Freight Rail in Minnesota

INTRODUCTION & CONTEXT

Freight rail has emerged as a key transportation topic in Minnesota, in part due to increases in the amount of crude oil being shipped on Minnesota's railroads. The impact of a changing railroad industry reaches beyond the rails that trains travel on, affecting communities and the state's economy in both positive and negative ways. The recovery of Minnesota's freight rail shipping industry signals that the state's economy is healthy. Freight rail provides an efficient, safe method for moving goods over long distances. Despite this, concerns about delays and safety around at-grade crossings, access to shipping opportunities for local producers, and the impact of freight shipments on passenger rail travel all present challenges for Minnesota's rail transportation system going forward.

Freight Rail's Resurgence

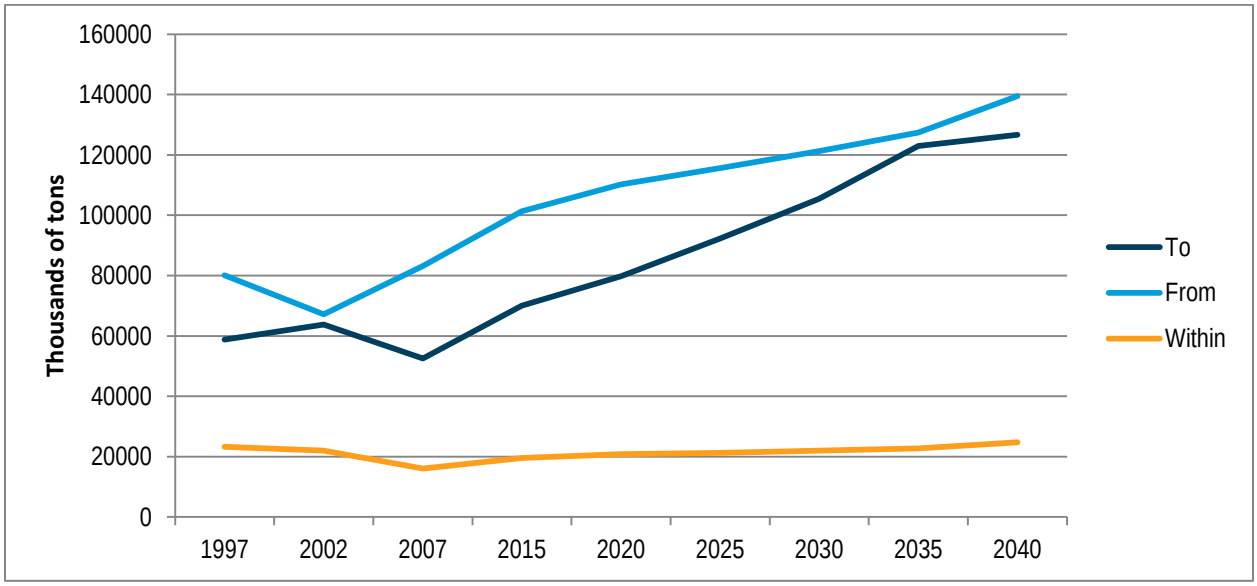
Freight rail continues to be a major component of Minnesota's transportation network. Rail companies suffered a downturn during the recent economic recession that began in late 2007 and continued in earnest for the better part of two years. As of today, freight railroads in the United States are nearing pre-recession traffic levels, and are currently carrying more shipments than they have since 2007.[1] These increases are a result of changing market environments. Stronger motor carrier regulations, higher truck fuel costs, and a truck driver shortage in the United States have pushed more freight to rail.[2] Shipments by rail have grown across nearly all sectors of the economy. Eighteen out of the twenty commodity categories tracked by the Association of American Railroads (AAR) showed year-over-year increases in 2014.[3] Of all major categories, crude petroleum, natural gas, and gasoline saw the highest year-to-year percentage growth in carloads, growing by 89.6 percent from 2012 to 2013.[4] Nationally, railroads have increased the tonnage of crude petroleum shipped from 800,000 tons in 2005 to 49.3 million tons in 2014, boosting revenue from $6 million to $2.87 billion from crude oil alone for those years.[5]

A Profile of Freight Rail Shipments

Understanding the types and volumes of goods that move along Minnesota's railroads can help to describe the challenges and opportunities facing the industry. The Federal Highway Administration's Freight Analysis Framework (FAF) combines data from a variety of sources to provide an overview of freight movement in the United States.[6] The FAF database allows users to sort through data by geographic region, state, commodity, and mode of transportation. Unfortunately, the data from this project is beginning to age. The FAF was published in 2010 and predates the oil boom that occurred on the Bakken oil fields in North Dakota, bringing its projections for crude petroleum shipments into question. Nevertheless, the dataset does offer insight into forecasted trends for other commodities in the state. Figure 1 shows the total tonnage of freight projected to be on the rails in Minnesota through the year 2040.

[1] American Association of Railroads, 2015
[2] Minnesota Department of Employment and Economic Development, 2013
[3] American Association of Railroads, 2015
[4] Railroad Ten-Year Trends, 2015
[5] Ibid.
[6] Freight Analysis Framework, 2010

Figure 1: Projected Freight Rail Shipments involving Minnesota (thousands of tons)



On the whole, the total tonnage of freight moving by rail is projected to increase steadily for shipments to and from Minnesota. Shipments by rail within the state are projected to increase as well, but at a slower rate.

The Rise of Crude-by-Rail

The United States has seen a dramatic turnaround in oil production during this decade. New technologies and advances in hydraulic fracturing ("fracking") and horizontal drilling have led to booming oil and gas production in shale deposits across the country.[7] Domestic crude oil production is projected to come close to matching the record high of 9.6 million barrels set in 1970.[8] Production increases have placed the United States in a position where some parts of the country have excess oil and refined products, and 66 percent of nation-wide demand is met by crude from North American sources.[9] Finding ways to transport crude oil and its byproducts has been a challenge for the industry given the rapid pace of growth in areas that had little oil production in the past.

Two emerging areas of production (referred to as "plays") include the Bakken Shale formation and Canadian tar sands. Major rail routes travel from these two locations through Minnesota to refineries in the Gulf of Mexico and on the East Coast. Oil production from Canadian tar sands has increased steadily while production in North Dakota has grown at an exponential rate. In 2003 North Dakota produced 81,000 barrels of crude oil per day; by mid-2014 the state was producing 1 million barrels per day. This makes North Dakota the second-largest oil producing state in the United States.[10] Such rapid growth outpaced the capacity of existing pipelines and the speed at which new pipelines could be built, meaning that oil producers needed to look at other methods for moving crude oil to refineries.

The use of freight rail to ship crude oil was originally thought of as a stopgap solution intended to overcome a lack of pipeline infrastructure, but it has continued to be a useful method to move the product across the continent.[11] Shipping by rail is appealing to producers for a number of reasons. Railroads offer more flexibility in reacting to market changes, offer shorter transit times (8-10 days from Alberta to the Gulf Coast compared to 40-50 days by pipeline), and are more responsive to increases in shipping demand.[12] Generally speaking, railroad companies are more likely to enter into shorter-term contracts with shippers than pipelines (1-2 years as opposed to 10-15 years), providing greater responsiveness to price and demand

[7] Association of American Railroads, 2015
[8] Ibid.
[9] Frittelli et. al., 2014
[10] Association of American Railroads, 2015
[11] Carey, 2013
[12] Ibid.

changes.[13] Railroad cars can also be heated, lessening the amount of diluent needed to maintain the crude oil's viscosity while in transit compared to pipelines.[14] Table 1 provides greater detail regarding the advantages that rail transportation has over pipelines for crude oil producers.

Table 1: Advantages of shipping crude by rail[15]

Advantage	Description
Geographical Flexibility	Railroads offer flexibility to producers as they are connected to nearly every major refinery in the United States and Canada. This can allow producers to better align themselves in response to both market needs and price advantages.
Responsiveness	The facilities needed to carry crude by rail can almost always be constructed or expanded more quickly than pipelines and refineries can be built. This is especially relevant when discussing new and emerging oil fields.
Efficiency	Railroad companies are involved in all aspects of development as new facilities are brought online. This results in an efficient set up for loading, hauling, and off-loading large volumes of product. The efficiencies gained through this process tend to encourage unit trains, which carry approximately 85,000 barrels of oil in trains that are at least 50 cars long.
Product Purity	Buyers of crude oil typically request specific types of oil; shipping pure product is much easier to do by rail than by pipeline given the smaller, enclosed nature of rail cars.

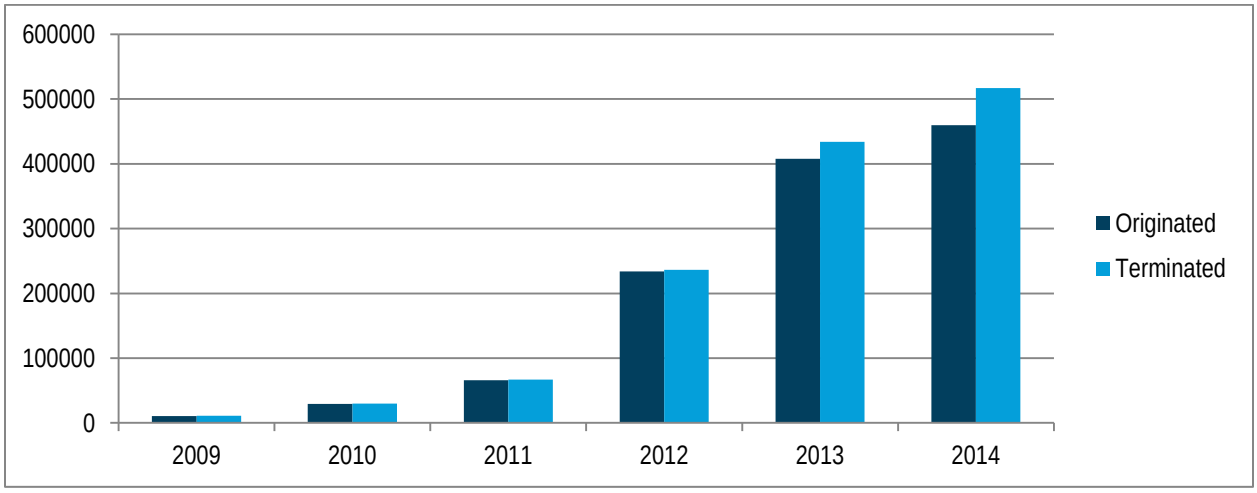
These advantages do come at a monetary cost and bring about potential safety hazards.

Oil producers are more likely to choose to pay the higher price of shipping crude oil by rail when oil prices are high enough to offset the increased cost of transportation. So far in 2015 there has been a ten percent decline in shipments of crude by rail compared to 2014 due to refinery maintenance and a narrow margin between U.S. crude prices and London's Brent Crude Index Price.[16]

Wide price margins and a lack of other infrastructure for crude oil shipments have led to a dramatic spike in the use of rail to move crude oil from production sites to refineries. Figure 2 shows the number of tanker cars carrying crude oil that originated and terminated in the United States respectively. Totals for 2014 are projected based on data from quarters one and two.

[13] Frittelli et. al., 2014
[14] Frittelli et. al., 2014
[15] American Association of Railroads, 2015
[16] Reuters, 2015

Figure 2: Carloads of crude oil shipped nationwide[17]



The difference in the number of rail cars terminating in the United States compared to the number of rail cars originating in the United States is due in large part to the shipment of crude oil from the Canadian tar sands to the United States via rail.

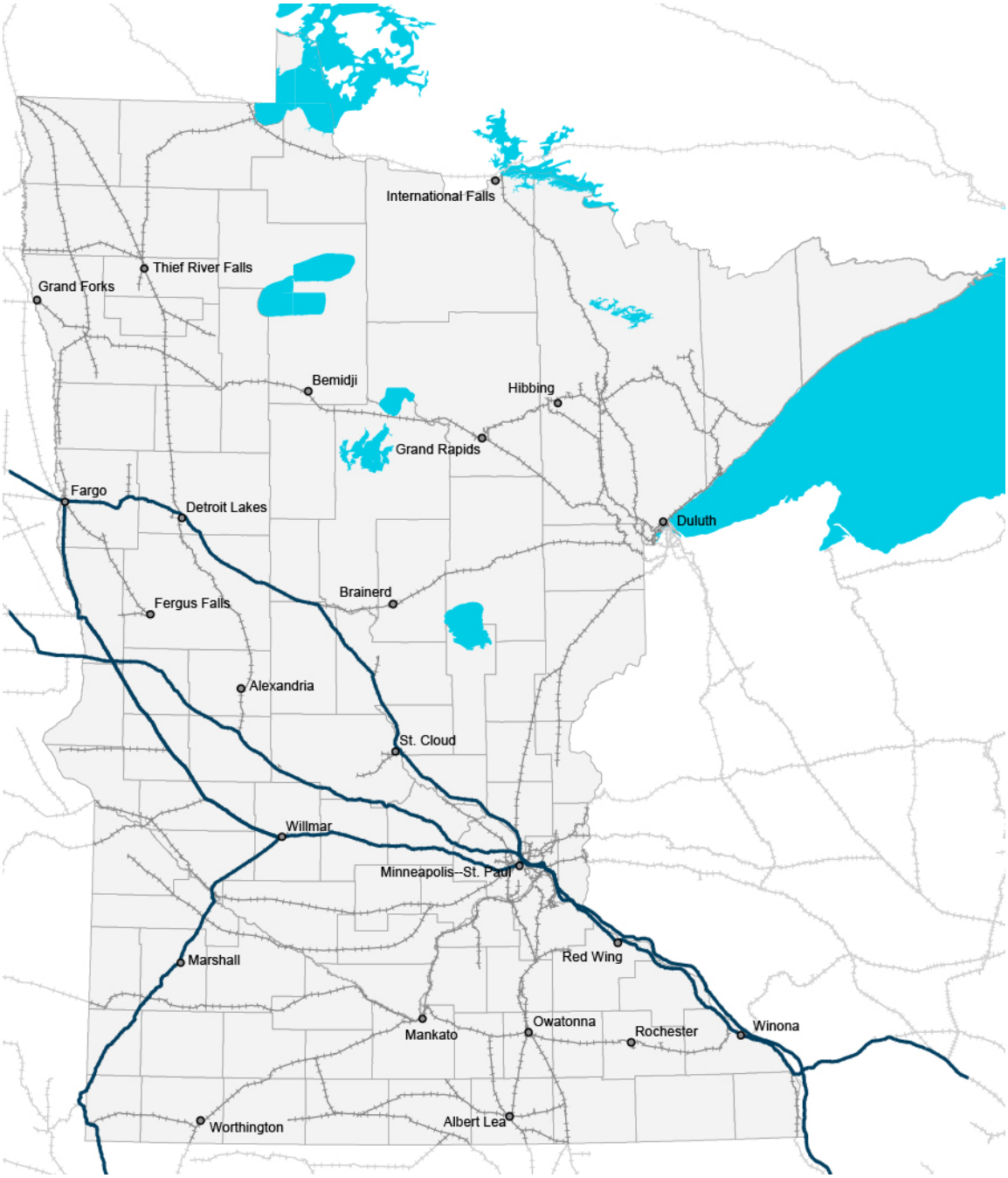
Crude oil from the Canadian tar sands is very different from crude produced in the Bakken region of North Dakota. Bakken crude, as has been widely publicized, is highly volatile and prone to catching fire in the presence of an ignition source (sources could include sparks and heated metal that may occur at accident sites).[18] Steps are currently being taken to make Bakken crude safer during transport. These steps include conditioning measures and processing procedures that make shipping the oil less dangerous.[19]

Crude from the Canadian tar sands is much less volatile. It is shipped in the form of diluted bitumen (commonly referred to as 'dilbit') mixed with additives that make it flow more easily. A 2010 pipeline spill demonstrated the unique challenges that dilbit causes when released into the environment. The 2010 spill poured 850,000 gallons of dilbit into Talmadge Creek, a tributary of the Kalamazoo River near Marshall, Michigan. A three year cleanup effort found that the dilbit did not biodegrade and sank to the bottom of the creek where it became embedded in the creek's sediment. The EPA ordered the pipeline operator to remove oiled sediment resulting in a $1.2 billion cleanup effort that was far more costly than a conventional oil spill of similar size.[20]

Figure 3 displays the rail routes that are used to ship Bakken crude oil across Minnesota.

[17] American Association of Railroads, 2015
[18] Minnesota Department of Transportation, 2014
[19] Frittelli, et. a., 2014
[20] Ibid.

Figure 3: Map of railroads used for Bakken crude oil shipments



Communities along the routes shown above have expressed concerns about increased shipments of crude oil along railroads. While there is danger in shipping crude oil by rail, it is important to note that crude oil makes up a small percentage of all rail shipments and is not the most dangerous material carried by rail. Crude oil can be and often is safely transported from source to refinery. Despite this, some incidents have occurred in North America since 2014.Table 3 provides an account of some recent crude-by-rail incidents in the United States and Canada.

Table 3: Recent crude-by-rail incidents in North America

Location	Date	Description
St. Paul Park, MN	June 7, 2015	Collision between an oil train and semi-truck carrying flour in St. Paul Park, MN. No oil was spilled or ignited as a result of this incident.
Heimdal, ND	May 6, 2015	Derailment resulted in the burning of 6 rail cars. The cars were all manufactured after 2011 and have more safety features than older cars. Approximately 40 people were evacuated from the town as a result of the derailment.
Gogama, Ontario	March 7, 2015	Derailment of 10 tanker cars that caught fire, some of which entered the nearby Mattagami River system and impacted the Gogama and Mattagami First Nations.
Galena, IL	March 4, 2015	Derailment of 21 cars near the intersection of the Galena and Mississippi Rivers. The derailment occurred in a rural area and did not result in any evacuations.
Boomer, WV	February 16, 2015	Derailment and subsequent fire involving 16 tanker cars. The crash impacted the Kanawha River in Boomer, WV. 200 to 300 people were ordered to evacuate as a result of the incident, and local water supplies were impacted. The train was en route to Yorktown, VA from North Dakota
Vandergrift, PA	February 12, 2014	Derailment resulting in a 3,000 to 4,000 gallon spill near the Kiskiminetas River.

There are 743 at-grade crossings of roads and railroads on the more than 700 miles of train routes that carry Bakken crude across the state, with a total financial shortfall of just under $250 million to make all crossings along the route safe.[21] Concerns regarding crossings are not limited to the potential for crashes; blocked at-grade crossings can keep emergency responders from reaching their intended destinations when railroads bisect communities. While the most recent data indicates that railroads spill less oil per ton-mile than other modes of land transportation on a consistent basis, incidents like the near miss in St. Paul Park, MN continue to raise concerns about the potential consequences of an oil train incident.[22]

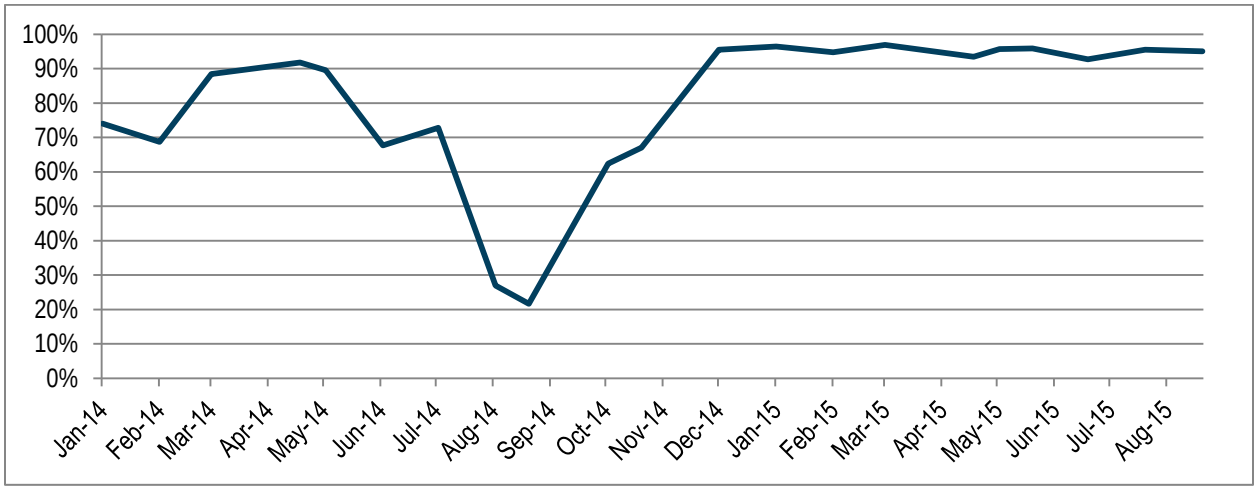
[21] Minnesota Department of Transportation, 2014
[22] Ibid.

IMPACT ON PASSENGER TRAVEL

Passenger Rail

Much has been made about the impact that increased crude-by-rail shipments have had on passenger rail operations. In Minnesota those impacts have been felt primarily by those traveling on Amtrak trains and the Northstar Commuter Rail line operated by Metro Transit. Figure 4 shows the on-time performance of Northstar since January of 2014.

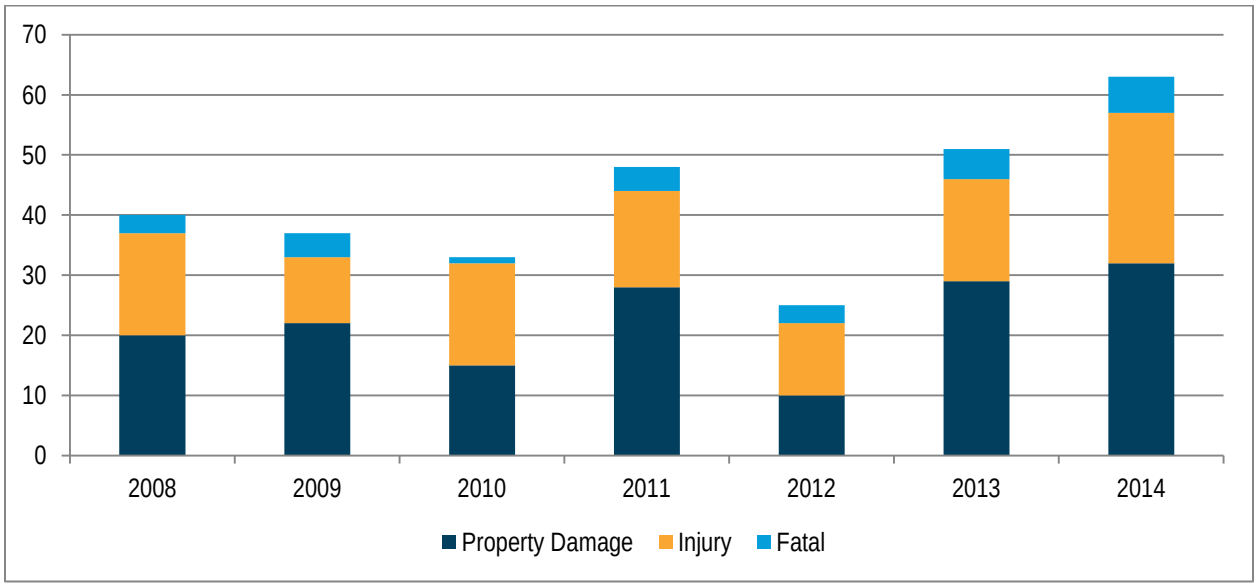
Figure 4: Northstar Commuter Rail on-time performance[23]



Automobile Travel

Increased train traffic along corridors that are used to ship Bakken crude oil cause delays for motorists waiting to cross the tracks. Given the extensive length of unit trains that carry Bakken crude these delays are frequently long and present challenges to emergency response vehicles. Safety is also a key concern for travelers moving through at-grade crossings. Figure 5 shows the number of recent crashes between automobiles and trains based on crash type. The general uptick in crashes from 2010 through 2014 is an interesting trend that merits further observation in years to come.

Figure 5: Motor vehicle – train crashes by type, 2008-2014[24]



[23] Metro Transit

[24] MN Department of Public Safety Crash Facts, 2014