Fernley Multimodal Freight Facility Feasibility Study

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NNDA Northern Nevada Development Authority

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A. Introduction

The management of Northern Nevada Development Authority (NNDA), recognizing that the City of Fernley region was in line to experience the next surge of Nevada commercial land development, requested Strategic Rail Finance's (SRF) advisory services to determine how the public sector can encourage and support freight-based economic development.

The Fernley region promises to be well-positioned for a multimodal freight facility with existing and future freight rail capabilities as the core. The objective of this Feasibility Study is to research the achievability and practicality of such a multimodal freight facility in the study region, qualify Fernley as the optimal location for a facility and assess the potential economic impact on the surrounding region.

While the focus of the project is Fernley, Hazen, Fallon, Silver Springs, and the Tahoe-Reno Industrial Center, it is important to understand the logistics dynamics, needs, and opportunities of nearby Mineral County and points east along the I80 corridor to determine the full set of shipper needs that new rail infrastructure can serve. This wider regional understanding has been developed through a combination of this engagement and the ongoing work on the new Nevada State Rail Plan.

The deliverable for this Fernley Multimodal Facility Freight Feasibility Study engagement is a report that communicates a set of recommendations and related background for a multimodal freight facility and related rail infrastructure and services that can be built and provided in the primary study area. This discrete Fernley Study will also be incorporated into the Nevada State Rail Plan. Rail infrastructure and service recommendations outside of the primary study area will be advanced and covered in the state plan.

SRF early-on ascertained that there are twelve private-sector land development projects underway in the region that all feature freight-generating industrial activity. Discussions with NNDA resulted in alignment on these key engagement elements:

- Support these private-sector project sponsors with logistics knowledge and relationships with transportation providers is a productive use of limited public-sector resources
- Identify ways for the Fernley region to become a rail-centric hub of intermodal and bulk cargo shipping to and from the California marketplace and its ports
- Develop a multifaceted industrial logistics strategy that is attractive to shippers and transportation providers across multiple states
- Prepare for interactions with Union Pacific Railroad and BNSF Railway to secure optimal services, routing, and pricing

B. Executive Summary

This feasibility study illustrates there is a commercial business case for an Integrated Multimodal Cargo Transfer Facility (IMCTF) in the study region and identifies Fernley as an optimal location for siting the development. An IMCTF is a design for an "Inland Port" or "Intermodal Facility" that stimulates freight-based commercial activity beyond the transfer of containers from one mode to another and is described in detail in this report.

Implementing an IMCTF in northwest Nevada is an opportunity to transform freight transportation in the region by creating a sustainable system which balances the use of truck and rail. The IMCTF will also be a catalyst for industrial development, offering cheaper and more flexible transportation options for new companies attracted to the industrial land available in the region.

B.1 Freight flow conversion and generation

The business case analysis demonstrates the commercial viability of the IMCTF and its role in converting existing truck movements to intermodal truck/rail and generating new intermodal activity.

The primary opportunity for truck to rail freight conversion is associated with existing through-state international and domestic truck service between the California port regions and states east of Nevada. This bi-directional flow presently accounts for 1.39MM annual truck journeys carrying 26.9MM tons of freight. Significant portions of this through-freight would be attracted by the reduced costs and improved service to an IMCTF in northwest Nevada. Farm and food product commodities are a leading freight category targeted for this conversion from road to rail.

Another category of existing freight flows the IMCTF could convert from road to rail are extractive commodities transported from northwest Nevada to California. On this freight corridor the commodity categories of clay, concrete, glass, stone, and non-metallic minerals presently account for 1,000,000 truck journeys of which 50% are empty return trips. While a rail freight corridor already exists for the transportation of these commodities it handles only a fraction of total volume. Our initial analysis indicates that an IMCTF facility in northwest Nevada would support the conversion of a significant volume of the 11MM tons of this freight currently being trucked to California onto rail.

The IMCTF will go beyond supporting the conversion of existing and future truck freight flows to rail. We estimate, based on analysis and interviews with developers and shippers, a generative effect from the new facility. New companies locating in the Fernley area will be attracted by the opportunity to reduce transportation costs and optimize their supply chain performance by utilizing the IMCTF facility.

B.2 Fernley: The optimal location in the study region

An effective and sustainable intermodal freight facility needs to be strategically located on a major transportation corridor where truck cargo/shipments intersect with primary rail lines and has large-scale land available for cargo handling expansions. The study region is therefore ideally positioned for an Integrated Multimodal Cargo Transfer Facility (IMCTF) and Fernley is the obvious location due to the combination of available land and adjacencies to I-80, U.S. 95, and the Union Pacific Railroad. Our analysis identifies that Fernley is the sole area between the California border and Hazen with sufficient available space, and flat topography, in a commercial development zone, located aside the primary rail and highway network.

B.3 Strategic Partnership with Port of Oakland

The study highlights that developing an IMCTF facility introduces the opportunity for a strategic transportation partnership with the Port of Oakland. Analysis of truck traffic passing through the study region identifies a compelling business case for deflecting existing freight flows bound for Los Angeles ports to the Port of Oakland via an IMCTF at Fernley. Exploratory dialogue with the Port of Oakland captured their enthusiasm for supporting rail-based development in Northern Nevada to deflect a proportion of these 1,250,000 annual truck journeys from the Los Angeles ports. The Port of Oakland specifically identifies short haul rail serving Nevada distribution centers as a strategic initiative, offering the potential for a partnership with the port to develop existing and new freight flows. An alternative to the congested Los Angeles ports would make the IMCTF facility hugely attractive to shippers on one of the nation's highest volume trade corridors resulting in growing business for the facility and the Port of Oakland.

B.4 Competitive advantage of the IMCTF

The study recommends NNDA support the development of an IMCTF facility to serve the needs of today's diverse supply chains. The IMCTF has a competitive advantage over traditional intermodal facilities at ports or elsewhere, which are generally limited to container freight and have little or no logistics transloading capacity. Existing facilities at California ports or inland sites east of Nevada, do not have this capability nor the capacity to develop it. Case study analysis in the Business Case section of this study suggests transportation costs savings of between 15% and 20% when shippers have access to an IMCTF compared to a traditional multimodal facility.

B.5 Catalyst for industrial development and land revaluation

In contrast to many new transportation infrastructure projects, the proposed IMTCF at Fernley is not dependent upon a freight-intensive anchor tenant to justify development. The large volumes of organic through-traffic with a real commercial business case for both the deflection and diversion of truck-based traffic to the facility are sufficient to make this project feasible. This is an important benefit of the IMCTF at Fernley generating significant upside for developers of industrial properties. The in-motion development of the facility and its attributes will catalyze new tenant attraction, as the intended value proposition of co-location to the IMCTF is clearly defined.

Industrial land values will reflect this enhanced attractiveness, encouraging developers to convert more land to industrial use and support expansion of economic development areas in the Fernley hinterland.

B.6 Ensuring sustainable economic development

Northwestern Nevada is experiencing increasing freight activity because of the surge of regional industrial development and from its position on one of the nation's major continental trade arteries. Over 75% of all freight in the study region is currently moved by truck accounting for more than 50% of all Nevada's truck journeys. Such an overreliance on trucks can negatively impact the economic value of a region as congestion, pollution and road maintenance costs increase to unsustainable levels. The development of an IMCTF facility at Fernley directly addresses this issue by enabling a far more sustainable transportation system. This study identifies that large scale conversion of existing freight flows will result from the availability of an IMCTF facility balancing the use of truck and rail appropriately and supporting the continued growth and prosperity of the economy in northwest Nevada.

B.7 Critical Success factors

The study identifies three critical success factors for the IMCTF project to deliver the sustainable freight system envisaged by the NNDA:

1) A diversified IMCTF model that offers cargo transload options in addition to modal transfer is necessary to maximize the freight facility's utility for generating freight volume and ancillary freight activity.

2) A degree of public sector sponsorship is important for a project of such strategic importance to the region. This will assure developers and shippers of the long-term commitment to a facility crucial to their freight transportation and business operations. This sponsorship can take the form of financial, technical, managerial, or political support.

3) The third critical success factor is effective stakeholder engagement. Developing the IMCTF and ensuring its sustainable operation is dependent on the involvement and support of many stakeholders including rail operators, land developers, shippers, freight forwarders and 3PLs, and California port operators. As these stakeholders will have distinct and sometimes divergent priorities, the process of alignment is vital to the project's success.

B.8 Trusted Partners

The migration to a sustainable freight system in northwest Nevada can be accelerated with a Fernley-area IMCTF at its core. However, simply building the facility will not transform existing freight flows or engender the new use of rail for freight movements into, out of, and through the region. Multiple factors require attention and management during the implementation phase.

We recommend contracting a specialist organization with experience in the rail industry, logistics, stakeholder engagement, project management, financing, and land development in order to realize a sustainable freight system in northwest Nevada.

C. The Current Freight Picture – Fernley and Northwest Nevada

The region of Fernley, Hazen, Fallon, Silver Springs, and eastern Sparks is experiencing a surge in commercial development with over 160,000 acres of existing and planned industrial park projects. In addition, there are many more acres of confidential or smaller industrial developments also underway or planned in the region.

Table 4-1: Region 5 Industrial Parks Under Development

Industrial Parks in Fernley-Hazen-Fallon-Silver Springs-Sparks			
Name	**Acreage**	**Location**	**Distance from Rail**
Pyramid Commercial Center*	3,333	NW of Wadsworth	2 mi., former R-O-W
Victory Logistics	3,894	NE of Fernley	Abuts 2 branch lines
Tahoe Reno Industrial II	6,345	SW of Fernley	3 mi. to closest parcel
Northern Nevada Industrial Center	20,251	Stagecoach	7 mi. to Mina Branch
Silver Springs Opportunity Fund	2,746	Silver Springs	½ mi. to 4 parcels
Geothermal Rail/Dark Horse Rail	3,177	NW of Hazen	2 parcels abut main line
Western Nevada Rail Park	226	NW of Hazen	In operation on main line
Churchill Hazen Industrial Park	2,308	S of Hazen	Abuts 2 branch lines
Lahontan Rail Industrial Park	620	NE of Silver Springs	Abuts Mina Branch
Tahoe-Reno Industrial Center	19,749	Storey County	Limited rail is present
Innovation Park	67,000	Storey County	Rail is adjacent
40-Mile Desert Project	25,000	Churchill County	Abuts UP main east of Hazen
Unnamed project, City of Fallon*	3,625	NW of Fallon	1 mi to Fallon Branch
Unnamed project, City of Fallon*	3,070	NE of Fallon	1 mi to Fallon Branch
Total	**161,344**	**acres**	

**land deals not finalized*

Integrating these Fernley area developments with rail infrastructure and service is important to the state as well as the country, given their size and location on the corridor to and from California. For reference, the entire land mass of Salt Lake City, UT is 70,000 acres and San Francisco, CA covers 71,000 acres.

While some land and economic development leaders do not consider rail service to be a salient selling point, most of the current project sponsors are working on rail-served industrial parks. Even those developers that have been low-key about rail in the past are expressing their interest in providing rail service to enhance the attractiveness of their properties.


Branch line in the Tahoe-Reno Industrial Center

Innovation Park is the name for the 67,000-acre development planned by Blockchains, Inc. acquired from the developers of the Tahoe-Reno Industrial Center. The brand may be in the process of also being applied to the 20,000-acres remaining within the Tahoe-Reno Industrial Center. Its total land mass of 107,000 acres makes it one of the top three largest industrial parks in the world.[1] The Tahoe-Reno Industrial Center is a vibrant industrial park, yet largely dependent upon trucks for freight. Of its 35 tenants with shipping needs of at least truckload quantities only 6 (17%) use rail. Our analysis suggests only 2-4% of freight flowing into and out of this development utilizes rail. Tesla, for instance ships an average of 52 truckloads of auto parts per night (round trip) from its Gigafactory over the Donner Pass to its assembly plant in Fremont, CA. The Fremont facility already has adjacent rail, and a routing for a new 2.5-mile spur to connect the Gigafactory to rail has been identified. This one project would enable the elimination of 36,400 truck trips a year on I-80 through Sparks, Reno, and northern California.

[1] World Atlas website, "The World's Largest Industrial Areas" article, source link, published June 10, 2019.

Key Strategies

- Support existing industrial parks and shippers in connecting to rail by attending to their specific logistics requirements and current rail infrastructure.

  In our engagement with land developers some believed rail could not be constructed to their properties. Months of dialogue in the Region uncovered a series of conflicting beliefs about where in the Tahoe-Reno Industrial Center rail could and could not be constructed and used, due to possible steep grades, tight curves, or poor engineering and construction. However, track inspection has shown the existing track to be adequate for servicing the park's tenants located adjacent to the rail corridor and topographical analysis conducted by CRN and NDOT in 2020 has identified a viable route to connect the remainder of the park tenants to rail, including Tesla, as well as the nearby Innovation Park acreage.

- Support new land developers in the Fernley/Hazen/Fallon/Silver Springs corridor in their efforts to develop rail service.

  The high number of vast land developments underway in Region 5 presents one of the state's most urgent opportunities to improve economic well-being and environmental sustainability through the logistics efficiencies of rail. Continuing the engagement with new land developers in this part of the region is needed to encourage their utilization and promotion of rail freight service in their industrial developments. It is crucial to continue to provide on-going support to these developers as they navigate the often-challenging process of dealing with railroads, tenants, federal government, state entities and other stakeholders when trying to enable rail service to their sites.

  One 4,000-acre development in the region was operating under the misunderstanding that a viable rail connection could not be constructed to their property. NDOT and CRN's preliminary topographical analysis has established two rail right-of-way alignments that could be used to build in rail service.

  This is a major opportunity for the region to secure rail freight service and address the current over-dependence on trucking freight because of the large scale of these new industrial sites. The largest land developers in Region 5 contacted by SRF have indicated they see rail as a core element of their land development. The developments that were accounted for via Land Development Project Assessment forms (Appendix Item) completed by developers include approximately 40,000 acres of land with 9,000 acres of industrial space being available in 2021 and 2022. All these developers are located aside or close to the UPRR Main line and 75% have industrial lead track status in place or accessible. The majority also have their industrial sites rail engineered with Union Pacific approval in place.

- Complete a detailed business case analysis of Fernley Multimodal Freight Facility.

  In parallel to the NVSRP report, SRF has also completed a feasibility study for the Northern Nevada Development Agency (NNDA) (Appendix Item) The study concluded that locating a new multimodal freight facility at Fernley is commercially feasible and will result in a significant conversion of truck freight to rail. The feasibility study identifies the potential for:

1) conversion of existing through-region truck freight,

2) conversion of existing truck freight out of the region, and

3) generation of new out of region freight flows.

The study proposes an Integrated Multimodal Cargo Transfer Facility (IMCTF) model for the Region to maximize the economic benefits of freight rail utilization. Unlike traditional multimodal terminals which are focused on container freight, the IMCTF model accommodates multiple freight types and a large land footprint. These aspects are important because the Fernley IMCTF will be able to capture the regional demand for mining and manufactured freight as well as containers. The additional land capacity of the Region is also a key factor as it enables the Fernley facility to offer extended freight services such as transloading and warehouse operations.

- Focus on rail development opportunities along the Fallon Branch, especially near the town of Fallon
- Reinstitute commercial service on the Mina Branch to Hawthorne, thereby stimulating rail activity that can utilize new logistics services in Fernley area
- Continue and expand stakeholder engagement and collaboration

This region is currently dominated by truck freight, accounting for 90% of all current freight flows. Although this report has identified major opportunities for increasing rail freight traffic, supported by land developers openly encouraging rail development, successfully achieving this potential will be dependent upon numerous stakeholders. Stakeholder engagement and collaboration is therefore of crucial importance.

A Guide to Region 5 Industrial Park Insets

The following nine maps, beginning with an overview map of all major industrial developments (Tim Tucker's planned 40-mile Desert Project is not shown) zoom in on the planned industrial parks listed previously. Region 5 is a hotbed of such activity due to the proximity of California and the lack of such large areas of developable land to the west in Region 6. Intense pressure on I-80 from traffic congestion, pavement degradation, and the incidence of truck accidents can be relieved through the proactive facilitation of rail service into these developments.

Figure 4-1: Region 5 – Industrial Parks

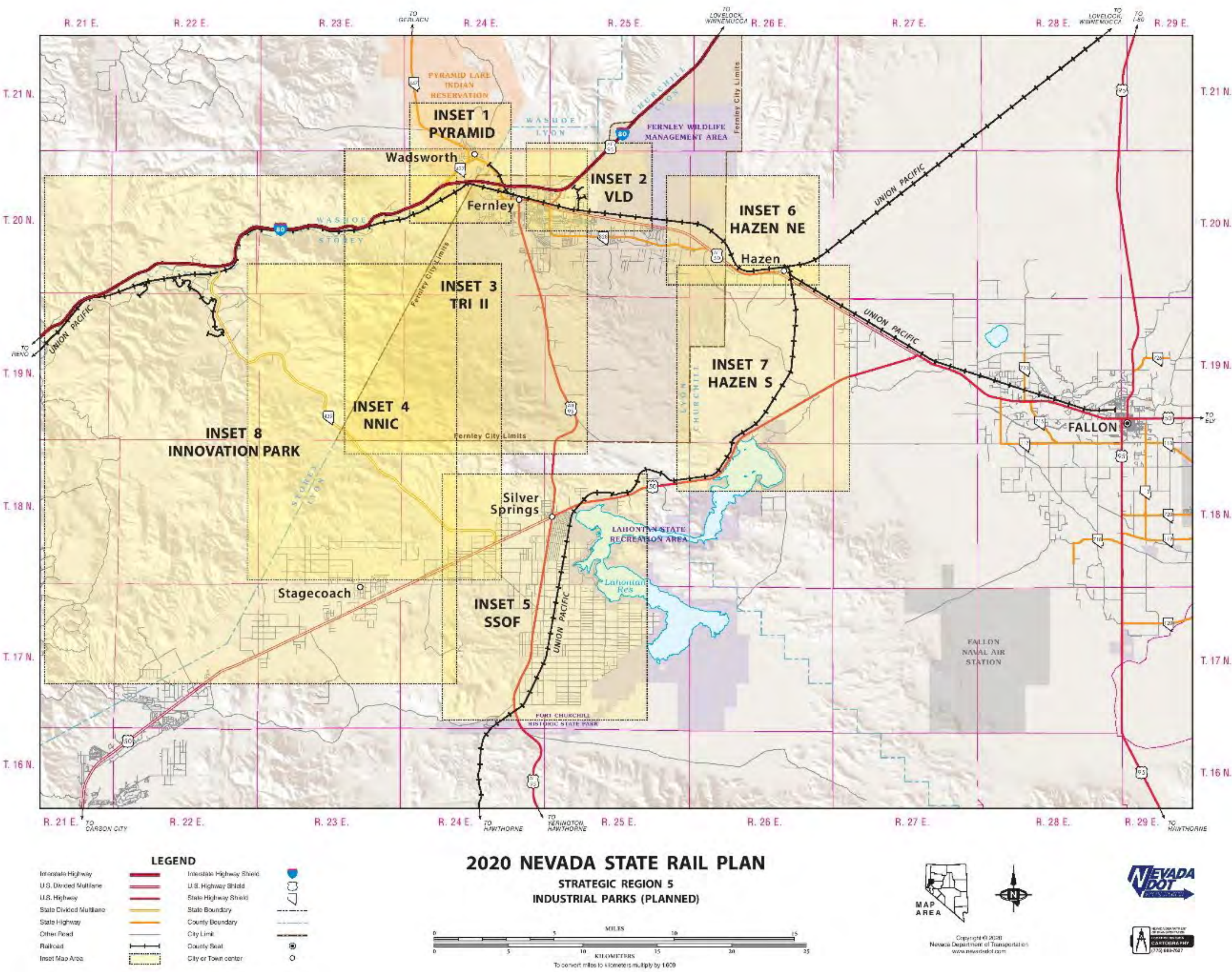


Figure 4-2: Region 5 – Pyramid Commercial

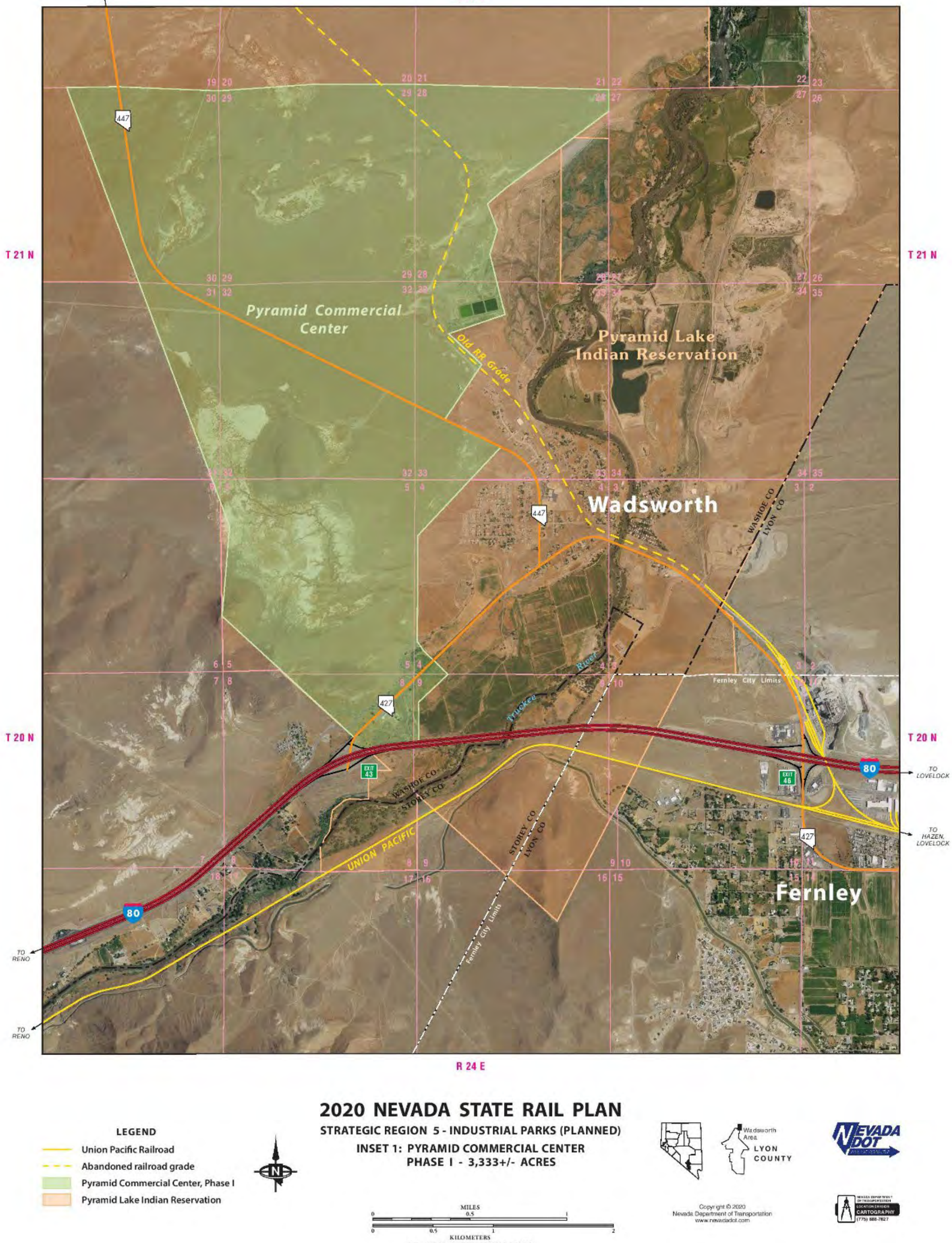


Figure 4-3: Region 5 – Victory Logistics District

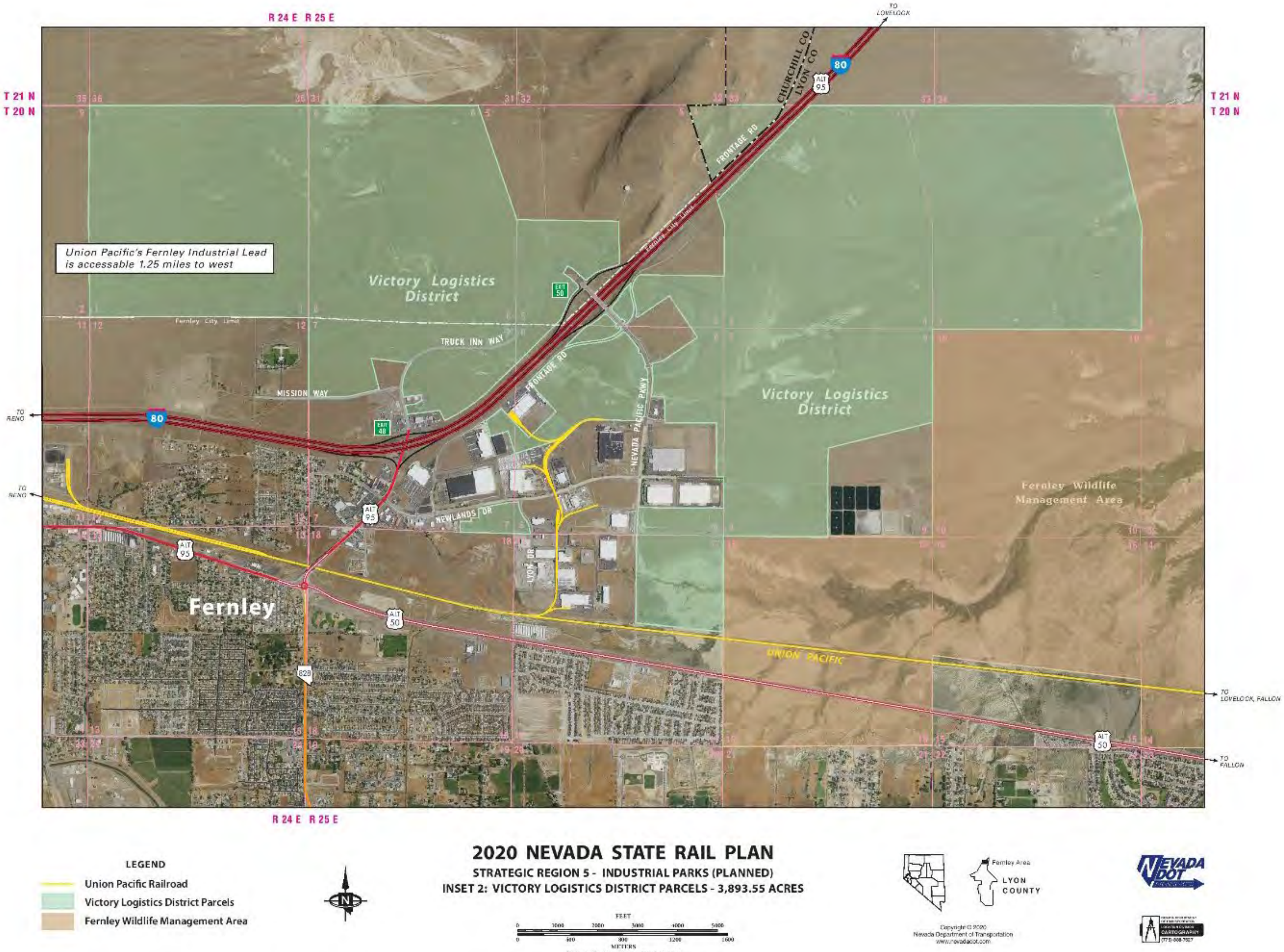


Figure 4-4: Region 5 – TRI II

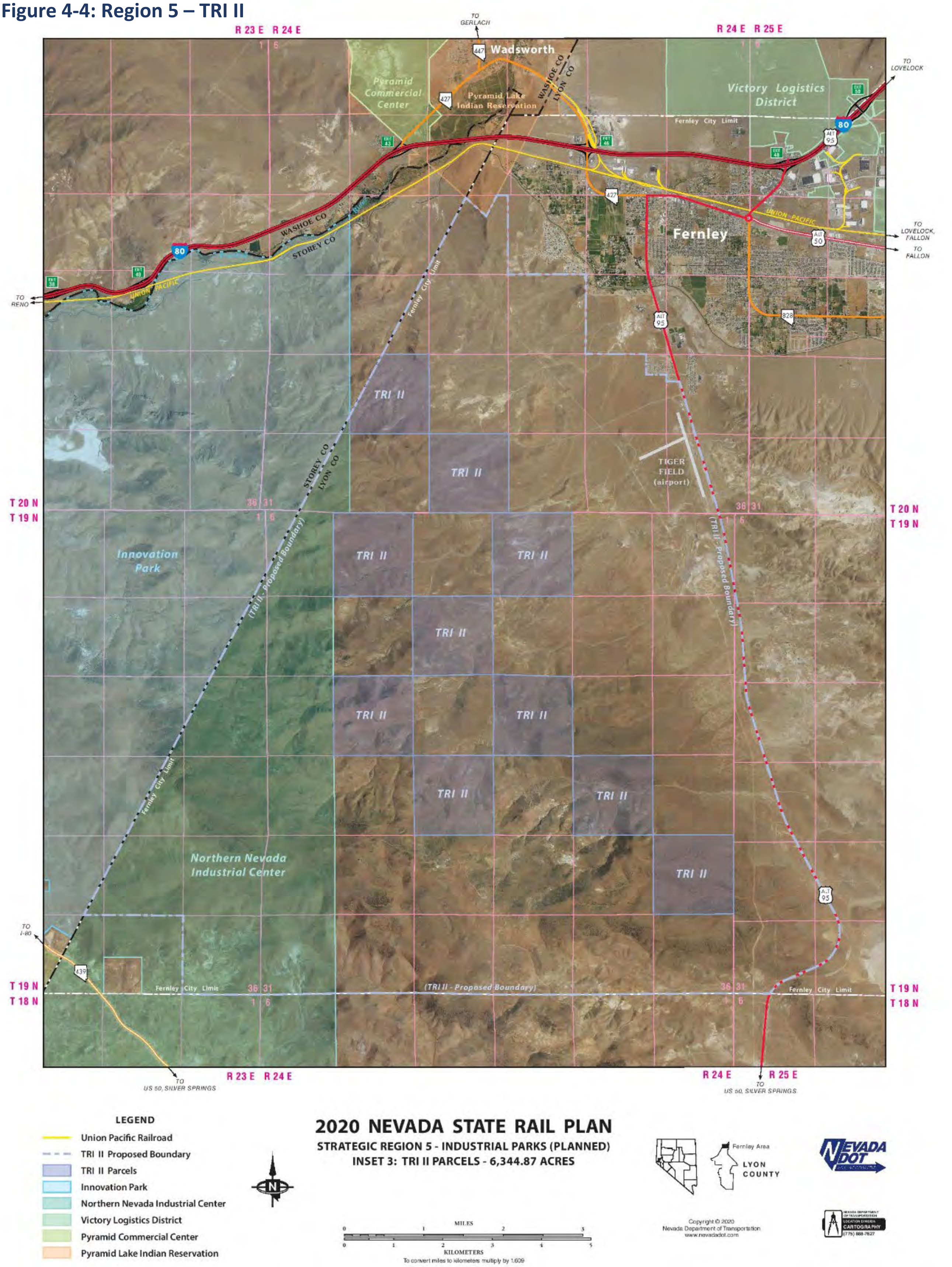


Figure 4-5: Region 5 – NNIC

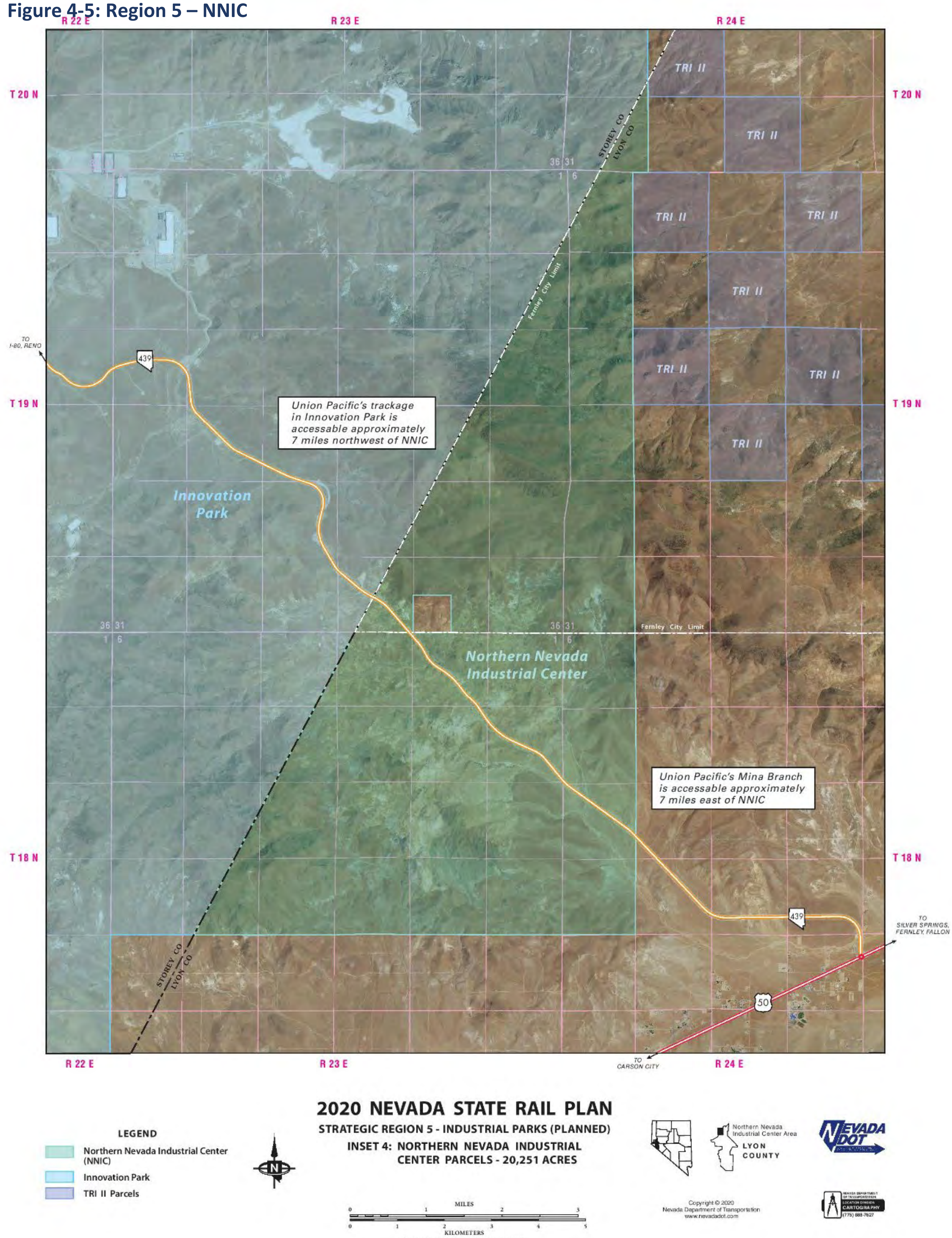


Figure 4-6: Region 5 – SSOF

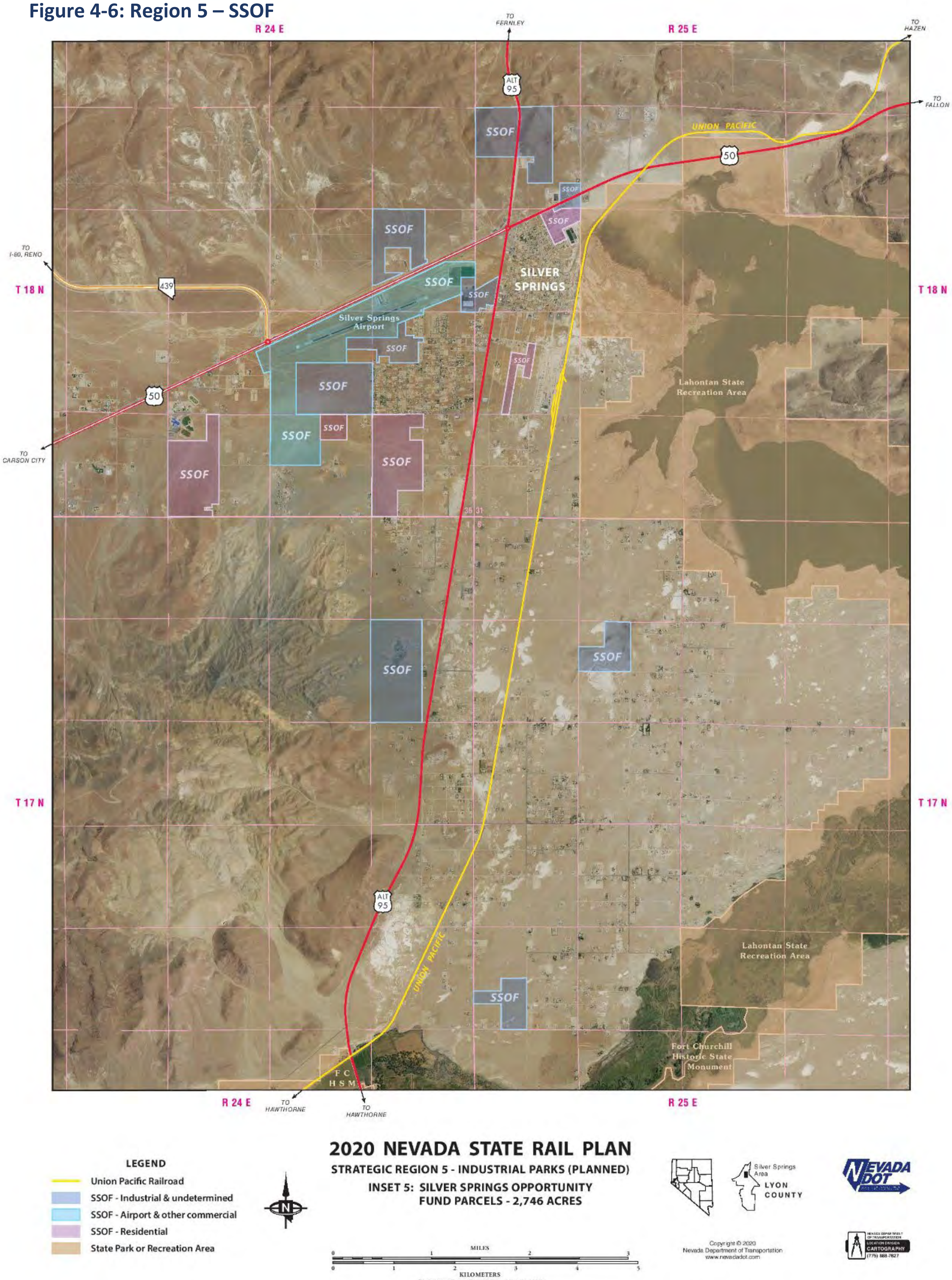


Figure 4-7: Region 5 – Hazen NW

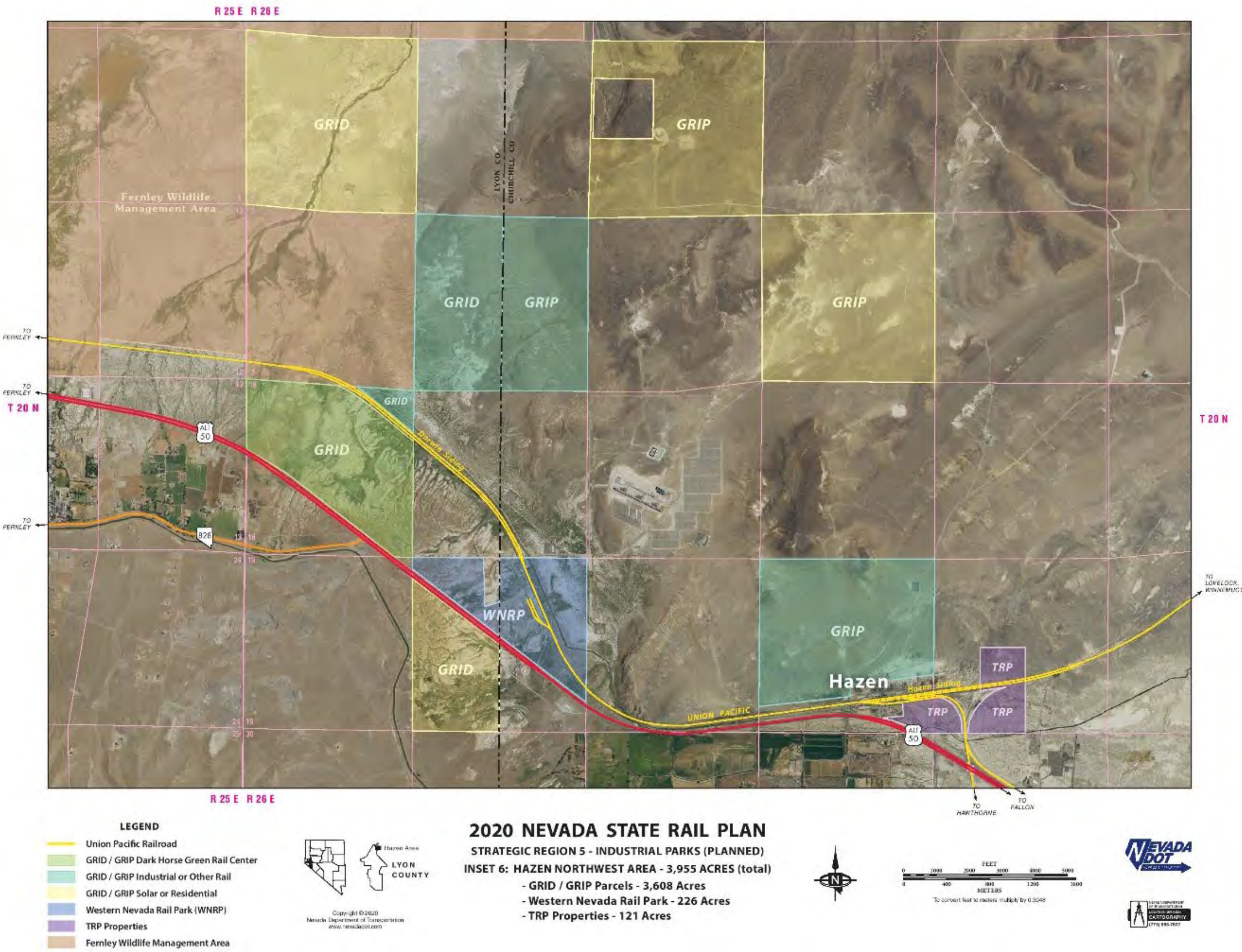


Figure 4-8: Region 5 – Hazen South

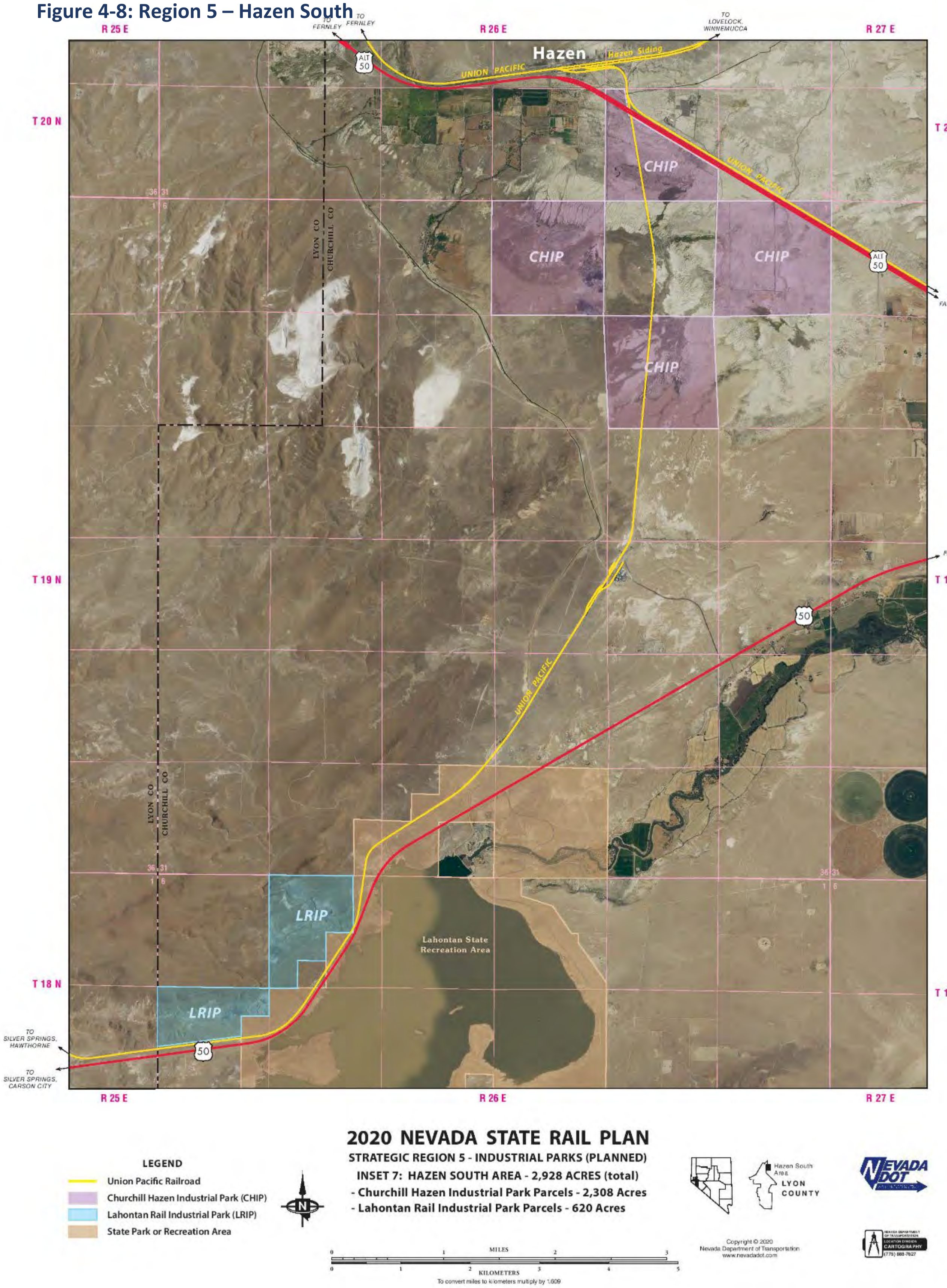


Figure 4-9: Region 5 – Innovation Park

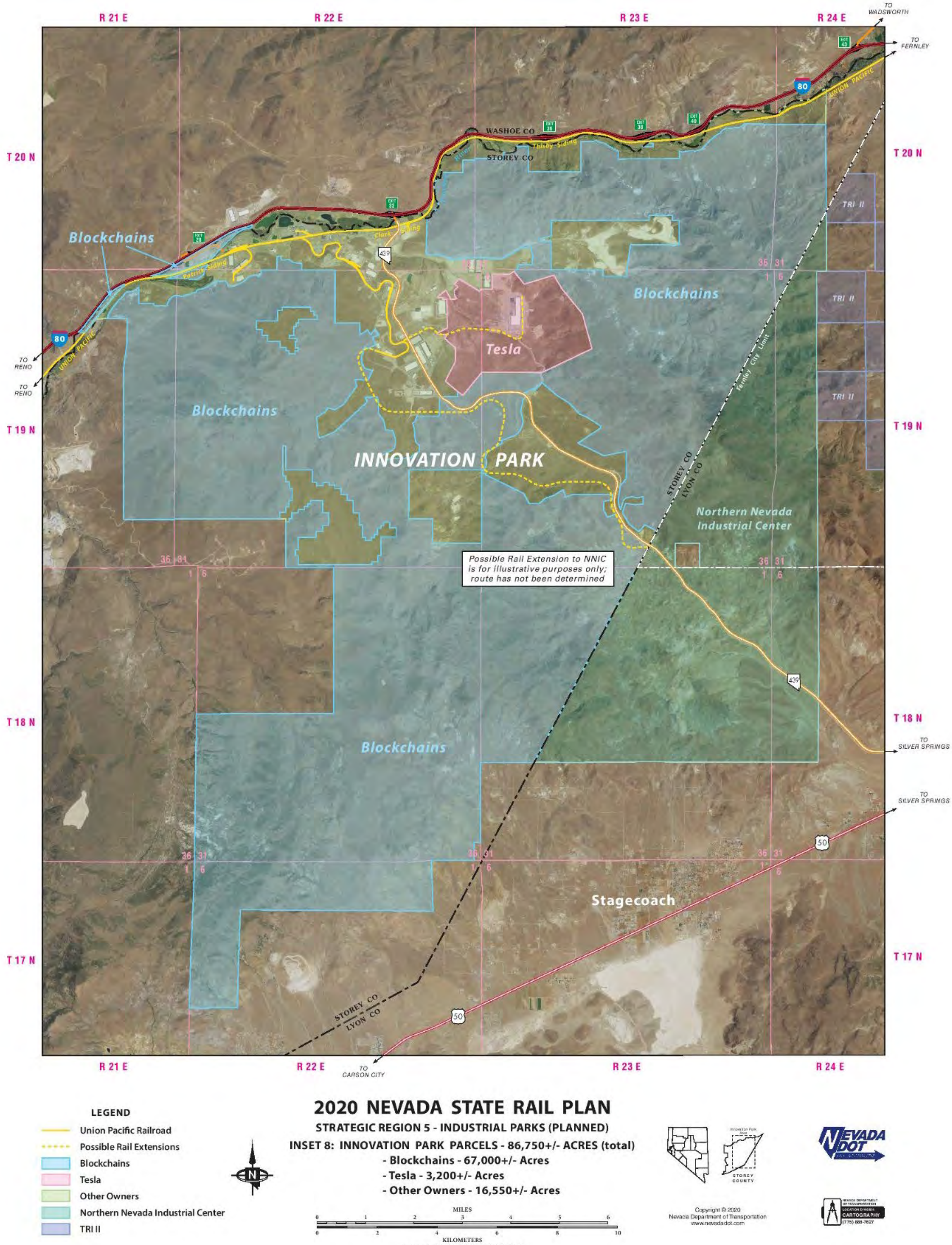
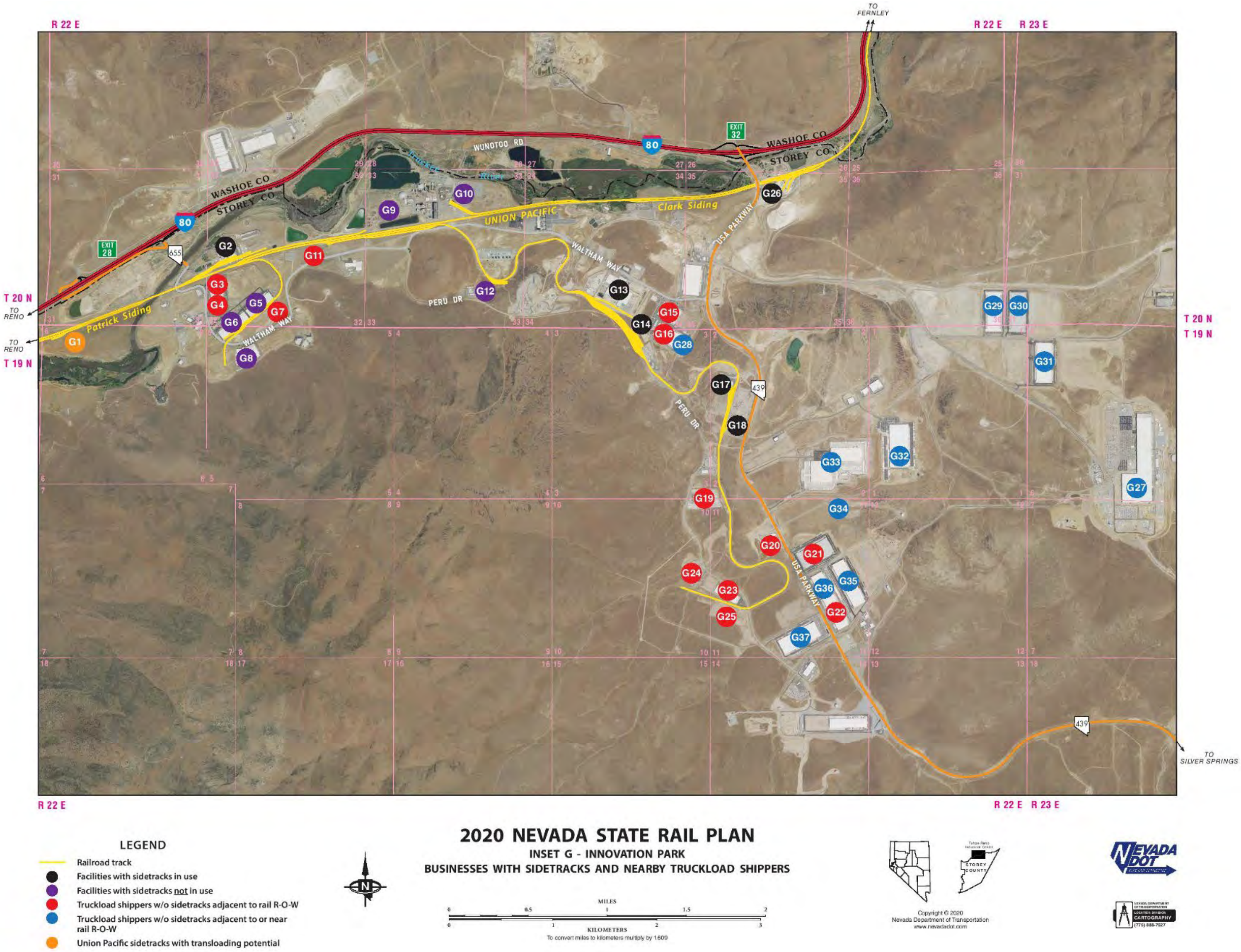


Figure 4-10: Innovation Park-Tahoe Reno Industrial Center (Inset)



The above map and the following map show details of the existing rail infrastructure where existing and potential rail customers are clustered in Region 5. Notice that Tesla's Gigafactory (blue disk G27 in lower right), which ships an average of 52 truckloads per night via I-80 over the Donner Pass to Tesla's assembly plant in Fremont, CA, is only 2.5 miles away from an active branch line. The rail right-of-way for this connection (not shown) has already been set aside by the TRI General Improvement District and Tesla.

Figure 4-11: Fernley Northeast Area

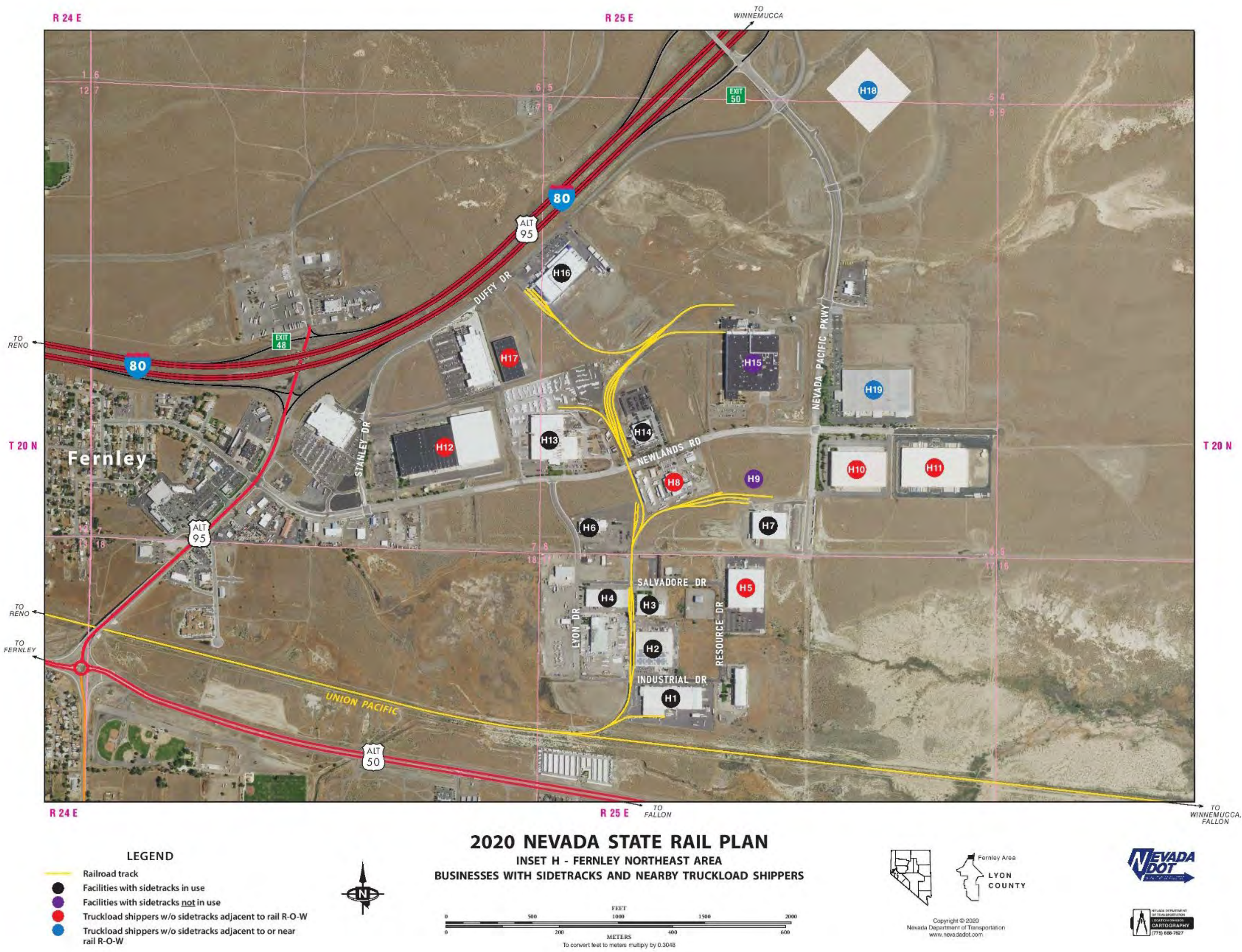


Table 4-2: Region 5 Project List

Project Name	County	Short Description	Contracted Description	Commodities	Track Mi*	Cost	Company	Region	Horizon
40-Mile Desert Land Development	Churchill	Connect to UP main line	Rail Connection	TBD	0.1	$4,000,000	TOT, LLC	5	4
Lahontan Rail Industrial Park	Churchill	Connect to Mina Branch	Rail Connection	TBD	0.2	$400,000	TOT, LLC	5	4
Geothermal Resources Industrial Park	Churchill	Connect to UP main line	Rail Connection	TBD	0.1	$4,000,000	GRIP LLC	5	4
Limestone Mine	Churchill	Transloading site off main	Transload	specialized limestone	0.2	$4,000,000	Advanced Carbonate Technologies, LLC	5	4

Project Name	County	Short Description	Contracted Description	Commodities	Track Mi*	Cost	Company	Region	Horizon
Victory Logistics	Churchill	Connect to Fernley Industrial Lead Connect to LA Pacific Lead	Rail Connection	TBD	0.4 1.25	$4,000,000	Mark IV Capital	5	4
TRP Properties	Churchill	Connect to Fallon Branch	Rail Connection	TBD	0.1	$300,000	Omaha Track Hazen Project	5	4
Churchill Hazen Industrial Park	Churchill	Connect to Fallon Branch	Rail Connection	TBD	0.1	$300,000	TOT, LLC	5	4
Northern Nevada Industrial Center	Lyon	Connect to TRIC lead	Rail Connection	TBD	7	$14,000,000	Reno Engineering	5	4
Sierra Springs Opportunity Fund	Lyon	Connect 15-591-09 (120 ac.) Connect 15-581-03 (91 ac.)	Rail Connection	TBD	0.6 0.6	$2,000,000	Sierra Springs Opportunity Fund	5	4
Geothermal Rail Industrial Development	Lyon	Connect to UP main line	Rail Connection	TBD	0.1	$4,000,000	GRID LLC	5	4
Gigafactory Project	Storey	Connect to TRIC lead	Rail Connection	battery packs, drivetrains	2.5	$5,000,000	Tesla	5	4
Sierra Biofuels Plant	Storey	Connect to TRIC lead	Rail Connection	O/B syncrude feedstock	0	$0	Fulcrum BioEnergy	5	4
Innovation Park	Storey	Industrial Park	Rail Connection	TBD	0.1	$4,000,000	Blockchains, Inc.	5	4
Pyramid Commercial Center	Washoe	Connect to Fernley Industrial Lead	Rail Connection	TBD	1.7	$5,000,000	Reno Engineering	5	4

Table 4-3: Region 5 – Active Mines

FID	ID #	Name	Operator	Commodity	County	Y_U83N	X_U83E
58	59	**Churchill Mine**	Nevada Cement Co.	Limestone	Churchill	4427500	349540
67	68	**Fernley Operation Mine**	EP Minerals, LLC	Diatomite	Churchill	4410158	332267
77	78	**Huck Salt**	Huck Salt Co.	Salt	Churchill	4346860	374550
95	96	**Nightingale Pit**	Imerys Filtration Minerals, Inc.	Diatomite	Churchill	4422800	321060
101	102	**Popcorn Mine**	EP Minerals, LLC	Perlite	Churchill	4344290	345870
131	132	**Brady Hot Springs**	Ormat Nevada, Inc.	Electricity	Churchill	4407088	327912
132	133	**Brady Hot Springs**	Olam Spices and Vegetables, Inc.	Vegetable dehydration	Churchill	4406553	327273
134	135	**Desert Peak II**	Ormat Nevada, Inc.	Electricity	Churchill	4402148	332634
135	136	**Dixie Valley**	Terra-Gen Power, LLC	Electricity	Churchill	4424433	426925
144	145	**Patua**	Cyrq Energy	Electricity	Churchill	4383471	321797
145	146	**Salt Wells**	Enel North America, Inc.	Electricity	Churchill	4352375	364296
147	148	**Soda Lake Nos. 1, 2**	Cyrq Energy	Electricity	Churchill	4380171	341112
150	151	**Stillwater 2**	Enel Stillwater, LLC	Electricity	Churchill	4378439	366194
151	152	**Tungsten Mountain**	Ormat Nevada, Inc.	Electricity	Churchill	4391619	440784
46	47	**Basalite Dayton Pit**	Basalite Concrete Products, LLC	Sand, gravel	Storey	4357606	282597
60	61	**Clark Mine**	EP Minerals, LLC	Diatomite	Storey	4381500	295120
106	107	**River Canyon III**	Joy Engineering	Aggregate	Storey	4379781	286375

FID	ID #	Name	Operator	Commodity	County	Y_U83N	X_U83E
110	111	**Sierra Stone Quarry**	CEMEX Construction Materials Pacific, LLC	Aggregate	Storey	4372283	274829
120	121	**Trico Pit**	Gopher Construction Co.	Aggregate	Storey	4382000	283800

This industrial development in northwest Nevada is generating increased freight activity. The region currently accounts for over 50% of all freight movements in the entire state of Nevada and this continued commercial development will lead to further increases in freight volumes.

Freight flow data from TRANSEARCH®, a transportation database developed by IHS Global Insights, reveals that 75% of all freight by tonnage in northwest Nevada moves by truck. This equates to 5.5MM loaded truck movements annually. The actual number of truck movements on the region's roads and highways is even higher because many loaded truck movements create empty return trips.

Limited freight rail service is available in northwest Nevada but only 4.6MM tons of freight is transported by rail into or out of the region. This compares to 29.2MM tons of freight traveling by truck. There are several reasons, listed below, for the relatively small volume of rail tonnage. All of these issues are eminently addressable through better coordination, education, and strategic infrastructure development.

- Prospective and current property buyers and lessees who are making site location and logistics decisions are skeptical about rail service
- Developers and shippers often have limited knowledge of rail service design, including engineering, loading, unloading and transloading, and may not understand the physical suitability of their property for freight rail development
- Existing rail intermodal facilities serve only container-based freight with limited frequencies and routings

As thousands of acres of new industrial development create more freight activity there is a compelling need to implement a balanced freight transportation system in the region. Otherwise, increasing truck traffic in northwest Nevada will negatively impact quality of life and reduce the region's attractiveness for businesses, developers, and residents. The future without this intervention can be viewed firsthand with a visit to the Pennsylvania towns of Easton, Allentown, Lancaster, and Carlisle, now overburdened by trucks on local roads and interstates to and from non-rail served industry. Eastern Pennsylvania, like Nevada has become a hotbed of warehouse and distribution activity in support of its more-densely populated adjacent states.

C.1 Northwest Nevada Freight Transportation Statistics Report

C.1.1 Overview of Data Sources and Reporting

The 2020 Northwest Nevada Freight Transportation Statistics report utilized a variety of data sources to determine the estimated road and rail traffic that impact the region's surface-based freight transportation network. In this report, the following counties and regions were analyzed in relation to the rest of Nevada (RONV). Herein the "Region" analyzed is comprised of the following jurisdictions:

- Reno-Sparks
- Churchill County
- Lyon County

- Storey County
- Unincorporated Washoe County

Rail-based cargo flow data from the Surface Transportation Board (STB), combined with the truck-based flows provided by TRANSEARCH® data capture the unit volume, commodity descriptions, units, and tonnage. This enables detailed analysis of surface freight movements in the Region and the potential opportunities for modal conversion and other strategies for more efficient freight movement.

The data sources employed were:

1. The Surface Transportation Board's (STB) 2018 stratified rail carload waybill sampling
2. IHS-Markit TRANSEARCH® 2018 Truck Freight Flows

C.1.2 The STB Waybill Sampling of Rail Data

The STB Waybill Sampling is a stratified look at carload waybills (usually 1-3%) for all U.S. rail traffic submitted by those rail carriers terminating 4,500 or more revenue carloads annually. The data provided was for 2018, the most current year available. Waybill data has broad applications and is used by transportation practitioners as a primary source of information for the development of state transportation plans. In the case of the 2020 Northwest Nevada (NWNV) freight report, the STB dataset was transmitted to TRANSEARCH® where it was processed and formatted in a Microsoft Access database and transmitted to Strategic Rail Finance for analysis and reporting.

C.1.3 TRANSEARCH® Truck Data

Developed by IHS Global Insight, TRANSEARCH® is an extensive database of North American freight flows, compiled from more than one hundred industry, commodity, and proprietary data-exchange sources. The truck data provided was for 2018, the most current year available. TRANSEARCH® combines primary shipment data obtained from some of the nation's largest truck freight carriers with information from public, commercial, and proprietary sources to generate a base-year estimate of freight flows at the county level. Furthermore, TRANSEARCH® establishes market-specific production tonnages by industry or commodity, drawn mostly from IHS Global Insight's Business Markets Insights (BMI) database.

C.1.4 Commodity Code Descriptions

Both the STB Waybill Sampling and the TRANSEARCH® truck data classify and report using the Standard Transportation Commodity Code (STCC) scheme. STCC is a publication containing specific product information used on waybills and other shipping documents. A STCC code is a seven-digit numeric code consolidating into and representing 38 commodity groupings (STCC2) on which this Plan reports.

With respect to TRANSEARCH® truck data reporting, there is a unique commodity code that is particularly insightful and that requires additional explanation.

- **STCC2 42: Semi-trailers Returned Empty.** While these truck movements do not represent a physical commodity, they are significant in terms of unit traffic volume and illustrate the degree to which many truck moves are one-way loaded moves, returning in many instances to home terminals without return freight. STCC2-42 is reported throughout the document in the assessment of truck-flows.

C.1.5 Reporting Structure

The reporting of freight data is in tabular ranking format with additional supporting charts. Reporting covers three primary areas:

1. Top commodities for truck and rail expressed in units and tons covering all freight traffic flows
2. Top out-of-state trading partners to the region, expressed in units and tons covering all freight traffic flows
3. Comparative charts of unit and tonnage of the NWNV Region versus the rest of Nevada

Reporting on freight traffic flows is organized in the following order:

- **Outflows:** Freight originating in the region that terminates in out-of-state destinations
- **Inflows:** Freight originating in out-of-state locations and terminating in Nevada overall and the NWNV region
- **Intrastate:** Freight that both originates and terminates within Nevada and/or NWNV region
- **Through Traffic:** Freight passing through the State and Region with both originations and destinations outside of the State and the NWNV Region

C.2 Northwest Nevada Freight Flows Overview:2018 Truck and Rail Traffic

The 2020 Northwest Nevada freight statistics report incorporates the latest available 2018 freight data that reports traffic and commodity flows across the Region's road and rail transportation networks. SRF processed over 12MM records for the period and applied filtering to arrive at nearly 6.2MM records of truck and rail movements associated with NWNV.

The NWNV region and the overall Nevada data reflect an overwhelming reliance on trucking of commodities versus rail. For the NWNV region and the rest of Nevada, over 78% of all commodity flows are conducted by truck versus 22% by rail. In general, this datapoint may lead to the conclusion that there exists a long-term opportunity for the investment in rail-cargo infrastructure that would lead to truck-to-rail modal conversion.

C.2.1 Overview: Trucking Statistics

Table 2 depicts truck traffic expressed in both units and tonnage. This table, in combination with **Figures 1 and 2** provide a clear over-all depiction of truck-based traffic flows and the comparative context between the NWNV Region and the rest of Nevada. While the overall distribution of truck traffic between NWNV and the rest of the state is nearly equal (52% NWNV vs. 48% Rest of Nevada), individual flow types reveal unique characteristics. As an example, and as identified below, nearly 80% of the State's truck-based outflow tonnage originates from the NWNV Region. In the following sections of this report, a detailed presentation of traffic flow types will be addressed.

Table 2: 2018 NWNV Freight Flow Matrix: Distribution of Freight Flows: Truck Units and Tons[2]

Description	NWNV Truck Flows	Rest of Nevada Truck Flows	Total Nevada Truck Tonnage	NWNV Truck Flows	Rest of Nevada Truck Flows	Total Nevada Truck Flows
Traffic Flow	**Tonnage**	**Tonnage**	**Tonnage**	**Units**	**Units**	**Units**
Outflow	19,814,465	5,334,857	25,149,322	1,130,872	700,308	1,831,180
Inflow	9,482,497	14,956,982	24,439,479	1,243,946	771,173	2,015,119
Intrastate	18,092,477	21,567,750	39,660,227	1,784,028	2,073,792	3,857,820
Through	26,991,174	29,043,365	56,034,539	1,387,384	1,486,859	2,874,243
Total	**74,380,613**	**70,902,954**	**145,283,567**	**5,546,230**	**5,032,132**	**10,578,362**

Figure 1: Truck Unit Volume Percentage NWNV vs. Rest of Nevada[3]

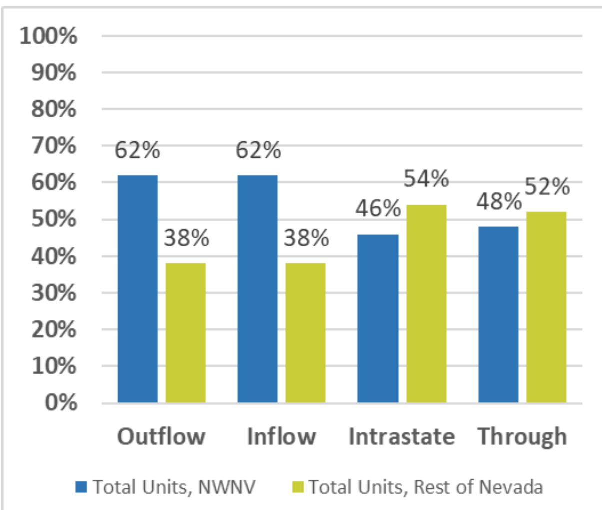
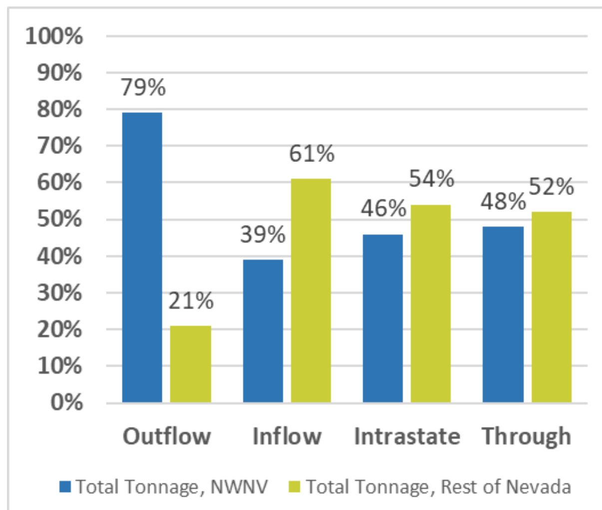


Figure 2: Truck Tonnage Volume Percentage NWNV vs. Rest of Nevada[4]



C.2.2 Overview: Rail Statistics

Table 3 depicts rail-based traffic expressed in both tonnage and units. This table, in combination with **Figures 3 and 4** provide a clear over-all depiction of rail-based traffic flows and a comparative context between the NWNV Region and the rest of Nevada. As with truck flows, there exists a near equal balance of overall rail-based traffic between NWNV and the rest of Nevada (51% NWNV vs. 49% Rest of Nevada). As with trucking, individual rail-based freight flow types reveal unique characteristics. As an example, and as identified below, nearly 63% of the State's rail-based inflow tonnage is destined for the NWNV Region. In the following sections of this report, a detailed presentation of traffic flow types will be addressed.

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[2] Source: TRANSEARCH® Truck Data 2018
[3] Source: TRANSEARCH® Truck Data 2018
[4] Source: TRANSEARCH® Truck Data 2018

Table 3: 2018 NWNV Freight Flow Matrix: Distribution of Freight Flows: Rail Tons and Units[5]

Description	NWNV Rail Flows	Rest of Nevada Rail flows	Total Nevada Rail flows	NWNV Rail flows	Rest of Nevada Rail flows	Total Nevada Rail Units
Traffic Flow	*Tonnage*	*Tonnage*	*Tonnage*	*Units*	*Units*	*Units*
Outflow	1,264,581	**989,604**	**2,254,185**	**22,312**	**11,252**	**33,564**
Inflow	3,342,102	**1,936,898**	**5,279,000**	**47,392**	**31,064**	**78,456**
Intrastate	55,548	**7,080**	**62,628**	**564**	**100**	**664**
Through	17,757,491	**18,329,509**	**36,087,000**	**466,143**	**662,395**	**1,128,538**
Total	**22,419,722**	**21,263,091**	**43,682,813**	**536,411**	**704,811**	**1,241,222**

Figure 3: Rail Tonnage NWNV vs. Rest of Nevada[6]

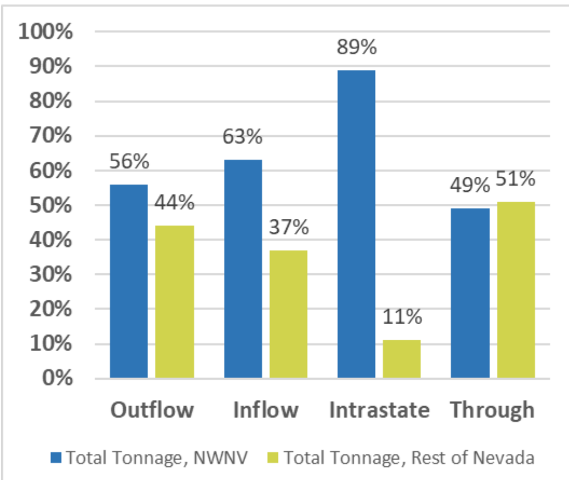
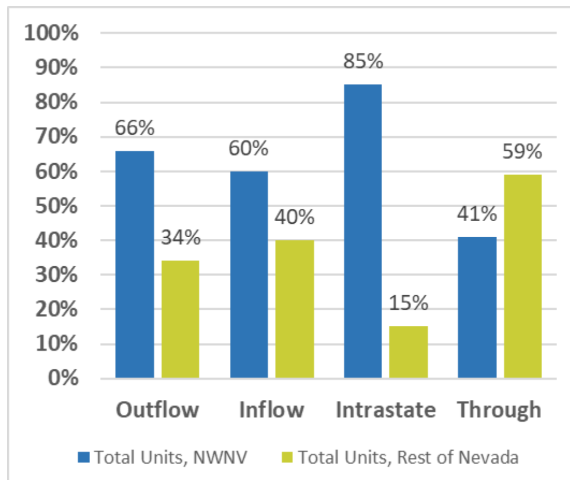


Figure 4: Rail Units NWNV vs. Rest of Nevada[7]



C.3 NWNV Road and Rail Freight Outflows:(NWNV Originations)

C.3.1 Truck Outflow Statistics

Table 4 ranks the top five commodities shipped by truck from NWNV to other states and is presented in both units and tonnage. As depicted in the table, the top five commodities represent an overwhelming percentage of overall shipments from the Region. The top five ranked commodities represent 90% of all truck-based commodity outflows. Thematic throughout this report is the magnitude of shipments of Non-Metallic Minerals (STTC2-14) and Clay, Concrete, Glass, and Stone (STTC2-32) from the Region. In terms of tonnage, these two commodities combined represent 70% of all truck-based commodity outflows.

Also, of importance, all tables that rank truck-based commodity flows include Return of Empty Trailers (STTC2-42). While these transportation movements do not represent a specific commodity and carry no

[5] Source: STB Waybill Sample 2018

[6] Source: TRANSEARCH® Truck Data 2018

[7] Source: TRANSEARCH® Truck Data 2018

tonnage, they do represent a critical component of truck volume activity, and its inclusion is a material element in the freight study report.

Table 4: 2018 NWNV Top Five Commodity Ranking: Truck Outflows[8]

NWNV Truck Outflow Traffic: Top Five Commodities					
STCC2	**Commodity Name**	**Units**	**% Units**	**Tons**	**% Tons**
32	Clay, Concrete, Glass, or Stone	346,789	31%	6,344,296	32%
14	Nonmetallic Minerals	313,796	28%	7,628,487	38%
42	Return of Empty Trailers	196,288	17%	0	0%
1	Farm Products	76,703	7%	1,376,786	7%
29	Petroleum or Coal Products	67,042	6%	1,614,907	8%
40	Waste or Scrap Materials	38,054	3%	953,114	5%
	All Other Commodities	92,201	8%	1,896,875	10%
	Total NWNV Commodities	**1,130,872**	**100%**	**19,814,465**	**100%**

Table 5: 2018 NWNV Top State Trading Partners: Truck Outflows[9]

NWNV Truck Outflows: State Partners				
State	**Units**	**% Units**	**Tons**	**% Tons**
CA	849,334	75%	15,254,291	77%
TX	31,422	3%	586,206	3%
UT	29,294	3%	433,677	2%
IN	15,110	1%	277,654	1%
WA	13,830	1%	271,173	1%
ALL Others	191,882	17%	2,991,465	15%
Total	**1,130,872**	**100%**	**19,814,465**	**100%**

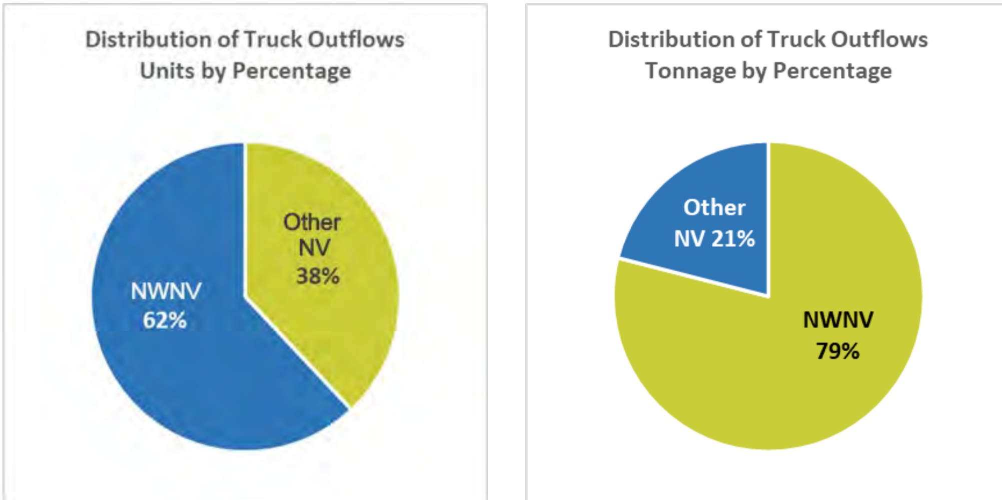
Table 5 identifies the NWNV's top five state partners for trucking outflows. The State of California leads with over 75% of all trucking volume. The next ranked trading partners of Texas, Utah, Indiana, and Washington account for 8% of the volume. The rest of the country with no state over 1%, comprises the remaining 15%.

Figure 5 demonstrates the concentration of truck-based outflow traffic from the NWNV region vs. the rest of Nevada. With over 62% of truck unit volume and nearly 80% of truck tonnage volume, it is clear that the Region is largely a production-based economy when compared to the rest of Nevada, especially compared to the consumption-based markets of the Las Vegas Region.

[8] Source: TRANSEARCH® Truck Data 2018

[9] Source: TRANSEARCH® Truck Data 2018

Figure 5: Truck-Based Outflows Versus the Rest of Nevada



C.3.2 Rail Outflow Statistics

Table 6 represents the top five rail-based commodity outflows. When compared to trucking, rail represents only 16% of the total regional outflow of commodities. While rail-based outflows represent a more diverse distribution of commodity haulage, the primary commodities of Non-metallic Minerals and Clay, Concrete, Glass, and Stone dominate rail-based cargo outflows, representing over 66% of all rail-based commodity outflow tonnage. Also, of note is STCC2-46 – Misc. Mixed Shipments which is directly tied to the movement of individual intermodal containers rather than rail cars. While intermodal containers represent only 8% of the total rail tonnage, they represent 29% of the unit movements.

Table 6: 2018 NWNV Top Five Commodity Ranking: Rail Outflows[10]

NWNV Rail Outflow Traffic: Top Five Commodities					
STCC2	Commodity Name	Tons	% Tons	Units	% Units
14	Nonmetallic Minerals	418,800	33%	5,356	24%
32	Clay, Concrete, Glass, or Stone	413,145	33%	3,900	17%
46	Miscellaneous Mixed Shipments	104,400	8%	6,440	29%
28	Chemicals or Allied Products	79,720	6%	1,160	5%
40	Waste or Scrap Materials	74,340	6%	944	4%
	All Other Commodities	174,176	14%	4,512	20%
	Total NWNV Commodities	1,264,581	100%	22,312	100%

Table 7 identifies the top five state rail trading partners. While California ranks number one in terms of tonnage, it does not represent the same degree of concentration as truck-based traffic to California. This

[10] Source: TRANSEARCH® Truck Data 2018

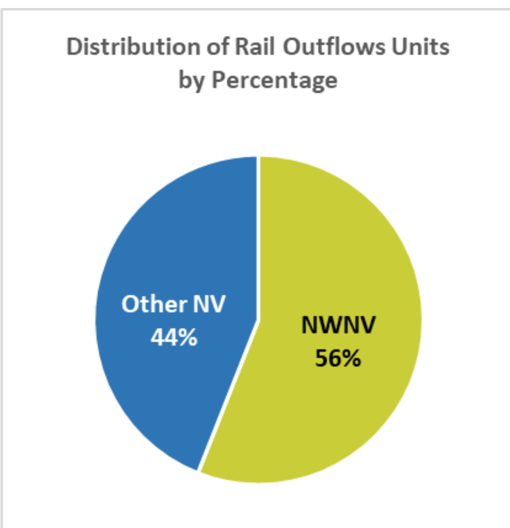
is due to the proximity between the two states and the economic rationale for rail-based transport versus trucking.

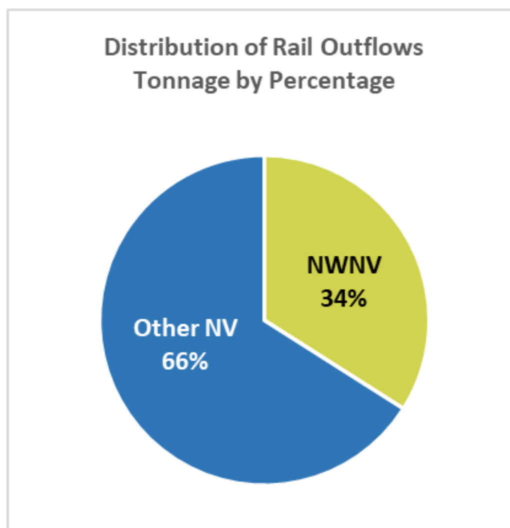
Table 7: 2018 NWNV Top State Trading Partners: Rail Outflows[11]

NWNV Rail Outflows: State Partners				
State	**Tons**	**% Tons**	**Units**	**% Units**
CA	524,485	41%	53,556	24%
IL	148,204	12%	7,820	35%
WY	93,360	7%	960	4%
PA	61,280	5%	1,320	6%
WA	52,004	4%	620	3%
ALL Others	385,248	30%	6,236	28%
Total	**1,264,581**	**100%**	**22,312**	**100%**

Figure 6 presents the distribution of rail-based outflow for the NWNV Region versus the rest of the state. While there is a concentration of rail freight tonnage from the region versus the rest of the State (56% vs. 44%), it does not demonstrate the significant bias toward truck-based movements, where nearly 80% of the outflow tonnage was moved by truck.

Figure 6: Rail-Based Outflows Versus the Rest of Nevada[12]





[11] Source: STB Waybill Sample 2018
[12] Source: STB Waybill Sample 2018

C.4 NWNV Road and Rail Freight Inflows (NWNV Destinations)

C.4.1 Truck Inflow Statistics

Relative to freight outflows, freight inflow traffic for both road and rail to the NWNV region is substantially lower in terms of tonnage. Whereas outflow tonnage from the region exceeds 21MM tons, inflow traffic is less than 13MM tons. This imbalance supports the fact that the Region is substantially a production-based economy rather than a consumption-based economy, especially when compared to the rest of Nevada, and in particular the Clark County-Las Vegas region. This indicates a positive result of the economic diversification work that has been done in Northern Nevada which may inform future opportunities for diversification in Southern Nevada.

Table 8 ranks the top truck inflow commodities. In terms of truck unit volume, inflow traffic of commodities is substantially more diverse when compared to outflows, which are dominated by extractive aggregates and byproducts. Attention should be paid to STCC2-42, Return of Empty Trailers. The return of these empty trailers represents 63% of all inflow truck traffic volume to the Region, nearly 800,000 units in 2018. This truck volume is primarily driven by the substantial volume of the outflow out-of-state traffic of non-metallic minerals and clay, concrete, glass, and stone, where there do not exist back-haul opportunities.

Table 8: 2018 NWNV Top Commodity Ranking: Truck Inflows[13]

NWNV Truck Inflow Traffic: Top Commodities					
STCC2	**Commodity Name**	**Units**	**% Units**	**Tons**	**% Tons**
42	Return of Empty Trailers	789,022	63%	0	0%
14	Nonmetallic Minerals	115,428	9%	2,806,094	30%
32	Clay, Concrete, Glass, or Stone	72,629	6%	1,169,282	12%
50	Warehouse/Distribution	56,556	5%	1,194,539	13%
20	Food or Kindred Products	47,286	4%	1,085,662	11%
1	Farm Products	41,668	3%	783,815	8%
	All Other Commodities	118,357	10%	2,443,106	26%
	Total NWNV Commodities	**1,243,946**	**100%**	**9,482,497**	**100%**

Table 9 represents the top state truck-based inflow trading partners to the NWNV region. California represents 84% of the total units and 65% of the truck freight tonnage. It is notable that the concentration of truck traffic from California is due to the significant volume related to the return of empty trailers. However, even absent that fact, California is a critical supply chain partner to the NWNV Region.

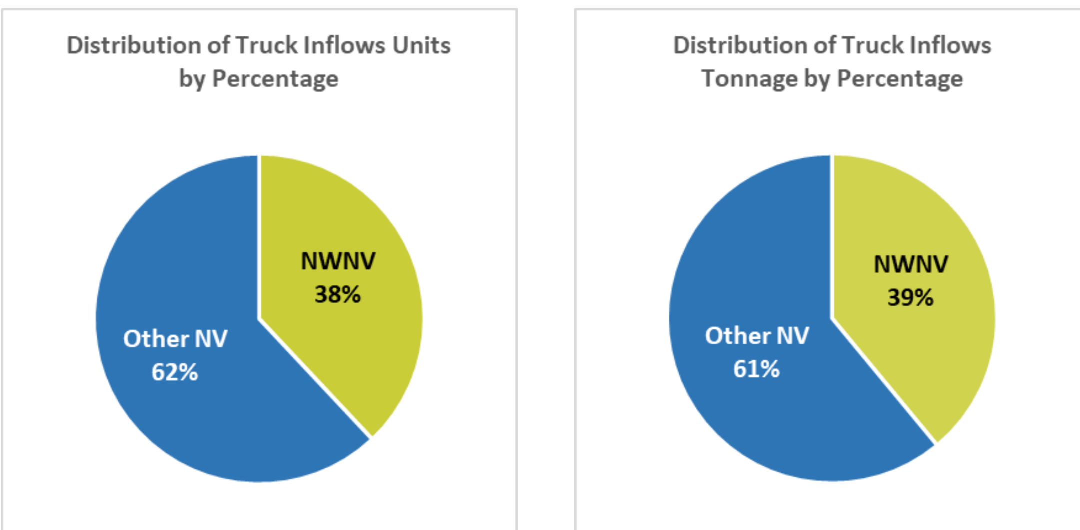
[13] Source: TRANSEARCH® Truck Data 2018

Table 9: 2018 NWNV Top State Trading Partners: Truck Inflows[14]

NWNV Truck Inflows: State Partners				
State	Units	% Units	Tons	% Tons
CA	1,040,716	84%	6,178,867	65%
ID	42,089	3%	640,043	7%
UT	39,371	3%	431,514	5%
OR	22,503	2%	396,312	4%
WA	16,390	1%	300,399	3%
All Others	82,877	7%	1,535,363	16%
Total	**1,243,946**	**100%**	**9,482,497**	**100%**

Figure 7 presents truck-based inflows for the NWNV Region versus inflows into the rest of Nevada. Thematic throughout the report, NWNV inflows of truck traffic units (62%) is largely due to the significant return of empty trailers. However, inflows of truck cargo tonnage demonstrate a majority of productive cargo tonnage inflows (61%) destined to consumption-based markets (Las Vegas Region).

Figure 7: Truck-Based Inflows Versus the Rest of Nevada[15]



C.4.2 Rail Inflow Statistics

Table 10 ranks the top 5 rail commodity inflows to the NWNV Region. While coal leads the way in terms of tonnage at 30%, it is on a steep decline relative to prior periods and this trend is expected to continue. Conversely, STCC2-28 Chemicals and Allied Products represents 27% of the total tonnage and based upon prior periods has risen dramatically and this trend is expected to continue. All other commodities represent 20% of the tonnage volume and a diverse array of commodities. Nevada electric power generation is projected to be completely coal-free by 2025.

[14] Source: TRANSEARCH® Truck Data 2018

[15] Source: TRANSEARCH® Truck Data 2018

Table 10: 2018 NWNV Top Commodity Ranking: Rail Inflows[16]

NWNV Rail Inflow Traffic: Top Five Commodities					
STCC2	**Commodity Name**	**Units**	**% Units**	**Tons**	**% Tons**
11	Coal	1,017,970	30%	8,804	19%
28	Chemicals or Allied Products	909,400	27%	10,260	22%
32	Clay, Concrete, Glass, or Stone	312,784	9%	2,900	6%
29	Petroleum or Coal Products	279,756	8%	3,384	7%
20	Food or Kindred Products	145,316	4%	1,912	4%
	All Other Commodities	676,876	20%	20,132	42%
	Total NWNV Commodities	**3,342,102**	**100%**	**47,392**	**100%**

Table 11 presents the top 5 State trading partners to the NWNV region. WY and UT represent nearly 40% of the inbound rail traffic and all other States represent 40% of the total tonnage. The Table demonstrates a significant diversity of inbound State trading partners, particularly of long-haul freight movements, which is traditionally the domain of rail.

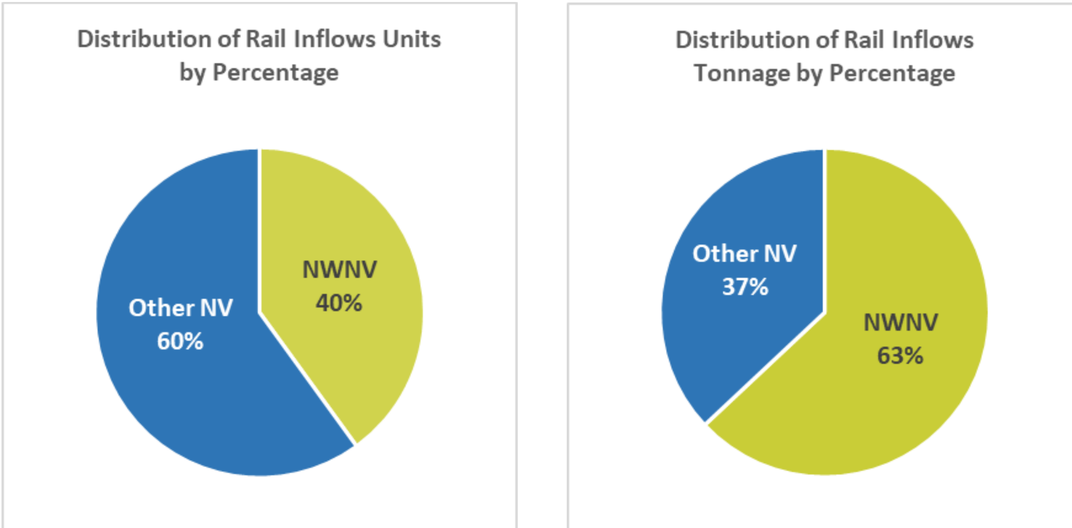
Table 11: 2018 NWNV Top State Trading Partners: Rail Inflows[17]

NWNV Rail Inflows: State Partners				
State	**Tons**	**% Tons**	**Units**	**% Units**
WY	877,770	26%	7,564	16%
UT	431,482	13%	4,122	9%
CA	304,952	9%	3,760	8%
IL	215,720	6%	10,440	22%
LA	174,320	5%	1,720	4%
All Others	1,337,858	40%	19,786	42%
Total	**3,342,102**	**100%**	**47,392**	**100%**

Figure 8 shows the distribution of rail inflow cargo in both tonnage and units for the NWNV region vs. the rest of Nevada. Note the inverse relationship between the tonnage and unit volume destined to the Region. This is because the NWNV region receives heavy weight car-load volumes while the rest of Nevada, particularly the Las Vegas region, receives a higher volume of low weight intermodal containers.

[16] Source: TRANSEARCH® Truck Data 2018
[17] Source: TRANSEARCH® Truck Data 2018

Figure 8: Rail-Based Inflows Versus the Rest of Nevada[18]



C.5 NWNV Road and Rail Intrastate Freight Flows

Intrastate traffic to and from the NWNV Region to the rest of Nevada is almost entirely truck based, representing 99.7% of total intrastate cargo tonnage. Intrastate rail traffic is virtually non-existent, and the State of Nevada's lack of intrastate rail infrastructure is a deficiency that should be addressed.

Table 12 ranks the top commodities moving into and out of the NWNV region to the rest of Nevada. Over 55% of the traffic is related to the return of empty trailers. Thus, virtually all intrastate truck moves are one-way loads and are returned to the station without any cargo, so only 45% of the truck units flowing into and out of NWNV carry productive cargo. Also as expected, intrastate flow of nonmetallic minerals and clay, concrete, glass, and stone represent 84% of the total tonnage and 38% of the unit volume.

Table 12: 2018 NWNV Top Commodity Ranking: Truck Intrastate Flows[19]

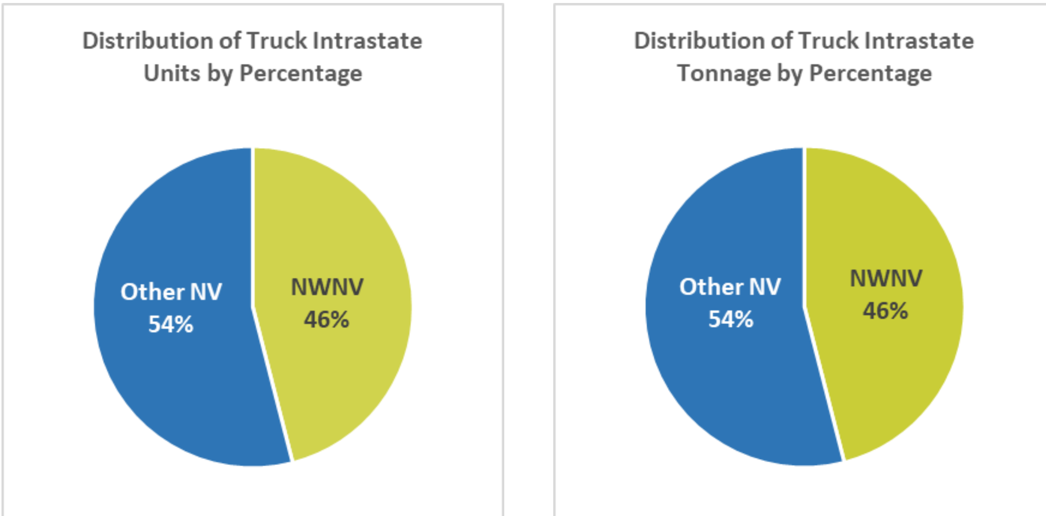
NWNV Truck Intrastate Traffic: Top Commodities					
STCC2	Commodity Name	Units	% Units	Tons	% Tons
42	Return of Empty Trailers	974,153	55%	0	0%
14	Nonmetallic Minerals	480,811	27%	11,688,684	65%
32	Clay, Concrete, Glass, or Stone	196,454	11%	3,484,789	19%
29	Petroleum or Coal Products	57,849	3%	1,404,053	8%
50	Warehouse/Distribution	36,905	2%	683,593	4%
1	Farm Products	16,551	1%	336,382	2%
	All Other Commodities	21,305	1%	494,976	3%
	Total NWNV Commodities	**1,784,028**	**100%**	**18,092,477**	**100%**

[18] Source: STB Waybill Sample 2018

[19] Source: TRANSEARCH® Truck Data 2018

Figure 9 presents the distribution of truck-based intrastate truck traffic between NWNV and the rest of Nevada. In terms of tonnage and units, NWNV represents 46% of Nevada's intrastate traffic.

Figure 9: Intrastate Truck Traffic vs. Rest of Nevada[20]



C.5.1 Truck Through-Traffic Statistics

As stated previously in this analysis, through-traffic is defined as cargo movements that neither originate nor terminate in the NWNV region, but simply pass through the Nevada road and rail system. **Table 13** represents the top truck-based commodities passing through NWNV Region. Farm and food products lead the way with over 52% of the unit volume and 56% of the tonnage. Remaining commodities represent a wide range, where All Other Commodities represent 28% of the volume and no single commodity represents more than 3% of the truck-based through traffic.

Table 13: 2018 NWNV Top Commodity Ranking: Truck Through-Traffic[21]

NWNV Truck Through Traffic: Top Five Commodities					
STCC2	Commodity Name	Units	% Units	Tons	% Tons
1	Farm Products	408,662	29%	7,848,964	29%
20	Food or Kindred Products	319,173	23%	7,326,221	27%
32	Clay, Concrete, Glass, or Stone	105,083	8%	1,766,396	7%
24	Lumber or Wood Products	60,221	4%	1,561,098	6%
40	Waste or Scrap Materials	52,864	4%	1,272,950	5%
42	Return of Empty Trailers	50,031	4%	0	0%
	All Other Commodities	391,350	28%	7,215,545	27%
	Total NWNV Commodities	**1,387,384**	**100%**	**26,991,174**	**100%**

[20] Source: TRANSEARCH® Truck Data 2018

[21] Source: TRANSEARCH® Truck Data 2018

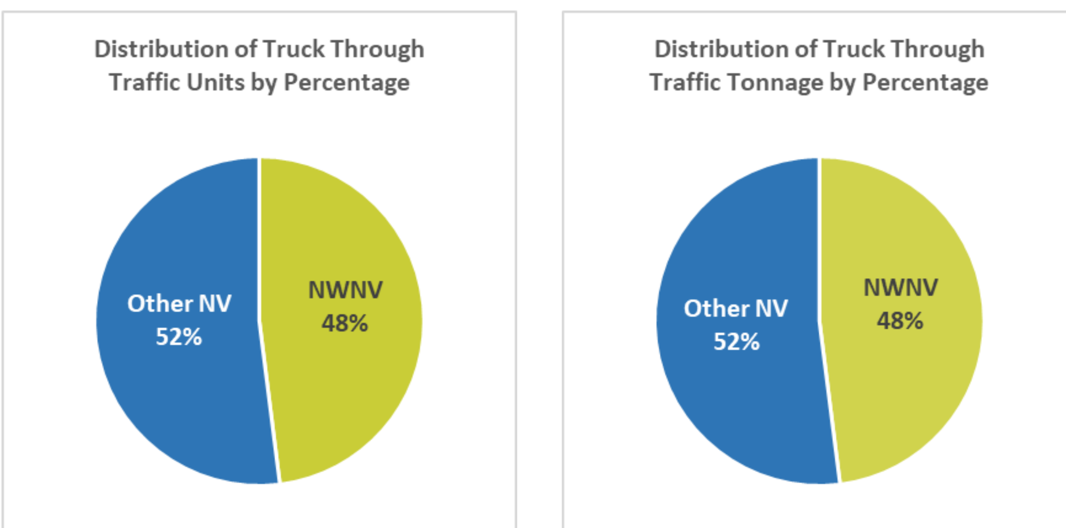
Table 14 presents the top 10 ranked State origin and destination pairs for truck-based commodities that pass through the NWNV Region. Of the 225+ identified State O-D pairs, the top 10 represent 54% of the total volume and the remaining 215 O-D pairs represent 46% of the total truck-based through traffic volume.

Table 14: 2018 NWNV Top State Origination/Destination Pairs for Truck Through Traffic[22]

NWNV Truck Through Traffic: State Partners					
Origination	**Destination**	**Units**	**% Units**	**Tons**	**% Tons**
ID	CA	211,891	15%	4,515,986	17%
UT	CA	98,414	7%	1,969,184	7%
CA	ID	98,394	7%	1,292,742	5%
CA	UT	68,611	5%	1,238,149	5%
MT	CA	55,281	4%	1,177,550	4%
WI	CA	53,059	4%	1,015,417	4%
MN	CA	52,036	4%	1,048,161	4%
CO	CA	40,790	3%	791,029	3%
IL	CA	37,123	3%	688,436	3%
OH	CA	36,098	3%	651,938	2%
All Others		635,688	46%	12,602,582	47%
Total		**1,387,384**	**100%**	**26,991,174**	**100%**

Figure 10 presents the distribution of truck- based unit and tonnage volume for the NWNV region versus the rest of Nevada. As can be seen, the NWNV region represents 48% of Nevada State truck-based through traffic in both truck units and tonnage.

Figure 10: Truck-Based Through-Traffic Versus the Rest of Nevada[23]



[22] Source: TRANSEARCH® Truck Data 2018

[23] Source: TRANSEARCH® Truck Data 2018

C.5.2 Rail Through-Traffic Statistics

Table 15 represents the top-ranked rail-based through-traffic commodities. As with trucking, farm and food products represent a significant proportion of the total rail-based commodity tonnage at over 52%.

It is important to note that the STB does not differentiate between the reporting of rail car units and domestic or international containers units. However, rail car units are likely to weigh three to four times more than containers, which are weight limited by truck regulations. As can be seen in the table below STCC2-46 Misc. Mixed Shipments is composed of a significant percentage of domestic and international containers. As illustrated, this commodity represents 31% of the total unit volume and only 14% of the tonnage. Conversely, farm products are transported primarily by much larger capacity rail cars and represent 26% of the total tonnage and only 10% of the total units. Domestic and international containers are also partially represented in the All Other Commodities category and represent 28% of the total units and 17% of the total tonnage.

Table 15: NWNV Top Commodity Ranking: Rail Through-Traffic[24]

NWNV Rail Through Traffic: Top Five Commodities					
STCC2	**Commodity Name**	**Tons**	**% Tons**	**Units**	**% Units**
1	Farm Products	4,661,869	26%	48,311	10%
20	Food or Kindred Products	4,630,017	26%	106,799	23%
46	Misc. Mixed Shipments	2,489,393	14%	144,648	31%
11	Coal	1,466,571	8%	12,022	3%
28	Chemicals or Allied Products	1,429,446	8%	23,483	5%
	All Other Commodities	3,080,195	17%	130,880	28%
	Total NWNV Commodities	**17,757,491**	**100%**	**466,143**	**100%**

Table 16 ranks the top origination and destination pairs for rail-based through traffic for the NWNV Region. Out of the 43 identified O-D State Pairs, the top 10 ranked State pairs represent 85% of the total tonnage. Of note are the 2nd and 3rd ranked trade partners of California and Illinois, which are heavily influenced by the movement of container traffic.

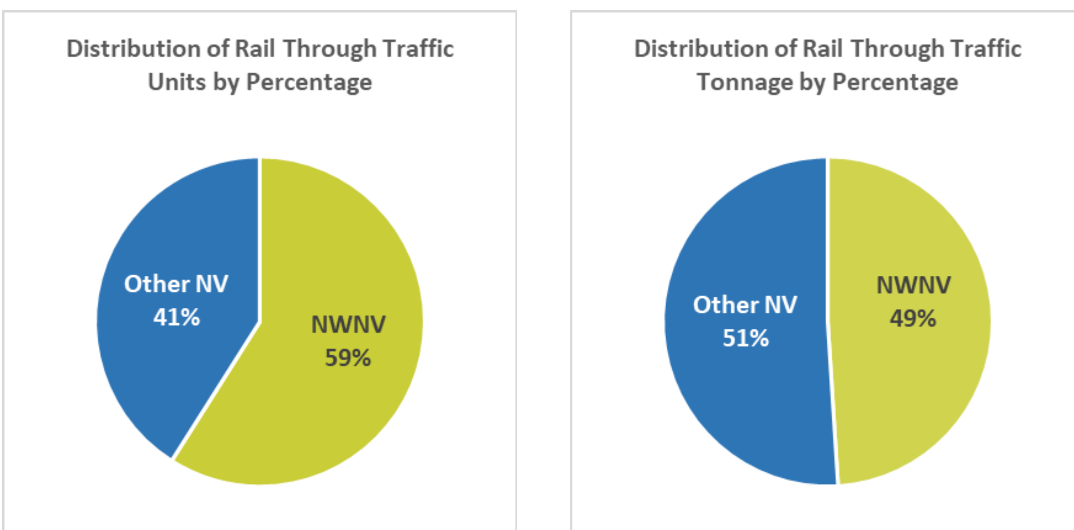
[24] Source: TRANSEARCH® Truck Data 2018

Table 16: 2018 NWNV Top State Origination/Destination Pairs for Rail Through Traffic[25]

NWNV Truck Through Traffic: State Partners					
Origination	Destination	Tons	% Tons	Units	% Units
NE	CA	3,078,686	17%	30,649	7%
IL	CA	2,308,348	13%	119,578	26%
CA	IL	2,081,481	12%	79,189	17%
UT	CA	2,079,103	12%	34,779	7%
IA	CA	199,813	11%	27,524	6%
MN	CA	1,442,505	8%	14,401	3%
CA	UT	845,974	5%	2,799	6%
ID	CA	412,705	2%	4,031	1%
CO	CA	388,857	2%	14,410	3%
MO	CA	374,472	2%	16,661	4%
All Other		2,745,551	15%	96,921	21%
Total		**17,757,491**	**100%**	**466,143**	**100%**

Figure 11 represents the distribution of rail cargo through-flows between the NWNV Region and the rest of Nevada. In terms of total rail tonnage, there is a near equal distribution. With respect to rail units, NWNV represents 41%. This is directly attributed to through-traffic of intermodal containers which are heavily biased towards the major ports of Los Angeles and Long Beach.

Figure 11: Rail-Based Through-Traffic Versus the Rest of Nevada[26]



[25] Source: TRANSEARCH® Truck Data 2018
[26] Source: TRANSEARCH® Truck Data 2018

D. The Goal of a Sustainable Freight System

Achieving the NNDA's vision of a prosperous, resilient economy for northwest Nevada requires a freight system that supports the economic ecosystem of the region. This system must balance the use of truck and rail appropriately. This provides economic, environmental, and social benefits to the state's businesses and residents in multiple ways:

- Improved quality of life in the community from a transportation system that uses rail as much and as safely as possible, replacing thousands of daily truck journeys
- Increased economic development opportunities from new logistics services and freight-oriented industrial development
- Local economic development with lower public burden for road construction and maintenance
- Land valued higher given its vital location on a trade corridor between the 5th largest economy in the world (California) and the rest of North America
- More profitable and growing businesses resulting from lower transportation costs, extended market reach, and integrated logistics services

This study considers the economic feasibility of a Multimodal Freight Facility, the practical options for locating this in the Fernley region, and the scale of freight-based economic development. This report is not an environmental impact study nor deep analysis of the quality of life implications from an enhanced freight system. However, the analysis reported herein uncovers the volume of existing and future truck trips that could be replaced by rail in the region. In 2015, the Congressional Budget Office reported[27] that trucks emitted 300% more PM, NO_x and CO_2 per ton-mile of freight than rail and the accident risk for trucks was between 700% and 1000% higher than rail. The implication of a sustainable freight system for the study region therefore includes many non-economic benefits such as safer roads, cleaner air, reduced congestion, and increased attractiveness of the region to incoming residents vital for its continued economic development.

E. Study Approach

This study, completed in conjunction with the Nevada State Rail Plan (NVSRP) detailed the following informational and geographic datasets for the region:

- Potential rail service growth projects
- Major land developments
- Active mines

[27] Source: Austin, D. (2015, March). Pricing Freight Transport to Account for External Costs [Editorial]. Working Paper Series. Retrieved 2015, from https://www.cbo.gov/sites/default/files/114th-congress-2015-2016/workingpaper/50049-Freight_Transport_Working_Paper-2.pdf.

- Truckload shippers that are not located adjacent to a rail line
- Nevada Inventory of Industry—Businesses with sidetracks and nearby truckload shippers including:
    - Private sidetracks owned by active and inactive rail shippers and receivers
    - UP-owned in-service sidetracks that are not used for linehaul or switching operations
    - Future sidetracks that could be built by truckload users adjacent to UP right-of-way

The databases used as sources were:

1. The SCRS (Serving Carrier Reciprocal Switching) database maintained by Railinc, which is a wholly owned subsidiary of the large U.S. railroad trade association, The Association of American Railroads. SCRS purports to itemize all private sidings in the U.S. by Customer Name, Station Name, Street Address, Serving Carrier, Phone, and other information. This resource proved to be only about 70 percent accurate for Nevada but was a good starting point.
2. Google Maps, to verify the existence of sidings in SCRS, to identify sidings not listed in SCRS, and to identify facilities that appear to be handling truckload lots next to railroad R-O-W.
3. Nevada county online tax maps, to identify the parcel ID number for specific lots where the operator of the facility is not shown on Google Maps.
4. Nevada county online property records, to find the owner, address, and acreage of specific parcels using the parcel ID number.
5. Internet search engines, to find the customer name associated with an address.
6. Web pages, to gather specific information about their products and telephone numbers.
7. Union Pacific maps, specifically ZTS maps that show track numbers designated by UP for individual customers and other UP-owned tracks.

The information gleaned from these databases was supplemented and confirmed when necessary by on-site visits and telephone calls. The SRF team has developed, as part of the NVSRP, an innovative set of data tools custom-designed to assist rail development in the region and state. These data tools, including maps, identify active and non-active rail sidings, truckload shippers, truckload shippers located adjacent to a rail line, and commercial projects that can benefit from expanded rail service.

All location data includes addresses and contact information and this catalogued data is accessible to stakeholders and interested third parties through an interactive database, spreadsheets, and digital mapping system.

In addition to the above sources utilized in the NVSRP, highly detailed truck and rail freight data for Reno, Churchill, Lyon, Storey, and Washoe Counties was specifically obtained for this study from TRANSEARCH®, a transportation database developed by IHS Global Insights.

E.1 Engagement with Land Developers

Our approach did not rely solely on statistical records and datasets. During the assignment SRF reached out to multiple land developers that are actively investing in Fernley area projects to understand their objectives and interest in sustainable freight systems and specifically an intermodal facility. Our analysis pinpoints specific land holdings and adjacent road and rail infrastructure of each development with maps of each project and their relation to each other. Stakeholders were all open and forthcoming with details of their projects and expressed appreciation for the attention to rail development that NNDA and NDOT are bringing to the area.

Nine developers in Region 5, the Fernley, Hazen, Fallon, and Silver Springs area of Northern Nevada were contacted in August 2020 by SRF and requested to complete a short questionnaire regarding their development plans for land use, target markets and utilization of rail.

The developers contacted control roughly 40,000 acres of land and are planning to develop over 250,000,000 square feet of industrial space. All the respondents projected opening in 2021 or 2022.

All these developers are located aside or close to the UPRR Main line and 75% of respondents had industrial lead track status in place or accessible. Five of the eight respondents already had their industrial sites rail engineered with Union Pacific approval in place. These five development sites equate to over 9,000 acres of industrial space.

Three quarters of respondents shared their projected industrial use and markets, and these were overwhelmingly related to intermodal and transload services supporting high-tech manufacturing and logistics tenants. One developer also planned to include affordable housing in addition to industrial development.

All developers reported a flat or gently sloping land topography, well suited for rail.

The majority of developers felt they had adequate or strong management strength but were mixed on rail experience where 25% already stated 'operator selected', 25% reported 'significant' and the remaining 50% responded they had minimal rail experience.

Regarding capital status all but one of the respondents reported having capital for development already available or in process. However, when questioned on specific rail funding a majority, 63% of respondents, stated they required capital support.

Three respondents had obtained switching quotes from Union Pacific and a further respondent had conceptual drawings approved by Union Pacific and BNSF.

E.2 Engagement with Transportation Stakeholders

In addition to land developers a broad eco-system of relevant stakeholders to the study were contacted. Existing shippers in the region, railroad operators UP and BNSF, and Caltrans and the Port of Oakland were all engaged directly to capture their views on, and potential support for, new rail infrastructure and specifically an intermodal facility in the study region. The Port of Oakland has subsequently made rail service to northern Nevada one of their top business development goals.

The study took a holistic and inclusive approach whereby detailed data, accurate maps and existing freight networks were utilized in conjunction with information from stakeholder liaison. This approach enabled 'real-world' testing of data accuracy, a continuous qualification of assumptions and, crucially, a platform to test the viability and stakeholder support for proposed solutions and subsequent recommendations in this report.

Port of Oakland's Executive Director Chris Lytle outlined in a 2017 Press Release[28] that he, "wants more rail business…rail transport is the preferred means of shipping cargo in and out of the Port. It takes trucks off the road," he said, "reducing freeway congestion and diesel emissions." His statement continued that in 2016 "the Port completed a $100 million rail storage yard with 41,000 feet of track."

In a December 2019 Business and Rail Overview Report, attached as Appendix 1, the port specifies short haul rail serving Nevada distribution centers as a strategic initiative.

F. Key Findings

- A sustainable freight system is necessary for the study region to manage dependency on truck transportation. The highway infrastructure cannot support the ongoing surge in the region's commercial development if this growth continues to be truck focused. More use of rail for freight flows is necessary for the continued economic development of the study region.

- A new multimodal freight facility situated in the study region would have a clear commercial business case converting international and domestic rail service between the Port of Oakland region and the eastbound geography that is currently serviced by truck. Furthermore, a new multimodal freight facility could attract a sizeable portion of existing international intermodal container unit volume and domestic railcar trade lane traffic between northwest Nevada and the high-volume consumption markets of San Francisco/Oakland and Los Angeles. Additionally, the facility would generate new rail-based freight flows.

- An Integrated Multimodal Cargo Transfer Facility (IMCTF) is required in preference to a traditional Intermodal Container Transfer Facility (ICTF). Optimizing the value and utilization of the Fernley facility requires freight type flexibility (for example bulk minerals as well as containers) and development of adjacent land for logistics services not available in traditional container facilities.

- The study region is ideally located for an Integrated Multimodal Cargo Transfer Facility (IMCTF) with its major east-west arteries serving California's markets and ports and its local growth as a growing economic development area. Fernley is the obvious location in the study region to build an intermodal facility, due to the combination of available land and adjacencies to I-80, U.S. 95, and the Union Pacific Railroad.

- The availability of land is a key success factor in developing an IMCTF. Northwest Nevada has a very high commercial space absorption rate having experienced seven continuous years of 3.5MM sq.

[28] Source: Zampa, M. (2017, May 27). Port of Oakland seeks to move more cargo via rails. Retrieved September 18, 2020, from https://www.portofoakland.com/press-releases/port-oakland-seeks-move-cargo-via-rails/

ft. of net absorption to 2019.[29] Our analysis identifies that Fernley is the sole area between the California border and Hazen with sufficient available space, and flat topography, in a commercial development zone, located aside the rail and highway network. (Two topographical maps are attached as Appendices 2 and 3 showing the paucity of available land in the region.)

G. Business Case

G.1 Overview

The objective of this report is to determine the commercial viability of establishing an Integrated Multimodal Cargo Transfer Facility (IMCTF) in the northwest Nevada region of Fernley. The basis and findings of this report rely heavily upon objective commodity truck flow data provided by TRANSEARCH®, a transportation database developed by IHS Global Insights. In some instances, the study relied upon reasonable estimates that are clearly noted in this report. Furthermore, the study employed an analytic process for this report.

From a commercial perspective, two primary questions need to be addressed in the affirmative:

- Does the freight data analysis support the required volume thresholds for the development and operation of the proposed facility?
- Will the design and service infrastructure of the IMCTF provide shippers with both service enhancement and cost savings that are sufficient enough to compel shippers to convert truck-based cargo to and from the Oakland and San Francisco region and the potential diversion of truck-based cargo currently destined and originating to the southern California Port region?

To attract the largest potential audience of shippers, the facility design will need to incorporate the latest thinking related to in-land transportation and logistics. Rather than a traditional intermodal container transfer facility (ICTF), it is highly recommended that this facility be designed as an integrated multimodal cargo transfer facility (IMCTF). Compared to traditional ICTFs, this facility design allows for:

- The receipt and discharge of cargo from all modes of transport and situations, including:
    a. the interception of domestic truck and rail-based traffic that is currently transloaded to international containers at or near ocean port facilities
    b. inbound transload and cross-docking of intermodal containers to domestic trucking
    c. truck-to-rail car transloading of domestically bound cargo
    d. conventional ICTF single-mode trucking (drayage) of preloaded and empty container transfers to and from intermodal rail ramps
- The siting of integrated cargo commodity handling infrastructure and services. This includes but is not limited to:
    - dry and cold chain storage
    - ground and open-pit discharge and storage

[29] “Reno Industrial MarketView Q2 2020,” CBRE, source link, (2020)

- cross-docking
- private chassis service
- phytosanitary
- USDA and customs inspection services
- other specialized commodity handling requirements.

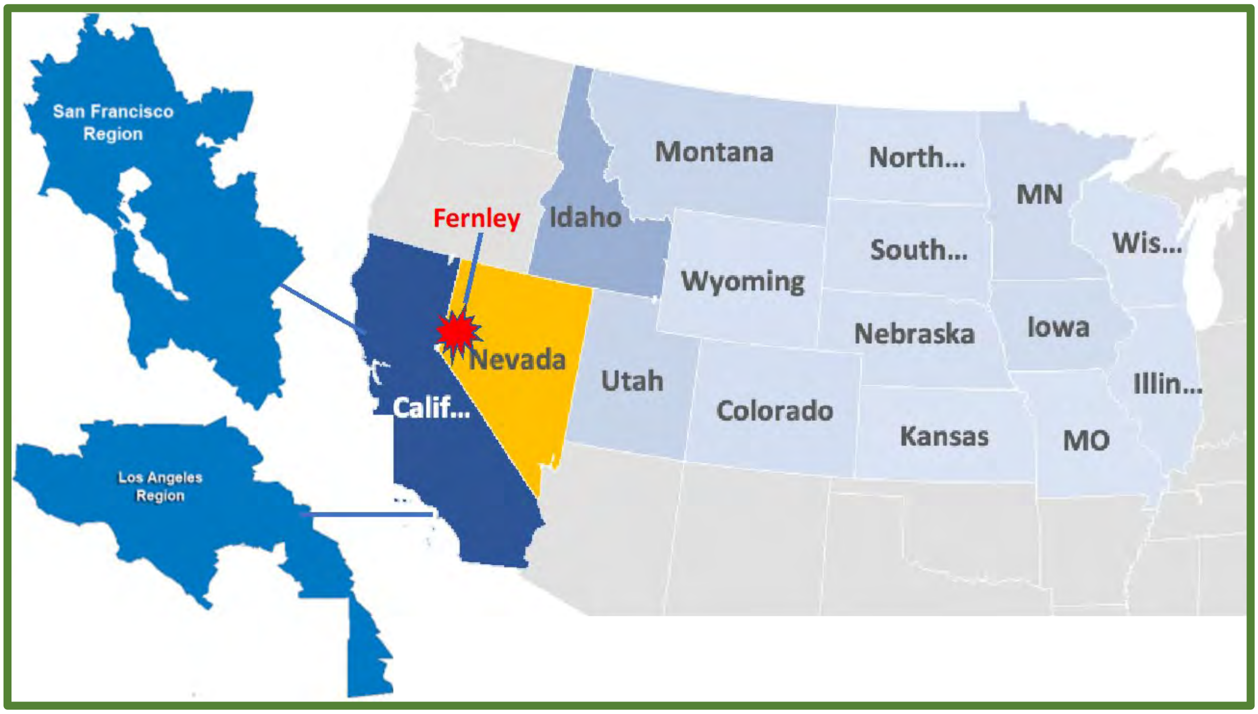
Our findings in this report suggest a clear commercial business case for an IMCTF facility in Fernley; providing intermodal and domestic rail service between the Port of Oakland region and the extensive eastbound geography that is primarily served by truck. Furthermore, based upon the above conditions and data analysis set forth in this study, SRF estimates that the Fernley IMCTF would attract a range of 160,000 to 215,000 of the existing international intermodal container unit volume and potentially significant domestic railcar trade lane traffic between the Fernley IMCTF and the high-volume consumption markets of San Francisco/Oakland and San Pedro Bay.

G.2 Defining the Geographic Market

An objective data-driven process was applied to determine the geographic markets that would support the unit volume threshold requirement for new rail infrastructure in the Fernley, NV region. This analysis identified all domestic and international truck-based through-traffic between the Oakland/San Francisco region and trade partner states east of Nevada that specifically pass through the Reno, NV corridor. For this report, this corridor region is called the Fernley Catchment Area (FCA) and consists of 14 states east and north east of Nevada.

Upon the identification of the FCA, the study also observed and reported domestic and international truck traffic from the FCA to and from the Los Angeles region and its Ports of Long Beach, Los Angeles, and San Diego. To the extent to which this cargo is destined to or from international markets, there is a compelling commercial business case for the deflection of this cargo from the Los Angeles area ports to the Port of Oakland via the IMCTF at Fernley.

Figure 12: Fernley Catchment Area (FCA)



G.3 Why Fernley

There are a host of strategic considerations and stakeholder requirements that must be met to ensure that the Fernley project becomes a successful operation. These considerations and requirements are intertwined. However, the over-arching key to success is simply volume. As depicted in **Table 17** and reported further in this study, there exists substantial truck-based traffic volume between Northern Nevada, the Fernley Catchment Area and the port regions of Oakland and Los Angeles. The following sections of this report identify strategic advantages of the proposed IMCTF at Fernley.

G.3.1 Strategic Location and Connectivity

The proposed facility in Fernley possesses strategic attributes that allow for substantial opportunities for road-to-rail conversion. Fernley is located along the east-west transit corridor of both I-80 and the Union Pacific Railroad, where an intermediate IMCTF would be ideally situated between the Fernley Catchment Area and the San Francisco/Port of Oakland region. In addition, Fernley is ideally situated to serve northern Nevada producers of domestically bound aggregates to the high-density markets of San Francisco and perhaps Los Angeles.

G.3.2 Existing Truck-Based Traffic

The Fernley region is a major thoroughfare for both domestic- and international-bound truck traffic to the high-density market regions of the San Francisco/Port of Oakland region and potential deflection of international traffic moving to the southern California ports. This report provides top-down truck-based volume reporting statistics in the section titled Northwest Nevada Freight Transportation Statistics Report. The study reveals substantial conditional volume available to the Fernley IMCTF.

Table 17: Comprehensive Truck Volume Table: FCA States and Corresponding Port Regions

Fernley Catchment Area (FCA)	Oakland/SF Domestic Truck	Oakland/SF Int'l Units	Oakland/SF Total Units	LA Region Domestic Units	LA Region Int'l Units	LA Region Total Units	Grand Total Units
Colorado	62,030	3,655	65,685	172,003	22,318	194,321	260,006
Idaho	185,713	4,341	190,054	136,771	8,509	145,280	335,334
Illinois	37,540	767	38,307	47,179	15,345	62,524	100,831
Iowa	30,857	1,684	32,541	32,035	10,974	43,009	75,550
Kansas	11,361	1,026	12,387	36,292	6,635	42,927	55,314
Minnnesota	49,357	1,886	51,243	74,945	13,283	88,228	139,471
Missouri	17,407	878	18,285	32,200	4,841	37,041	55,326
Montana	42,296	2,251	44,547	71,934	2,446	74,380	118,927
Nebraska	18,324	3,164	21,488	24,707	12,766	37,473	58,961
North Dakota	13,897	309	14,206	30,228	2,710	32,938	47,144
South Dakota	18,863	1,350	20,213	27,322	4,959	32,281	52,494
Utah	121,641	10,862	132,503	269,617	49,306	318,923	451,426
Wisconsin	49,580	1,543	51,123	74,162	9,808	83,970	135,093
Wyoming	32,107	1,940	34,047	53,001	5,490	58,491	92,538
Total	**690,973**	**35,656**	**726,629**	**1,082,396**	**169,390**	**1,251,786**	**1,978,415**

Source: TRANSEARCH® 2018 Truck Data

G.3.3 Land Availability

One key to the facility design of an IMCTF is land availability. In the absence of sufficient developable land adjacent to the Union Pacific Railroad, the opportunity at Fernley would be relegated to traditional ITCF design, which would lack adequate site capabilities to attract sufficient freight volume to justify further consideration. As it were, the Fernley region possesses significant large-scale land availability, both contiguous and non-contiguous, to support both an IMCTF single-site facility and adjacent non-contiguous parcels to support commercial and industrial development that would naturally arise from the advanced and highly efficient service provided by an IMCTF.

G.3.4 Fernley in Summary

So, why Fernley? It possesses ideal rail and road connectivity, evidence of sufficient potential freight volume, and substantial land availability.

G.4 About IMCTFs

To best understand contemporary thinking related to inland terminals and how they support effectiveness, efficiency, and value in the supply chain, particularly to the land transportation portion of the supply chain, one must understand the differences between the current intermodal container transfer facility (ICTF) models operating today as compared to the proposed IMCTF. We must understand their designed roles, their current limitations, and the pain points that have developed because of ever-growing changes within the cargo supply chain itself.

G.4.1 Traditional ICTF (Intermodal Container Transfer Facility)

The primary role of the traditional ICTF is to transfer loaded or empty containers to/from the train cars, to/from the ITCF facility, and then to/from trucks. This traditional model is typically run by an intermodal operator, such as a Class I railroad (i.e. Union Pacific), which oversees the operations portion of transferring containers to and from railcars and trucks.

G.4.1.1 Pain Points of the Traditional ICTF model

Shipper/Trucker Perspective

- Facilities are typically open for 8-to-10-hour shifts Monday to Friday and closed on weekends and all major/traditional holidays.
- Process delays are common and include factors such as heavy truck volume accessing the terminal, onsite chassis availability, and limited electrical sources to power refrigerated containers.
- Multiple point processing, when truckers must make several stops to secure chassis and containers can add substantial time to the drayage process.
- Inland terminal locations in densely populated areas require truckers to manage congestion and safety issues that can add time to container moves.
- Land-locked urban areas lack available land for inland terminals and related operations.

G.5 Latest thinking in Integrated Multimodal Cargo Transload Facility (IMCTF) Design

The IMCTF model design allows for the inflow and outflow of cargo from all modes of transport, with integrated on-dock cargo handling and services resulting in significant shipper savings. **The IMCTF is built around identifying a strategic location where sufficient volumes of truck cargo/shipments intersect with primary rail lines that can provide the most efficient land transportation method to/from specific major destination points.** This concept design is limited only by the availability of large-scale land development, which in the case of Fernley is not a factor.

G.5.1 Important operational service differences of the IMCTF model

The IMCTF model focuses on driving efficiency through combining cargo transloading operations in a strategic location. The IMCTF provides for the following:

- Commodity specialization including in-gate processing infrastructure and dry- and cold-storage capabilities
- Bulk commodity transfer stations where aggregates and other bulk commodities can be received by truck and transloaded to rail
- Complete on-dock consolidation of logistics steps that provide un-paralleled ease of use relative to current practices
- Customs bonded operations to provide for multiple in-bond services
- Partnering Government Agencies (PGA) located onsite allowing access for efficient and timely processing of CBP, USDA, FDA, F&W, etc. as may be needed for shipments in review

G.5.2 IMCTF can remove pain points that result in inefficiencies and added costs

- IMCTF facilities, with supportive volumes, can operate 24/7 aligning with most Class I rail (i.e. Union Pacific) operations

- Drayage movements of containers from terminals to distant rail "ramps" are not necessary when cargo is transloaded directly to rail. Truckers thus avoid the empty miles of making additional stops to pick up and return chassis equipment, and the empty return trip to the terminal.
- Elimination of wait-time charges for shippers who face delays when their shipments are brought to third-party service providers for transloading from trailers to containers
- Detention charges from equipment providers can quickly add up to thousands of dollars. Because an IMCTF would be providing high-volume moves using precision scheduled railroad processes and systems, detention charges could be eliminated
- Timely onsite PGA processing of shipments allow for cargo reviews to be completed in a timely fashion and without travel to multiple third-party facilities in congested urban areas. With the IMCTF, cargo is brought directly to the on-site PGAs

G.5.3 Case Study: ICTF at Salt Lake City

The Union Pacific ITCF facility in Salt Lake City provides direct intermodal rail service to the Ports of Oakland and Los Angeles-Long Beach. Why do 250,000 international-bound trucks bypass this facility every year?

- <u>No cargo transloading capabilities</u>: The ICTF does not transload cargo in and out of different containers, it only moves the containers themselves from one mode to another. Therefore, the largest portion of international-bound loads, which are coming from states beyond Nevada, load their cargo into standard 53-foot trailers for truck delivery to near-dock transloading facilities in the Oakland/San Francisco or Los Angeles/Long Beach port regions for processing and last-mile transportation to the port.
- Limited equipment capabilities: This ICTF facility is limited to TOFC (Trailer on Flat Car) and COFC (Container on Flat Car) equipment transfer services.
- Container/chassis equipment access: Limited to truck carriers that are required to meet all equipment provider (ocean carrier, chassis provider, railroad, etc.) rules and requirements included in intermodal interchange agreements.
- Detention charges: These can add up very fast and are built into the equipment provider interchange agreements between the truck carriers and the facility. Costs accrue well in excess of $100/container per day for shippers unable to pick-up or return equipment within the allowable "free time" (which varies by equipment provider).
- Limited local service area: All international cargo loads outside of the local SLC area must make a trip to the SLC ICTF to first pick up a container on a chassis, then transport it back to the shipper for loading, and then return to the SLC ICTF to drop off the loaded container. This process adds excessive time and costs to moving the cargo, more so with increased distance from the ICTF.

G.6 Shipper Savings

The following section identifies the shipper savings gained through the elimination of the truck-based processes obviated for FCA international shippers using the IMCTF at Fernley. Also, in this section are two business cases identifying shipper cost savings in comparison to the most highly cost-competitive routing and utilization of the Union Pacific ITCF in Salt Lake City. These models stress-test the economics relating to the diversion of truck-based cargo to Fernley with rail-shuttling to the Port of Oakland.

G.6.1 Consolidated Logistics Steps

The traditional ICTF model is built around the transfer of equipment, not cargo. The ability to transition typical truckload cargo requires it to be loaded into rail-approved container equipment at the shipper or transload facility. This offsite requirement adds significant additional costs and time to get the cargo transported to the destination point.

The IMCTF model is based around cargo transloading and therefore removes the obstacles associated with container equipment positioning for seamless transition from truckload cargo to rail transportation.

Figure 13: ITCF 9-Step Logistics Process

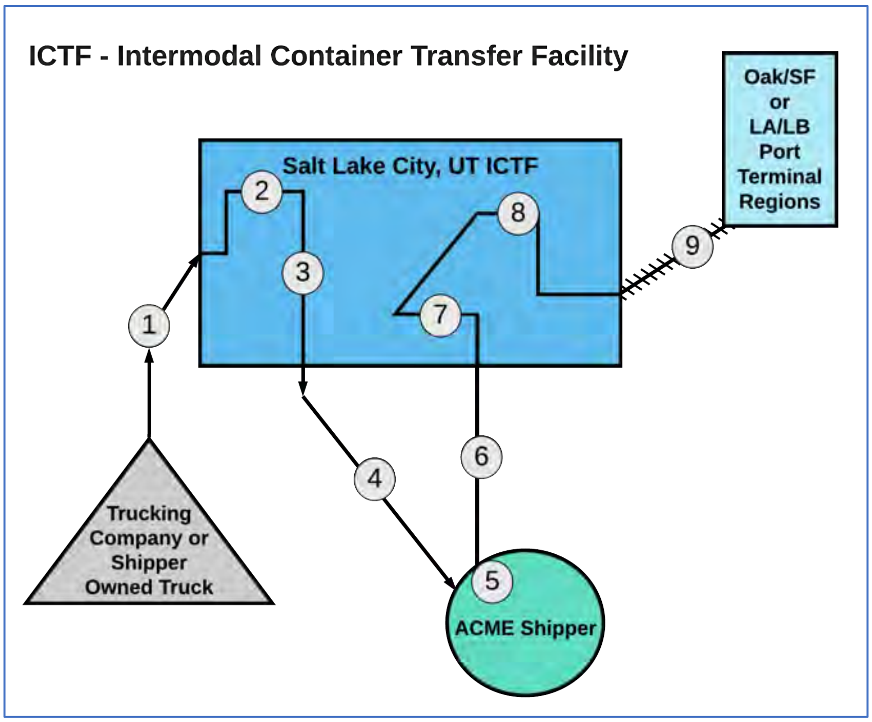


Exhibit 1 demonstrates the nine steps involved to accommodate an export container loaded via an ICTF operation. The ICTF process is driven by the need for cargo loading at the shipper location into special equipment necessary for rail transportation.

Step 1 – Shipper owns truck or hires a truck carrier to provide container drayage services to pick up a container and bring it to the shipper’s loading dock to be loaded (export). Trucker gets the container booking information from the shipper and goes to the ICTF for the chassis and container equipment.

Step 2 – Truck carrier/driver arrives at the ICTF, checks in at the gate and proceeds to the chassis area where truck carrier/driver finds a chassis and connects safely.

Step 3 – Truck carrier/driver proceeds to the yard location for container. Truck carrier/driver waits for yard operator to load an empty export container on the chassis. Trucker then proceeds to the check-out area and does an outside visual inspection for any potential unsafe conditions before leaving.

Step 4 – Trucker leaves the ICTF and drives to shipper dock for loading.

Step 5 – Truck carrier/driver arrives at shipper's designated facility dock for loading (export). Most international shipments are shipped floor loaded. Time to load a floor loaded 40-foot container by a two-person team can vary greatly depending on the commodity and packaging characteristics but typically it takes four hours.

Step 6 – Truck carrier/driver leaves the shipper dock and returns to ICTF with the loaded (export) container.

Step 7 - Upon return to the ICTF, the truck carrier/driver checks in at the gate, moves to instructed yard position and awaits removal of the container from the chassis.

Step 8 – Upon removal of the container from the chassis, the truck carrier/driver takes the chassis to the chassis drop location in the yard and disconnects it.

Step 9 – The ICTF transfers the loaded container onto the train for transportation to the ocean port terminal destination for transfer to a pre-determined ocean carrier vessel.

Figure 14: IMCTF 5-Step Logistics Process

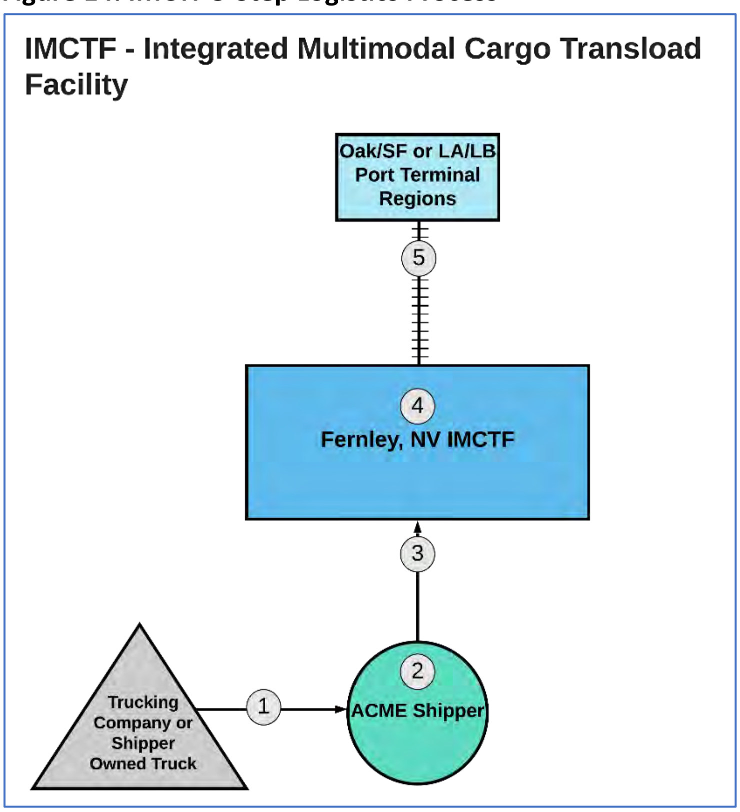


Exhibit 2 is the process diagram for an IMCTF operation. As demonstrated, the IMCTF significantly consolidates logistics activities from 9 steps to 5.

Step 1 – Shipper owns truck or shipper hires a truck carrier to provide standard 53-foot dry van to transport the shipper's cargo to the IMCTF. Shipper-owned truck process starts at Step 2.

Step 2 – Truck carrier/driver arrives at the shipper facility, checks in and backs into a designated dock and gets loaded. Once loaded the trucker is provided all necessary documents and ensures there is a seal attached to the trailer door to ensure no tampering prior to arrival at the IMCTF.

Step 3 – Truck carrier/driver transports the cargo truckload to the IMCTF in Fernley, NV.

Step 4 – Truck carrier/driver arrives at the IMCTF in Fernley, NV and is directed to a dock for transloading. The transload team unloads the cargo and the driver proceeds to the check-out gate and on to their next job.

Step 5 – Once the transload operator has completed the transload of the cargo into the international container, the IMCTF operator stages the loaded container for the intermodal operator where it will be loaded onto the train for transportation to the ocean port terminal.

In summary, and as demonstrated in the above exhibits, the consolidation of steps offered by the IMCTF translates to ease of use and significant internal cost savings.

G.6.2 Transportation Cost Improvement

Two scenarios are presented in **Tables 18** and **19** below to illuminate the savings difference between the traditional ICTF model and the IMCTF model. The study employed current sample western region truck rates of $2.65/mile 500 miles/day with 10 hours' drive time per day for cost calculations. It is important to note that we have applied an estimated $600.00 rail shuttle cost to and from the Fernley IMTCF and the Port of Oakland. Furthermore, in the model below, we show a $450.00 transloading revenue charge per truck, an appealing revenue line item for a Fernley IMCF investor/operator.

Table 18: Fernley IMCTF Vs. SLC ITCF: Shippers in 250 Mile Radius Drive

Shipper Savings Summary: ICTF vs IMCTF	Salt Lake City, UT ICTF	Fernley, NV IMCTF
40' Intl. Export Food/Farm Cargo at 250 miles away	Year 1	Year 2
Container Drayage 500 miles R/T (250 miles O/W)	$1,325.00	$0.00
Shipping of cargo to IMCTF via 53' Dry Van 250 miles	$0.00	$662.50
Chassis Charge @$40/day with 2 Day minimum	$80.00	$0.00
Transload to 40' container floor load	$100.00	$450.00
Rail to Oakland/SF Port Terminal Region	$600.00	$600.00
Other	$0.00	$0.00
Estimated Total Costs	$2,105.00	$1,712.50
Shipper Savings per Unit		-$392.50

Savings Percentage:
19%

Table 18 demonstrates the accrued shipper savings from the consolidation of logistics services at the IMCTF, versus the multiple movements required at UP's ICTF in Salt Lake City.

In this scenario:

- An international shipper of farm and food cargo located within the FCA and located 250 miles from the Salt Lake City ITCF is compared with a shipper located 250 miles from the Fernley IMCTF.
- Transporting the cargo via the ITCF at Salt Lake City to the Port of Oakland is estimated to cost $2,105.
- The re-routing of the truck-based cargo to the IMCTF at Fernley and with a final destination to the Port of Oakland is expected to cost $1,712.50.
- This yields a nearly $400 savings and eliminates a number of the logistics gymnastics relating to the use of the ITCF.

Table 19: Fernley IMCTF Vs. Through Trucking to Near Port Transload

Shipper Savings Summary: Truck Through vs IMCTF	Through Truck	Fernley, NV IMCTF	
40' Intl. Export Food/Farm Cargo at SLC region to destination to Oak/SF Port Terminal Region.	730 miles	486 miles	
Shipping of cargo to IMCTF via 53' Dry Van 486 miles	$0.00	$1,287.90	
Shipping of cargo to IMCTF via 53' Dry Van 250 miles	$1,934.50	$0.00	
Transload to 40' container floor load	$450.00	$450.00	
Container Drayage near dock	$300.00	$0.00	
Chassis Charge @$40/day with 2 Day minimum	$80.00	$0.00	
Rail to Oakland/SF Port Terminal Region	$0.00	$600.00	
Other	$0.00	$0.00	
Estimated Total Costs	$2,764.50	$2,337.90	Savings Percentage:
Shipper Savings per Unit		-$426.60	19%

Table 19 demonstrates the accrued shipper savings, with a cost comparison for shippers located within the FCA of trucking cargo to near west coast port transload facilities, versus their using the IMCTF at Fernley.

In this scenario:

- An international shipper of farm and food cargo is located within the FCA, 730 miles from the Port of Oakland region, and 486 miles from the Fernley IMCTF.
- Truck transporting the cargo to the Port of Oakland for container transloading is estimated to cost $2,764.50.
- The alternate routing of the truck-based cargo to the IMCTF at Fernley with a final destination to the Port of Oakland is expected to cost $2,337.90.
- This yields over $425 in savings to the shipper, and as previously discussed, the entire IMTCF design concept removes other soft costs related to complex transport supply-chain alternatives.

G.7 Survey of Relevant Rail Infrastructure and Port Partnerships

As addressed in the above sections, the ITCF in Salt Lake City is one of the most viable options within the FCA for international and domestic shippers to reach the California Port Regions. As explained, this facility has significant limitations to handling diverse truck-based commodity shipments, as its design and function is purely as an ICTF operation. Below is a brief description of the relevant rail interfaces, their attributes, and their respective service schedules. Also, below is a broad differentiation between the Ports of Los Angeles and Long Beach relative to the Port of Oakland.

G.7.1 Current Inland Rail Interfaces

- Sparks, NV: Union Pacific: Rail carload service only to and from Chicago.
- Las Vegas, NV: Union Pacific: Domestic 53' container service only to and from UP ITCF Los Angeles.
- Salt Lake City, UT: Union Pacific.
  - International container service to Long Beach, CA. Four days per week, three-day transit time
  - International and domestic container service to Oakland, CA. Four days per week, two-day transit time.
  - Proximity from Fernley: 481 Miles (6:45)

G.7.2 Port Partnership Considerations

- Ports of Los Angeles and Long Beach
  - From an economic shipper savings perspective and to the extent that this traffic is international, a near-universal business case can be made to deflect this current trade lane to the Port of Oakland via the Fernley IMTCF. Current truck-based routing of the FCA westbound and eastbound originations that pass-through Nevada are concentrated on the Southwestern Nevada I-15 gateway to Southern California port regions, and currently avoid the routing to/from the Fernley/Reno I-80 gateway.
  - Perhaps even more important, neither the Port of Los Angeles or Long Beach possess the capacity to absorb any additional on-dock intermodal rail volume, thus eliminating them as a rail-based port partner for either Las Vegas, Sparks, or Fernley
- Port of Oakland and Union Pacific (UP) Bay Area
  - Geographically aligned with Nevada truck-based through-traffic
  - UP main line already provides domestic and international container service between Oakland and Salt Lake City
  - Enthusiastic Port Authority and no limitations for on-dock intermodal and carload service
  - Fernley is likely to deflect cargo from the Ports of Los Angeles and Long Beach, creating incremental new volume to Oakland
  - Fernley would modally convert truck-based traffic to rail, reducing port congestion and meeting Caltrans and NDOT objectives of highway to rail (H2R) conversion along the I- 80 corridor
  - Oakland is a major farm and food products port, which coincides with NV through-traffic of those commodities which represent nearly 50% of all NV truck-based through-traffic
  - In conjunction with Eagle Rock Aggregates (Vancouver), the Port of Oakland has opened an on-dock import and distribution operation for sand and gravel to supply Bay Area construction. Non-Metallic Mineral and Clay, Concrete, and Stone represent over 50

percent of the NWNV commodity production, with over 190,000 truckloads moving to the Bay Area region.

G.8 Trucking Statistics

The following tables and charts depict truck-based traffic flows between the FCA and California port regions of Oakland/San Francisco and the Southern California port regions of Long Beach, Los Angeles, and San Diego, collectively referred to here as the Port Regions. The data (from 2018) was furnished by TRANSEARCH®. To estimate potential cargo flows to the IMCTF at Fernley, the presented data has undergone filtering to isolate baseline truck-traffic between the FCA and the Port regions.

Table 20 depicts the total consolidated truck-based freight activity to and from the FCA and the Port Regions. Total current freight activity to and from the Oakland region exceeds 725,000 units annually and 1,250,000 units to the LA region. It is important to note that virtually all of the Oakland/San Francisco regional freight traffic passes through the Fernley region along I-80. Secondly, as demonstrated in the Shipper Savings section, **there is a compelling business case for the deflection of existing internationally bound domestic and international truck-based traffic to/from the Los Angeles area ports to the Port of Oakland via the IMCTF at Fernley.** This scenario is included in the potential volume study for the IMCTF at Fernley.

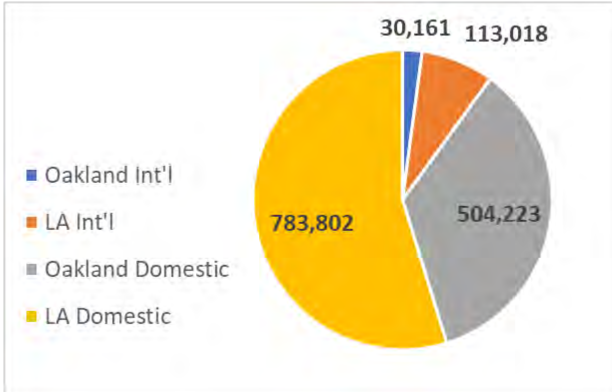
Table 20: Consolidated Truck-Based Freight Activity: FCA between Oakland and Los Angeles Regions

Fernley Catchment Area (FCA)	Oakland/SF Domestic Truck	Oakland/SF Int'l Units	Oakland/SF Total Units	LA Region Domestic Units	LA Region Int'l Units	LA Region Total Units	Grand Total Units
Colorado	62,030	3,655	65,685	172,003	22,318	194,321	260,006
Idaho	185,713	4,341	190,054	136,771	8,509	145,280	335,334
Illinois	37,540	767	38,307	47,179	15,345	62,524	100,831
Iowa	30,857	1,684	32,541	32,035	10,974	43,009	75,550
Kansas	11,361	1,026	12,387	36,292	6,635	42,927	55,314
Minnnesota	49,357	1,886	51,243	74,945	13,283	88,228	139,471
Missouri	17,407	878	18,285	32,200	4,841	37,041	55,326
Montana	42,296	2,251	44,547	71,934	2,446	74,380	118,927
Nebraska	18,324	3,164	21,488	24,707	12,766	37,473	58,961
North Dakota	13,897	309	14,206	30,228	2,710	32,938	47,144
South Dakota	18,863	1,350	20,213	27,322	4,959	32,281	52,494
Utah	121,641	10,862	132,503	269,617	49,306	318,923	451,426
Wisconsin	49,580	1,543	51,123	74,162	9,808	83,970	135,093
Wyoming	32,107	1,940	34,047	53,001	5,490	58,491	92,538
Total	690,973	35,656	726,629	1,082,396	169,390	1,251,786	1,978,415

Source: TRANSEARCH® 2018 Truck Data

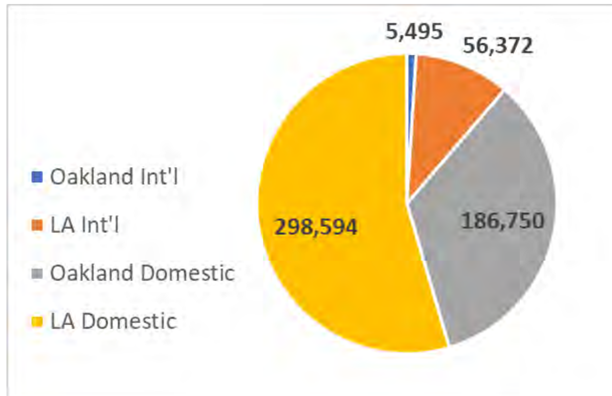
Figures 15 and **16** depict the directional flows of Nevada truck-based through traffic between the FCA and Port Regions. As demonstrated from the charts, over 72% is westbound from the FCA to the Port Regions, versus only 28% eastbound. This is largely explained by both the significant consumption and International shipping that occurs in the Port Regions of Oakland and Los Angeles.

Figure 15: Westbound Traffic to Port Regions



Source: TRANSEARCH® 2018 Truck Data

Figure 16: Eastbound Traffic to FCA



Source: TRANSEARCH® 2018 Truck Data

G.8.1 Consideration of Farm and Food Products Commodities

Commodities of farm and food products play a dominate role in transportation between the FCA and the Port Regions. Overall, 47% of all truck-based cargo shipped to and from the FCA and the Port Regions are farm and food products, nearly 900,000 truck units. This commodity concentration is even more pronounced when isolating shipments between the FCA and the Oakland region, where farm and food products represent over 54% of the westbound truck moves (291,000 moves) and 60% of the eastbound truck moves (116,000 moves).

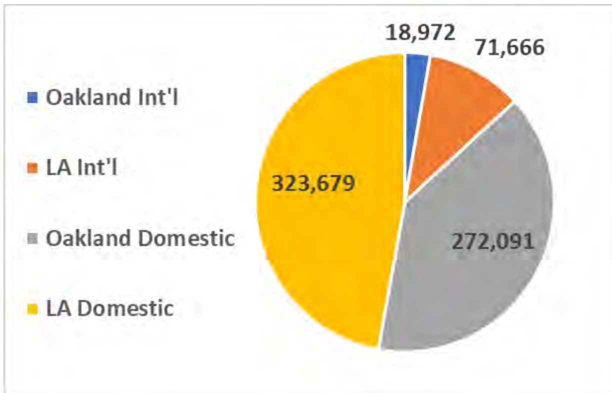
This commodity concentration represents a significant opportunity to attract freight volume to the IMCTF:

1) Allows for specialization of infrastructure to handle this large volume commodity sector, as this commodity group is likely to represent approximately 50% of the cargo volume.

2) Provides for the opportunity for highly targeted marketing strategies to an industry sector that is known for its collective organizational strength: large-scale food processing tenants.

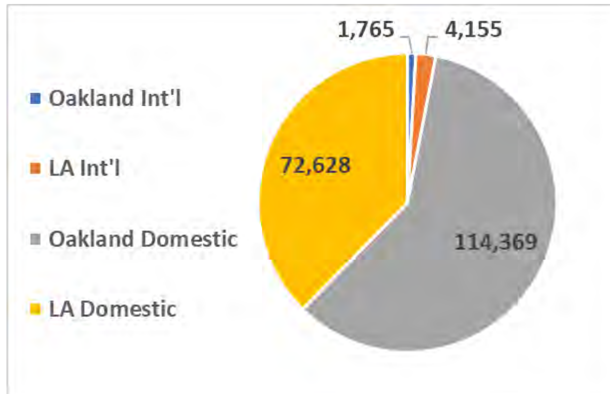
3) Served by a highly focused group of third-party logistics firms. **Figures 17** and **18** present the truck unit volume of Farm and Food Products by truck units, direction, and trade type.

Figure 17: Westbound Farm and Food Products Traffic



Source: TRANSEARCH® Truck Data

Figure 18: Eastbound Farm and Food Products Traffic



Source: TRANSEARCH® Truck Data

As Farm and Food Products are a significant contributor to overall truck flows, **Tables 21** and **22** focus on this commodity, including the domestic traffic activity and directional flow for Oakland Regional truck traffic, ranked by State truck volume.

Table 21: Domestic Westbound Commodity Traffic from the FCA to the Oakland Region

Cartchment Origination	Port Region Destination	Farm & Food Truck Units	Other Commodities Truck Units	Total Truck Units
Idaho	SF/OAK	103,550	23,212	126,762
Utah	SF/OAK	31,835	39,667	71,502
Minnesota	SF/OAK	19,803	20,809	40,612
Colorado	SF/OAK	13,338	27,104	40,442
Montana	SF/OAK	29,306	10,350	39,656
Wisconsin	SF/OAK	4,949	34,193	39,142
Wyoming	SF/OAK	8,941	18,763	27,704
Illinois	SF/OAK	5,105	21,155	26,260
Iowa	SF/OAK	17,387	8,707	26,094
Nebraska	SF/OAK	11,220	4,881	16,101
South Dakota	SF/OAK	10,457	5,377	15,834
Missouri	SF/OAK	3,756	9,922	13,678
North Dakota	SF/OAK	9,083	3,118	12,201
Kansas	SF/OAK	3,361	4,874	8,235
Total		**272,091**	**232,132**	**504,223**

Source: TRANSEARCH® Truck Data

Table 22: Domestic Eastbound Commodity Traffic from Oakland Region to the FCA

Port Region Origination	Catchment Destination	Farm & Food Truck Units	Other Commodities Truck Units	Total Truck Units
SF/OAK	Idaho	30,906	28,045	58,951
SF/OAK	Utah	32,172	17,967	50,139
SF/OAK	Colorado	11,208	10,380	21,588
SF/OAK	Illinois	8,205	3,075	11,280
SF/OAK	Wisconsin	8,787	1,651	10,438
SF/OAK	Minnesota	6,677	2,068	8,745
SF/OAK	Iowa	3,688	1,075	4,763
SF/OAK	Wyoming	938	3,465	4,403
SF/OAK	Missouri	2,592	1,137	3,729
SF/OAK	Kansas	2,299	827	3,126
SF/OAK	South Dakota	2,353	676	3,029
SF/OAK	Montana	1,842	798	2,640
SF/OAK	Nebraska	1,599	624	2,223
SF/OAK	North Dakota	1,103	593	1,696
Total		114,369	72,381	186,750

Source: TRANSEARCH® Truck Data

As with **Tables 21** and **22**, the following tables focus on Farm and Food Product data: **Tables 23** and **24** present the domestic traffic activity and directional flow for Los Angeles Regional, ranked by State truck volume.

Table 23: Domestic Westbound Commodity Traffic from the FCA to the LA Region

Cartchment Origination	Port Region Destination	Farm & Food Truck Units	Other Commodities Truck Units	Total Truck Units
Utah	LA Region	46,886	108,375	155,261
Idaho	LA Region	84,781	24,601	109,382
Colorado	LA Region	32,872	72,786	105,658
Minnesota	LA Region	22,662	40,458	63,120
Wisconsin	LA Region	6,746	56,316	63,062
Montana	LA Region	37,367	24,968	62,335
Wyoming	LA Region	10,757	33,526	44,283
Illinois	LA Region	7,172	22,651	29,823
Iowa	LA Region	13,619	13,653	27,272
Kansas	LA Region	9,575	17,005	26,580
Missouri	LA Region	6,875	19,175	26,050
North Dakota	LA Region	16,030	9,599	25,629
South Dakota	LA Region	14,378	9,543	23,921
Nebraska	LA Region	13,959	7,467	21,426
Total		323,679	460,123	783,802

Source: TRANSEARCH® Truck Data

Table 24: Domestic Eastbound Commodity Traffic from the LA region to the FCA Truck Data

Port Region Origination	Catchment Destination	Farm & Food Truck Units	Other Commodities Truck Units	Total Truck Units
LA Region	Utah	21,445	92,911	114,356
LA Region	Colorado	13,412	52,933	66,345
LA Region	Idaho	10,969	16,420	27,389
LA Region	Illinois	4,039	13,317	17,356
LA Region	Minnesota	6,677	5,148	11,825
LA Region	Wisconsin	4,300	6,800	11,100
LA Region	Kansas	2,595	7,117	9,712
LA Region	Montana	1,829	7,770	9,599
LA Region	Wyoming	1,203	7,515	8,718
LA Region	Missouri	1,611	4,539	6,150
LA Region	Iowa	1,693	3,070	4,763
LA Region	North Dakota	636	3,963	4,599
LA Region	South Dakota	1,132	2,269	3,401
LA Region	Nebraska	1,087	2,194	3,281
Total		72,628	225,966	298,594

Source: TRANSEARCH®

G.9 IMCTF at Fernley—Estimated Traffic Volume

G.9.1 Preliminary Facility Requirements

In preparation of this report, an extensive truck-based freight study was performed to determine the range of cargo volumes that could be captured at the IMCTF at Fernley. This study first identified the target market catchment area—the FCA, and its truck-based commodity volume relationship with the California Port Regions. The reporting of freight statistics establishes the baseline of the available universe of relevant truck volume. Appropriate facility design and operating requirements are as follows:

- The facility design, operations and services need to extend beyond traditional ICTF's to the full services offered by an IMCTF.
- The IMCTF must clearly demonstrate to shippers compelling cost and service improvements over current transportation practices.
- Largely dependent upon volume, the frequency of intermodal rail service must meet a minimum threshold of three days per week, preferably 4 to 5 days per week. Any rail shuttle service must meet the Union Pacific Railroads' Precision Scheduled Railroading (PSR) operating requirements.
- Direct integrated ocean bill of lading service at the Fernley IMCTF must be provided by the broad range of ocean carriers that are currently calling on the Port of Oakland.
- The IMCTF should be a private operation and independent of the facility's core partners of Union Pacific and the Port of Oakland.
- Relating to the above, a detailed financial business case and model will need to demonstrate an appropriate rate of return on the infrastructure investment.

To estimate freight volume potential at the IMCTF at Fernley, a cascading volume sensitivity model has been developed. While the overall data is entirely objective, the model relies upon several major subjective considerations, for which there are no verifiable data-driven sources. They are:

G.9.2 Near-Port International Conversion of Domestic Cargo

The TRANSEARCH® Truck Data only reports cargo unit moves as international when the destination or origination is specifically identified as an international deep-water port. Otherwise, the move is identified as domestic. In the case of the Fernley IMCTF report, all domestic and international truck-based traffic reporting was refined to port region origins and destinations. By default, the Port Regions imply that both possess major international port gateways. The question then becomes, how much of this truck-based cargo is being consumed within those two regions and how much is being converted to and from international containers in near-port regions and then locally drayed to/from the international port. The estimated percentage of international cargo is a three-factor consideration:

1. The regions immediately surrounding the ports of Oakland, Los Angeles, Long Beach, and San Diego have extensive near-port logistics and transportation service providers whose core functions are to receive and discharge domestic trucks, provide dry and cold storage, consolidate and deconsolidate international containers, and provide drayage to and from the local port(s).
2. Within the FCA, international shipper and receiver locations are scattered, and often distant from intermodal container truck-to-rail transfer facilities; thus, trucking to and from international port regions is the only commercially viable option.

3. The composition of commodities shipped to and from the FCA are biased towards potential for international export and import. As an example, aggregate commodities such as sand and stone are almost entirely consumed domestically within their delivered market. Conversely, unprocessed food and farm products are more likely to be exported rather than locally processed and consumed within the major port regions. In the case of the FCA and Port Regions relationship, farm and food products represent nearly 50% of all commodities.

Based on the above, and considering the relative near-port population, and regional production-consumption characteristics in both the FCA and corresponding Port Regions, a subjective ratio was applied to domestic truck-based cargo flows that are transloaded from domestic truckloads into between internationally bound containers, herein known as International Conversion Ratio (ICR).

Table 25: Westbound Domestic to International Conversion Ratio ICR: FCA and Port Regions

Origination	Destination	Min. Conversion	Max. Conversion
Oakland Region	Oakland Region	30%	40%
FCA	LA Region	20%	30%

Table 26: Eastbound Domestic to International Conversion Ratio ICR: FCA and Port Regions

Origination	Destination	Min. Conversion	Max. Conversion
Oakland Region	FCA	45%	55%
La Region	FCA	35%	45%

G.9.3 Fernley IMCTF Interception of International Cargo

Of the nearly two million total truck-based through traffic trips between the FCA and the Port Regions, the above tables narrow the range of eligible cargo from 630,00 to 791,000 truck moves, or 32-40% of the total truck-based traffic. **Tables 27** and **28,** below depict the range of domestic truck-based cargo that is likely reclassified as international cargo. The final portion of the analysis relates to the interception of international cargo to the Fernley IMCTF for final rail shuttle service to the Port of Oakland. Again, this is a subjective exercise but is based upon the ability to market the facility's attributes of shipper savings, the broad service offering of the IMTCF, and its convenience versus current truck-based transport to and from the FCA and the Port Regions. See **Tables 27** and **28**:

Table 27: Westbound Fernley Interception Ratios (FIR): FCA and Port Regions from FCA to Oakland Region

Origination	Destination	Min. Conversion	Max. Conversion
FCA	Oakland Regon	30%	40%
FCA	LA Region	20%	25%

Origination	Destination	Min. Conversion	Max. Conversion
Oakland Region	FCA	35%	45%
La Region	FCA	25%	35%

Table 28: Eastbound Fernley Interception Ratios (FIR): FCA and Port Regions from FCA to Oakland Region

G.9.4 Summary of Findings for International Cargo Volumes at the Fernley IMCTF

Based upon the above range of ratios relating to truck-based domestic cargo reclassification to international, along with the Fernley interception ratio of inbound/outbound international cargo flows to and from the Port of Oakland, the schedules below present both estimated minimum and maximum anticipated truck-based unit volumes that the Fernley IMCTF could receive and discharge between the Port of Oakland and the FCA on an annual basis: See **Tables 29** and **30**.

Table 29 applies the minimum ratios to the entire truck-based data set and arrives at a minimum anticipated volume of international containerized traffic between the Fernley IMCTF and the Port of Oakland of approximately 160,000 units per year. This number essentially distills the overall through-traffic volumes between the FCA and the Port Regions of two million units to 16% market capture by the Fernley IMCTF.

Table 30 applies the maximum ratios to the entire truck-based data set and has arrives at a maximum anticipated volume international containerized traffic between the Fernley IMCTF and the Port of Oakland of approximately 215,000 units per year. This number essentially distills the overall through-traffic volumes between the FCA to the Port regions of two million units to 21.5% market capture by the Fernley IMCTF.

Table 29: Consolidated Total of Minimum International Volumes at the Fernley IMCTF: FCA and Port Regions

IMCTF at Fernley: Projected Volume Analysis, Westbound

Fernley Catchment Area (FCA)	Oakland/SF Domestic Truck	Oakland/ SF Int'l Units	Oakland/SF Total Units	LA Region Domestic Units	LA Region Int'l Units	LA Region Total Units	Grand Total Units
FCA to Port Regions	504,223	30,161	534,384	783,802	113,018	896,820	1,431,204
Domestic to Int'l Conversion Ratio	30%			20%			
Int'l Traffic Unit Values	151,267	30,161	181,428	156,760	113,018	269,778	451,206
Fernley IMCTF Interception Ratio	30%	30%		20%	20%		
Anticipated Volumes at Fernley IMCTF	45,380	9,048	54,428	31,352	22,604	53,956	108,384

IMCTF at Fernley: Projected Volume Analysis, Eastbound

Fernley Catchment Area (FCA)	Oakland/SF Domestic Truck	Oakland/ SF Int'l Units	Oakland/SF Total Units	LA Region Domestic Units	LA Region Int'l Units	LA Region Total Units	Grand Total Units
Port Regions to FCA	186,750	5,495	192,245	298,594	56,372	354,966	547,211
Domestic to Int'l Conversion Ratio	30%			20%			
Int'l Traffic Unit Values	56,025	5,495	61,520	59,719	56,372	116,091	177,611
Fernley IMCTF Conversion Ratio	35%	35%		25%	25%		
Anticipated Volumes at Fernley IMCTF	19,609	1,923	21,532	14,930	14,093	29,023	50,555
Grand Total (Min) Unit Volume at Fernley IMTCF, Westbound and Eastbound	**64,989**	**10,971**	**75,960**	**46,282**	**36,697**	**82,979**	**158,939**

Table 30: Consolidated Total of Maximum International Volumes at the Fernley IMCTF: FCA and Port Regions

IMCTF at Fernley: Projected Volume Analysis, Westbound

Fernley Catchment Area (FCA)	Oakland/SF Domestic Truck	Oakland/ SF Int'l Units	Oakland/SF Total Units	LA Region Domestic Units	LA Region Int'l Units	LA Region Total Units	Grand Total Units
FCA to Port Regions	504,223	30,161	534,384	783,802	113,018	896,820	1,431,204
Domestic to Int'l Conversion Ratio	40%			30%			
Int'l Traffic Unit Values	201,689	30,161	231,850	235,141	113,018	348,159	580,009
Fernley IMCTF Interception Ratio	30%	30%		20%	20%		
Anticipated Volumes at Fernley IMCTF	60,507	9,048	69,555	47,028	22,604	69,632	139,187

IMCTF at Fernley: Projected Volume Analysis, Eastbound

Fernley Catchment Area (FCA)	Oakland/SF Domestic Truck	Oakland/ SF Int'l Units	Oakland/SF Total Units	LA Region Domestic Units	LA Region Int'l Units	LA Region Total Units	Grand Total Units
Port Regions to FCA	186,750	5,495	192,245	298,594	56,372	354,966	547,211
Domestic to Int'l Conversion Ratio	40%			25%			
Int'l Traffic Unit Values	74,700	5,495	80,195	74,649	56,372	131,021	211,216
Fernley IMCTF Conversion Ratio	45%	45%		35%	25%		
Anticipated Volumes at Fernley IMCTF	33,615	2,473	36,088	26,127	14,093	40,220	76,308
Grand Total (Min) Unit Volume at Fernley IMTCF, Westbound and Eastbound	**94,122**	**11,521**	**105,643**	**73,155**	**36,697**	**109,852**	**215,495**

G.10 Additional Volume Considerations at the Fernley IMCTF

G.10.1 Industrial Development

Nearly all truck-to-rail facilities, such as inland ports, begin with securing a prospective freight-intensive anchor tenant to justify development of a transportation infrastructure project, for example the BMW facility at the South Carolina Inland Port at Greer. **Unlike many other transportation infrastructure projects, the proposed IMTCF at Fernley possesses extraordinary organic through-traffic where there is a real and actual commercial business case for both the deflection and diversion of truck-based traffic to the facility.** It is essentially the de-facto "anchor tenant" in terms of its potential volume through-put.

What this means for developers of industrial properties is that new freight-intensive tenant attraction will not be akin to a "field of dreams" approach, and the development of the IMCTF can proceed without first solving the tenant question. The in-motion development of the facility and its attributes will likely have a significant impact on new tenant attraction, as the intended value proposition of co-location to the IMCTF is clearly defined and not based upon singular outcomes that typically define the exhausting and long-term effort common with developing new transportation facilities.

G.10.2 Domestic Railcar Service of Aggregates

As addressed in the Aggregates Study below, the immediate region within the Fernley market locally produces significant quantities of construction aggregates consumed in the high-density trade lane markets of Sacramento, Oakland, and Los Angeles. With respect to the Oakland region alone, over 180,000 truckloads of material are shipped annually. The IMCTF at Fernley will possess the ability to transload this locally produced, truck-based material and, to the extent that there exists a corresponding rail-served deconsolidation facility, handle a potential market of over 45,000 railcars to the Oakland market.

Recently, the Port of Oakland has entered into an agreement with a Canadian importer of construction aggregates, (Eagle Rock Aggregates of Vancouver), and the port has provisioned land within their facility to serve as a truck-based transload and discharge operation to serve the Bay Area market from the Port of Oakland. This development is a natural fit for the Fernley IMCTF, where the design of the facility is likely to generate additional organic opportunities.

Included as Appendix 4 is a paper entitled *Modern Logistics and the Evolution of Multimodal Terminals*. This paper explains in detail the IMCTF and how it differs from traditional container terminals. The paper also describes how modern logistics and supply chain planning is migrating from restricted container port models to integrated models such as the IMCTF being proposed at Fernley.

G.11 Aggregates Study

G.11.1 Activities and Objectives

SRF conducted an extensive commodity freight flow study of both truck and rail activity for both the entire state and the northwest Nevada region (NWNV). For the NWNV region, over 6 million freight records were analyzed from the year 2018.

The objective of the Aggregates Study is to determine the economic feasibility for the modal conversion from trucking to lower cost rail, thus providing options and lower cost of transportation for Nevada shippers.

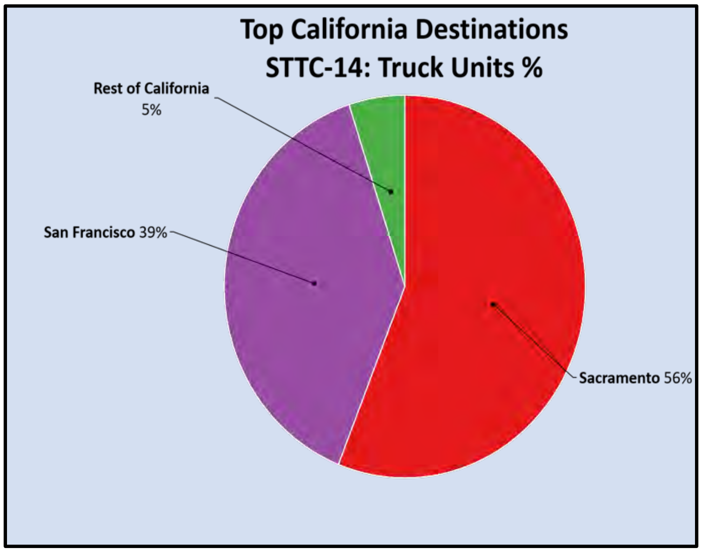
Table 31: Northwest Nevada Truck Units and Tons Outflow by Commodity

NWNV Truck Outflow Traffic: Top Five Commodities					
STCC2	**Commodity Name**	**Tons**	**% Tons**	**Units**	**% Units**
14	Clay, Concrete, Glass or Stone	6,344,296	32%	346,789	31%
32	Nonmetallic Minerals	7,628,487	38%	313,796	28%
42	Return of Empty Trailers	0	0%	196,288	17%
1	Farm Products	1,376,786	7%	76,703	7%
29	Petroleum or Coal Products	1,614,907	8%	67,042	6%
40	Waste or Scrap Materials	953,114	5%	38,054	3%
	All Other Commodities	1,896,875	10%	92,201	8%
	Total NWNV Commodities	**19,814,465**	**100%**	**1,130,872**	**100%**

Source: TRANSEARCH® Freight Flow Data 2018

From the above table, over 60% of all Nevada truck-based shipments to out-of-state destinations are comprised of two primary commodities: Non-Metallic Minerals, i.e. Sand (STTC2-14) and Clay, Concrete, Glass or Stone (STTC2-32). California is by far the single largest destination (97% for STCC 14 & 57% for STCC 32)

Figure 19: Top California Destinations - Clay, Concrete, Glass or Stone



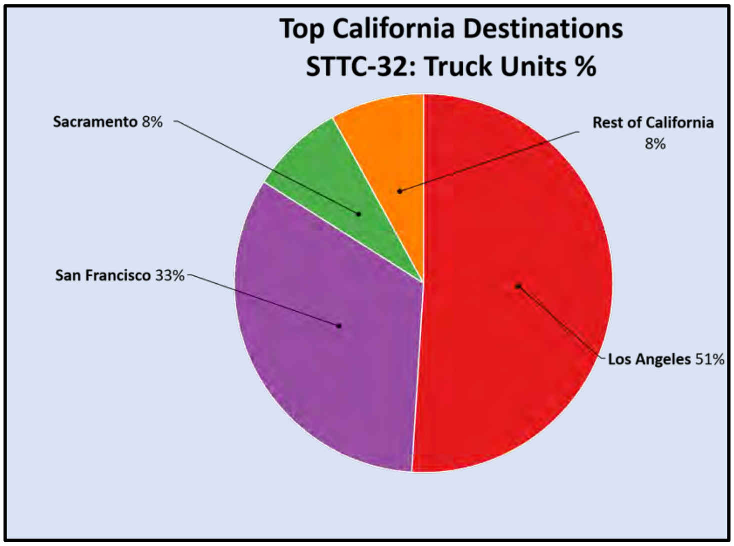
- California Accounts for 97% of the Destinations for Nevada's Production of Clay, Concrete, Glass or Stone Non-Metallic Mineral – Over 305,000 Truck Loads - All of Which Return to the Region Empty – Thus, over 600,000 Truck Movements
- 56% or 170,000 Truck Loads are Destined to the Sacramento Region
- 39% or 120,000 Truck Loads are Destined to the San Francisco Region
- 5% is Destined to All Other Regions of California

Source: TRANSEARCH® Freight Flow Data 2018

G.11.2 Questions and Inquiry Regarding Clay, Concrete, Glass or Stone

- Why is there such a concentration of shipments to the Sacramento Region – 56% of all California truck-based destinations?
- ▪ Is there a major truck-to-rail transfer facility in Sacramento?
- ▪ Is there a concentration of industrial raw material conversion activity in the Sacramento Region?
- Similar questions apply to the concentration of shipments to the San Francisco Region – 39% of all California truck-based destinations.
- ▪ Is there a concentration of industrial raw material conversion activity in the San Francisco Region?
- Would northwest Nevada benefit from the development of localized truck-to-rail transfer facilities for this commodity group that would serve the destinations of Sacramento and San Francisco?
- Are there opportunities to convert these raw commodities into finished goods at the local level? What are the constraints: water, etc.?

Figure 20: Top California Destinations - Non-Metallic Minerals



- California Accounts for 57% of the nation's destinations for Nevada's Non-Metallic Minerals – Nearly 200,000 Truck Loads - All of Which Return to the Region Empty – Thus, over 400,000 Truck Movements
- 51% or over 100,000 Truck Loads are Destined to the Los Angeles Region
- 33% or 65,00 Truck Loads are Destined to the San Francisco Region
- 16% is Destined to All Other

Source: TRANSEARCH® Freight Flow Data 2018

G.11.3 Questions about Non-Metallic Minerals

- Why is there such a concentration of shipments to the Los Angeles Region – 51% of all California truck-based destinations?
- Is there a concentration of industrial raw material conversion industry in the Los Angeles Region?
- The same question applies to the concentration of shipments to the San Francisco Region – 33% of all California truck-based destinations?
- Would North-West Nevada benefit from the development of localized truck to rail transfer facilities for this commodity group?
- Are there opportunities to convert these raw commodities into finished goods at the local level? What are the constraints?

G.11.4 The Region Already Transports These Two Commodities by Rail

Rail movements are already occurring, representing defined trade lanes to the major truck markets of Los Angeles, San Francisco, and Sacramento.

Table 32: Northwest Nevada Rail Units and Tons by Commodity

NWNV Rail Outflow Traffic: Top Five Commodities					
STCC2	Commodity Name	Tons	% Tons	Units	% Units
14	Nonmetallic Minerals	418,800	33%	5,356	24%
32	Clay, Concrete, Glass or Stone	413,145	33%	3,900	17%
46	Misc. Mixed Shipments	104,400	8%	6,440	29%
28	Chemicals or Allied Products	79,720	6%	1,160	5%
40	Waste or Scrap Materials	74,340	6%	944	4%
	All Other Commodities	174,176	14%	4,512	20%
	Total NWNV Commodities	**1,264,581**	**100%**	**22,312**	**100%**

Source: TRANSEARCH® Freight Flow Data 2018

While total rail volume, at 6% of total tonnage, is only a fraction of truck-based volume, the commodity groups STTC2-14 and STTC2-32 represent 66% of total commodities shipped by rail to out-of-state destinations. Thus, a business case for conversion of road to rail has already been demonstrated.

G.11.5 In Summary

The freight corridor between northwest Nevada and California is subject to 1,000,000 annual truck journeys carrying the commodity categories of clay, concrete, glass, stone, and non-metallic minerals. Around 500,000 of these truck journeys are empty return trips back to Nevada from California. While a rail freight corridor already exists between northwest Nevada and California for the transportation of these commodities it handles only 6% of the total volume.

Our initial assessment indicates that an IMCTF facility located in northwest Nevada would support the conversion to rail of a significant volume of the 11MM tons of this freight currently being trucked to California.

We recommend a further study be commissioned to; 1) address the questions outlined in this Aggregates Study regarding the truck-based shipping behavior of northwest Nevada regional producers, 2) build an accurate modeling of the potential for truck to rail conversion, and 3) fully assess opportunities from converting these raw commodities into semi and finished goods within the study region thus stimulating job growth and economic vitality.

H. Implementation and Recommendations

As outlined in the Business Case section of this report, there is a viable opportunity and sufficient support from key stakeholders for the development of a multimodal transfer facility, specifically an IMCTF, at Fernley. Implementing the IMCTF involves various activities ranging from stakeholder engagement to financing.

H.1 Stakeholder Engagement

This study has referenced the eco-system of stakeholders whose engagement and active support will be crucial to the success of an IMCTF and the continued realization of its benefits. Each stakeholder has their own economic, commercial, environmental, and strategic objectives relative to a Fernley IMCTF. The project’s success requires an appreciation of stakeholder priorities and objectives. Buy-in from certain stakeholders, such as the Union Pacific Railroad and the Port of Oakland is fundamental to the successful development and operation of an IMCTF. Other stakeholders such as land developers, NDOT, Caltrans, shippers, freight forwarders, and transport operators also form an important constituency whose contribution is key to the success of the Fernley IMCTF project.

We recommend stakeholders be engaged throughout the next phase of deeper analysis and conception to ensure that all commercial factors are included in the ‘go forward’ decision. Their involvement is necessary for securing the full set of commitments that will support the use of this facility.

H.2 Financing

Developing an IMCTF facility capable of handling these volumes of converted flows plus the newly generated volumes from planned industrial developments in northwest Nevada likely involves a major capital investment.

The *Integrated Multimodal Cargo Transfer Facility, Business Case for Fernley, Nevada* provides a detailed forecast of anticipated freight volumes. International traffic, combining eastbound and westbound freight flows, equates to between 165,000 and 215,000 annual shipments. In addition, the *Aggregates Study* reported in Section G.11 identifies the probability of converting a proportion of the 500,000 truckloads of aggregates and non-metallic minerals produced in northwest Nevada and shipped to the Sacramento, Oakland, and Los Angeles areas.

Even without a contribution of public funding the business case for Fernley IMCTF is such that its development may be funded by private investors who could be existing stakeholders or new financing partners. The NVSRP proposes an initiative titled Connect Rail Nevada (CRN), a framework for public-private collaboration sponsored by the Nevada Department of Transport (NDOT).

The role of CRN is to coordinate contributions from NDOT, SRF, state economic development agencies, and an extensive network of stakeholder relationships for harnessing action across Nevada. A key function of CRN would be to facilitate private sector financing for rail projects in Nevada and the NVSRP recommends the establishment of a Nevada Freight Rail Development Fund for this purpose. This proposed Fund would raise and deploy debt capital for small and mid-sized rail projects, and service loans from origination to maturity. Additionally, it would use transaction fees to fund technical services provided by CRN.

More details on the proposed Fund and other rail financing initiatives are included in the NVSRP report.

H.3 Implementation Planning

The migration to a sustainable freight system in the study region has the Fernley IMCTF at its core. However, as outlined in this study, simply building the facility will not transform freight flows and foster the increased use of rail for freight movements into, out of and through the region. There are multiple success factors which require attention and management during the implementation phase.

Implementation therefore requires a multifaceted plan incorporating both ‘soft’ and ‘hard’ elements. Soft elements include communication plans, stakeholder engagement, marketing activity, and management of reputational risks and project opposition. Hard elements are traditional project steps such as land acquisition, construction design, contractor selection, project management, budgeting, financing, and statutory reporting.

The sponsoring entity for the Fernley IMCTF project must ensure implementation planning takes into consideration the entire range of activities. Proven experience and specific management skills should be utilized with the ultimate goal of a sustainable freight system through the development of the IMCTF.

H.4 Further Studies

In preparing this report we have identified additional study areas we recommend that should be commissioned to maximize the business case for a Fernley multimodal freight facility.

H.4.1 Aggregates market study

The Aggregates Study included in this report identifies the significant potential for converting large volumes of aggregate traffic from trucks to rail. An aggregates market study would dive deeper into the truck-based shipping behavior of northwest Nevada regional producers and build accurate modeling of the truck to rail conversion potential. This report could also expand to include an assessment of the opportunities for the study region from converting these raw commodities into semi and finished goods thus stimulating job growth and economic vitality.

A Note on Beneficiation

The economic development strategy known as "Beneficiation" holds the potential to drive Nevada towards higher value activities, and therefore its economic and environmental objectives. Beneficiation concentrates developmental resources on a region's established industry sector as the backbone for new enterprise. Expanding value chains within a region serve to attract new related businesses, and in turn offer the original businesses opportunities for service expansion. Naturally, these synergies produce an expanding set of employment opportunities.

An example of the beneficiation approach can be readily imagined as applied to Nevada's resources sector. Rather than simply exporting raw materials out of the state, new industries that process those materials could be encouraged. In time, this could beget businesses that receive the used, post-market material, recycle it, and sell it back into the supply chain. Such a vision of economic expansion is clearly dependent upon the ease and cost of intra-state commodity movement, facilitated by rail in many cases. Capacity, scalability, and sustainability must be considered crucial values toward the development of higher value industries through beneficiation.

As the freight data analysis in Chapter 2 reports, the share of intra-state freight rail activity (originate and terminate the same railcar load of freight within the state) is currently about .25% of overall rail traffic in Nevada. That statistic, as diminutive as it is, also expresses Nevada's vast potential for higher-value economic growth.

H.4.2 Fernley IMCTF growth generation

Development of a new integrated multimodal facility at Fernley has the potential to attract new industrial development to the region and generate additive freight volumes. A further study assessing the generative effects of the Fernley IMCTF and modeling new freight flows will further bolster the business case. This study should also consider how the IMCTF can improve land values.

I. Appendices

1. Port of Oakland Business and Rail Overview (12.10.2019)

2. Slope Map Fernley Wadsworth

3. Slope Map Reno Sparks

4. Modern Logistics and the Evolution of Multimodal Terminals


Photo by Ronan Furuta

Nevada DOT
SAFE AND CONNECTED

NNDA
Northern Nevada Development Authority

Port of Oakland
Business and Rail Overview
12/10/2019

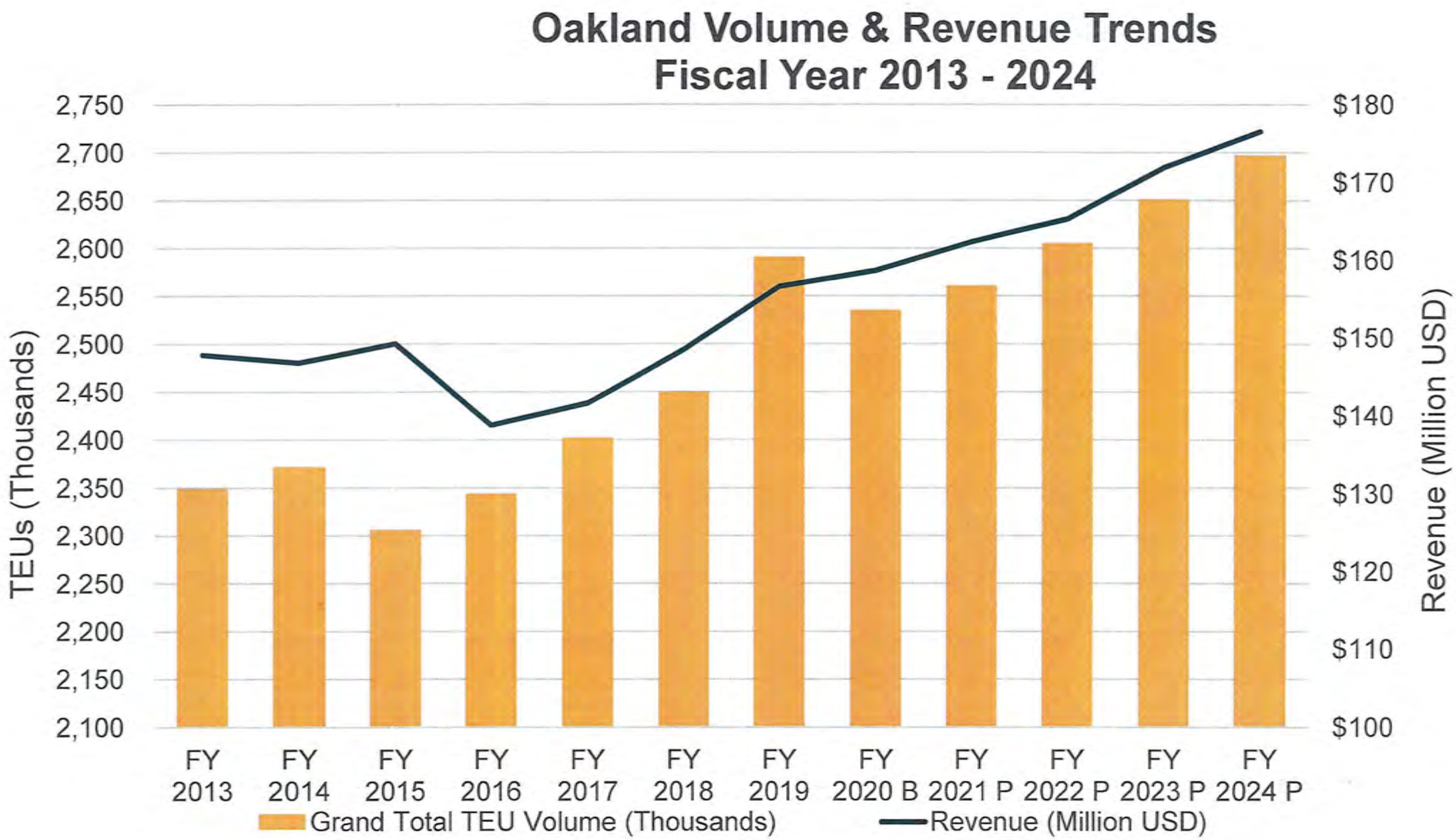
PORT OF OAKLAND
SEAPORT

Port of Oakland by the Numbers

- **4 active** marine terminals
- **3 terminal operators** SSA, Everport, & TraPac
- **33 Cranes** of which 23 are Port-owned
- **2.54 million TEUs** handled in 2018
- **20 ocean carriers** with service to/from Oakland
- **1,571 vessel calls** in 2018

PORT OF OAKLAND
SEAPORT

Port Volume & Revenue Trends



PORT OF OAKLAND SEAPORT

Notes: *For TEU and Revenue figures, B = Budget, F = Forecast, and all other numbers are Actual*
Revenue excludes utility sales
Fiscal Year is July 1 – June 30

Ongoing Key Events & Improvements

- Terminal **consolidation**
- Introduced industry-first online **measure of truck wait times**
- **Cool Port** operational since November 2018
- **TraPac Terminal** expansion completed
- CenterPoint Properties breaks ground, to launch **Seaport Logistics complex** in 2020
- **Tallest cranes in U.S.** ordered for 2020 delivery in addition to 4 cranes raised to accommodate larger ships

PORT OF OAKLAND
SEAPORT

Port Investment$ for the Future

- **$100M** in rail manifest and support tracks
- **$78.5M** in Oakland International Container Terminal
  (**$42.5M** toward purchase of 3 cranes and raising 4)
- **$67M** in TraPac Terminal project
- **$28M** in Ben E. Nutter Terminal upgrades
- **$610M** in grade separation, intelligent transportation system, and traffic circulation improvements
- **$90M** in Cool Port
- **$52M** in Seaport Logistics Complex
- **$90M** in grain transload facilities

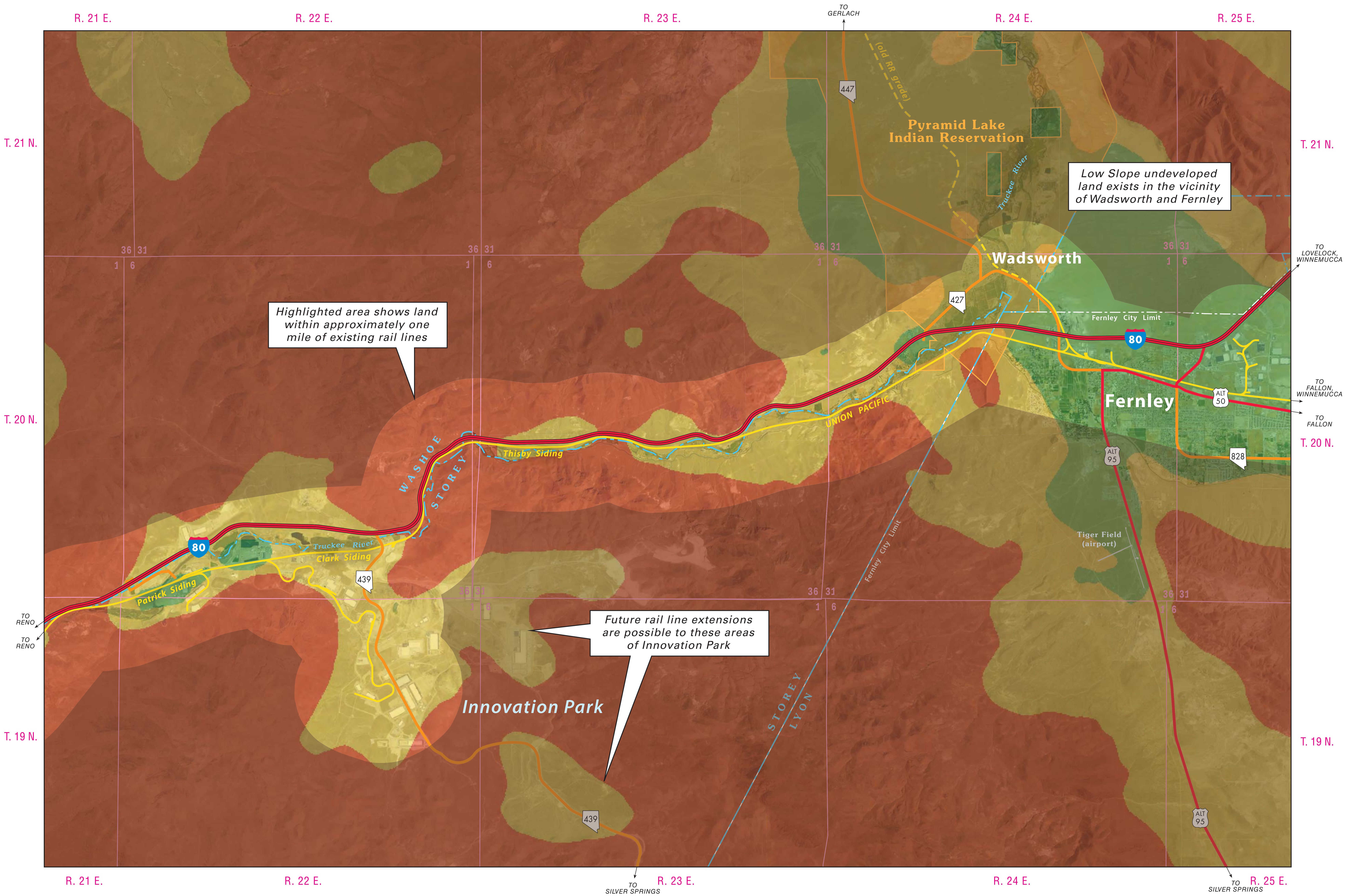
PORT OF OAKLAND
SEAPORT

Preferred Export Gateway for Protein

US Port	Bills of Lading	Container Qty	TEUs	Total Calculated Value (US$)
OAKLAND,CA	**37,565**	**35,891**	**71,387**	**3,601,876,908**
SAVANNAH,GA	16,651	30,258	60,467	835,885,876
LOS ANGELES,CA	18,313	18,658	37,062	1,894,723,962
CHARLESTON, SC	13,061	18,374	36,727	828,167,656
LONG BEACH,CA	16,365	16,807	33,462	1,639,772,147
NORFOLK,VA	7,755	10,302	20,512	471,729,702
HOUSTON,TX	5,539	10,116	20,076	547,511,513
WILMINGTON, NC	6,058	6,661	13,322	271,784,880
NEW ORELANS, LA	2,614	6,497	12,983	160,446,601
TACOMA,WA	3,860	4,773	9,529	361,495,784
SEATTLE,WA	3,205	3,364	6,666	264,243,940
Total All U.S. Ports:	146,241	181,507	361,550	11,840,189,988

Strategic Initiatives

- **First** port of call
- **Short haul** rail serving major DCs in Nevada
- **Diversity** of services
- **Environmentally** conscious upgrades
  - Electric trucks
  - Hybrid RTGs
  - 2020 & Beyond Plan
  - Truck Management Plan



LEGEND

- Railroads
- Flat and Low Slope Areas
- Moderate Slope Areas
- Steep Slope Areas

2020 NEVADA STATE RAIL PLAN

SLOPE ANALYSIS OF LAND ADJACENT TO RAIL LINES IN THE FERNLEY - WADSWORTH AREA

MILES 0 1 2 3 4 5 6

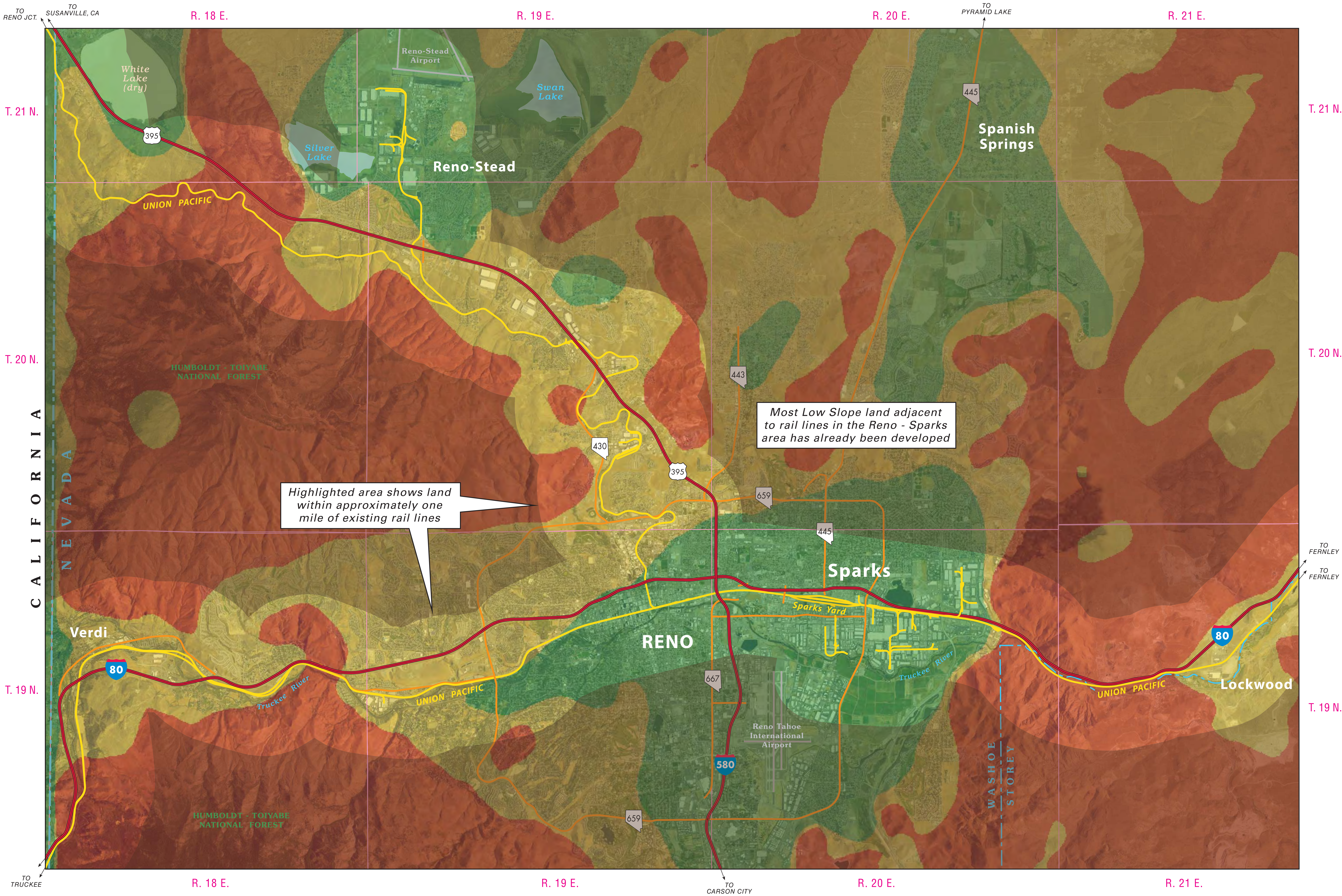
KILOMETERS 0 2 4 6 8 10

To convert miles to kilometers multiply by 1.609

MAP AREA

NEVADA DOT SAFE AND CONNECTED

NEVADA DEPARTMENT OF TRANSPORTATION LOCATION DIVISION CARTOGRAPHY (775) 888-7627



LEGEND

- Railroads
- Flat and Low Slope Areas
- Moderate Slope Areas
- Steep Slope Areas

2020 NEVADA STATE RAIL PLAN

SLOPE ANALYSIS OF LAND ADJACENT TO RAIL LINES IN THE RENO-SPARKS AREA

MILES 0 1 2 3 4 5 6

KILOMETERS 0 2 4 6 8 10

To convert miles to kilometers multiply by 1.609

MAP AREA

NEVADA DOT SAFE AND CONNECTED

NEVADA DEPARTMENT OF TRANSPORTATION LOCATION DIVISION CARTOGRAPHY (775) 888-7627

Modern Logistics and the Evolution of Multimodal Terminals

This report explains in further detail the concept of the IMCTF terminal and how modern logistics and supply chains are migrating from traditional container-based multimodal facilities to integrated models such as the IMCTF being proposed at Fernley.

Introduction

The globalization of the world's economy over the past two decades has spotlighted the importance of supply chains. Companies and entire industry sectors have been able to take advantage of international outsourcing of production, supply, and distribution to reduce costs, increase output, extend product lines, improve quality, and lift profitability. Supply chains have always existed but in the modern global economy they have become more international and a highly sophisticated and complex aspect of the business value chain.

There have been significant advances in supply chain design and adoption of technology which has transformed goods tracking, route planning and order fulfilment. However, not all aspects of the modern supply chain have been optimized and there are sizeable opportunities to improve their resilience and performance. In the United States there are bottlenecks and other inefficiencies in the underlying transportation system which impact the performance of supply chains. A key area for improvement is land transportation at terminals where legacy operating models and the sub-optimal utilization of rail creates unnecessary costs and delays which degrades supply chain performance.

This report will describe how NNDA can utilize a new intermodal operations framework that optimizes land transportation at terminals and offers a major source of sustainable economic development for the region. The framework design, **Integrated Multimodal Cargo Transfer Facility (IMCTF),** addresses the fundamental inefficiencies in terminals and land transportation operations by identifying the optimal mode to reduce costs and enhance supply chain performance. The IMCTF reworks existing land transportation operations, which are traditionally designed around road trucking, and ensures that both rail and road options are taken into consideration by supply chain planners.

To understand the role of inland port terminals and how the IMCTF model is a catalyst for economic development it is important to understand the key areas impacting the efficient flow of cargo in the traditional transportation supply chain. There are four modes of transportation, Air, Ocean, Rail and Truck prevalent in today's supply chain.

Air Freight

The highest cost mode of transportation is air freight and is typically only utilized for high value items (such as pharmaceuticals, medical equipment, or electronics) or goods that are time critical (perishables such as flowers, livestock, or critical manufacturing components). Air freight is premium priced compared to other modes, especially when compared to ocean and rail modes. Inbound air freight arrives at a local airport cargo terminal where shipments are allocated into trucks delivering direct to customers covering specific areas in the region, generally over short distances.

Outbound shippers using air cargo typically arrange for a local truck to pick up individual consignments for delivery to an airport in a single stop. This same truck then handles the inbound deliveries collected from the airport.

The air cargo transportation model consists of one direction increments; from shipper by local route truck to the closest airport, then flown to the closest destination airport where another local route truck will collect and deliver multiple shipments direct to customers within the region. Due to the large number of international, regional, and local airports in the United States, the infrastructure exists to support consistent, efficient, and expedited transportation services. Air cargo transportation can typically move shipments faster and more efficiently than any other mode. However, air cargo is, relative to other modes, very expensive and not cost effective for most of the freight in the global supply chain. In addition, aircraft, including dedicated freighters, are limited in their ability to carry bulky, oversized, or heavy shipments. Although air cargo accounts for 35% of world trade by value it accounts for less than 1% of all trade by volume.

Ocean Freight

Accounting for 90% of world trade by volume, ocean freight's 50,000 vessels are the backbone of global supply chains. It is by far the most cost-efficient method for moving freight per ton. Ocean freight is also highly flexible, with the ability to transport any cargo type from containers to specialized or oversized items, such as bulk freight, liquids and roll-on/ roll-off (vehicle/equipment).

Although ocean freight is vital for the shipping of bulk commodities such as oil, coal, aggregates, and grain it is containerization that makes ocean shipping fundamental to the world economy and its global supply chains. There are an estimated 20 million shipping containers in active use, with the largest ocean vessels able to carry over 20,000 units. Containers use a global standard with only two designs: TEU (20 feet long) and FEU (40 feet long). This standardization has been crucial in the development of highly efficient global supply chains with rail, road and ocean transportation modes utilizing a standard design in ports, trailers, cars, terminals, and vessels.

The ocean freight transportation model involves one direction increments from port terminals to port terminals on specific routes. Two constraints associated with ocean freight relate to limitations at ports. Firstly, a port's capacity to handle the vessel's size and secondly a port's ability to handle the volume of cargo in terms of storage space or transloading facilities.

Rail Freight

Due to its large and scalable capacity and an extensive route network throughout the continental United States rail freight provides an important land transportation method accounting for 10% of surface freight[1]. Rail freight is significantly more cost effective than road trucking over distances greater than 300 miles but also competes with truck operators on shorter routes. Individual freight trains typically consist of over 100 rail cars providing a considerable fuel and labor cost advantage over trucks. In addition, rail can handle many types of freight; dry, liquid, bulk, containers, and vehicles. Rail freight also has fewer weight restrictions than road trucking. However, the reason why rail freight carries the minority of goods (by volume or by value) is that it is limited to operate only where tracks have been built, whereas roads are ubiquitous across the landscape. This means that unless the start and end points of a freight journey are both served by rail (such as coal mine to port) rail is dependent upon a modal transfer to road

[1] U.S. Ton-Miles of Freight, source link

transport to complete the final local carriage. In the United States intermodal transfers tend to be inefficient and add to journey times which can make road trucking equally or more attractive to shippers. In addition, although the United States has over 140,000 route miles in the rail network there are hundreds of freight rail operators and many freight flows require at least one operator transfer which extends delivery times.

Rail transportation is completed in one direction increments from railhead, port and intermodal terminals to other railhead, port, and intermodal terminals on specific routes. The primary constraint for rail is its inability to provide first and final mile service for the majority of freight flows. Rail transportation is therefore highly dependent on intermodal transfer of freight to play an effective role in modern supply chains. Unfortunately, the inefficiency of intermodal transfers in the U.S. transportation system, particularly between road and rail, proves to be a limiting factor in the utilization of rail by shippers and supply chain planners.

Truck Freight

Over 65% of U.S. surface freight is transported by road trucking[2] and trucks are required for an increasing number of the first and last mile freight moves. Unless a shipper or customer has a dedicated rail connection, is located at an inland terminal, airport, or marine port all freight flows must commence and end with road trucking. For most freight flows the shipment completes its journey on the same vehicle or is transloaded to another truck. Only a minority of shipments will be transferred to/from rail.

Truck transportation is typically reliable, highly flexible when compared with rail freight and benefits from publicly funded road infrastructure which keeps operating costs very low. Trucks are compatible with many types of cargo including containers, bulk goods, finished products, refrigerated perishables and commodities. The mode also offers 'less than truckload' (LTL) freight enabling small consignments to be collated into a single truck journey, providing a high level of flexibility for even the smallest of shipments.

The relative disadvantage of truck freight is the size and capacity limitations of individual vehicles and highway weight limits. Each truck and trailer combination can only transport the equivalent of one rail car, compared to over one hundred rail cars on a single freight train. Another disadvantage of truck transportation is the restriction on driver hours which delays longer distance freight journeys, especially compared to rail freight where a fixed network operation enables efficient crew changes and a seamless journey flow. Despite its flexibility compared to rail and lower operating costs, trucking generates thin operating margins. There are thousands of truck operators in the U.S., the majority being small, owner-operated businesses. The result of this fragmented operator base is a highly competitive industry and inefficient operations resulting from many return freight flows running empty for all or part of their journey. Although large, national trucking companies, such as Schneider National and JB Hunt, are able to optimize their routing and operations to avoid empty running, small operators, which account for most of the industry, struggle to secure return loads.

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[2] U.S. Ton-Miles of Freight, source link

The demand for efficiencies in the supply chain

As outlined in the previous summary of the four core transportation modes there are significant inefficiencies in the twin surface modes of rail and truck. There are two fundamental deficiencies in the way land transportation is allocated and interchanged.

Land transport allocation

Despite the advantages rail offers in capacity, scalability and cost per ton rail freight accounts for only 9% of the volume of freight carried in trucks[3] . In Nevada only 4% of all the state's freight movement are made by rail to and from instate businesses with a significant number of truck borne freight flows operating on existing rail freight corridors.

There is clearly a misallocation of transportation modes on a national and state level. Despite the advantageous operating economics of rail freight, and the issues of congestion, pollution, and road safety associated with road freight, there remains an over-reliance on trucking. Considering the high degree of 'empty running' of trucked freight these social and environmental impacts are incurred with zero economic value for close to half of all trucking activity.

There are multiple contributors to the current misallocation; inadequate marketing of rail freight by operators, a fear of or bias against rail from shippers, ignorance of the accessibility of rail among companies, development agencies and freight forwarders, and inadequate service levels offered by rail operators. Each of these underlying reasons are addressable.

Interchanges

Intermodal interchange and transferring is typically inefficient and adds unacceptable delays (and sometimes risk) for shippers. As a result, single mode transit is preferred by supply chain planners. With trucks already serving the majority of first and last mile freight flows trucking becomes the default transportation mode.

Interchanges are inefficient for numerous reasons; outdated operating procedures, inadequate or incomplete technology, poor coordination between the transferring parties (truck and rail), poor coordination between interchange parties (rail and rail), requirement for and limited ability of specialized chassis equipment and a prevalence of empty running.

The IMCTF model being proposed for NNDA addresses these issues and would create a far more efficient supply chain in Northern Nevada. Generating a major shift to rail freight will open opportunities for economic development in the region, as existing and new companies can leverage the cost and competitive advantages of an optimized transportation and supply chain system.

The cost of inefficient land transportation in supply chains

The previous section described the inefficiencies in land transportation and the reasons why sub-optimal practices around modal allocation and intermodal operations continue in the United States. What are the implications of this inefficiency, and who would benefit from optimizing the land transportation component in supply chains?

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[3] Summary Freight Tables, source link

There are significant economic and environmental implications. Economic implications are first outlined below:

Congestion Costs

The present modal allocation which favors trucks for land transportation is adding millions of truck miles to the nation's roads. In Nevada, 96% of freight is currently hauled by truck exposing the fact that goods movement is not being efficiently integrated with railroads. The direct impact for Nevadans is congested highways, especially on corridors with growing economic activity or with limited highway capacity. Nationally, Americans as a whole lost an average of 97 hours a year due to traffic congestion, which cost them nearly $87 billion in 2018, or an average of $1,348 per driver[4]. Congestion is a serious and growing concern and with projected growth in U.S. freight transport of 40% in the next 25 years[5] an over-reliance on truck based freight is not sustainable without major development of the state's highway infrastructure.

Congestion creates numerous costs across the economy impacting individuals, companies, and the state. Citizens see their car journey times increase and are forced to trade productive time for wasted time sitting in their cars. Employers cannot attract talent as new hires are dissuaded by lengthy and congested commutes. Manufacturers are forced to re-schedule production as their suppliers cannot deliver as quickly or reliably. Distributors must reduce service levels as delivery schedules are longer and less predictable. Business owners avoid locating to areas with congestion reducing the land values and attractiveness in economic development zones.

Transportation Costs

All business sectors in Nevada incur some degree of transportation cost. For the extractive and manufacturing industries transportation can account for as much as 15% of all costs. Inefficient supply chains such as over-reliance on trucking when lower cost rail alternatives are available are typically responsible for higher than necessary transportation costs. A study of companies with inefficient networks identifies they can lower their transportation costs by 10-25%[6]. These efficiencies improve their competitive advantage due to lower prices, higher profits and added shareholder value. Business owners, particularly in extractive, processing, manufacturing, and distribution industries, will closely study transportation costs when selecting new site developments, making areas with optimized and efficient transportation options, such as intermodal road and rail facilities, more attractive. For economic development agencies the ability to offer reduced transport costs from intermodal options will increase the value of commercial land. Conversely, high transportation costs and limited modal flexibility reduces the attractiveness and value of sites to commercial developers.

One of the major contributors to higher transport costs is the prevalence of one-way loaded moves with over half resulting in empty returns. All empty moves still incur full operating and social costs. One-way or empty running costs are particularly acute at ports because time and access constraints severely restrict the flexibility of road truckers to identify and secure return loads. Beyond port operations supply chains across the U.S. are impacted by the additional costs associated with one-way loads. In Nevada there are

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[4] U.S. Ton-Miles of Freight, source link

[5] U.S. Ton-Miles of Freight, source link

[6] Ruffin, R., Shehorn, M., & Banerjee, D. (2020, April 01). Are Your Distribution and Transportation Costs Out of Control? source link

numerous examples of dump trucks transporting aggregate rock material to California which invariably return empty because there are no suitable loads for the return journey in these special-purpose vehicles. Freight flow data from TRANSEARCH®, a transportation database developed by IHS Global Insights, reveals that 200,000 loaded truck shipments of Clay, Concrete, Glass or Stone move annually from Northern Nevada to California, all of which return empty, making 400,000 truck movements in total.

Transportation Capacity Costs

An over-reliance on truck transportation causes capacity constraints in different aspects of the supply chain which reduces overall efficiency, increases costs, and generates delays. Two capacity challenges which add costs to everyone touching the supply chain are port space and chassis availability.

Ocean container ports mandate a modal interchange for every piece of freight arriving and departing; ocean vessels must transfer their cargo to either rail or road-based transportation. The largest U.S. ocean ports are located in some of the highest populated cities in the country such as Los Angeles, New York, Seattle, Oakland, Houston, and Miami. Although these ports have a large footprint, they are hemmed in by the adjoining urban areas which have swallowed up the adjoining port property as land prices rise. At the same time, ocean shipping has experienced a significant traffic growth and increased vessel size over the past two decades. As the amount of freight being handled has grown and the dimensions of cranes and vessels increase, ports are simply squeezed for space. This capacity constraint is a serious concern for supply chain planners. Port delays, affecting inbound and outbound flows on ocean vessels, trains, or trucks, increases shipping costs and has a serious impact on supply chain performance. In addition to the capacity crunch inside the port, road transport is constrained by the growing urban development and congestion around ports. Trucks are increasingly subjected to limited hours of access, added regulations, and congestion delays inside and outside the port.

Due to these capacity issues at ports and the impact on efficient movement of freight, efficiency in the landside supply chain is crucially important. Rail freight has a clear advantage over trucking at ocean ports. Rail is not impacted by road congestion or access restrictions and moves significantly more freight in a single operation. However, despite these advantages' trucks carry the vast majority of land transportation freight volumes at ports, estimated at 75-80%[7] by volume.

A secondary capacity cost is caused by the limited availability and reliability of chassis equipment. Chassis are the equipment required to transport a cargo container by road, the trucking equivalent of a railroad flat car. Despite the fundamental importance of chassis in the movement of container freight by truck the process of chassis allocation is ad hoc and highly fragmented making it highly inefficient. This inefficiency is exacerbated because of a shortage of available chassis at ports in the U.S. As a result, chassis equipment becomes a significant bottleneck impacting container movements in ports causing supply chain delays for inbound and outbound freight flows. An additional cost resulting from the shortage and inefficient allocation of chassis is demurrage fees, which can amount to thousands of dollars, incurred when containers are not transported from the port as scheduled.

State Infrastructure costs

Unlike railroad infrastructure, which is privately owned by rail and terminal operators, the nation's roads, bridges, and tunnels which form the trucking infrastructure are funded by the federal and state government. The frequency and costs of maintenance for highways is significantly impacted by the volume of trucks as these heavier vehicles cause far more wear and damage than cars. A Transport

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[7] Weight of Shipments by Transportation Mode, source link

Research Board study in 1990 established that one heavy truck is equivalent to about 95 light trucks or passenger cars in terms of its impact on pavement maintenance cost.[8] Where trucks are not the most optimal transportation mode used in the supply chain the economic costs are not only borne by the mining company, manufacturer, or distribution company. The state and federal government are also bearing a substantial economic cost for the repair and maintenance of highways. In addition to economic costs there are environmental implications from an inefficient transportation model which has a bias towards truck.

Pollution

This report has referenced the many economic cost disadvantages of truck transportation compared to rail for freight movements. Rail freight provides a scale efficiency where a single train and crew moves the equivalent freight of a hundred truck loads. This operational efficiency of rail transportation also translates into an important environmental benefit whereby the present inefficient overallocation of freight towards trucking has a significant pollution cost.

Pollution is a serious consideration for the transportation industry and supply chains. In 2018 the U.S. Environmental Protection Agency (EPA) reported[9] that transportation is the nation's single largest source of U.S. greenhouse gas emissions, accounting for approximately 27% of total emissions. Medium and heavy-duty trucks account for 60% of all freight transport emissions compared to only 5% for rail freight. Considering that trucks account for 67% and rail 11% of freight in the US this means truck road transport emits 100% more emissions than rail per ton of freight carried.

Safety

A key difference between rail and truck transportation is the level of control and safety built into their network and operations. Rail operations utilize an integrated network where moving vehicles are controlled and operated within a set of safety regulations managed by the National Transportation Safety Board (NTSB). This highly regulated operation contrasts with truck operations which utilize the public highway systems.

Rail freight is one of the safest modes of transportation in the US. Rail also has limited interface with the public, with rail grade crossings over roads being the only touchpoint. In 2018 the U.S. Bureau of Transportation Statistics (BTS)[10] reported only 685 accidents at grade crossings for the year. In contrast to rail's closed operating system, trucks share the same highway infrastructure as passenger vehicles, pedestrians, and other road users. In the same BTS survey, large trucks (defined as >10,000lb weight) were involved in 531,000 crashes in 2018.

Trucks account for six times more freight volumes than rail but are involved in seven hundred and seventy times more crashes involving the public. Beyond the health and safety implications of having more trucks on the highways than necessary there is an economic cost associated with crashes which impacts the costs of transportation, supply chains, and society.

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[8] Gibby, R., Kitamura, R., and Zhao, H., *Evaluation of Truck Impacts on Pavement Maintenance Costs,* source link, (1990)

[9] Fast Facts on Transportation Greenhouse Gas Emissions. source link (2020, July 29).

[10] Transportation Accidents by Mode. source link

IMCTF – Addressing the inefficiencies in land transportation in Nevada

The previous sections of this report highlighted how an inefficient allocation of road transport freight between road and rail in supply chain in Nevada and the U.S. adds significant economic costs to supply chains. It also adds avoidable environmental and social costs. Fortunately, there are solutions to this inefficient process which have been tried and proven throughout the world. Nevada has a unique opportunity to implement solutions that address these inefficiencies to achieve significant economic and environmental benefits for the state's companies and residents.

An Integrated Multimodal Cargo Transfer Facility (IMCTF) is recommended to address the twin issues of modal misallocation and the ineffectiveness of modal interchange in Nevada's current supply chains.

The IMCTF is a flexible solution which accommodates all freight types; packaged/boxed/carton goods, equipment, bulk dry product, agriculture products, containers, and temperature-controlled goods. It can support Nevada's existing freight flows and generate new supply chains. It can work with existing multi-modal facilities with little or new investment required or it could take the form of a new multi-modal facility developed as an economic generator attracting new companies and industries to a development zone.

What is the IMCTF model?

An IMCTF is a facility for multi-modal interchange, which essentially means transferring freight between transportation modes. There are four transfer, or transloading, scenarios: road to rail, rail to road, rail to rail and road to road. Offering all four options in a single facility provides shippers and supply chain planners a flexible and integrated solution. The leading cause of the over-reliance on trucks in Nevada and across the U.S. is the absence of efficient interchange facilities to utilize rail transportation. Where intermodal interchanges do exist, they typically are not operated in an integrated manner and cannot support the time sensitive supply chains important to many businesses. Even when transport and supply chain planners want to alleviate the over reliance on trucks, they find few realistic alternatives enabling efficient modal interchange. IMCTF's provide planners with an alternative enabling them to transform supply chain performance by removing unnecessary financial and environmental costs.

Examples of how IMCTF transforms supply chains

EXAMPLE 1) Ocean Containerized Retail Freight

In this example a large retailer of fans orders multiple FEU (40 feet long) ocean containers per year of various boxed fans manufactured in Asia. Today these containers are imported to the U.S. and arrive at a Pacific port terminal where they are offloaded from the vessel and stacked in the terminal yard waiting for trucks to pick them up. Truck drivers receive instructions from a dispatcher, make an appointment with the terminal to collect the container, make an appointment to deliver the container to the receiver, go to an offsite location to pick up a chassis, then drive to the port and join a line awaiting access. The driver will then check-in and go to the yard location to pick up the container.

The truck will depart the port and drive to the receiver, which in this example is a large distribution center (DC). DC's could be located many hours' drive from the port area and trucks are often faced with urban traffic congestion around the port.

On arrival, the container is unloaded at the DC and the truck driver will schedule an appointment to drop his empty container back at the port. As ports have limited space, they restrict the volume of empty containers on site and the appointment could be a day or more in the future.

The boxed fans at the DC are checked, recorded, and managed (palletized and stretch wrapped) and will eventually be collected by truck for onward delivery. This onward journey could be direct to local customers or a longer distance haul to another DC and then distributed to local customers around that DC location.

In an IMCTF model, the ocean container is put directly onto a rail flat car as it is unloaded from the vessel. When the train has been loaded at the port (potentially up to 300 FEU containers can be loaded onto a single train) it runs to the IMCTF site. The shipper will have advised the IMCTF as to the consignment's arrival and provided instructions on dealing with the incoming container. On arrival at the IMCTF the container is offloaded and positioned in a neutral area by the intermodal rail operator at the IMCTF site. Once in the neutral area, the transload operator who oversees the managing of the trucking and transloading operations takes responsibility for the container. The container in this example is marked in the system for transloading, placed on a yard chassis and positioned to a dock door at the onsite transloading facility for unloading, palletizing and transloading for outbound shipping into a standard 53' dry van trailer for one way delivery to destination.

This example demonstrates several benefits in using the IMCTF:

- Using rail at the port avoids lengthy road transport journeys and avoids adding to congestion in the port and its urban environs. No road transport at all is required at the port. This is a significant cost saving and environmental benefit.
- There is no empty running back to the port as the empty container stays in the IMCTF yard and is available for an export shipment which will be transloaded from an incoming truck to rail at the IMCTF. This is a significant cost saving and environmental benefit.
- Utilizing rail at the port is more cost effective than trucking, a single train replacing 300 trucks entering and returning to the port.
- Large trucks with chassis carrying containers are not required. The IMCTF has eliminated trucks entering the road system at the port area, on the highway system between port and DC and the local roads around the DC.
- Utilizing the IMCTF avoids the capacity issues at ports where containers must be unloaded and reloaded onto trucks when they access the port. In addition, ports are spared the requirement of holding empty containers helping with space management and improving the efficiency of the port's operations.
- Eliminates the need for chassis equipment because the empty containers are processed within the IMCTF site. This removes the costs and challenges of locating and retuning chassis equipment.
- As no large trucks are used there is no requirement for a chassis. This eliminates the costs associated with identifying, collecting, and returning chassis.
- Relocating transloading from the ports provides an opportunity for those regional and local truck operators to take part in the first and final mile truck transportation. This helps boost the local and regional economy surrounding the IMCTF site.

EXAMPLE 2) Dry Bulk Freight

In this example a construction aggregates producer in Northern Nevada is shipping locally mined aggregate material to Sacramento, CA. The demand is high, and several dump truck loads are shipped per day.

Today dump trucks would load-up the day before and leave early the following morning for the drive to Sacramento. Once onsite in Sacramento they unload their trucks and return home with empty dump trucks. It is unlikely dump trunk compatible loads can be sourced around Sacramento for delivery to Northern Nevada so the return trip will be an empty run.

In an IMCTF model a facility located in the Northern Nevada area would receive these trucks and transload the aggregates into hopper rail cars or flat-bottomed gondola rail cars. The freight would then be transported by rail to the customer. In this example we assume the customer has a rail siding that the cars can be held whilst aggregates are unloaded.

If the customer is not situated on a rail line, an IMCTF or simple transloading point closer to his facility in Sacramento could be utilized with trucks collecting and delivering the aggregates.

This example demonstrates several benefits in using the IMCTF:

- Using a single rail train over most of the freight journey is significantly cheaper than running multiple trucks from northern Nevada to California.
- This model takes multiple truck journeys off the highways, providing environmental and safety benefits as well as reducing highway maintenance costs.
- The IMCTF model offers a far more efficient utilization of transportation equipment. Whereas empty trucks are forced to make the return journey back to the driver's home base, empty rail cars can be left at the customer site and utilized for the export of other goods or, more commonly, collected and brought to a local yard for re-allocation.
- The IMCTF model provides greatly improved throughput for the Nevada construction distributor since the company trucks can make multiple trips to/from a local IMCTF site as opposed to one trip per day on a long transit to Sacramento. The added opportunity for additional volume of business is a typical value-add of an IMCTF site.

Locating IMCTFs

Although IMCTF's can handle all types of freight they do not need to be equipped for all cargo types. An analysis of current and projected freight flows in a region will define the optimal IMCTF design. IMCTF sites could be single or multiple use, for example container only or dry bulk only. Some IMCTF sites will incorporate substantial warehousing sites for container transloading to small trucks, others may incorporate open storage space for equipment, vehicles, or other large freight items.

IMCTF's stimulate additional economic activity and growth in the region. New companies will seek to locate close to a facility which can reduce their transport costs and provide a high performing supply chain operation which can open new markets and further boost growth. An IMCTF will encourage an eco-system of new distribution hubs attracted by the accessibility and efficiency gains.

An IMCTF is a strategic opportunity for economic development agencies seeking to grow commercial zones or catalyze underperforming regions. Where inland port terminals already exist, these can be easily converted into IMCTF sites and advantages of the integrated model can be quickly implemented.

The availability of existing rail lines and available land for constructing rail extensions from existing lines suggests the Fernley region is an optimal location for locating an IMCTF.