



# SELECTING RAIL AS A MODE OF TRANSPORTATION

# SELECTING RAIL AS A MODE OF TRANSPORTATION

Transportation modes are selected based on several factors that include but are not limited to the following.

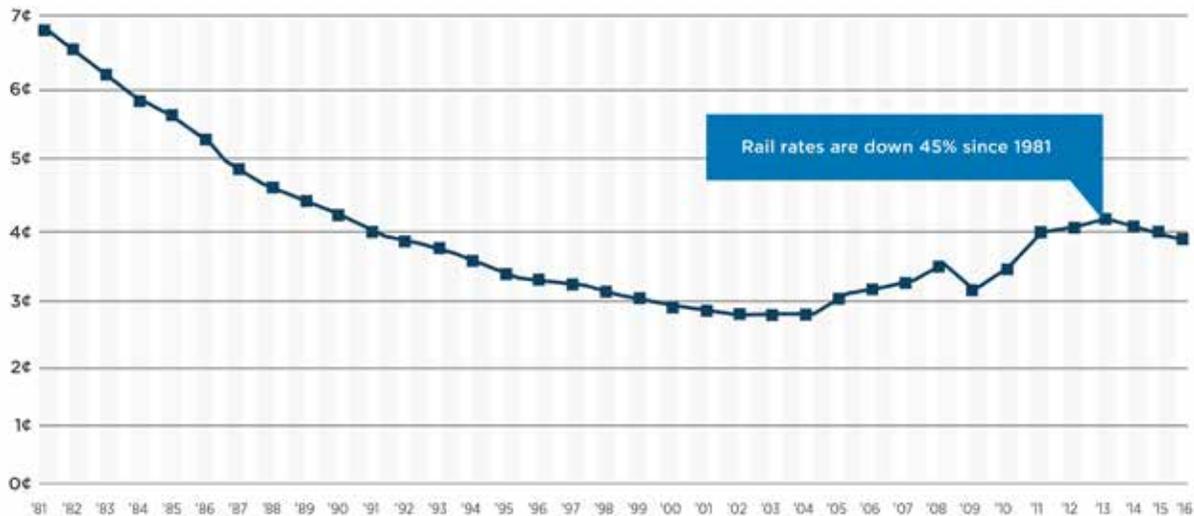
## Economics

Rail has particular cost advantages when shipping sizable quantities or commodities in bulk where the large capacity of a rail car (or multiple cars) offers economies of scale. Shippers moving oversized or overweight truckloads may be able to use rail to avoid or reduce issues with highway clearances and permitting. Rail is often a very effective way to move large equipment, pipe, and other dimensional cargo. The serving railroad can provide details and the process to ship oversized loads by rail.

In a competitive transportation market, transportation service providers typically compete on a cost per mile basis. Total landed costs (includes the cost of the product as well as all shipping costs, tariffs, taxes, insurance, handling fees, etc.) can also be compared when making mode selections. But other factors such as inventory, damage in transit, and any special material handling requirements must also be considered. The ability of a carrier to make information available on the status and location of in-transit shipments can be important and mitigate the impact of potentially longer transit times and travel time variability that can be experienced when shipping by rail.

## AVERAGE U.S. FREIGHT RAIL RATES DOWN SINCE DEREGULATION

U.S. Freight Rail Rates Keep Costs Low for Rail Customers and Help Save Consumers Money



Thanks to freight rail's efficiency and productivity improvements, the average rail customer today can move nearly twice as much freight for about what they paid 35 years ago. With rates among the lowest in the industrialized world, U.S. freight railroads help keep America's farmers and manufacturers competitive in a tough global economy and save consumers billions of dollars each year.

Notes: \*Based on average revenue per ton-mile in 2016 dollars

Source: Association of American Railroads



## Commodity characteristics

Most products can move by rail if packaged correctly. Railroad carriers have loading specialists who can help you secure your shipment to avoid damage. The matrix below illustrates a sample of products that can successfully be shipped by rail. Some products, depending on shipment quantity, can move in either rail car or intermodal service. One intermodal shipment is typically the same size as a truckload shipment. One railcar shipment can move the same amount of cargo as three or four truckloads depending on the product dimensions and rail car size. Loading bulk cargo in rail cars can often speed up the loading process given today's high-capacity loading equipment and large-capacity rail cars.

## Access

Rail-served industries can load rail cars at the point of origin and destination. For shippers or receivers without direct rail access, transload operations using public or contract facilities can load/unload railcars directly, and then trucks can support the first and/or last segment of transportation. Intermodal rail services involve the loading of containers or trailers that can be loaded onto the train at designated terminals. This equipment is then trucked from the rail terminal to the shipper's or consignee's facility.

## Train operating service characteristics

Railroads often distinguish carload train service by the operational profile of the train handling the freight. A train that loads an entire train at an elevator, mine, or other facility is often called a "unit" or "shuttle" train, which is a grouping of cars that are all loaded at the same place and move to a single destination without intermediate stops. Manifest train service is typically described as several railcars moving from one customer to another. These individual shipments are grouped together at the rail terminal and move together in designated train service, which stops to make pickups and drop-offs along the way.

Industry	Automotive	Bulk products	Consumer goods	Merchandise	Dimensional cargo
Rail car types	Autorack car	Hopper rail car	Intermodal	Railcar	Flat car
Products	Finished vehicles Import or export vehicles	Grain, feed Sand, cement, gravel Coal Ores Nonmetallic minerals Stone	Food, beverage Electronics Parts Manufactured products Mixed freight Textiles Retail products Scrap Exports and imports	Food, beverage Building supplies Machinery Fertilizer Paper products Basic chemicals Household products	Machinery Logs Lumber Wind generator blades

## Train operating service characteristics

- Railcars can carry as much as three to four truckloads moving between the same origin and destination pairs. Rail service provides a benefit to any shipper who moves large quantities of freight.
- Rail service is more cost competitive the longer the length of haul; however, some shipments under the right circumstances can move short distances over a single rail-owned segment competitively.
- While rail transit times may be longer than truck transit times, with proper planning, a longer transit time via a lower cost mode can reduce supply chain costs.
- Are your suppliers or customers located on rail or near a rail transload? If the answer is yes, rail might be an option for you to consider.
- For shippers who measure their carbon footprint, rail is a desirable mode of transportation.
- For those who pay for and designate the mode of transportation, understanding rail alternatives can provide substantial cost savings.

# MODE TRANSPORTATION COMPARISONS

## Trucks

Trucking companies provide a variety of services. Contract fleets typically move between modes in one shipper-owned network. Less than truck load (LTL) service typically combines the freight of several customers and moves cargo between consolidation points, and delivers freight to the customers' locations. A most notable LTL shipper is United Parcel Service. Full truckload service providers move products from one customer to another using a variety of equipment, including dry van, flatbed, hopper, and refrigerated equipment. Trucks are flexible and can move small shipments of a few hundred pounds up to 48,000 pounds per shipment depending on equipment configuration.

## Railroads

Railroads move on privately owned networks for the most part, and are well suited for moving large volumes of freight between two shipping points. Railroads are the workhorse of the bulk commodities and construction trades. They provide significant economies of scale due to their fuel-efficient operations. Rail access is available to many industries nationwide and is also available to users who are near transload facilities. These transload operations combine the volume of three to four truck shipments into one rail car for transportation to the final customer or supplier.

## Barges

Barges are a staple of the industries moving bulk products by river or inland waterway. This mode often competes with rail but is more limited based on marine access. Barges can be loaded and unloaded much more rapidly than packaging a bulk product and putting it in a truck. The comparison below shows that one barge can handle as much as 58 trucks or more than 13 jumbo hopper rail cars. Barges are also very fuel-efficient compared to rail or truck. Barges can be delayed by ice on the waterways in the winter. Transit time may vary widely based on the direction of the current and river conditions.

# COMPARE ...

## CARGO CAPACITY

				
<b>ONE BARGE</b> 1,500 TONS 62,500 BUSHELS 453,500 GALLONS	<b>ONE 15-BARGE TOW</b> 22,500 TONS 767,500 BUSHELS 6,804,000 GALLONS	<b>ONE RAIL CAR</b> 110 TONS 3,500 BUSHELS 32,600 GALLONS	<b>ONE 100-CAR TRAIN</b> 11,000 TONS 350,000 BUSHELS 3,260,000 GALLONS	<b>ONE LARGE SEMI</b> 25 TONS 910 BUSHELS 7,865 GALLONS

## EQUIVALENT UNITS

(USING CORN BUSHEL SHIPMENTS FOR THIS EXAMPLE)

		
<b>ONE BARGE</b>	<b>14 RAIL CARS</b>	<b>60 LARGE SEMIS/TRACTOR TRAILERS</b>
		
<b>ONE 15-BARGE TOW AND TOW BOAT</b>	<b>TWO 100-CAR TRAINS</b>	<b>900 LARGE SEMIS/TRACTOR TRAILERS</b>

## EQUIVALENT LENGTHS

		
<b>ONE 15-BARGE TOW</b> 0.25 MILE	<b>TWO 100-CAR TRAINS</b> 2.2 MILES	<b>900 LARGE SEMIS/TRACTOR TRAILERS</b> 11.9 MILES (BUMPER TO BUMPER)

# ALTERNATE ACCESS TO RAILROADS

## TRANSLOADING

### A SOLUTION FOR SHIPPER WITHOUT DIRECT RAIL ACCESS

#### Transloading

In its broadest definition, transloading is the process of transferring freight between two modes of transportation. This toolkit will focus on transferring freight between rail and trucking.

Transloading allows a shipper to take advantage of the cost, speed, and capabilities of more than one mode of transportation. For example, it can link the flexibility of a truck to the long-haul efficiency of rail. A larger shipment can be hauled a long distance by rail and divided at a site near the end-use market into several truck movements for deliveries to customers in the area.

Trucking coupled with long-haul rail service may offer cost savings and improve the flexibility and reliability within the supply chain. Transloading may be a viable option whenever a shipper or customer does not currently have railroad tracks into or at a facility.

Transloading works for many commodities, including finished and unfinished goods, fresh food and beverage products, lumber, paper, metals, building materials, a variety of packaged bulk commodities, as well as special shipments that cannot travel their entire route by road.

How a shipper gains access to the rail system to transload a shipment varies a great deal. A shipper may utilize high-tech container shipping (covered in the next section on intermodal shipping) or a simple rail car set out on a siding (a team track). Between those two extremes there are a variety of options with varying levels of service.

#### How does transloading work?

The diagram on the following page illustrates an example of a transload process. In this example, there is a transload at both ends of the commodity's journey. The transload process can produce greater economic benefits if only one end of the transportation process uses a transload operation.

#### Types of transloading

##### Transloading facility with warehousing

A full-service transloading facility with warehousing can add value and flexibility to your supply chain. By offering short- or long-term storage and handling for goods, a shipper can position goods closer to end users. Products can be reloaded from a larger-quantity rail car, stored, and shipped direct to customers meeting their needs for speed and reliability. Each transload facility may offer a variety of services such as on-call delivery from their warehouse; merchandise consolidation and distribution; packaging, labeling, assembly, or other value-added services.

Some transloading facilities specialize in a particular product or type of product such as a cold storage transload/warehouse that deals only in refrigerated or frozen goods.

##### Basic transloading facility

Other transloading facilities have the ability to shift from mode to mode, but lack warehousing and have limited or no value-added services and staffing. Also, a transload facility may be dedicated to a single type of product with particular requirements such as an ethanol transloading site or a food grade product transloading site. Other facilities may have the capability for multiple types of products.

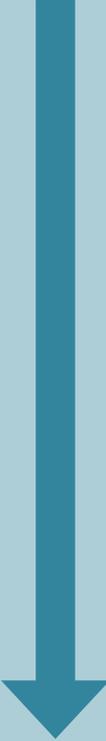
### Cross dock

At a cross-dock transloading facility, cargo is unloaded from an incoming truck or rail car and is reloaded, typically within the same day, directly into outbound trucks, trailers, containers, or rail cars. Inventory is not held during the process. A cross dock typically allows level loading between modes.

### Team track

A team track is the most basic type of transload facility. It is a simple siding or spur track where railcars are placed, available for public use to load or unload freight. No services or equipment are provided by the track owner. A team track may be owned by the railroad, business served by the railroad, industrial park, public agency, or freight terminal operator. It is the responsibility of the shipper or receiver to load/unload the car(s). The shipper or receiver must provide any needed equipment, as well as blocking and bracing to secure the load. Once the cars are loaded, the railroad is notified to pick them up.

### Example of a transload process

Inbound	Process	Outbound	Description
	Load		The commodity is loaded on a short-haul truck for delivery to a transload facility.
	Transport by truck		The truck delivers the commodity to a transload facility, usually within 50 miles of origin.
	Transload		The commodity is loaded onto rail cars. This can be accomplished in many ways depending on the commodity. Transload facilities for bulk liquid commodities will have specialized bays where liquids are pumped through a pipeline to a rail tank car. Dry bulk commodities may use gravity, pneumatics, or a mechanical means to transfer from one mode to another. Forklifts, cranes, and other lifting equipment may be used for other commodities.
	Terminal handling		The loaded rail car will be spotted for pick up by a railroad carrier. Transload facilities may be served by a single railroad or multiple railroads. Multiple railroad carriers serving a transload facility offer the advantage of price competitiveness and routing options.
	Ship by rail		The loaded rail cars are routed to the transload facility near the destination, or may be delivered directly to the customer if they are rail served.
	Store (optional)		Sometimes, at the option of the customer (and when available) the transload will store the commodity on-site until the customer requests the material. Options may exist for either long- or short-term storage.
	Transport by truck		The commodity is transloaded to short-haul trucks for the final leg of the journey and the cycle is complete.

### Iowa's transloading facilities

The table and map on the following pages show transloading locations that have been identified through conversations with railroad staff, along with a brief description and the name of a contact person or number. Contact the transloading location directly to find out more about the services, staffing, and capabilities of each location.

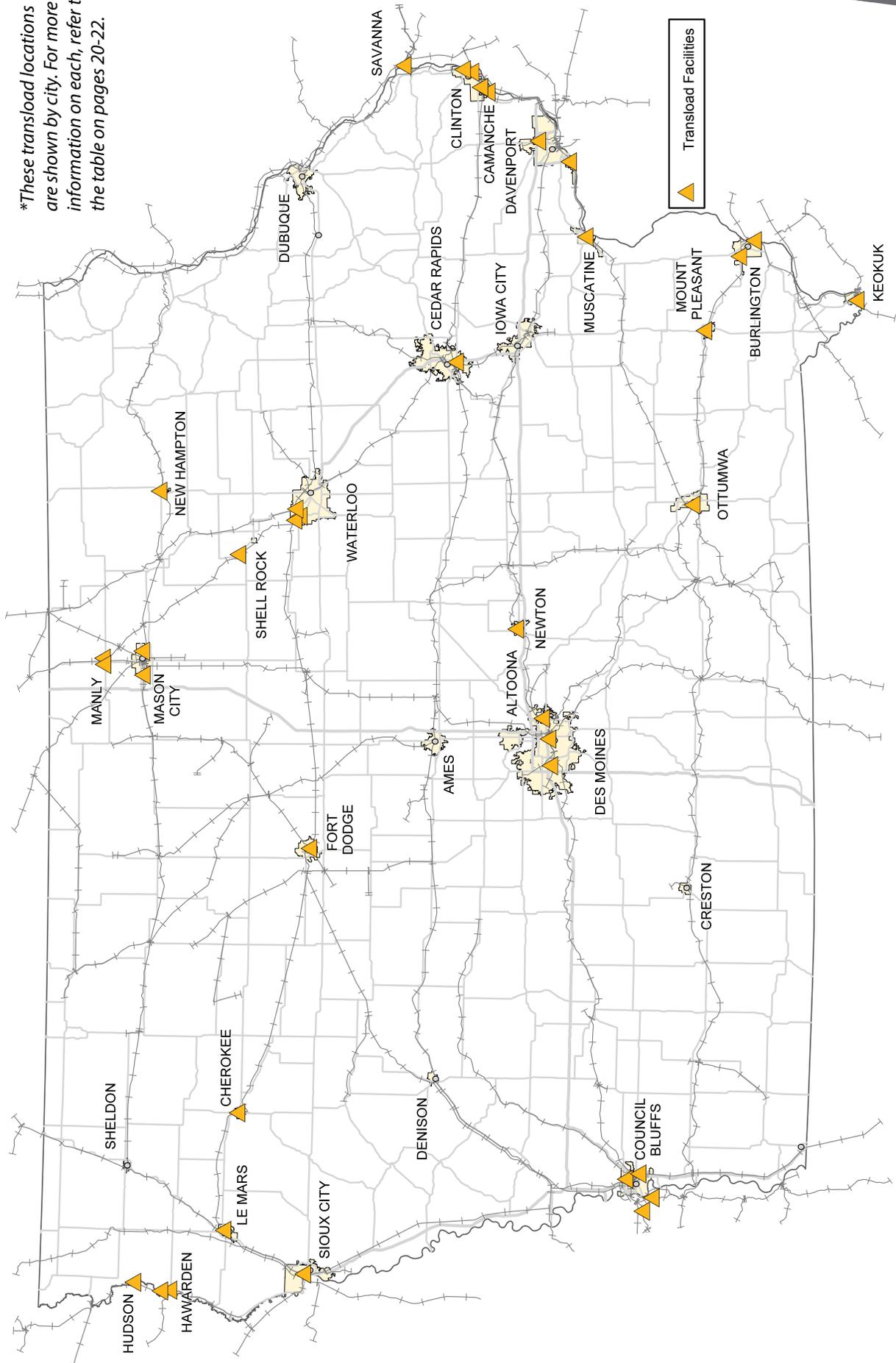
## TRANSLOADING FACILITIES AND WAREHOUSES WITH RAIL SERVICE

Location	Name	Services	Railroad	Contact
Altoona, IA	Iowa Cold Storage	Large capacity refrigerated warehouse resources, cross dock	BNSF, UP	iowacold.com 515-957-8595
Altoona, IA	Merchants Distribution Services	135,000 sq ft heated high cube warehouse and cross-dock facility with 8 rail doors. Pallets, roll paper, packaged food, coiled and flat steel, and unitized building materials. Located one mile from I-80 in the Altoona Business Park.	IAIS	sales@merchantsdsm.com 515-244-2123
Atlantic, IA	IAIS	Railroad-owned two-acre rolled stone tarmac with 800 foot single-side accessible rail siding.	IAIS	Andy Laurent 319-423-5186
Boone, IA	PDM Distribution Services, Inc.	BRC certified food-grade and non-food-grade packaging, transloading, and warehousing.	BSV	Terry Goodman terry.goodman@pdmcompany.com 515-264-8655
Boone, IA	Boone & Scenic Valley Railroad	Team Track Accessibility	BSV	Travis Stevenson travis.stevenson@bsvrr.com 515-432-4249
Burlington, IA	Burlington Junction Railroad	Provides transloading for liquid and dry bulk products, lumber, machinery, oversize, plastics. Industrial development sites available. Rail served barge transfer facilities.	BJRY, BNSF	www.bjryrail.com 319-753-6157 transload@bjryrail.com
Camanche, IA	ADM Terminal Service	Enclosed facility with 8 tracks and 100 railcar spots. Can handle bulk and dimensional cargo.	BNSF, CP, UP	Jim Dougherty 563-259-2474
Camanche, IA	Union Pacific Distribution Services	12-acre wind component distribution center	UP	Cheryl A. Schow 402-233-3538
Cedar Falls, IA	Standard Distribution Co.	Third-party logistics and transloading	CN	www.standardddist.com info@sdcdc.com
Cedar Rapids, IA	CRANDIC	Cross dock, team track for dry material transfer via PD truck	CRANDIC	Jeff Woods 319-786-3660
Centerville, IA	Iowa Southern Railway	Car loading and unloading facilities handling steel products, lumber, and feed ingredients	ISRY	Michael Johns 641-954-1519
Cherokee, IA	Cloverleaf Cold Storage	Warehouse facility	CN	712-225-5151 cherokee@cloverleaf.com
Clayton, IA	Consolidated Grain and Barge	Transload to/from barge, rail, truck, and storage of aggregates, minerals, ag products, biomass, and project cargo. Track space for 30 railcars with options for expansion. Truck access to four interstate highways.	CP	ctlconline.com/terminals/ clayton-ia
Clear Lake, IA	Progressive Rail Services	Third-party logistics and transloading, 70,000 square-foot warehouse storage	IATR	Michael Johns 641-529-0061
Clinton, IA	ADM Terminal Services	Bulk material handling. Facilities include dry bulk barge dock, ground and covered storage	BNSF, CP, UP	Jim Dougherty 563-259-2474
Clinton, IA	Clausen Companies	Food grade and non-food grade warehouse space including temperature control, rail/truck transfer for dry and liquid bulk as well as packaged products, 80 car spots	UP	Cheryl A. Schow 402-233-3538
Council Bluffs, IA	IAIS	Transloading space available for customer-direct or third-party rail-truck accessibility. 20+ car spots available on two tracks, along with 7 acres of rolled stone tarmac, end ramp, lighting, perimeter fencing, and a third-party truck scale on site. I-29/80 highway access within ¼ mile.	IAIS	Andy Laurent 319-423-5186
Council Bluffs, IA	IAIS	Intermodal facility	UP, BNSF, KCS, CN	intermodaldistro@iaisrr.com

Council Bluffs, IA	Union Pacific Distribution Services	Team track with a four-car spot and side dock	UP	Cheryl A. Schow 402-233-3538
Davenport, IA	Catch-Up Logistics	Frozen, refrigerated, and dry storage	CP	412-441-9512
Davenport, IA	Murray Warehousing		CP	www.murraywarehouse.com 563-333-4587
Davenport, IA	Savage Services	Box car, flat car, and bulk transload facility with more than 20 railcar spots. Enclosed 20,000 square foot warehouse. Outside laydown storage area. Hazardous and non-hazardous liquids and dry bulk commodities, lumber, steel, pipe, break bulk materials.	SDR, CP	Dan Price DanielP@savageservices.com
Des Moines, IA	Lucky Logistics LLC	Plastics, scale available, 60 railcar spots	UP	815-672-2931
Dubuque, IA	Foodliner Inc./Quest Liner	Food and plastics	BNSF, CN	800-251-9569
Emery, IA		This transload facility includes car loading and unloading facilities, a truck height dock, liquid transfer capability with track pans, crane service for heavy lifts and flat car loading for machinery.	IATR	Michael Johns 641-529-0061
Fort Dodge, IA			CN	
Hawarden, IA	GCC Dakotah Cement (raw cement)	3,000 feet of track leased for a cement terminal with additional track space as needed for storage.	DAIR	Jack Parliament 724-552-3818
Hawarden, IA	Poet Nutrition (corn oil)	1,800 feet of track leased for a truck to rail transload with additional track space as needed for storage	DAIR	Jack Parliament 605-330-6588
Hudson, SD	Siouxland Energy Transload (SELC)	Nearly 7,000 feet of private track constructed by SELC for their ethanol transloading operation.	DAIR	Jack Parliament 712-722-4904
Keokuk, IA	KJRY	Team track	KJRY	Dale Montgomery 309-697-1400
Le Mars, IA	Burlington Junction Railway	Provides transloading of liquid and dry bulk products, lumber, machinery, and oversize. Industrial development sites available.	CN	www.bjryrail.com 319-753-6157 transload@bjryrail.com
Manly, IA	Manly Logistics Park and Waterloo Terminal	Three-mile loop track and cross-dock facility	IANR	Amy Homan ahoman@iowanorthern.com 319-431-2605
Manly, IA	Manly Terminal/Yard	800-car rail classification yard, 100-acre site for liquid storage and transload, wind turbine component distribution center	IANR	641-454-4000
Mason City, IA	Emery Yard	Wet and dry chemicals, wet and dry foods, propane transloading	UP, IATR, CP	Michael Johns 641-529-0061
Mason City, IA	Cartersville Elevator Inc.	Warehouse rail-to-truck and truck-to-rail transload	CP	Richard Weiner 641-749-2584
Mason City, IA	Iowa Traction Railway Co.	Cross dock, feed ingredients bagging services, bulk commodity transloading of all types. Interchanging with UP and CP.	IATR	Michael Johns 641-529-0061
Middleton, IA	Commerce Center of Southeast Iowa	Existing rail and truck served warehouses available as well as building sites.	BNSF	Eric Pitcher 312-850-5699 eric.pitcher@bnsf.com
Moravia, IA	Iowa Southern Railway	Propane transload, railcar to truck. Interchange with BNSF, NS, and CP.	ISRY	Michael Johns 641-954-1519
Mount Pleasant, IA	Burlington Junction Railway	Provides transloading for liquid and dry bulk products, oversize, and plastics. Industrial development sites available.	BJRY, BNSF	www.bjryrail.com 319-753-6157 transload@bjryrail.com
Muscatine, IA	CAMII Warehouse Inc.	Warehousing facility	CP	563-264-8871

Muscatine, IA	Kinder Morgan Terminals	Bulk liquid storage and warehousing (chemicals and herbicides), tank truck loading/unloading, tank car unloading, tank car to tank truck transloading. Four available rail car spots.	CP	Greg Chappell 319-262-8621 www.kindermorgan.com/content/docs/terminalbrochures/r_Muscatine.pdf
New Hampton, IA	New Hampton Transfer & Storage	300,000 square feet of climate-controlled warehouse facilities, railcar transload	CP	Jonas Schwickerath 641-394-3191 www.nhwarehouse.com info@nhwarehouse.com
Newton, IA	IAIS	Transloading access on two parallel railroad-owned tracks with 56 car spots. Adjacent rolled stone tarmac with lighting available for project, dimensional, or bulk commodities. Industrial roadway access to I-80.	IAIS	Andy Laurent 319-423-5186
Omaha, NE	Geo Transload LLC	Warehouse, 32 car spots, dry bulk capable	UP	402-504-6146
Omaha, NE	Omaha Transloading	Covered and enclosed facilities with 15 tracks and spots for 300 railcars. Can handle bulk and dimensional cargo. Has warehouse available.	BNSF	www.omahatransloading.com 402-341-2233 steven2@omahatransloading.com
Ottumwa, IA	Burlington Junction Railway	Provides transloading for liquid and dry bulk product, machinery, oversize, and plastics. Industrial development sites available.	BJRY, BNSF	www.bjryrail.com 319-753-6157 transload@bjryrail.com
Ottumwa, IA	Questliner/Foodliner Inc.	Transloading facility for wet and dry chemicals, dry foods, plastics, and petroleum products, 23 car spots	CP	questliner.com
Savanna, IL	Riverport Railroad	Enclosed and uncovered facilities with three tracks and spots for 999 cars, bulk and dimensional cargo capability, and warehouse and industrial development options available.	BNSF	www.riverportrailroad.com 815-273-3200
Shell Rock, IA	Butler Logistics Park	Rail car storage, industrial building space available, cross-dock/warehouse facility	IANR	Bill Rhodes 319-415-8150 wrhodes@iowanorthern.com
Sioux City, IA	Big Soo Terminal	Multi-commodity, multi-dimensional rail/truck and rail/barge transload terminal, two tracks, 65 car spots, 100,000-square-foot warehouse storage, 6 million gallons of liquid tank storage capacity, 125,000 tons of dry bulk storage capacity, 15 acres outside storage, river dock for transferring products to barges	UP	www.bigsoo.com Kevin Knepper 712-258-0537
Sioux City, IA	Floyd Valley Transload	Transload for dry and liquid bulk as well as machinery. Non-hazardous commodities only. Access to interstate, state highway, and river port.	BNSF	Brad Cummings bradcummings@live.com 712-244-5103
Various locations in northwest Iowa		100,000-square-foot warehouse storage, 6 million gallons of liquid tank storage capacity, 125,000 tons of dry bulk storage capacity, 15 acres outside storage,	DAIR	Jack Parliament 605-330-6588
Waterloo, IA	Waterloo Terminal/ Bryant Yard	Self-serve, cross dock, and direct rail-to-truck transload facility	IANR	Bill Rhodes 319-415-8150 wrhodes@iowanorthern.com
Waterloo, IA	Kinder Morgan, Black Hawk Terminal	Handling fertilizer and steel bar, rail/truck/storage transloading, access to US 20, I-380, and US 63, warehouse services	UP	www.kindermorgan.com Fred Nordman 319-233-5273
West Liberty, IA	Custom Farming Transload	River dock for transferring products to barges	IAIS	Larry Regennitter 319-627-4168
Williams, IA	Williams Bulk Transfer (WBT)	State of the art materials handling terminal. Access to I-35 and US 20 as well as the CN railroad. Also offering outdoor storage and development opportunities.	CRANDIC, CN	Jeff Woods 319-786-3698 jeffwoods@alliantenergy.com

\*These transload locations are shown by city. For more information on each, refer to the table on pages 20-22.



# INTERMODAL

## What is intermodal?

Intermodal freight transport involves an intermodal container or trailer, using multiple modes of transportation (rail, ship, and/or truck), without handling of the freight itself when changing modes. The method reduces cargo handling, improving security, reducing damage and loss, and can allow freight to be transported faster. For this toolkit, the focus will be intermodal service using rail. Intermodal rail service typically combines truck pickup and delivery with rail line haul service. Trucks transport containers and trailers to rail terminals often within 100 miles of the loading/unloading point. Intermodal trains typically are not mixed with rail manifest or unit trains and move in dedicated rail service between designated terminals.

Intermodal service is not sold directly to shippers, but instead it is coordinated by truckload carriers, intermodal marketing companies, or third-party logistics (3PL) providers. These providers bundle the terminal-to-terminal train service with trucking services (often called drayage) between customer locations. Container and trailer equipment is provided by the intermodal marketing company and/or trucking company.

## What are the types of intermodal service?

**Domestic intermodal** service typically moves across the rail network in 48' or 53' long containers between terminals located on the Class I rail network in North America. While technically terminals in Mexico and Canada are international locations, the North American surface transportation system connects these markets using the same railroad service standards and similar equipment. Equipment specifications are shown below in Figure 1.

**International intermodal** import service typically enters the rail network at or near a deep-water port. Export products are loaded in empty containers and typically shipped by rail to a deep-water port. International containers are provided by the ocean carrier and are typically 20 or 40 feet in length. International containers are mounted to chassis at the final terminal for local delivery. These services are typically coordinated by a freight forwarder or are specified in the ocean transportation contract. Equipment specifications are listed on the next page in Figure 2.

48' high cube x 102" Usable cube capacity 3,470 cu. ft.				53' high cube x 102" Usable cube capacity 3,830 cu. ft.			
Inside dimensions	Door opening	Palletized loads	Tare weights	Inside dimensions	Door opening	Palletized loads	Tare weights
L 48'6"		48"x40" (units) 28	Container only 9,600 lbs.	L 52'6"		48"x40" (units) 30	Container only 10,750 lbs.
W 98"	W 98"			W 98"	W 98"		
H 106.5"	H 206.5"	48"x42" (units) 26	Container with chassis 18,000 lbs.	H 106.5"	H 106.5"	48"x42" (units) 30	Container with chassis 19,340 lbs.

Figure 1: Domestic container specifications source: PNW Equipment Inc.

Container size/ type	Material	Outside height (in.)	Tare weight (lbs.)	Max. cargo capacity (lbs.)	Door opening		Interior dimensions		
					Width (in.)	Height (in.)	Length (in.)	Width (in.)	Height (in.)
20 ft.	Aluminum	102	3,594	41,204	92	90	233	92	94
20 ft.	Steel	102	5,071	47,840	92	90	232	92	94
40 ft.	Aluminum	102	5,820	61,377	92	90	475	92	94
40 ft.	Steel	102	8,510	58,687	92	90	474	93	94
40 ft. high cube	Aluminum	114	6,636	60,561	92	104	475	92	105
40 ft. high cube	Steel	114	8,796	58,400	92	102	474	93	106
20 ft. refrigerated	Aluminum	102	6,217	46,694	89	87	218	89	89
40 ft. refrigerated	Aluminum	102	9,039	58,158	90	85	460	90	87
20 ft. open top	Steel	96	5,401	47,510	92	88	232	93	92
40 ft. open top	Steel	102	9,149	58,048	92	88	473	93	92
20 ft. flat rack	Steel	102	5,732	47,179	-	-	234	93	89
40 ft. flat rack	Steel	102	11,244	55,953	-	-	475	93	89
40 ft. platform	Steel	-	13,580	110,231	-	-	480	96	-

Figure 2: International Container Dimensions Source: [Redhawkglobal.com/resources/intermodal-container-specs](http://Redhawkglobal.com/resources/intermodal-container-specs)



Figure 3: North American Intermodal train network and terminals:

Source: Oak Ridge National Laboratory. *BTS. Containerization International*

Credit: Dr. Jean-Paul Rodrigue, Department of Global Studies and Geography, Hofstra University

The map in Figure 3 shows the North American intermodal train network and terminal locations. There is one intermodal terminal in Iowa, located in Council Bluffs on the Iowa Interstate Railroad. Other Midwest intermodal facilities are in Minneapolis/Saint Paul, Minnesota; Chicago and Rochelle, Illinois; Kansas City, Missouri; and Omaha, Nebraska.

# CARLOAD

Rail carload shipping has been a viable form of transportation since the 1800s. Freight can be transported in a dedicated (unit) train or as part of a broad mix of freight types (manifest service). Solids, liquids, and gases can be moved with a variety of car types. Some of the common options for freight transportation by rail are described below.

## Manifest train service

Manifest trains are made up of rail car shipments from multiple shippers. The train might contain boxcars, hopper cars, and flatcars carrying a broad variety of products. Individual rail cars are loaded at a customer facility and move to a regional switching yard. From that yard they are added to a train, moved to the final train terminal where individual cars are switched out of the train, and then are delivered to local customers. Manifest trains may have 100 different shipper and receiver combinations within a single train. The diagram below illustrates how cargo moves in a Class I manifest rail network. While transit times can be predictable, when train volumes vary, transit times can often be widely variable.



Figure 1: Class I manifest train movement

## Unit train service

Unit trains are often blocks of 100 to 130 rail cars, all traveling at the same time between two point pairs. Shuttle trains typically move 50 to 55 cars between two point pairs. When possible, shuttle trains are combined to gain operational efficiency. Cars in unit train or shuttle train service are loaded at one origin and all the cars move together to the final destination. There are efficiencies in this type of service because there is less car switching required. However, the shipper must be able to load a full train in the space of 24 hours or within a time specified by the railroad. Unit train service is very efficient and among the lowest cost trains for shippers. Unit train service is often used for coal, crude oil, grain, and other bulk commodities.



Figure 2: Class I unit train movement

## RAIL CARS

There are many rail car types in use in the rail industry. Several standard car types are provided by many railroads. Shippers with special needs have designed and purchased their own rail cars. Equipment leasing companies also offer lease agreements for certain types of equipment. In 2013, the American Association of Railroads reported that 364,025 rail cars were owned by Class I railroads, 90,502 were owned by short line and regional railroads, and shippers and leasing companies owned 792,100 cars for transportation purposes.

### Boxcars

Boxcars are general purpose vehicles that carry products like packaged foods, paper, machinery, and just about anything you might load in a dry van truck. Some boxcars are refrigerated and carry fresh and frozen foods or any products requiring temperature control. The specifications below illustrate rail car cubic and weight carrying capacity.

	50' standard	50' high-roof	60' standard	60' high-roof	86' auto
<b>Inside length</b>	50'7"	50'6"	60'9"	60'9"	86'6"
<b>Inside width</b>	9'6"	9'6"	9'4"	9'6"	9'6"
<b>Inside height</b>	10'11"	13'	10'10"	13'	13'
<b>Door type</b>	Slide and/or plug	Plug	Slide and/or/plug	Plug	Slide and/or/ plug
<b>Door width</b>	10'	10' – 12'	10'	10' – 12'	20'
<b>Door height</b>	10'	12'	10'	12'	12'
<b>Exterior length</b>	55'5"	58'2"	67'11"	67'7"	93'6"
<b>Exterior width</b>	10'7"	10'8"	10'6"	10'8"	10'8"
<b>Cube capacity</b>	5,238 cu. ft.	6,269 cu. ft.	6,085 cu. ft.	6,646 cu. ft.	9,999 cu. ft.
<b>Freight capacity</b>	70 – 100 tons	100 tons	70 – 100 tons	100 tons	70 tons

### Flatcars

Flatcars are often used for finished machinery, transformers, tractors, steel plate, steel coils, logs, pipe, and other products that may not be able to be loaded easily within a boxcar. Flatcars can have a center beam for strapping finished lumber, wall board, or building products. Bulkhead flatcars often carry pulp logs cut into 5-foot lengths that move to paper mills, and can also be used to move pipe or other products that might shift if a bulkhead was not available to stabilize the load. General purpose flatcars often carry machinery that is tied down to stabilize the load. Flatcars come in a wide variety of lengths and configurations.

## Hopper cars

These bulk utility cars come in several sizes and configurations. Some have covers to keep cargo dry in transit. Most hopper cars have two to four compartments and are typically loaded from the top. Many hopper cars have a bottom gate allowing them to dump product using gravity to unload the product. Open hopper cars move bulk products that are not affected by weather such as scrap, coal, stone, slag, gravel, and sand.

	Small cube	Jumbo
<b>Size</b>	2,700 to 3,599 cubic feet	3,600 to 5,324 cubic feet
<b>Freight capacity</b>	70 to 100 tons	100 to 110 tons
<b>Car length</b>	39 to 50 feet	13 feet
<b>Car height</b>	13 to 15.5 feet	15 to 15.5 feet
<b>Compartments</b>	Two to three	Three to four
<b>Loading hatches</b>	Three to six centered 30-inch diameter; or eight to 12 off-centered 30-inch diameter	20- to 40-inch wide center trough running the length of the car
<b>Outlet gates</b>	One to two 13-inch by 42 -inch gates per compartment	Two 13-inch by 42-inch gates per compartment
<b>Number of gates per car</b>	Two to six	Three to six
<b>Gate spacing</b>	12 feet	12 to 15 feet
<b>Gate types</b>	Gravity	Gravity

## Gondola cars

Gondola cars are an open top car with a flat bottom. Cars can reach up to 65-feet long and sides range between four to eight feet high. Commodities that typically move in gondola cars include sand, ore, gravel, and scrap.

	52' gondola	65' gondola
<b>Freight capacity</b>	70 to 100 tons	100 to 110 tons
<b>Car length (standard)</b>	52'6"	55'6"
<b>Car height (standard)</b>	9'13/16"	9'13/16"
<b>Inside height (standard)</b>	5'6"	5'6"
<b>Inside width (standard)</b>	9'6"	9'
<b>Cubic capacity</b>	2,743 cubic feet	3,242 cubic feet

## Tank cars

Tank cars are highly specialized to carry bulk liquids. Primary types of tank cars include general service, heat coil and insulated cars, high-pressure tank cars, acid and liquid sulfur cars, and crude oil cars.

These cars are typically privately owned, and carry a wide range of chemicals, gases, fertilizer, and food products such as syrups, juices, and other beverage products.