1974–79—Continued

[Thousands of dollars]

	Polk, Wisconsin						Portage, Wisconsin					
	1974[1]	1975[1]	1976[1]	1977[1]	1978[1]	1979[1]	1974[1]	1975[1]	1976[1]	1977[1]	1978[1]	1979[1]
Labor and proprietors' income by place of work[2]												
By type												
Wage and salary disbursements	51,296	53,359	58,414	66,561	77,268	88,142	132,140	146,875	166,005	187,714	215,053	248,135
Other labor income	3,820	4,415	5,170	6,627	7,944	9,571	9,694	11,797	14,359	17,305	20,100	24,245
Proprietors' income[3]	23,611	21,146	21,337	20,967	25,892	33,715	19,315	22,064	13,200	27,168	28,864	31,743
Farm	14,210	10,889	9,758	8,280	12,592	18,834	7,662	9,508	−1,276	10,139	10,772	11,809
Nonfarm[4]	9,401	10,257	11,579	12,687	13,300	14,881	11,653	12,556	14,476	17,029	18,092	19,934
By industry												
Farm	16,038	12,851	11,589	10,283	14,838	21,785	11,563	13,684	2,611	14,404	15,574	18,109
Nonfarm	62,689	66,069	73,332	83,872	96,266	109,643	149,586	167,052	190,953	217,783	248,443	286,014
Private	49,431	52,301	58,564	68,199	78,932	90,820	124,539	138,686	160,004	183,867	210,156	244,036
Agricultural services, forestry, fisheries, and other[4]	(D)	(D)	(D)	(D)	(D)	(D)	(D)	849	3,739	(D)	(D)	(D)
Mining	(D)	(D)	(D)	(D)	(D)	(D)	(D)	279	320	(D)	(D)	(D)
Construction	3,449	3,565	4,171	5,329	5,997	6,368	6,516	10,567	9,930	11,162	12,549	13,439
Manufacturing	16,585	14,712	15,830	20,683	25,847	31,534	31,699	30,178	34,109	46,958	54,304	65,732
Nondurable goods	9,835	8,891	10,264	12,498	14,316	15,524	22,684	20,552	23,073	33,254	40,204	50,294
Durable goods	6,750	5,821	5,566	8,185	11,531	16,010	9,015	9,626	11,036	13,704	14,100	15,438
Transportation and public utilities	4,182	4,623	5,615	6,443	7,195	7,683	14,888	15,286	17,067	18,944	21,349	25,125
Wholesale trade	3,896	4,760	4,898	4,564	4,983	5,763	9,795	12,902	13,895	10,929	12,643	13,421
Retail trade	11,147	10,629	11,420	11,815	13,137	15,328	16,974	19,628	22,155	29,317	32,011	36,131
Finance, insurance, and real estate	1,913	2,118	2,641	3,058	3,387	3,788	24,706	28,487	34,817	36,602	43,266	50,416
Services	8,672	10,047	12,012	14,169	16,111	17,944	18,035	20,510	23,972	27,840	31,772	36,325
Government and government enterprises[1,2]	13,258	13,768	14,768	15,673	17,334	18,823	25,047	28,366	30,949	33,916	38,287	41,978
Federal, civilian	1,724	1,552	1,886	2,126	2,426	2,577	1,901	2,072	2,421	2,590	2,868	3,048
Federal, military	1,812	930	813	819	868	999	574	583	620	628	669	710
State and local	9,722	11,286	12,069	12,728	14,040	15,247	22,572	25,711	27,908	30,698	34,750	38,220
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	78,727	78,920	84,921	94,155	111,104	131,428	161,149	180,736	193,564	232,187	264,017	304,123
Less: Personal contributions for social insurance by place of work	3,826	3,989	4,196	4,608	5,352	6,196	8,319	9,099	10,494	11,448	13,130	15,330
Net labor and proprietors' income by place of work	74,901	74,931	80,725	89,547	105,752	125,232	152,830	171,637	183,070	220,739	250,887	288,793
Plus: Residence adjustment	13,010	14,186	16,584	18,563	21,911	25,160	11,375	11,377	13,459	15,558	17,366	18,285
Net labor and proprietors' income by place of residence	87,911	89,117	97,309	108,110	127,663	150,392	164,205	183,014	196,529	236,307	268,253	307,078
Plus: Dividends, interest, and rent[1]	16,714	18,823	19,455	22,218	25,003	29,195	25,019	27,924	28,863	32,729	36,633	42,493
Plus: Transfer payments	20,787	25,809	28,849	31,276	34,887	39,614	25,047	31,677	35,278	38,477	43,799	50,218
Personal income by place of residence	125,412	133,749	145,613	161,604	187,553	219,201	214,271	242,615	260,670	307,513	348,685	399,789
Per capita personal income (dollars)	4,249	4,427	4,798	5,293	5,988	6,906	4,164	4,650	4,910	5,684	6,269	7,066

	Price, Wisconsin						Racine, Wisconsin					
	1974[1]	1975[1]	1976[1]	1977[1]	1978[1]	1979[1]	1974[1]	1975[1]	1976[1]	1977[1]	1978[1]	1979[1]
Labor and proprietors' income by place of work[2]												
By type												
Wage and salary disbursements	31,796	29,773	34,304	38,006	44,254	52,377	623,926	680,060	752,467	820,913	937,115	1,051,679
Other labor income	2,730	2,782	3,595	4,203	5,034	6,142	52,866	63,645	75,130	86,658	100,115	114,535
Proprietors' income[3]	5,980	7,996	7,947	8,730	10,932	12,631	49,574	57,762	52,368	64,558	67,921	76,529
Farm	2,145	3,736	3,382	4,165	5,985	7,151	5,015	9,885	623	10,026	10,718	13,511
Nonfarm[4]	3,835	4,260	4,565	4,565	4,947	5,480	44,559	47,877	51,745	54,542	57,203	63,018
By industry												
Farm	2,742	4,378	3,979	4,820	6,721	8,117	8,599	13,723	4,190	13,937	15,121	19,304
Nonfarm	37,764	36,173	41,867	46,119	53,499	63,033	717,767	787,744	875,775	958,202	1,090,028	1,223,439
Private	31,880	29,350	34,752	38,714	45,270	54,022	635,044	693,468	773,775	846,087	962,193	1,081,916
Agricultural services, forestry, fisheries, and other[4]	113	78	115	(D)	(D)	182	856	956	1,245	1,430	1,543	1,808
Mining	0	216	−173	(D)	(D)	0	845	658	763	695	829	885
Construction	1,778	1,493	1,931	2,072	2,262	2,307	36,985	38,734	39,874	47,587	56,743	58,405
Manufacturing	19,076	16,018	19,959	21,724	26,283	33,172	379,550	397,172	445,472	493,078	571,809	656,440
Nondurable goods	8,916	8,987	12,892	13,888	17,093	20,057	106,595	106,385	121,040	130,551	148,134	164,518
Durable goods	10,160	7,031	7,067	7,836	9,190	13,115	272,955	290,787	324,432	362,527	423,675	491,922
Transportation and public utilities	1,905	1,867	2,261	2,677	3,063	3,432	24,815	27,527	31,652	35,739	38,739	39,456
Wholesale trade	919	1,311	1,171	1,314	1,459	1,649	32,503	36,216	40,026	43,546	46,614	52,110
Retail trade	4,306	4,381	4,943	5,221	5,615	6,061	61,813	67,807	74,096	80,169	88,435	100,778
Finance, insurance, and real estate	782	881	1,062	1,238	1,498	1,561	16,412	19,558	23,676	27,172	30,263	33,527
Services	3,001	3,105	3,483	4,274	4,857	5,658	81,265	104,840	116,971	116,671	127,218	142,507
Government and government enterprises[1,2]	5,884	6,823	7,115	7,405	8,279	9,011	82,723	94,276	102,000	112,115	127,835	141,523
Federal, civilian	1,624	1,981	2,028	1,965	2,195	2,332	5,498	6,078	7,008	7,120	8,142	8,652
Federal, military	139	129	130	129	134	134	1,773	1,819	1,891	1,893	1,993	2,093
State and local	4,141	4,713	4,957	5,311	5,950	6,545	75,452	86,379	93,101	103,102	117,700	130,778
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	40,506	40,551	45,846	50,939	60,220	71,150	726,366	801,467	879,965	972,139	1,105,151	1,242,743
Less: Personal contributions for social insurance by place of work	2,303	2,220	2,414	2,601	3,045	3,529	40,494	44,279	46,936	49,744	57,079	66,691
Net labor and proprietors' income by place of work	38,203	38,331	43,432	48,338	57,175	67,621	685,872	757,188	833,029	922,395	1,048,072	1,176,052
Plus: Residence adjustment	−629	−268	−361	−340	−391	−724	68,566	61,638	62,075	68,000	78,014	94,696
Net labor and proprietors' income by place of residence	37,574	38,063	43,071	47,998	56,784	66,897	754,438	818,826	895,104	990,395	1,126,086	1,270,748
Plus: Dividends, interest, and rent[1]	7,583	8,609	8,989	10,334	11,620	13,543	116,679	129,473	130,772	143,996	160,394	184,746
Plus: Transfer payments	11,546	15,287	15,586	17,250	18,966	21,432	98,384	120,455	133,886	143,325	156,554	177,705
Personal income by place of residence	56,703	61,959	67,646	75,582	87,370	101,872	969,501	1,068,754	1,159,762	1,277,716	1,443,034	1,633,199
Per capita personal income (dollars)	3,689	3,901	4,330	4,875	5,608	6,627	5,546	6,033	6,583	7,252	8,120	9,128

Table 5.—Personal Income for States and Counties of the Great Lakes Region, 1974–79—Continued

(Thousands of dollars)

	Richland, Wisconsin						Rock, Wisconsin					
	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]
[illegible]or and proprietors' income by place of work[3]												
By type												
[illegible]Wage and salary disbursements	25,792	27,282	29,716	33,270	36,974	41,373	441,525	453,669	535,756	606,623	678,631	743,006
[illegible]Other labor income	1,815	2,142	2,559	3,053	3,459	4,005	42,125	49,964	67,490	83,026	94,487	108,276
[illegible]Proprietors' income[4]	14,921	15,635	14,026	18,568	21,963	26,659	49,170	53,478	43,335	58,301	52,535	68,335
[illegible]Farm	8,887	9,398	7,171	12,286	15,412	19,213	14,986	17,510	3,863	16,775	8,957	20,215
[illegible]Nonfarm[4]	6,034	6,237	6,855	6,282	6,551	7,446	34,184	35,968	39,472	41,526	43,578	48,120
By industry												
[illegible]	10,346	10,962	8,640	13,893	17,215	21,567	19,279	22,107	8,144	21,470	14,242	27,146
[illegible]rm	32,182	34,097	37,661	40,998	45,181	50,470	513,541	535,004	638,437	726,480	811,411	892,471
Private	25,857	27,030	30,106	32,556	35,493	39,559	458,916	472,364	571,092	658,244	738,785	816,387
Agricultural services, forestry, fisheries, and other[5]	235	298	471	479	555	(D)	1,013	1,049	1,206	1,456	1,612	1,921
Mining	(L)	55	51	(L)	(L)	(D)	1,729	1,601	1,544	1,535	1,700	2,121
Construction	1,929	1,738	2,013	2,503	2,831	3,040	36,812	30,529	31,307	37,997	42,381	46,286
Manufacturing	7,413	7,474	8,915	10,116	11,170	11,914	245,248	249,202	329,155	383,926	434,931	477,839
Nondurable goods	3,094	3,326	4,094	4,231	4,493	4,851	35,631	41,661	52,761	61,120	68,221	73,650
Durable goods	4,319	4,148	4,821	5,885	6,677	7,063	209,617	207,541	276,394	322,806	366,710	404,189
Transportation and public utilities	1,138	1,152	1,414	1,656	1,837	2,382	30,746	30,035	36,512	43,055	48,089	51,346
Wholesale trade	2,093	3,737	3,646	3,404	3,538	4,097	15,753	21,958	18,728	18,298	20,232	24,457
Retail trade	5,857	6,121	6,488	6,363	6,684	7,655	56,164	59,422	64,271	72,642	78,874	89,378
Finance, insurance, and real estate	1,347	1,500	1,779	2,045	2,353	2,595	11,916	12,111	13,909	17,327	19,609	21,196
Services	4,842	4,955	5,329	5,945	6,482	7,177	59,535	66,457	74,460	82,008	91,357	101,843
Government and government enterprises[6]	6,315	7,067	7,555	8,442	9,688	10,911	54,625	62,640	67,345	68,236	72,626	76,084
Federal, civilian	894	948	1,101	1,115	1,126	1,197	4,291	4,762	5,551	5,701	6,258	6,650
Federal, military	126	137	139	136	147	147	1,101	1,155	1,180	1,180	1,240	1,255
State and local	5,295	5,982	6,315	7,191	8,415	9,567	49,233	56,723	60,614	61,355	65,128	68,179
Derivation of personal income by place of residence												
[illegible]Labor and proprietors' income by place of work	42,528	45,059	46,301	54,891	62,396	72,037	532,820	557,111	646,581	747,950	825,653	919,617
Personal contributions for social insurance by place of work	1,972	2,062	2,168	2,299	2,532	2,925	28,865	29,989	33,936	37,651	42,819	50,041
[illegible]abor and proprietors' income by place of work	40,556	42,997	44,133	52,592	59,864	69,112	503,955	527,122	612,645	710,299	782,834	869,576
Plus: Residence adjustment	5,603	5,677	6,292	7,041	8,172	9,188	34,849	34,292	28,830	30,093	37,854	42,932
[illegible]Net labor and proprietors' income by place of residence	46,159	48,674	50,425	59,633	68,036	78,300	538,804	561,414	641,475	740,392	820,688	912,508
[illegible]Dividends, interest, and rent[7]	9,594	10,705	11,357	13,233	14,891	17,367	82,896	90,787	94,655	107,818	120,179	138,636
Transfer payments	10,518	13,783	14,014	15,288	16,843	19,224	79,504	100,892	109,677	109,177	119,917	140,354
[illegible]rsonal income by place of residence	66,271	73,162	75,796	88,154	99,770	114,891	701,204	753,093	845,807	957,387	1,060,784	1,191,498
Per capita personal income (dollars)	4,046	4,344	4,533	5,394	5,949	6,799	5,231	5,588	6,311	7,143	7,905	8,886

	Rusk, Wisconsin						St. Croix, Wisconsin					
	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]
Labor and proprietors' income by place of work[3]												
By type												
[illegible]ge and salary disbursements	23,425	26,068	29,747	33,065	38,716	43,267	60,688	67,021	77,158	88,340	105,797	121,775
Other labor income	1,700	2,062	2,511	2,985	3,611	4,187	4,132	5,450	6,746	8,141	9,980	11,812
Proprietors' income[4]	9,540	9,279	9,403	9,782	11,933	15,054	25,447	23,253	22,027	29,392	27,896	37,609
Farm	5,537	5,425	5,256	5,298	7,409	9,845	14,838	11,754	9,859	16,087	14,141	22,224
[illegible]onfarm[4]	4,003	3,854	4,147	4,484	4,524	5,209	10,609	11,499	12,168	13,305	13,755	15,385
By industry												
Farm	6,311	6,255	6,031	6,145	8,361	11,095	17,496	14,604	12,523	19,001	17,413	26,515
[illegible]Nonfarm	28,354	31,154	35,630	39,687	45,899	51,413	72,771	81,120	93,408	106,872	126,260	144,681
Private	21,894	23,481	27,157	30,734	35,967	40,632	59,431	67,356	78,449	89,684	105,921	121,343
Agricultural services, forestry, fisheries, and other[5]	(D)	250	(D)	(D)	(D)	248	573	562	607	646	732	888
Mining	123	67	(D)	(D)	(D)	137	281	219	350	260	267	267
Construction	(D)	927	1,077	1,092	1,239	1,500	4,110	4,475	5,324	6,774	7,676	8,159
Manufacturing	8,506	9,468	11,632	13,451	16,936	18,670	20,057	22,031	26,329	30,838	40,134	45,163
Nondurable goods	4,004	3,790	3,890	3,637	6,025	7,274	9,072	9,517	9,001	10,927	13,153	14,877
Durable goods	4,502	5,678	7,742	9,814	10,911	11,396	10,985	12,514	17,328	19,911	26,981	30,286
Transportation and public utilities	2,672	2,683	2,942	3,358	3,654	4,400	4,378	4,383	4,813	5,409	5,589	8,580
Wholesale trade	930	1,659	1,724	1,959	2,156	2,311	3,638	5,936	6,268	7,117	7,491	8,795
Retail trade	4,159	3,820	4,198	4,186	4,595	5,265	12,939	12,811	14,704	16,385	18,301	20,740
Finance, insurance, and real estate	1,154	1,076	1,178	1,736	1,851	2,171	2,169	2,502	3,038	3,649	4,148	4,708
Services	3,374	3,521	4,115	4,638	5,186	5,930	11,286	14,437	17,016	18,606	21,583	24,043
Government and government enterprises[6]	6,460	7,673	8,473	8,953	9,932	10,781	13,340	13,764	14,959	17,188	20,339	23,338
Federal, civilian	760	837	943	977	1,104	1,174	1,274	1,435	1,646	1,734	1,931	2,052
Federal, military	112	124	127	125	132	132	569	566	608	618	657	723
State and local	5,588	6,712	7,403	7,851	8,696	9,475	11,497	11,763	12,705	14,836	17,751	20,563
[illegible]erivation of personal income by place of residence												
Total labor and proprietors' income by place of work	34,665	37,409	41,661	45,832	54,260	62,508	90,267	95,724	105,931	125,873	143,673	171,196
Less: Personal contributions for social insurance by place of work	1,606	1,784	2,006	2,139	2,504	2,901	4,306	4,725	5,283	5,703	6,762	7,360
[illegible]t labor and proprietors' income by place of work	33,059	35,625	39,655	43,693	51,756	59,607	85,961	90,999	100,648	120,170	136,911	163,336
[illegible]us: Residence adjustment	504	451	341	445	294	316	42,076	43,861	49,907	59,482	67,340	74,898
[illegible]t labor and proprietors' income by place of residence	33,563	36,076	39,996	44,138	52,050	59,923	128,037	134,860	150,555	179,652	204,251	238,234
Plus: Dividends, interest, and rent[7]	5,796	7,356	7,518	8,422	9,472	11,033	21,351	24,776	25,352	28,512	31,951	37,298
Plus: Transfer payments	10,610	13,530	14,228	15,275	16,646	19,039	19,578	23,787	26,105	28,437	31,373	35,571
[illegible]rsonal income by place of residence	49,969	56,962	61,742	67,835	78,168	89,995	168,966	183,423	202,012	236,601	267,575	310,903
[illegible]r capita personal income (dollars)	3,408	3,726	4,042	4,497	5,206	6,082	4,479	4,725	5,105	5,861	6,491	7,408

See footnotes at end of tables.

Table 5.—Personal Income for States and Counties of the Great Lakes Region, 1974–79—Continued

[Thousands of dollars]

	Sauk, Wisconsin						Sawyer, Wisconsin					
	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]
Labor and proprietors' income by place of work[3]												
By type												
Wage and salary disbursements	107,119	111,470	121,648	135,296	156,596	180,137	15,468	19,003	20,337	22,758	25,138	29,892
Other labor income	8,586	9,549	11,321	13,162	15,678	18,416	972	1,361	1,596	1,901	2,175	2,535
Proprietors' income[4]	30,964	35,021	30,473	36,717	41,794	54,796	3,722	4,468	4,803	6,001	7,037	7,975
Farm	17,340	20,300	13,810	19,308	23,531	34,432	617	560	281	1,221	1,985	2,345
Nonfarm[4]	13,624	14,721	16,663	17,409	18,263	20,364	3,105	3,908	4,522	4,780	5,052	5,630
By industry												
Farm	20,787	23,992	17,231	23,055	27,752	40,009	1,012	984	681	1,660	2,478	2,981
Nonfarm	125,882	132,048	146,211	162,120	186,316	213,340	19,150	23,848	26,055	29,000	31,872	37,421
Private	109,014	113,830	127,630	141,266	163,959	185,704	14,911	19,067	21,142	23,791	25,959	30,956
Agricultural services, forestry, fisheries, and other[5]	(D)	(D)	(D)	(D)	(D)	2,143	(D)	88	145	141	168	169
Mining	(D)	(D)	(D)	(D)	(D)	673	(D)	(L)	(L)	(L)	(L)	(L)
Construction	16,125	17,142	19,639	21,728	24,264	28,144	1,436	1,469	2,138	2,280	2,481	2,740
Manufacturing	40,372	35,767	40,365	44,715	52,793	59,863	2,929	2,983	3,396	4,154	5,205	4,891
Nondurable goods	23,581	21,279	19,526	20,333	22,479	24,516	173	323	402	471	602	648
Durable goods	16,791	14,488	20,839	24,382	30,314	35,347	2,756	2,660	2,994	3,683	4,603	4,243
Transportation and public utilities	7,298	6,481	8,154	9,223	10,791	12,284	686	969	1,052	1,364	1,430	1,606
Wholesale trade	4,646	9,321	10,393	11,100	12,170	14,398	418	796	967	1,047	997	1,026
Retail trade	20,179	19,412	21,318	23,080	26,030	30,331	5,078	6,191	6,435	6,646	7,104	8,321
Finance, insurance, and real estate	3,478	5,442	5,541	5,763	6,473	7,476	1,178	1,246	1,471	1,744	2,020	2,296
Services	15,300	17,457	20,399	23,828	26,958	30,392	2,969	5,296	5,509	6,385	6,528	9,872
Government and government enterprises[3]	16,868	18,218	18,581	20,854	24,357	27,636	4,239	4,781	4,913	5,209	5,913	6,465
Federal, civilian	2,193	2,003	1,968	1,908	2,118	2,251	905	1,052	1,036	1,030	1,217	1,293
Federal, military	333	352	361	361	378	384	85	93	96	98	103	102
State and local	14,342	15,863	16,252	18,585	21,861	25,001	3,249	3,636	3,781	4,081	4,593	5,070
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	146,669	156,040	163,442	185,175	214,068	253,349	20,162	24,832	26,736	30,660	34,350	40,402
Less: Personal contributions for social insurance by place of work	7,470	7,761	8,305	8,890	10,250	11,922	1,237	1,512	1,609	1,716	1,902	2,192
Net labor and proprietors' income by place of work	139,199	148,279	155,137	176,285	203,818	241,427	18,925	23,320	25,127	28,944	32,448	38,210
Plus: Residence adjustment	−3,605	−2,622	−2,530	−1,065	−5,012	−7,128	−428	−650	−655	−782	453	−85
Net labor and proprietors' income by place of residence	135,594	145,657	152,607	175,220	198,806	234,299	18,497	22,670	24,472	28,162	32,901	38,125
Plus: Dividends, interest, and rent[7]	30,587	33,886	34,873	39,509	44,391	51,654	7,411	7,611	7,934	9,077	10,206	11,887
Plus: Transfer payments	27,175	33,668	36,868	39,422	43,411	49,389	10,455	13,224	14,224	14,884	16,895	19,049
Personal income by place of residence	**193,356**	**213,211**	**224,348**	**254,151**	**286,608**	**335,342**	**36,363**	**43,505**	**46,630**	**52,123**	**60,002**	**69,061**
Per capita personal income (dollars)	**4,828**	**5,233**	**5,542**	**6,256**	**7,073**	**8,303**	**3,389**	**3,812**	**4,022**	**4,406**	**5,032**	**5,633**

	Sheboygan, Wisconsin						Taylor, Wisconsin					
	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]
Labor and proprietors' income by place of work[3]												
By type												
Wage and salary disbursements	345,480	352,470	401,107	454,402	522,220	592,838	31,221	34,678	39,066	44,091	51,779	58,664
Other labor income	28,311	31,821	38,576	46,379	53,919	63,331	2,152	2,665	3,229	3,918	4,747	5,591
Proprietors' income[4]	36,725	43,479	43,116	47,308	53,474	62,267	11,051	12,268	15,329	14,111	19,816	25,159
Farm	12,086	16,213	14,160	17,570	22,025	27,398	6,759	7,610	9,960	8,971	14,424	19,211
Nonfarm[4]	24,639	27,266	28,956	29,738	31,449	34,869	4,292	4,658	5,369	5,140	5,392	5,948
By industry												
Farm	14,731	19,047	16,820	20,482	25,294	31,663	7,689	8,608	10,899	9,994	15,570	20,710
Nonfarm	395,785	408,723	465,979	527,607	604,319	686,773	36,735	41,003	46,725	52,126	60,772	68,704
Private	354,356	361,735	415,840	472,283	540,936	616,149	31,057	34,552	39,789	45,169	53,411	61,020
Agricultural services, forestry, fisheries, and other[5]	996	880	960	1,056	1,174	(D)	693	(D)	(D)	(D)	752	975
Mining	288	275	344	200	233	(D)	0	(D)	(D)	(D)	(D)	(D)
Construction	25,386	24,208	28,252	33,092	38,231	41,863	2,549	2,614	3,115	3,911	4,467	4,955
Manufacturing	198,396	193,061	226,653	256,923	300,835	345,518	12,408	13,831	16,703	20,032	24,352	27,974
Nondurable goods	57,377	59,960	68,960	71,255	81,657	86,841	3,052	3,662	4,563	5,431	6,992	9,409
Durable goods	141,019	133,101	157,693	185,668	219,178	258,677	9,356	10,169	12,140	14,601	17,360	18,565
Transportation and public utilities	16,293	16,383	17,766	21,130	23,831	26,567	2,360	2,231	2,667	2,836	3,457	3,790
Wholesale trade	20,833	23,572	25,958	27,527	28,780	26,288	2,757	3,961	3,901	4,464	(D)	(D)
Retail trade	38,396	40,866	44,519	49,412	53,981	67,293	5,218	5,383	5,637	5,697	6,297	7,181
Finance, insurance, and real estate	13,709	14,141	16,614	19,371	22,070	24,888	1,092	1,380	1,773	2,122	2,442	2,793
Services	40,059	48,349	54,774	63,572	71,801	82,074	3,980	4,463	5,116	5,415	6,400	7,119
Government and government enterprises[3]	41,429	46,988	50,139	55,324	63,383	70,624	5,678	6,451	6,936	6,957	7,361	7,684
Federal, civilian	2,934	3,200	3,602	3,698	4,207	4,470	860	884	1,000	1,021	1,108	1,178
Federal, military	941	966	999	1,006	1,060	1,100	162	172	181	183	195	200
State and local	37,554	42,822	45,538	50,620	58,116	65,054	4,656	5,395	5,755	5,753	6,058	6,306
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	410,516	427,770	482,799	548,089	629,613	718,436	44,424	49,611	57,624	62,120	76,342	89,414
Less: Personal contributions for social insurance by place of work	22,869	23,438	25,627	28,095	32,449	37,904	2,220	2,423	2,647	2,938	3,472	4,038
Net labor and proprietors' income by place of work	387,647	404,332	457,172	519,994	597,164	680,532	42,204	47,188	54,977	59,182	72,870	85,376
Plus: Residence adjustment	694	0	−4	−273	−543	−431	3,391	3,357	3,754	4,089	4,500	4,945
Net labor and proprietors' income by place of residence	388,341	404,332	457,168	519,721	596,621	680,101	45,595	50,545	58,731	63,271	77,370	90,321
Plus: Dividends, interest, and rent[7]	75,672	82,975	85,356	96,050	107,398	124,160	8,416	9,396	10,078	11,815	13,292	15,487
Plus: Transfer payments	55,115	69,981	74,103	78,705	87,198	99,769	10,172	13,236	13,477	14,223	15,985	18,567
Personal income by place of residence	**519,128**	**557,288**	**616,627**	**694,476**	**791,217**	**904,030**	**64,183**	**73,177**	**82,286**	**89,309**	**106,647**	**124,375**
Per capita personal income (dollars)	5,178	5,552	6,173	6,903	7,852	8,923	3,580	3,945	4,374	4,650	5,505	6,508

Table 5.—Personal Income for States and Counties of the Great Lakes Region, 1974–79—Continued

[Thousands of dollars]

	Trempealeau, Wisconsin						Vernon, Wisconsin					
	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]
Labor and proprietors' income by place of work[3]												
By type												
Wage and salary disbursements	41,500	44,032	50,861	59,262	63,592	71,754	33,512	34,739	36,910	41,245	48,349	56,005
Other labor income	2,967	3,496	4,498	5,789	6,207	6,956	2,587	2,695	2,962	3,629	4,422	5,502
Proprietors' income[4]	22,820	22,174	17,275	25,173	30,411	37,950	19,860	20,071	22,321	27,663	28,996	42,430
Farm	15,860	14,657	9,241	16,311	21,045	27,180	12,665	12,803	15,284	19,379	20,524	32,827
Nonfarm[4]	6,960	7,517	8,034	8,862	9,366	10,770	7,195	7,268	7,537	8,284	8,472	9,603
By industry												
[illegible]	18,470	17,453	11,852	19,173	24,262	31,395	20,443	20,114	17,159	21,435	22,843	35,882
Farm	48,817	52,249	60,782	71,051	75,948	85,265	40,479	42,279	45,534	51,102	58,924	68,055
Private	38,285	40,114	47,484	56,691	59,794	67,310	31,082	31,981	34,776	39,853	46,539	54,698
Agricultural services, forestry, fisheries, and other[4]	(D)	(D)	(D)	(D)	(D)	(D)	289	325	398	533	702	862
Mining	(D)	(D)	(D)	(D)	(D)	(D)	60	93	(L)	(L)	51	62
Construction	2,090	2,115	2,703	3,167	3,897	4,590	2,287	1,761	2,491	3,104	3,958	3,847
Manufacturing	14,874	14,814	19,663	24,319	23,433	24,270	4,803	4,610	5,033	6,040	8,134	9,722
Nondurable goods	9,266	9,591	13,085	15,731	12,940	11,818	2,900	3,124	3,375	3,967	5,107	5,821
Durable goods	5,608	5,223	6,578	8,588	10,593	12,452	1,903	1,486	1,658	2,073	3,027	3,901
Transportation and public utilities	2,525	2,638	2,985	3,239	3,649	4,817	3,350	3,468	3,945	4,256	4,494	5,749
Wholesale trade	1,477	3,238	3,422	3,631	3,926	4,746	4,946	5,078	5,142	6,189	7,476	7,324
Retail trade	9,535	8,665	9,430	10,731	11,606	13,091	5,152	5,407	7,158	8,206	9,077	9,841
Finance, insurance, and real estate	1,791	1,652	1,857	2,232	2,496	3,072	1,525	1,787	2,078	2,484	2,732	3,154
Services	5,578	6,448	6,894	8,642	9,897	11,702	6,335	7,213	7,598	8,998	9,915	11,137
Government and government enterprises[5]	10,532	12,135	13,298	14,360	16,154	17,955	9,396	10,298	10,758	11,249	12,385	13,357
Federal, civilian	1,473	1,658	2,121	2,034	2,060	2,189	1,309	1,266	1,625	1,674	1,872	1,989
Federal, military	206	218	225	229	240	245	233	244	248	253	265	274
State and local	8,853	10,259	10,952	12,097	13,854	15,521	7,854	8,678	8,885	9,322	10,248	11,094
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	67,287	69,702	72,634	90,224	100,210	116,660	60,922	62,893	62,693	72,537	81,767	103,937
Less: Personal contributions for social insurance by place of work	2,969	3,115	3,478	3,852	4,130	4,774	2,633	2,621	2,785	2,966	3,447	3,971
Net labor and proprietors' income by place of work	64,318	66,587	69,156	86,372	96,080	111,886	58,289	59,772	59,908	69,571	78,320	99,966
Plus: Residence adjustment	6,558	6,604	6,750	7,431	8,713	9,738	9,407	9,322	11,689	13,222	15,044	16,652
Net labor and proprietors' income by place of residence	70,876	73,191	75,906	93,803	104,793	121,624	67,796	69,094	71,597	82,793	93,364	116,618
Plus: Dividends, interest, and rent[7]	12,848	14,367	14,714	16,687	18,761	21,900	13,273	15,053	16,108	18,909	21,275	24,823
Plus: Transfer payments	17,371	21,311	23,131	24,664	26,950	30,944	16,434	19,847	21,329	22,993	25,048	28,321
Personal income by place of residence	101,095	108,869	113,751	135,154	150,504	174,468	97,503	104,594	109,034	124,695	139,687	169,762
Per capita personal income (dollars)	4,278	4,481	4,707	5,479	6,079	7,070	3,842	4,134	4,401	4,913	5,489	6,724

	Vilas, Wisconsin						Walworth, Wisconsin					
	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]
Labor and proprietors' income by place of work[3]												
By type												
Wage and salary disbursements	21,728	26,577	30,389	34,224	41,193	44,254	176,727	179,835	196,322	223,318	252,976	278,246
Other labor income	1,449	1,867	2,307	2,785	3,360	3,801	15,108	15,084	16,589	20,593	24,251	27,410
Proprietors' income[4]	3,582	3,999	4,140	5,099	5,347	5,934	27,617	25,961	23,226	29,467	31,098	37,836
Farm	−55	−424	−826	42	99	−4	9,451	7,438	1,787	7,030	7,377	11,626
Nonfarm[4]	3,637	4,423	4,966	5,057	5,248	5,938	18,166	18,523	21,439	22,437	23,721	26,210
By industry												
Farm	340	1	−418	487	599	632	13,253	11,516	5,634	11,240	12,099	17,747
Nonfarm	26,419	32,442	37,254	41,621	49,301	53,357	204,199	209,364	230,503	262,138	296,226	325,745
Private	22,086	27,414	31,731	35,399	41,934	45,022	164,055	163,755	180,900	210,241	239,701	265,788
Agricultural services, forestry, fisheries, and other[4]	(D)	64	53	131	154	(D)	1,085	1,132	1,191	(D)	(D)	1,803
Mining	(D)	(L)	(L)	(L)	(L)	(D)	108	226	291	(D)	(D)	233
Construction	2,197	2,212	2,880	3,855	4,801	5,344	12,275	11,534	13,522	16,178	18,242	20,031
Manufacturing	4,449	4,718	5,147	4,987	5,721	7,000	57,408	51,208	57,299	80,071	91,298	103,169
Nondurable goods	583	929	1,014	1,133	1,328	1,386	15,469	13,453	14,591	16,225	19,335	23,811
Durable goods	3,766	3,789	4,133	3,854	4,393	5,614	51,939	47,755	52,708	63,846	71,962	79,358
Transportation and public utilities	595	760	907	1,255	1,517	1,535	13,463	12,717	13,806	16,018	17,999	15,573
Wholesale trade	2,144	2,075	2,374	2,717	2,843	3,079	5,365	9,183	10,593	11,931	14,550	16,382
Retail trade	5,500	6,921	7,702	8,246	8,736	10,490	27,977	29,147	32,088	35,909	41,184	48,446
Finance, insurance, and real estate	806	989	1,110	1,352	1,722	1,778	5,328	5,946	8,011	9,451	10,934	12,023
Services	6,120	9,645	11,521	12,833	16,396	15,560	30,046	32,662	34,099	38,908	43,485	48,128
Government and government enterprises[5]	4,333	5,028	5,523	6,222	7,367	8,335	40,144	45,609	49,603	51,897	56,525	59,957
Federal, civilian	906	937	1,139	1,151	1,358	1,443	1,883	2,004	2,323	2,472	2,886	3,066
Federal, military	101	109	113	121	136	135	635	652	690	702	750	781
State and local	3,426	3,982	4,271	4,950	5,873	6,757	37,626	42,953	46,590	48,723	52,889	56,110
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	26,759	32,443	36,836	42,108	49,900	53,989	217,452	220,880	236,137	273,378	308,325	343,592
Less: Personal contributions for social insurance by place of work	1,594	1,875	2,256	2,435	2,894	3,352	11,545	11,560	12,258	13,452	15,408	17,898
Net labor and proprietors' income by place of work	25,165	30,568	34,580	39,673	47,006	50,637	205,907	209,320	223,879	259,926	292,917	325,694
Plus: Residence adjustment	−843	−1,355	−1,675	−1,886	−2,581	−2,711	30,891	34,851	39,577	42,238	49,615	57,024
Net labor and proprietors' income by place of residence	24,322	29,203	32,905	37,787	44,425	47,926	236,798	244,171	263,456	302,214	342,532	382,618
Plus: Dividends, interest, and rent[7]	13,308	14,396	15,822	18,827	21,150	24,556	49,697	58,124	59,363	65,860	73,700	85,282
Plus: Transfer payments	11,885	14,731	16,705	18,721	21,166	24,115	38,987	48,335	52,452	56,322	62,678	71,506
Personal income by place of residence	49,515	58,330	65,432	75,335	86,741	96,637	325,452	351,630	375,471	424,396	478,910	539,406
Per capita personal income (dollars)	3,812	4,353	4,806	5,181	5,763	6,382	5,020	5,389	5,626	6,232	6,961	7,778

See footnotes at end of tables.

Table 5.—Personal Income for States and Counties of the Great Lakes Region, 1974–79—Continued

[Thousands of dollars]

	Washburn, Wisconsin						Washington, Wisconsin					
	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]
Labor and proprietors' income by place of work[3]												
By type												
Wage and salary disbursements	21,113	24,974	27,671	30,293	31,488	34,238	189,765	192,432	224,662	253,145	294,313	327,572
Other labor income	1,337	1,842	2,232	2,479	2,600	2,935	16,039	18,671	23,321	27,258	32,205	36,747
Proprietors' income[4]	5,116	5,089	5,155	5,554	6,355	7,920	26,760	27,921	27,781	33,086	36,614	42,382
Farm	1,769	1,329	1,088	1,229	1,840	2,828	10,498	9,630	7,619	10,910	13,190	16,508
Nonfarm[4]	3,347	3,760	4,067	4,325	4,515	5,092	16,262	18,291	20,162	22,176	23,424	25,874
By industry												
Farm	2,233	1,827	1,566	1,753	2,426	3,573	12,286	11,547	9,409	12,871	15,394	19,398
Nonfarm	25,333	30,078	33,492	36,573	38,017	41,520	220,278	227,477	266,355	300,618	347,738	387,303
Private	19,802	23,810	26,710	29,173	29,623	32,224	195,589	200,548	234,000	265,304	307,229	342,123
Agricultural services, forestry, fisheries, and other[5]	141	126	130	140	186	206	746	795	809	932	1,137	1,345
Mining	0	0	0	0	0	0	725	833	795	886	1,233	1,352
Construction	1,295	1,467	1,668	2,056	2,345	2,430	11,746	13,067	16,560	23,667	26,925	28,884
Manufacturing	3,070	5,411	6,313	5,627	5,339	5,757	119,295	111,099	130,832	142,786	171,028	188,929
Nondurable goods	639	2,861	3,062	2,209	1,589	1,899	21,665	21,425	24,790	29,314	33,437	36,659
Durable goods	2,431	2,550	3,251	3,418	3,750	3,858	97,630	89,674	106,042	113,472	137,591	152,270
Transportation and public utilities	1,772	1,895	2,094	2,149	2,442	3,176	8,972	9,917	12,132	12,762	13,812	14,431
Wholesale trade	866	1,578	1,613	1,681	1,821	2,346	5,157	9,412	10,557	12,473	12,591	16,402
Retail trade	6,678	6,660	7,371	7,871	8,116	8,580	22,540	23,601	26,189	28,794	31,845	35,429
Finance, insurance, and real estate	908	847	1,019	1,212	1,391	1,545	7,711	10,118	11,531	13,964	15,566	16,446
Services	5,072	5,826	6,502	8,437	7,983	8,184	18,797	21,706	24,595	29,040	33,092	37,905
Government and government enterprises[6]	5,531	6,268	6,782	7,400	8,394	9,296	24,589	26,929	32,355	35,314	40,509	45,180
Federal, civilian	1,445	1,545	1,731	1,808	1,978	2,102	2,452	2,706	3,082	2,893	3,324	3,532
Federal, military	135	139	148	151	160	168	590	630	657	685	749	755
State and local	3,951	4,584	4,903	5,441	6,256	7,026	21,547	23,593	28,616	31,736	36,436	40,893
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	27,566	31,905	35,058	38,326	40,443	45,093	232,564	239,024	275,764	313,489	363,132	406,701
Less: Personal contributions for social insurance by place of work	1,583	1,848	2,044	2,124	2,218	2,562	12,682	12,812	14,405	15,727	18,456	21,540
Net labor and proprietors' income by place of work	25,983	30,057	33,014	36,202	38,225	42,531	219,882	226,212	261,359	297,762	344,676	385,161
Plus: Residence adjustment	285	106	189	324	706	1,017	94,991	107,870	115,126	145,016	172,623	209,555
Net labor and proprietors' income by place of residence	26,268	30,163	33,203	36,526	38,931	43,548	314,873	334,082	376,485	442,778	517,299	594,716
Plus: Dividends, interest, and rent[7]	6,669	7,823	7,997	9,027	10,156	11,840	51,774	58,119	61,954	71,892	79,995	92,399
Plus: Transfer payments	12,038	15,307	16,891	18,795	20,647	23,227	30,480	40,649	43,398	47,510	53,423	62,574
Personal income by place of residence	**44,975**	**53,293**	**58,091**	**64,348**	**69,734**	**78,615**	**397,127**	**432,850**	**481,837**	**562,180**	**650,717**	**749,689**
Per capita personal income (dollars)	**3,787**	**4,271**	**4,540**	**4,924**	**5,337**	**6,014**	**5,369**	**5,724**	**6,253**	**7,008**	**7,759**	**8,671**

	Waukesha, Wisconsin						Waupaca, Wisconsin					
	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]	1974[1]	1975[2]	1976[2]	1977[2]	1978[2]	1979[2]
Labor and proprietors' income by place of work[3]												
By type												
Wage and salary disbursements	750,369	834,908	926,947	1,105,358	1,299,662	1,492,239	78,186	88,453	99,665	112,092	126,782	141,795
Other labor income	56,423	70,662	83,075	104,817	126,269	149,891	7,655	9,093	10,970	13,127	15,092	17,828
Proprietors' income[4]	95,638	107,750	115,296	132,845	139,305	154,858	22,127	25,278	23,121	29,779	33,519	41,717
Farm	5,841	9,102	3,489	8,337	7,753	11,252	9,557	11,782	8,671	14,342	17,363	23,504
Nonfarm[4]	89,797	98,648	111,807	124,508	131,552	143,606	12,570	13,496	14,450	15,437	16,156	18,213
By industry												
Farm	8,182	11,611	5,852	10,926	10,658	15,020	11,646	14,023	10,756	16,624	19,929	26,881
Nonfarm	894,248	1,001,709	1,119,466	1,332,094	1,554,578	1,781,968	96,322	108,801	123,000	138,374	155,464	174,459
Private	795,152	895,704	1,001,765	1,200,440	1,402,145	1,611,304	75,868	85,536	97,852	111,802	126,243	143,088
Agricultural services, forestry, fisheries, and other[5]	2,029	3,166	3,600	4,954	6,012	7,323	533	700	821	856	986	1,243
Mining	4,033	3,903	3,919	3,882	4,733	5,775	299	214	483	328	320	374
Construction	106,841	105,307	119,572	149,684	170,744	178,383	3,774	3,446	4,168	5,060	5,894	6,050
Manufacturing	322,759	349,038	380,209	466,569	562,576	662,411	35,116	35,035	41,041	47,879	55,103	61,518
Nondurable goods	71,609	75,102	88,384	110,010	129,920	150,433	6,606	9,558	10,245	11,762	13,387	14,543
Durable goods	251,150	273,936	291,825	356,559	432,656	511,978	28,510	25,477	30,796	36,117	41,716	46,975
Transportation and public utilities	30,040	45,704	56,032	63,750	76,123	89,414	4,197	4,721	5,581	6,552	7,681	8,931
Wholesale trade	81,871	94,793	105,801	130,505	146,397	174,756	3,257	5,747	6,347	7,305	8,184	9,895
Retail trade	94,354	107,945	119,093	135,473	152,207	171,845	14,925	15,648	17,259	19,392	21,329	24,007
Finance, insurance, and real estate	20,530	32,059	40,680	49,133	59,533	67,495	3,045	4,256	5,301	5,991	6,734	7,833
Services	132,695	153,789	172,859	196,490	223,820	253,902	12,722	15,769	16,851	18,439	20,012	23,237
Government and government enterprises[6]	99,096	106,005	117,701	131,654	152,433	170,664	20,454	23,265	25,148	26,572	29,221	31,371
Federal, civilian	6,166	6,773	7,621	8,171	9,840	10,456	1,510	1,670	1,931	2,055	2,302	2,446
Federal, military	1,914	2,071	2,167	2,236	2,454	2,457	371	388	401	407	427	441
State and local	91,016	97,161	107,913	121,247	140,139	157,751	18,573	21,207	22,816	24,110	26,492	28,484
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	902,430	1,013,320	1,125,318	1,343,020	1,565,236	1,796,988	107,968	122,824	133,756	154,998	175,393	201,340
Less: Personal contributions for social insurance by place of work	50,990	56,852	60,862	70,158	82,764	96,725	5,731	6,403	6,832	7,346	8,341	9,655
Net labor and proprietors' income by place of work	851,440	956,468	1,064,456	1,272,862	1,482,472	1,700,263	102,237	116,421	126,924	147,652	167,052	191,682
Plus: Residence adjustment	433,159	450,459	525,630	568,390	657,810	750,770	4,430	3,990	4,610	4,164	4,292	6,585
Net labor and proprietors' income by place of residence	1,284,599	1,406,927	1,590,086	1,841,252	2,140,282	2,451,033	106,667	120,411	131,534	151,816	171,344	198,267
Plus: Dividends, interest, and rent[7]	193,804	214,334	225,909	258,194	285,625	328,039	24,969	27,680	29,047	33,403	37,464	43,544
Plus: Transfer payments	101,800	131,909	143,031	154,711	173,669	204,172	31,887	38,605	40,704	43,368	48,040	54,727
Personal income by place of residence	**1,580,203**	**1,753,170**	**1,959,026**	**2,254,157**	**2,599,576**	**2,983,244**	**163,523**	**186,696**	**201,285**	**228,587**	**256,848**	**296,538**
Per capita personal income (dollars)	**6,390**	**6,881**	**7,515**	**8,378**	**9,183**	**10,138**	**4,069**	**4,546**	**4,895**	**5,493**	**6,056**	**6,858**

Table 5.—Personal Income for States and Counties of the Great Lakes Region, 1974–79—Continued

(Thousands of dollars)

	Waushara, Wisconsin						Winnebago, Wisconsin					
	1974[1]	1975[1]	1976[1]	1977[1]	1978[1]	1979[1]	1974[1]	1975[1]	1976[1]	1977[1]	1978[1]	1979[1]
Labor and proprietors' income by place of work[2]												
By type												
Wage and salary disbursements	19,369	21,747	23,166	27,298	33,681	38,026	489,180	524,796	588,011	664,082	742,472	822,528
Other labor income	1,323	1,560	1,816	2,402	3,010	3,446	42,975	50,682	59,903	71,939	82,892	96,558
Proprietors' income[4]	9,367	9,917	5,302	12,867	14,107	17,142	40,706	43,874	43,652	50,001	51,616	62,920
Farm	5,821	6,017	1,227	8,293	9,193	11,737	10,416	10,691	7,023	12,046	11,559	18,717
Nonfarm[4]	3,546	3,900	4,075	4,574	4,914	5,405	30,290	33,183	36,629	37,955	40,057	44,203
By industry												
Farm	8,422	8,796	3,814	11,133	12,399	15,934	12,048	12,444	8,664	13,842	13,573	21,349
Nonfarm	22,142	24,428	26,470	31,434	38,399	42,680	560,813	606,908	682,902	772,180	863,407	960,657
Private	16,959	18,726	20,580	25,143	31,304	34,899	485,252	523,320	593,004	671,971	749,745	835,503
Agricultural services, forestry, fisheries, and other[5]	(D)	(D)	(D)	(D)	2,368	2,584	1,008	(D)	(D)	1,276	1,416	1,629
Mining	(D)	(D)	(D)	(D)	(D)	(D)	2,388	(D)	(D)	2,605	2,994	3,494
Construction	1,071	1,152	1,510	1,816	(D)	(D)	24,378	26,578	37,347	39,415	39,562	45,793
Manufacturing	3,333	3,383	3,530	4,533	5,274	5,762	285,226	299,207	336,407	384,276	444,158	498,239
Nondurable goods	845	1,484	1,632	1,865	2,106	2,114	160,535	172,351	196,848	225,907	258,374	288,069
Durable goods	2,488	1,899	1,898	2,668	3,168	3,648	124,691	126,856	139,559	158,369	185,784	210,170
Transportation and public utilities	1,631	1,869	2,090	2,420	3,033	3,239	21,224	20,418	29,894	39,895	37,242	34,623
Wholesale trade	1,056	1,892	1,949	2,459	3,747	4,696	19,949	21,744	23,612	25,600	27,946	32,474
Retail trade	4,605	4,866	5,368	5,929	6,802	7,696	50,587	55,672	59,350	64,784	69,839	77,605
Finance, insurance, and real estate	1,019	658	804	1,913	2,104	2,532	17,536	19,649	22,310	24,406	27,077	29,631
Services	3,625	4,116	4,467	4,917	5,635	5,747	62,956	76,258	80,145	89,714	99,511	112,015
Government and government enterprises[1,3]	5,183	5,702	5,890	6,291	7,095	7,781	75,561	83,588	89,898	100,209	113,662	125,154
Federal, civilian	677	734	813	822	948	1,007	5,850	5,805	6,735	8,108	8,866	9,422
Federal, military	123	131	135	138	144	144	1,354	1,382	1,446	1,451	1,525	1,608
State and local	4,383	4,837	4,941	5,331	6,003	6,630	68,357	76,401	81,717	90,650	103,271	114,124
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	30,564	33,224	30,284	42,567	50,798	58,614	572,861	619,352	691,566	786,022	876,980	982,006
Less: Personal contributions for social insurance by place of work	1,436	1,567	1,655	1,849	2,260	2,607	31,545	33,971	36,691	40,358	45,810	53,550
Net labor and proprietors' income by place of work	29,128	31,657	28,629	40,718	48,538	56,007	541,316	585,381	654,875	745,664	831,170	928,456
Plus: Residence adjustment	11,260	11,545	13,066	14,947	16,971	19,155	−27,323	−29,491	−35,024	−48,453	−53,109	−53,256
Net labor and proprietors' income by place of residence	40,388	43,202	41,695	55,665	65,509	75,162	513,993	555,890	619,851	697,211	778,061	875,200
Plus: Dividends, interest, and rent[6]	9,792	10,737	11,274	13,004	14,616	17,015	95,229	103,702	107,528	121,443	135,482	156,148
Plus: Transfer payments	11,845	15,174	16,073	17,471	19,577	22,458	76,051	92,867	101,489	109,333	119,901	136,081
Personal income by place of residence	62,025	69,113	69,042	86,140	99,702	114,635	685,273	752,459	828,868	927,987	1,033,444	1,167,429
Per capita personal income (dollars)	3,898	4,284	4,213	5,173	5,903	6,627	5,262	5,729	6,293	7,028	7,829	8,815

	Wood, Wisconsin						Shawano (Incl. Menominee), Wisconsin					
	1974[1]	1975[1]	1976[1]	1977[1]	1978[1]	1979[1]	1974[1]	1975[1]	1976[1]	1977[1]	1978[1]	1979[1]
Labor and proprietors' income by place of work[2]												
By type												
Wage and salary disbursements	254,341	268,910	308,180	346,084	388,722	422,495	52,699	58,197	64,694	73,305	82,609	93,714
Other labor income	20,154	23,553	28,834	34,603	39,676	44,851	3,472	4,089	4,850	5,777	6,659	7,873
Proprietors' income[4]	24,335	25,096	24,909	27,807	31,974	36,823	25,420	27,259	29,933	32,909	41,102	51,186
Farm	6,840	6,261	4,792	6,927	10,008	12,236	15,967	16,960	18,829	21,396	29,036	37,640
Nonfarm[4]	17,495	18,835	20,117	20,880	21,966	24,587	9,453	10,299	11,104	11,413	12,066	13,546
By industry												
Farm	9,360	8,961	7,350	9,729	12,154	15,285	18,079	19,227	20,951	23,725	31,647	41,048
Nonfarm	289,470	308,598	354,573	398,765	447,218	487,384	63,512	70,318	78,516	88,169	98,723	111,725
Private	256,379	271,200	314,670	359,469	406,529	446,526	51,606	56,964	64,585	72,314	80,376	91,127
Agricultural services, forestry, fisheries, and other[5]	504	570	611	827	940	(D)	511	3,084	3,240	3,762	4,011	4,551
Mining	100	(L)	(L)	(L)	(L)	(D)	150	161	222	230	(D)	252
Construction	16,407	12,804	15,531	19,689	21,355	24,318	4,038	4,203	4,783	6,083	5,254	7,150
Manufacturing	127,929	135,934	161,581	184,084	207,163	220,557	14,286	14,287	17,124	19,962	22,367	24,992
Nondurable goods	91,120	99,378	116,362	133,890	149,366	160,968	6,947	7,208	8,868	9,154	9,998	10,848
Durable goods	36,809	36,556	45,319	50,194	57,797	59,589	7,339	7,079	8,256	10,808	12,369	14,144
Transportation and public utilities	13,816	16,176	18,974	21,644	24,856	27,641	2,115	2,204	2,379	2,665	(D)	3,666
Wholesale trade	13,088	15,455	16,841	19,479	22,904	26,378	3,418	5,555	6,259	6,412	7,258	8,426
Retail trade	32,251	32,261	36,711	40,455	46,337	52,721	14,302	14,914	16,699	18,192	19,488	22,149
Finance, insurance, and real estate	5,088	5,619	6,541	7,945	9,395	11,225	4,181	2,555	3,024	3,461	4,405	5,133
Services	47,196	52,350	57,650	65,326	73,561	82,650	8,605	9,901	10,855	11,547	13,357	14,736
Government and government enterprises[1,3]	33,091	37,398	39,903	39,296	40,689	41,358	11,906	13,354	13,931	15,852	18,347	20,598
Federal, civilian	2,481	2,636	3,022	3,212	3,637	3,864	1,383	1,524	1,562	1,934	2,179	2,315
Federal, military	590	618	645	653	693	709	306	321	330	335	358	365
State and local	30,020	34,144	36,236	35,431	36,359	36,785	10,217	11,509	12,039	13,583	15,810	17,918
Derivation of personal income by place of residence												
Total labor and proprietors' income by place of work	298,830	317,559	361,923	408,494	460,372	504,169	81,591	89,545	99,477	111,891	130,370	152,773
Less: Personal contributions for social insurance by place of work	16,580	17,544	19,347	21,342	24,399	28,515	3,838	4,207	4,645	5,011	5,624	6,504
Net labor and proprietors' income by place of work	282,250	300,015	342,576	387,152	435,973	475,654	77,753	85,338	94,832	106,880	124,746	146,269
Plus: Residence adjustment	−27,632	−28,490	−33,483	−38,050	−42,687	−46,076	14,733	15,916	18,275	20,955	23,797	25,438
Net labor and proprietors' income by place of residence	254,618	271,525	309,093	349,102	393,286	429,578	92,486	101,254	113,107	127,835	148,543	172,707
Plus: Dividends, interest, and rent[6]	41,582	47,256	49,628	56,545	63,178	72,860	20,198	23,359	23,731	25,692	29,966	34,942
Plus: Transfer payments	39,902	50,283	52,679	57,588	64,834	75,042	23,544	33,989	31,142	33,721	38,301	44,127
Personal income by place of residence	336,102	369,064	411,400	463,235	521,298	577,480	136,228	158,602	168,040	188,208	216,840	251,796
Per capita personal income (dollars)	4,987	5,403	5,962	6,613	7,359	8,104	3,665	4,225	4,470	4,942	5,587	6,414

See footnotes at end of tables.

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