



Iowa State Rail Plan Final

Appendix C

Economic Impacts



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Executive Summary

Rail economic impacts to Iowa are derived from the IMPLAN® economic model with input data and assumptions from freight movement data (via the STB WAYBILL) and passenger rail operations and visitor characteristics. Impacts of rail activities in Iowa emanate from firms providing freight and passenger transport services, industries using such services to trade goods (shippers/receivers), and tourism-related visitors to Iowa via rail. Of these activities, freight-users generate the most significant impacts.

Impacts are calculated and presented by activity (service provision and rail users), type (direct, indirect, induced, and total), and measure (employment, income, value added, output, and tax revenue) for year 2013 to provide a comprehensive perspective on how rail in Iowa impacts the economy:

- **Employment** – Economic impacts of rail extend beyond the 3,520 directly employed in the provision of rail transport (both passenger and freight). When the freight and visitor user impact activities and multiplier impacts are included, rail-related employment in Iowa totals 219,380 jobs, which represent 10.8% of the 2.0 million jobs statewide.
- **Income** – \$13.8 billion earned by these total employees represent 13.6% of Iowa's total labor income.
- **Value-Added** – And, the combined value-added impact, \$24.2 billion, associated with the rail services and users represent 14.7% of the state's Gross State Product (GSP).

Table C.1: Rail Economic Impacts in Iowa

MEASURE AND TYPE	TRANSPORT SERVICES			TRANSPORT USERS			TOTAL		
	PASS.	FREIGHT	SERVICES	PASS.	FREIGHT	USERS	PASS.	FREIGHT	TOTAL
EMPLOYMENT*									
Direct	20	3,500	3,520	230	66,450	66,680	250	69,960	70,200
Total	40	8,830	8,860	300	210,220	210,510	330	219,040	219,380
INCOME**									
Direct	\$1.1	\$365.9	\$367.0	\$4.8	\$6,411.3	\$6,416.1	\$5.9	\$6,777.2	\$6,783.1
Total	\$1.7	\$600.6	\$602.4	\$7.6	\$13,214.2	\$13,221.8	\$9.4	\$13,814.8	\$13,824.2
VALUE ADDED**									
Direct	\$1.9	\$1,075.5	\$1,077.4	\$7.1	\$11,196.9	\$11,204.0	\$9.0	\$12,272.4	\$12,281.4
Total	\$3.0	\$1,448.0	\$1,451.0	\$12.0	\$22,705.5	\$22,717.6	\$15.0	\$24,153.6	\$24,168.6
OUTPUT**									
Direct	\$3.6	\$1,725.8	\$1,729.4	\$13.4	\$43,029.3	\$43,042.6	\$17.0	\$44,755.0	\$44,772.0
Total	\$5.6	\$2,428.0	\$2,433.6	\$22.3	\$66,970.4	\$66,992.7	\$27.9	\$69,398.4	\$69,426.3
TAX REVENUE**									
Direct	\$0.05	\$18.3	\$18.4	\$1.2	\$475.0	\$476.2	\$1.3	\$493.3	\$494.6
Total	\$0.14	\$49.5	\$49.6	\$1.6	\$1,325.5	\$1,327.1	\$1.8	\$1,375.0	\$1,376.7

Source: CDM Smith, Amtrak, WAYBILL, and IMPLAN

* Employment rounded to nearest ten job-years; totals may not sum due to rounding

** in millions of 2013 dollars

C.1 Introduction

Economic impacts of rail activities in Iowa emanate from firms providing freight and passenger rail services, industries using such services to trade goods (shippers/receivers), and tourism-related visitors to Iowa via rail. Of these activities, freight-users generate the most significant impacts.

The Surface Transportation Board (STB) WAYBILL SAMPLE freight database is used to analyze Iowa rail goods movements. WAYBILL-derived, inbound, outbound, and intrastate commodity volumes and values¹ are applied, together with the IMPLAN® economic model, to determine how commodity movements generate direct economic impacts in Iowa relating to shippers/receivers.

Additionally, visitors to Iowa via rail (spending on accommodations, food and beverages, recreational activities, etc.) and the provision of freight and passenger rail services also yield direct economic impacts.

Indirect impacts associated with suppliers, and induced impacts associated with the re-spending of income, are also quantified. Combined, the direct, indirect, and induced comprise total economic impacts, with each measured in terms of employment, income, value-added (i.e., Gross State Product), output, and taxes. The following sections outline the methodology employed, relevant commodity/input data, and modeling results.

C.2 Methodology, Data Sources, and Analysis Assumptions

The analysis categorically addresses the range of economic impacts directly and tangentially related to rail transportation. The following subsection outlines this methodology, data sources, economic model, and the applied assumptions for freight and passenger movements.

C2.1 Methodology and Terminology

Economic impacts of rail are categorized into two broad activities: transport service providers and transport users. For each activity, three types are quantified: direct, indirect, and induced. And for each type, five measures are derived: jobs (employment), income, value-added, output, and taxes. Activities, types, and measures are defined below.

Activities — Iowa rail-related economic impacts are categorized into service provider and user impacts. Rail transport services would be curtailed in the absence of rail activity (elimination of goods or passenger movements). And, transport user impacts pertain to industries using freight rail to transport goods or the industries supporting visitors to Iowa travelling by rail.

- **Transport Service Providers** — Impacts associated with the provision of rail transport (e.g., the rail industry) include a wide range of primarily modal transport activity, but also may include other support administrative operations. Service provider impacts are based on existing transportation industry information in the IMPLAN® model (e.g., “rail transportation” and “scenic and sightseeing transportation”). It reflects freight (e.g., BNSF), passenger (i.e., Amtrak), and scenic railroad operations.
- **Transport Users** — Impacts associated with shippers/receivers of freight and the industries that supply goods and services to out-of-state visitors traveling via rail.
 - **Freight Users** — Impacts associated with shippers/receivers using freight rail for goods movement (e.g., intermediate and final goods, etc.), excepting the rail industry itself. Rail users have several options available to transport freight and could possibly substitute other modal transport (truck and/or water) if rail services became unavailable. However, the choice to use railroads to ship/receive freight indicates cost and/or logistical advantages, and as such, removal of such advantages would negatively affect rail users.

¹ Freight rail volumes are readily available from the STB WAYBILL database; however, values for the movements are not supplied; as such, values per ton for commodities from the TRANSEARCH® database pertaining to proximate geographies were applied to the STB WAYBILL database for Iowa.

- **Visitors** – Similarly, economic impacts arise in industry sectors that service visitors to Iowa who arrive by passenger rail (i.e., Amtrak) or come for scenic tours. Rail visitors have several transport options and could possibly substitute other modal transport (highway and/or air) if rail services became unavailable. However, the choice to travel via Amtrak indicates cost, convenience and/or amenity advantages, and as such, removal of such advantages would negatively affect rail users and the industries serving them.

Types – Transport services and users each consist of three types (and a combined total):

- **Direct** – Impacts from the provision of rail transport (i.e., “transport services”), as well from the firms/industries that use such rail transport services to ship and receive goods or service out-of-state visitors (i.e., “transport users”).
- **Indirect** – Impacts associated with the suppliers that provide intermediate goods and services to the directly impacted industries.
- **Induced** – Impacts associated with the re-spending of earned income from both the direct and indirect industries in the study area².
- **Total** – Aggregated direct, indirect, and induced types.

Measures – Each type is measured in terms of five economic metrics³:

- **Jobs/Employment** – Measured in terms of full-time-equivalent (FTE) job-years.
- **Income** – Wage/salary earnings paid to the associated jobs.
- **Value-Added** – Net additional economic activity (i.e., total output less gross intermediate inputs), synonymous with GRP (gross regional product); includes employee and proprietor income, other income types, taxes, etc., required to produce final goods and services.
- **Output** – Total sales value associated with all levels of economic activity (comprised of gross intermediate inputs and value added, combined).
- **Taxes** – Various taxes on production and imports (sales, property, excise, etc.), fines, fees, licenses, permits, etc., resulting from business economic activity; and, include all federal, state, and local tax revenues.

C.2.2 Data Sources and Models

For the two impact activities, various data and modeling data are utilized. Reflective of assorted production sectors, freight rail user impacts are typically much greater than those related to transport services, and especially dwarf the visitor-related impacts. Generating comprehensive freight user-related estimates requires converting commodity movement data into direct industry output estimates. This is done by bridging the STB WAYBILL commodity movement data and the IMPLAN[®] economic model. Passenger-related impacts are derived from IMPLAN[®], Amtrak and other visitor-related data.

WAYBILL SAMPLE – Based on traditional Standard Transportation Commodity Classifications (STCC) developed for railroads, and by the Surface Transportation Board (STB), the WAYBILL provides detailed movement data by commodity at the county level. It uses a 2% stratified sample of carload waybills for all domestic rail traffic submitted by carriers that terminate 4,500 or more revenue carloads annually. STCC data were obtained from the WAYBILL at the four-digit level to ascertain the economic impact associated with firms that export locally produced goods, and/or import materials used in the production process (intermediate goods) or sold as finished products (final consumption). Although the WAYBILL database provides freight rail volumes, values for the movements are not supplied; as such, values per ton for commodities from the TRANSEARCH[®] database pertaining to other geographies were applied to WAYBILL database for Iowa, effectively serving as a proxy estimate for the directional commodity movement values.

IMPLAN[®] – The IMPLAN[®] v3 model, produced by the IMPLAN[®] Group, LLC, is an economic modeling, input-output based, social account matrix software. It is used to estimate the economic impacts to a defined geography (i.e., Iowa) ensuing from expenditures in an industry or commodity⁴. A social account matrix

² Note that the indirect and induced impact types are often referred to, jointly, as multiplier impacts.

³ Note that all monetary measures are presented in constant 2013 dollar terms (i.e., income, value-added, output, and taxes).

⁴ Note that all results presented pertain only to one-year static impacts for year 2013 flows (in year 2013 values), and do not provide any dynamic or feedback changes.

reflects the economic interrelationships between the various industries (and commodities), households, and governments in an economy and measures the economic interdependency of each industry on others through impact multipliers. Multipliers are developed within IMPLAN® from regional purchase coefficients, production functions, and socioeconomic data for each of the economic impact variables and are geographically-specific. IMPLAN® data and industry-accounts closely follow the conventions used in the “Input-Output Study of the U.S. Economy” by the U.S. Bureau of Economic Analysis. IMPLAN® is one of the most commonly accepted models used for economic impact analysis and estimation throughout the country.

Additionally, IMPLAN® provides commodity-to-industry production and absorption matrices that enable the quantification, for example, of how inbound commodities are used (absorbed) across Iowa industries in the respective production processes to create final goods and services, or by institutions for final consumption. Further, algorithms developed for this analysis translate commodity (Standard Transportation Commodity Classification, or STCC) data into IMPLAN® industry categories. Such data and translation processes are used to estimate the impacts associated with directional commodity movements.

Combined – The WAYBILL commodity detail (supplemented with proxy values for the directional commodity tonnage movements) is bridged with the IMPLAN® economic model to assess the economic interrelationships underpinning the Iowa economy, and to derive the economic impacts of freight. WAYBILL data provides the requisite commodity detail for translation into detailed economic interrelationships between commodities, industries, and institutions in the economy, made transparent via the IMPLAN® model.

IMPLAN® does not identify commodity tonnage movements (only the underlying commodity to industry structure), and the WAYBILL does not provide the economic interrelationships necessary to determine how the commodity movements interact within the economy. As such, the two sources are combined to derive the freight-related economic impacts to Iowa. Lastly, both the commodity detail and the IMPLAN® model reflect year 2013 activity.

Visitor Data – Expenditures were estimated for out-of-state visitors arriving by Amtrak, based on various sources. Amtrak “Fact Sheets”⁵ were used to estimate passenger movements. Travel expenditure data and overall visitor characteristics were estimated via similarly-conducted previous studies, “Amtrak’s Economic Contribution”⁶, and the Iowa Economic Development Authority (Tourism Office)⁷. Tourist rail services-related data and assumptions (e.g. the Boone and Scenic Valley Railroad in Boone) were estimated from online data in the respective webpages of the tourist rail lines and Consultant interviews of tourist rail operators.

C.2.3 Freight Tonnage and Value

Freight tonnage volumes used in the economic analysis are based on the data and findings presented in Chapter 2. Economically-relevant directional movements include outbound (originating within Iowa, terminating beyond), inbound (originating beyond Iowa, terminating within), and intra (originating and terminating within Iowa). However, through traffic is not directly applicable to freight users based in Iowa, and are thus excluded; albeit, such movements affect on the magnitude of freight transport service providers in Iowa.

For economic analysis, two considerations to the data presented in Chapter 2 were made:

- **Commodity Detail** –To translate between WAYBILL commodity categories with those of IMPLAN®, commodity flow data are analyzed from a detailed four-digit STCC code level, whereas the freight flow analysis is aggregated at the two-digit STCC level⁸.

5 <https://www.amtrak.com/pdf/factsheets/IOWA13.pdf>

6 <https://www.amtrak.com/ccurl/256/745/Amtrak-Economic-Contribution-Brochure-051915.pdf>

7 http://www.traveliowa.com/UserDocs/2015_WC_Survey_Report_2_26_16_FINAL.pdf

8 STCC4 and STCC2 are commodity aggregation designations, with STCC4 reflecting more detailed commodity sub-categorization, whereas STCC2 reflect higher level category subtotals; the freight flow analysis presents STCC2 results for the sake of simplifying and presenting multidimensional results; however, the economic analysis necessitates the greater commodity detail because of the detailed commodity-to-industry economic model structure.

- **Intrastate Movements** — Are combined with outbound movements, since both reflect industry production within Iowa.

While the detailed commodity freight flows (i.e., four-digit STCC) are evaluated in the economic impact calculations, the consolidated tons and value movements (i.e., two-digit STCC) are summarized in Table C.2.

Table C.2: Economically-Relevant Freight Movements

STCC2	COMMODITY	TONS		VALUE (IN MILLIONS)		AVERAGE
		AMOUNT	PERCENT	AMOUNT	PERCENT	VALUE/TON
OUTBOUND/INTRA						
28	Chemicals or Allied Prods.	10,280,937	24.3%	\$15,019	43.6%	\$1,461
20	Food or Kindred Prods.	19,415,563	45.9%	\$13,163	38.2%	\$678
46	Misc. Mixed Shipments	398,800	0.9%	\$2,110	6.1%	\$5,290
33	Primary Metal Prods.	981,544	2.3%	\$1,431	4.2%	\$1,458
35	Machinery	107,236	0.3%	\$845	2.4%	\$7,875
01	Farm Prods.	4,411,181	10.4%	\$754	2.2%	\$171
37	Transportation Equipment	258,998	0.6%	\$292	0.8%	\$1,126
40	Waste or Scrap Materials	804,620	1.9%	\$236	0.7%	\$294
32	Clay, Concrete, Glass, or Stone	772,904	1.8%	\$155	0.4%	\$200
29	Petroleum or Coal Prods.	135,368	0.3%	\$152	0.4%	\$1,121
	Remaining Commodities	4,724,433	11.2%	\$315	0.9%	\$67
Total		42,291,584	100.0%	\$34,471	100.0%	\$815
INBOUND						
28	Chemicals or Allied Prods.	4,229,255	12.0%	\$5,292	40.7%	\$1,251
46	Misc. Mixed Shipments	367,000	1.0%	\$1,942	14.9%	\$5,290
20	Food or Kindred Prods.	2,510,984	7.1%	\$1,496	11.5%	\$596
33	Primary Metal Prods.	500,324	1.4%	\$1,133	8.7%	\$2,265
11	Coal	22,363,841	63.3%	\$802	6.2%	\$36
37	Transportation Equipment	173,128	0.5%	\$735	5.7%	\$4,247
29	Petroleum or Coal Prods.	387,588	1.1%	\$456	3.5%	\$1,176
01	Farm Prods.	2,277,752	6.4%	\$365	2.8%	\$160
26	Pulp, Paper or Allied Prods.	268,040	0.8%	\$280	2.2%	\$1,046
40	Waste or Scrap Materials	754,940	2.1%	\$230	1.8%	\$304
	Remaining Commodities	1,509,948	4.3%	\$269	2.1%	\$178
Total		35,342,800	100.0%	\$13,001	100.0%	\$368

Source: STB WAYBILL 2013 and CDM Smith

Outbound/Intrastate — Combining outbound and intrastate rail movements, 42.3 million tons of freight, valued at \$34.5 billion, originates in Iowa. *Chemicals or Allied Products* and *Food and Kindred Products* comprise the majority of originating freight tonnage (70.2%, combined) and value (81.8%). Impacts associated with outbound/intrastate movements are derived by mapping the freight values with the respective industrial production in Iowa from the IMPLAN® model. While *Miscellaneous Mixed Shipments* category is a relatively small tonnage share (0.9%), the relatively high value per ton (mostly containers with a heterogeneous composition of goods) results in the third largest-valued movement originating in Iowa (6.1%). Such undefined commodities are mapped into the economic model by allocating the associated value across the various existing physical goods production within the existing economy.

Inbound — In 2013, 35.4 million economically-relevant tons were moved into Iowa, valued at \$13.0 billion. *Coal*, by far the largest commodity by volume at 63.3%, only amounts to 6.2% of the inbound value. In contrast, *Chemicals and Allied Products* comprise 12.0% of the inbound volumes, but 40.7% of the value. In combination with *Miscellaneous Mixed Shipments* (i.e., containerized goods), those two categories comprise more than half of all inbound freight value (55.6%). Inbound commodities are translated into economic impacts by mapping the value of the inbound goods via the absorption of such respective goods into the industry production in Iowa. Non-defined miscellaneous commodities are reallocated to the various existing Iowa industries that absorb physical products into the production process⁹.

C. 2.4 Passenger Rail Assumptions

Various data sources used include: Amtrak, tourist rail operator interviews, rail industry journals, annual reports, IMPLAN[®], the Iowa Economic Development Authority Tourism Office, the internet, and consultant experience. Data sought included number of passengers (equally split between boardings and alightings), employment, revenues, operating expenses, visitor characteristics (percent of passengers, average expenditures), etc. Such information was used to estimate direct transport-service and transport-user impacts input into the IMPLAN[®] model.

Passenger Transport — IMPLAN[®] industry data provides various economic measures associated with the direct provision of rail transport in Iowa (e.g., employment, output, etc.). Unfortunately, such data are not subcategorized by passenger versus freight transport. As such, to estimate the passenger share of direct transport service impacts required evaluation of the Amtrak “Fact Sheets” for Iowa¹⁰ in year 2013, which provide total employment and labor income for Amtrak passenger rail transport service. While such Amtrak data exclude any freight transport activity, it is comparable to the overall industry sector IMPLAN[®] totals. Consequently, the difference between the IMPLAN[®] rail transport industry sector totals (i.e., 3,511 jobs) and the estimated direct passenger transport activity impacts (i.e., about 7 Amtrak rail jobs) provides an estimate for direct freight rail provision activity impacts (i.e., 3,504 jobs). In addition to Amtrak service provision employment, employment for the tourist railroads were included, amounting to an additional 13 FTE direct jobs in the scenic transportation and museum industries.

Passenger Visitor Expenditures — Out-of-state visitor expenditures reflect Amtrak and tourist rail passengers arriving in Iowa (obtained from the Amtrak Fact Sheets and tourist rail interviews). Such information, in conjunction with visitor profiles and Consultant experience, is used to estimate the share of rail visitors (i.e., out-of-state) and average visitor spending.

In the case of Amtrak, total annual passenger movements for the six Iowa stations totaled 59,825 in 2013. Since each passenger typically embarks (boards) and disembarks (alights), it is necessary to divide total passenger movements by two to estimate the actual number of Amtrak passengers (29,913). It was estimated that half of the boarding passengers are out-of-state visitors. Assuming an average visit duration of 3.5 days and an estimated visitor expenditure per day of \$114, a total Amtrak visitor expenditure to Iowa is estimated at \$6.0 million.

In addition to the Amtrak visitors, similar assumptions for the tourism rail lines and museum were based on information directly from the respective operations, other visitor studies, and consultant estimates to yield an out-of-state visitor spending estimate of \$8.7 million. Combined, Amtrak and tourism rail visitor spending is estimated at \$14.7 million in 2013, as summarized in Table C.3.

⁹ Allocated in proportion to the existing economic composition of imported physical products to the region.

¹⁰ <http://www.amtrak.com/pdf/factsheets/IOWA13.pdf>

Table C.3: Passenger Rail Visitor Expenditures

ACTIVITY	INTERCITY		TOURIST				SUBTOTAL	TOTAL
RR NAME	AMTRAK	BOONE & SCENIC VALLEY	MIDWEST CENTRAL	MIDWEST ELECTRIC	THRESHERS REUNION	UP RR MUSEUM		
LOCATION	STATEWIDE	BOONE	MT. PLEASANT	MT. PLEASANT	MT. PLEASANT	COUNCIL BLUFFS		
ANNUAL PASSENGERS								
Boardings	29,913	52,000	14,000	25,000	N/A	N/A	91,000	120,913
Alightings	29,913	52,000	14,000	25,000	N/A	N/A	91,000	120,913
Total Movements	59,825	104,000	28,000	50,000	N/A	N/A	182,000	241,825
VISITORS (OUT-OF-STATE)								
Percent	50%	60%	50%	50%	50%	73%	57%	104,845
Number	14,955	31,200	7,000	12,500	18,750	20,440	89,890	
Expenditures/Day	\$114	\$114	\$88	\$88	\$88	\$88	\$97	
Days/Visit	3.5	1.0	1.0	1.0	1.0	1.0	1.0	
Visitor Expenditures	\$5,976,885	\$3,562,666	\$612,500	\$1,093,750	\$1,640,625	\$1,788,500	\$8,698,041	\$14,674,926

Sources: Amtrak, Iowa Economic Development Authority, Tourism Office, CDM Smith

C.3 Rail Economic Impacts

Rail impacts total 219,380 jobs across Iowa, reflecting the various impact activities (services provision and users) and types (direct plus multipliers). A vast majority of these total employment impacts arise from rail users who move goods via the freight system, with the fractional balance attributable to transport services and visitor impacts.

The ensuing discussion details the composition of the employment impact estimates, as well as the other impact measures (e.g., output, value-added, income, and taxes). Impact types (e.g., direct, indirect, and induced) and measures are first presented for rail transport-services, and then for freight and visitor users.

C.3.1 Transport Service Impacts

Provisioning rail transportation to Iowa yields a direct employment impact of 3,520 jobs, comprised of 20 passenger-related transport jobs and 3,500 freight transport jobs. As reflective of the multiplier impacts, the indirect and induced effects associated with rail operations yield an additional 5,340 jobs (2,450 and 2,890 indirect and induced, respectively) throughout the State. Combined, an estimated 8,860 people owe their jobs, directly or tangentially to the physical movement of freight or passengers by rail. This excludes freight user impacts associated with the shippers/consignees that ship/receive goods (as quantified in the following subsection).

As gleaned from the summary services impacts, presented in Table 4 by activity, measure (output, jobs, etc.) and type (direct, indirect, etc.), the passenger-related transportation service impacts constitute less than 1% of all Iowa rail transport impacts. Summary findings shown in the table indicate that the freight movement is a larger relative contributor to economic activity than the passenger component, which is relatively trivial.

Table C.4: Transport Service Impacts

MEASURE AND TYPE	PASSENGER	FREIGHT	SERVICES TOTAL
EMPLOYMENT*			
Direct	20	3,500	3,520
Indirect	10	2,440	2,450
Induced	10	2,880	2,890

Total	40	8,830	8,860
INCOME**			
Direct	\$1.1	\$365.9	\$367.0
Indirect	\$0.4	\$129.7	\$130.1
Induced	\$0.3	\$105.0	\$105.3
Total	\$1.7	\$600.6	\$602.4
VALUE ADDED**			
Direct	\$1.9	\$1,075.5	\$1,077.4
Indirect	\$0.5	\$180.9	\$181.4
Induced	\$0.6	\$191.7	\$192.2
Total	\$3.0	\$1,448.0	\$1,451.0
OUTPUT**			
Direct	\$3.6	\$1,725.8	\$1,729.4
Indirect	\$1.0	\$365.6	\$366.6
Induced	\$1.0	\$336.7	\$337.6
Total	\$5.6	\$2,428.0	\$2,433.6
TAX REVENUE**			
Direct	\$0.05	\$18.3	\$18.4
Indirect	\$0.03	\$13.1	\$13.2
Induced	\$0.05	\$18.0	\$18.1
Total	\$0.14	\$49.5	\$49.6

Source: CDM Smith, Amtrak, and IMPLAN

* emp. rounded to nearest 10 job-years; totals may not sum due to rounding

** in millions of 2013 dollars

- **Direct** — Combining the passenger and freight providers yields a direct impact of 3,520 jobs, earning \$367 million in labor income, producing \$1.08 billion in value-added activity, which equates to \$1.73 billion in economic output, with tax revenues (on direct output) of \$18.4 million.
- **Total** — Including the Iowa multiplier effects, transport service-related activity impacts total 8,860 jobs, earning \$602 million in labor income, producing \$1.45 billion in economic value-added, which equates to a total economic output of \$2.43 billion, and yields a tax impact of \$49.6 million to the State and Federal governments.

C.3.2 Transport User Impacts

Provided below (per Table C.5) are the impacts to Iowa from rail users, including passenger and freight activities.

- Passenger-related activities reflect expenditures within the region by out-of-state visitors, based on Amtrak and tourist rail related passenger movements and assumptions regarding visitors (versus residents), average length of stay, average visitor expenditure per day, and an allocation to various expenditure categories (e.g., retail purchases, ground transportation, entertainment and recreation, lodging, and food purchases).
- Freight-related activities reflect the extent to which inbound goods via rail are absorbed into the existing production processes as intermediates into the final production of saleable goods and services, and how outbound/intrastate goods via rail are produced by the various existing industries in the region.

A compositional breakdown of the directional-related freight user impacts is also provided in Table C.5. Combining passenger and freight users yields the following combined impacts:

- **Direct** — Passenger and freight users, combined, yields a direct impact of 66,680 jobs, earning \$6.4 billion in labor income, producing \$11.2 billion in value-added activity, which equates to \$43.2 billion in economic output; with tax revenues (on direct output) equating to \$0.5 billion.
- **Total** — Including the multipliers, transport user-related activity impacts total 210,510 jobs, earning \$13.2 billion in labor income, producing \$22.7 billion in economic value-added, which equates to a total economic output of \$67.0 billion, and yields a tax impact of \$1.3 billion to the State and Federal governments.

Table C.5: Transport User Impacts

MEASURE AND TYPE	PASSENGER	FREIGHT		SUBTOTAL	USERS TOTAL
		OUT/INTRA	INBOUND		
EMPLOYMENT*					
Direct	230	24,490	41,960	66,450	66,680
Indirect	30	56,310	24,080	80,390	80,420
Induced	40	39,850	23,530	63,370	63,410
Total	300	120,870	89,350	210,220	210,510
INCOME**					
Direct	\$4.8	\$3,626.5	\$2,784.8	\$6,411.3	\$6,416.1
Indirect	\$1.5	\$3,249.9	\$1,249.9	\$4,499.8	\$4,501.2
Induced	\$1.3	\$1,447.8	\$855.4	\$2,303.1	\$2,304.5
Total	\$7.6	\$8,313.0	\$4,901.3	\$13,214.2	\$13,221.8
VALUE ADDED**					
Direct	\$7.1	\$6,426.7	\$4,770.2	\$11,196.9	\$11,204.0
Indirect	\$2.5	\$5,267.0	\$2,039.8	\$7,306.8	\$7,309.3
Induced	\$2.4	\$2,641.1	\$1,560.7	\$4,201.8	\$4,204.3
Total	\$12.0	\$14,332.8	\$8,372.7	\$22,705.5	\$22,717.6
OUTPUT**					
Direct	\$13.4	\$28,872.7	\$14,156.6	\$43,029.3	\$43,042.6
Indirect	\$4.6	\$12,199.5	\$4,359.3	\$16,558.8	\$16,563.4
Induced	\$4.3	\$4,640.4	\$2,741.9	\$7,382.4	\$7,386.6
Total	\$22.3	\$45,696.4	\$21,274.0	\$66,970.4	\$66,992.7
TAX REVENUE**					
Direct	\$1.2	\$163.3	\$311.7	\$475.0	\$476.2
Indirect	\$0.2	\$302.9	\$151.8	\$454.8	\$454.9
Induced	\$0.2	\$248.8	\$147.0	\$395.7	\$396.0
Total	\$1.6	\$727.2	\$598.4	\$1,325.5	\$1,327.1

Source: CDM Smith, Amtrak, WAYBILL, and IMPLAN

* employment rounded to nearest 10 job-years; totals may not sum due to rounding

** in millions of 2013 dollars

C.3.2.1 Visitor Impacts

As per Table C.5, the passenger-related rail user impacts are dwarfed by the freight user impacts, which is intuitive, considering the volumes on each respective rail purpose. The impact differential is a function of the relative volumes and the value carried. In addition, the passenger-related user impacts reflect spending in service industries. Conversely, the freight-related user impacts are dispersed throughout various industries in the economy, including those almost entirely rail dependent. As such, the narrowly-focused passenger user-related impacts are overshadowed by the more broadly-encompassing freight-related impacts.

- **Direct** — Passengers and the tourism-related spending yield a direct impact of 230 jobs, earning \$4.8 million in labor income, producing \$7.1 million in value-added activity, which equates to \$13.4 million in economic output, with tax revenues (on direct output) of \$1.2 million.
- **Total** — Including the multipliers, passenger-related user activity impacts a total of 300 jobs, earning \$7.6 million in labor income, producing \$12.0 million in economic value-added, which equates to a total economic output of \$22.3 million, and yields a tax impact of \$1.6 million to the State and Federal governments.

C.3.2.2 Freight User Impacts

In addition to the transport-service impacts detailed above, many consignees and shippers heavily rely on rail service to receive and/or ship freight; in doing so, they generate significant impacts. While these firms/industries are not entirely dependent on rail for shipping freight (as alternative modes are available, such as trucking), it is hard to envision continued operations without such access. In fact, rail access is often instrumental in major manufacturing business location decisions.

If railroads did not accommodate demand, consignees and shippers could use other modes (i.e., truck, water, air, etc.) to transport freight. However, the use of other modes would likely entail higher transport costs (due to longer transport distances, price, logistics, etc.) and could increase overall demand (and resulting handling costs) for all users of other modes (both the diverted rail users as well as current users). The long-term result would be a migration of industry away from Iowa to other locations with relatively better rail accessibility and better modal options/mix.

The following analysis identifies the economic impacts associated with industries in Iowa that rely on freight rail transport. To estimate such impacts associated with rail tonnage movements requires an understanding of how the various inbound and outbound/intrastate commodities are used or produced by various industries to generate output, income, and employment. To do so, the IMPLAN[®] commodity-to-industry matrices and other algorithms were applied to estimate direct impact measures. Indirect and induced multipliers were then applied to the direct impact estimates to derive total economic impacts.

Outbound/Intrastate — 42.3 million tons of freight originating in Iowa is either shipped via rail out-of-state (35.4 million tons) or internally (6.9 million tons). Combined, rail freight originating in Iowa is valued at \$34.5 billion (see Table 2), and generates an estimated 120,870 total jobs (Table 5).

Inbound — 35.3 million tons of inbound freight originating beyond Iowa, valued at \$13.0 million (Table 2), are used by Iowa industries and institutions to generate 89,350 total jobs (Table 5). Inbound freight user impacts comprise final demand and intermediate demand. Final demand goods are distributed via wholesale or retail outlets, or through direct sales, with economic impacts stemming from the trade margins associated with the transfer of goods from suppliers to end-users. Intermediately demanded physical commodities imported via rail are used/absorbed by Iowa industries in their production processes based on relative commodity absorption patterns.

Freight User Directional Overlap — Impact overlap issues arose between outbound/intra and inbound commodity conversion to economic impacts¹¹. To avoid double-counting impacts, such potential overlaps were identified at an aggregate level and subtracted-out of the analysis to ensure conservative estimates. Such potential overlaps comprise between 12% and 23% of the total unadjusted freight user impacts, depending on the impact measure and type.

- **Direct** — Combining the directional components of freight users (and reflecting removal of the potential overlap) yields a direct subtotal impact of 66,450 jobs, earning \$6.4 billion in labor income, producing \$11.2

¹¹ As an example, when commodities, such as seed, are imported by a grain producer, the user impacts quantified allocate a share of the inbound seed to the grain industry and then estimate the industry-associated output. Potential overlap arises when the grain is subsequently transported outbound by rail, since impacts are also estimated for outbound rail movements. So in effect, the output associated with the grain industry would be counted twice: once associated with the inbound movement of seed and fertilizer, and second with the outbound movement of grain.

billion in value-added activity, which equates to \$43.0 billion in economic output, with tax revenues (on direct output) of \$0.5 billion.

- **Total** — Including the multipliers, freight user activity impacts total 210,220 jobs, earning \$13.2 billion in labor income, producing \$22.7 billion in economic value-added, which equates to a total economic output of \$67.0 billion, and yields a tax impact of \$1.3 billion.

C.3.3 Total Rail Activity Impacts

Rail service is essential to Iowa's economy. While the basic provision of rail service generates a modest 3,520 direct jobs (8,860 including multipliers), rail users generate 66,680 direct jobs, a significant majority relating to freight users (compared with passengers). Impacts to Iowa by rail activity (transport services and users, differentiated by passenger and freight rail purposes), by impact measure (output, employment, labor income, value-added, and taxes), and by type (direct, indirect, induced, and total) are summarized below in Table C.6.

- **Direct** — Combining the various rail-related activities yields a direct impact of 70,200 jobs, earning \$6.8 billion in labor income, producing \$12.3 billion in value-added activity, which equates to \$44.8 billion in economic output, with tax revenues (on direct output) of \$0.5 billion.
- **Total** — Including the multipliers, the various rail-related activities total 219,380 jobs, earning \$13.8 billion in labor income, producing \$24.2 billion in economic value-added, which equates to a total economic output of \$69.4 billion, and yields a tax impact of \$1.4 billion.

Table C.6: Rail Impacts, 2013

MEASURE AND TYPE	TRANSPORT SERVICES			TRANSPORT USERS			TOTAL		
	PASS.	FREIGHT	SERVICES	PASS.	FREIGHT	USERS	PASS.	FREIGHT	TOTAL
EMPLOYMENT*									
Direct	20	3,500	3,520	230	66,450	66,680	250	69,960	70,200
Total	40	8,830	8,860	300	210,220	210,510	330	219,040	219,380
INCOME**									
Direct	\$1.1	\$365.9	\$367.0	\$4.8	\$6,411.3	\$6,416.1	\$5.9	\$6,777.2	\$6,783.1
Total	\$1.7	\$600.6	\$602.4	\$7.6	\$13,214.2	\$13,221.8	\$9.4	\$13,814.8	\$13,824.2
VALUE ADDED**									
Direct	\$1.9	\$1,075.5	\$1,077.4	\$7.1	\$11,196.9	\$11,204.0	\$9.0	\$12,272.4	\$12,281.4
Total	\$3.0	\$1,448.0	\$1,451.0	\$12.0	\$22,705.5	\$22,717.6	\$15.0	\$24,153.6	\$24,168.6
OUTPUT**									
Direct	\$3.6	\$1,725.8	\$1,729.4	\$13.4	\$43,029.3	\$43,042.6	\$17.0	\$44,755.0	\$44,772.0
Total	\$5.6	\$2,428.0	\$2,433.6	\$22.3	\$66,970.4	\$66,992.7	\$27.9	\$69,398.4	\$69,426.3
TAX REVENUE**									
Direct	\$0.05	\$18.3	\$18.4	\$1.2	\$475.0	\$476.2	\$1.3	\$493.3	\$494.6
Total	\$0.14	\$49.5	\$49.6	\$1.6	\$1,325.5	\$1,327.1	\$1.8	\$1,375.0	\$1,376.7

Source: CDM Smith, Amtrak, WAYBILL, and IMPLAN

* Employment rounded to nearest ten job-years; totals may not sum due to rounding

** in millions of 2013 dollars

Impacts as Percentage of Economy — It is important to contextualize the preceding economic impact estimates, as it is difficult to visualize millions of jobs and billions of dollars, etc. As such, the economic impacts can be compared with the existing economic composition of Iowa in 2013, by the same economic measures as the presented economic impacts, per Table C.7.

Table C.7: Iowa Economic Measures, 2013

MEASURE	VALUE
Employment	2,031,434
Income*	\$101,512
Value Added*	\$164,460
Output*	\$356,288
Tax Revenue*	\$9,449

Source: IMPLAN

* in millions of 2013 dollars

Total economic impacts related to rail movements in Iowa range between 10.8% (employment) to 19.5% (economic output) of the statewide economy, depending on measure, as seen in Table C.8. Again, the largest relative contribution to the statewide economy from rail pertains to the freight users, with the transport services and passenger-related impacts a mere fraction of freight.

Table C.8: Impacts as Percentage of Iowa Economy

MEASURE AND TYPE	TRANSPORT SERVICES			TRANSPORT USERS			TOTAL		
	PASS.	FREIGHT	SERVICES	PASS.	FREIGHT	USERS	PASS.	FREIGHT	TOTAL
EMPLOYMENT									
Direct	0.001%	0.2%	0.2%	0.011%	3.3%	3.3%	0.012%	3.4%	3.5%
Indirect	0.000%	0.1%	0.1%	0.002%	4.0%	4.0%	0.002%	4.1%	4.1%
Induced	0.000%	0.1%	0.1%	0.002%	3.1%	3.1%	0.002%	3.3%	3.3%
Total	0.002%	0.4%	0.4%	0.015%	10.3%	10.4%	0.016%	10.8%	10.8%
INCOME									
Direct	0.001%	0.4%	0.4%	0.005%	6.3%	6.3%	0.006%	6.7%	6.7%
Indirect	0.000%	0.1%	0.1%	0.001%	4.4%	4.4%	0.002%	4.6%	4.6%
Induced	0.000%	0.1%	0.1%	0.001%	2.3%	2.3%	0.002%	2.4%	2.4%
Total	0.002%	0.6%	0.6%	0.008%	13.0%	13.0%	0.009%	13.6%	13.6%
VALUE ADDED									
Direct	0.001%	0.7%	0.7%	0.004%	6.8%	6.8%	0.005%	7.5%	7.5%
Indirect	0.000%	0.1%	0.1%	0.002%	4.4%	4.4%	0.002%	4.6%	4.6%
Induced	0.000%	0.1%	0.1%	0.001%	2.6%	2.6%	0.002%	2.7%	2.7%
Total	0.002%	0.9%	0.9%	0.007%	13.8%	13.8%	0.009%	14.7%	14.7%
OUTPUT									
Direct	0.001%	0.5%	0.5%	0.004%	12.1%	12.1%	0.005%	12.6%	12.6%
Indirect	0.000%	0.1%	0.1%	0.001%	4.6%	4.6%	0.002%	4.8%	4.8%
Induced	0.000%	0.1%	0.1%	0.001%	2.1%	2.1%	0.001%	2.2%	2.2%
Total	0.002%	0.7%	0.7%	0.006%	18.8%	18.8%	0.008%	19.5%	19.5%
TAX REVENUE									
Direct	0.001%	0.2%	0.2%	0.013%	5.0%	5.0%	0.013%	5.2%	5.2%
Indirect	0.000%	0.1%	0.1%	0.002%	4.8%	4.8%	0.002%	5.0%	5.0%
Induced	0.001%	0.2%	0.2%	0.002%	4.2%	4.2%	0.003%	4.4%	4.4%
Total	0.001%	0.5%	0.5%	0.017%	14.0%	14.0%	0.019%	14.6%	14.6%

Source: CDM Smith, Amtrak, WAYBILL, and IMPLAN

Employment by Industry – In Table C.9 and Figure C.1, the employment impacts to Iowa from the combined transport services and user-related impacts are presented by industry (according to the North American Industry Classification System, or NAICS, at the two-digit industry aggregation level).

More than 50% of the total (i.e., direct and multiplier) 219,380 employment impacts stemming from rail are concentrated within the top five NAICS-defined industry sectors: *Manufacturing, Retail Trade, Forestry, Fishing, and Hunting, Health and Social Services, and, Transportation and Warehousing Services*. Direct *Manufacturing* employment (38,580) is a noted portion of the impacts, and the *Manufacturing* industry subcategories are thus detailed further in Figure C.2. As depicted, the largest *Manufacturing* subsector impacts pertain to *Food Products* and *Chemical Manufacturing*. The finding is intuitive, given the large movements of food and ethanol products.

In contrast to *Manufacturing*, many of the other top industries impacts by rail are predominately done via indirect and induced-related impacts; that is, those industries supplying materials to the *Manufacturing* and other industries, and via the re-spending of income earned by the directly and indirectly affected employee base. Also notably, *Health and Social Services* employment impacts attributable to rail total 17,578, of which 84% (14,852) reflect induced impacts. This illustrates how the respending of direct and indirect income circulates through the economy.

Table 9: Rail Employment Impacts by Industry

INDUSTRY	DIRECT	INDIRECT	INDUCED	TOTAL
31-33 Manufacturing	38,580	2,715	622	41,918
44-45 Retail Trade	4,572	5,322	11,509	21,403
11 Ag, Forestry, Fish and Hunting	5,944	14,282	186	20,412
62 Health and Social Services	2,715	11	14,852	17,578
48-49 Transportation and Warehousing	4,929	10,575	1,395	16,899
42 Wholesale Trade	528	12,324	1,683	14,535
72 Accommodation and Food Services	3,059	2,127	8,669	13,854
56 Administrative and Waste Services	1,211	8,513	2,923	12,646
81 Other Services	1,513	2,823	7,317	11,654
52 Finance and Insurance	84	5,588	4,927	10,599
54 Professional- Scientific and Tech Services	443	4,616	2,028	7,087
23 Construction	3,567	2,541	639	6,748
53 Real Estate and Rental	445	2,978	2,465	5,889
55 Management of Companies	65	3,246	310	3,621
71 Arts- Entertainment and Recreation	333	747	2,188	3,268
61 Educational Services	385	85	2,784	3,255
51 Information	287	1,459	1,059	2,805
22 Utilities	1,200	1,003	231	2,434
92 Government and Non NAICS	221	1,295	474	1,990
21 Mining	122	620	42	783
Total	70,203	82,872	66,302	219,377

Source: CDM Smith, Amtrak, WAYBILL, and IMPLAN

Figure C.1: Employment Impacts by Industry and Type

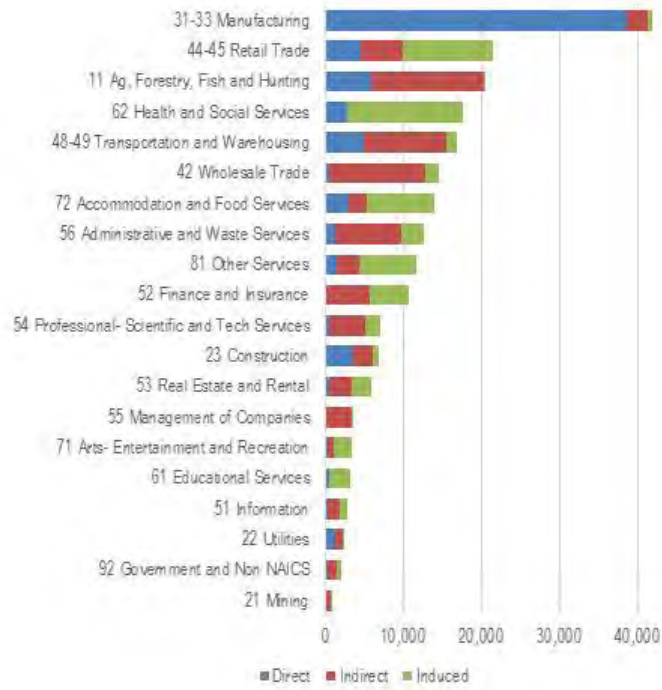
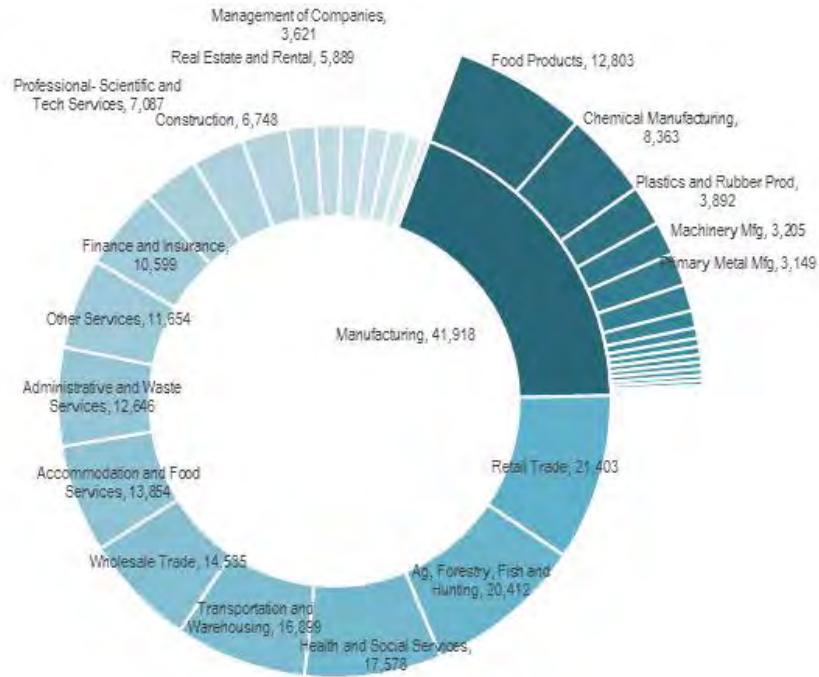


Figure C.2: Total Employment Impact Composition



C.4 Conclusion

Rail accommodates the movement of both goods (freight) and people (passengers), which facilitates economic activity. Freight movements reflect the reallocation of intermediate goods for production and final goods for consumption; and, passenger movements are linked with personal consumption patterns. Both such movements are supported by rail and can be captured by economic impact metrics via tracing the movement volumes, translated into applicable values (and, subject to economic/geographic factors) through the various interrelationships within the economy.

Translation of rail passenger and freight volumes into economic impacts demonstrates the vital role rail provides in Iowa's economy. Such economic impact analysis provides a complementary perspective for traditional freight-related analysis that predominately emphasizes the volume (units and/or tons) of the movements and the capacity of the transportation route.

An economic analysis supplies an alternative means to assess the relative importance of freight rail. In instances, the volume of a certain commodity movement is substantial and would thus be considered relevant from a traditional freight analysis perspective; however, that same high-volume movement may be a low-value (per weight) commodity with little economic relevance (e.g., certain waste material movements). Consequently, not all traditionally-assessed freight movements (from a volume perspective) would be considered equally relevant, as compared with other freight movements observed from an economic perspective. In effect, volumes do not always translate into relevant values, and into direct economic impacts (and thus, into total impacts, reflective of multiplier effects as economic activity permeates through the economy).

Impacts, as measured in terms such as employment, income, value added, and output, span all industries and reach every region of the state:

- **Employment** – Economic impacts of rail extend beyond the 3,520 direct employed in the provision of rail transport (both passenger and freight). When the freight and visitor user impact activities and multiplier impacts are included, rail-related employment in Iowa totals 219,380 jobs, which represent 10.8% of the 2.0 million jobs statewide.
- **Income** – \$13.8 billion earned by these total impacted employees represent 13.6% of Iowa's total labor income.
- **Value-Added** – And, the combined value-added impact, \$24.2 billion, associated with the rail services and users represent 14.7% of the state's Gross State Product (GSP).

It would be erroneous to conclude that all of these impacts are entirely and solely dependent on rail and would disappear if rail ceased operating (i.e., no modal substitutability). Rather, the findings show that rail service facilitates business throughout the State. Specifically, these impacts highlight the magnitude of freight rail use by manufacturers across the State, as well as dealers, retailers, and others who transport materials, component parts, and products.

Of the rail activities analyzed, passenger-related economic impacts are relatively insignificant in comparison to the comparatively large-scale freight-related impacts; and, the rail users (especially the freight users, including both outbound/intrastate and inbound movements, pertaining to production and absorption, respectively) far exceed the economic impacts associated with provisioning the services that facilitate the movement of both people and goods. In conclusion, the rail industry provides some economic activity, in itself; but, it facilitates far more economic activity via the services rendered to people and industries, particularly by enabling the movement of goods necessary to conduct economic pursuits.



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