



West U.S. Largest Small-Item Sortation Distribution Center (DC)
BFL Intl Airport – 4-story, 2.6M Sq. Ft. on .64M Sq. Ft.



Example of Goods Movement Growth in the South Central Valley Goods Movement Complex - 2021

- 50 major distribution centers/ag processing facilities in the Southern SJV
- 25 are located at Tejon Ranch, Delano, and Shafter/BFL Intl Airport; 2/3rds of those built/expanded in the last 10 yrs. averaging 4M sq.ft./yr. for past 5 yrs.
- 7 major new warehouses now under construction or recently completed



West U.S. Largest Perishable Grocery DC
Shafter, CA/BNSF – 5-story, .6M Sq. Ft.



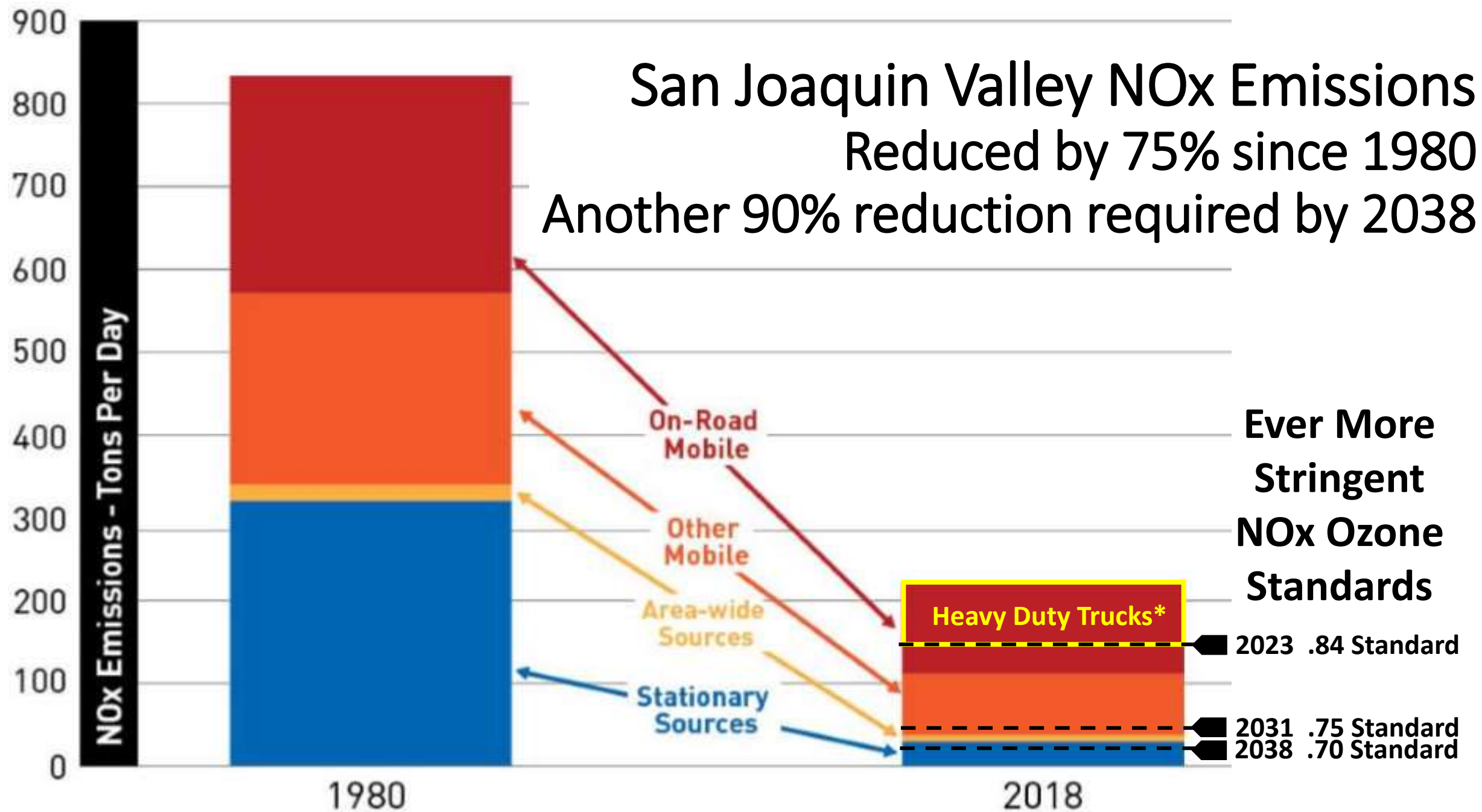
New Leased DC Majestic Realty
.5M Sq. Ft.



Hierarchy for Transportation-Related Land Use Decisions

SITE OPPORTUNITIES

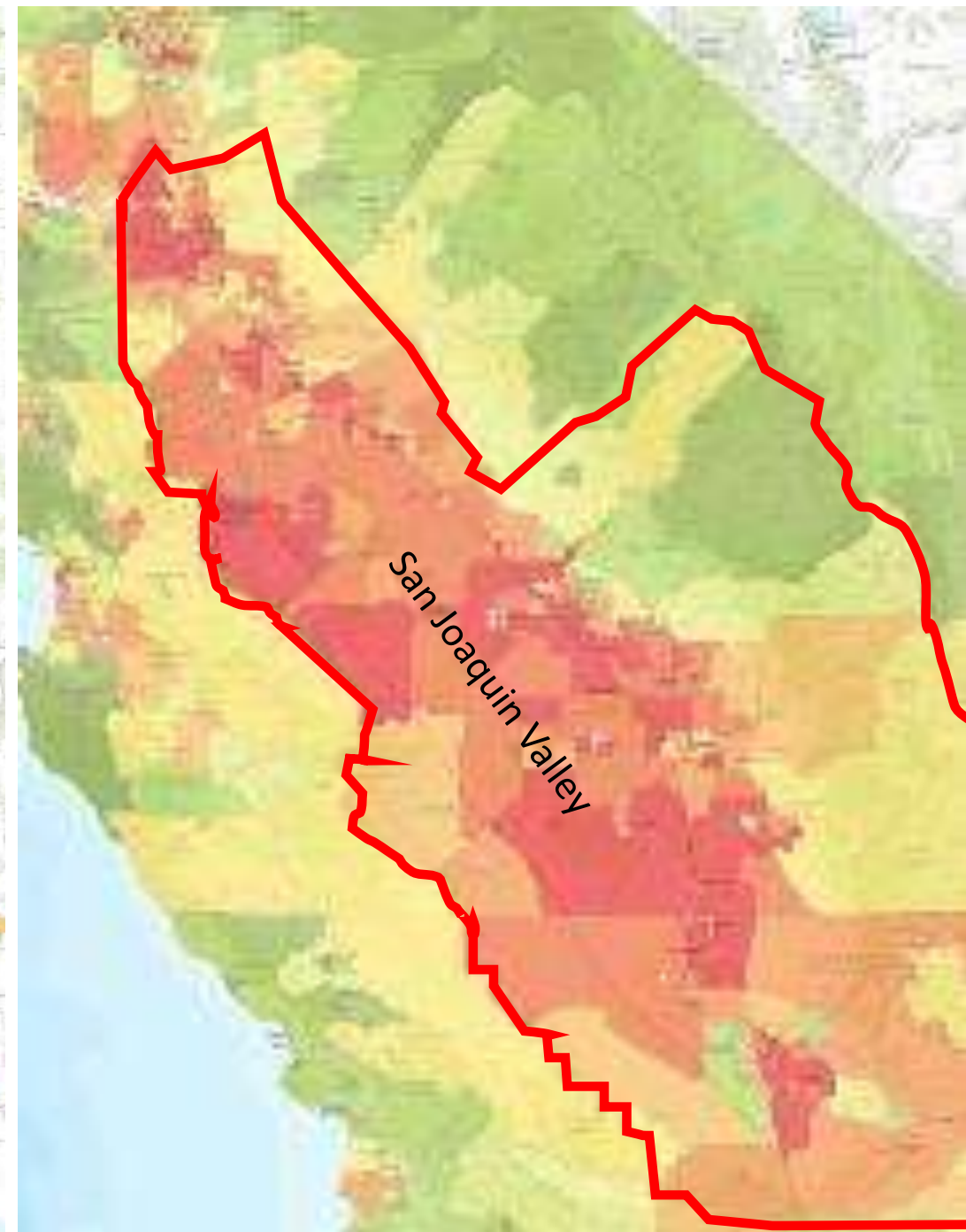
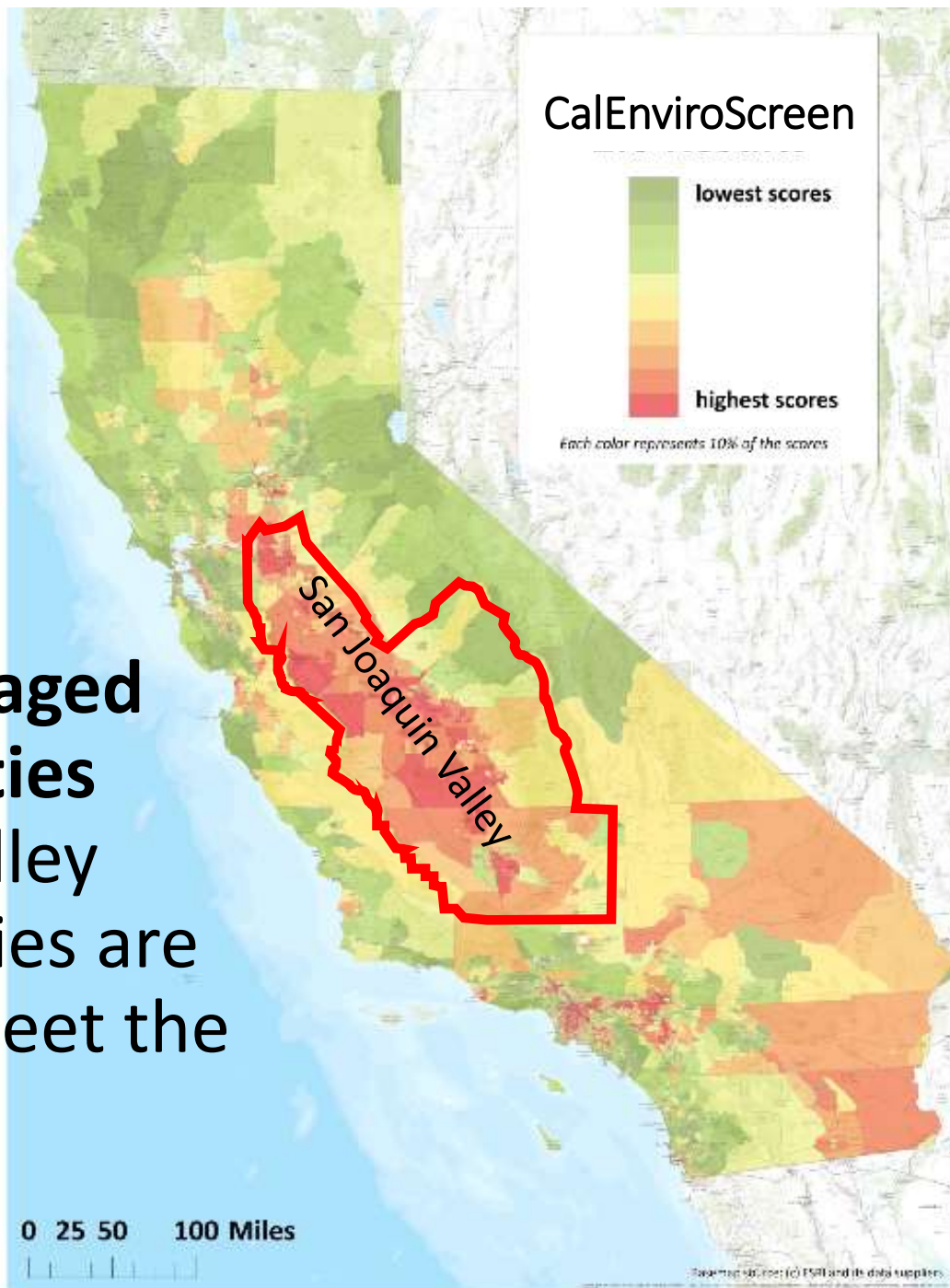




*% trucks estimated using 2016 Ozone Plan base inventory for 2012. Chart modified from one prepared by San Joaquin Valley APCD 12/18



**Disadvantaged
Communities**
Central Valley
communities are
rising to meet the
challenges





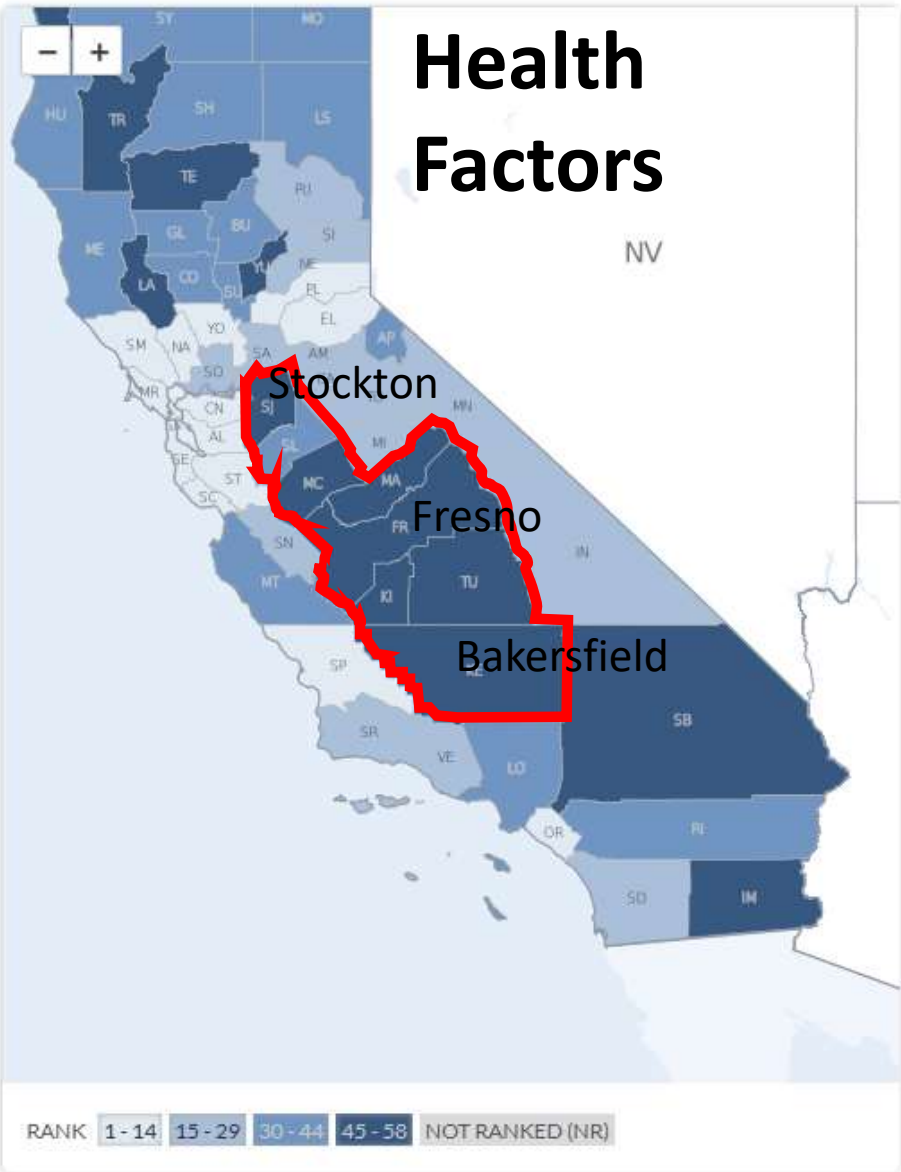
COUNTY HEALTH RANKINGS:

All but 3 of the poorest health counties in CA are in the Central Valley according to the Robert Wood Johnson Foundation

Overall Rankings in Health Outcomes ⓘ

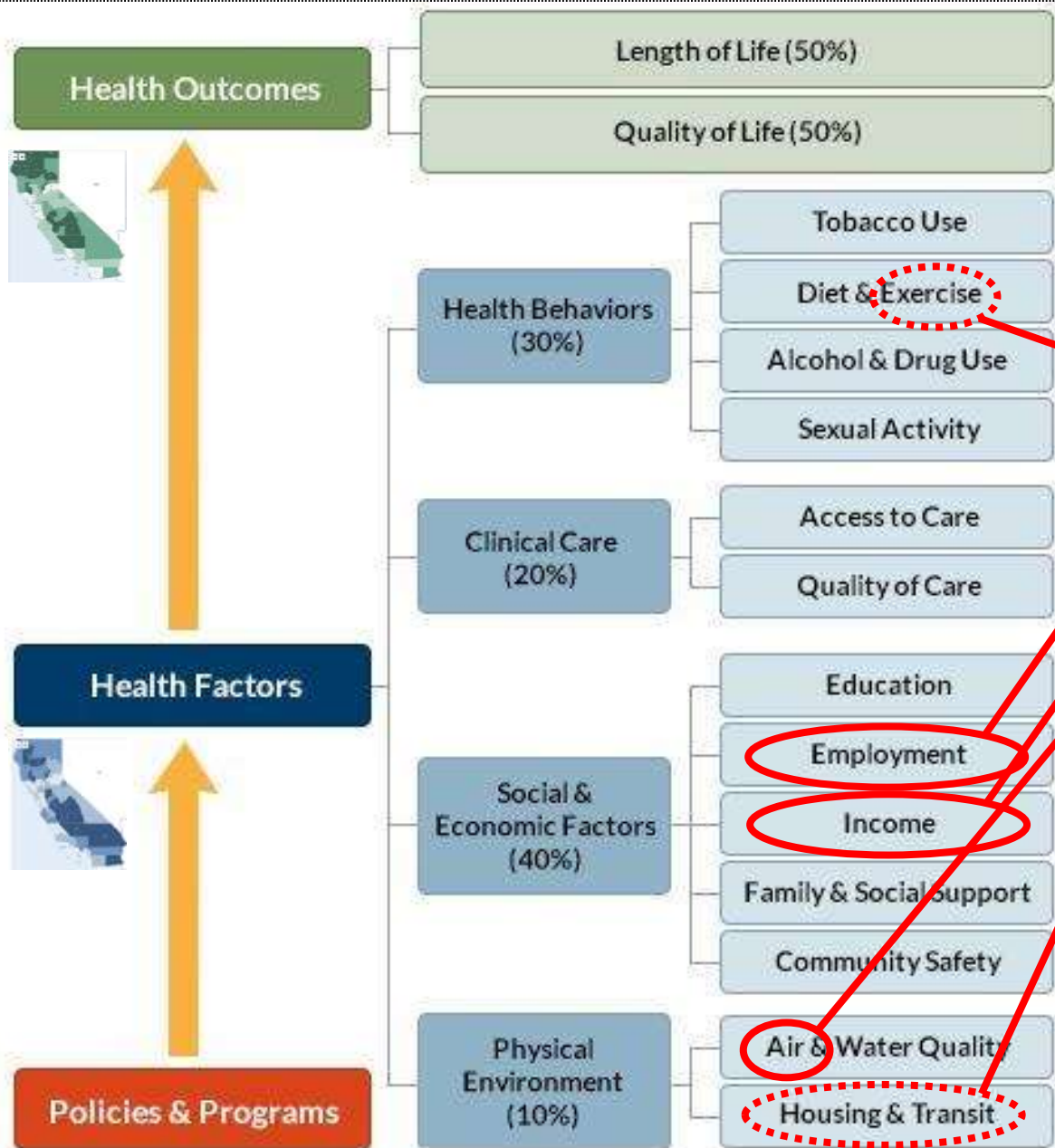


Overall Rankings in Health Factors ⓘ



RWJ County Health Ranking Methodology

2.5% of Valley Counties' Poor Health Ranking Due to the Air, 16% Due to the Economy!

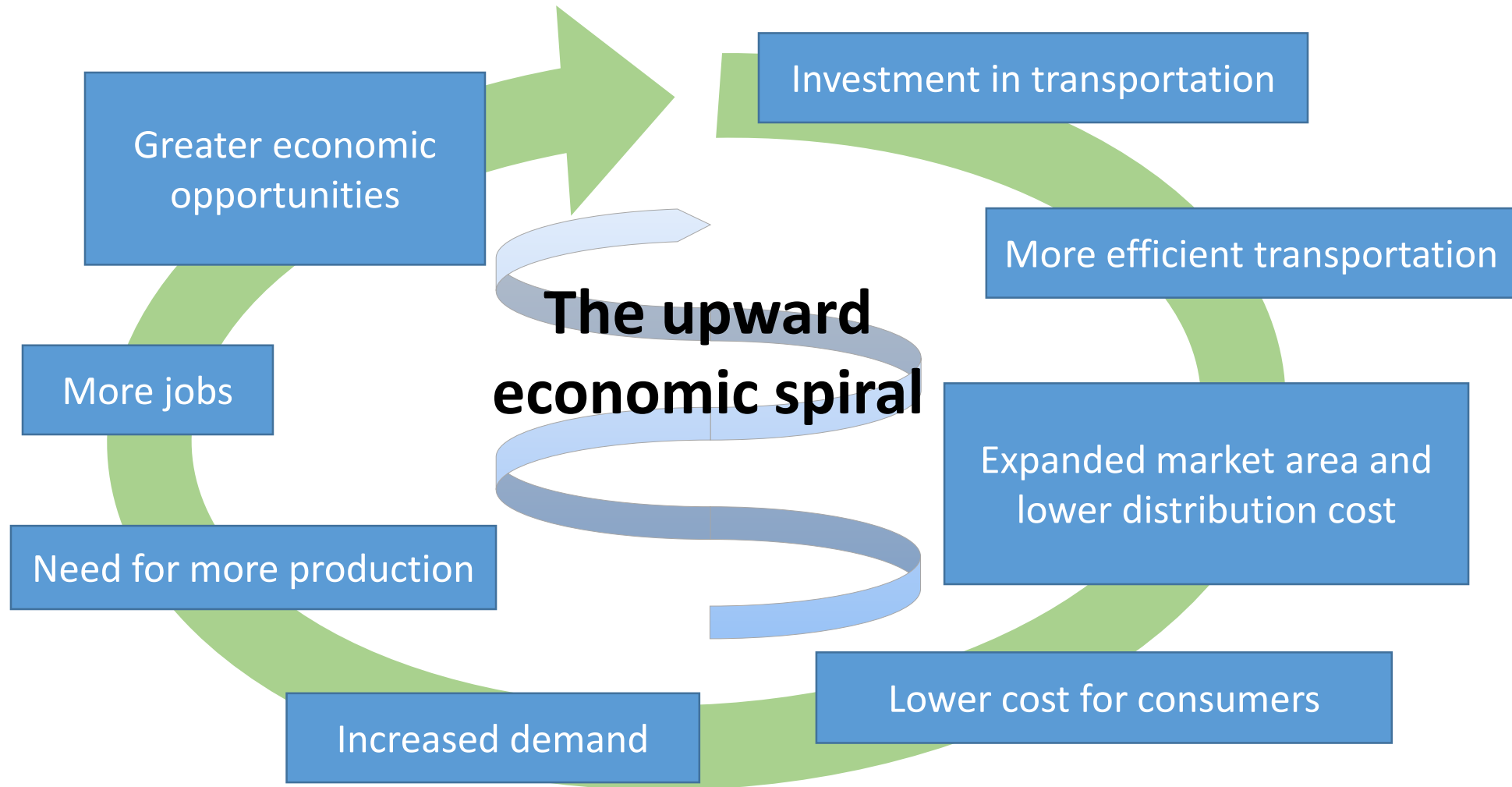


Estimated Weights of Transportation Related Factors on Health Ranking:

- 4% - Exercise (walking, biking)
- 8% - Employment (economic growth)
- 8% - Income (economic growth)
- 2.5% - Air (vehicle emissions)
- 5% - Housing & Transit (job access, walking)

Transportation Related Factors Affect Less than 30% of the region's health ranking and more than half (16%) are economic growth related.

How a Well Funded Transportation System For Goods Movement Drives the Economy



Transportation Investment Benefits: The Grapevine Example



12 hours to L.A.



2 hours to L.A.

8-lane freeway to Southern California has brought Kern 10 hours closer to 22 million consumers and the resulting economic benefit.

Tejon Ranch Commerce Center Federal Foreign Trade Zone (Duty Free)

2014-2018 Observed
Trucks Per Day (TPD)*
www.kerncog.org/traffic-counts

8 Distribution Centers (DCs), half in last 6 years
4.5M Square Feet - 2019
2,500 Jobs - 2015



* Truck counts on local roadways are from the Kern COG regional traffic count program, taken at different times of the year and not adjusted for seasonal variation. TPD counts are non-annualized, weekday, 24-hour counts using multiple hoses to classify observed trucks. TPD counts shown are of combination (combo) trucks with at least one trailer and 4+ axels. Same for all graphics.

Kern is Seeing Spillover From the Inland Empire

Tejon Ranch Commerce Center

Tejon Ranch has less congestion, shorter travel times/cost to the Port of LA/LB, compared to the Inland Empire.

Inland Empire is filling up, freeway congestion is bad, and property costs compared to Kern are more than double.

Beaumont
(I-10/SR60)

The Ports are a significant destination for warehousing and manufacturing loads.

Ports of LA/LB

6 out of 7 Kern Residents Favor New Distribution Centers

*Spring 2019 statistically valid survey**

- **1,400 people in Kern were asked:** *“Recently new employers, such as Amazon.com, have located in Kern County, creating many new jobs in the County. These jobs have also created new commuter and truck trips. **Do you think these new jobs are worth the additional traffic?**”*

82% worth it, 13% not worth it, ~5% didn't know or no answer

**To available online with past surveys at:*
<https://www.kerncog.org/quality-of-life-survey/>

Importance of Specific Issues Over Next 20 Years:

- 1. Improving public education/opportunities**
2. Preserving water supply/quality
3. Improving crime and gang prevention
- 4. Maintaining local streets and roads**
- 5. Creating more high paying jobs**
6. Improving air quality
7. Improve local health care/social services
- 8. Revitalize business dists./neighborhoods**
9. Improve fire/emergency medical services
- 10. Encourage new business to relocate here**

Inside New Amazon DC - BFL Airport



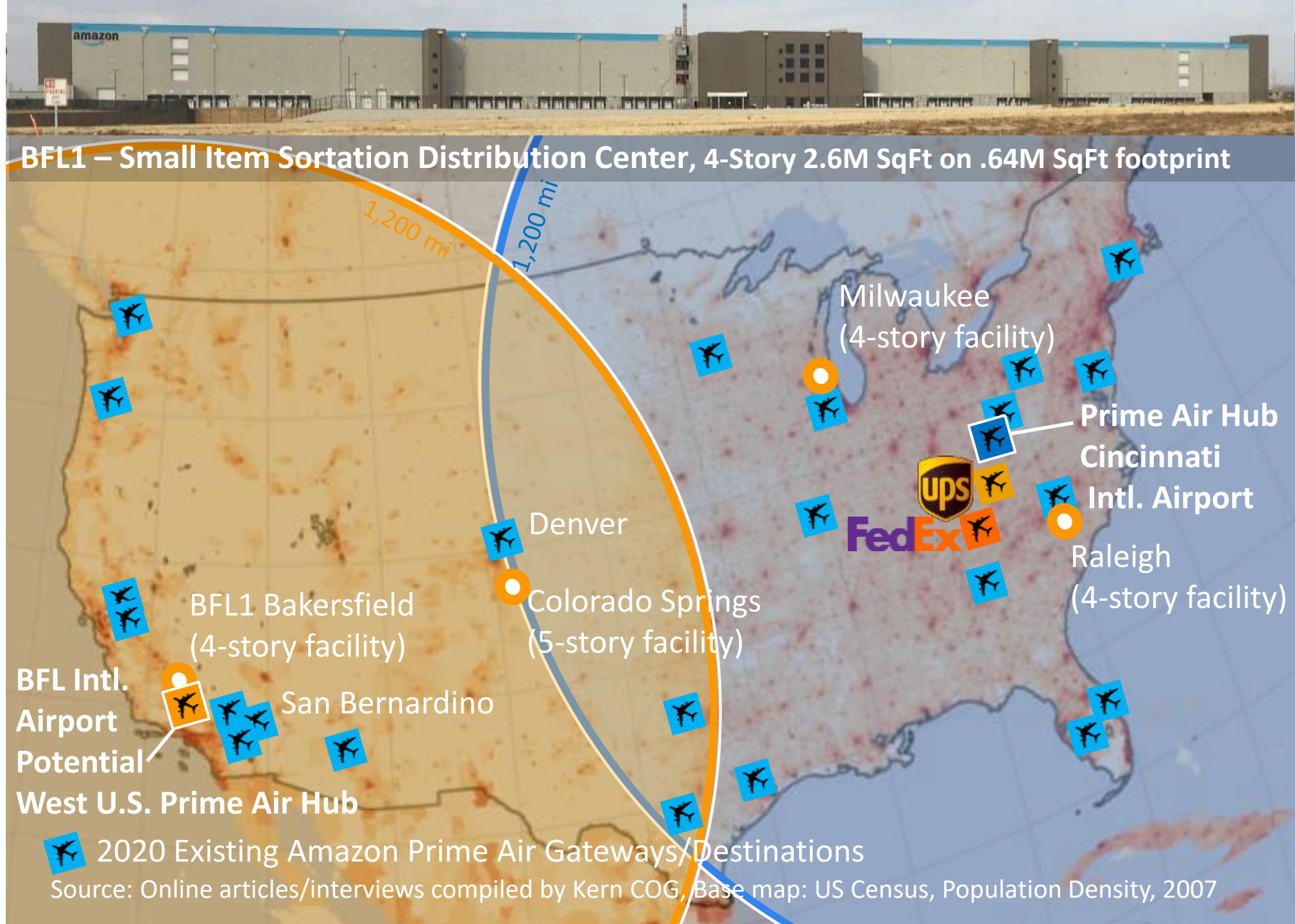
See video at link below of automated sorting system illustrated at right.
<https://www.newsobserver.com/news/business/article236527353.html>

Testing of robot sorting system in sister facility near Raleigh, North Carolina.



Potential Future West U.S. PrimeAir Freight Hub

Bakersfield is
one of four
new
Multi-story
warehouses
near airports
outside major
urban areas

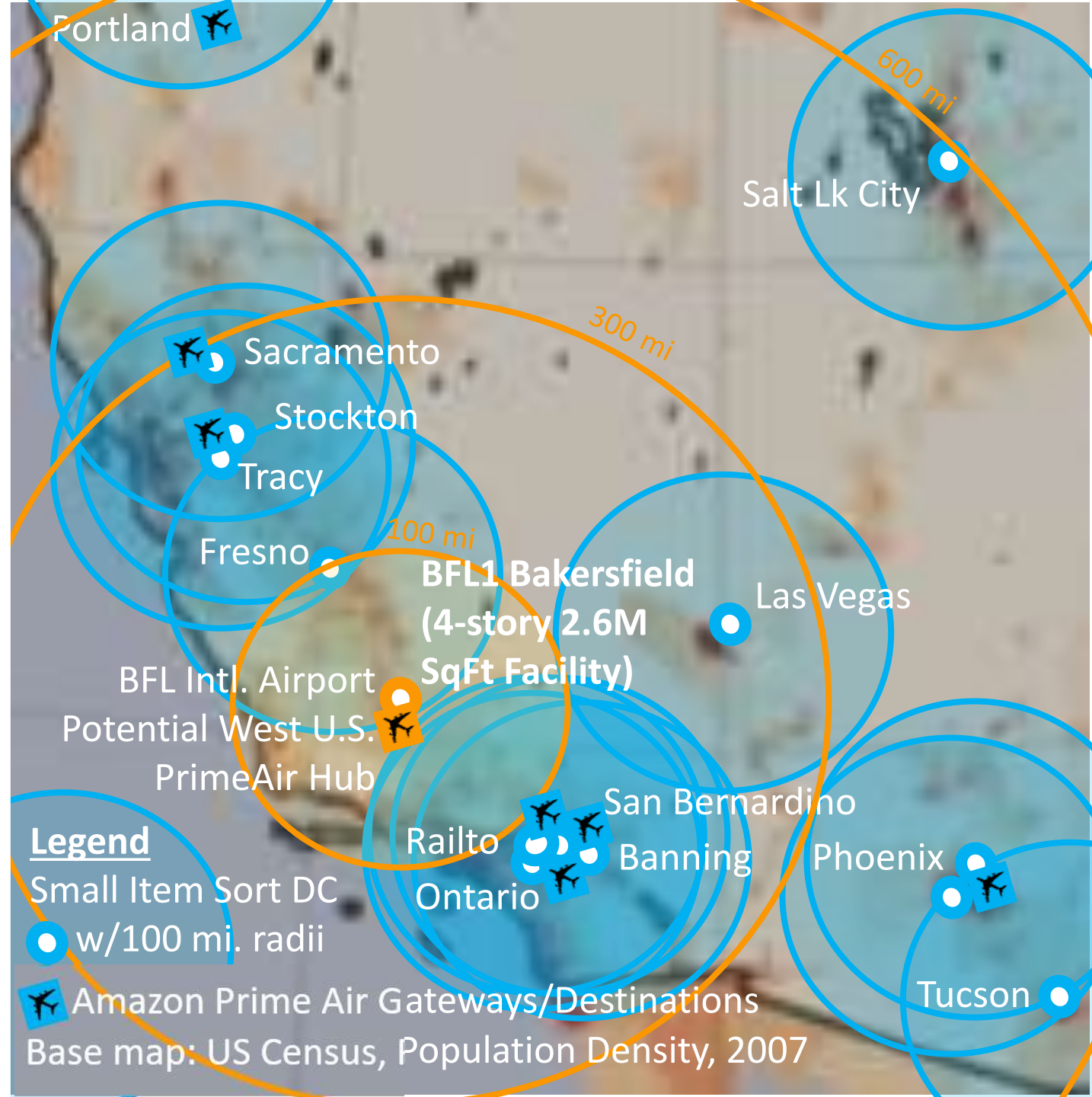




Small Item Sortation Distribution Centers in West U.S. with 100 mi. Radii

- Bakersfield - **only** 4-story Amazon warehouse in the West U.S.
- The facility is adjacent a low volume intl. airport 1,100' runway.
- Geographically central to major West U.S. markets
- Could serve as a possible upstream staging facility for high volume seasonal or event driven products.

Note that map only shows related Small Sortation Distribution Facilities. It does NOT show specialty large item, cross dock or other Amazon warehouse facilities. The map was compiled from lists found on Wikipedia and https://www.mwpvl.com/html/amazon_com.html.



Inside New Walmart DC - Shafter

One of 3 New Automated Perishable Grocery Distribution Centers in the U.S.



Tall vertical automated rack system in a 100' tall building will be able to pick products 40% faster than a conventional forklift accessed rack system



See video link of automated rack system <https://youtu.be/cUHj2qff1Ds>

The 3 Newest Walmart Automated Perishable Grocery DCs

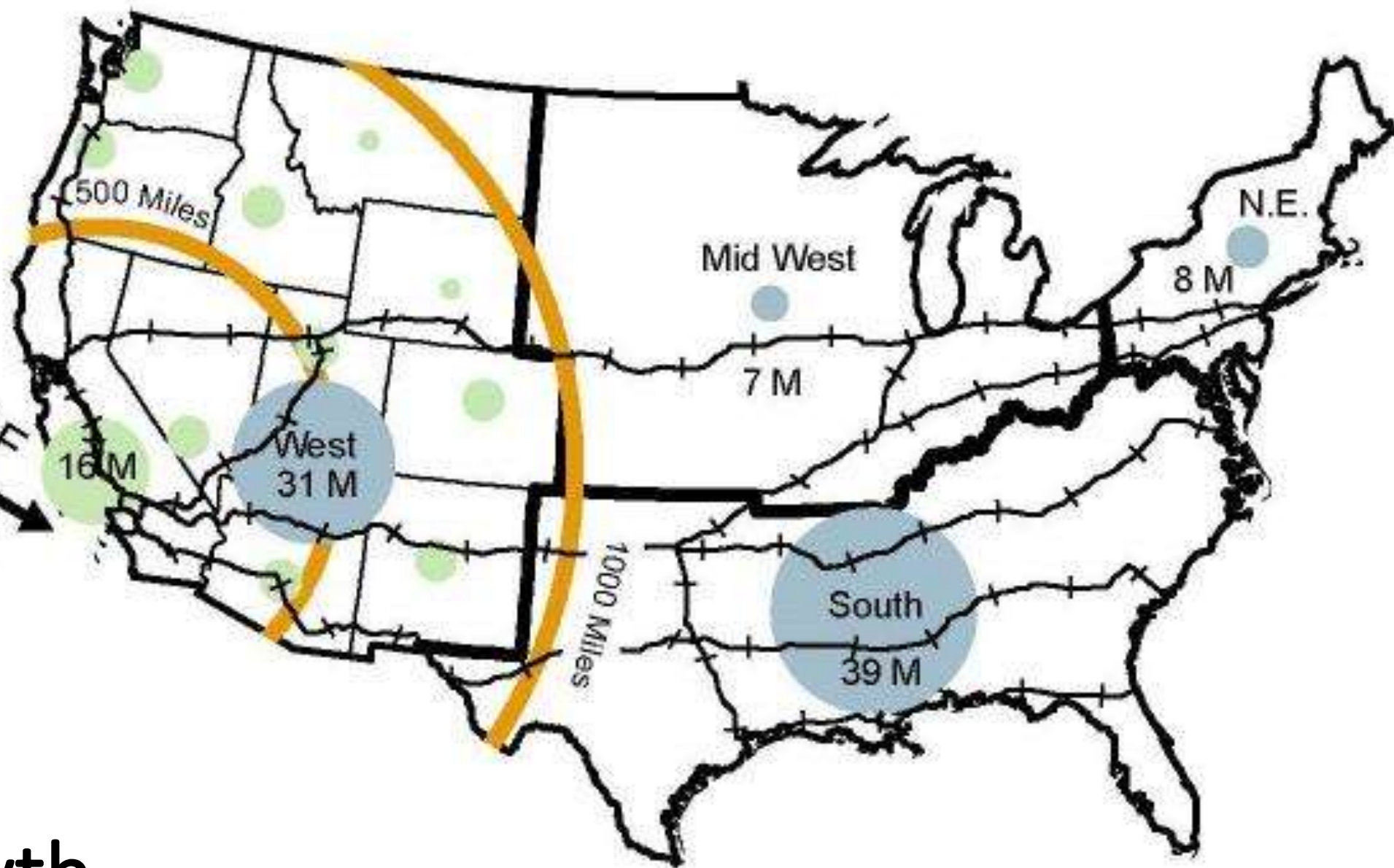


Think Global



To Asia

40% TO 60% OF
ALL U.S. IMPORTS



Future
U.S. Growth
Concentrations

82% of Growth in the Lower 48 States
In South and West 2010 - 2050

California's Emerging Trucking Center

California Logistics Distribution Center Cluster

Over 50 Distribution Centers Located within 50 Miles of State Center of Population

Located in Kern County in the immediate vicinity of the City of Shafter, the geographic center of population is the weighted single point that is closest to all people in California. It is the location with the lowest shipping cost and carbon footprint for facilities designed to ship to consumers statewide. It is also a hub for shipping goods throughout the West.

51 Selected Distribution Centers & Manufacturing Facilities By Size¹

MSF ² Dist. Center (DC), Manufacturing (MFG)	MSF DC/MFG	MSF DC/MFG
2.60 Amazon Small Sortation Dist. Ctr. DC	0.40 Pactiv MFG	0.14 CarQuest Auto Parts DC
1.80 Target DC	0.37 U.S. Cold Storage DC	0.12 GAF Materials Corp MFG
1.70 Ross Dress for Less DC	0.35 Red River Lgts./American Tire Anx	0.11 American Tire Distributors DC
1.60 IKEA DC	0.35 Famous Footwear DC	0.10 California Paper Products MFG
1.20 Sears Logistics DC	0.30 Hillman DC	0.10 Core Mark Intl DC
1.13 Walmart DC	0.30 Formica DC	0.09 Custom Building Products DC
1.00 Wonderful Industrial Park DC, T.B.A.	0.25 Hadco Metal Trading MFG/DC	0.09 Rain-For-Rent MFG
1.00 Ross Dress For Less Anx. DC	0.24 Men's Wearhouse DC	0.08 MRC Global MFG
1.00 American Tire DC	0.21 GAF Roofing Tiles Plant MFG	0.08 Amware Logistics DC
0.60 Walmart Refrigerated Grocery DC	0.20 FedEx Ground DC	0.07 Bakersfield Pipe & Supply MFG
0.60 Dollar General DC	0.20 UP Cold Connect Intermodal DC	0.04 GMC Roofing & Building Paper MFG
0.60 IKEA Annex/Vision Media DC	0.19 PFG Customized Distribution DC	0.04 Cognito Motorsports DC
0.54 Dryers IceCream Plant MFG/DC	0.17 Camping World DC	0.03 Bakersfield QDC Intermodal DC
0.50 L'Oreal Cosmetics/Dollar General Anx.	0.16 KW Plastics MFG	0.03 FedEx Freight DC
0.50 Tejon Ranch/Maquestic Realty DC T.B.A.	0.15 George Fischer Harvel Plastics MFG	0.02 DenBeste Manufacturing MFG
0.40 Essendant Wholesale Supplies DC	0.15 Prime Valley Warehouse DC	0.01 Shafter Container Yard-160 spcs. DC
0.40 Caterpillar DC	0.15 Sigler Wholesale Distributors DC	0.00 Waits Intermodal Siding DC

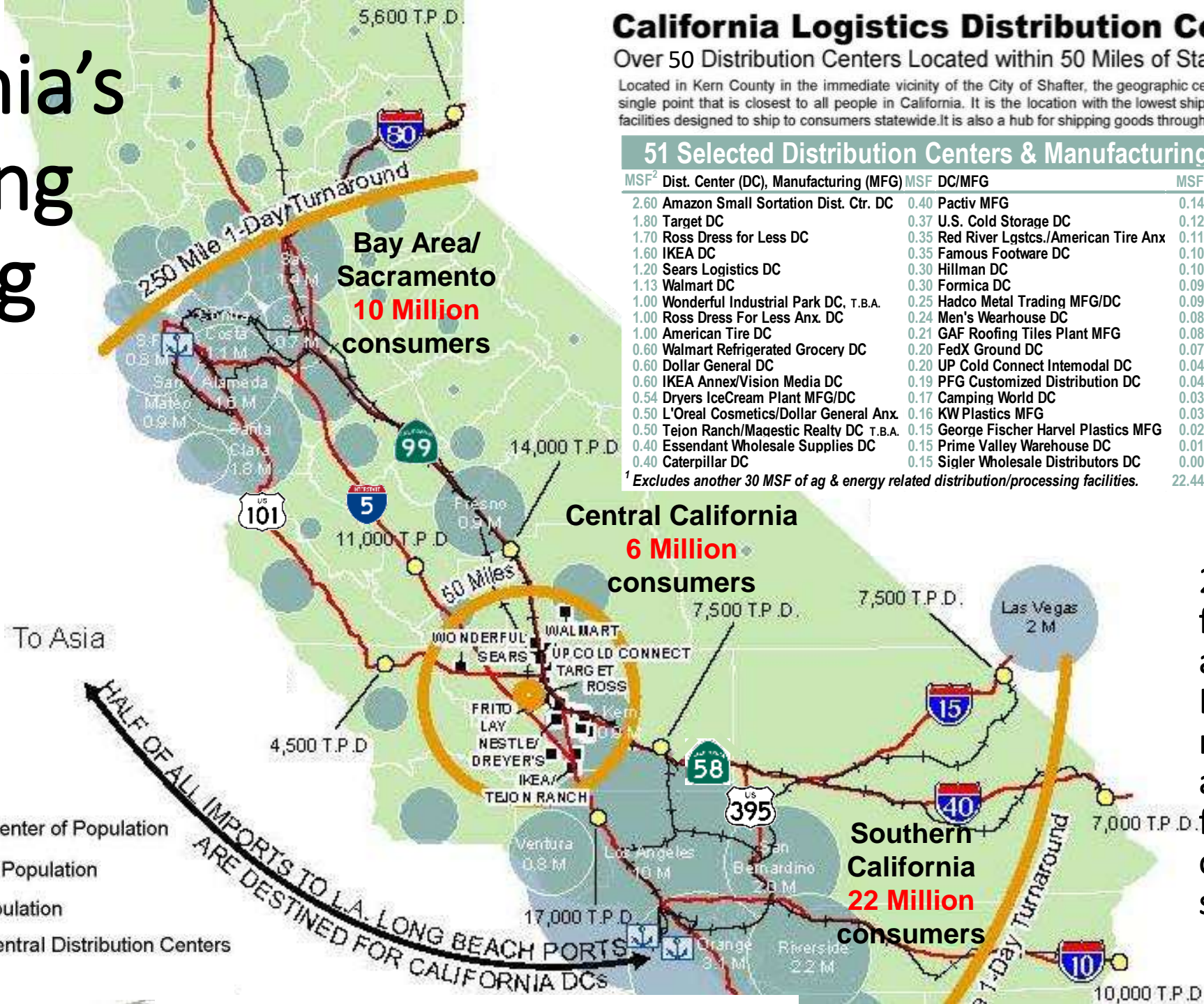
¹ Excludes another 30 MSF of ag & energy related distribution/processing facilities.

22.44 ²Million Square Feet (MSF)

0 15 30 60 90 120 Miles

December 2017
www.kerncog.org
Kern Council of Governments

- Major Container Ports
- Distribution Centers
- California Geographic Center of Population
- Distance from Center of Population
- County Proportional Population
- Major Route Used by Central Distribution Centers
- Major Rail Routes



2020 Inventory found 186 Large and Medium Large DCs, manufacturing, and processing facilities totaling over 50 million square feet.

52M Sq. Ft., 50% in Facilities Greater Than ½M Sq. Ft.

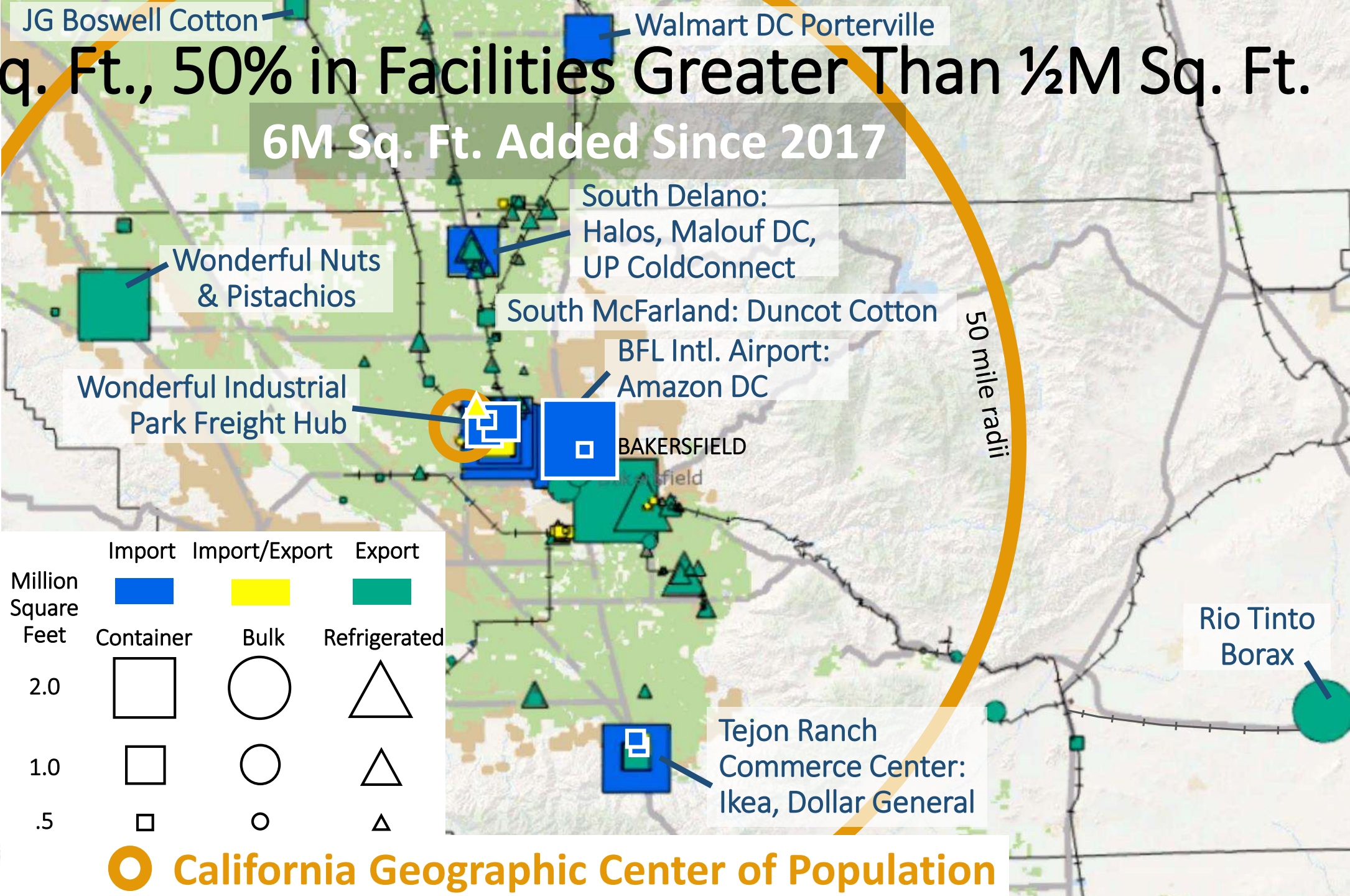
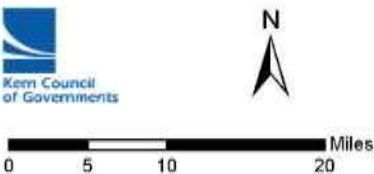
6M Sq. Ft. Added Since 2017

Symbol sizes are proportional to the square footage at that major, large & medium facilities.

Green = Exporter
Blue = Importer
Yellow = Both

Square footage data is for distribution centers, warehouses, processing, mining and energy facilities using Google Earth 2019.

Green areas are predominantly agriculture. Tan areas are predominantly oil production.



	Import	Import/Export	Export
Million Square Feet	<div></div>	<div></div>	<div></div>
	Container	Bulk	Refrigerated
2.0	<div></div>	<div></div>	<div></div>
1.0	<div></div>	<div></div>	<div></div>
.5	<div></div>	<div></div>	<div></div>

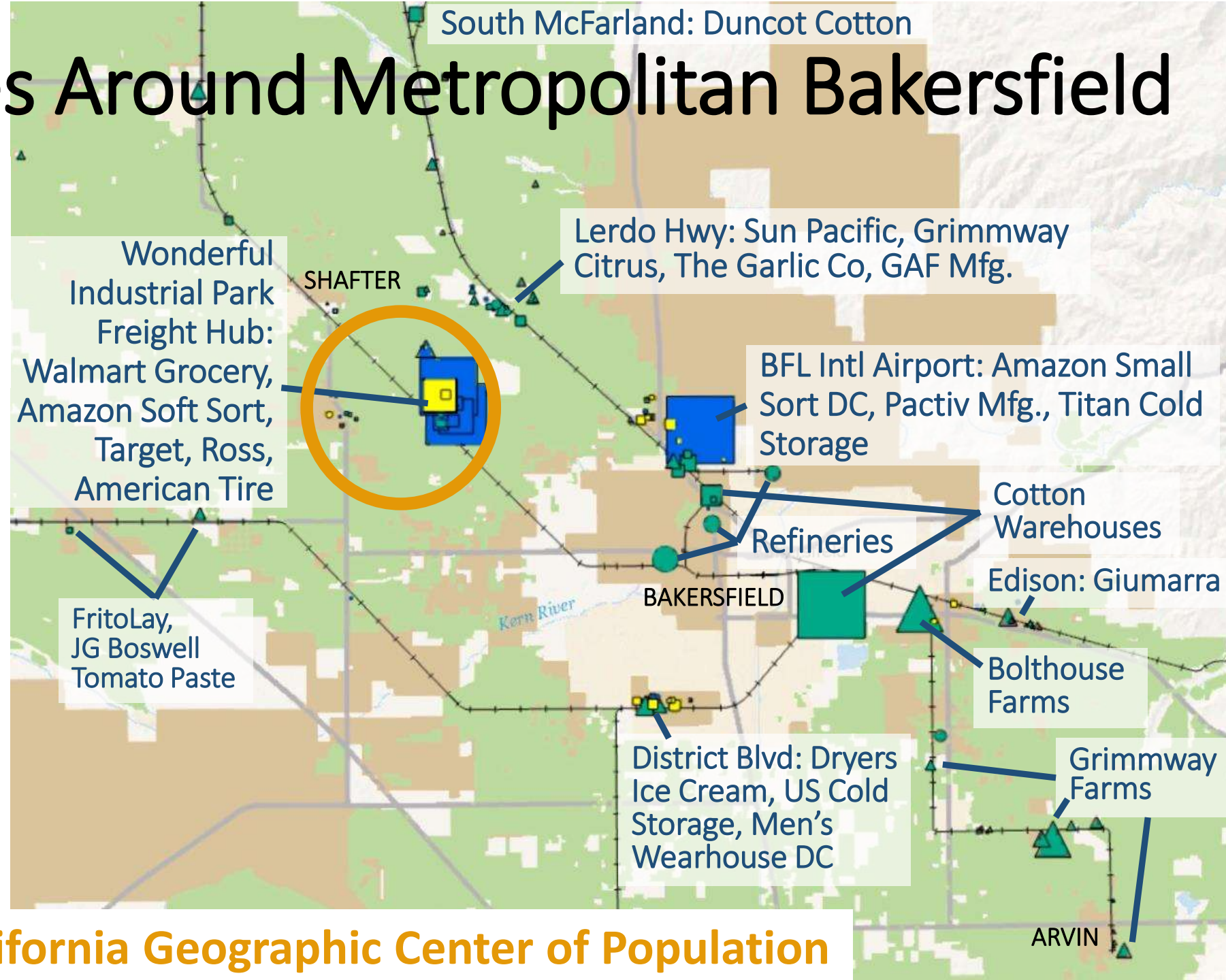
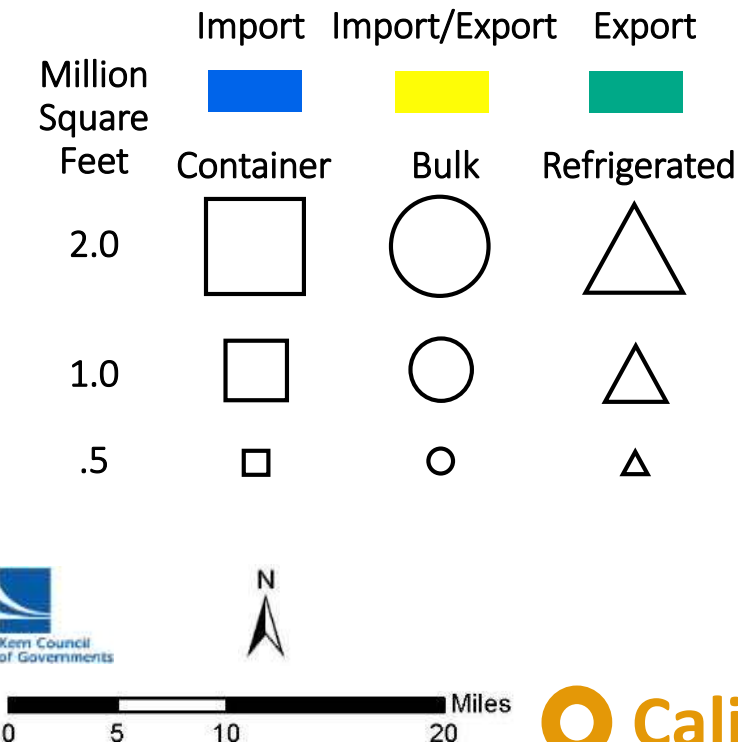
California Geographic Center of Population

Major Facilities Around Metropolitan Bakersfield

Symbol sizes are proportional to the square footage at that facility.

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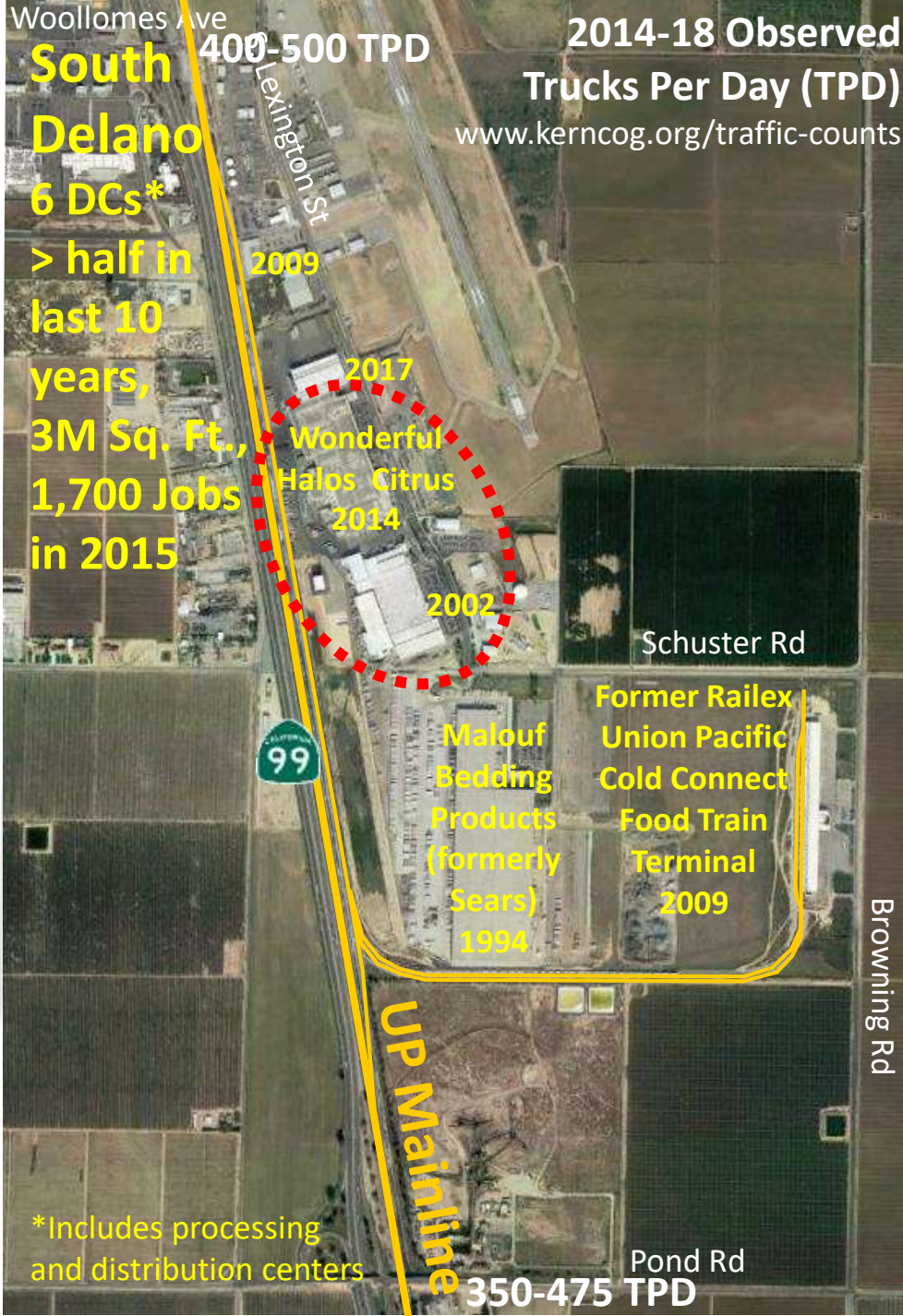
South Delano – Wonderful Halos/Citrus

World's Largest Citrus Processing Facility

Top 3 Ag Producing Counties in U.S. - Kern, Fresno, Tulare
Export produce from all over CA (CV, Salinas, Imperial)



Largest Citrus Processing Conveyor System in the World



South Delano
6 DCs*
> half in last 10 years,
3M Sq. Ft.,
1,700 Jobs in 2015

2014-18 Observed Trucks Per Day (TPD)
www.kerncog.org/traffic-counts

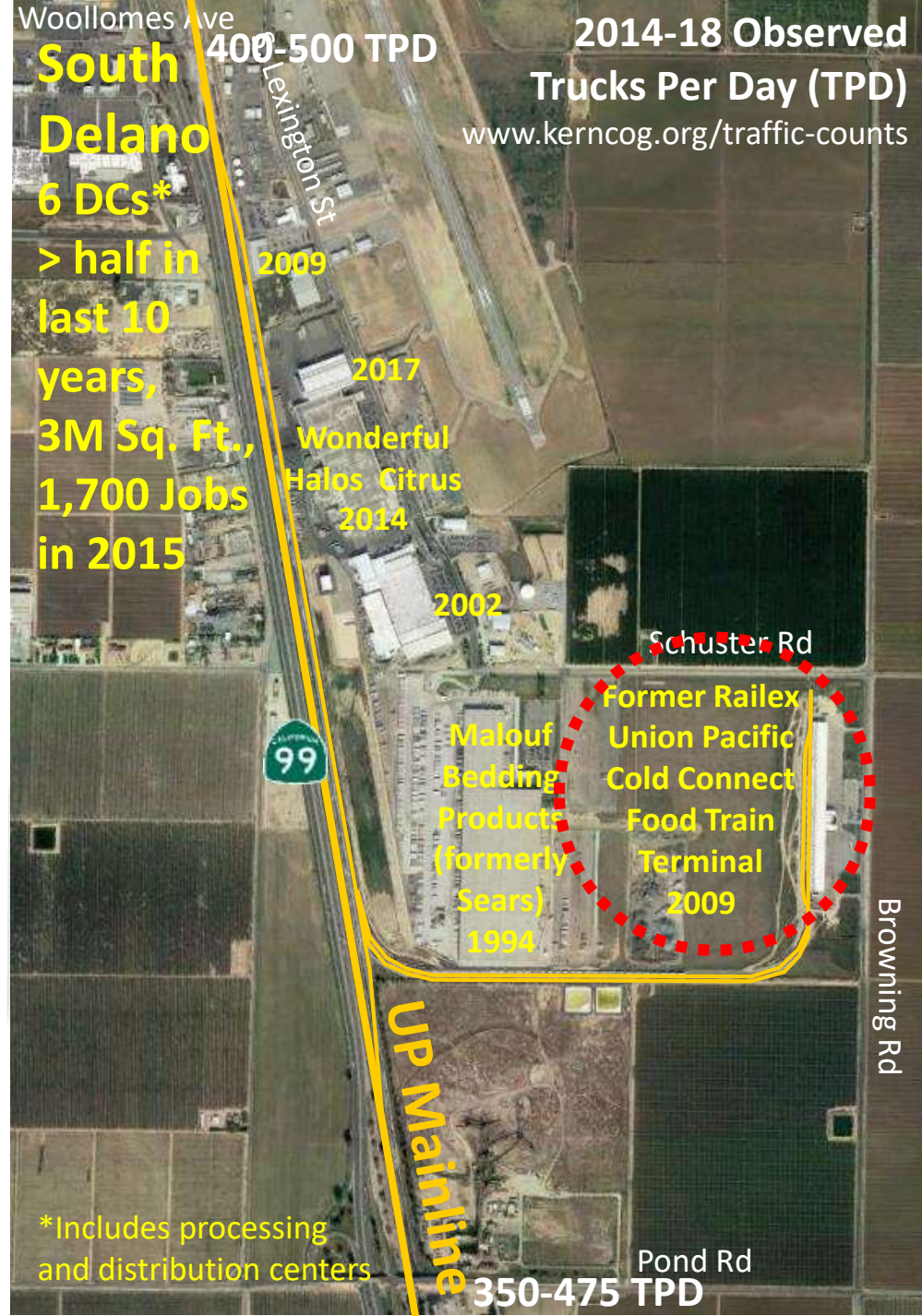
*Includes processing and distribution centers

UP Mainline

350-475 TPD

South Delano – Union Pacific Cold Connect Food Train Service (operations temporarily down)

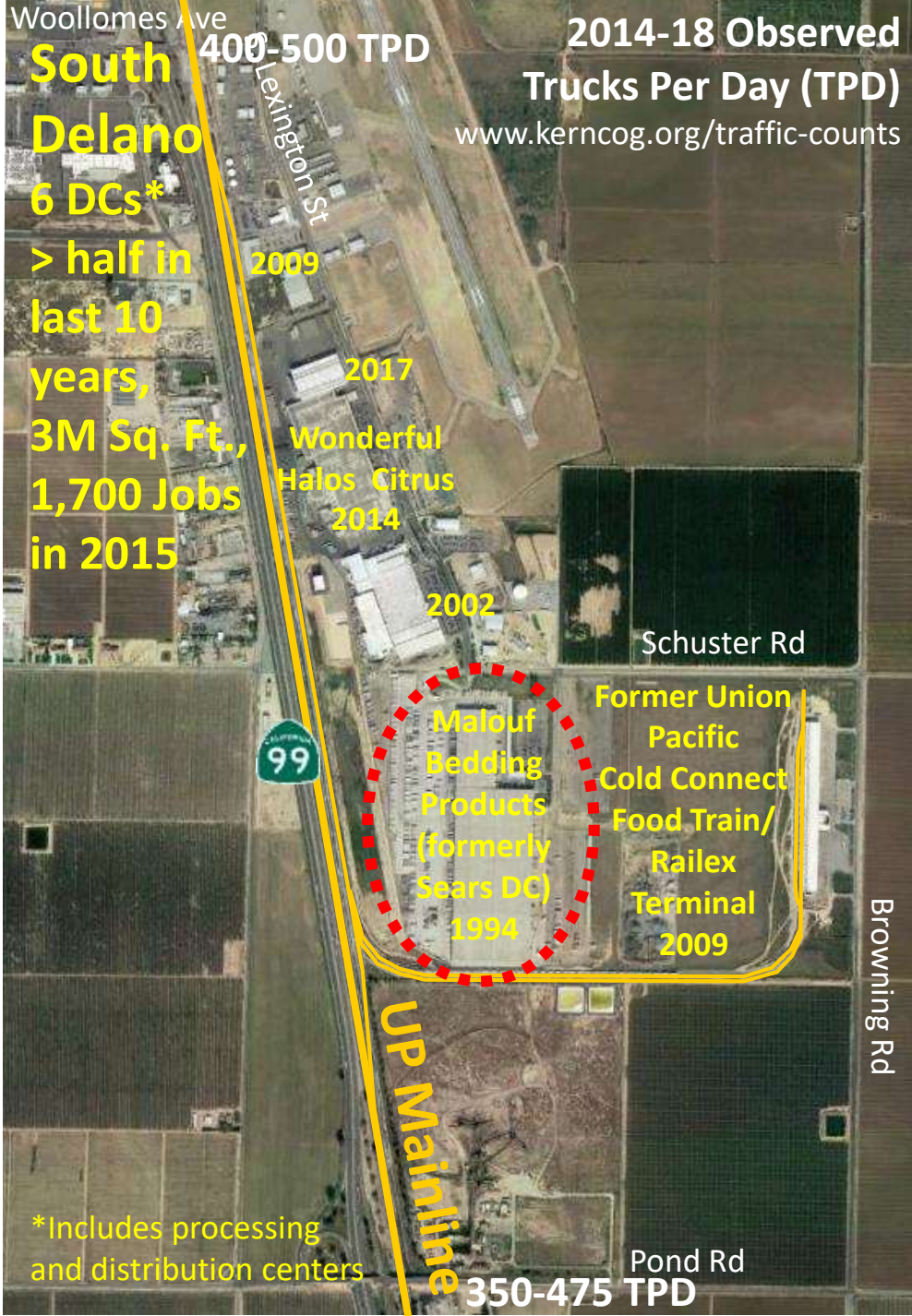
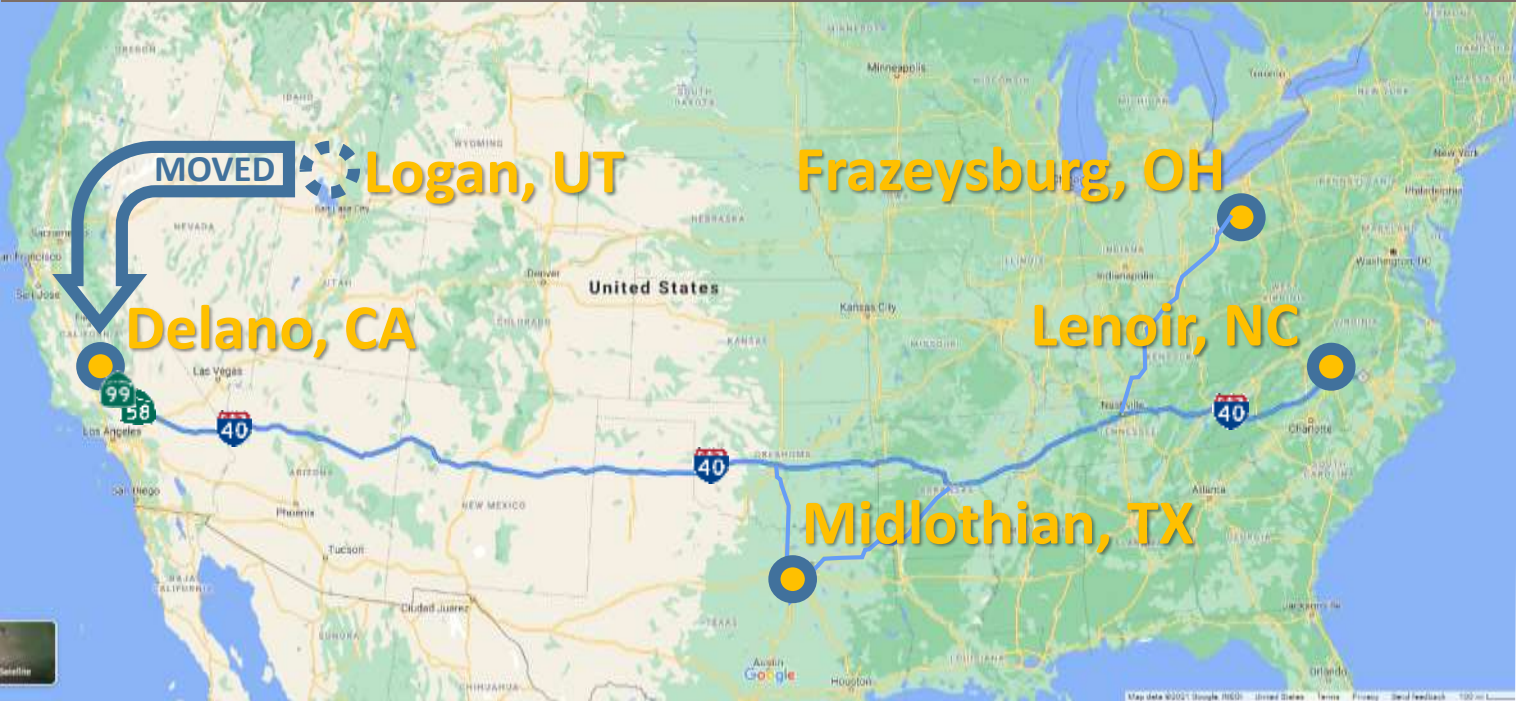
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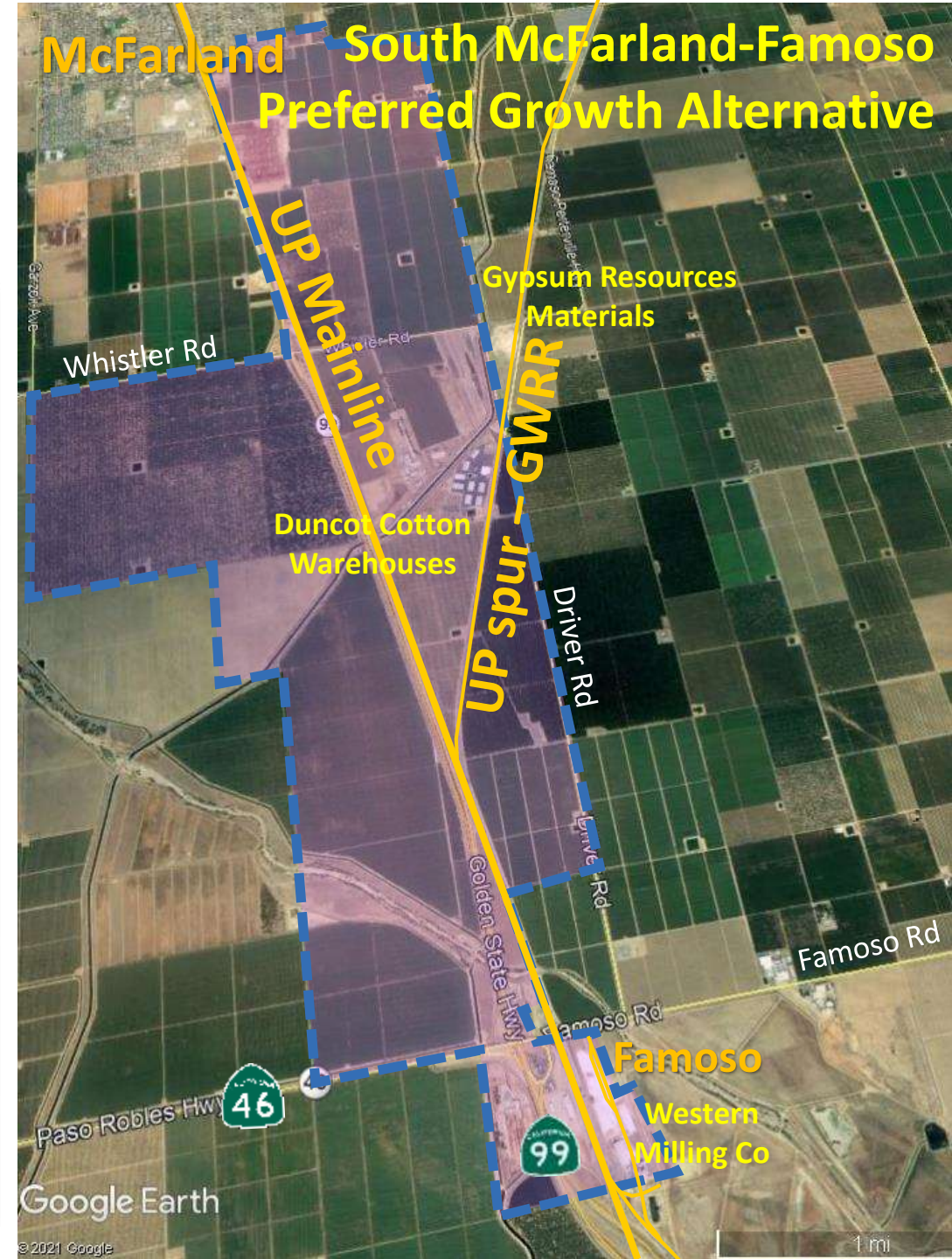
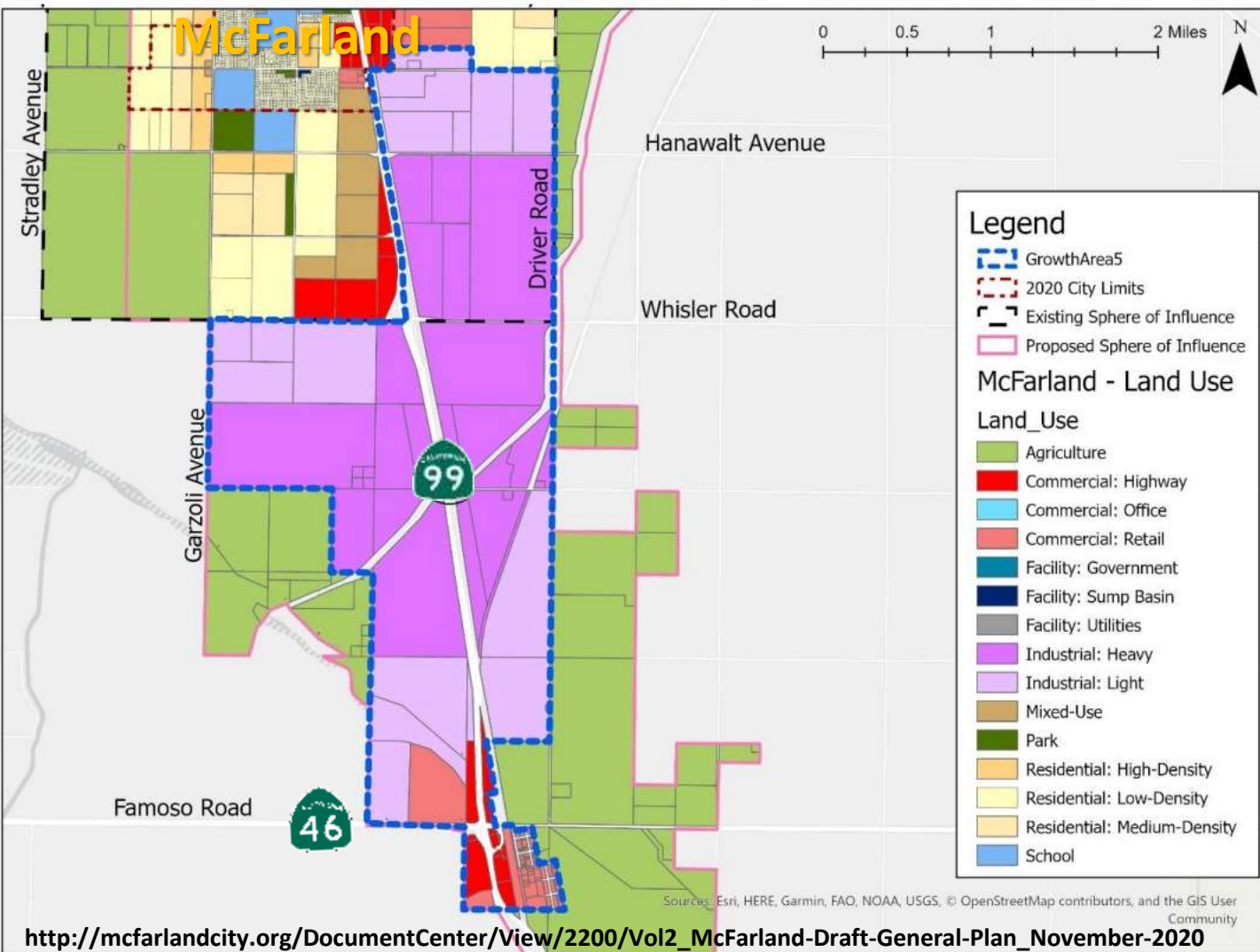
South Delano – Malouf Bedding Moves West U.S. Warehouse to Delano, CA from Logan, UT



*Includes processing and distribution centers

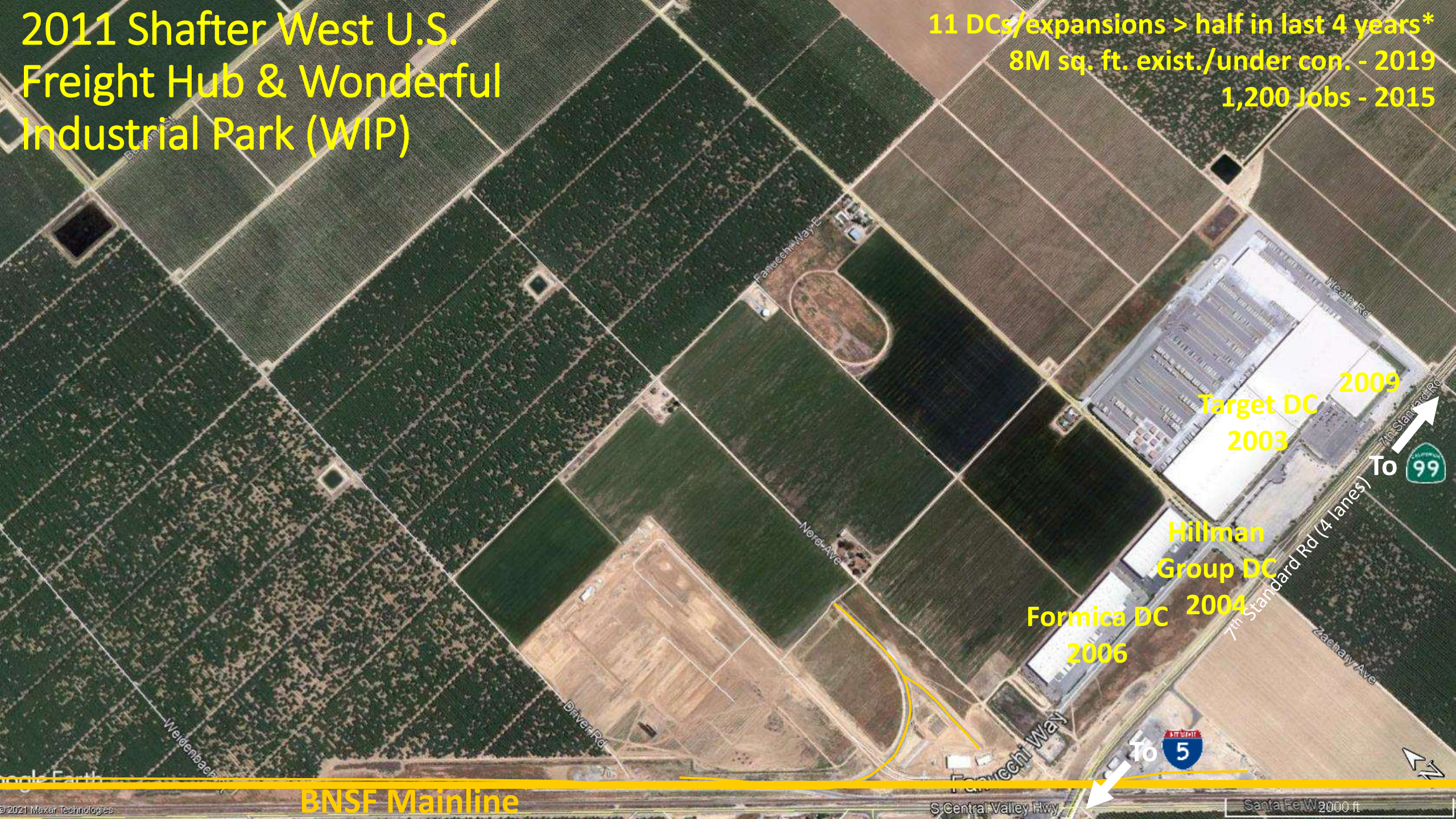
McFarland–Famoso Industrial Park & Commercial Center 5+ sq. mi.

Map 5-7: Preferred Growth Alternative Key Growth Area #5: Famoso Industrial and Commercial Center



2011 Shafter West U.S. Freight Hub & Wonderful Industrial Park (WIP)

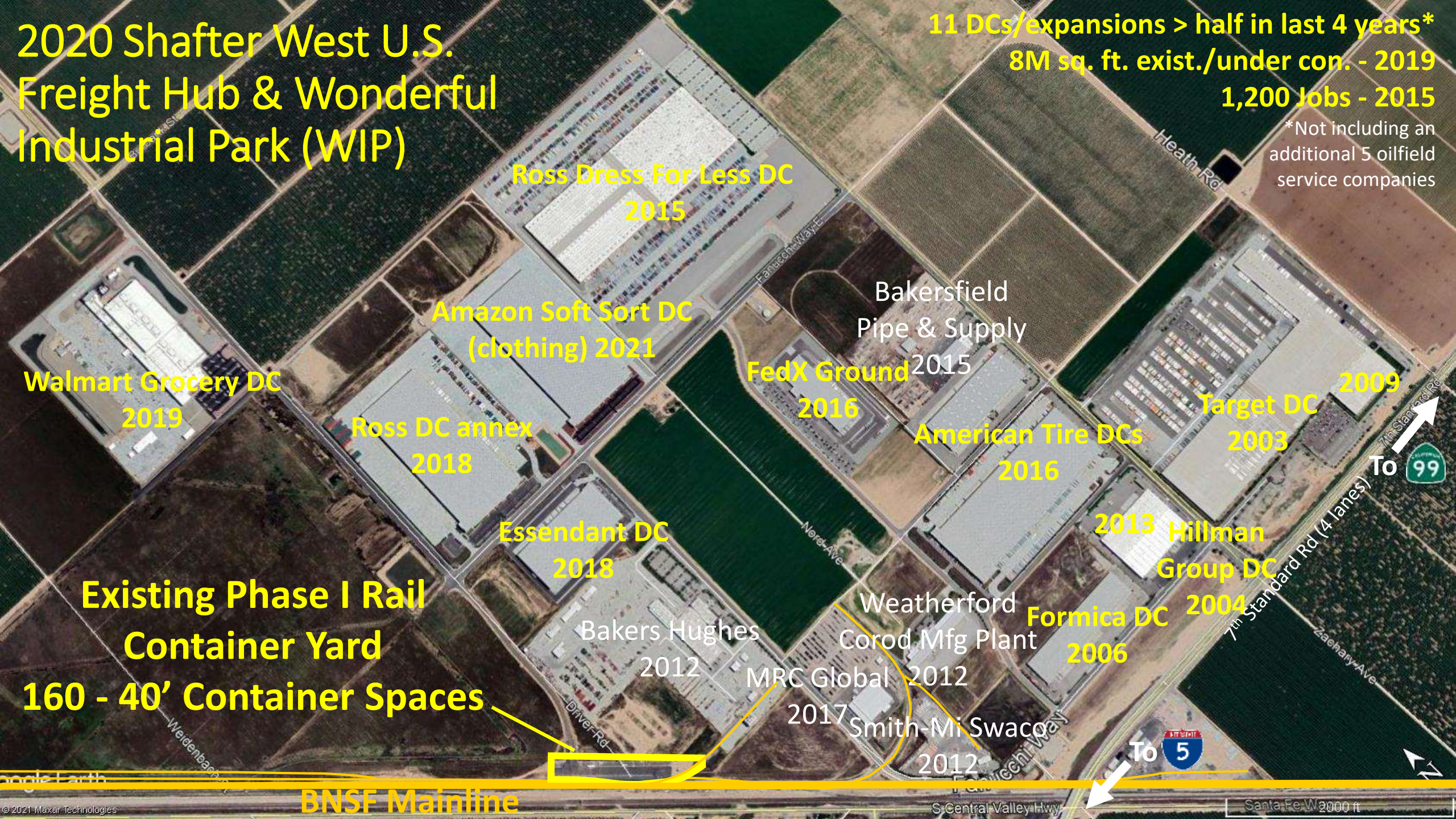
11 DCs/expansions > half in last 4 years*
8M sq. ft. exist./under con. - 2019
1,200 Jobs - 2015



Target DC
2003

Hillman
Group DC
2004

Formica DC
2006



2020 Shafter West U.S.
Freight Hub & Wonderful
Industrial Park (WIP)

11 DCs/expansions > half in last 4 years*
8M sq. ft. exist./under con. - 2019
1,200 Jobs - 2015
*Not including an additional 5 oilfield service companies

- Walmart Grocery DC 2019
- Ross Dress For Less DC 2015
- Amazon Soft Sort DC (clothing) 2021
- Ross DC annex 2018
- Essendant DC 2018
- Bakers Hughes 2012
- MRC Global 2017
- Smith-Mi Swaco 2012
- Weatherford Corod Mfg Plant 2012
- Formica DC 2006
- Hillman Group DC 2004
- American Tire DCs 2016
- FedX Ground 2016
- Bakersfield Pipe & Supply 2015
- Target DC 2009
- Target DC 2003

Existing Phase I Rail
Container Yard
160 - 40' Container Spaces

BNSF Mainline

To 5
To 99

Santa Fe Way 2000 ft

August 2018

Walmart Grocery DC
(under construction)

Ross
Dress For Less
DCs

Planned Industrial

Amazon
Soft Sort
(clothing)

Ross
Annex

Planned Industrial

FedX
Ground
DC

Planned Industrial

Planned Phase 2
Intermodal Rail
Containerized Freight
Facility (Wonderful Co)

Existing Phase I
Rail Container Yard
City of Shafter

4.5 miles of rail sidings owned/operated by City of Shafter, longest is 2 miles w/ switches to main line at both ends

BNSF Mainline

Proposed
Industrial
Expansion

Buildout Concept

West U.S. Freight Hub 12 Square Miles of Vacant Industrial/Commercial land

2014-18 Observed
Trucks Per Day (TPD)
www.kerncog.org/traffic-counts



20M sq. ft. exist./under con. - 2019
14,000 Jobs in corridor in 2015

**Rail Shuttle
to Ports
Avg Savings
= 127 truck
miles (VMT)
per container
trip = Less
Emissions +
Less Wear
& Tear on
Roads+Less
Congestion**

Importer or Exporter		Walmart	Sears	Target	Men's Warehouse	IKEA	
City		Porterville	Delano	Shafter	Bakersfield	Lebec	Average
From Ports of LALB Via Highway							
Truck VMT		204	166	147	133	109	
I710		19	19	19	19	19	
I5 South of Kern Co.		74	74	74	74	74	
I5 Total		90	90	90	90	89	
I5 in SJV Study Area		16	16	16	16	15	
SR99		77	55	31	20	0	
Other		18	2	7	4	1	
From Ports of LALB Via Shafter Intermodal Terminal							
Truck VMT		50	27	1	18	41	
I710		0	0	0	0	0	
I5 South of Kern Co.		0	0	0	0	0	
I5 in SJV Study Area		0	0	0	0	1	
SR99		0	16	0	9	32	
Other		50	11	1	9	8	
VMT Change							
Truck VMT		-154	-139	-146	-115	-68	
I710		-19	-19	-19	-19	-19	
I5 South of Kern Co.		-74	-74	-74	-74	-74	
I5 in SJV Study Area		-16	-16	-16	-16	-14	
SR99		-77	-39	-31	-11	32	
Other		32	9	-6	5	7	
I5/SR99 Corridor Net		-93	-55	-47	-27	18	-43
Non-Corridor		-61	-84	-99	-88	-86	-84
Total		-154	-139	-146	-115	-68	-127

KERN COUNTY 2017

- Value of goods = \$850,717,738
- Tons = 455,810
- 28% of the Port of Long Beach Ag Exports
- Jobs = 4,320

The Challenge is at the Ports

How do you get 300 containers bound for DCs in the Central Valley from a single ship at the right pier with access to the right rail line, that is also willing to take on export containers from the Central Valley? Block chain tracking?

Legend

- 1 – Pier J On-Dock
- 2 – Pier G On-Dock
- 3 – Pier E On-Dock (MHT)
- 4 – Pier A On-Dock
- 5 – Pier T On-Dock
- 6 – Pier B Rail Yard
- 7 – TICTF Shared On-Dock
- 8 – Pier 300 On-Dock
- 9 – Pier 400 On-Dock
- 10 – WBICTF On-Dock
- 11 – WB-East (TraPac) On-Dock
- 12 – B200 Support Rail Yard (PHL Base)

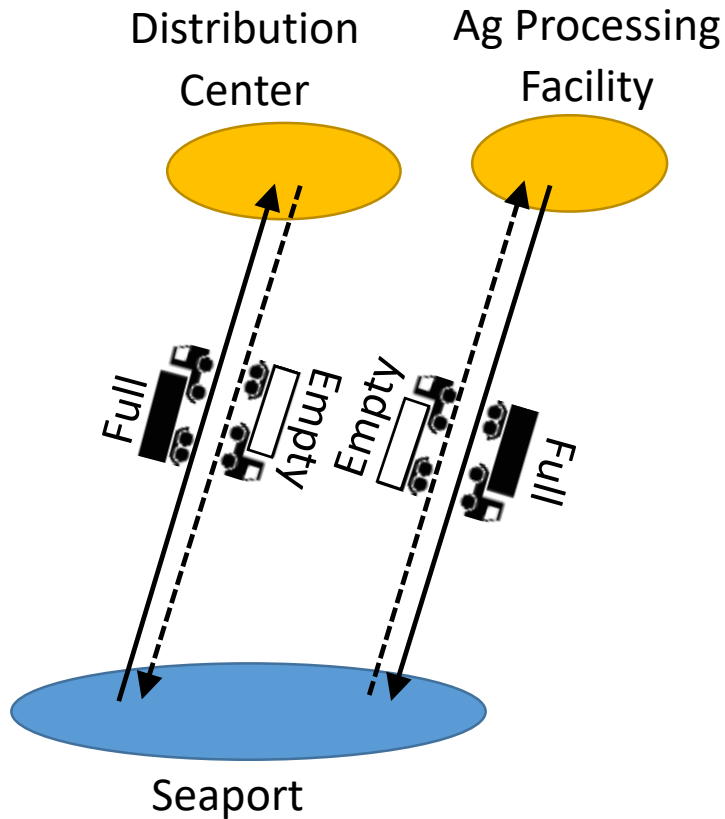


Figure 14.300 On-Dock and Support Rail Yards in San Pedro Bay



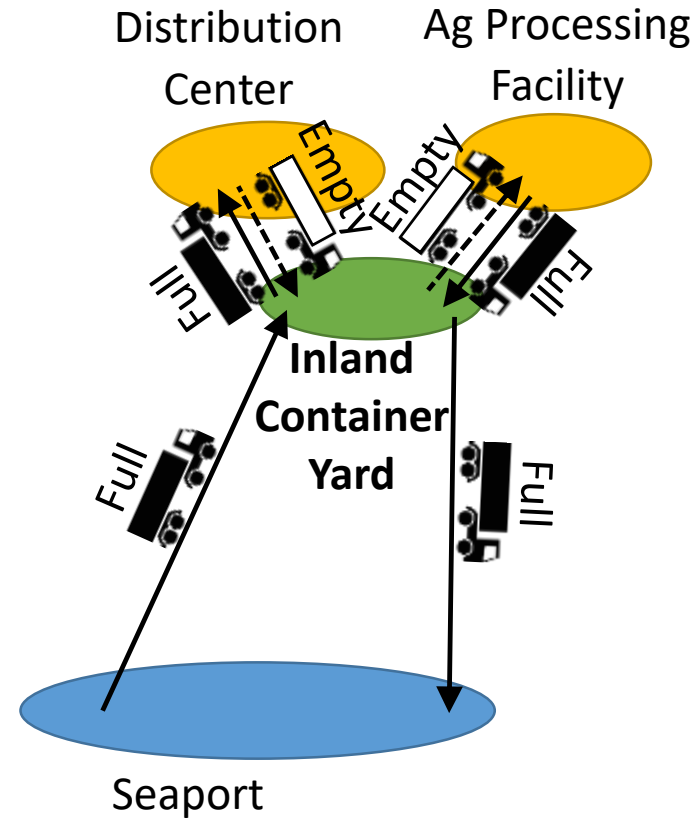
Basic Concept: Container Load Matching

Before Load Matching



Today – Empty containers passing each other on I-710, I-405 & I-5

After Load Matching

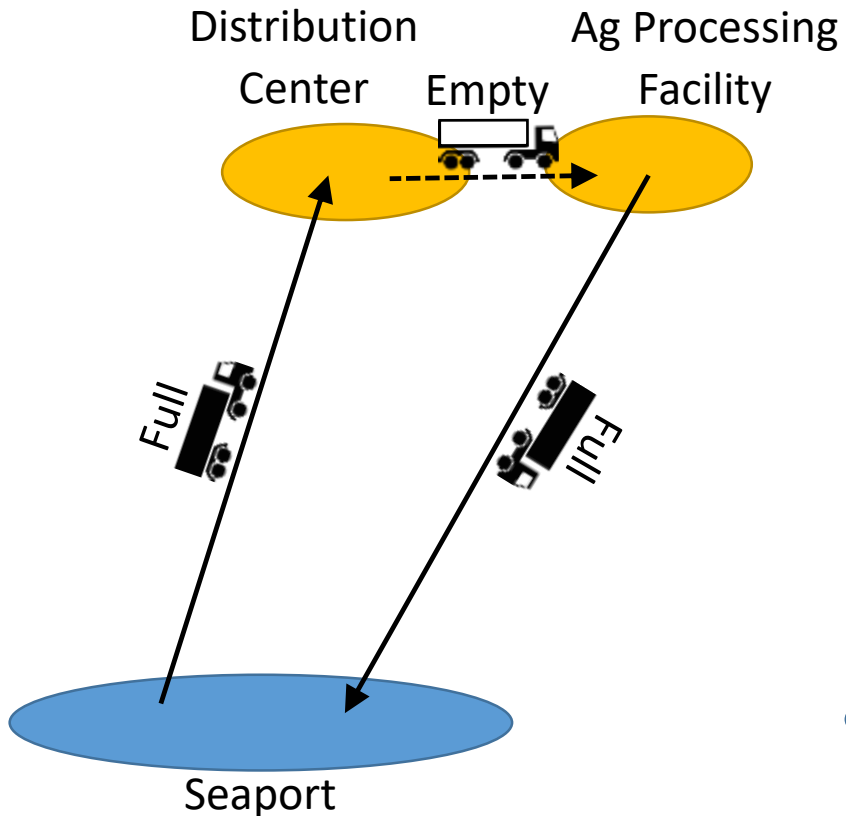


Save up to 40% in shipping costs, VMT, port congestion, road wear & tear, and emissions

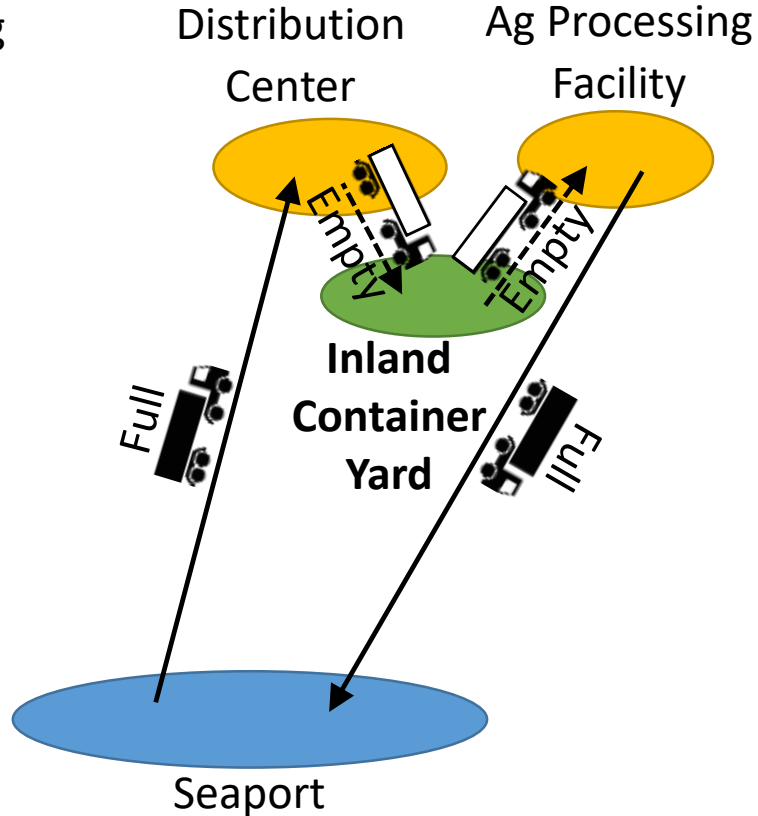
More Efficient Load Matching Variations

A. Virtual Container Yard

(needs public cloud supply chain solutions and/or block chain solutions)

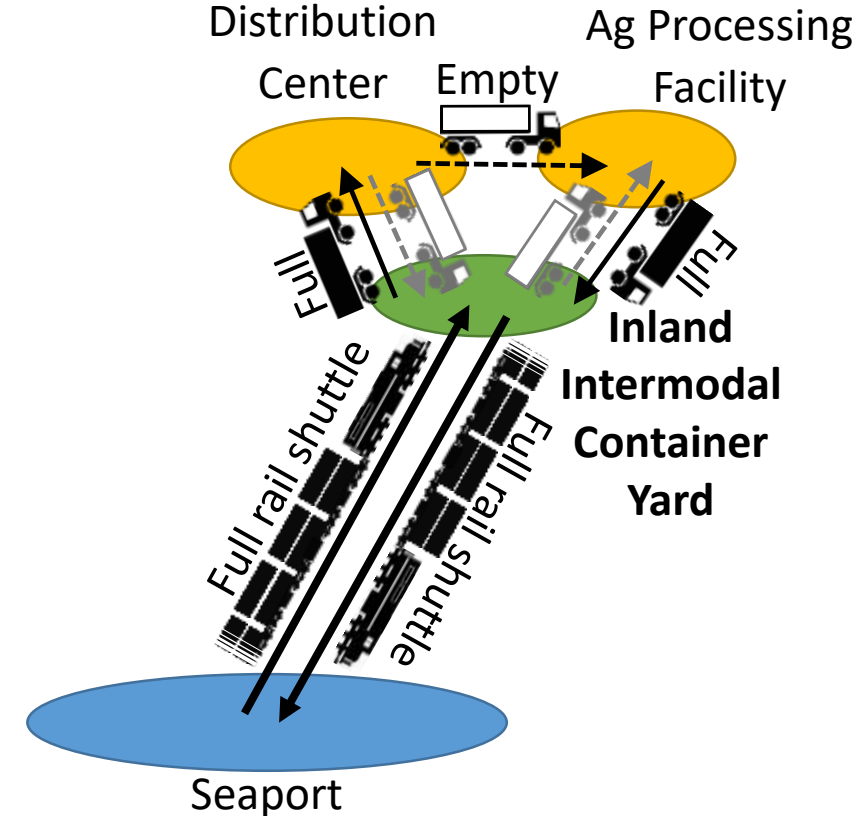


B. Exchange Empty Container/Chassis for needed ocean carrier type, and/or for cleaning



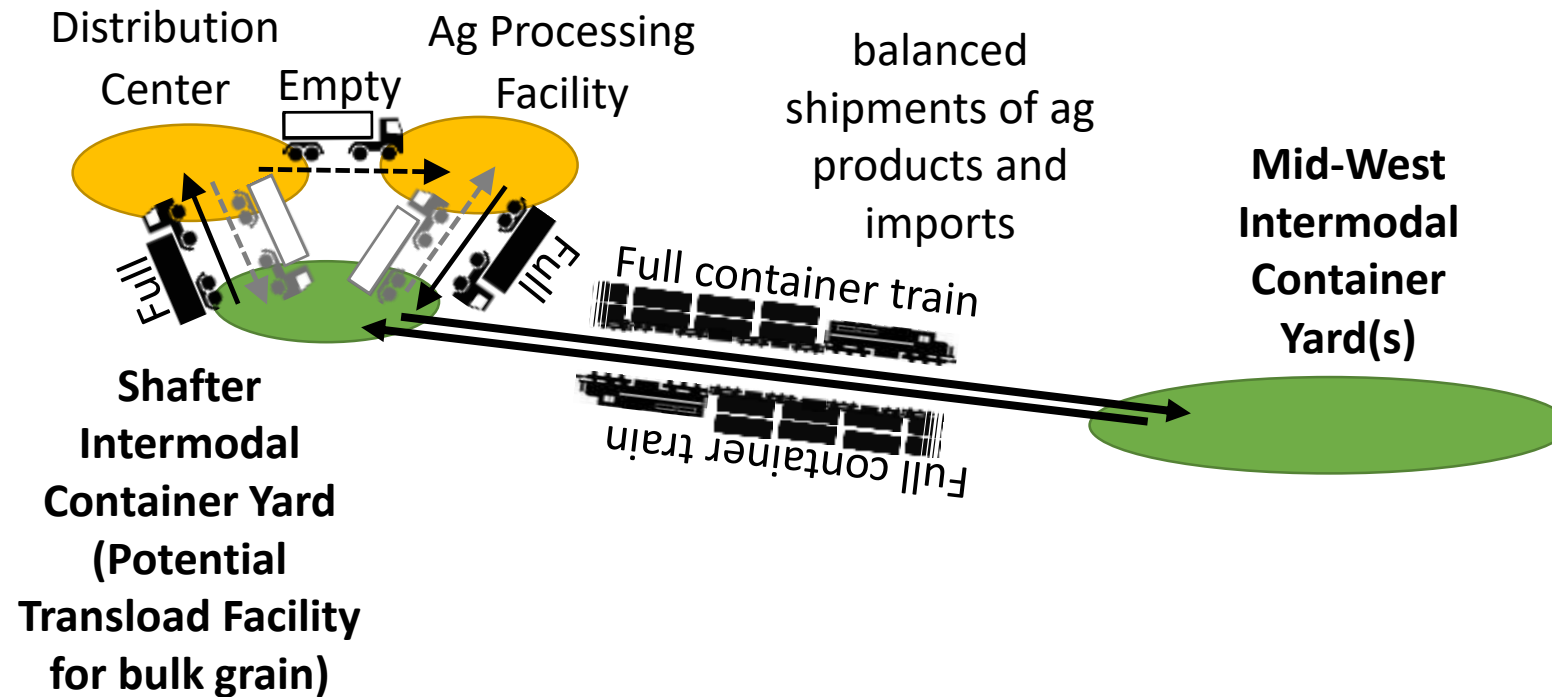
C. Rail Shuttle Concept ... Challenge

(Need 300 containers per ship headed to inland port and similar volume of exports going back with competitive pricing from a class 1 RR and/or additional government investment)



One More Interim Step Before Rail Shuttle to LA Port

B2. Establish Intermodal Rail Service at Shafter



SJVR & CFNR acquired by Canadian/Singapore Firms – Brookfield/GIC



15 years Ago Kern COG Proposed a Network of Inland Ports Connected by Short Haul Rail



SJV Air District: Inland Port Feasibility Study

Consider a network of multiple inland ports along the SR 99 Corridor

Partners: Merced/Castle AFB, SJVAPCD, South Coast APCD, Port of L.A.

September 2020

Kern COG: Kern Area Regional Goods-movement Operations (KARGO) Sustainability Study Phase I.

Identify Last Mile Connectors, Local Circulation Needs, Disadvantaged Community Impacts - Partners: Kern County, Bakersfield, Shafter, Caltrans

Early 2021

SJVRPAs: I-5 Freight Zero Route Emission Operation (ZERO) Sustainability Study

Identify Long Haul Clean Truck Technologies for the SJV I-5 Corridor -

Partners: 8-SJV Regional Planning Agencies, UC Davis, Caltrans

Fall 2021

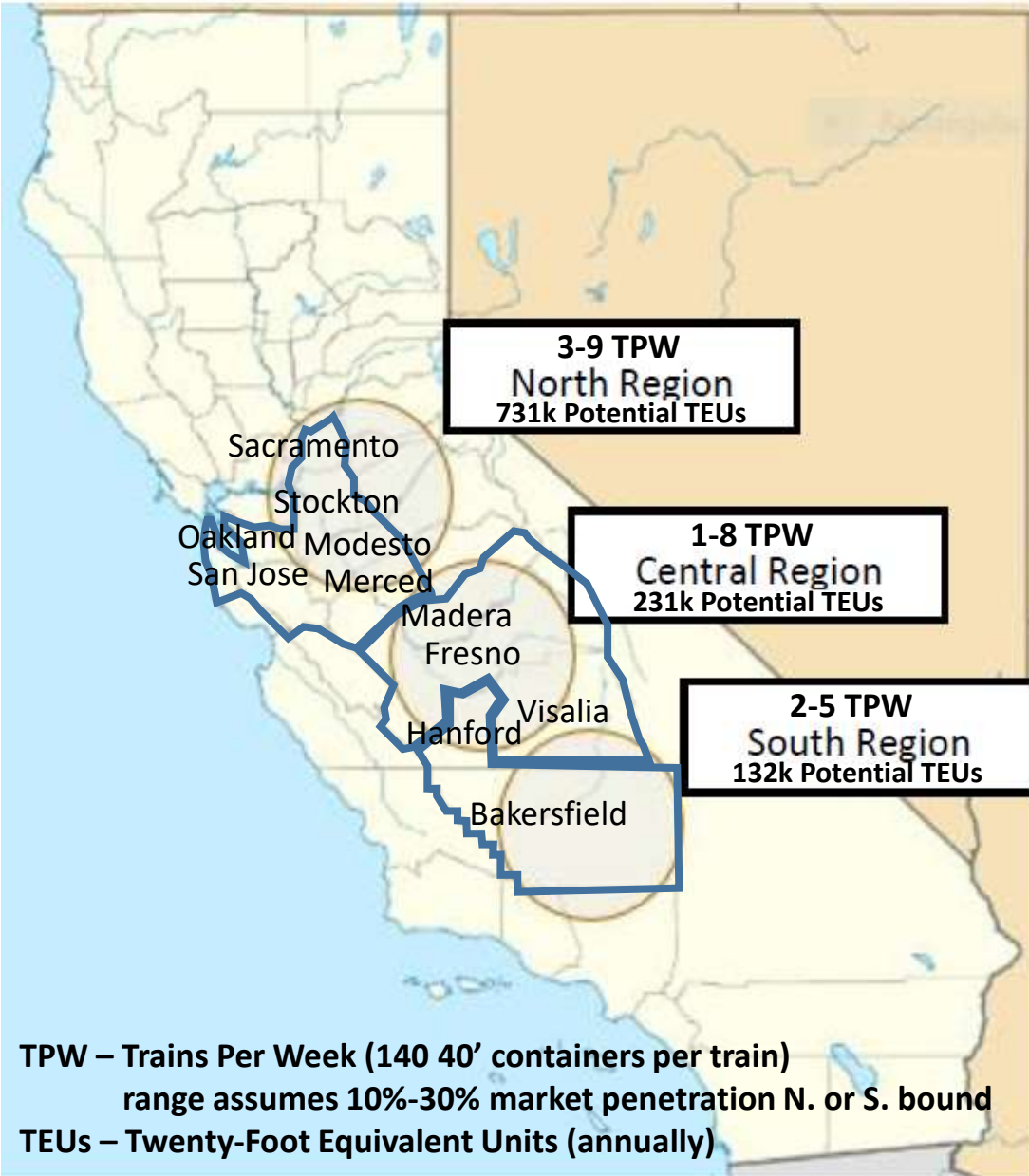
<https://www.kerncog.org/goods-movement/>



Comments on California Inland Port Feasibility Study: Preliminary Business Model



Inland Port Study



Loaded Import & Export TEUs Via PoLB/PoLA and Oakland to Bay Area & Central Valley

Region	Import TEUS		Export TEUs		Total TEUs		Total 3 Ports
	LA/LB	Oakland	LA/LB	Oakland	LA/LB	Oakland	
Bay Area	210,219	106,683	149,018	22,304	359,237	128,987	488,224
North Valley	79,037	25,303	101,867	36,684	180,904	61,987	242,891
Central Valley	61,829	18,509	107,683	42,816	169,512	61,325	230,837
South Valley	42,541	5,288	54,569	29,686	97,110	34,974	132,084
Total	393,626	155,783	413,137	131,490	699,080	287,349	1,094,038

Loaded Import & Export TEUs Via PoLB/PoLA and Oakland to Middle & South Valley Zones

County	Import TEUS		Export TEUs		Total TEUs		Total 3 Ports
	LA/LB	Oakland	LA/LB	Oakland	LA/LB	Oakland	
Merced	8,240	2,749	16,621	2,716	24,861	5,465	30,326
Madera	5,346	1,013	12,031	3,593	17,377	4,606	21,983
Fresno	31,813	11,363	29,322	16,126	61,135	27,489	88,624
Tulare	16,430	3,384	49,709	20,381	66,139	23,765	89,904
Total Central Valley	61,829	18,509	107,683	42,816	169,512	61,325	230,837
Kings	7,108	3,168	23,600	8082	30,708	11,250	41,958
Kern	35,433	2,120	30,969	21,604	66,402	23,724	90,126
Total South Valley	42,541	5,288	54,569	29,686	97,110	34,974	132,084



Shafter - Wonderful Industrial Park (WIP)



Kern Area Regional Goods-movement Operations

KARGO Sustainability Study

Leveraging AB 617 Outreach Process

Phase I: Integrated Circulation Study

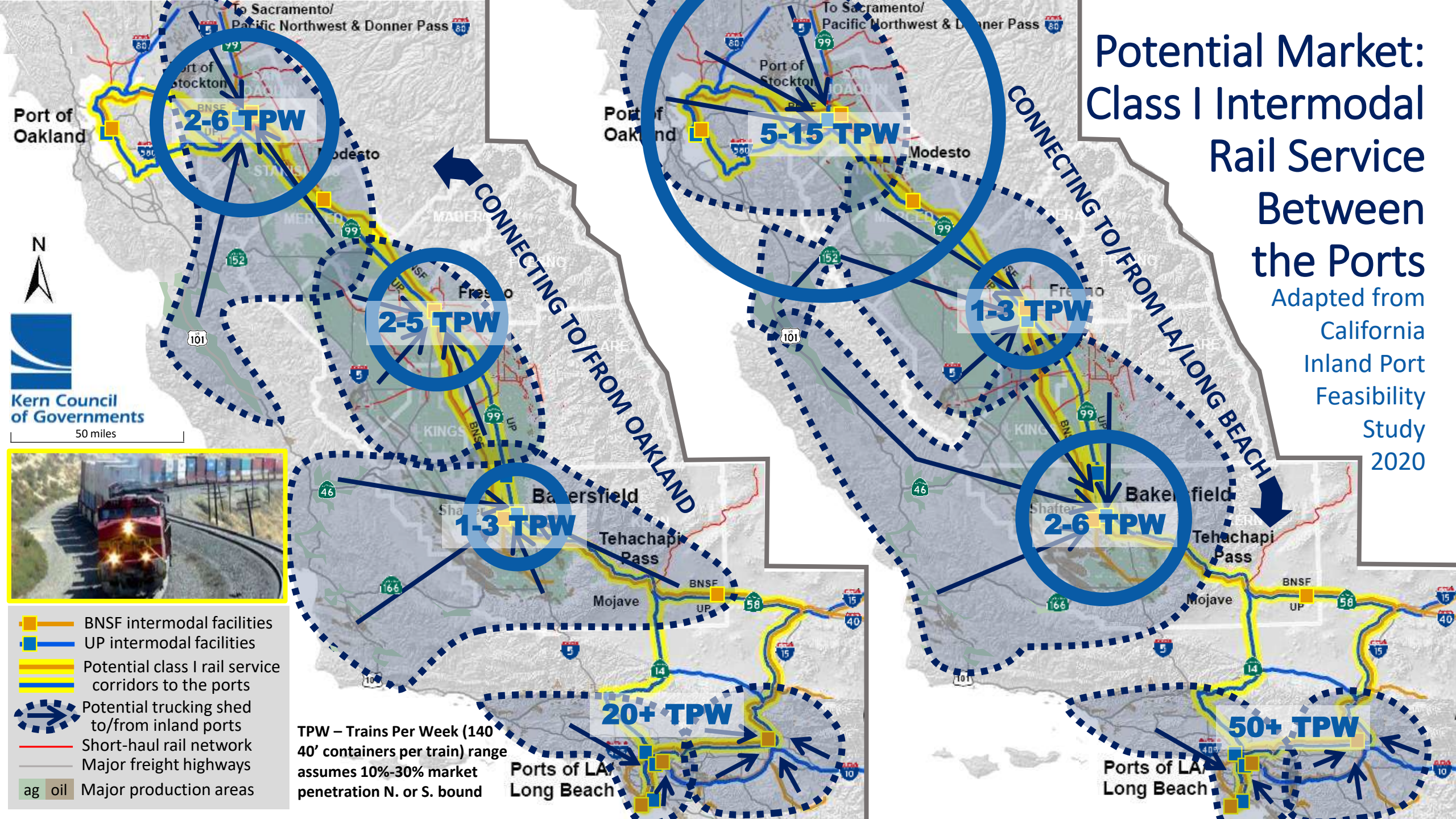
BFL International Airport – One of only 3 this size in the U.S.



Modified 2/18/21

Potential Market: Class I Intermodal Rail Service Between the Ports

Adapted from
California
Inland Port
Feasibility
Study
2020



Rio Tinto starts producing lithium in California from old mining waste

By DAVID STRINGER | BLOOMBERG

OCT. 25, 2019 | 1:37 PM



Rio Tinto's borax mine in Boron, Calif., in 2010. The company is reprocessing mining waste to extract lithium, which can be used in rechargeable batteries. (David McNew / Getty Images)

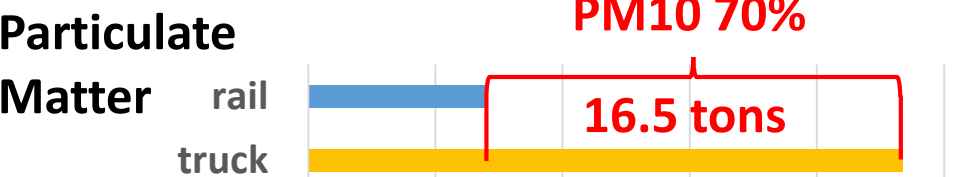
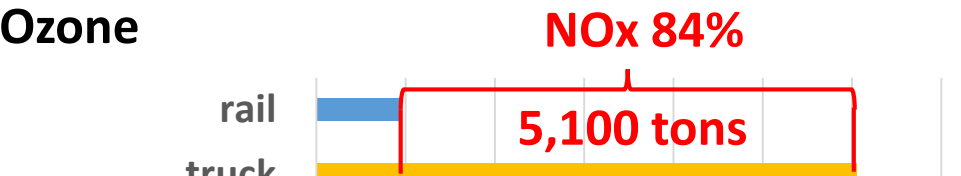
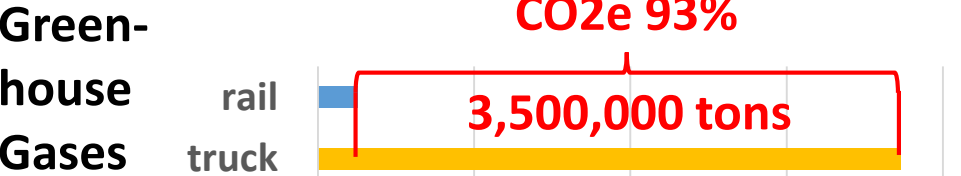
Potential Autonomous Electric Haulage Vehicle



BNSF Operates 7 trains per week betwn.
Rio Tinto in Boron and the Port of L.A.



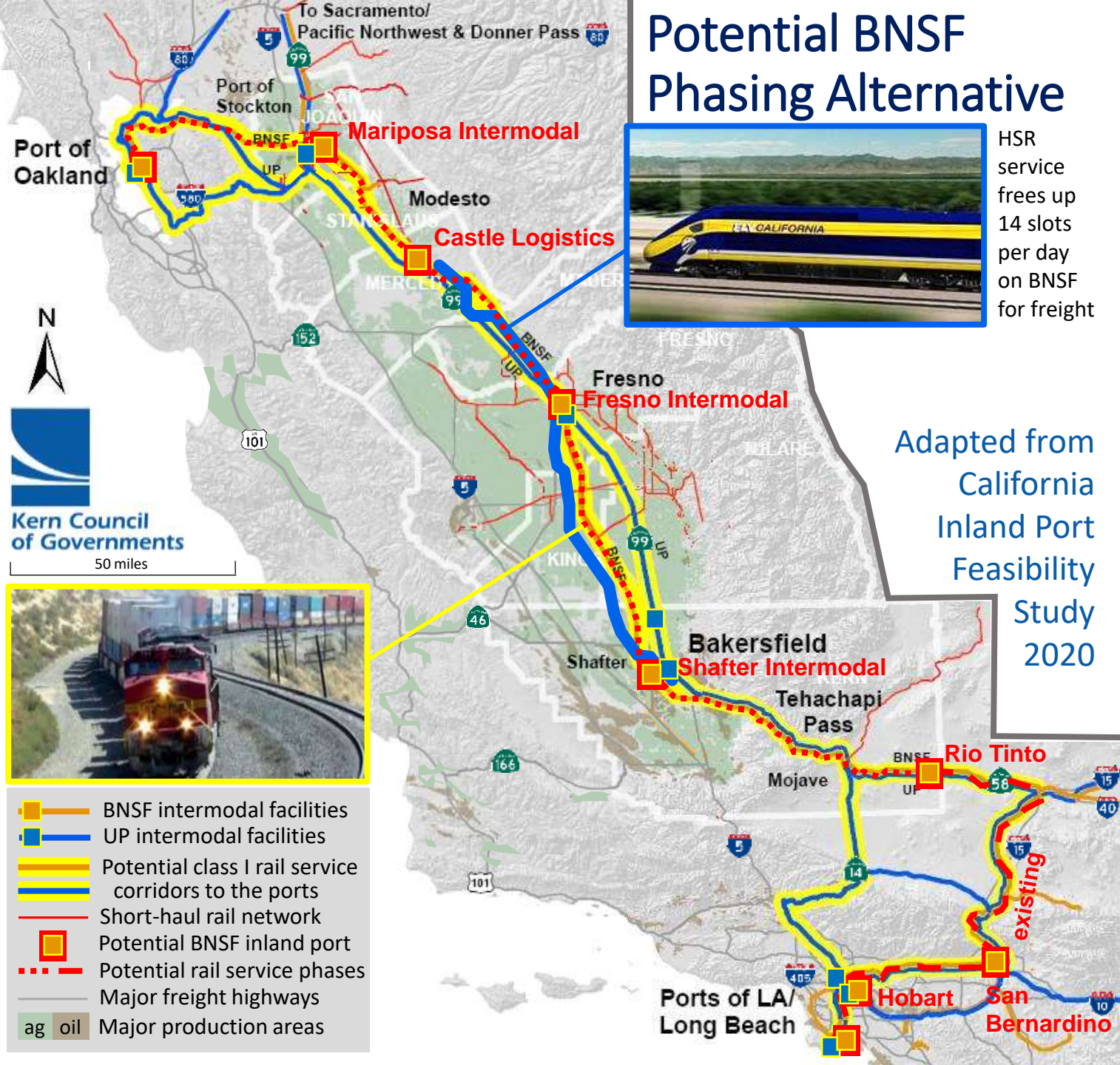
Potential Rail Freight Service Annual Emission Reductions



Assumptions:

- 250 truck trips removed per train
- 2010 train emission rates

Source: SJVAPCD, California Inland Port Feasibility Study 2020



Projected Land Use Employment



SHAFTER

GAF

UP mainline

WIP

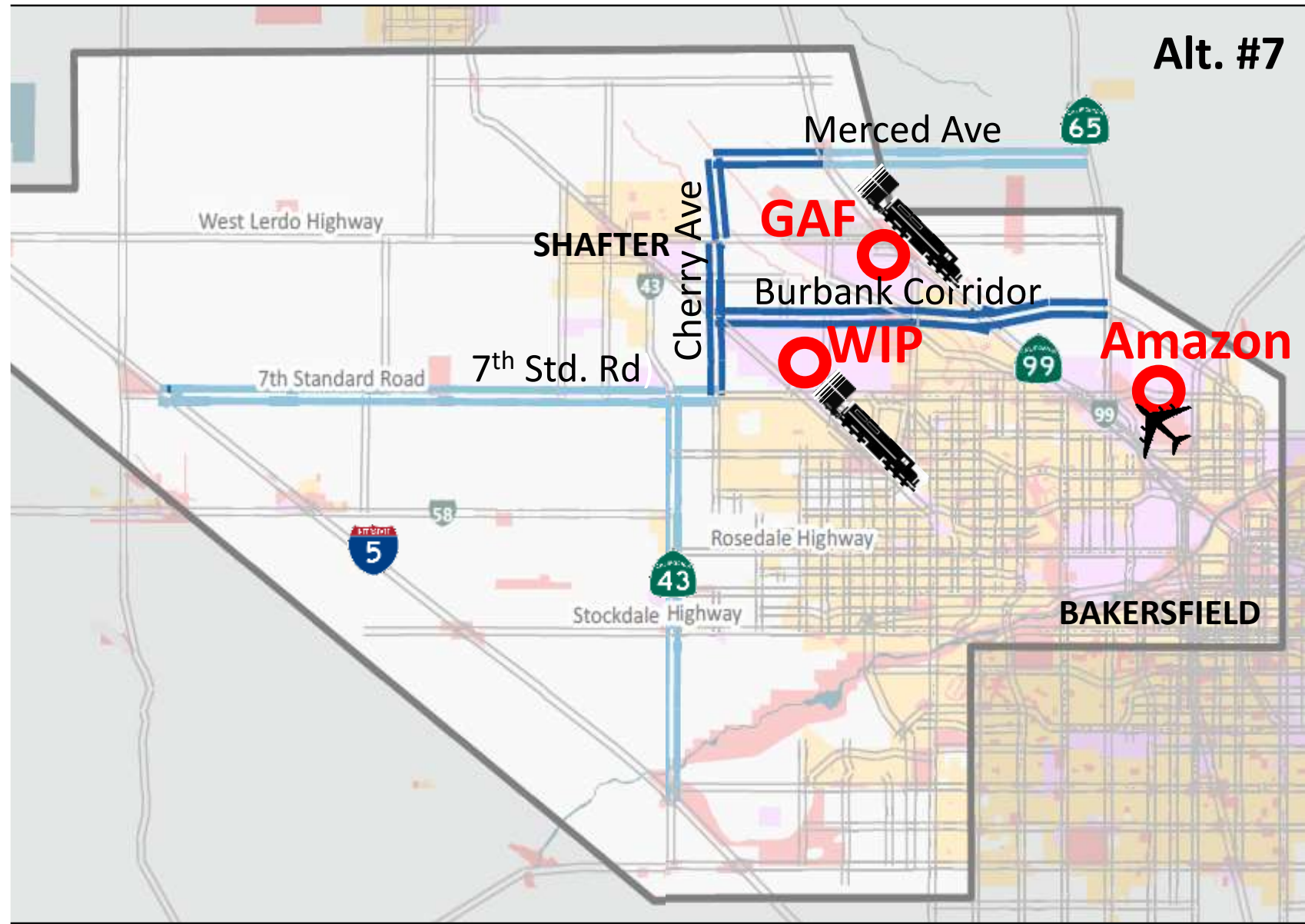
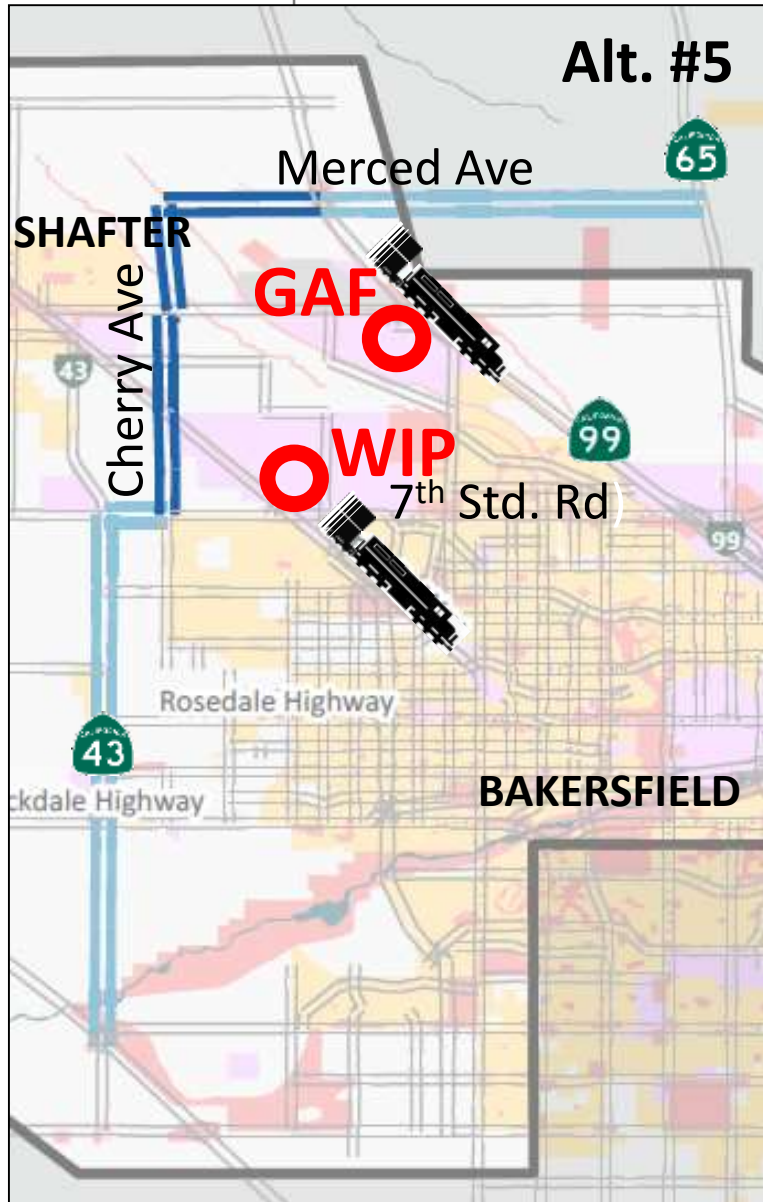
BNSF mainline

Amazon

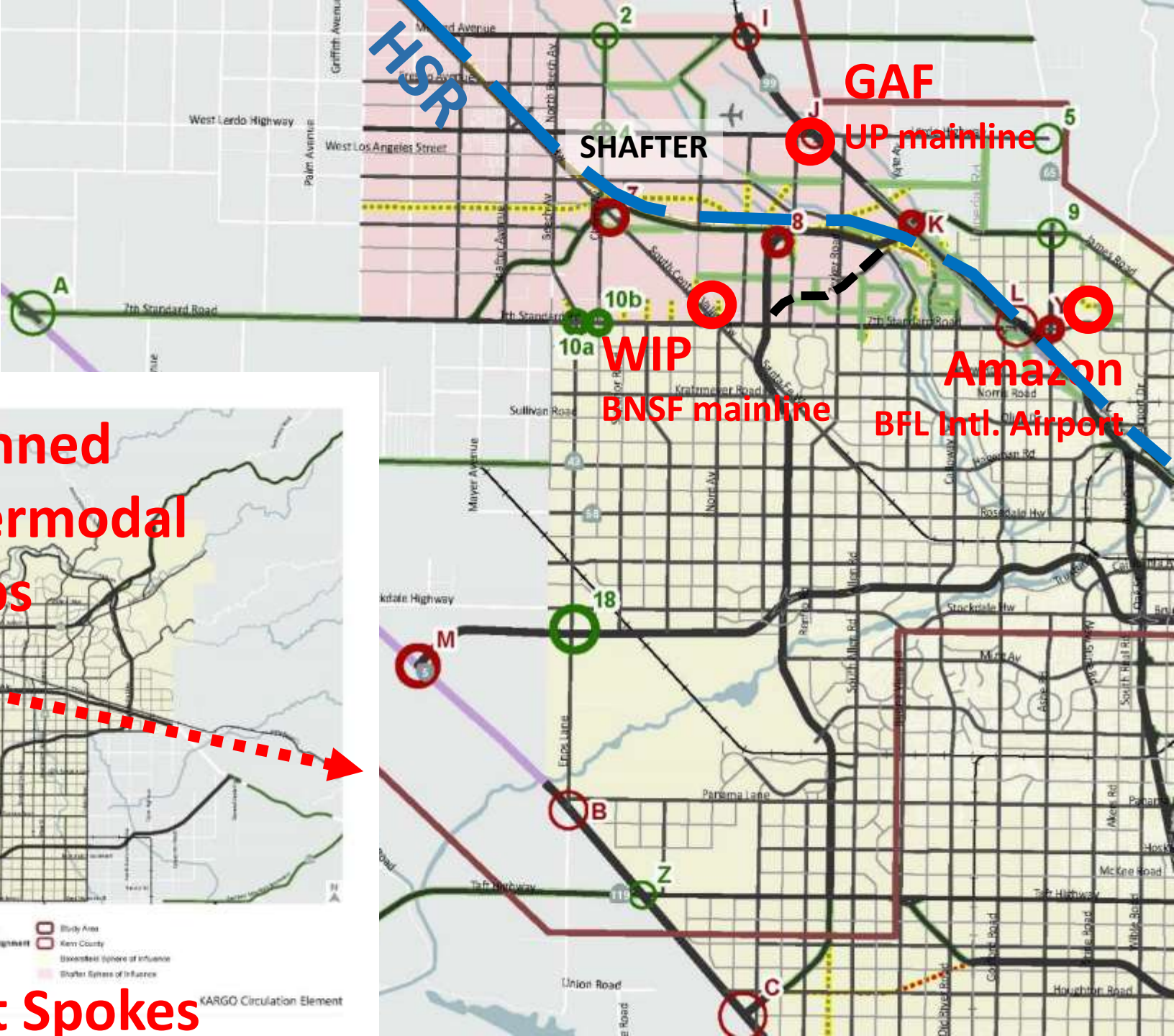
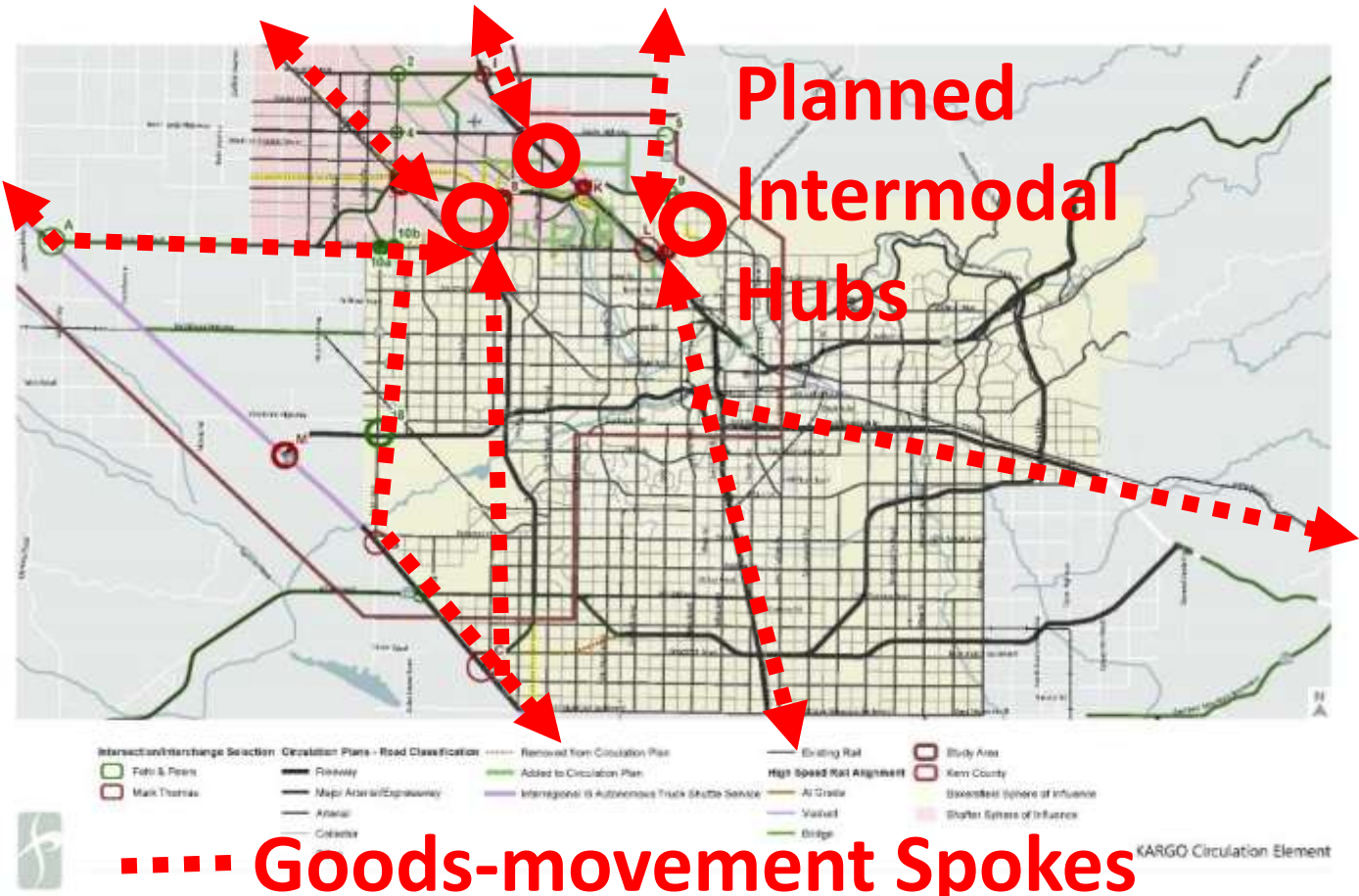
BFL Intl. Airport

BAKERSFIELD

Promising Early Hybrid Alternative



Suggested Non Auto-Oriented Changes to Local Jurisdiction Circulation Plans



Proposed Kern SAFETEC Logistics Zone – Advanced Research Corridor Network

– Safer Autonomous Freight Enhanced Testing Environmentally Clean (SAFETEC) Logistics Zone



Google spinoff Waymo LLC

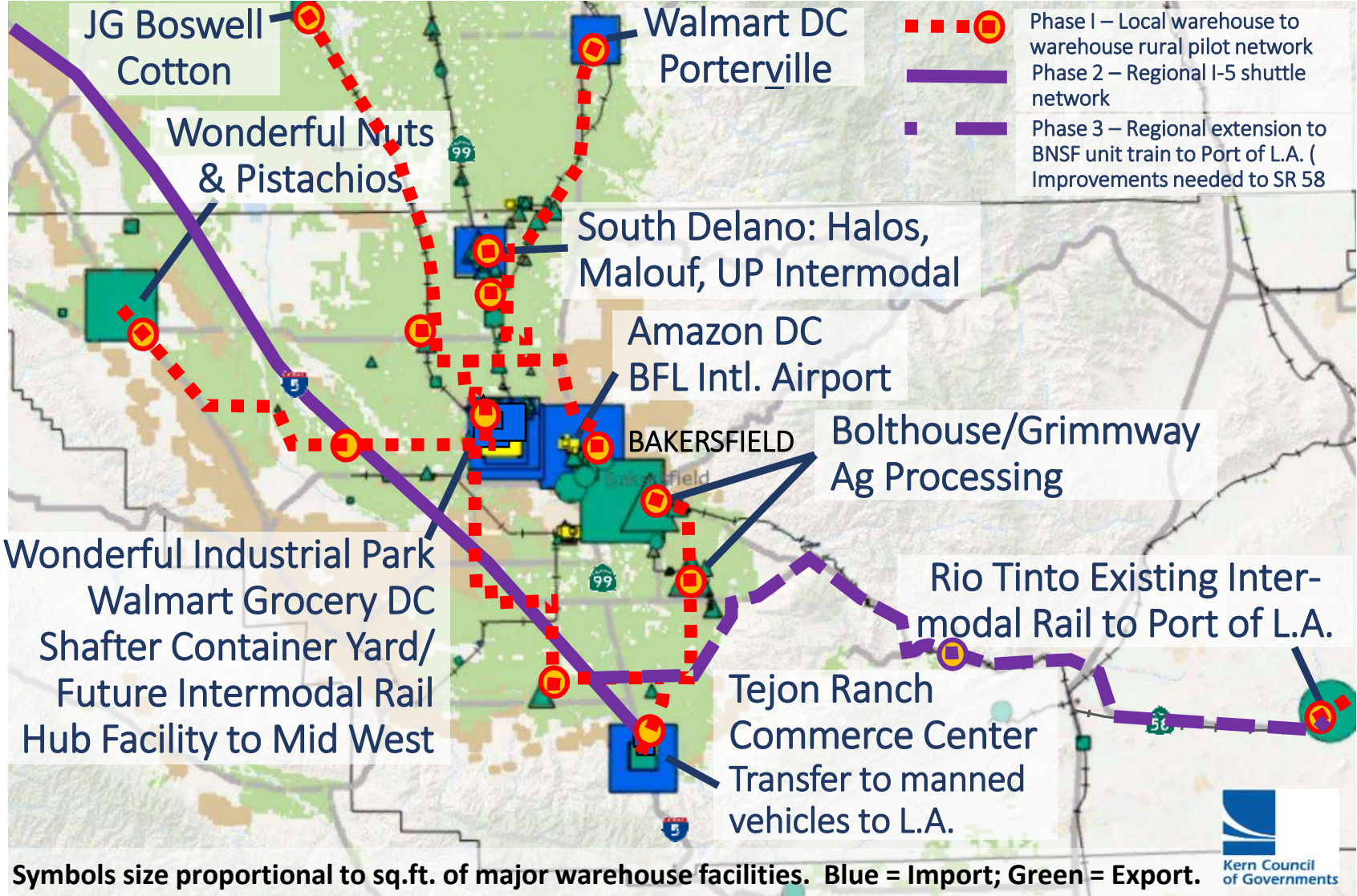


Tesla Electric Truck - Autonomous



Volvo Electric Autonomous Truck

Potential Pilot Rural Logistics Corridor Network



Potential Signage for Autonomous Truck Testing Routes



Autonomous trailers transfer to trucks with drivers for connecting to all points West to US101 Salinas Valley Corridor

Potential Benefits:

- High Paying Tech Jobs
- Cleaner Air
- Improved Safety
- Community Livability
- Lower Shipping Costs
- New Road Funding Source

Potential Rural Logistics Corridor Network

- Test track
- Dairy cluster
- Distribution Center (DC), Processing/Mfg. Facility
- Potential Transfer Facility to Rail or Trucks with Drivers
- Local Government Maintained Corridors/future routes (dashed lines)
- Local/State Maintained Corridors
- Local/State Corridors thru Neighboring Counties
- Interregional I-5 Autonomous Truck Shuttle Service
- Interregional Service Expansion to Existing Rail Service

Initial corridor testing would likely be warehouse to warehouse shipping points in rural, low population areas of the region, and gradually expanded as technology is proven successful and safe. Special consideration will be needed to fund road maintenance, improvements, insurance, safety patrolling, and avoidance of impacts on disadvantaged communities by these testing corridors.

DRAFT Proposed Kern SAFETEC Logistics Zone

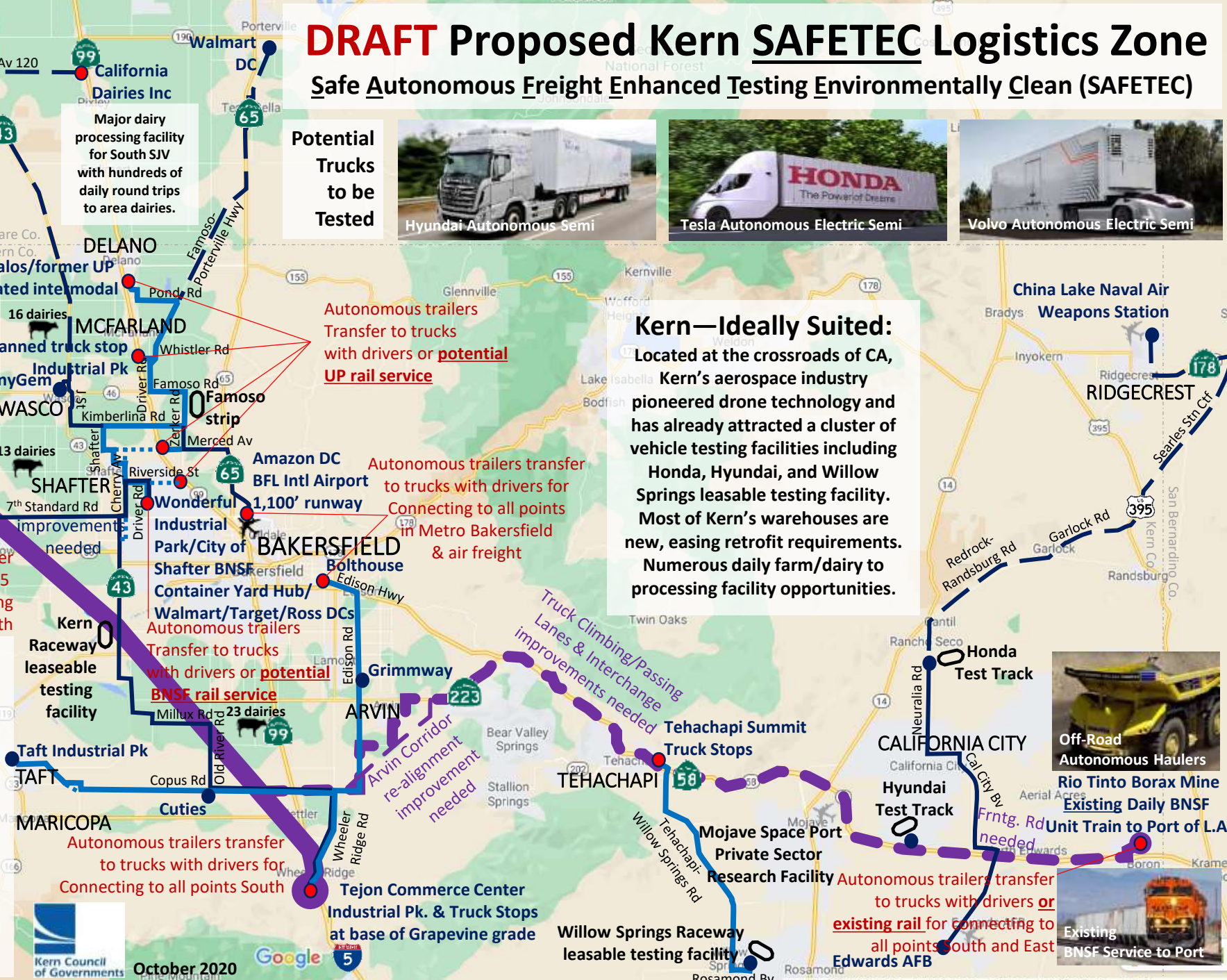
Safe Autonomous Freight Enhanced Testing Environmentally Clean (SAFETEC)

Potential Trucks to be Tested



Kern—Ideally Suited:

Located at the crossroads of CA, Kern's aerospace industry pioneered drone technology and has already attracted a cluster of vehicle testing facilities including Honda, Hyundai, and Willow Springs leasable testing facility. Most of Kern's warehouses are new, easing retrofit requirements. Numerous daily farm/dairy to processing facility opportunities.



October 2020



Kern COG KARGO Sustainability Study – Phase II.

Research Funding Mechanisms/Mitigation Strategies

Next-Generation Industrial TradePort District

- Clean Tech Incentive Fee Structure for Early Adopters
(Autonomous Trucks, ZEV Tech, etc.)
- Mobility/Regional Road Mileage Fee Pilot
(on Autonomous Trucks)
- Freight Modal Shift Program to Rail
- Regional Warehousing Impact Fee on top of TIFs
- Sales/Property Tax Measures
- Other clean-up tasks from Phase I.

I-5 Freight Zero Route Emission Operation (ZERO) Sustainability Study

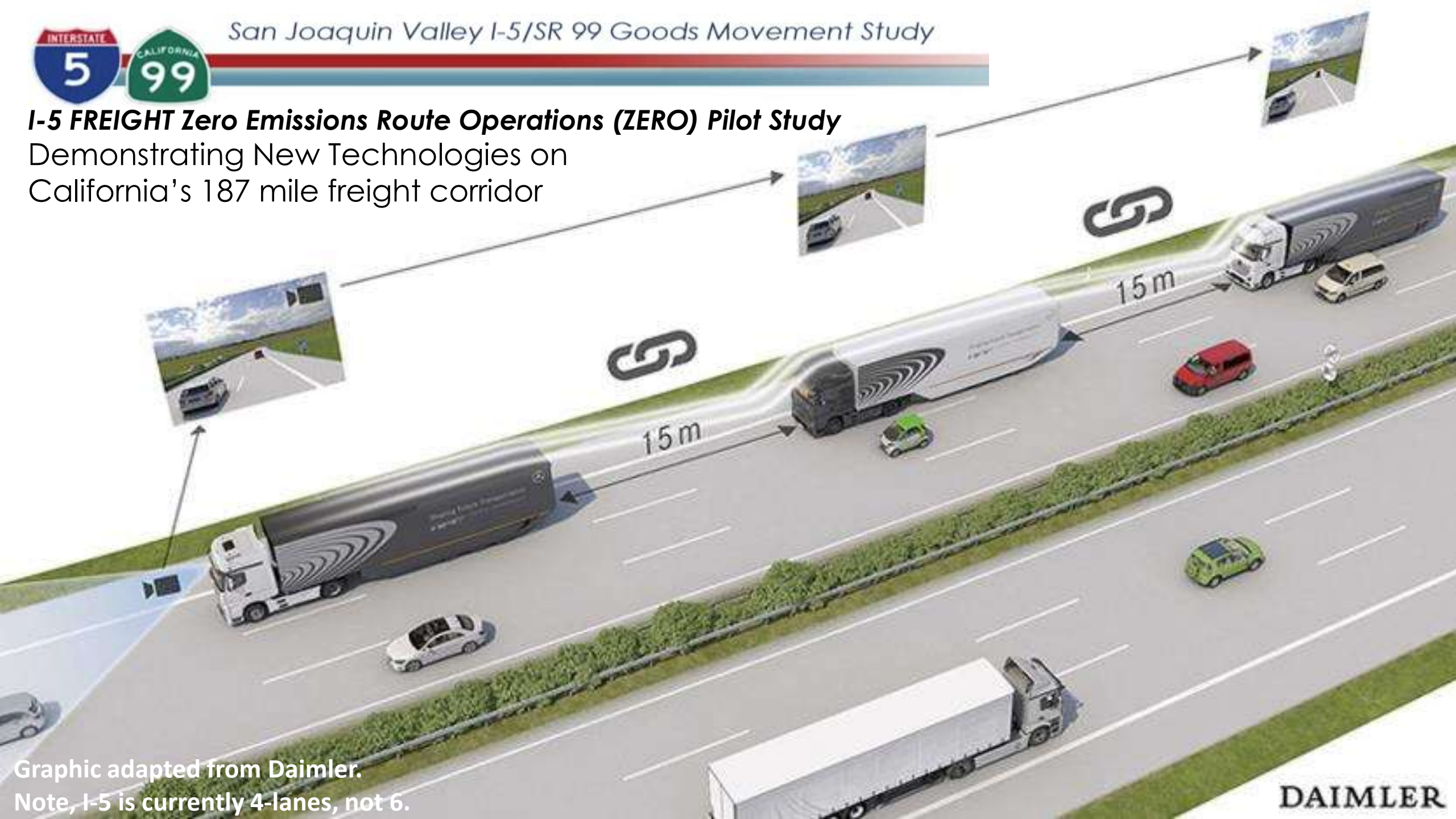


Kern Council
of Governments



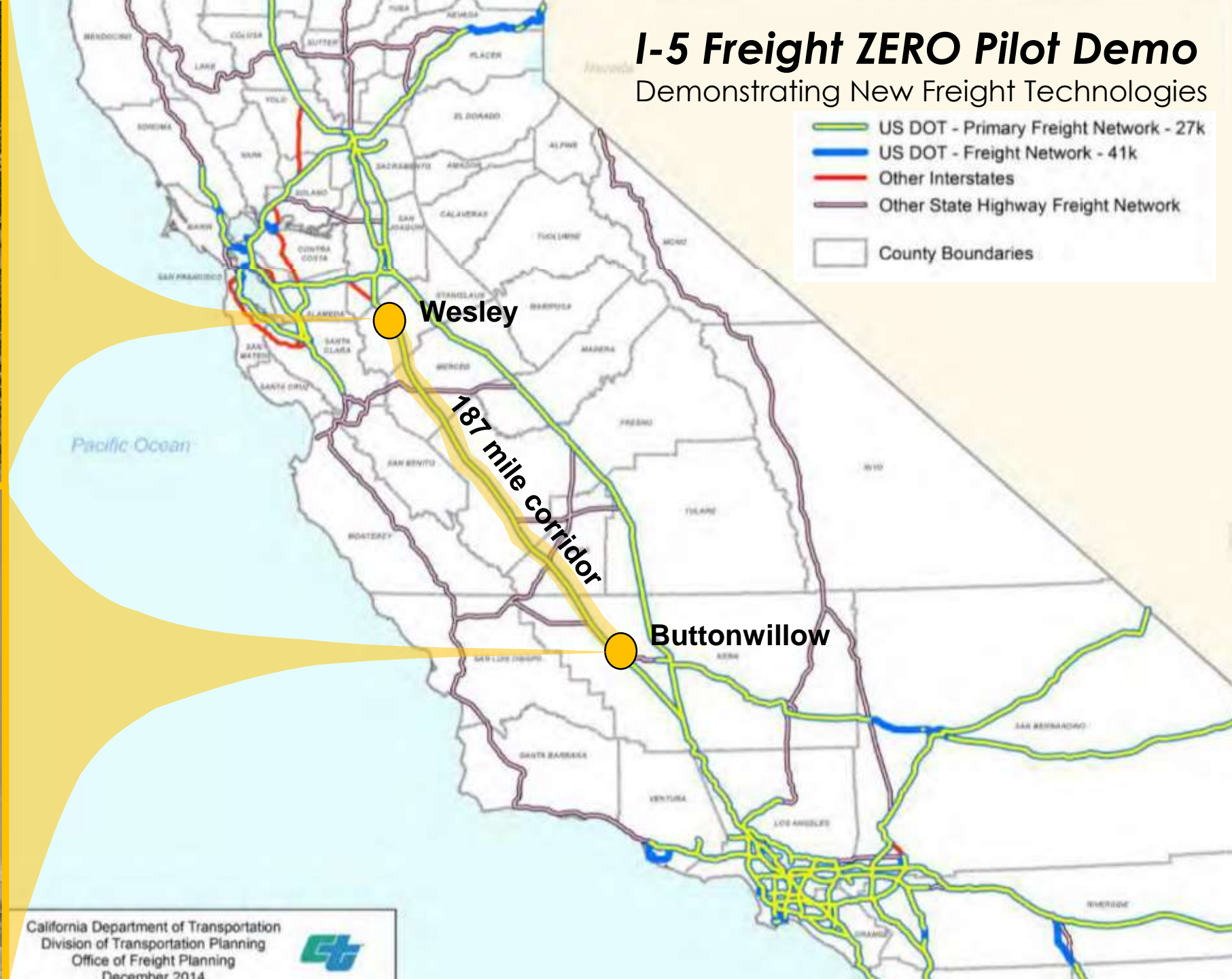
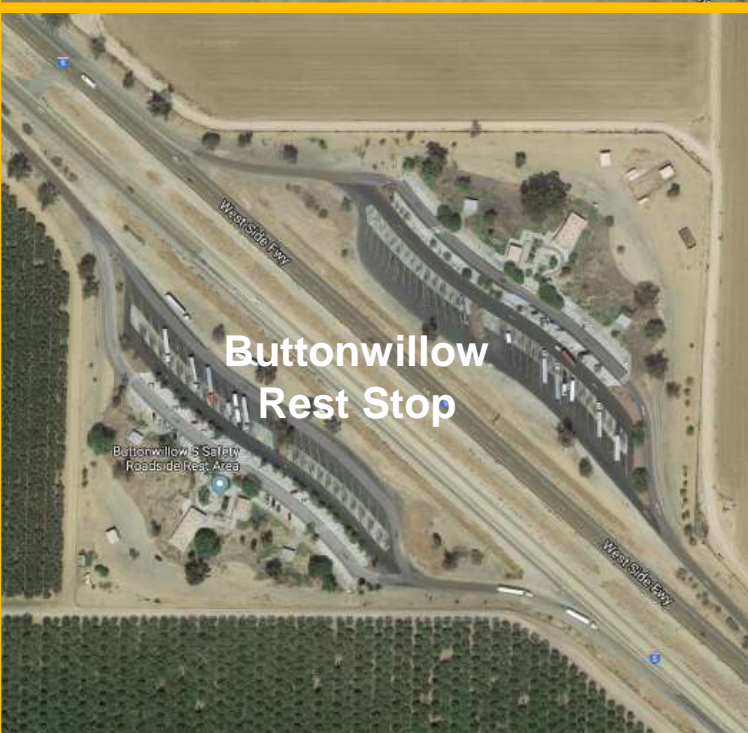
I-5 FREIGHT Zero Emissions Route Operations (ZERO) Pilot Study

Demonstrating New Technologies on
California's 187 mile freight corridor



Graphic adapted from Daimler.
Note, I-5 is currently 4-lanes, not 6.

DAIMLER



I-5 Freight ZERO Pilot Project – Phase I.

Testing Emerging Cleaner Long-Haul Semi-Truck Fleet Tech

- SJV Frito-Lay Plant has 38 existing CNG Volvo Trucks and fueling facilities
- Another 15 Tesla Trucks are on Order

Ultra-Clean
Renewable
Bio-Diesel

Hydrogen
Fuel-cell

Battery Electric

Renewable
Natural Gas
CNG/LNG

Freightliner Cascadia

Diesel Truck
6x4 Tandem Axel Drive
Long Range
Sleeper
0-60 in ~60 Sec. @ 80k GCW



Image: Freightliner

Nikola One

Hydrogen Fuel Cell – Electric Truck
Six Motor AWD
Long Range
Large Sleeper
0-60 in 30 Sec. @ 80k GCW



Image: NIKOLA

Tesla Truck

Battery – Electric Truck
Six Motor AWD
Long Range
Large Sleeper
0-60 in 20 Sec. @ 80k GCW



BYD Truck

Battery – Electric Truck
Six Motor AWD
Medium Range
No Sleeper
0-60 in ?? Sec. @ 80k GCW



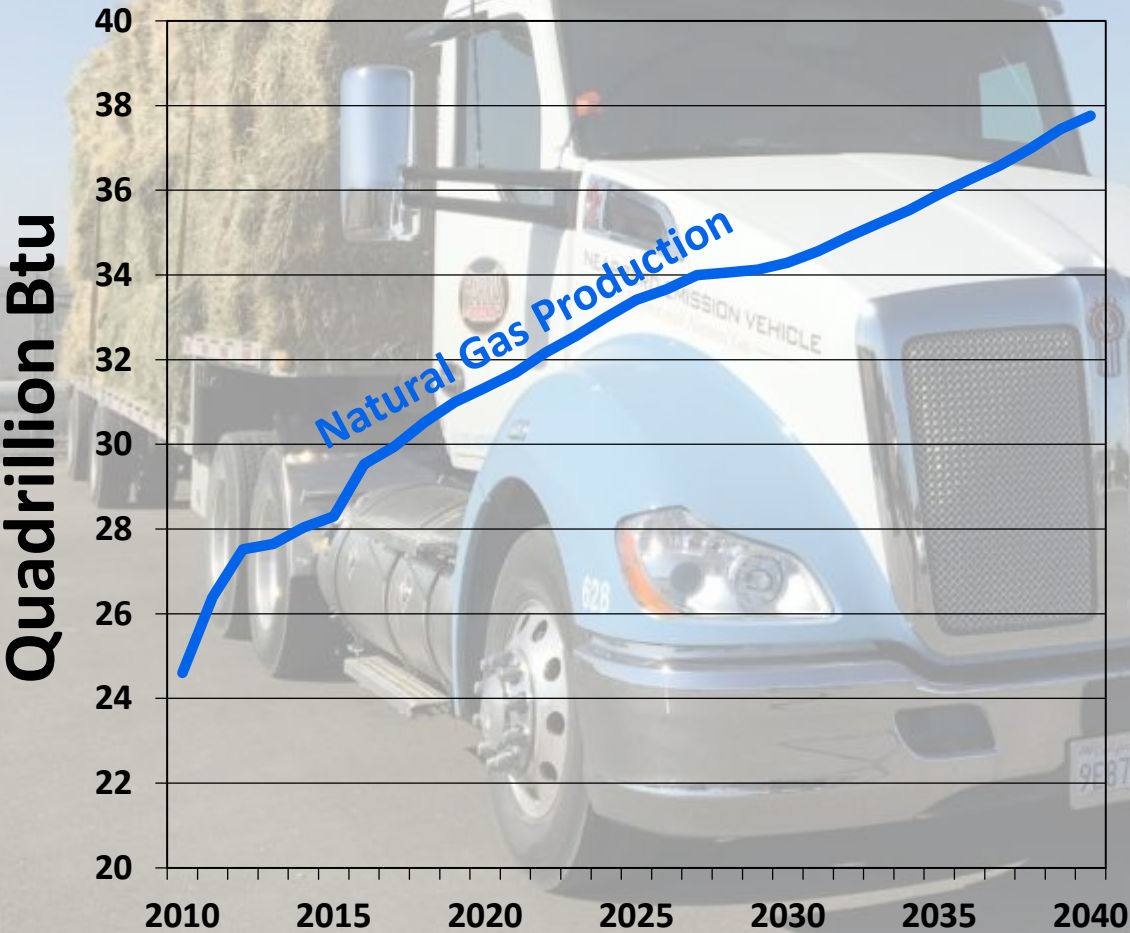
Kenworth RNG

CNG or LNG
6x4 Tandem Axel Drive
Long Range
Sleeper option
0-60 in ~60 Sec. @ 80k GCW

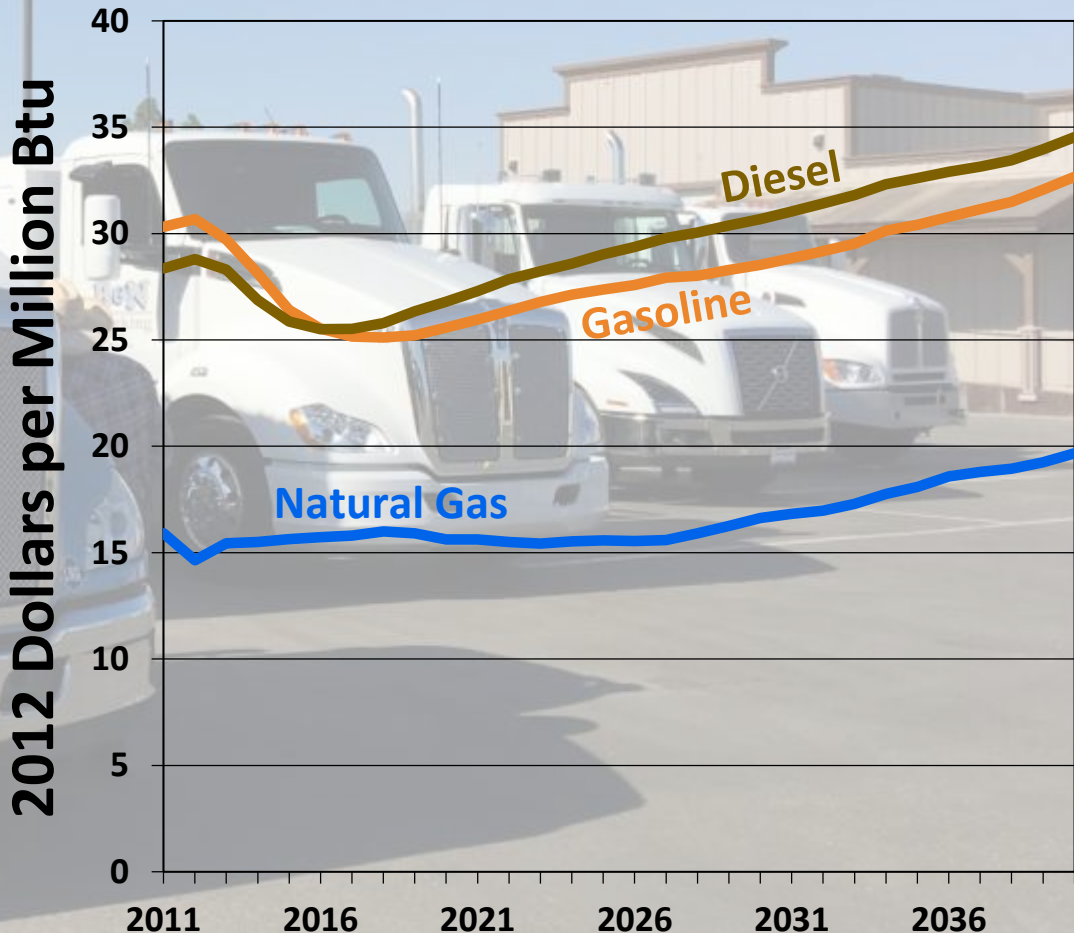


CNG Basics: Supply and Price Projections

Natural Gas Production – U.S.



Transportation Fuel Price – U.S.



99.9% clean “Near Zero Emission” CNG & LNG Kenworth & Volvo trucks used in the SJV on display in Shafter, CA

Compressed Natural Gas \Rightarrow Renewable Natural Gas \Rightarrow Hydrogen

RNG Better than zero for CO₂*, low federal criteria emissions (NO_x,...), interim step to hydrogen fuel cell

Two Zero Emission Technology Options for Trucks & Buses

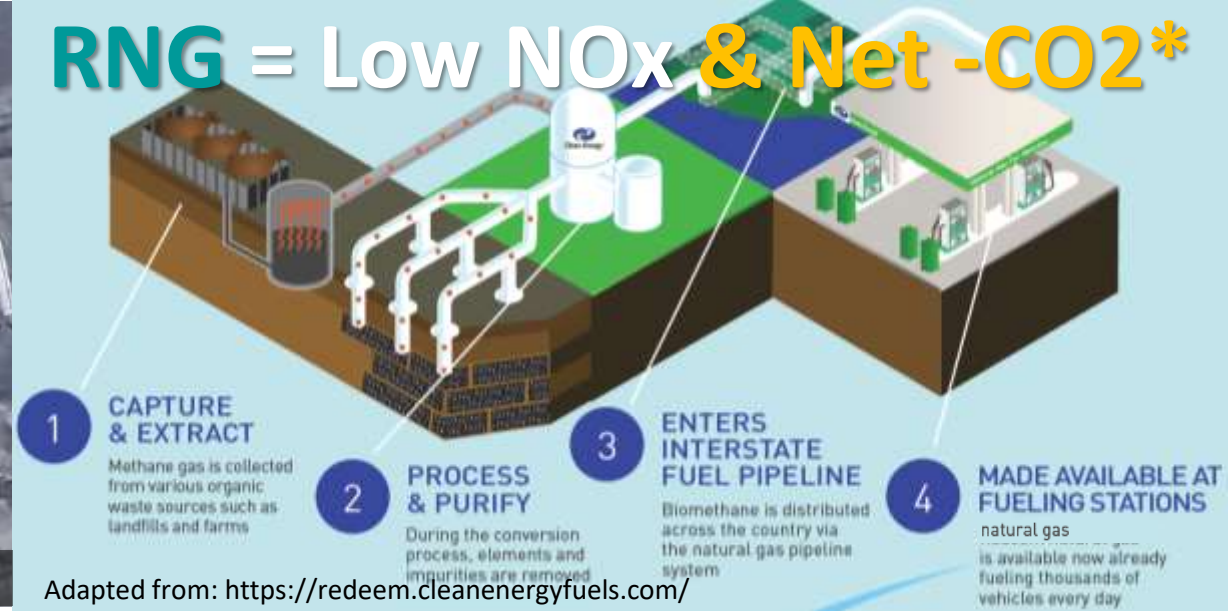
Hydrogen fuel cell tech
BEATS battery electric

- longer range
- faster refilling
- better cold weather performance
- superior hill climbing ability

CNG = Low NO_x



RNG = Low NO_x & Net -CO₂*



- **Similar Ranges** - CNG/RNG & hydrogen fuel cell trucks/buses all have similar operating ranges, so same routes can be operated with no additional trucks/buses. CNG and hydrogen trucks both require the refueling of a compressed gas, with similar piping, compression, and gas distribution equipment
- **Similar Codes** - Codes and standards are similar

(for the safe handling of Class 2 flammable gasses)

- **Similar Infrastructure** - CNG/RNG and hydrogen use a common feedstock – natural gas - so much of the existing infrastructure can be repurposed
- **Faster Fueling** - Like CNG, hydrogen refueling infrastructure is scalable and allows fast refilling
- **Similar Training Requirements** as handling CNG fuel

*Methane in RNG is a 25 times more potent greenhouse gas than CO₂ so burning it greatly reduces CO₂ equivalent emissions resulting in better than zero CO₂ emissions compared to burning straight hydrogen.

To Get Industry's Interest... Talk Market Share/Branding Government Fees & Incentives vs. Protecting Business Market Share

- Government Funds Marketing Campaign for Consumers to Purchase Products Shipped Sustainably (Like SmartWay or Energy Star, sort of a LEED program for goods movement).
- Menu Based Approach - Let Business Pick Which Sustainable Shipping Strategies They Want to Use
- Participating Businesses are licensed to Market their Products as Being “Shipped the Smart Way” or “Green Seal Certified.”
- Government Certification Regularly For Use of Marketing & Promotional Materials



Other branding and certification resources



proprietary product for
supply chain tracking



Trucking Efficiency is a an industry organization focused on reducing fuel use by the trucking industry.

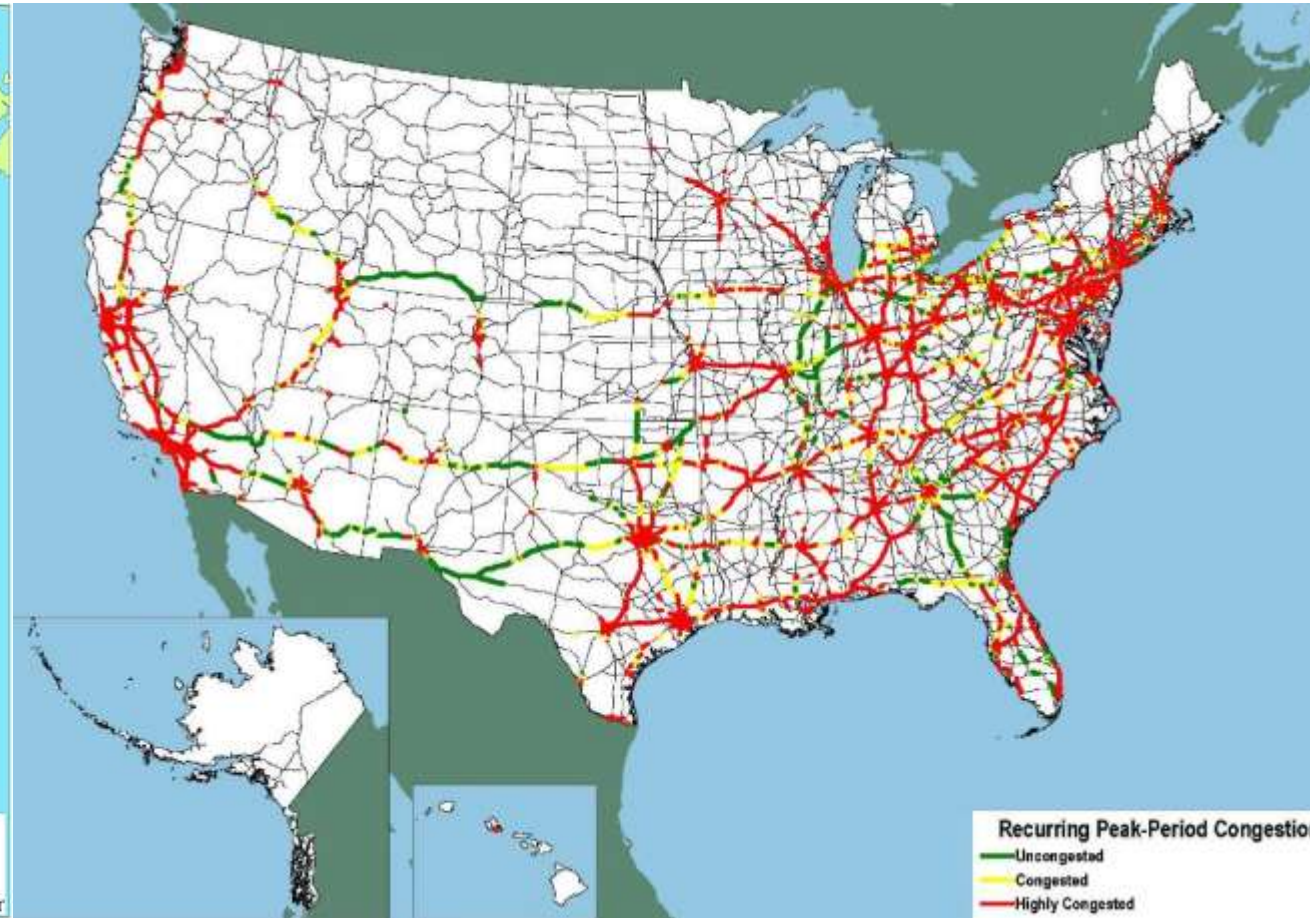
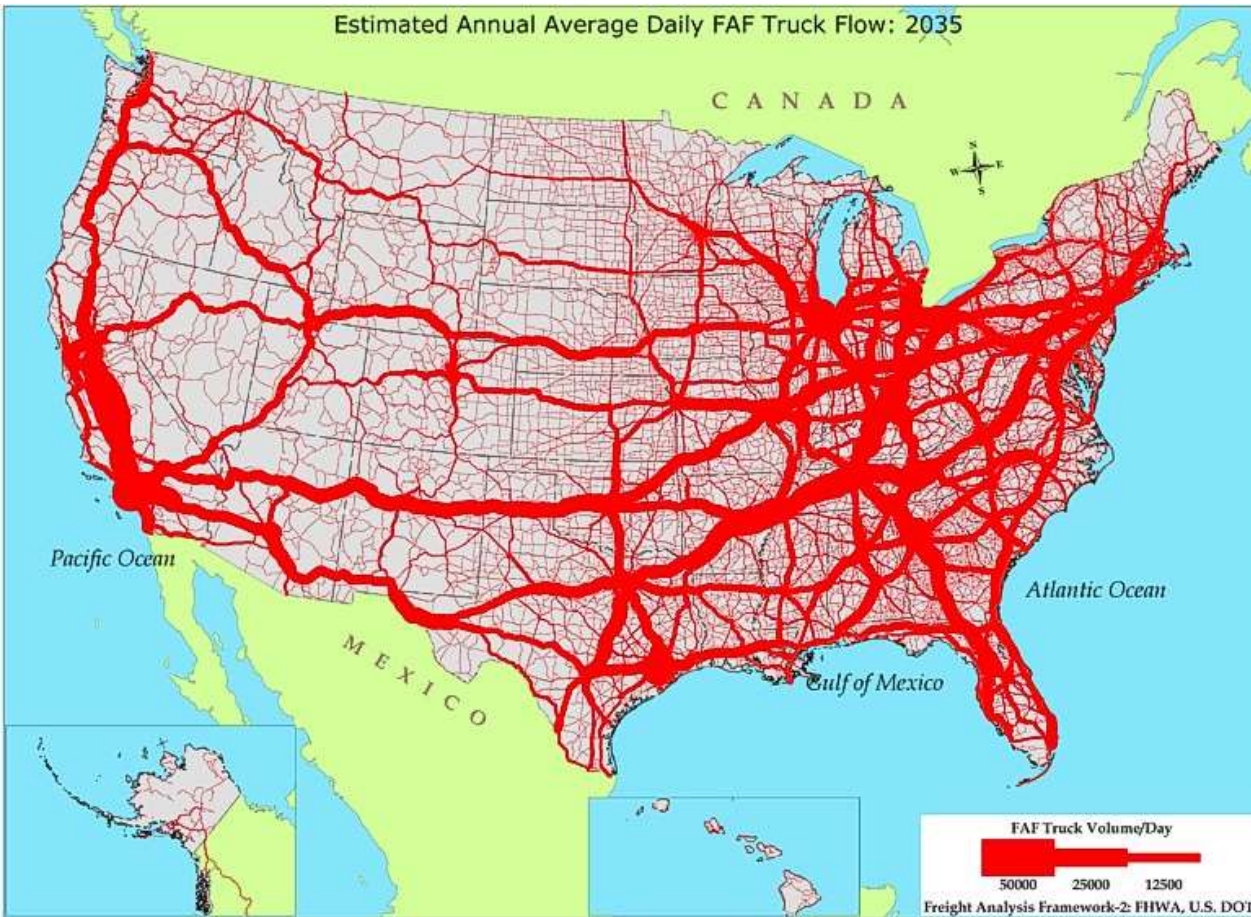


<https://rmi.org/our-work/transportation/trucking-efficiency/>

Non- Transportation
Certification
Branding Examples



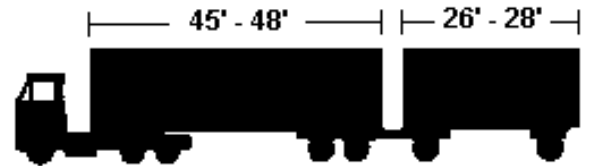
2035 Truck Volumes Will be A Major Issue for the San Joaquin Valley and the Nation



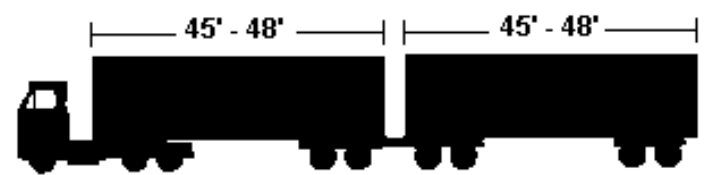
Triple Trailers + Longer Trucks = Fewer Trucks and Less Emissions

Common LCVs

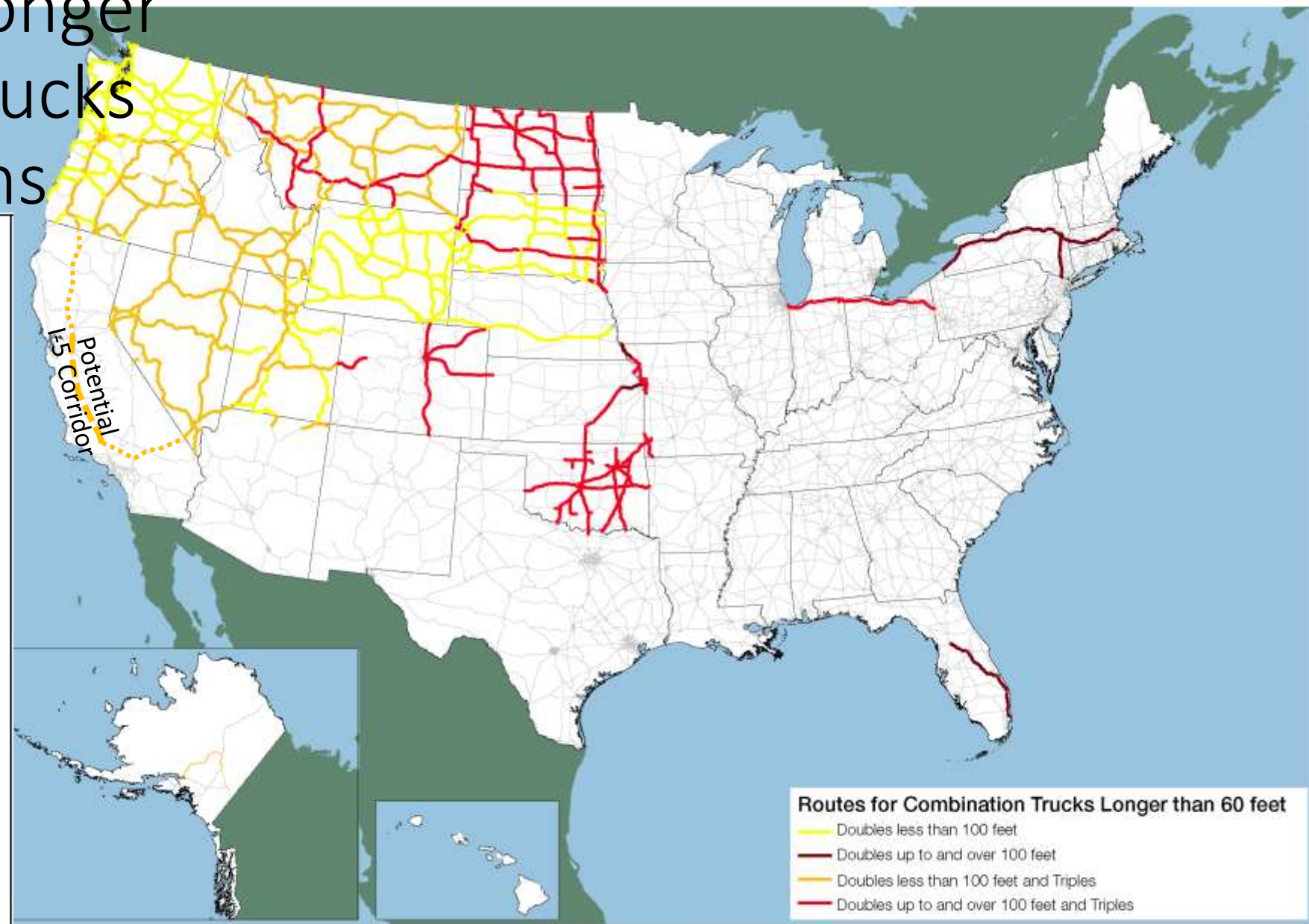
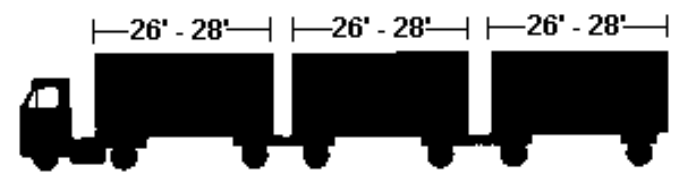
Rocky Mountain Double



Turnpike Double



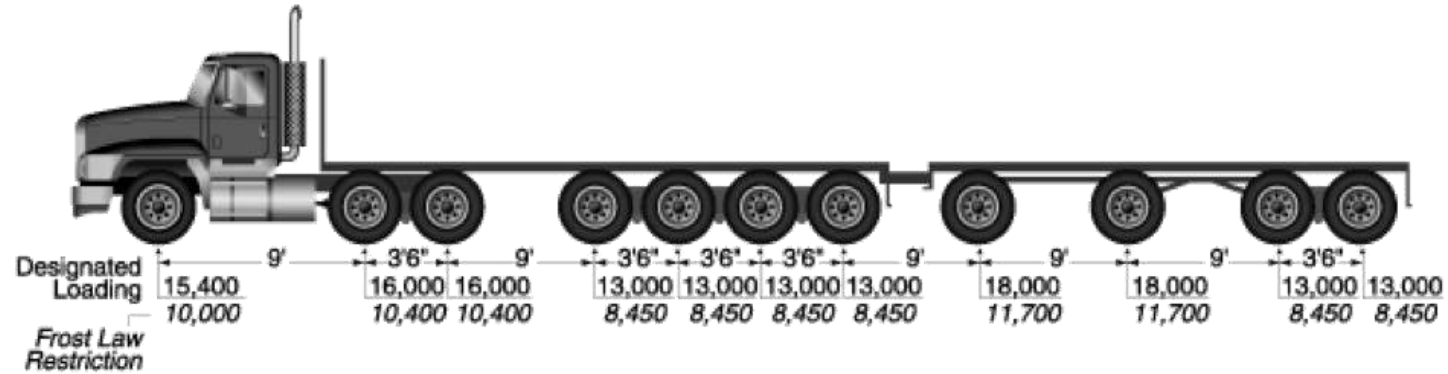
Triple



Note: Empty Triples are allowed on I-80 in Nebraska.

Source: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Management and Operations, special compilation by the Freight Operations and Technology Team, 2010.

Heavier Loads + Even More Tires = Less Weight/Tire = Fewer Trucks, Better Air, Less Wear and Tear on Roads, Savings on Road Maintenance to Re-invest in Capacity



Truck tolling is discussed in a report by the Information Technology and Innovation Foundation presented to Congress in 2013 <http://www2.itif.org/2013-oct-house-testimony-atkinson.pdf>.

Concluding Facts

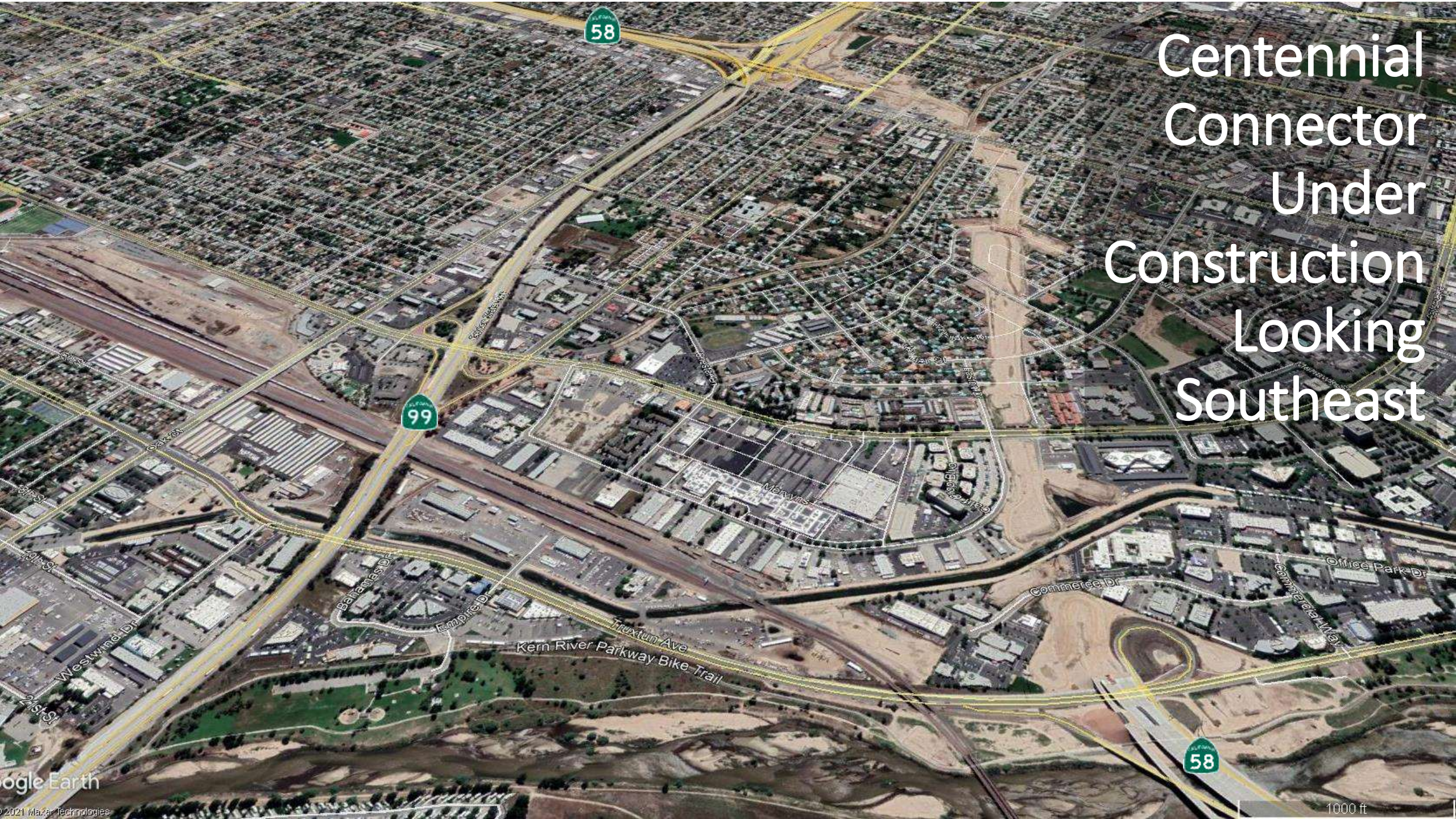
- Kern is the Largest 1-County Market for Container Traffic in the Valley... Larger than Fresno
- Kern is the #1 Ag and #1 Oil producing County in the State
- Kern is the Geographic Center for Population for California and a West U.S. Hub
- Growth in Goods Movement Attracts More Growth as exhibited by recent Amazon and Walmart investment in Kern

Highway Infrastructure Projects Supporting More Sustainable Goods Movement - 2019



Kern Council
of Governments

Centennial Connector Under Construction Looking Southeast

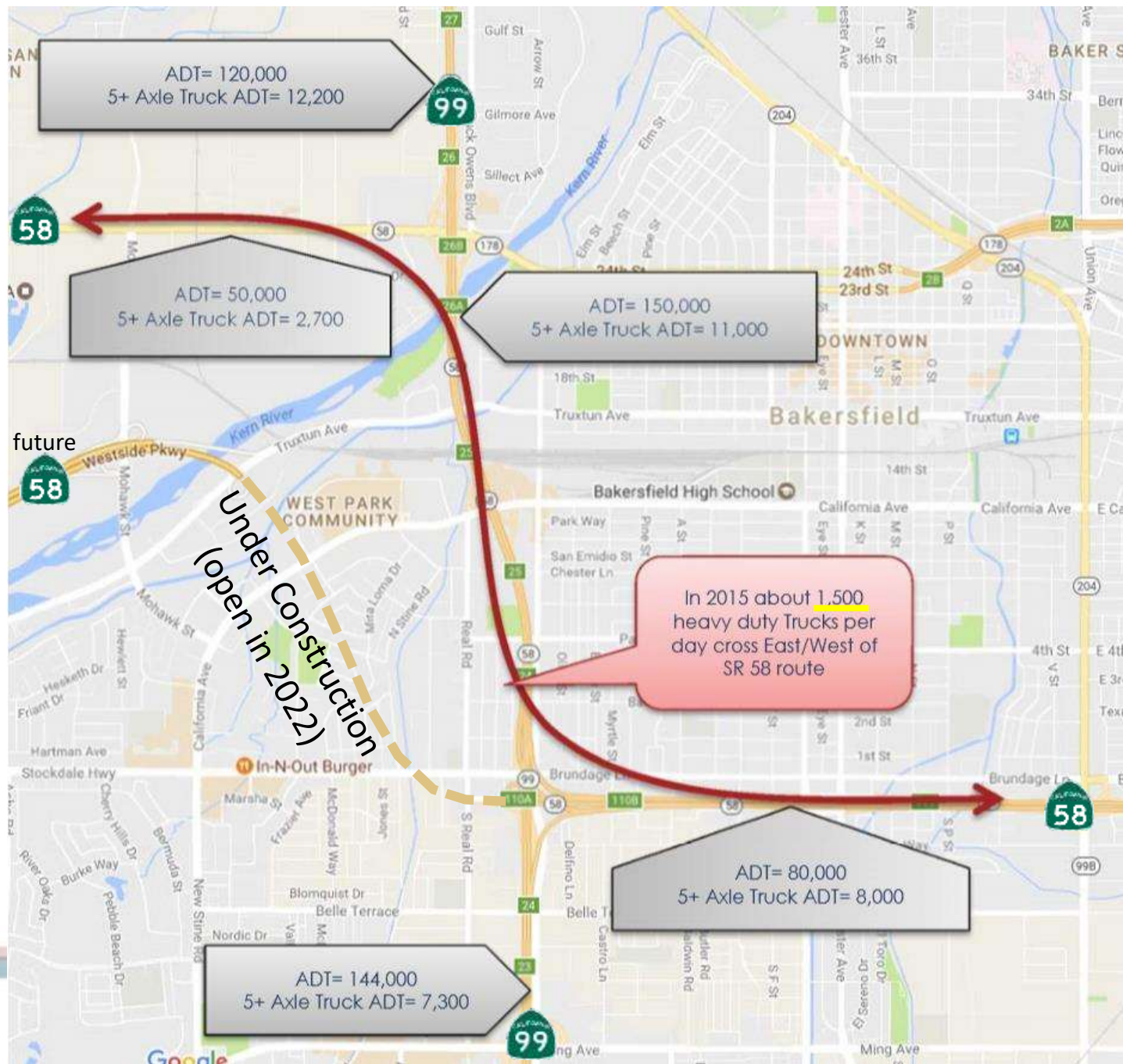


**Centennial Connector
Project: Shifts 1,500 trucks
per day (TPD) off the
busiest segment of SR 99
South of Sacramento over
to I-5, including another 100
TPD N. of Bakersfield to I-5
and carrying up to 8,000
TPD by 2038.**



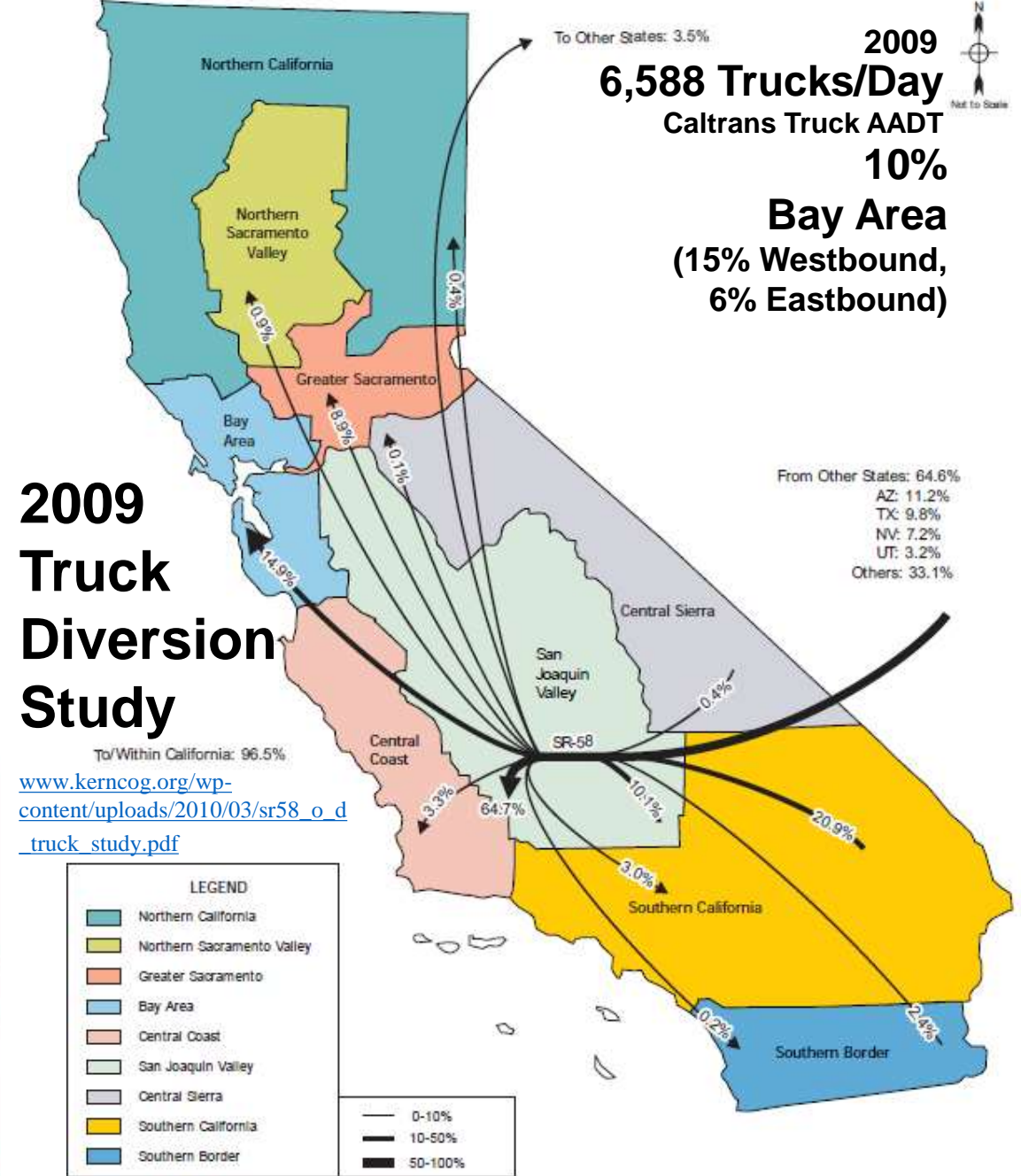
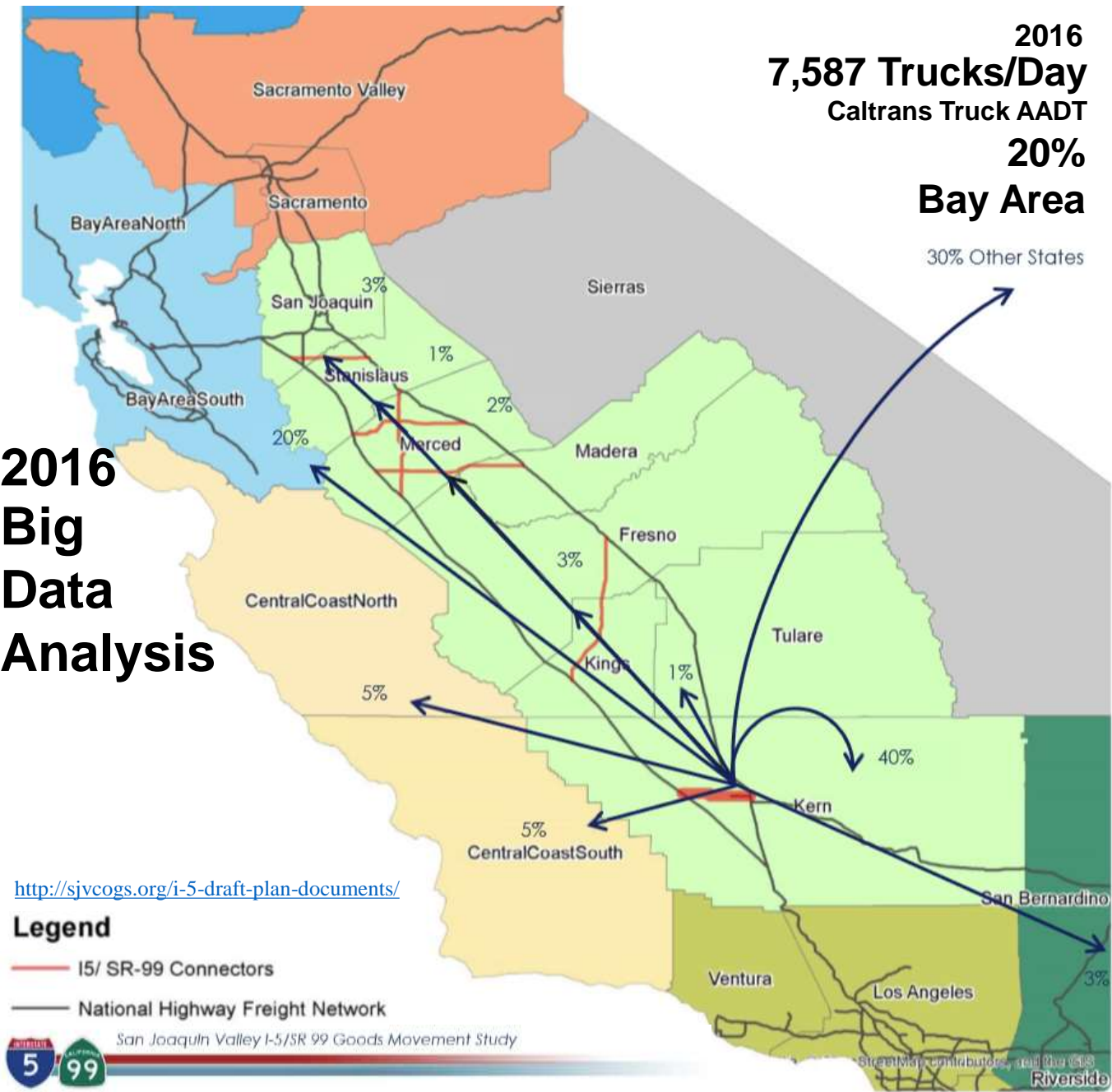
San Joaquin Valley I-5/SR 99 Goods Movement Study

<http://sjvcogs.org/i-5-draft-plan-documents/>



SR 58: 1000 More Trucks/Day in Last 7 yrs. – Bay Area’s Share of Trucks Doubles

2016
Big
Data
Analysis



Centennial
Corridor
Project Will
Reduce
Travel
between
I-40/I-580 by
an Average
of 12 Mi. for
8000 Trucks
Per Day by
2038

Distances based on
Google Maps -
March 2016
<https://www.google.com/maps/dir/California+58,+California/Interstate+580,+California/>



Route 58 Eastbound Truck Climbing Lanes



LOCATION (PM)	AVE GRADE	TOTAL RISE	DISTANCE	COST*
#1 (PM 71.8 – 74.5)	4.40 %	610 ft	2.63 miles	\$32 m
#2 (PM 76.3 - 79.4)	5.03 %	805 ft	3.03 miles	\$33 m
#3 (PM 84.1 - 86.5)	3.72 %	483 ft	2.46 miles	\$40 m

SR 58 Truck Climbing Lanes & HSR

