Lakeside-02

Appendix A Supporting the Prepared Direct Testimony of Daryl Maas

(Pilot Project)

[PUBLIC VERSION VOLUME 4]

MAAS ENERGY WORKS

Clear Lake Dairy (Digester #2)

Pro Forma Income Statement

Capital Costs - Digester	**$ 2,200,948**
Financial Model	**Farmer-Owned**

	Development	Production	Production	Production	Production	Production
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Wet Cow Equivalent		2,307	2,307	2,307	2,307	2,307
RNG						
Total Income From Pipeline Company		**$ 1,399,417**	**$ 1,399,417**	**$ 1,399,417**	**$ 1,399,417**	**$ 1,399,417**
Gross Income		**$ 1,399,417**	**$ 1,399,417**	**$ 1,399,417**	**$ 1,399,417**	**$ 1,399,417**
Expenses						
Development, Construction & Startup	**$ 2,200,948**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Digester Operating Expenses		$ (138,429)	$ (141,889)	$ (145,437)	$ (149,072)	$ (152,799)
On-Dairy Gas Treatment O&M		$ (112,756)	$ (115,575)	$ (118,464)	$ (121,426)	$ (124,461)
Total Expense	**$ (2,200,948)**	**$ (251,184)**	**$ (257,464)**	**$ (263,901)**	**$ (270,498)**	**$ (277,261)**
Earnings						
Net Earnings	**$ (2,200,948)**	**$ 1,148,232**	**$ 1,141,953**	**$ 1,135,516**	**$ 1,128,919**	**$ 1,122,156**

MAAS ENERGY WORKS

Dixie Creek Dairy (Digester #3)

Pro Forma Income Statement

Capital Costs - Digester	**$ 3,499,550**
Financial Model	**Farmer-Owned**

	Development	Production	Production	Production	Production	Production
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Wet Cow Equivalent		5,187	5,187	5,187	5,187	5,187
RNG						
Total Income From Pipeline Company		**$ 3,146,305**	**$ 3,146,305**	**$ 3,146,305**	**$ 3,146,305**	**$ 3,146,305**
Gross Income		**$ 3,146,305**	**$ 3,146,305**	**$ 3,146,305**	**$ 3,146,305**	**$ 3,146,305**
Expenses						
Development, Construction & Startup	**$ 3,499,550**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Digester Operating Expenses		$ (311,229)	$ (319,009)	$ (326,985)	$ (335,159)	$ (343,538)
On-Dairy Gas Treatment O&M		$ (253,509)	$ (259,846)	$ (266,343)	$ (273,001)	$ (279,826)
Total Expense	**$ (3,499,550)**	**$ (564,737)**	**$ (578,856)**	**$ (593,327)**	**$ (608,160)**	**$ (623,364)**
Earnings						
Net Earnings	**$ (3,499,550)**	**$ 2,581,568**	**$ 2,567,449**	**$ 2,552,978**	**$ 2,538,145**	**$ 2,522,941**

MAAS ENERGY WORKS

Double L Dairy (Digester #4)

Pro Forma Income Statement

Capital Costs - Digester	**$ 3,066,475**
Financial Model	**Farmer-Owned**

	Development	Production	Production	Production	Production	Production
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Wet Cow Equivalent		2,888	2,888	2,888	2,888	2,888
RNG						
Total Income From Pipeline Company		**$ 1,751,827**	**$ 1,751,827**	**$ 1,751,827**	**$ 1,751,827**	**$ 1,751,827**
Gross Income		**$ 1,751,827**	**$ 1,751,827**	**$ 1,751,827**	**$ 1,751,827**	**$ 1,751,827**
Expenses						
Development, Construction & Startup	**$ 3,066,475**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Digester Operating Expenses		$ (173,289)	$ (177,621)	$ (182,061)	$ (186,613)	$ (191,278)
On-Dairy Gas Treatment O&M		$ (141,151)	$ (144,680)	$ (148,297)	$ (152,004)	$ (155,804)
Total Expense	**$ (3,066,475)**	**$ (314,439)**	**$ (322,300)**	**$ (330,358)**	**$ (338,617)**	**$ (347,082)**
Earnings						
Net Earnings	**$ (3,066,475)**	**$ 1,437,388**	**$ 1,429,527**	**$ 1,421,469**	**$ 1,413,211**	**$ 1,404,745**

MAAS ENERGY WORKS

High Roller Dairy (Digester #5)

Pro Forma Income Statement

Capital Costs - Digester	**$ 2,459,227**
Financial Model	**Farmer-Owned**

	Development	Production	Production	Production	Production	Production
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Wet Cow Equivalent		1,479	1,479	1,479	1,479	1,479

RNG

Total Income From Pipeline Company		**$ 896,840**	**$ 896,840**	**$ 896,840**	**$ 896,840**	**$ 896,840**
Gross Income		**$ 896,840**	**$ 896,840**	**$ 896,840**	**$ 896,840**	**$ 896,840**

Expenses

Development, Construction & Startup	**$ 2,459,227**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Digester Operating Expenses		$ (88,714)	$ (90,932)	$ (93,205)	$ (95,536)	$ (97,924)
On-Dairy Gas Treatment O&M		$ (72,261)	$ (74,068)	$ (75,920)	$ (77,818)	$ (79,763)
Total Expense	**$ (2,459,227)**	**$ (160,976)**	**$ (165,000)**	**$ (169,125)**	**$ (173,353)**	**$ (177,687)**

Earnings

Net Earnings	**$ (2,459,227)**	**$ 735,864**	**$ 731,840**	**$ 727,715**	**$ 723,487**	**$ 719,153**

MAAS ENERGY WORKS

Lakeside Dairy (Digester #6)

Pro Forma Income Statement

Capital Costs - Digester	**$ 3,597,130**
Financial Model	**Maas-Owned**

	Development	Production	Production	Production	Production	Production
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Wet Cow Equivalent		4,396	4,396	4,396	4,396	4,396
RNG						
Total Income From Pipeline Company		**$ 2,666,275**	**$ 2,666,275**	**$ 2,666,275**	**$ 2,666,275**	**$ 2,666,275**
Gross Income		**$ 2,666,275**	**$ 2,666,275**	**$ 2,666,275**	**$ 2,666,275**	**$ 2,666,275**
Expenses						
Development, Construction & Startup	**$ 3,597,130**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Digester Operating Expenses		$ (263,745)	$ (270,338)	$ (277,097)	$ (284,024)	$ (291,125)
On-Dairy Gas Treatment O&M		$ (214,831)	$ (220,202)	$ (225,707)	$ (231,349)	$ (237,133)
Total Expense	**$ (3,597,130)**	**$ (478,576)**	**$ (490,540)**	**$ (502,803)**	**$ (515,374)**	**$ (528,258)**
Earnings						
Net Earnings	**$ (3,597,130)**	**$ 2,187,699**	**$ 2,175,735**	**$ 2,163,471**	**$ 2,150,901**	**$ 2,138,017**

MAAS ENERGY WORKS

Lone Oak #1 Dairy (Digester #7)

Pro Forma Income Statement

Capital Costs - Digester	**$ 3,219,616**
Financial Model	**Farmer-Owned**

	Development	Production	Production	Production	Production	Production
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Wet Cow Equivalent		4,414	4,414	4,414	4,414	4,414
RNG						
Total Income From Pipeline Company		**$ 2,677,522**	**$ 2,677,522**	**$ 2,677,522**	**$ 2,677,522**	**$ 2,677,522**
Gross Income		**$ 2,677,522**	**$ 2,677,522**	**$ 2,677,522**	**$ 2,677,522**	**$ 2,677,522**
Expenses						
Development, Construction & Startup	**$ 3,219,616**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Digester Operating Expenses		$ (264,857)	$ (271,479)	$ (278,266)	$ (285,222)	$ (292,353)
On-Dairy Gas Treatment O&M		$ (215,737)	$ (221,131)	$ (226,659)	$ (232,325)	$ (238,134)
Total Expense	**$ (3,219,616)**	**$ (480,594)**	**$ (492,609)**	**$ (504,924)**	**$ (517,548)**	**$ (530,486)**
Earnings						
Net Earnings	**$ (3,219,616)**	**$ 2,196,928**	**$ 2,184,913**	**$ 2,172,598**	**$ 2,159,975**	**$ 2,147,036**

MAAS ENERGY WORKS

Poplar Lane Dairy (Digester #8)

Pro Forma Income Statement

Capital Costs - Digester	**$ 3,463,398**
Financial Model	**Maas-Owned**

	Development	Production	Production	Production	Production	Production
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Wet Cow Equivalent		2,221	2,221	2,221	2,221	2,221
RNG						
Total Income From Pipeline Company		**$ 1,347,426**	**$ 1,347,426**	**$ 1,347,426**	**$ 1,347,426**	**$ 1,347,426**
Gross Income		**$ 1,347,426**	**$ 1,347,426**	**$ 1,347,426**	**$ 1,347,426**	**$ 1,347,426**
Expenses						
Development, Construction & Startup	**$ 3,463,398**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Digester Operating Expenses		$ (133,286)	$ (136,618)	$ (140,033)	$ (143,534)	$ (147,122)
On-Dairy Gas Treatment O&M		$ (108,567)	$ (111,281)	$ (114,063)	$ (116,915)	$ (119,837)
Total Expense	**$ (3,463,398)**	**$ (241,852)**	**$ (247,899)**	**$ (254,096)**	**$ (260,449)**	**$ (266,960)**
Earnings						
Net Earnings	**$ (3,463,398)**	**$ 1,105,574**	**$ 1,099,527**	**$ 1,093,330**	**$ 1,086,977**	**$ 1,080,466**

MAAS ENERGY WORKS

River Ranch Dairy (Digester #9)

Pro Forma Income Statement

Capital Costs - Digester	**$ 3,267,915**
Financial Model	**Farmer-Owned**

	Development	Production	Production	Production	Production	Production
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Wet Cow Equivalent		6,008	6,008	6,008	6,008	6,008
RNG						
Total Income From Pipeline Company		**$ 3,643,992**	**$ 3,643,992**	**$ 3,643,992**	**$ 3,643,992**	**$ 3,643,992**
Gross Income		**$ 3,643,992**	**$ 3,643,992**	**$ 3,643,992**	**$ 3,643,992**	**$ 3,643,992**
Expenses						
Development, Construction & Startup	**$ 3,267,915**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Digester Operating Expenses		$ (360,459)	$ (369,471)	$ (378,707)	$ (388,175)	$ (397,879)
On-Dairy Gas Treatment O&M		$ (293,609)	$ (300,949)	$ (308,473)	$ (316,185)	$ (324,089)
Total Expense	**$ (3,267,915)**	**$ (654,068)**	**$ (670,420)**	**$ (687,180)**	**$ (704,360)**	**$ (721,969)**
Earnings						
Net Earnings	**$ (3,267,915)**	**$ 2,989,924**	**$ 2,973,572**	**$ 2,956,812**	**$ 2,939,632**	**$ 2,922,023**

ELECTRIC INNOVATIONS INC.

Lic 907032

3711 Meadow View
Redding, CA 96002

Ph. 530-222-3366
c. 760-717-1605

6/20/2018

Gas Processing System

Contract for Digester Electrical and Mechanical Construction
Gas Processing

Customer: Maas Energy Works, 3711 Meadow View Drive, Redding CA 96002

SCOPE OF WORK: Electric Innovations Inc. agrees to provide consultation, administrative and electrical installation work as directed by Maas Energy. Duties will include but are not limited to: Electrical diagrams and load calculations, design and installation of electrical infrastructure, switchgear, controls, disconnects, panels, mechanical and branch circuits as directed Maas Energy Works and outlined below:

Dairy 350 SCFM

- **Gas Blower System and filter**: Provide and install all of the following:
  - Gas filter-316 stainless durable gas filtration canister with pressure differential gauge
  - Gas blower - Roots system with flex couplings
  - Gas silencer 316 stainless
  - Sage flow meter with RS 485 communications
  - 316 stainless gas flanges and tie-in
  - Gas rated manual shut off valves
- **Controls and Cabinets**
  - Indoor rated Cabinet with climate control
  - VFD(s) and line reactor(s)
  - Red lion data logging
  - PLC and data logging
  - HMI user interface touchscreen
  - Power system with battery backup
  - Ethernet switch
  - Blind PC
  - Programming, remote data access, remote blower control, remote real-time monitoring and alerts
  - Video camera for digester cover
  - Predator Pro Gas Data logging-CH4, O2, H2S, N2, RH gas sampling onboard data logging.

- **Gas Chilling and Moisture removal System**
  - Exchanger moisture removal
  - G&D Chiller
  - 316 stainless Gas train pipe work and ports
  - Sensors and control package, pressure, temperature, pre-post, blended temp, glycol temp
  - 316 stainless Positive pressure drain switch canister with 1.5” outlet
  - Kuncle pop off valve 10psi
  - Labor, installation, shipping and commissioning

ELECTRIC INNOVATIONS INC.

Lic 907032

3711 Meadow View
Redding, CA 96002

Ph. 530-222-3366
c. 760-717-1605

Electric Innovations Inc. Agrees to provide the above services for the sum of:

$178,900

Exclusions: Building Permit. Engineering, 150 amps 480v 3ph to chiller location, 250 amps 480v 3ph to blower location,60 amps 480v to chiller location, 60 amps 480v 3ph to blower locations. Drain line connection, flare, support structure including concrete foundation. Pipework from digester and to flare. Propane or Natural gas at flare location.

Optional: Power usage meter and logging, Redundant flow meter and data logging, automatic valves, Single Phase Power

INSURANCES AND LICENCES: Electric Innovations Inc. agrees to maintain a $1M/$2M general liability insurance policy, as well as workers compensation insurance throughout the duration of the project. Current insurance certificates will be provided to Maas Energy on request. Electric Innovations Inc. shall maintain current B and C-10 contracting licenses.

Payment Schedule: 40% due on signing for long lead time, custom build items and design. (8 – 10 weeks). 55% due on beginning of construction. 5% due on energizing.

T&M APPROVAL: All additional T&M work will require approval by Maas Energy or Daryl Maas prior to beginning work.

T&M RATES: Maas Energy agrees to remit to Electric Innovations Inc. the following rates for services:

Office Admin	$ 45 / Hr	Office administration and paperwork –Secretarial
Apprentice Electrician	$ 78 / Hr	Electrical assistance to Master Electricians
Construction Super	$ 78/ Hr	Construction supervision of project outside of contract scope
Master Electrician	$ 90 / Hr	Switchgear, panels, controls, programming, all other electrical work

T&M MATERIAL PURCHASES: Maas Energy agrees to reimburse Electric Innovations Inc. at the time of billing for materials purchased for use on any T&M portion of the project. Materials will be billed at cost plus 10%.

T&M RECORDS: Electric Innovations Inc. agrees to maintain accurate records of all man hours including detailed description of work preformed, materials purchased, and other expenses billed to Maas Energyf. Submittal of these records will be done as requested.

WARRANTY: Electric Innovations Inc. provides a one-year warranty on work and materials provided *and* installed by Electric Innovations only. Electric Innovations takes no responsibility for work and/or materials supplied/installed by others. Earthquakes, flooding, tornados, high winds, or other acts of God will not be covered under this warranty.

INVOICING: Electric Innovations Inc. will invoice based on percentage of work complete throughout the project when milestones have been met, and as outlined above under payment schedule. An initial equipment deposit for large items pre-ordered may be billed to cover design and large switchgear equipment, and lock in low materials pricing.

Lic 907032

3711 Meadow View
Redding, CA 96002

Ph. 530-222-3366
c. 760-717-1605

I certify I have read this agreement and understand its terms and conditions

Electric Innovations Inc.

Signature_____

Printed Name _____

Date Signed_____

Maas Energy

Signature_____

Printed Name _____

Date Signed_____

Maas Energy

MAAS MOTOR WORKS

Quote

Quote Prepared For:

MAAS ENERGY WORKS

3711 Meadow View Drive

Redding Ca, 96002

Date:	6/21/2018
Quote #:	20182106 - MEW
Gas Skid	**$193,500**
Commisioning	$12,000
Shipping	$4,000

Payment Terms: 50% Down | 50% at Shipping

MMW Gas Conditioning System
GAS SKID

Controls System

MMW - Industrial Cabinet Control
Red Lion DSPSX001 and PLC data logging
ComApp Intellivision 8 Touchscreen - HMI interface
Remote monitoring and programing

315 CFM Blower Package

Inlet pressure of -30" WC and discharge pressure of 100" WC
Roots 47 URAI-G gas tight blower
15HP NEMA Premium Efficient Motor, TEFC Cl 1 Div 2
230/460V-3PH-60Hz
Motor direct coupled to blo
316 stainless steel discharge silencer
Check valve, 316 SS construction
Stainless steel flex connectors
Blower Package assembled and piped on stainless steel frame

Gas Condensing Unit

Exchanger BG-250
Volumetric Flow Rate: 325.0 Std. Ft^3/min. & 40 gal/min'
Desing Temperature : 300 ° F
Maximum Preassure: 5.0 Lb/in^2
Materials: 304 Stainless Steel
Conectors: 6" Process bypass and reheat
Dimentions: 42" x 46" x 42"
Temperature In 160.0 °F
Average Temperature Out: 90 °F
Velocity (Standard) : 144.4 ft/min
Service Media Heat Load: 145,122 BTU/hr

Chiller

GD-20H 480 Volt 3 Phase Two Stage Chiller
2 complete refrigeration circuit for redundancy and load control
Engineered high efficiency heat exchanger for maximum energy savings
Chiller Glycol Pump and Process Pump
Dynamic Fluid bypass valve
Insulated Glycol reservoir with level indicator and aux ports
ETL 508A listed complete control panel w/single point electrical
Connection, breakers , starters & safety switches
Digital Phase and voltage monitoring with error log
Powder coated aluminum housing and steel frame rated for outdoor use

Includes: 12 month warranty on all new systems provided

Excludes: Estimated *Shipping charges: ($4,000) Comissioning (12,000) & Taxes.*

Signature: _____

Accepted By: _____

Date: **6/21/2018**

Electric Innovations Inc.
3711 MEADOW VIEW DR STE 100
REDDING, CA 96002 US
(530)222-3366
mprader@electricinnovations.net

ADDRESS
Maas Energy Works
3711 Meadow View Dr
STE 100
Redding, CA 96002

ESTIMATE 1005

DATE 06/20/2018

DATE	ACTIVITY	QTY	RATE	AMOUNT
06/20/2018	4 Tube System-Howitzer 4000 - 120 cubic feet - 6" inlet and outlet	1	0.00	0.00
06/20/2018	HDPE Materials and fabrication	1	26,320.00	26,320.00
06/20/2018	Shipping- Fresno California	1	1,900.00	1,900.00
06/20/2018	In Field Installation, welding, PVC assembly and supports, loading customer supplied media	1	10,400.00	10,400.00
06/20/2018	Commissioning	1	1,100.00	1,100.00

TOTAL **$39,720.00**

Accepted By

Accepted Date

Electric Innovations Inc.
3711 MEADOW VIEW DR STE 100
REDDING, CA 96002 US
(530)222-3366
mprader@electricinnovations.net

ADDRESS
Maas Energy Works
3711 Meadow View Dr
STE 100
Redding, CA 96002

ESTIMATE 1004

DATE 06/20/2018

EXPIRATION DATE 07/20/2018

DATE	ACTIVITY	QTY	RATE	AMOUNT
06/20/2018	3 Tube System-Howitzer 3000 - 90 cubic feet - 6" inlet and outlet	1	0.00	0.00
06/20/2018	HDPE Materials and fabrication	1	22,320.00	22,320.00
06/20/2018	Shipping- Fresno California	1	1,700.00	1,700.00
06/20/2018	In Field Installation, welding, PVC assembly and supports, loading customer supplied media	1	9,400.00	9,400.00
06/20/2018	Commissioning	1	1,100.00	1,100.00

TOTAL **$34,520.00**

Accepted By

Accepted Date

MV TECHNOLOGIES

Engineered to Guarantee Results

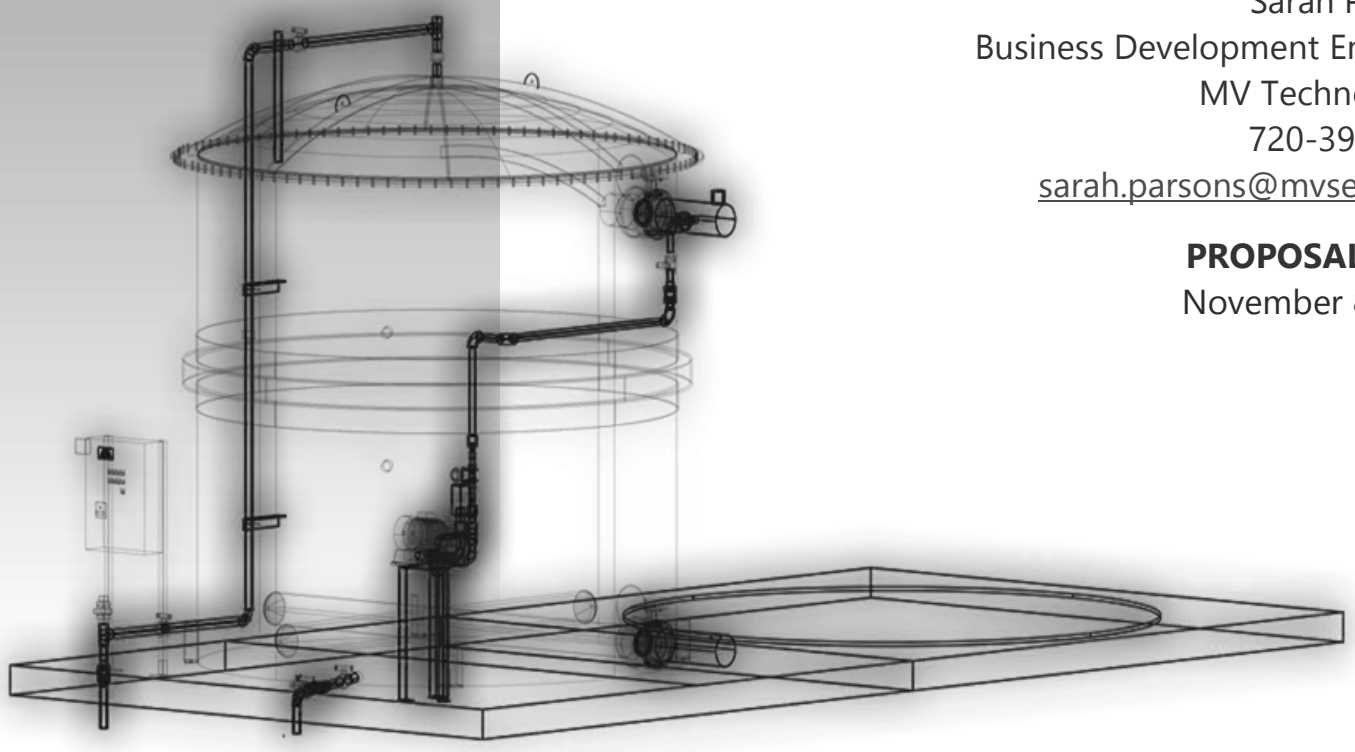
H2SPlus™ System Proposal

PROJECT
Verwey-Madera
12852 Road 9
Madera, CA 93637

PREPARED FOR
Daryl Maas
Chief Executive Officer
Maas Energy Works
1670 Market Street, Suite 256
Redding, CA 96001
210-527-7631
daryl@maasenergy.com

PREPARED BY
Sarah Parsons
Business Development Engineer
MV Technologies
720-390-3170
sarah.parsons@mvseer.com

PROPOSAL DATE
November 8, 2016



MV TECHNOLOGIES

PROJECT OVERVIEW

Maas Energy Works requests a proposal from MV Technologies to provide an H_2S scrubber system for application to the digester biogas at the Verwey Dairy in Madera, California.

The preliminary project parameters as provided by Maas Energy Works are listed below:

Process Parameter	Value
Treated Gas Flow Rate:	250 SCFM
Inlet Gas Concentration of H_2S:	1000-3000 ppm
Outlet Gas Concentration of H_2S:	40 ppm for air permit
System Gas Static Vacuum Pressure:	-1 to -2 psi

PROPOSED H2SPLUS SYSTEM DESCRIPTION

To meet these requirements MV Technologies proposes to deliver a single-vessel configuration of our H2SPlus™ System. This system containing our enhanced iron sponge media, BAM™ Media, will deliver a maximum H_2S outlet concentration of less than 40 ppm, under the stated current operating conditions.

The specific H2SPlus System proposed to meet stated project parameters is summarized below:

Design Parameter	Value
Configuration:	Uninsulated, Single-Vessel H2SPlus System
Media Vessel Dimension:	12’ diameter; 11’-8” height
Anticipated Max. Pressure Drop:	9” Water Column
Water Consumption:	Approx. 15-30 gal. / week (makeup water)
Main Power Supply:	Electric, typically 460VAC; 40AMP Service; 3-Phase
BioActive Media (BAM) Volume:	1,134-FT^3

Estimated Annual Media Costs

The following table presents the estimated media costs for varying inlet concentrations given a current media cost of \$17.00/ft^3:

System Flow Rate	Inlet H_2S Conc.	Media Bed Life	Annual Media Costs
250 SCFM	1000 ppm	425-days	\$16,525
	2000 ppm	215-days	\$33,050
	3000 ppm	145-days	\$49,575

SYSTEM EQUIPMENT DETAILS

The H2SPlus System proposed to Maas Energy Works for Verwey-Madera will include:

Media Vessel

- One (1) Uninsulated Vessel, 12′ Diameter X 11′-8″ Tall
- Design capacity of 1,134-ft^3 of BioActive Media per vessel
- Fully removable flanged and domed lid with neoprene dovetail gasket. Bolts provided are 18-2 SS
- MV Technologies designed media support system and gas distribution system
- 8″ Flanged inlet/outlet with neoprene spherical expansion joint
- Butterfly inlet/outlet valves with lug style, cast iron body, Buna-N Seat, SS Disc, and SS Stem. Gear-operated with hand wheel.

BioActive Media

- 1,134-ft^3 of media
- Proprietary Bacteria and Nutrients
- Capable of removing 13-pounds of H_2S per cubic foot of BioActive Media
- Spent media is non-hazardous may be landfilled, composted, or land applied

BioActive Media Removal System

- One (1) Set of MVNets™ designed and fabricated for this specific application

Recirculation System

Sized to provide adequate recirculation of MV Technologies bacteria, nutrients and water required to maintain correct moisture content of BioActive Media in each vessel. The system typically requires 15-30 gallons per week of makeup water.

- ~~In Ground Sump: FRP, 3′ Diameter x 9′ Depth~~
- ~~Sump Pump, Qty. 1: submersible, explosion-proof 480 VAC 3 Phase~~
- ~~Level Transmitter for automatic makeup water addition~~
- Sump Makeup Water Ball Valve, ASCO, Brass Body, 1″ NPT, NEMA 7 Actuator
- PVC Schedule 80 Piping to and from the sump and media vessel

Continuous Online Regenerative System

- Regenerative blower for 5-10% air addition to system to improve media removal efficiency. O_2 levels for optimized removal capacity of media is typically 2%. O_2 is consumed in media bed, leaving less than 0.5% in the downstream biogas. System efficiencies stated dependent on presence of sufficient oxygen in biogas and periodic maintenance checks as outlined in owner documents.
- Schedule 80 PVC air lines to the gas inlet header
- Biogas flow switch, NEMA 7 Enclosure. To be installed in client header piping, with 20 pipe diameter upstream and 10 pipe diameter downstream.

Online BioActive Media Bed Monitoring System

- Temperature switch to monitor bed temperature
  - Digital temperature display with high and high-high switch contacts connects to RTD
  - All temperature switches to be mounted on or near main control panel, for central viewing of all vessel temperatures.
- 3-Wire 100 OHM Resistance Temperature Detector, NEMA 7 Head. Field wiring between temperature control unit and RTD required; 304 SS Thermowell for RTD

Control Panel

- Analog monitoring and control of temperature alarm points, sump pump, blower/intake valve, sump water makeup valve
- NEMA 4 Enclosure, Field mounted in non-hazardous location.

Documentation

- General Arrangement, PFD, P&ID, Control Panel GA and Layout Drawing
- Installation guidance document
- Operation and Maintenance Manual

Startup and Commissioning

- Pre-Startup Checklist
- Commissioning Startup Plan and Checklist
- Equipment Testing Services - Control panel checkout will be performed prior to shipment. All other rotating equipment, instruments, and valves shall be tested prior to, or during, system startup. System will be pressure tested after installation.
- Training - MV Technologies Engineers will provide on-site operations training to Owner designated staff at time of startup. Upon startup, an MV Technologies Engineer will work with a designated Owner Representative to finalize IOM documentation specifically for the client's system. Online training for media replacement is also available and MV will provide support and training on-site at the time of first media replacement.

INVESTMENT SUMMARY

The total cost for the H2SPlus™ System proposed to Maas Energy Works includes the initial charge of media, single trip on-site startup and training, and remote assistance for the first media replacement.

PRICING SUMMARY – Verwey-Madera	
H2SPlus™ System Equipment – Single-Vessel	$99,650.00
Initial Media Charge – 1,134-ft^3	$19,275.00
Discount – Recirculation Equipment from Verwey Hanford	-$9,975.00
TOTAL SYSTEM INVESTMENT	**$108,950.00**

NOTES

1. Quote is valid for sixty (60) days from proposal date.
2. Standard lead time of equipment delivery is 12-weeks upon approval of engineering submittal.
3. Estimated freight rates for system equipment and initial charge of media, at time of proposal, is $16,250. Client may elect to have MV Technologies assist in freight coordination, at no extra cost. Billing from freight brokers will be direct to client. Some freight reduction may apply for combined shipments of vessels and media with group purchase option.

PAYMENT TERMS

30% Invoiced (Net 5) upon execution of Purchase Agreement. Engineering commences upon receipt of payment.

30% Invoiced (Net 30) 60 days after Purchase Agreement, or upon Engineering Submittal approval, whichever is earlier

35% Invoiced (Net 30) upon H2SPlus™ System components readiness for shipment

5% Invoiced (Net 30) 30 days after shipment or completed acceptance test, whichever is earlier

EXCLUSIONS

1. Site preparation shall be provided by others, including, but not limited to concrete pad and site utility requirements, such as electrical and water.
2. System installation and assembly shall be provided by others, unless otherwise negotiated.
3. All system and interconnecting piping, HDPE or equivalent recommended, provided by others.
4. Pricing does not include taxes, sales or otherwise. It is the sole responsibility of owner to account for and report any applicable taxes, as required.
5. Pricing does not include freight of system components. Customer may elect to have MV Technologies arrange shipping, which shall be billed separately and is subject to nominal administration fee(s).
6. Pricing does not include flow meter, nor hydrogen sulfide monitors. Existing owner Instruments may be utilized, or MV Technologies can provide pricing for the supply of new meters, at owner's election.
7. River rock to be placed over internal gas distribution pipework in bottom of installed vessel(s) as specified by MV Technologies, shall be provided by others.

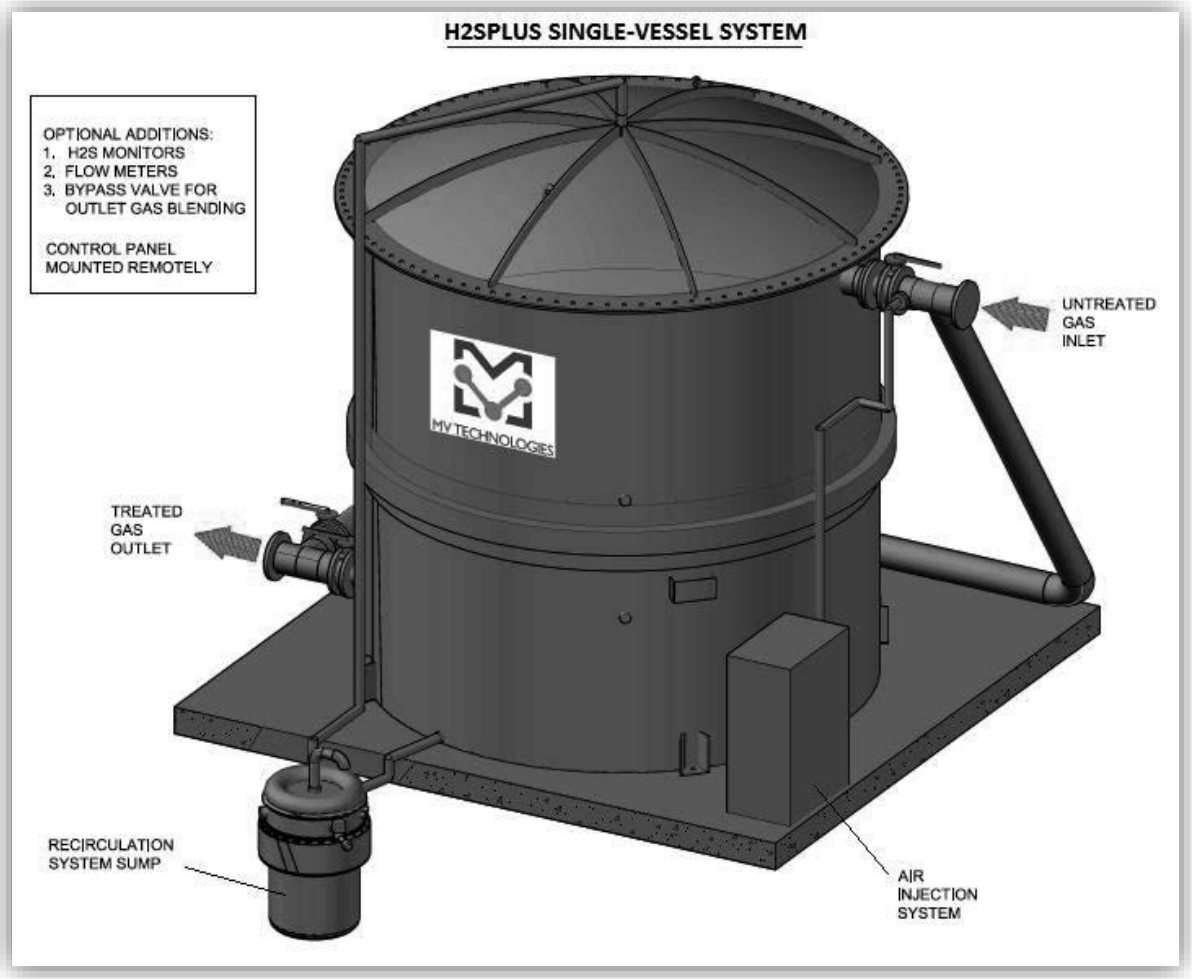
OWNER RESPONSIBILITY

Labor Requirements; Power Cost; Waste Generation; Cost/Procurement of Additional Materials

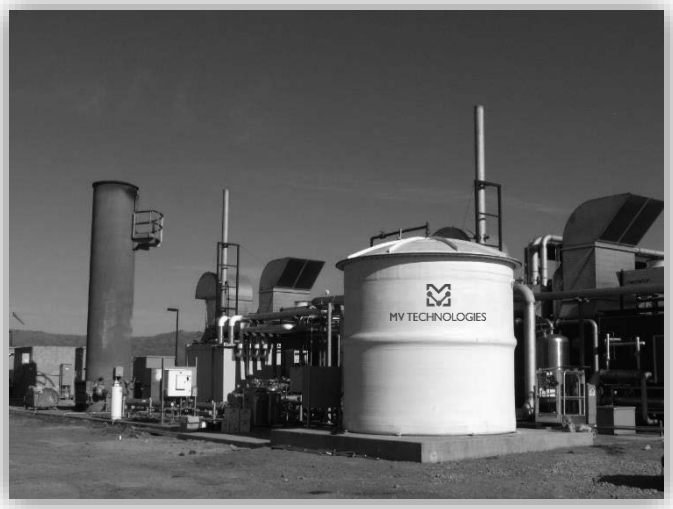
GENERAL H2SPLUS SYSTEM DESIGN AND OPERATION

A typical H2SPlus™ System includes the components shown in the General Arrangement below. The dimensions of the media vessel are primarily based on the flow rate, with some additional consideration given to inlet H_2S concentration. The media temperature is controlled by the recirculation system, which also allows for media pH management to a target range of 9-10 through the sump. If used, a continuous media regeneration effect is created by the addition of small amounts of ambient air to the gas stream through either a blower or motor operated valve depending on site conditions and system design.

System controls are simple: vessel temperature is used to control the recirculation system and the regeneration blower. Of course system shutdown and safety interlocks are included. In a basic version, H_2S inlet and outlet concentrations are measured periodically with gas tubes. Instrumentation and data recorders of course can be added for concentration and flow measurement electronic data collection if desired.



In cases where a bypass and blend arrangement is selected to reduce media use, the bypass can be operated manually or automatically depending on user preference and, of course, budget considerations. For this project, a bypass line for blending outlet concentration is not necessary or required.



RECENT SINGLE VESSEL INSTALLATIONS OF H2SPLUS™ SYSTEMS

At time of media replacement, MV Technologies top-entry tanks, in combination with our MVNets™ make the process simple and efficient, as photographed below. MV's leadership position in dry scrubber technology is based not only on the engineering of cost-effective H_2S conversion reactions, but also importantly, designing the whole process to be simple and safe for our clients.

MVNETS™ PROVIDE EASE IN REMOVAL OF SPENT MEDIA

TECHNOLOGY OVERVIEW

Our H2SPlus™ System as proposed and addressed in this document will:

- **Be designed to meet all operating conditions as determined by end-user requirements.** MV will engineer and procure equipment necessary to deliver the H_2S outlet concentrations as required. Should site conditions change or experience increases, or spikes, above the stated expected maximum conditions of concentration, the system would continue to deliver required outlet conditions. The only effect will be the increased rate of media consumption.

- **Provide for easy and rapid media change out – with MVNets™** a media change in a single vessel can typically be accomplished in less than 24 hours.

- **Provide the lowest cost per pound of H_2S removal.**

- **Operate at 100% effectiveness immediately upon startup** and does not require any offline run-in or maturation period, as is standard in biological scrubbers.

- **Not be susceptible to upset conditions** such as large swings in H_2S concentrations or changes in temperature that have impact on biological scrubbers.

- **Feature a "set and forget" design** – Unless emission standards may demand more frequent sampling, typically operator attention is required only periodically (three times per week) to measure H_2S concentrations with industry standard Drager tubes (if instrument recording is not selected as a system option). Based on those readings, occasional addition of standard calcium carbonate to the sump system may be required. We have many direct user testimonials that speak to the ease of operation of our systems – particularly in contrast to wet chemical or biological scrubbers.

- **Convert all of the H_2S in your biogas stream into pyrites and elemental sulfur** as a direct result of our media formulation. Spent media can be land applied or disposed of as non-hazardous waste.

- **Require no additional material load to be placed on your waste water treatment system**

- **Be easy to install** - In most all cases, because of the low pressure drop and simplicity of design, the units can be added to an existing gas delivery system with little ancillary modification.

STATEMENT OF EXPERIENCE

The first MV Technologies H2SPlus™ System, installed in 2001, was placed in service to remove the hydrogen sulfide gas from a biogas stream collected from a covered lagoon at a Cargill Meat Packing facility in Fort Morgan, Colorado.

Since 2001, MV Technologies has installed numerous H2SPlus Systems, providing H_2S solutions for facilities such as landfills, waste water treatment plants, covered lagoons, anaerobic digesters at food and beverage plants, and farm-based anaerobic digesters.

Following is an abbreviated list of just some of the various projects completed by MV Technologies:

Landfill Gas

- Ada County Landfill, Idaho (SCS Engineers)
- Cape May Municipal Landfill, New Jersey (three projects)
- CES Landfill/Broad Mountain Power, Pennsylvania (UGI)
- Chesterfield, North Carolina (INGENCO)
- Emerald Park Landfill, Wisconsin
- New Bern Landfill, North Carolina (INGENCO)
- Pecan Road Landfill, Georgia (ESG)
- Warren County Landfill, New Jersey (Atlantic Lining)

Anaerobic Digester Biogas

- Bidart Dairy Digester, California (CalBio)
- Double A Dairy, Idaho (Andgar)
- Dry Fermentation Anaerobic Digestion, California (Zero Waste Energy)
- MillerCoors Brewery, Colorado
- MillerCoors Brewery, Texas
- Pixley Biogas Digester, California (Maas Energy Works)
- Potawatomi Digester, Wisconsin (Biothane, LLC)
- Spoetzel Brewery, Texas

Covered Lagoon Digester Biogas

- Dodge City, Kansas (Cargill Meat)
- Fort Morgan, Colorado (Cargill Meat)
- Fresno, California (Cargill Meat)

SYSTEM PERFORMANCE GUARANTEE

System Performance Warranty

MV Technologies warrants, for a period of ten years, that the proposed H2SPlus™ or systems will meet or exceed the requirements as stated in this Proposal. This warranty is contingent upon: the user's demonstration that system application has been, at all times, within the gas flow rates and H_2S loading provided in the Equipment Purchase Specification; the user's demonstration that MV's Operations and Maintenance procedures have been followed; the user's demonstration that media use has not exceeded 11-pounds of H_2S per cubic foot of BioActive Media before change out; that on-site annual system performance inspections are conducted by MV Technologies authorized personnel and that recommended necessary adjustments to operating conditions are made in a timely fashion. This warranty may be extended at the end of the ten-year period by mutual agreement of the parties.

H2SPlus Media Performance Guarantee

MV Technologies warrants, for an agreed period of time from date of system startup, the H2SPlus System™ designed for the System Owner will, when operated according to MV Technologies Specifications at or below design conditions as established in the approved MV Technologies H2SPlus Proposal, will remove up to 13-pounds of H2S per one (1) cubic foot of our reactive media, BAM™, until breakthrough condition.

In the event the H2SPlus system does not perform as described above, MV Technologies will provide, at its expense, the pro-rata amount of BAM™ at each media replacement cycle so as to provide the equivalent media consumption performance. By way of example, if the actual H2S removal rate was determined to be 9-pounds per one cubic foot of BAM, MV would provide 30% of the next vessel media charge of BAM at no cost to the System Owner.

Standard H2SPlus Media Performance Guarantee may not apply to all installations and is evaluated on a site by site basis upon final review of site conditions and parameters.

Conditions of the Warranty

1. "Breakthrough" condition is defined as measured H_2S concentration levels in the H2SPlus System outlet gas, exceeding the system design levels established in the approved MV Technologies Proposal.
2. Client must demonstrate, to the reasonable satisfaction of MV Technologies, that the H2SPlus System is installed and operated according to its design specifications, and at or below the design conditions. Specifically, H2S inlet and outlet concentrations, treated flow rate of incoming gas, outlet gas O2, and H2SPlus sump water pH, must be accurately monitored and recorded regularly on a schedule as agreed by MV and System Owner. System Owner will report all readings to MV on a monthly basis, except in the event that regular readings are outside limits established in Operations and Maintenance Manual, in which case MV shall be notified immediately.
3. In any claim made against this Warranty, System Owner must provide all reasonable and necessary support to MV Technologies efforts to correct the stated condition.

Limitations of Remedy and Liability

In no event shall MV Technologies be liable for any special, incidental or consequential damages based upon breach of warranty, breach of contract, negligence, strict tort or any other legal theory. Such damages include, but are not limited to, loss of profits, loss of savings or revenue, and/or the system to which it is attached or has been made a part of, costs of any substitute equipment, downtime, the claims of third parties, including customers, and injury to property.

MV TECHNOLOGIES

GENERAL PRODUCT AND SYSTEM WARRANTY STATEMENT

MV Technologies, LLC ("MV Technologies" or "MV") is committed to providing quality products and services to its customers. As a demonstration of this commitment, MV Technologies offers the following warranty on its products and systems.

GRANT OF WARRANTY

MV Technologies provides this warranty for its products and systems under the terms and conditions detailed below to the person, corporation, organization, or legal entity, which owns the product or system on date of start-up (Owner). This warranty is not transferrable without express written consent of MV Technologies.

WARRANTY COVERAGE

Products or systems provided by MV Technologies that are determined by MV to have malfunctioned during the warranty period, under normal use, solely as a result of defects in manufacturing workmanship or material, shall be repaired or replaced at MV Technologies discretion. MV Technologies liability under this warranty to the Owner shall be limited to MV's decision to repair or replace, at its shop or in the field, items deemed defective after inspection by MV.

WARRANTY EXCLUSIONS

1. Any equipment, parts and work not manufactured or performed by MV Technologies carry their own manufacturer's warranty.
2. MV Technologies' only obligation regarding equipment, parts, and work manufactured, or performed by others, shall be to assign to the Owner whatever warranty MV Technologies receives from the original manufacturer.
3. MV Technologies does not warrant its products or systems from malfunction or failure due to shipping or storage damage, deterioration due to exposure to the elements, vandalism, accidents, power disturbances, or "Acts of God" as commonly applied in commercial transactions.
4. This warranty does not cover damage due to misapplication, misuse, improper installation, or lack of proper service and/or maintenance, nor does it cover normal wear and tear, and does not apply to modifications or the effect of modifications not specifically authorized in writing by MV Technologies, or to parts and labor for repairs not made by MV Technologies or its authorized warranty service provider.
5. This warranty does not cover incidental or consequential damages or expenses incurred by the Owner, or any other party, resulting from the order and/or use of its products or systems, whether arising from breach of warranty, non-conformity to order specifications, delay in delivery, or any loss sustained by the Owner. No agent or employee of MV Technologies has any authority to make verbal representations or warranties for any goods manufactured and sold by MV Technologies, without the written authorization signed by an authorized officer of MV Technologies. Any alterations or repair of MV Technologies' product or systems by personnel other than those directly employed by, or authorized by MV, shall void the warranty, unless otherwise stated under specific written guidelines issued by MV Technologies to the Owner.
6. MV Technologies warrants the products and systems designed and fabricated to perform in accordance with the specifications as stated in the proposal for the equipment and while the equipment is properly operated within the site specific design limits for that equipment as stated in the proposal.
7. MV Technologies warrants only that its products and systems will meet the site specific design limits as stated in its proposal, and makes no representation that those site specific design limits satisfy any operating condition, regulatory, safety, or other limits or standards whatsoever.
8. Operation of the product or systems outside the site specific design limits shall void the warranty. All media must be purchased through MV Technologies or approved in writing by MV Technologies during the warranty period. Media purchased through alternate sources and not approved in writing by MV Technologies shall void the warranty.
9. Owner shall be responsible for all maintenance service, including, but not limited to, lubricating and cleaning the equipment, replacing expendable parts and/or media, making minor adjustments, and performing operating checks, all in accordance with the procedures outlined in MV Technologies Operations and Maintenance Manual.

WARRANTY PERIOD

Unless otherwise specifically agreed in writing, MV Technologies warranty is valid for 18 months from the time the equipment is shipped from MV Technologies factory or 12 months from the date of startup, whichever occurs first.

WARRANTY PERIOD REPAIRS

All warranty claim requests must be initiated with a Return Material Authorization (RMA) number for processing and tracking purposes. When field service is deemed necessary in order to determine a warranty claim, the costs associated with travel, lodging, etc. shall be the responsibility of the Owner, except under prior agreement. This warranty covers only those repairs that have been conducted by MV Technologies, or by an MV authorized warranty service provider, or by someone specifically authorized by MV Technologies to perform a particular repair or service activity. All component parts replaced under the terms of this warranty shall become the property of MV Technologies.

MV TECHNOLOGIES ASSUMES NO OTHER WARRANTY FOR ITS EQUIPMENT, EITHER EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OR MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE, OR NON-INFRINGEMENT, OR LIABILITY FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGE.

MV Technologies, LLC • 751 Pine Ridge Road, Golden, CO 80403 • Phone: 303-277-1625 • Fax: 303-277-9624 • www.MVseer.com

MV TECHNOLOGIES

STANDARD TERMS AND CONDITIONS OF SALE

1. **Application.** These Standard Terms and Conditions apply to any sale of equipment, parts, materials and related services (the "Products") by MV Technologies LLC ("MV") to any MV Customer (the "Customer"). Acceptance of these Standard Terms and Conditions by an MV Customer is an express condition of any such sale.
2. **Entire Agreement**. These Standard Terms and Conditions, the Order Confirmation (the "MV Order Confirmation") issued by MV in respect of each sale and supply of Products and any other document expressly incorporated by reference in a MV Order Confirmation (collectively, the "Agreement") constitute the entire agreement between MV and the Customer regarding a sale of Products or related services by MV to the Customer. These Standard Terms and Conditions supersede all other discussions, proposals, quotes, negotiations, statements, representations, understandings and the like, whether written or oral. MV rejects any differing or supplemental terms that may be printed or otherwise found in any purchase order or other document sent by the Customer prior to the acceptance of Agreement, except as expressly accepted by MV in writing with the signature of an authorized representative. If there are inconsistencies in the documents constituting the Agreement, such documents shall take precedence in the following order:
   i. the MV Order Confirmation;
   ii. a contract document or addendum incorporated by reference into the MV Order Confirmation; and
   iii. these Standard Terms and Conditions.
3. **Terms of Payment.** Unless otherwise agreed by MV in writing, MV invoices for the Customer's purchase of Products are payable within thirty (30) days of the date of the invoice with place of payment to 751 Pine Ridge Road, Golden, Colorado 80403 or as designated in the MV Agreement. Should payment not be made to MV when due, such payment shall bear an interest at the rate of one and one-half percent (1½%) per month (18% per annum). The charging of such interest shall not be construed as obligating MV to grant any extension of time in the terms of payment. No cash discount shall be available to the Customer unless agreed to by both parties. If prior to any delivery of Products, MV has concern regarding timely payment of the purchase price because of a material adverse change in Customer's circumstances or otherwise, MV may require payment of all or additional parts of the purchase price before shipment or delivery and/or MV may require satisfactory security for the payment of the purchase price.
4. **Cancellation of Contract before Delivery.** In the event the Customer cancels the Agreement after the date such Agreement is accepted, Customer agrees to pay the following charge as liquidated damages in lieu of actual damages, it being understood and agreed between the parties that actual damages to MV would be impractical or extremely difficult, time consuming and expensive to ascertain. It is as follows:

% of Time Elapsed From Date of Agreement to Time of Cancellation (calendar days)	% of Sales Price Due (Not including Shipping Costs)
0 ≤ % Time Elapsed < 33-1/3%	50%
33-1/3 ≤ % Time Elapsed < 50%	75%
50 ≤ % Time Elapsed < 66-2/3%	85%
66-2/3 ≤ % Time Elapsed < 80%	95%
80% ≤ % Time Elapsed ≤ 100%	100%

5. **Delivery Terms.** Each Product subject to sale shall be shipped in accordance with the International Commercial Trade Terms known as Incoterms 2010 specified in the MV Agreement. If shipping instructions are not so specified for any supply of Products, such supply shall be shipped ex works (EXW). Ex works deliveries of the shipped Products are deemed complete upon release of the Products to the Customer's carrier at MV's or its designee's facilities. If the Customer is unable or unwilling to accept physical delivery at the time specified for delivery, MV may store Customer's Products at Customer's cost and the delivery of such Products shall be deemed complete as of the date of storage.
6. **Taxes.** Unless otherwise expressly provided for in an MV Agreement, the price of the Products shall not include sales, use, excise, value added or any similar taxes, duties or other export/import charges.
7. **Delivery Schedule.** Time for delivery is approximate and starts on the later of the date specified in the MV Agreement or the receipt by MV of any advance payment or first payment as set forth in the MV Agreement. Should Customer not make an advance payment or first payment as set forth in the MV Agreement, MV may request from the Customer credit approval or placement of security for the balance of the purchase price. Unless otherwise specified in an MV Agreement, MV shall not be liable for losses of any kind incurred by the Customer for delays in or failure to deliver all or any part of the Products. Changes in the delivery schedules requested by the Customer must be in writing and received by MV at least two (2) business days prior to the previously scheduled delivery date. MV is under no obligation to accept any changes in delivery dates requested by the Customer.
8. **Title Retention.** Title or ownership of the Products shall not pass to the Customer, notwithstanding delivery thereof, but shall remain vested in MV until the purchase price of the Products is paid in full. As security for the full payment of the purchase price of the Products, the Customer hereby grants to MV, and MV hereby reserves, a purchase money security interest and charge in the Products and in all substitutions, replacements and additions thereto and the proceeds thereof. Until such time of full payment, the Customer shall: (a) insure the Products against loss, damage or destruction for full replacement value; and (b) execute such additional documents as MV shall request for the confirmation or perfection of such security interest and charge. Upon any default by the Customer, and subject to applicable law, MV may repossess and deal with the Products as it shall see fit and retain all payments which have been made by the Customer for the account of the purchase price as liquidated damages. Upon any such realization of security, the Customer shall remain liable for any deficiency in the purchase price and shall reimburse MV for all costs and expenses, including reasonable legal fees, incurred in enforcing its rights. All rights and remedies of MV are cumulative and in addition to those available at law or in equity.
9. **MV Property.** All supplies, materials, tools, jigs, dies, gauges, fixtures, molds, patterns, equipment and other items procured by MV to perform the supply of Products under its Agreement with Customer shall be and shall remain the property of MV under all circumstances, including, without limitation, reimbursement of MV by the Customer for all or any portion of the cost of such items.
10. **Risk of Loss.** Unless otherwise specified or confirmed in the MV Agreement, the risk of loss or damage to the Products, including any repaired or replaced items, and the responsibility for the payment of insurance premiums and freight passes to the Customer upon MV' delivery as provided in Sections 5 and 7 above. No loss of or damage to the Products or any part or portion thereof shall relieve the Customer from its obligations for payment hereunder.
11. **Inspection, Rejection, Remedy.** Customer shall have the right to reasonable inspection of the Product after delivery to destination, which inspection shall be completed within ten (10) days of the date of delivery to destination. Any rejection by Customer as to part or all of the Product shall be in writing, specifically stating the damage or design non-conformance. In such event, MV shall have a reasonable period of time to determine the validity of and, if necessary, to repair any damage to a Product or correct a design non-conformance of a Product. Should a design non-conformance form the basis of the Customer's rejection, at MV' option and if appropriate, it may replace part or all of the Product. Upon validating damage to a Product or a design non-conformance, MV shall provide Customer with a date certain for completion of repair or replacement or provision of a design conforming item.
    Subsequent to installation and commissioning and within the Product warranty period, should the Product delivered be found not to meet functional specifications set forth in the MV Agreement for measured emissions, MV shall provide a date certain for bringing the Product into functional conformance per the MV Agreement. The time period to do so shall not exceed sixteen (16) weeks from the date of discovery of failure to meet functional specifications. The time period within which

to correct such a functional non-conformance shall commence at the later of the commissioning date or the date that the emissions non-conformance was discovered.

Customer's failure to make rejection as herein stated, or to allow MV to cure Customer's objections, shall be deemed to conclusively establish acceptance by Customer of the Product.

12. **Limited Warranties.** MV warrants that each Product is free of defects in material and workmanship strictly in accordance with the terms and conditions of the limited warranty statement specified or confirmed in the MV Agreement. Throughout the Warranty Period, MV warrants that the Product will achieve the emissions levels set forth in the accepted MV Agreement, subject to the following conditions:
    a) the Product is operated and maintained at all times in accordance with MV's written instructions;
    b) the Customer's equipment is operated and maintained at all times in accordance with all manufacturer's instructions and guidelines;
    c) the Customer's equipment, during operation, never exceeds the inlet emissions concentration, inlet flow rates, or gas inlet temperature set forth in the MV Agreement;
    d) all operating parameters including flow rate, emissions concentration, and hours of operation are recorded and/or logged at a frequency agreed upon by both parties.

    Emissions levels, flow rates and other operating parameters from Customer's equipment and the Product discharge point shall be tested at the Customer's expense, in accordance with a mutually agreed upon test procedures and protocol consistent with customary and accepted industry practices. MV's limited warranty shall expire in the event the Product is misused, neglected, improperly maintained or operated other than for its intended use or purpose by the Customer.

    If the above conditions are met and the Product fails to achieve the output performance stated in the MV Agreement within the Warranty Period, MV shall replace or modify and adjust its Product as needed to meet such output performance standards. Consistent with Section 11 above, Customer is required to notify MV, in writing, of any specific defect(s) and provide MV with complete documentation of the defect(s) and proof of satisfaction of all conditions, a) through f), of this Section 12. If MV is unable to achieve the output performance standards under the MV Agreement conditions, Customer may rescind the sale, and MV shall return the full purchase price that shall be Customer's sole remedy for breach of the warranty made in this paragraph. In no event shall MV be responsible for consequential or punitive damages or otherwise.

13. **NO OTHER WARRANTIES EXPRESS OR IMPLIED.** THE LIMITED PRODUCT WARRANTIES REFERRED TO IN SECTIONS ABOVE ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS OR IMPLIED WARRANTIES OR CONDITIONS IN RESPECT OF THE PRODUCTS, INCLUDING, WITHOUT LIMITATION, ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THE REMEDIES PROVIDED IN THE APPLICABLE PRODUCT WARRANTY ARE THE CUSTOMER'S SOLE REMEDIES FOR ANY FAILURE OF MV TO COMPLY WITH ITS WARRANTY OBLIGATIONS.

14. **LIMITATION OF LIABILITY.** THE TOTAL CUMULATIVE LIABILITY OF MV TO THE CUSTOMER FOR ALL LIABILITIES OF ANY KIND, WHETHER BASED ON TORT, NEGLIGENCE, CONTRACT, WARRANTY, STRICT LIABILITY OR OTHERWISE, ARISING FROM OR RELATING TO THE MV AGREEMENT SHALL NOT BE GREATER THAN THE AGGREGATE PURCHASE PRICE OF THE PRODUCTS SUPPLIED BY MV UNDER SUCH AGREEMENT.

15. **Consequential Damages.** MV shall not be liable for and shall be held harmless by the Customer from any damage, loss, claim or expense, including without limitation indirect, special, consequential, incidental or punitive damages in relation to loss of use of facilities or equipment, loss of production, revenue or profits, downtime costs, or costs of capital or of substitute equipment or services arising directly or indirectly from the Products or the sale thereof, including without limitation the manufacture, handling, use, installation, operation or dismantling of the Products, whether alleged in contract, negligence or otherwise.

16. **Re-sale of Products.** In respect of any re-sale of the Products or sale of any Customer product which incorporates a Product as a component, the Customer shall indemnify, defend and hold MV harmless against any and all claims, actions, liabilities and expenses (including all legal fees, on a substantial indemnity basis) arising from a representation or warranty to a third party for the Products made by the Customer other than, as limited by the Product Warranties, or arising from an allegation of process patent infringement relating to a Customer process in which the Products are used as a component part.

17. **Survival.** All payment obligations, provisions for the limitation of or protection against liability of MV and any other provision of an Agreement which by its nature is continuing, shall survive the termination, cancellation or expiration of such Agreement.

18. **Permits.** The Customer shall obtain, at its expense, all licenses, permits and approvals for the purchase, delivery, shipment, installation and use of any Products.

19. **Force Majeure.** MV shall be excused from the timely performance of its obligations in the sale or other supply of Products and/or services if its performance is impeded or prevented by circumstances beyond its control (other than its own financial difficulties) (a "Force Majeure Event") and MV shall take all reasonable steps or actions to mitigate the effect of the delay. This provision shall specifically apply to Section 7 above. Upon the occurrence and the termination of a Force Majeure Event, MV shall promptly provide the Customer with written notice and reasonable particulars of the Force Majeure Event. Either party may terminate any Agreement affected by a Force Majeure Event if such circumstances continue for more than six (6) months and written notice of termination is delivered to the non-terminating party. Upon and notwithstanding any such termination, the Customer shall pay MV for that portion of the Products manufactured or delivered prior to the date of the above mentioned initial notice of the Force Majeure Event. Notwithstanding anything in this Section 19, the Customer shall extend any security granted for the payment of the purchase price of Products for a period equal to the delay caused by the Force Majeure Event.

20. **Governing Law.** The sale of the Products and this Agreement are and shall be governed by the laws of the State of Colorado and the laws of the United States of America as applicable therein. Each of the parties irrevocably attorns and agrees to the exclusive jurisdiction of the Courts of the State of Colorado, provided that the parties shall not be prevented from seeking injunctions or other temporary relief or enforcing judgments of the Courts of Colorado in another jurisdiction.

21. **Confidential Information.** Proprietary or confidential information disclosed for supply of any Products may not be used or disclosed by the recipient, Customer or MV other than for the express purpose for which it was disclosed. The owner of such proprietary or confidential information shall be responsible for designating it as such by clear and timely notice thereof to the recipient at the time of or before its conveyance to the recipient.

22. **Assignment.** Neither party may assign all or any part of the MV Agreement without the prior written consent of the other party.

23. **Waiver, Amendment.** Any waiver, modification or amendment of an Agreement shall only be effective if such waiver, modification or amendment is contained in a written instrument prepared or otherwise accepted in writing by MV and Customer and signed by their respective authorized agents.

24. **Suspension, Cancellation or Termination.** Subject to Sections 4, 11 and 19 hereof, no MV Agreement may be cancelled or suspended by the Customer without the express written consent of MV, such consent to be granted in MV' sole and unrestricted discretion and upon such terms, including the payment of all costs incurred and profits foregone, as MV may require. Termination may be effected as set forth in Section 19 by either party.

25. **Severability and Reconstruction or Termination.** If a binding court determination, ruling or judgment is made that a provision of these Standard Terms and Conditions or any other document which forms the MV Agreement is unenforceable (in whole or in part), then such provision shall be void only to the extent that such determination, ruling or judgment requires, and the parties shall replace such void provision with one that is enforceable and valid and, to the greatest extent permitted by law, serves the intent and purpose of the void provision. No other provision shall be affected as a result thereof, and, accordingly, the remaining provisions shall remain in full force and effect as though such void, voidable or inoperative provision had not been contained herein.

Nicholas Construction Inc.
251 Carsen Way
Shafter CA 93263
Phone: (661) 391-8800 ● Fax: (661) 391-8900
CA License# 843461

May 24, 2017

Nathan Nisly
MAAS Energy Works
1670 Market Street, Suite 256
Redding, CA 96001

PROPOSAL

Nicholas Construction, Inc. (NCI) is pleased to offer the following proposal for your consideration to construct the Calgren Diary Fuels, LLC biogas pipeline, Phase 1. Construction is anticipated to take 8 weeks after pipe deliveries and Tulare County Encroachment Permit has been issued.

BASE BID:	UNIT	UNIT COST	TOTAL
MOBILIZATION/DEMOB	1 LS	$89,000	$89,000
F&I 20-INCH DR18 HDPE PIPE	5,335 LF	$59.00	$314,765
F&I 18-INCH DR18 HDPE PIPE	13,344 LF	$60.00	$800,640
PATCH PAVING	3EA	$10,000	$30,000
TESTING	1 LS	$11,000	$11,000
TRAFFIC CONTROL	1LS	$23,000	$23,000
TOTAL BASE BID			$1,268,405

ADD ALTERNATES:

	UNIT	UNIT COST	TOTAL
PIPE ZONE IMPORT MATERIAL	18,679 LF	9.00	$168,111.00
BARBED WIRE FENCING	5,280 LF	5.00	$42,240.00 (estimate)

Due to poor in-situ soil classification, achieving a 90% relative compaction in the pipe zone will be nearly impossible without deflecting the pipe. Importing material with at least a sand equivalent of 30 or better is recommended.

Pre-bid investigation with Tulare County indicated the road will not be closed even on a daily basis and re-opened at night. Randy Dysart was insistent on using flaggers and keeping one lane of traffic open during working hours.

LEAD TIMES:

HDPE Pipe	6-7 weeks
Valves	5-6 weeks

CONDITIONS:
Soils/Concrete Testing fees born by Contractor
Environmental Training/Monitoring/Mitigation by Owner
SWPPP by Owner
As-builts by Owner

TERMS:
Payment net 30
Sales tax EXCLUDED

Nicholas Construction Inc.
251 Carsen Way
Shafter CA 93263
Phone: (661) 391-8800 ● Fax: (661) 391-8900
CA License# 843461

Thanks for chance to bid.

Regards,

Alex Silicz
Estimating/PM

Nicholas Construction Inc.
251 Carsen Way
Shafter CA 93263
Phone: (661) 391-8800 ● Fax: (661) 391-8900
CA License# 843461

September 22, 2017

Nathan Nisly
MAAS Energy Works
1670 Market Street, Suite 256
Redding, CA 96001

PROPOSAL

Nicholas Construction, Inc. (NCI) is pleased to offer the following proposal for your consideration to construct the Calgren Diary Fuels, LLC biogas pipeline, Phase 2. Construction is anticipated to take 8 weeks after pipe deliveries. If there are crops in the field along Road 96, County will need to be notified as we will be working in their ROW. If needed, costs will be negotiated. We are assuming pipe will be installed with same quality and workmanship as Ph 2.

BASE BID:	UNIT	UNIT COST	TOTAL
MOBILIZATION/DEMOB/PUNCHLIST	1 LS	$86,000	$86,000
F&I PIPE STA.2076+00 TO 2162+71	8,670 LF	$40.00	$346,800
F&I AIROSO LAT.	4,305 LF	$30.00	$129,150
F&I VANDER EYK LAT.	919LF	$30.00	$27,570
AVE. 108 DITCH ALIGN CROSSING	1LS	$23,000	$23,000
AVE. 100 DITCH ALIGN CROSSING	1LS	$23,000	$23,000
INSTALL DROP W/ALIGN CROSS	2EA	$8,000	$16,000
TESTING	1 LS	$11,000	$11,000
TRAFFIC CONTROL (MINOR)	1LS	$6,500	$6,500
TOTAL BASE BID			$669,020

LEAD TIMES:

HDPE Pipe	8-10 weeks
Valves	2-3 weeks

CONDITIONS:
Soils/Concrete Testing fees born by Contractor
Environmental Training/Monitoring/Mitigation by Owner
SWPPP by Owner
As-builts by Owner
Construction Staking by Contractor

TERMS:
Payment net 30
Sales tax EXCLUDED

Thanks for chance to bid.

Regards,

Nicholas Construction Inc.
251 Carsen Way
Shafter CA 93263
Phone: (661) 391-8800 ● Fax: (661) 391-8900
CA License# 843461

Alex Silicz
Estimating/PM

LYLES UTILITY CONSTRUCTION, LLC

Mailing Office: P.O. Box 4347 • Fresno, CA 93744
Phone: 559-487-7999 • Fax: 559-570-0147
www.lylesutility.com

May 24, 2017

Calgren Dairy Fuels, LLC
11704 R. 120
P.O. Box E
Pixley, CA 93256

Attention: Nathan Nisly Director of Development, MAAS Energy Works, Inc.

Subject: Calgren Biogas Pipeline Project, Phase1

Reference: Calgren Diary Fuels Facility, Ave 112 & Road 96, Tulare County, California

We are pleased to provide the following proposal for the described work on the above referenced project. We will furnish all labor, equipment, and insurance to install approximately 19,000 LF 10" to 20" gas pipeline for the above referenced facilities as described in the following scope #1 of work for the lump sum price of **$1,810,000.** If scope # 2 is utilized as described below the adjusted lump sum price is **$2,070,000.**

Scope of Work

1. Earthen Backfill - Lyles Utility will provide the labor, materials and equipment install approximately 19,000 LF 10" to 20" PE SDR 21 gas pipe as indicated on plans dated 5/12/2017. This scope of work does not include import material, but assumes native backfill. Assuming pipeline has a minimum cover of 4'; all changes in elevations due to cross lines to be handle as a change in scope of work. Please see inclusions and exclusions for further details.
2. Import Materials – As an alternate Lyles Utility will install materials in the same process as described above, but pea gravel will be utilized around the haunch of the pipe to achieve the 90% compaction requirements around the haunch of the pipe.

Project Specific Terms and Conditions

1. This proposal is based on installing pipe, valves and vaults from station 2156+11.02 to 2346+00.00.
2. Drawing reference Job No. 263217005, Dated 5-12-2017.
3. The bid price is based on a mutually agreeable schedule.
4. Based on one mobilization.
5. This proposal is void if not accepted within 30 days.
6. This proposal is based normal work time 7:00 AM - 3:30 PM.
7. We have the right to modify our pricing based upon changes in scope of work due encroachment permit requirement not addressed prior to bid time.
8. **This proposal includes the following**:
   a. Provide labor, material and equipment to install 10", 12", 18", and 20" DR21 HDPE gas piping.
   b. Installation of tracer wire, warning tape, gas markers, valves and vaults.

c. Provide Pipeline "Air" testing at 1.5 times MAOP for 4 hour duration.
d. Paving of existing roads that are affected by pipe line crossings only.
e. Compaction testing at 500LF intervals.

9. **This proposal is based on following exclusions**:
   a. Paving of existing damaged roads that are parallel to pipeline.
   b. Tie in to existing gas mains or feed at Calgreen plant
   c. Storm water pollution prevention plan / permits / fees or implementation.
   d. Dewatering or trenching in groundwater conditions.
   e. Demolition of any kind, not included in scope of work.
   f. Adjusting or relocation of existing / proposed survey monuments or utilities.
   g. Biological report requirements.
   h. Import of select material and export of excess native spoils.
   i. Environmental impact report / study.
   j. Surveying or staking.
   k. All inspection costs, coordination, and fees.
   l. Traffic control plans.

Thank you for the opportunity of submitting this proposal.

The following name and address, which is that of our General Offices, should be used in the preparation of all contract documents: Lyles Utility Construction, P.O. Box 4347, Fresno, CA 93744

Lyles Utility Construction, LLC,

By_____
Roman D. Hernandez
Senior Engineer

Contractors are required by law to be licensed and regulated by the Contractors' State License Board. Any questions concerning a contractor may be referred to the Registrar, Contractors' State License Board, 9835 Goethe Road, Sacramento, California 95827. Mailing address: P. O. Box 26000, Sacramento, CA 95826.

Lyles Utility Construction's California Contractor's License No. is 981146.

The California Contractors' State License Board has jurisdiction to investigate complaints against contractors if a complaint regarding a patent act (generally known or reasonably susceptible of discovery) or omission is filed within four years of the date of the alleged violation. A complaint regarding a latent act (hidden or unknown) or omission pertaining to structural defects must be filed within ten years of the date of the alleged violation.

General Terms and Conditions:

1. We reserve the right to request financial data to support the Owner's ability to make timely payments for our work and will not start our scope of work until we have received evidence, to our satisfaction, that there are sufficient funds set aside to pay for the work performed and directed. The Owner shall be obligated to disclose all potential lien rights and/or financing party information on the property.
2. This proposal is conditioned upon the use of standard terms and conditions, or application thereof, of the Associated General Contractors (AGC) General Contract Agreement. We reserve the right to suggest and make contractual changes to any contract documents with good faith and direct negotiations.
3. This proposal includes costs for typical insurance policies: General Liability (2 million / 4 million) and Auto (2 million) with Additional insured as requested along with standard workers compensation or any payment of deductibles may be at an additional cost.
4. By law, the duty to indemnify shall not extend to the acts of willful misconduct or sole negligence, active or passive, on the part of the Owner or anyone associated with him including design or engineering work submitted for our Scope.
5. If hazardous materials, unsuitable ground conditions, change in soil conditions or concealed conditionals are encountered, we will cease all operations and the Owner will determine the nature and extent of such conditions, and will recommend the nature and extent of remediation. Any hazardous materials, unsuitable ground conditions, change in soil conditions or concealed conditions that are encountered shall be considered "extra work" under an approved Change Order.
6. Any authorized cost plus or force account work shall be completed under written direction per the agreed time and material section within the contractual documents or in absence, using our annual and most current labor and equipment rates along with our time and material calculation sheet.
7. Any and all claims, controversies or disputes arising out of or relating to this agreement, or the breach thereof , which remain unresolved after good-faith and direct negotiations between the on-site Project Managers and after with the Corporate Officer(s) and authorized representative of the Owner (parties), shall then be submitted to confidential mediation with written notice in accordance with the rules and procedures for mediation then in effect under either JAMS for Mediation or the Construction Industry Mediation Rules of the American Arbitration Association. Continuing claims, controversies or disputes thereafter shall be submitted to binding Arbitration as allowed by California Law.
8. Monthly payments shall be agreed in the final executed contractual documents or as follows; Payment for services rendered by the 15th of each month for 95% of all work performed during the preceding month. Final payment to be made within 35 days after completion and acceptance of our scope of work. Late payments shall incur an interest charged by law or at a minimum rate of eighteen percent (18%) per annum on past-due accounts.
9. All contractual correspondence and payments shall be directed to our Corporate Office at Lyles Utility Construction, LLC, P.O. Box 4347, Fresno, California 93744-4347.

Environmental Fabrics, Inc.

85 Pascon Court
Gaston, SC 29053
(803) 551-5700
(803) 551-5701 FAX
www.environmentalfabrics.com

CA#822058 **BUDGET PROPOSAL**

June 18, 2018

Attn: Hudson Davis, Interconnection Project Manager

Project: Proprietary Internal Fixation System for 3000, 4500 and 6000 wet cow equivalent dairy ranging from 160,000 sq. ft. to 250,000 sq. ft. area at top of digester area

Environmental Fabrics, Inc. hereby proposes to furnish the following scope of work:

1.0 Environmental Fabrics, Inc. (EFI) Scope of Work:
The scope of work covered by this proposal is limited to the following Bid Items:

AIR INJECTION SYSTEM

1.1 Furnish material, labor and equipment to install an oxygen production and injection system. System consist of a delivered, fully finished container to house oxygen generator, air tank, oxygen generator controls and other associated devices for full oxygen generation and injection delivery. Building will be climate controlled by its own split unit system. Building will come ready for operation, shore power connection by others.

Lines from a biogas compressor will feed the diffusors submerged located at mixer locations to be identified once plans are submitted. Each diffusor is mounted by an individual hatch port for ease of owner to inspect/clean/replace diffusors in the future. An inline 4 gas meter will be downline from a static mixer to ensure proper readings of the biogas. Each diffusor line will have a rotameter and a fuel gas solenoid valve. A manual ball valve is also included at each of these locations for operator ease when inspecting diffusors. In said injection lines, before branching, exist a flame arrestor with thermal shut off valve.

Included, but not limited to, EFI will have all needed testing draw off points at designated locations, needed valves, hoses across the cover, diffusors under the cover and associated hardware to make a complete system. Electrical service to our delivered building will be furnished by others and connected to our panel (3 phase). As advise by customer, customers PLC will control/monitor all electrical components of this install. EFI has removed the PLC and associated cost from this quote. All wiring of devices will be pulled to EFI's supplied building so that customer can tie into their supplied PLC.

1.2 Sales Tax or Use Tax is **not included** in the Lump Sum Price.

1.3 The prices quoted do not include the cost of Payment & Performance Bonds.

1.4 One Mobilization/Demobilization is included in the Lump Sum price. EFI requires a (2) two week

notice for Mobilization and a three week lead time on construction of building from time of order/PO issuance by customer

LUMP SUM BUDGET PRICE **$214,820.00**

2.0 Services To Be Furnished By Others:

2.1 Site must be ready to accept building (9' wide x 20' long) and contiguous area for lay down of mixers/compressors/associated devices

2.2 Access to the work area for EFI personnel and equipment.

2.3 Access to and use of sanitary facilities for EFI personnel.

2.4 Provide a storage and parking area of 1,000 square feet within 100 feet of the area to be covered.

2.5 Permission to unload and store onsite all material arriving at the site prior to EFI's crew arrival.

2.6 All third party QC/QA testing. This includes, but is not limited to, laboratory testing of the field samples, Conformance testing, all Independent Laboratory and all Third Party testing should customer deem necessary.

3.0 Items Specifically Not Included:

3.1 Permits, licenses, fees, union wages, union agreements, prevailing wages and Sales Tax.

3.2 Retainage being withheld from the contract amount beyond the completion of scope of work listed in paragraph 1.0.

3.3 All costs related to the repair of the oxygen injection system that results from work performed by others.

4.0 Delays:

4.1 This proposal is based on EFI proceed without delays or interruptions caused by, but not limited to, incomplete preparation of site delivery area, incomplete structures or other reasons beyond the control of EFI.

4.2 If such delays do occur, EFI reserves the right to invoice the customer at the rate of $300.00 per man per day.

4.3 If remobilization is required and/or requested to accommodate rescheduling due to delays beyond the control of EFI, a remobilization charge of $5,000.00 will be invoiced to the customer.

5.0 Safety:

5.1 All work on or near a liner and/or cover presents a safety hazard for personnel and animals due to their slippery surface, especially when wet. It is the customer's responsibility to provide protection and safety in the form of fences, rope, security, etc., as necessary to prevent injury or death except for EFI personnel.

6.0 Warranty:

6.1 The Installation Warranty will be provided by and subject to EFI's 24-month pro-rated warranty to cover labor of repairs due to failed devices.

6.2 All manufacturers warranty's will remain in place on all installed devices.

7.0 Terms of Payment: Invoicing subject to establishment of an approved line of credit. The following terms will apply as a minimum:

7.1 EFI will invoice for all materials delivered to the site. Payment will be made to EFI within thirty (30) days after receipt of invoice.

7.2 EFI will invoice for all work completed each month and it will be due and payable within thirty (30) days after receipt. Upon completion of the scope of work listed in Paragraph 1.0, payment will be received by EFI within thirty (30) days following the receipt of the final invoice.

7.3 Contractor hereby acknowledges that EFI relies solely and exclusively on the credit of the Contractor for payment for its work. All payments, including progress payments, payments for change orders and extra work, retainage and final payment, are the sole responsibility of the Contractor and shall be paid according to the terms of payment stipulated herein and on invoice documents. Receipt of payment from the Owner by the Contractor is specifically not a condition precedent to payment for payments due to EFI by the Contractor.

8.0 Insurance:

8.1 Builder's Risk Insurance will be provided by the owner or the contractor, which specifically covers all materials, furnished by EFI and all labor required to replace any materials, which are damaged during the contract period.

8.2 A certificate of insurance for the Builder's Risk Insurance, naming EFI as "Additional Insured", will be issued to EFI prior to our mobilization for the project.

9.0 Pricing: The prices quoted will be valid for a period of thirty (30) days after the date of this proposal. EFI reserves the right to increase pricing if our suppliers increase pricing for any reason and/or as a result of invoking force majeure.

10.0 Terms of Contract: The terms and conditions of this proposal will be made part of any agreement or purchase order for the scope of work listed in this proposal.

Respectfully Submitted,
John Paul Smith

ELECTRIC INNOVATIONS INC.

Lic 907032

3711 Meadow View
Redding, CA 96002

Ph. 530-222-3366
c. 760-717-1605

6/25/2018

Gas Processing System

Contract for Digester Electrical and Mechanical Construction
Air Injection System

Customer: Maas Energy Works, 3711 Meadow View Drive, Redding CA 96002

Attn: Hudson Davis, Project Manager

SCOPE OF WORK: Electric Innovations Inc. agrees to provide consultation, administrative and electrical installation work as directed by Maas Energy.

Project: Proprietary Internal Fixation System for 3000, 4500 and 6000 wet cow equivalent dairy ranging from 160,000 sq. ft. to 250,000 sq. ft. area at top of digester area. Duties will include but are not limited to: Electrical diagrams and load calculations, design and installation of electrical infrastructure, switchgear, controls, disconnects, panels, mechanical and branch circuits as directed Maas Energy Works and outlined below:

- **Furnish material, labor and equipment to install an oxygen production and injection system.**

System consists of a delivered, fully finished container to house oxygen generator, air tank, oxygen generator controls and other associated devices for full oxygen generation and injection delivery. Building will be climate controlled by its own split unit system. Building will come ready for operation, shore power connection by others.

Lines from a biogas compressor will feed the diffusors submerged located at mixer locations to be identified once plans are submitted. Each diffusor is mounted by an individual hatch port for ease of owner to inspect/clean/replace diffusors in the future. An inline 4 gas meter will be downline from a static mixer to ensure proper readings of the biogas. Each diffusor line will have a rotameter and a fuel gas solenoid valve. A manual ball valve is also included at each of these locations for operator ease when inspecting diffusors. In said injection lines, before branching, exist a flame arrestor with thermal shut off valve.

Included, but not limited to, EI will have all needed testing draw off points at designated locations, needed valves, hoses across the cover, diffusors under the cover and associated hardware to make a complete system. Electrical service to our delivered building will be furnished by others and connected to our panel (3 phase). As advise by customer, customers PLC will control/monitor all electrical components of this install. EI has removed the PLC and associated cost from this quote. All wiring of devices will be pulled to EI's supplied building so that customer can tie into their supplied PLC.

1.2 Sales Tax or Use Tax is not included in the Lump Sum Price.
1.3 The prices quoted do not include the cost of Payment & Performance Bonds.
1.4 One Mobilization/Demobilization is included in the Lump Sum price. EI requires a (2) two week notice for Mobilization and a three week lead time on construction of building from time of order/PO issuance by customer.

ELECTRIC INNOVATIONS INC.

Lic 907032

3711 Meadow View
Redding, CA 96002

Ph. 530-222-3366
c. 760-717-1605

Electric Innovations Inc. Agrees to provide the above services for the sum of:

$ 171,856

Exclusions: Building Permit. Engineering, 150 amps 480v 3ph to location, union wages, union agreements, prevailing wages and Sales Tax.

INSURANCES AND LICENCES: Electric Innovations Inc. agrees to maintain a $1M/$2M general liability insurance policy, as well as workers compensation insurance throughout the duration of the project. Current insurance certificates will be provided to Maas Energy on request. Electric Innovations Inc. shall maintain current B and C-10 contracting licenses.

Payment Schedule: 40% due on signing for long lead time, custom build items and design. (8 – 10 weeks). 55% due on beginning of construction. 5% due on commissioning.

T&M APPROVAL: All additional T&M work will require approval by Maas Energy or Daryl Maas prior to beginning work.

T&M RATES: Maas Energy agrees to remit to Electric Innovations Inc. the following rates for services:

Office Admin	$ 45 / Hr	Office administration and paperwork –Secretarial
Apprentice Electrician	$ 78 / Hr	Electrical assistance to Master Electricians
Construction Super	$ 78/ Hr	Construction supervision of project outside of contract scope
Master Electrician	$ 90 / Hr	Switchgear, panels, controls, programming, all other electrical work

T&M MATERIAL PURCHASES: Maas Energy agrees to reimburse Electric Innovations Inc. at the time of billing for materials purchased for use on any T&M portion of the project. Materials will be billed at cost plus 10%.

T&M RECORDS: Electric Innovations Inc. agrees to maintain accurate records of all man hours including detailed description of work preformed, materials purchased, and other expenses billed to Maas Energy. Submittal of these records will be done as requested.

WARRANTY: Electric Innovations Inc. provides a one-year warranty on work and materials provided *and* installed by Electric Innovations only. Electric Innovations takes no responsibility for work and/or materials supplied/installed by others. Earthquakes, flooding, tornados, high winds, or other acts of God will not be covered under this warranty.

INVOICING: Electric Innovations Inc. will invoice based on percentage of work complete throughout the project when milestones have been met, and as outlined above under payment schedule. An initial equipment deposit for large items pre-ordered may be billed to cover design and large switchgear equipment, and lock in low materials pricing.

Lic 907032

3711 Meadow View
Redding, CA 96002

Ph. 530-222-3366
c. 760-717-1605

I certify I have read this agreement and understand its terms and conditions

Electric Innovations Inc.

Signature_____

Printed Name _____

Date Signed_____

Maas Energy

Signature_____

Printed Name _____

Date Signed_____

Maas Energy

EST. 1968
PROVOST& PRITCHARD
CONSULTING GROUP
An Employee Owned Company

111 Mission Ranch Blvd., Suite 140
Chico, CA 95926-2267
Tel: (866) 776-6200

www.ppeng.com

May 2, 2017

Lyle Schlyer
Calgren Dairy Fuels, LLC
P.O. Box E
Pixley, CA 93256

Daryl Maas
Maas Energy Works, Inc.
1670 Market Street, Suite 256
Redding, CA 96001

RE: Calgren Renewable Fuels Pipeline Expansion Project – Final Design Services

Dear Mr. Schlyer and Mr. Maas:

Thank you for the opportunity to submit this proposal to provide engineering services for the subject project. This proposal discusses our understanding of the project, recommends a scope of services together with associated fees, deliverables and approximate schedule. It also sets forth our assumptions and discusses other services that may be required as the project proceeds.

Project Understanding

The final design phase will use the information provided in the Basis of Design and the Technical Memorandum to prepare final design drawings. We understand that the project will be privately bid and not subject to prevailing wage requirements. References for technical specifications will be included on the drawings to the greatest extent practicable. Our scope does not include preparation of bidding and contract documents for the project, although this can be added into our scope as an additional service.

Scope of Services

Our proposed scope of work for this phase of the project is described below.

Phase T01: County Encroachment Permit (Previously Authorized)

Phase T02: Final Design

1. Drawings (estimated sheet count):
    a. Cover sheet – 1 sheet.
    b. Notes, specs, symbols & abbreviations – 2 sheets.
    c. Survey control – 2 sheets.
    d. Sheet index – 1 sheet.
    e. Plan-profile sheets – 26 sheets (in addition to County ROW drawings developed in T01).
    f. County road crossing details – 3 sheets.
    g. Ditch crossing details – 6 sheets.
    h. Connection piping at the dairies (to digesters) – 6 sheets.
    i. Detail sheets – 4 sheets.

2. Calgren/Maas will provide specific information on the following:
    a. Termination points at each digester location. Provost & Pritchard will use this information to provide connection piping design from the digester location to the main biogas pipeline.
    b. Moisture drop locations and design. Provost & Pritchard will use this input to finalize the moisture drop locations and design.
3. Specs – to be included on drawings.
4. Submittals:
    a. 90%
    b. 100%
5. Utility and ditch company contact and discussion of crossings. The ditch companies have indicated that they will accept directional drilling of the crossings if 5 feet of separation between the ditch bottom and the top of the casing pipe is provided throughout the entire easement/right-of-way. Casing pipe can be HDPE which will allow for directional drilling instead of bore and jack with steel casing.
6. Geotechnical investigation. Provost & Pritchard recommends that geotechnical investigations be performed for the project. The scope of work from Vertical Sciences, Inc. (VSI) is presented in Attachment A to this proposal. It is our understanding that Calgren will contract directly with VSI for the described geotechnical services.
7. 3 review meetings w/ Calgren/Maas.
8. Project management.

Deliverables

1. 90% and 100% design drawings. PDF's (each submittal).

Time and Materials (Fee Budget)

Provost & Pritchard will perform the services on a time and materials basis, in accordance with our Standard Fee Schedule in effect at the time services are rendered. Please note that we were using our 2016 fee schedule for preliminary design. Our 2017 fee schedule will be in effect for this project. Our time and material fees are estimated by phase below. These fees will be invoiced monthly as they are accrued. Reimbursable expenses will be invoiced in addition to professional fees and are included in the estimate. If it appears that we will need to exceed the fee estimate shown below, we will notify you in writing before we do so, and will provide a revised estimate. We will not continue work beyond the initial budget without additional authorization.

Proposed Fee – Calgren Pipeline Project	
Phase	**Estimated Fee**
Phase T01 – County Encroachment Permit	Previously Authorized
Phase T02 – Final Design	
Provost & Pritchard Design	$230,500
VSI Geotechnical Investigation	To be contracted directly with Calgren
Total Estimated Fee:	$230,500

Schedule

Once we receive a signed proposal and are authorized to proceed, we will begin work. The Phase T02 work will be completed in approximately 16 weeks.

Assumptions

- Design criteria and preliminary design presented in the Basis of Design and Technical Memorandum will be the basis of the final design.
- All required application fees, etc. will be paid directly by Calgren.
- Design drawings will be prepared for private bidding and the project is not subject to prevailing wage requirements.
- Preparation of bidding and contract documents for the project is outside this scope of work.

Additional Services

The following services are not included in this proposal; however, these and others can be provided at additional cost, either directly by Provost & Pritchard Consulting Group or through subconsultants, upon request.

- Stormwater Pollution Prevention Plan (SWPPP) for the construction of the gas pipelines. A SWPPP is likely to be required, but our assumption is that the contractor will handle this.
- SJVAPCD Dust Control Plan. If needed, our assumption is that the contractor will handle this.
- RWQCB coordination if moisture drops will discharge to ground instead of being pumped or piped to an existing dairy pond.
- Preparation of bidding and contract documents.
- Assistance during the bidding phase of the project.
- Design services during construction, construction management assistance and construction observation.
- Construction staking and associated survey services.
- Other permitting as may be required for the gas pipelines.
- Registration of the pipelines with Underground Service Alert (USA).

Terms & Conditions

As discussed, the remaining retainer balance of $57,537.62 from the pipeline preliminary design, survey and encroachment permit projects (Project Nos. 02632-17-001, 004 and 005) will be preserved and

transferred to this final design project. The retainers will be transferred when the total outstanding balances have been paid by Calgren (estimated at $38,641.50, to be paid by May 31, 2017) and when the work on those respective projects is substantially complete. The transferred retainer balance will be held and will be applied to the final project invoice.

In order to convey a clear understanding of our mutual responsibilities under this proposal, the Consultant Services Agreement previously signed by Calgren Dairy Fuels, LLC dated December 27, 2017 is made a part of this proposal. If this proposal is acceptable, please sign this proposal, and return a copy to our office together with the retainer fee. These documents will serve as our Notice to Proceed. This proposal is valid for 30 days from the date above.

Sincerely Yours,
Provost & Pritchard Consulting Group

Kenneth K. Shuey, RCE 33558
Principal Engineer

John Schaap, RCE 61754
Vice President

Attachment: Vertical Sciences, Inc. Geotechnical Scope of Work

Terms & Conditions Accepted

By Calgren Dairy Fuels LLC

_____
Signature

_____
Printed Name

_____
Title Date

Attachment A – Vertical Sciences, Inc. Geotechnical Investigation Scope of Work

Task 1 – Data Collection & Pre-Exploration

Selected, available, pertinent geologic and geotechnical data will be compiled and reviewed during this task. Those data, where available, will include the following:

- Past site-specific geotechnical studies along proposed pipeline alignments;
- Regional and local geologic maps;
- Regional and local groundwater data; and
- Historical aerial photographs.

Those data will be reviewed to help identify potential geologic hazards and/or potential challenging geotechnical construction conditions that might impact the project.

Prior to subsurface exploration, VSI will mark proposed drill hole locations and contact Underground Service Alert (USA) to assist in identifying potential buried utility conflicts. VSI will also obtain all necessary drilling permits, which are issued by Tulare County Environmental Health Division.

Task 2 – Subsurface Exploration

We propose to advance drill holes at the trenchless irrigation ditch crossings and at selected locations along the proposed pipeline alignments to help characterize geotechnical conditions. Information from the drill holes is significant because it will provide:

- Geotechnical data for use during project design;
- Subsurface conditions that the contractor might encounter (this should help tighten bids on the project and reduce changed conditions claims during construction); and
- Subsurface conditions at trenchless crossings that is essential for the contractor to design trenchless methods for each crossing.

Hollow-stem auger drilling methods will be used for exploration during this study. Drill holes will be advanced at each side of the proposed trenchless crossing locations and at about 2,000- to 3,000- foot intervals along the proposed pipeline alignments. Using that exploration scheme, up to 40 drill holes will be advanced for this study. Drill holes at the proposed trenchless crossing sites will extend to depths of up to 30 to 40 feet. All other drill holes will extend to depths of up to 5 feet below the proposed pipeline invert depths.

Sampling within soil materials will be performed at no greater than 5-foot depth intervals using SPT and California modified split-soon samples that will be driven using a 140-pound auto trip hammer or cathead in accordance with standard test method ASTM D1586-11. SPT samples will be collected in a sample bag, labeled, and transported to our laboratory for testing. California modified split-spoon samples will be collected in 2.5-inch diameter by 6-inch long brass or stainless steel sleeves. Those sleeves will be capped, labeled, and transported to our laboratory in foam-cushioned boxes.

VSI personnel will log the soils encountered in the explorations, and will obtain samples for visual examination, classification, and laboratory testing. Logging of soils will be performed using the Unified Soil Classification System (USCS). We will estimate exploration locations using a compass and tape measure from known geographic control points on the property and by the use of a handheld Global Position System (GPS) receiver. All drill holes will be destroyed using cement grout. Cuttings from drilling operations will be dispersed on site.

Task 3 – Laboratory Testing

Soil samples obtained during Task 2 will be delivered to VSI's laboratory for testing. It is anticipated that the following laboratory tests will be performed during the course of this study:

ANTICIPATED LABORATORY TESTING SCHEDULE		
Test	**Standard Test Method**	**Number of Tests**
In-Situ Moisture Density	ASTM D2937	170
Atterberg Limits	ASTM D4318	15
Grain-Size Distribution	ASTM D422	15
Direct Shear	ASTM D3080	7
Maximum Density/Optimum Moisture	ASTM D1557	6

The actual types and numbers of tests that will be performed cannot be estimated until after the field exploration has been performed.

Task 4 – Geotechnical Analysis

Upon completion of the above-noted tasks, we will perform geotechnical evaluations for the project. Those evaluations will include the following:

- Subsurface soil profiles at each trenchless location;
- Evaluation of applicable types of trenchless pipeline emplacement methods that might be suitable for each trenchless crossing site;
- Types of and excavatability of soils along the pipeline alignments;
- Evaluation of groundwater depths and distribution;
- Mitigation alternatives to reduce impacts of groundwater on the proposed project;
- Potential to reuse soils for select backfill materials;
- Static and dynamic lateral earth pressures for retention structures and shoring;
- Allowable bearing capacities, friction coefficients, passive pressures, etc.;
- 2013 CBC seismic design parameters; and
- Pavement replacement evaluations for road crossings.

Task 5 – Geotechnical Reporting

Results of the field investigation, laboratory tests, and engineering analyses will be summarized and concluded in a geotechnical report. That report that will contain, at a minimum, the following:

- A description of the proposed project including a site plan showing the approximate location of the explorations advanced for this study;
- A description of select, existing, available data collected, reviewed, and utilized during this study;
- A discussion regarding geologic hazards that could impact the project;
- A description of the site surface and subsurface conditions encountered at the time of our field investigation;
- A geologic map showing the distribution of earth materials along the proposed pipeline alignments;
- Geologic cross sections prepared at each trenchless crossing location, depicting subsurface soil and groundwater conditions encountered during this study;
- 2013 CBC seismic design parameters;
- Recommendations related to geotechnical aspects of:
    - ✓ Grading and drainage, including compaction criteria and potential reuse of on-site soils as select backfill materials;
    - ✓ Pipe and trench zone backfill and compaction;
    - ✓ Modulus of soil reaction (E') for native soils, backfill soils, CLSM, and composites for pipeline design;
    - ✓ Allowable bearing capacities for associated structures, if any;
    - ✓ Allowable passive pressures for foundations reaction surfaces for trenchless methods;
    - ✓ Lateral earth pressures (active, at-rest, and passive) under static and dynamic conditions for retention and shoring structures;
    - ✓ Coefficients of friction for soil materials;
    - ✓ Temporary excavations and shoring; and
    - ✓ Pavement replacement sections.
- An appendix presenting a summary of the field investigation including exploration logs denoting sampling intervals and laboratory test results;
- An appendix presenting the results of our laboratory testing.

Unless otherwise directed, we will submit a draft copy of the report in a *.pdf format for review and comment. Upon receipt of comments, we will edit the report then submit the finalized report for Provost & Prichard's use.

SCHEDULE

We are prepared to initiate our services immediately upon receipt of authorization to proceed with the study. We estimate that our geotechnical studies can each be completed within 6 to 8 weeks following receipt of authorization to proceed with those services. The field exploration services schedules will be influenced by the availability of exploration equipment, site access, permit acquisition, and inclement weather, all of which are out of VSI's control. The schedule noted above can be accelerated, if necessary, to meet compressed project deadlines.

ASSUMPTIONS

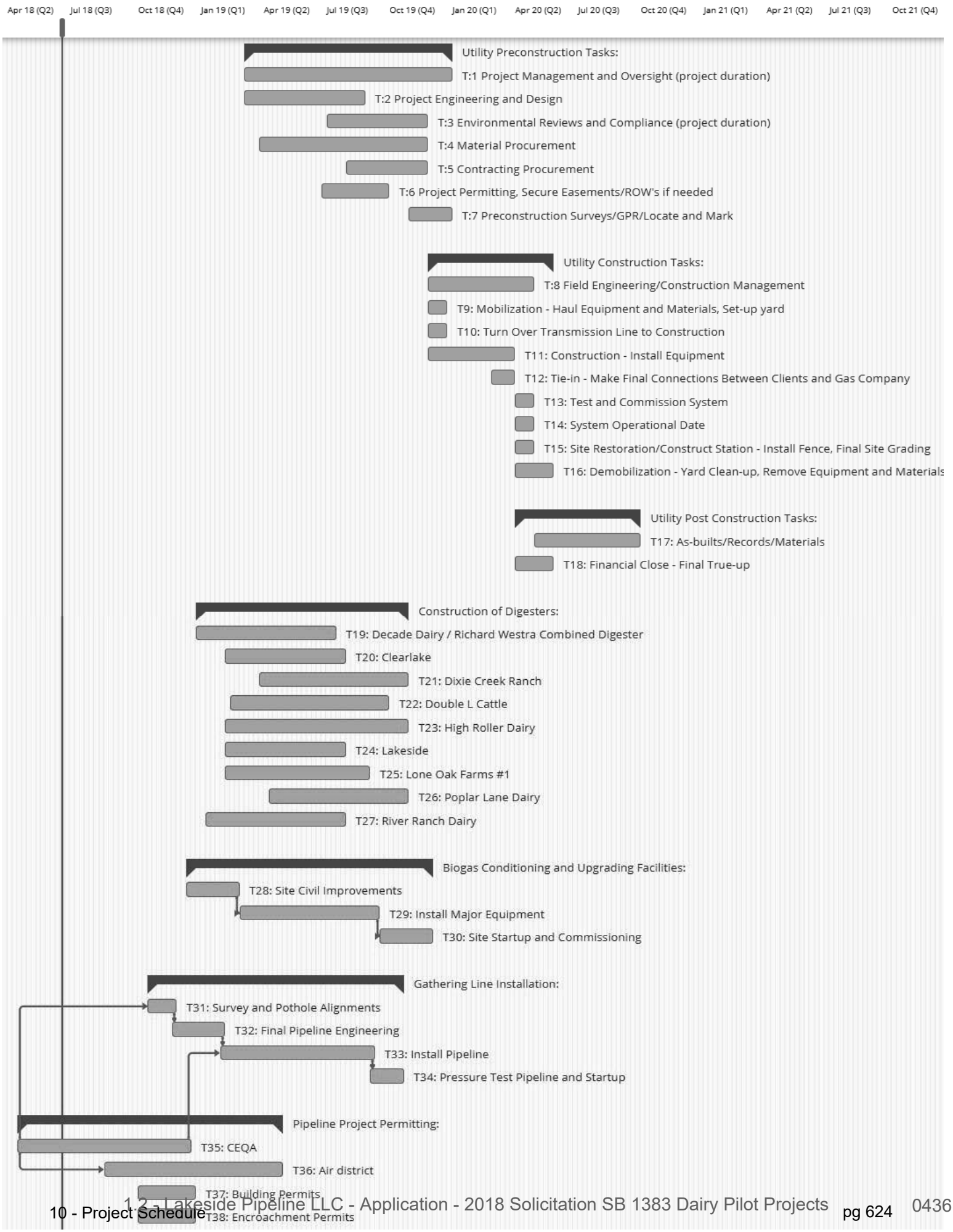
A number of critical assumptions were made in preparation of this proposal. Those assumptions are as follows:

- Access for VSI's site visits and explorations along the proposed pipeline alignments will be secured for us by Provost & Prichard;
- By contacting USA regarding utility locations on-site, VSI will have performed the standard of care, due diligence to avoid encountering buried utilities during exploration. If mislocated or

unlocated utilities are encountered during exploration, VSI cannot be held responsible for the adverse effects caused by encountering those utilities; and

- Plan and profile base maps of the proposed pipeline alignments will be provided to VSI, preferably as PDF or JPEG files.

Lakeside Pipeline Project Timeline



Attachment 11.1: Supporting Documentation

Overview of Table 2: Baseline and Project Emissions with Reduction Summary

The project emissions are modeled using the biogas pathway structure shown below. Each block represents a major processing step within the pathway. Within each block, emissions associated with the baseline condition and the proposed project are estimated. Reported emissions associated with the pathway are the net emissions of the proposed project after deducting baseline emissions.

Waste Collection

This process block includes emissions from waste collection equipment, primarily diesel-fueled agricultural tractors and wheel loaders, and emissions from the waste lagoon. Baseline emissions are the sum of emissions from the baseline diesel equipment and the uncovered lagoon. Project emissions are the sum of diesel equipment emissions (including any modernization of the equipment as part of the proposed project) and the emissions associated with the covered lagoon.

Uncovered/Covered Lagoon Emissions

In the baseline condition, the lagoon is uncovered and emits hydrogen sulfide (H2S), ammonia (NH3), and volatile organic compounds (VOCs). Emissions factors for NH3 and VOCs are shown in Table 1 below and were obtained from an ATC for a new dairy facility.[1]

Table 1 Emissions from Uncovered Lagoon (lbs/hd-yr)

Herd Type	VOC	NH3
Milking Cow	2.7	15.7
Dry Cow	1.7	9.6
Heifers	0.9	5.93
Calves (0-3 Months)	0.9	5

The lagoon also emits substantial amounts of methane and hydrogen sulfide. Methane emissions were estimated for each project site based on historical project data. This methodology accounts for the specific mix of cows, solids separation methods, and manure control efficiencies. Total baseline methane emissions are reported on a “metric tons per year per MEM” basis.

Authoritative or otherwise commonly accepted emissions factors for H2S from a dairy lagoon could not be identified. In lieu of such factors, H2S emissions were estimated by assuming a typical H2S concentration in raw biogas and calculating mass emissions from the previously calculated baseline methane emissions. Using a typical biogas composition of 3,000 ppm H2S, a 65% methane content, and the methane production rate per MEM per year calculated using historical project data, baseline H2S emissions rates are estimated for each site. While H2S concentrations can vary significantly over time and amongst dairies, the estimated

[1] Attachment 11.10 - Excerpt from SJVAPCD ATC Documenting Lagoon Emissions (page 16)

3,000 ppm level used in these calculations is consistent with a midpoint value of typical concentration ranges reported in literature.[2]

Project emissions are calculated using a control factor of 60% annually.

Off Road Equipment Operation

Waste collection emissions associated with the operation of off-road diesel equipment are calculated using emissions factors given in Table D-9 of The Carl Moyer Program guidelines.[3] These guidelines provide emissions factors for NOx, ROG, and PM10. For purposes of this analysis, it is assumed that ROG emissions are equivalent to VOC emissions. CO emissions are based on US EPA emissions standards for each of the applicable emissions tiers and horsepower groups.[4] SOx emissions are based on the use of 11ppmwS ULSD and all fuel-borne sulfur is assumed to oxidize to SO2. Emissions rates are converted to a grams/bhp-hr basis using a factor of 18.5 bhp-hr/gallon, per Table D-21 of the Carl Moyer Program guidelines[5]. The resulting emissions rates are summarized in Table 2 below.

Table 2 Controlled Off-road Diesel Engines Emissions Factors (g/bhp-hr)

Horsepower	**Tier**	**NO_x**	**ROG**	**PM10**	**CO**	**SOx**
100-174	*2*	*4.15*	*0.15*	*0.128*	*2.6*	*0.0037*

Baseline and project emissions are determined by multiplying the amount of fuel used in each equipment category by the conversion factor 18.5 bhp-hr/gallon to produce an estimate of the total bhp-hr per year in each equipment category. Because specific equipment inventories vary amongst projects and over time, it is assumed that all off-road activity occurs in the 100-174 HP Tier 2 emissions category. This is a reasonable, but conservative estimate based on reviews of limited equipment inventory data. These values are then multiplied by their corresponding emissions rates, given in the table above, to determine total emissions for each equipment category. Total baseline and project emissions are simply the sum of the emissions in each equipment category.

Diesel fuel use is reduced under the proposed projects by eliminating the need for clean-out of the settling lagoon using an excavator and/or reducing the activity of other off-road equipment. Additionally, the use of storage lagoon agitators is eliminated and replaced by electrically powered digester mixers. These reductions in diesel fuel use are partially offset by diesel fueled equipment used for the periodic cleanout of the sand lane and digester. Diesel fuel use for each of these equipment categories is a function of the dairy size and is adjusted accordingly for each project site.

[2] Attachment 11.11 - NYSERDA Assessment
[3] Attachment 11.12 - 2017 Carl Moyer Appendix D
[4] Attachment 11.13 - EPA - Tier 1-3 Exhaust Emissions Standards
[5] Attachment 11.12 - 2017 Carl Moyer Appendix D

Waste Digestion

Waste Management/Digester Electricity Demand

This process block includes emissions and electricity demand associated with operating the uncovered lagoon in the baseline condition and operating the covered lagoon digester in the project condition. Several equipment types were identified in this process block including: stationary screen separators, screw presses, flush pumps, irrigation pumps, and digester mixers.

Flush Pumps - All project locations currently employ flush pumps and no change in electricity demand is expected to occur between the baseline and project conditions for this piece of equipment.

Stationary Screen Separators - Most project locations employ stationary screen separators, however, a few project locations do not. The proposed BCS system will employ these separators at all facilities, meaning that any facility that does not have a separator in the baseline condition will incur an incremental electricity demand for the addition of the separator in the proposed project.

Screw Presses – Most project locations do not currently employ a screw press. The proposed BCS system will employ screw presses at all facilities. Any facility that does not currently operate a screw press will incur an incremental electricity demand for the addition the screw press in the proposed project.

Digester Mixers – Mixers are an incremental electrical load over the baseline condition and are required at all project sites. The number of mixers is a function of the dairy size and is adjusted accordingly for each project site.

Biogas Chiller – A Biogas Chiller is an incremental electrical load over the baseline condition and is required at all project sites. The size of the chiller is a function of the dairy size and is adjusted accordingly for each project site.

Biogas Blower – A Blower is an incremental electrical load over the baseline condition and is required at all project sites. The size of the blower is a function of the dairy size and distance from central hub and is adjusted accordingly for each project site.

Electricity demand for each piece of equipment is calculated by determining the average size of the equipment and annual operation. For example, a typical flush pump averages 67 kW's and 1500 operating hours annually for a total of 54 MWh's per year.

*Equipment Electrical Demand * Average Annual Operating Hours = Total kWh's*

Grid emissions factors are then applied to the calculated electricity demand to determine the associated emissions for the Waste Digestion process. Grid emissions factors are taken from Argonne National Laboratories GREET 2.0 2016 model for the California grid mix and are displayed below in Table 3. These emissions factors reflect "direct emissions" from power plants and do not include upstream emissions associated with fuel production and transport of the fuel to the powerplant. Only direct emissions were included because these emissions are most likely to occur within California and have a direct impact on air quality and health in California's disadvantaged communities. Whereas, upstream emissions will predominantly occur outside of California.

Table 3
CA Grid Emissions Factors – Direct Emissions (g/kWh @ Customer Site)

Pollutant	Factor
VOC	0.009
CO	0.122
NOx	0.14
PM10	0.019
PM2.5	0.011
SOx	0.131

Biogas Transport and Upgrading

This process block includes the operation of a biogas upgrading system that removes impurities and brings the biogas stream to pipeline specifications for subsequent injection into a pipeline interconnection.

Gathering Compression Electricity Demand

This process block includes the electrical energy and emissions associated with compressing the raw upgraded biogas stream for delivery through the gathering lines to the central hub. Grid emission factors in Table 3 were used in calculating emissions from this demand.

Upgrading Electricity Demand

The biogas upgrading system is electrically driven. Based on discussions with the manufacturer, the upgrading system will require approximately 0.008 kWh of electricity per SCF of incoming biogas. Assuming an incoming biogas composition of 60% methane and 40% carbon dioxides, this translates into an energy demand of 14.65 kWh/MMBTU of biomethane. Total electrical energy demand is calculated by determining the biomethane flow rate from the Biogas Transport process block, less the calculated leakage from the gathering lines, and applying this total biomethane flow rate to the energy demand factor for the upgrading system.

*0.008 kWh/SCF biogas * 546 BTUCH4/SCF * 1 MMBTU / 1,000,000 BTU = 14.65kWh/MMBTUCH4*

Biogas Leakage

The upgrading process results in a small amount of leakage/fugitive emissions of methane. These emissions are difficult to precisely characterize but ARB has historically assumed a default leakage rate of 1% for the biogas upgrading process in the CA-GREET 2.0 model. This is the same leakage rate used in their prospective dairy gas pathway[6], hence, a 1% leakage rate is adopted for this analysis. Note that this leakage reduces the amount of biomethane available for the Sales Gas and CNG Use process blocks.

Sales Gas Compression Electrical Demand

This process block includes the electrical energy and emissions associated with compressing the cleaned and upgraded biogas stream for injection into a receiving utility pipeline.

Compression Energy

As with the Biogas Transport process block, compression energy for sales gas compression is calculated using CA-GREET 2.0's "Compression Energy" spreadsheet. Inlet pressures are assumed to be 375 psia, based on the outlet pressure of the biogas upgrading system. Outlet pressures from the sales gas compressor

[6] https://www.arb.ca.gov/fuels/lcfs/ca-greet/ca-greet2.0-tier1.xlsm

vary depending on the receiving pipeline's operating pressure, hence, compression energy factors in kWh/kg of sales gas are calculated uniquely for each project location based on the required pipeline injection pressure at that location. Grid emissions factors are applied to the calculated electrical energy demand as described in the Biogas Transport process block.

Compressor Leakage

The sales gas compression process is assumed to have some associated leakage. These emissions are difficult to precisely characterize but ARB has historically assumed a default leakage rate of 1% for the sales gas compression process in the CA-GREET 2.0 model. This is the same leakage rate used in their prospective diary gas pathway, hence, a 1% leakage rate is adopted for this analysis. Note that this leakage reduces the amount of sales gas injected into the pipeline and reduces the amount of biomethane available for the CNG Use process block.

Diesel Use

Diesel Refining and T&D Emissions

Pollutant emissions factors for the refining and distribution of ultralow sulfur diesel were taken from CAGREET 2.0 using default values for CA ULSD. Reported emissions factors in grams per MMBTU of fuel delivered to the station are summarized in Table 4 below.

Table 4 Diesel Related Emissions (g/MMBTU)

Pollutant	Refining	T&D
VOC	1.667	0.091
CO	6.517	0.333
NOx	9.572	0.838
PM10	0.865	0.021
PM2.5	0.915	0.026
SOx	2.835	0.146

Tailpipe Emission Factors

Tailpipe emissions factors for diesel vehicles were taken from EMFAC2014. Emissions factors were calculated on a fuel consumption basis by dividing total daily emissions by total daily fuel use. Resulting emissions factors are on a "grams per diesel gallon" (g/DGE) basis. For purposes of this analysis, the diesel fleet included all T6, T7, and bus equipment categories for aggregated model years. Light duty and medium duty vehicles were not included because the primary anticipated use of CNG is in the heavy-duty sector. Table 5 below summarizes the tailpipe emissions factors as well as refining and T&D emissions factors on a g/DGE basis.

Table 5 Diesel Related Emissions (g/DGE)

Pollutant	Tailpipe
VOC	1.648
CO	6.715
NOx	39.000
PM	2.545
SOx	0.095

CNG Use

This process block utilizes the modeling structure used by ARB to determine fuel pathway emissions under the Low Carbon Fuel Standard for the use of natural gas as a transportation fuel.

Biomethane injected into the pipeline as "sales gas" is available to be directed to transportation end uses under the Low Carbon Fuel Standard program. Because the biomethane does not physically flow all the way to a CNG fueling station in most cases, ARB uses an estimate of the maximum pipeline transportation distance from the injection point to end use for purposes of calculating energy use and GHG impacts. Once at the CNG station, the biomethane must be compressed to approximately 3,600 psig, before being used as a transportation fuel in a natural gas engine. Use of the CNG in the vehicle results in further tailpipe emissions that are included in the fuel pathway. Net emissions benefits are then calculated by accounting for offsetting of pathway emissions associated with the use of ULSD as a transportation fuel.

Pathway emissions are calculated by multiplying the emissions factors described below by the amount of fuel produced or displaced in diesel gallons equivalent (DGE). CNG fuel production is calculated based on the amount of sales gas compressed, less compressor leakage, and is converted to DGE as follows:

$$\textit{CNG Produced (DGE/year)} = \textit{Sales Gas Injected (kg/year)} / 0.0203\ g_{CH4}/SCF * 962\ BTU/SCF_{CH4} / 127{,}460\ BTU/gallon_{ULSD}$$

The amount of ULSD displaced by the CNG is determined by multiplying the amount of CNG produced by the Energy Economy Ratio of heavy-duty CNG vehicles, currently set at 0.9.

$$\textit{ULSD Displaced (gallons/year)} = \textit{CNG Produced (DGE/year)} * 0.9$$

Natural Gas Transmission and Distribution

Pollutant emissions factors for natural gas Transmission and Distribution were taken from CA-GREET 2.0. Reported emissions factors in grams per MMBTU of fuel delivered to the station are summarized in Table 6 below.

Table 6 Natural Gas T&D Emissions (g/MMBTU)

Pollutant	Factor
VOC	2.859
CO	14.699
NOx	17.398
PM10	0.0403
PM2.5	0.0376
SOx	0.291

CNG Fueling Station Compression

Pollutant emissions factors for CNG compression were taken from CA-GREET 2.0 and were calculated using the default values for a CNG station in California. Reported emissions factors in grams per MMBTU of fuel delivered to the station are summarized in Table 7 below.

Table 7 CNG Compression Emissions (g/MMBTU)

Pollutant	Factor
VOC	0.401
CO	2.459
NOx	3.417
PM10	0.3404
PM2.5	0.246
SOx	2.547

CNG Tailpipe Emissions

Tailpipe emissions factors for CNG vehicles were assumed to be equivalent to the model year 2018 diesel average for most pollutants. For NGVs utilizing a "near-zero" natural gas engine, NOx emissions were reduced by 90%, reflecting the fact that these engines are certified to a 0.02 g/bhp-hr NOx standard that is 90% cleaner than the 0.2g/bhp-hr standard that 2018 diesel engines are certified to. Additionally, SOx emissions were assumed to be negligible for CNG vehicles, owing to the very low concentrations of sulfur in the natural gas stream as compared to ULSD. Table 8 below summarizes the tailpipe emissions on a g/DGE basis.

Table 8 CNG Related Emissions (g/DGE)

Pollutant	Diesel Tailpipe –	CNG Tailpipe –
VOC	0.373	0.373
CO	2.412	2.412
NOx	7.787	0.778
PM10	1.098	1.098
SOx	0.095	0.000

Additional Precursor Emissions Reductions

The proposed projects generate substantial reductions in H2S emissions. In the atmosphere, the primary fate of H2S is oxidation to SO2 and conversion occurs relatively rapidly; on the order of hours rather than days.[8] Therefore, reductions in H2S emissions produce a secondary reduction in SO2 emissions at the local and regional level. These emissions reductions are calculated assumed that one mole of H2S oxidizes to 1 mole of SO2 in the atmosphere. Mass emissions can then be calculated using the ratios of the molecular weights of SO2 and H2S, yielding a mass conversion factor of 64.07/34.08 = 1.88 g-SOx/gH2S.

Additionally, because SO2 participates in PM formation in the atmosphere, SO2 reductions provide an additional PM reduction benefit. Secondary PM reductions are calculated from SO2 reductions using the following factors provided by SJVAPCD in its PM2.5 modeling guidance document.[9] NOx emissions also participate in secondary PM formation and increases or decreases in NOx emissions are translated in PM impacts using the appropriate factors listed below in Table 9.

[8] Seinfeld, J. (1975). Air Pollution: Physical and Chemical Fundamentals. McGraw-Hill, Inc.
[9] Attachment 11.2 - PM2.5 Modeling Procedures 2-28-13

Table 9 PM Conversion Factors

2.629	lb NOx	=	1	lb PM2.5
1	lb SOx	=	1	lb PM2.5

Secondary Emissions from Construction & Increased Traffic

The proposed project would entail multiple digester sites that would need to have an assortment of different vehicles traveling to and from the site. Based on our extensive history in building manure digesters we conservatively estimated that there would be 750 hours of heavy-duty off-road vehicles involved in the construction of a single digester, along with 40 hours of heavy-duty on-road vehicle and 200 hours of light-duty on-road vehicles. Once all construction emissions for a single digester were determined, we multiplied the resulting emissions by the number of digesters currently proposed.

On going traffic after construction was conservatively estimated at 146 hours of heavy duty on road traffic and 693 hours of light duty on road traffic each year.

Heavy Duty Off Road Emissions

Emissions associated with the operation of off-road diesel equipment are calculated using the same method earlier discussed for Off Road Emissions. The emissions factors are taken from Table D-9 of The Carl Moyer Program guidelines.[10] These guidelines provide emissions factors for NOx, ROG, and PM10. For purposes of this analysis, it is assumed that ROG emissions are equivalent to VOC emissions. CO emissions are based on US EPA emissions standards for each of the applicable emissions tiers and horsepower groups.[11] SOx emissions are based on the use of 11ppmwS ULSD and all fuel-borne sulfur is assumed to oxidize to SO2. Emissions rates are converted to a grams/bhp-hr basis using a factor of 18.5 bhp-hr/gallon, per Table D-21 of the Carl Moyer Program guidelines[12]. The resulting emissions rates were summarized in Table 2.

The emissions are determined by multiplying the amount of fuel used by the conversion factor 18.5 bhp-hr/gallon to produce an estimate of the total bhp-hr per year in each equipment category. Because specific equipment inventories vary amongst projects, it is assumed that all off-road activity occurs in the 100-174 HP Tier 2 emissions category. This is a reasonable, but conservative estimate based on reviews of internal historical data. These values are then multiplied by their corresponding emissions rates, given in the Table 2, to determine total emissions for this category.

Heavy Duty On Road Emissions

Emissions associated with the operation of on-road diesel equipment are calculated using the emissions factors are taken from Table D-1 of The Carl Moyer Program guidelines.[13] These guidelines provide emissions factors for NOx, ROG, and PM. For purposes of this analysis, it is assumed that ROG emissions are equivalent to VOC emissions. CO emissions are based on US EPA emissions standards for

[10] Attachment 11.12 - 2017 Carl Moyer Appendix D
[11] Attachment 11.13 - EPA - Tier 1-3 Exhaust Emissions Standards
[12] Attachment 11.12 - 2017 Carl Moyer Appendix D
[13] Attachment 11.12 - 2017 Carl Moyer Appendix D

each of the applicable emissions tiers and horsepower groups.[14] SOx emissions are based on the use of 11ppmwS ULSD and all fuel-borne sulfur is assumed to oxidize to SO2. Emissions rates are converted to a grams/bhp-hr basis using a factor of 18.5 bhp-hr/gallon, per Table D-21 of the Carl Moyer Program guidelines[15]. The resulting emissions rates were summarized in Table 10 below.

The emissions for NOx, VOC, and PM are determined by multiplying the estimated number of miles expected to be travelled by the corresponding emissions factor. Miles expected to be travelled was determined by multiplying the expected number of hours by an average speed of 50 miles per hour.

Table 10 Heavy Duty On Road Emission Factors

Horsepower	Tier	NO_x	ROG	PM10	CO	SOx
		g/mile			g/bhp-hr	
300-600	*3*	*1.27*	*0.06*	*0.002*	*2.6*	*0.0037*

The emissions for CO and SOx are determined by multiplying the amount of fuel used by the conversion factor 18.5 bhp-hr/gallon to produce an estimate of the total bhp-hr per year in each equipment category. Because specific equipment inventories vary amongst projects, it is conservatively assumed that all on-road activity occurs in the 300-600 HP Tier 3 emissions category. These values are then multiplied by their corresponding emissions rates, given in Table 10, to determine total emissions for this category.

Light Duty On Road Emissions

Emissions factors for light duty on road vehicles were taken from EMFAC2017. For purposes of this analysis, the vehicles included were all Light Duty Auto categories for aggregated model years and speeds. Table 11 below summarize the determined emissions factors. Total emissions were then determined by multiplying the estimated number of miles expected to be travelled by the corresponding emissions factor. Miles expected to be travelled was determined by multiplying the expected number of hours by an average speed of 50 miles per hour.

Table 11 Light Duty On Road Emission Factors (g/mile)

Pollutant	Factor
VOC	0.02
CO	1.02
NOx	0.07
PM	0.0017
SOx	0.00295

Project Co-Benefits (Explanations for Section 5.4)

The Project Co-Benefits that involve calculations are shown below:

[14] Attachment 11.13 - EPA - Tier 1-3 Exhaust Emissions Standards
[15] Attachment 11.12 - 2017 Carl Moyer Appendix D

Reduced Ground Water Contamination

Detailed engineering analysis performed for the Central Valley Water Board has determined that unlined earthen lagoons allow manure to seep into the soil at an average rate of 1.1 millimeters per day.[16] Using the area of the pond we propose to line, we used a conversion of 1.1 mm to 0.00360892 feet to find the cubic feet of seepage from the pond. Then we converted cubic feet to gallons using a conversion rate of 7.48 gallons per cubic foot, and then multiplied that number by 365 to find the total water savings per year.

*(Lagoon Surface Area * Seepage Rate) * 7.48 * 365 = Gallons Saved*

Water Conservation

The calculations below show the total water conservation savings achieved by preventing evaporation with a flexible membrane cover over manure storage lagoons. The California Department of Water Resources recorded the total inches of pan evaporation shown in the table below[17].

AVERAGE MONTHLY EVAPORATION FROM CLASS 'A' PAN IN IRRIGATED PASTURE ENVIRONMENTS AT CALIFORNIA STATE UNIVERSITY AT FRESNO FROM 1968-2010

Evaporation in inches

FRESNO PAN EVAPORATION

Month	Average	STD DEV	STD Error
January	1.26	0.28	0.04
February	2.08	0.41	0.06
March	3.94	0.77	0.12
April	6.03	0.86	0.13
May	8.75	1.03	0.16
June	10.43	0.92	0.14
July	11.02	0.73	0.11
August	9.67	0.68	0.11
September	6.99	0.57	0.09
October	4.42	0.49	0.07
November	2.25	0.4	0.06
December	1.21	0.3	0.05
Mar-Oct Total	61.26	0.76	0.12
Jan-Dec Total	**68.07**	0.62	0.1

The ponds total surface area was multiplied by the average yearly evaporation of 68.07 inches and then converted to gallons.

*Lagoon Surface Area * Evaporation Rate * gallons per cubic foot = Evaporation Prevented*

[16]Attachment 11.4 - Evaluation of Earthen Liquid Dairy Manure Lagoons in the Central Valley (citation on pg. 23, 27)

[17] Attachment 11.14 - Fresno Pan Evaporation Study

Procedures for Modeling PM2.5

October 4, 2011

Background:

Significant Impact Levels (ug/m^3)

24 hour = 1.2
Annual = 0.3

PM2.5 Conversion Ratios[1]

NO_X = 2.629 lbs NO_X/PM2.5
SO_X = 1.0 lbs SO_X/ PM2.5

Options:

Tier 0 - No Net Increase

1. Modeling of PM2.5 impacts will not be required for projects with no net increase in permitted PM2.5 emissions.

Tier I – Minor PM2.5 NSR Projects Only

1. For minor NSR sources, primary PM2.5 will be modeled and secondary formation of PM2.5 will be exempted until guidance is developed / provided by EPA and the District has developed streamlining tools and guidance to address secondary formation from these sources.
   - A Minor PM2.5 NSR Project is defined as a project that is less than 100 tons per year of PM2.5 or a project at a Major PM2.5 Source with an increase less than 10 ton per year of PM2.5, and less than 40 tons per year of NO_X, and less than 40 tons per year of SO_X, as provided in District Rule 2201 Sections 3.24.1 and 3.18.1.4.

Tier II – AERMOD PM2.5 Modeling – Major PM2.5 NSR Projects

1. Use the Air Resource Board's (ARB's) Particulate Matter (PM) Speciation Profile to determine PM2.5 emissions based on PM10 emission estimates.
2. Model primary PM2.5 using 5-years of meteorological data to determine maximum annual and 24-hour primary PM2.5 concentrations. Compare the results to the PM2.5 Significant Impact Levels (SILs) or 0.3 micrograms per cubic meter annual average concentration and 1.2 micrograms per cubic meter 24-hour concentrations. The SILs are never-to-be-exceeded values. If the primary PM2.5 concentrations exceed the SILs, there is no need to proceed further. Go to Tier III.

   Please note: 1) A post processor will be needed to combine each of the files below (PM2.5– 24Hr, NO_2– 24Hr, and SO_2 – 24Hr) and 2) The PM2.5 modeling evaluation will be limited to the months of October thru March (Modeled PM2.5 Season) as they provided the chemistry needed for the formation of secondary PM2.5. This period encompass the District's actual PM2.5 season which is from approximately November thru February. By including a month before and after the actual period it will ensure that any seasonal variation is considered / included in the modeled results.

[1] The conversion ratios provided here for NOx and SOx are extremely conservative compared to EPA's previous default ratios of 40:1 and 100:1. Therefore the use of these ratios for evaluating secondary formation is expected to overestimate emissions. The District is working to refine these numbers and will update this document as needed to reflect any updated information and analysis.

3. Model primary PM2.5 emissions during Modeled PM2.5 Season using 5-years of meteorological data. Create a post-file of the results of 24-hour concentrations.
4. Model nitrogen oxides emissions during Modeled PM2.5 Season using 5-years of meteorological data. Create a post-file of the results of 24-hour concentrations.
    a. Calculate secondary formation of nitrates using a conversion ratio of 2.629 lbs of oxides of nitrogen per lb. of PM2.5.
5. Model oxides of sulfur emissions during Modeled PM2.5 Season using 5-years of meteorological data. Create a post-file of the results of 24-hour concentrations.
    b. Calculate secondary formation of sulfates using a conversion ratio of 1.0 lbs of oxides of sulfur per lb. of PM2.5.
6. Using a post-processor, combine the predictions of primary and secondary PM2.5 formation to determine total annual and 24-hour average concentrations at each receptor. Compare the maximum total PM2.5 concentrations to the SILs.
7. If below SILs no further modeling required, project passes.

Tier III – Offsets Required

The source fully offsets all Primary PM2.5 and Secondary PM2.5 (oxides of nitrogen, and oxides of sulfur) emissions, project passes.

Options for Future Consideration

CALPUFF Modeling (EPA Approved)

Option A – Modeling for Each Project:

1. Use the CALPUFF model with meteorological data from Valley airports to model the specific source.

Option B – Streamlining Tool (Look-up Chart):

1. Model common sources that are known to cause trouble.
2. Use the modeling results to create a matrix to estimate secondary concentrations.

CALPUFF Modeling (Non-EPA version)

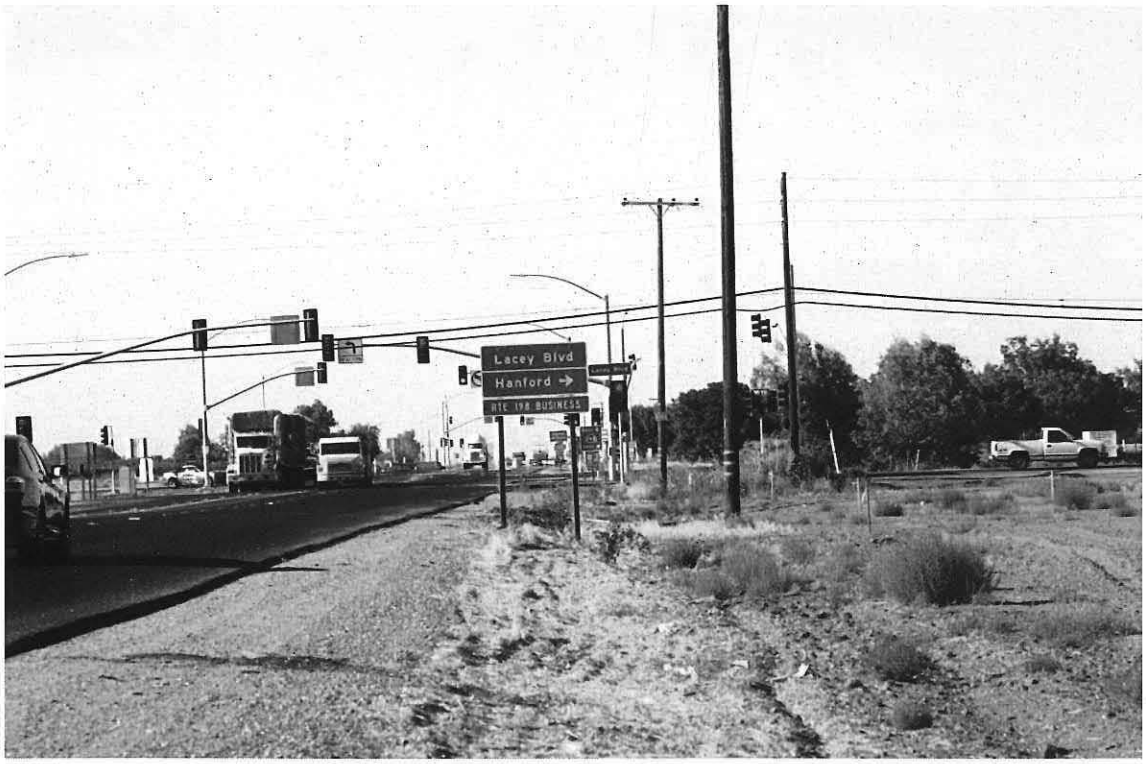
1. Collect any evaluation studies that may be available for the new version of CALPUFF and/or for its chemical mechanism.
2. Provide evidence for the new version to the Board and ask them to accept it as a refined model for certain classes of sources.
3. Establish a protocol for modeling consultants to use in providing studies to the District to support permit applications.

Transportation Concept Report

State Route 43

District 06

April 2015



Disclaimer: The information and data contained in this document are for planning purposes only and should not be relied upon for final design of any project. Any information in this Transportation Concept Report (TCR) is subject to modification as conditions change and new information is obtained. Although planning information is dynamic and continually changing, the District 6 System Planning Division makes every effort to ensure the accuracy and timeliness of the information contained in the TCR. The information in the TCR does not constitute a standard, specification, or regulation, nor is it intended to address design policies and procedures.

California Department of Transportation

Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability.

Approvals:

Gail Miller — Date: 4-16-15
Deputy District Director
Planning and Local Assistance
Caltrans – District 6

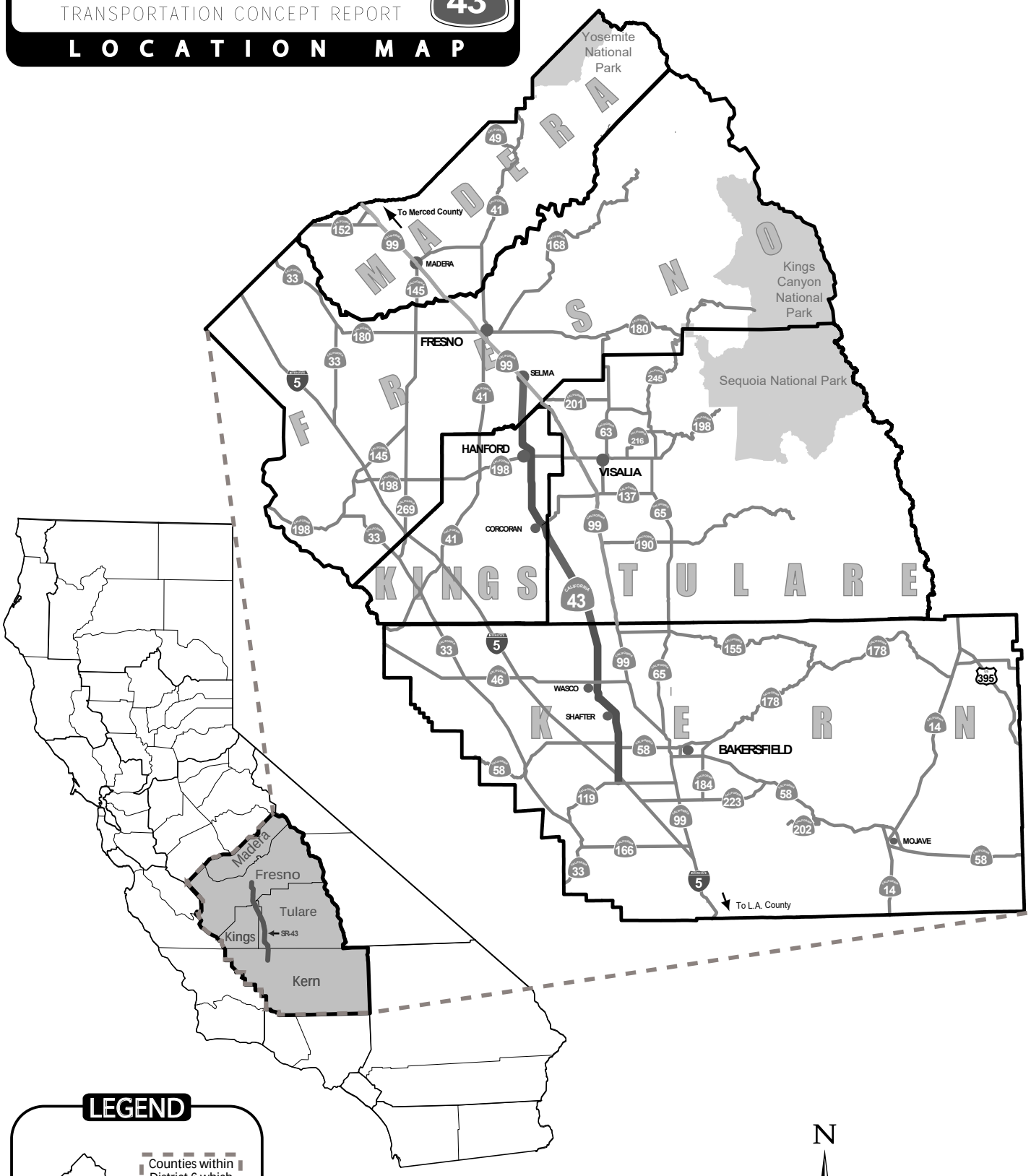
Sharri Bender Ehlert — Date: 4-16-2015
District Director
Caltrans – District 6

SR 43 at Lacey Boulevard in Hanford

STATE ROUTE 43

TRANSPORTATION CONCEPT REPORT

LOCATION MAP



LEGEND

Counties within District 6 which SR 43 traverses

Caltrans District 6 Boundary

Caltrans

N

Not To Scale

TABLE OF CONTENTS

ABOUT THE TRANSPORTATION CONCEPT REPORT

System Planning is the long-range transportation planning process for the California Department of Transportation (Caltrans). The System Planning process fulfills Caltrans' statutory responsibility as owner/operator of the State Highway System (SHS) (Gov. Code §65086) by evaluating conditions and proposing enhancements to the SHS. Through System Planning, Caltrans focuses on developing an integrated multimodal transportation system that meets Caltrans' goals of safety, mobility, delivery, stewardship, and service.

The System Planning process is primarily composed of four parts: the District System Management Plan (DSMP), the Transportation Concept Report (TCR), the Corridor System Management Plan (CSMP), and the DSMP Project List. The district-wide **DSMP** is strategic policy and planning document that focuses on maintaining, operating, managing, and developing the transportation system. The **TCR** is a planning document that identifies the existing and future route conditions as well as future needs for each route on the SHS. The **CSMP** is a complex, multi-jurisdictional planning document that identifies future needs within corridors experiencing or expected to experience high levels of congestion. The CSMP serves as a TCR for segments covered by the CSMP. The **DSMP Project List** is a list of planned and partially programmed transportation projects used to recommend projects for funding. These System Planning products are also intended as resources for stakeholders, the public, and partner, regional, and local agencies.

TCR Purpose

California's State Highway System needs long range planning documents to guide the logical development of transportation systems as required by CA Gov. Code §65086 and as necessitated by the public, stakeholders, and system users. The purpose of the TCR is to evaluate current and projected conditions along the route and communicate the vision for the development of each route in each Caltrans District during a 20-25 year planning horizon. The TCR is developed with the goals of increasing safety, improving mobility, providing excellent stewardship, and meeting community and environmental needs along the corridor through integrated management of the transportation network, including the highway, transit, pedestrian, bicycle, freight, operational improvements and travel demand management components of the corridor.

STAKEHOLDER PARTICIPATION

Stakeholders were consulted with during the research phase of this TCR for their input and the accuracy of the data. Contact was done mainly via e-mail or telephone. Once a draft was completed, it was circulated for comments with internal stakeholders. These stakeholders include: the divisions of Planning, Traffic, Maintenance, Environmental, Design, Right of Way, and the Native American Liaison. As comments were collected, the TCR was further edited and revised. As the TCR became more finely tuned, it was then sent out via e-mail or regular mail for input from external stakeholders. These stakeholders include, within the corridor: Metropolitan Planning Organizations (MPOs), Regional Transportation Planning Agencies (RTPAs), city and county planning and public works agencies, transit agencies, Sierra Club Chapters, California Trucking Association, San Joaquin Valley Air Pollution, Control District, Chambers of Commerce, Native American Tribes, Farm Bureaus, and other transportation agencies. Upon signature of both the District 6 Planning Deputy Director and the District 6 Director, thus making the document official and final, copies were emailed, sent by regular mail, and posted to the District 6 Intranet site at: www.dot.ca.gov/dist6/planning/tcrs/.

EXECUTIVE SUMMARY

State Route 43 traverses central California, from Kern County to southern Fresno County. The route primarily serves the needs of agriculture as it is in the heart of farm land. It also serves as an alternate to SR 99. State Route 43 is mainly two-lane conventional highway. It lies near the Burlington Northern and Santa Fe (BNSF) Railroad for most of its extent. Many of the communities along the route are served by Amtrak. In the future, SR 43 will be impacted by high speed rail and commercial development as the cities along the route continue to grow. Base year (BY) for this report is 2014 and horizon year (HY) is 2035, unless otherwise noted.

Concept Summary

CONCEPT SUMMARY					
Segment*	**Segment Description**	**Existing Facility**	**20-25 Year Capital Facility Concept**	**20-25 Year System Operations and Management Concept**	**Post-25 Year Concept**
1	SR 119 to I-5/SR 43	2C	2C with improvements, i.e. signals, passing lanes, turn lanes	Intersection improvements and AC overlay (CAPM) and digouts	4C
2	I-5/SR 43 to SR 58 East	2C	2C with improvements, i.e. signals, passing lanes, turn lanes	AC overlay (CAPM) and digouts, closed circuit TVs	4C
3	SR 58 East to SR 58 West	2C	4C	AC overlay (CAPM) and digouts, changeable message sign	4C
4	SR 58 West to 7th Std Rd	2C	4C	Closed circuit TV, changeable message sign, vehicle detection system	4C
5	7th Std Rd to Riverside St	2C	4C	Closed circuit TV	4C
6	Riverside St to 0.1 mile south of Euclid Ave	2C	4C	ADA curb ramps	4C
7	0.1 mile south of Euclid Ave to Poplar Ave	4C	4C	ADA curb ramps, closed circuit TV	4C
8	Poplar Ave to Filburn St	4C	4C	ADA curb ramps	4C
9	Filburn St to Poso Ave	4C	4C	ADA curb ramps	4C
10	Poso Ave to W Jct SR 46	2C	2C with improvements, i.e. signals, passing lanes, turn lanes	ADA curb ramps	4E
11	W Jct SR 46 to McCombs Rd	2C	2C with improvements, i.e. signals, passing lanes, turn lanes	Maintain only	4E
12	McCombs Rd to the Tulare County line	2C	2C with improvements, i.e. signals, passing lanes, turn lanes	Vehicle detection system	4E
13	Kern County line to 0.2 miles south of Deer Crk	2C	2C with improvements, i.e. signals, passing lanes, turn lanes	Maintain only	4E
14	0.2 miles south of Deer Crk to the Kings County line	2C	2C with improvements, i.e. signals, passing lanes, turn lanes	Vehicle detection system	4E
15	Tulare County line to Pickerell Ave	2C with improvements, i.e. signals, passing lanes, turn lanes	2C with improvements, i.e. signals, passing lanes, turn lanes and construct roundabout	AC overlay and widen shoulders, highway advisory radio, remote processing unit	4E
16	Pickerell Ave to Santa Fe Ave	2C	2C with improvements, i.e. signals, passing lanes, turn lanes	Maintain only	4E
17	Santa Fe Ave to SR 198	2C	2C with improvements, i.e. signals, passing lanes, turn lanes	Changeable message sign	4E
18	SR 198 to 10th Ave	2C	4E	Changeable message sign	4E
19	10th Ave to the Fresno County line	2C	4E	Maintain only	4E
20	Kings County line to Nebraska Ave	2C	4E	Changeable message signs, vehicle detection system	4E
21	Nebraska Ave to SR 99	4C	4C	Maintain only	4C

**Segments maps are located at: Segments 1 – 3, page 9; Segments 4 – 7, page 10; Segments 8 – 11, page 11; Segments 12 – 14, page 12; Segments 15 – 16, page 13; Segment 17, page 14; Segment 18, page 15; Segments 19 – 20, page 16; Segment 21, page 17.*

Concept Rationale

Considering reasonable financial and physical constraints, this TCR defines the appropriate route concept level of service (LOS) and facility type(s) for SR 43. Level of service is a qualitative measure used to describe the operational conditions in a stream of traffic and the perception of conditions by users. It is a measure of factors such as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety. Six levels of service are defined for each type of facility for which analysis procedures are available. They are given letter designations from "A" to "F", with LOS "A" representing the best operating conditions and LOS "F" representing the worst. Each LOS represents a range of operating conditions.

Caltrans endeavors to maintain a target LOS at the transition between LOS "C" and LOS "D" on State highway facilities, or whichever LOS is feasible to attain. The concept LOS is a target LOS determined by the importance of the route and environmental factors. A deficiency or a need for improvement is triggered when the actual LOS falls below the concept LOS.

Proposed Projects and Strategies

Much of the route will require improvements or widening in the years to come. A few segments only have minor improvements that are proposed. There are proposed Class II bikeways in segments 2 through 6 in Kern County and also in part of Segment 13 in Tulare County. In Kings County a touring bikeway is proposed.

The City of Selma's 2035 General Plan Update of 2010 indicates a new alignment of the route and new interchange and connection with SR 99. The current Highland Avenue alignment would be diverted to DeWolf Avenue. The route would leave the current alignment at a point between Saginaw Avenue and Nebraska Avenue and head off at a northwest direction at a point between Rose Avenue and Floral Avenue on DeWolf Avenue. The route would meet SR 99 further north at Dinuba Avenue for a new interchange. Also proposed are dual left-turn lanes along the Highland Avenue/SR 43 alignment at numerous intersections. Caltrans has yet to approve these changes as more detailed studies are needed.

The High-Speed Train (HST) project will have impacts to SR 43 as well. There are 17 locations in Tulare, Kings, and Fresno counties where it is proposed to cross over the route. For further information, please see the Key Corridor Issues section of this report.

This route includes a number of at-grade intersections. The type of traffic control at intersections on the SHS is determined through a process called Intersection Control Evaluation, which requires that all viable alternatives be considered. In general, Caltrans has a preference for roundabouts over signalized intersections where viable because roundabouts often have superior performance with regards to safety and operations for drivers, pedestrians, and cyclists. They may also require less maintenance than traffic signals and have fewer environmental impacts. While right-of-way requirements may be greater at an intersection for a roundabout than a traffic signal, less right-of-way is often needed between intersections due to reduced storage requirements or a reduced number of through lanes.

The Highway Design Manual (HDM) provides design guidance and should be utilized when planning and developing roundabouts on the SHS.

CORRIDOR OVERVIEW

ROUTE SEGMENTATION

ROUTE SEGMENTATION			
Segment #	Location Description	County_Route_ Beg. PM	County_Route_ End PM
1	SR 119 to I-5/SR 43	KER_43_0.111	KER_43_1.865
2	I-5/SR 43 to SR 58 East	KER_43_1.865	KER_43_8.112
3	SR 58 East to SR 58 West	KER_43_8.112	KER_43_9.162
4	SR 58 West to 7th Std Rd	KER_43_9.162	KER_43_12.19
5	7th Std Rd to Riverside St	KER_43_12.19	KER_43_15.32
6	Riverside St to 0.1 mile south of Euclid Ave	KER_43_15.32	KER_43_16.32
7	0.1 mile south of Euclid Ave to Poplar Ave	KER_43_16.32	KER_43_18.578
8	Poplar Ave to Filburn St	KER_43_18.578	KER_43_R23.624
9	Filburn St to Poso Ave	KER_43_R23.624	KER_43_R24.124
10	Poso Ave to W Jct SR 46	KER_43_R24.124	KER_43_R25.124
11	W Jct SR 46 to McCombs Rd	KER_43_R25.124	KER_43_26.29
12	McCombs Rd to the Tulare County line	KER_43_26.29	KER_43_38.807
13	Kern County line to 0.2 miles south of Deer Crk	TUL_43_0.000	TUL_43_R9.887
14	0.310 miles south of Deer Crk to the Kings County Line	TUL_43_R9.887	TUL_43_22.674
15	Tulare County Line to Pickerell Ave	KIN_43_0.000	KIN_43_2.26
16	Pickerell Ave to Santa Fe Ave	KIN_43_2.26	KIN_43_3.020
17	Santa Fe Ave to SR 198	KIN_43_3.020	KIN_43_18.218
18	SR 198 to 10th Ave	KIN_43_18.218	KIN_43_22.272
19	10th Ave to the Fresno County Line	KIN_43_22.272	KIN_43_27.286
20	Kings County Line to Nebraska Ave	FRE_43_0.000	FRE_43_8.340
21	Nebraska Ave to SR 99	FRE_43_8.340	FRE_43_9.308

ROUTE DESCRIPTION

Route Location: State Route 43 is located in the Central Valley of California and is located solely in District 6. The route begins in Kern County, at SR 119, and traverses Tulare, Kings, and Fresno counties. The route ends at SR 99, in Selma, covering 98 miles.

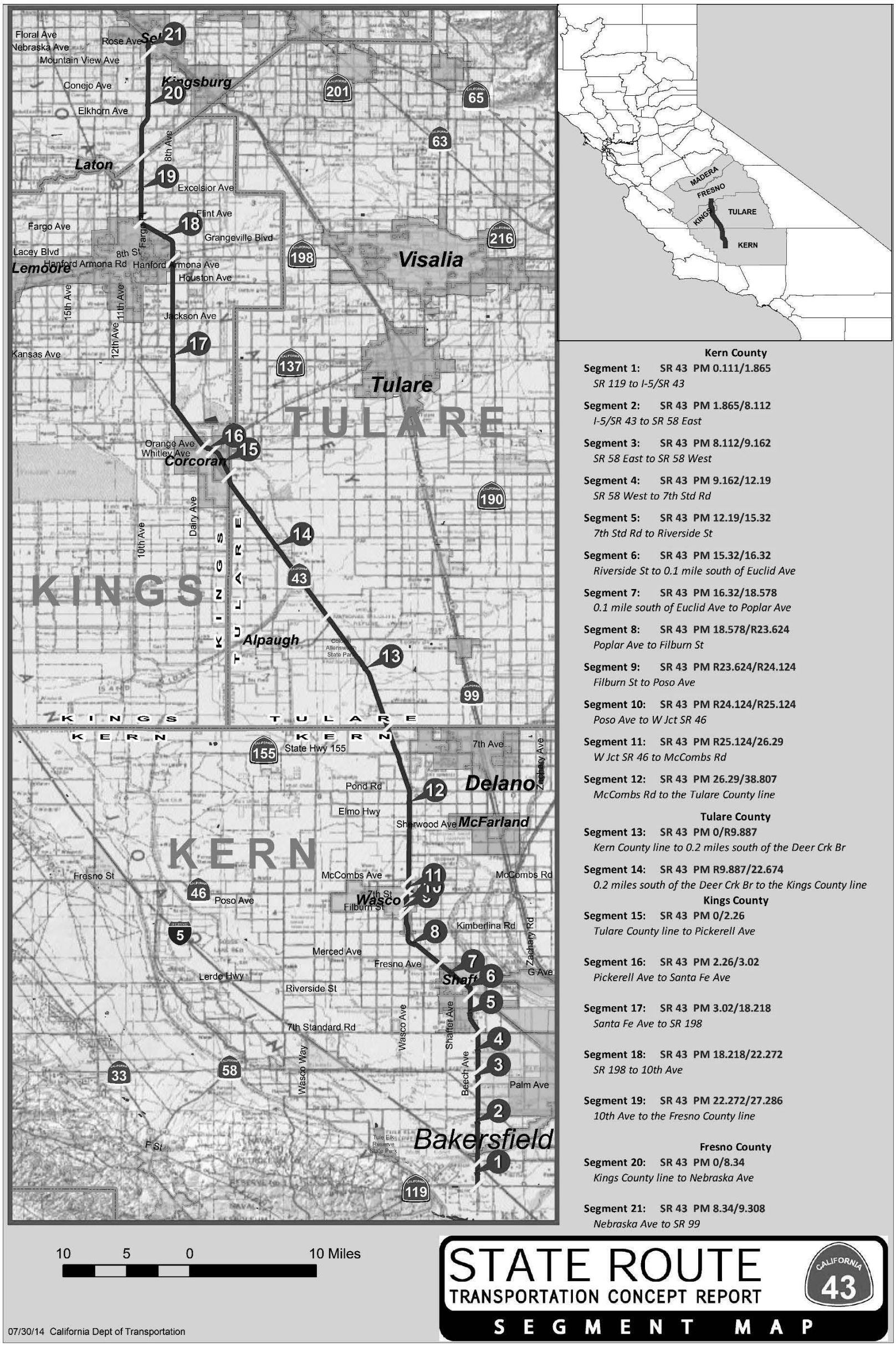
Route Purpose: The route serves mainly agricultural communities and farm to market services. It may also serve as an alternate north-south route for I-5 and SR 99. It also serves intermodal services, such as truck to rail modes with the Burlington Northern and Santa Fe railroad located close to the route.

Major Route Features: The route begins at SR 119 in Kern County, just to the west of Bakersfield. It covers nearly 39 miles in Kern County. The route is known as Enos Lane in Kern County and is also known as the Central Valley Highway along its entire length. There is an interchange at I-5. The route intersects with the following major roads and highways in Kern County: Stockdale Highway, SR 58 East and West, Seventh Standard Road, Lerdo Highway, Kimberlina Road, SR 46, Pond Road, and Garces Highway.

In Tulare County, it traverses the following major roads: Avenue 56, Avenue 120, and Poplar Avenue. It covers just over 22 miles in Tulare County.

In Kings County, it intersects with the following major roads and highways: Whitley Avenue, SR 137, Kansas Avenue, Jackson Avenue, Houston Avenue, Hanford-Armona Road, SR 198, Lacey Boulevard, Grangeville Boulevard, Fargo Avenue, Flint Avenue, and Excelsior Avenue. In Kings County, the route covers just over 27 miles. North of Corcoran, where the alignment straightens and runs north/south, it takes on the alignment of Eighth Avenue, until it curves and heads northwestward near Hanford. In the Hanford area, the route takes on the alignment of Tenth Avenue.

In Fresno County, the route intersects the following major roads and highway: Elkhorn Avenue, Conejo Avenue, Mountain View Avenue, Nebraska Avenue, and ends at SR 99. It covers just over nine miles in Fresno County. It also follows the Highland Avenue alignment.



Kern County

Segment 1: **SR 43 PM 0.111/1.865**
SR 119 to I-5/SR 43

Segment 2: **SR 43 PM 1.865/8.112**
I-5/SR 43 to SR 58 East

Segment 3: **SR 43 PM 8.112/9.162**
SR 58 East to SR 58 West

Segment 4: **SR 43 PM 9.162/12.19**
SR 58 West to 7th Std Rd

Segment 5: **SR 43 PM 12.19/15.32**
7th Std Rd to Riverside St

Segment 6: **SR 43 PM 15.32/16.32**
Riverside St to 0.1 mile south of Euclid Ave

Segment 7: **SR 43 PM 16.32/18.578**
0.1 mile south of Euclid Ave to Poplar Ave

Segment 8: **SR 43 PM 18.578/R23.624**
Poplar Ave to Filburn St

Segment 9: **SR 43 PM R23.624/R24.124**
Filburn St to Poso Ave

Segment 10: **SR 43 PM R24.124/R25.124**
Poso Ave to W Jct SR 46

Segment 11: **SR 43 PM R25.124/26.29**
W Jct SR 46 to McCombs Rd

Segment 12: **SR 43 PM 26.29/38.807**
McCombs Rd to the Tulare County line

Tulare County

Segment 13: **SR 43 PM 0/R9.887**
Kern County line to 0.2 miles south of the Deer Crk Br

Segment 14: **SR 43 PM R9.887/22.674**
0.2 miles south of the Deer Crk Br to the Kings County line

Kings County

Segment 15: **SR 43 PM 0/2.26**
Tulare County line to Pickerell Ave

Segment 16: **SR 43 PM 2.26/3.02**
Pickerell Ave to Santa Fe Ave

Segment 17: **SR 43 PM 3.02/18.218**
Santa Fe Ave to SR 198

Segment 18: **SR 43 PM 18.218/22.272**
SR 198 to 10th Ave

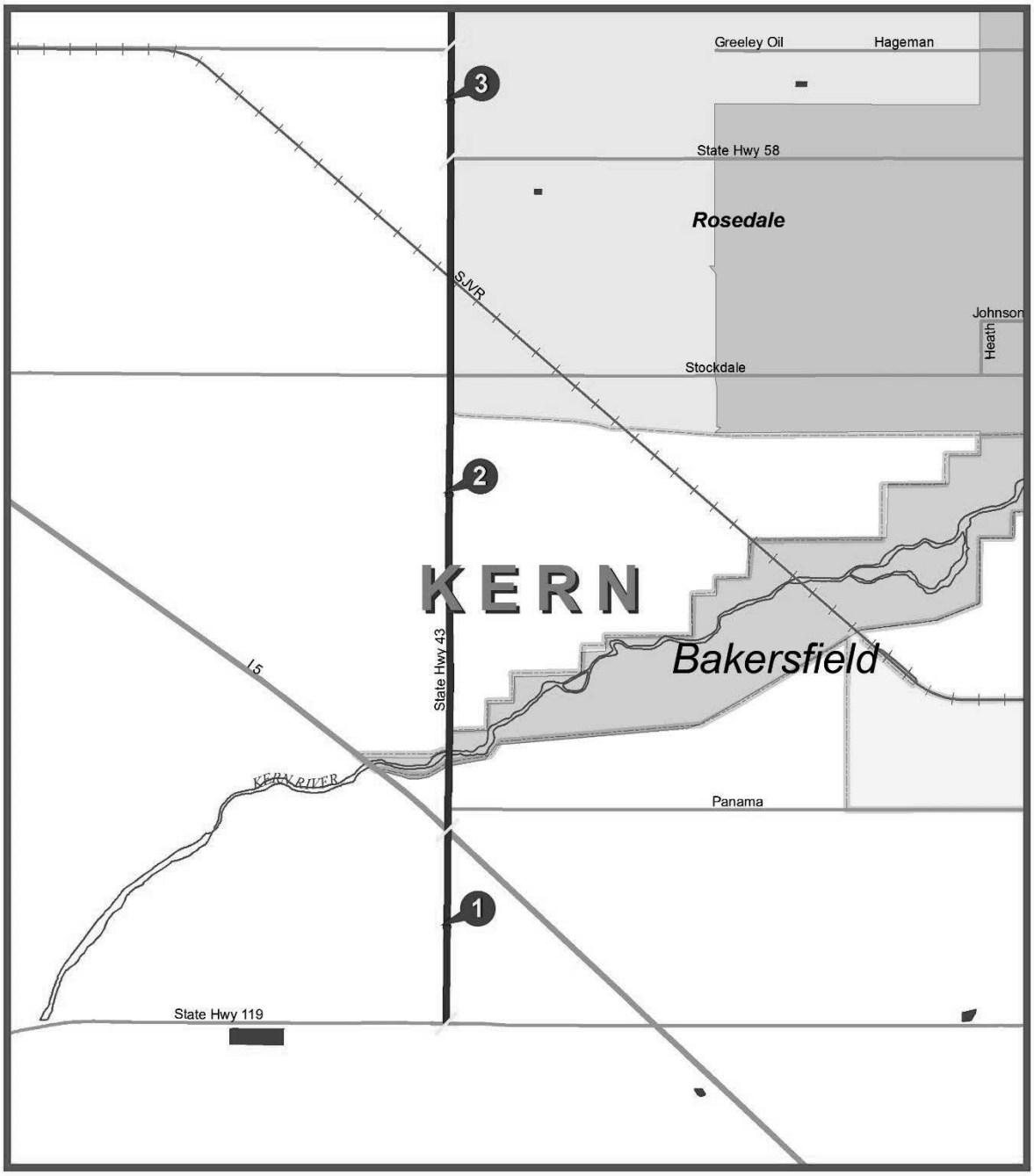
Segment 19: **SR 43 PM 22.272/27.286**
10th Ave to the Fresno County line

Fresno County

Segment 20: **SR 43 PM 0/8.34**
Kings County line to Nebraska Ave

Segment 21: **SR 43 PM 8.34/9.308**
Nebraska Ave to SR 99

STATE ROUTE
TRANSPORTATION CONCEPT REPORT
SEGMENT MAP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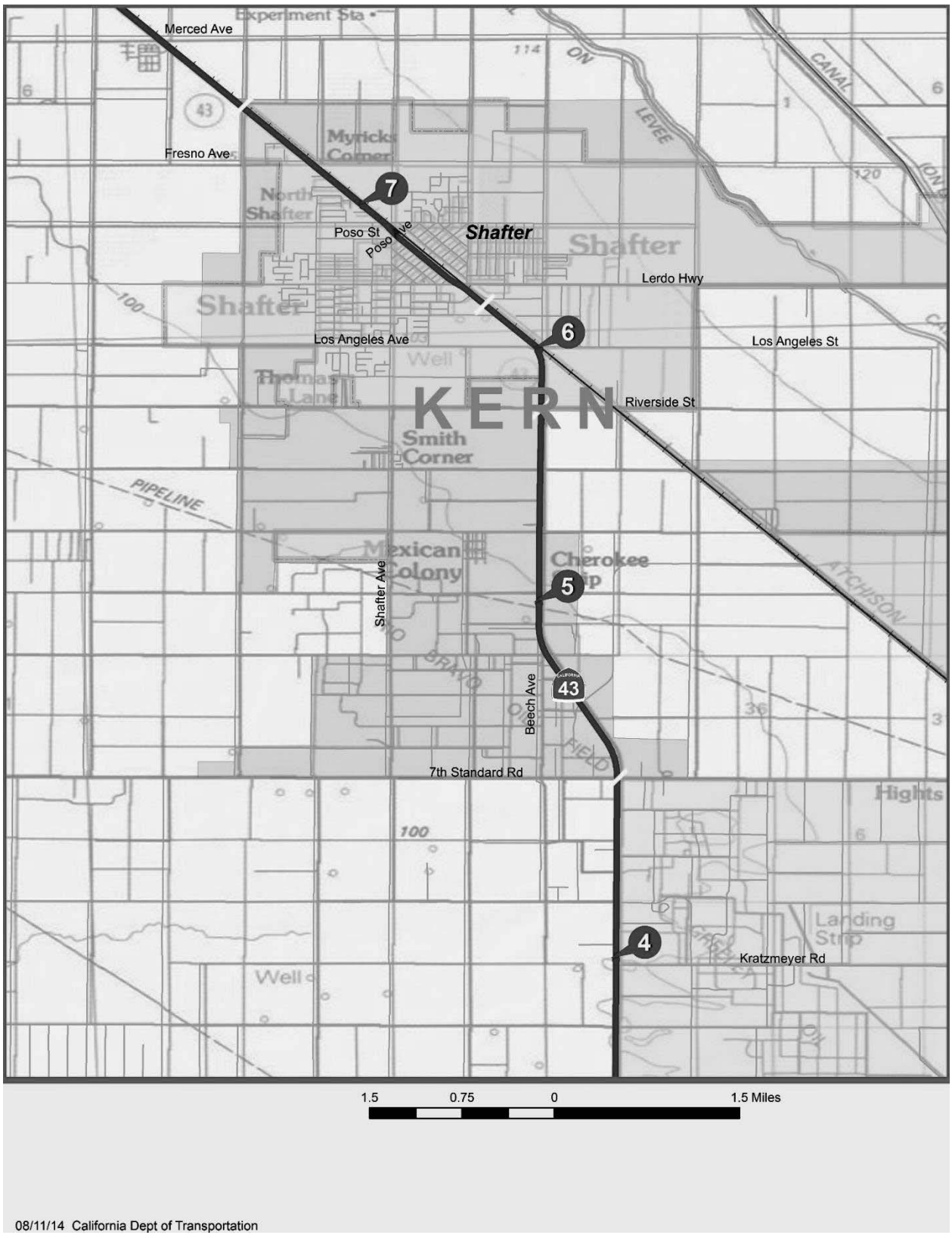
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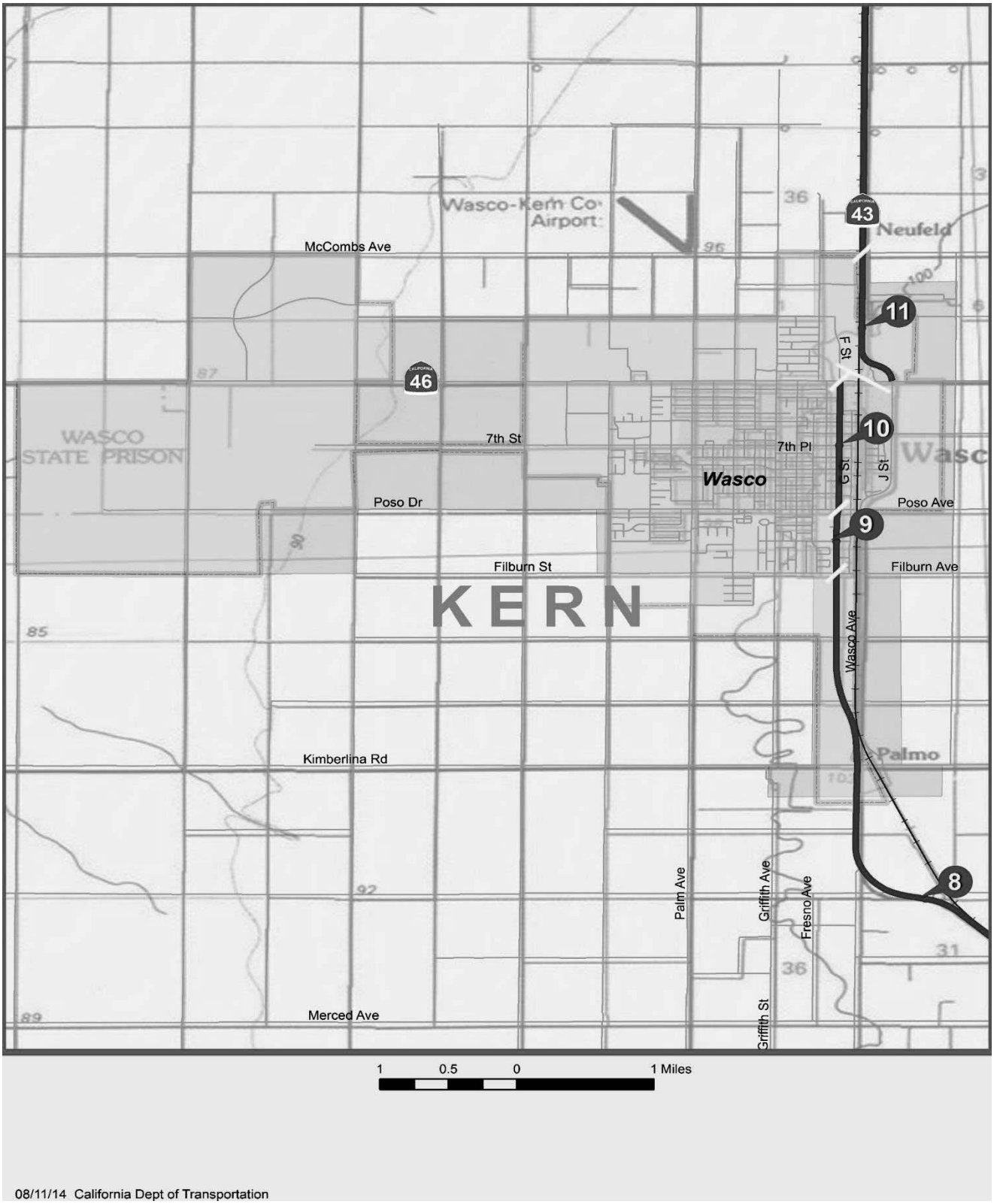
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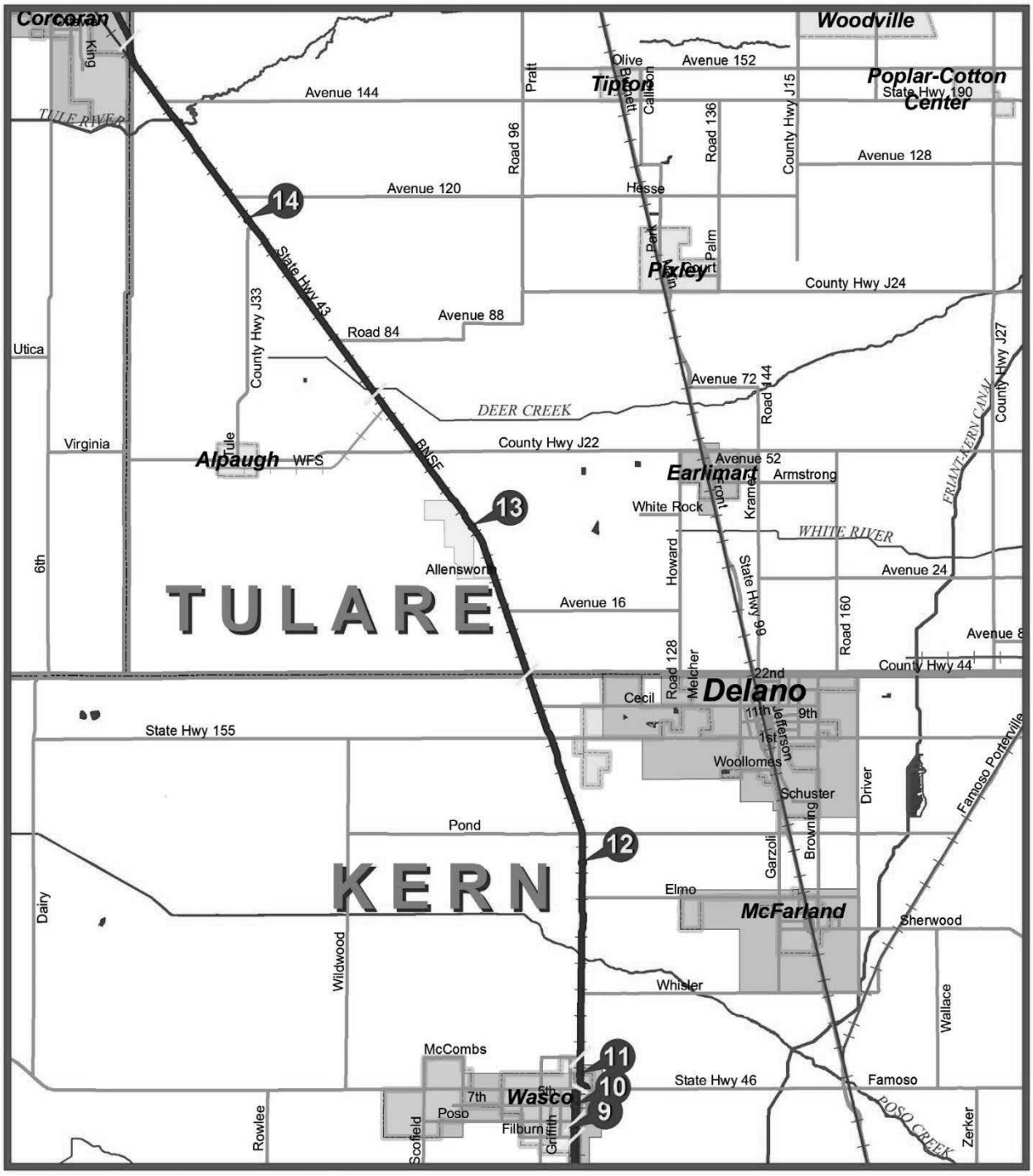
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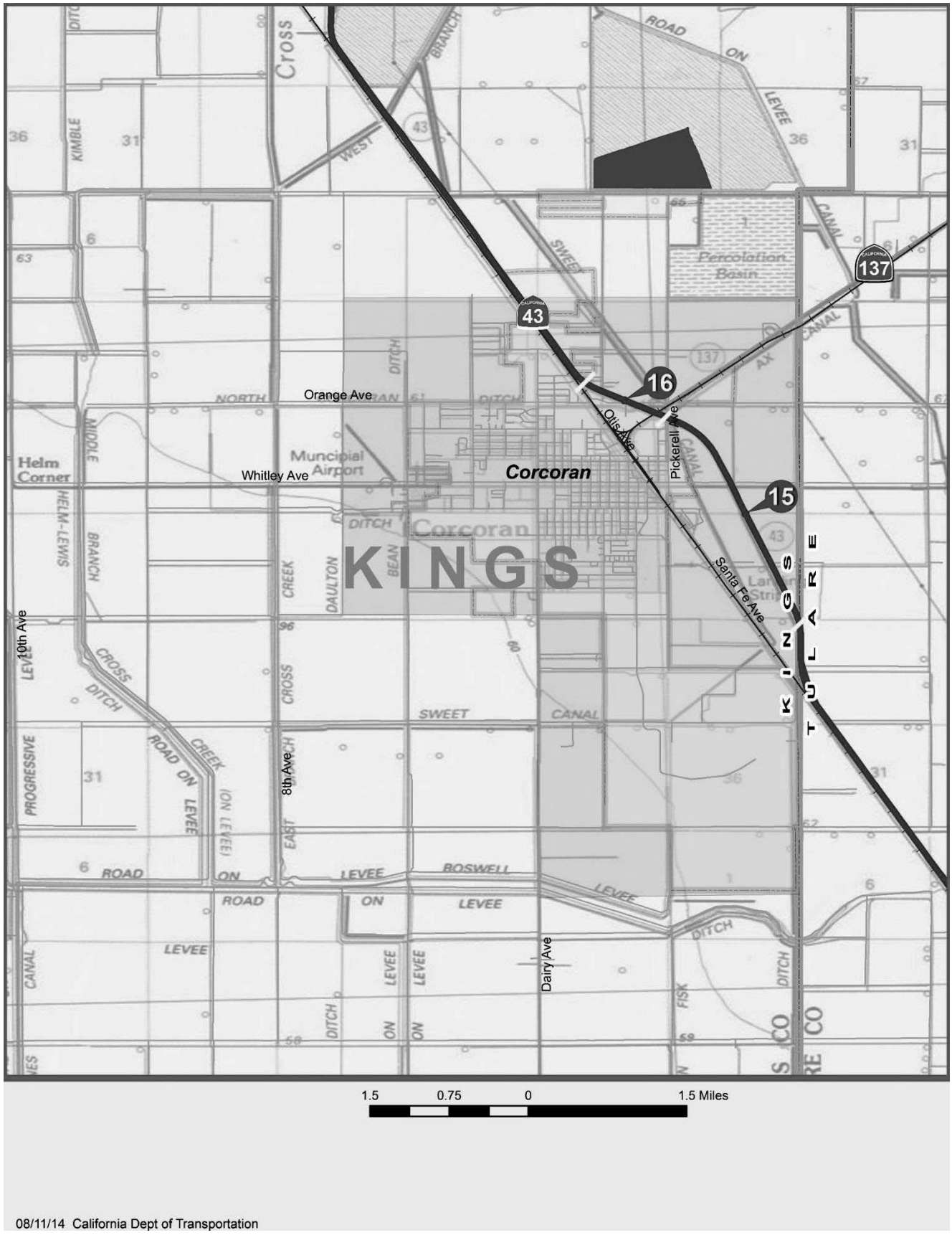

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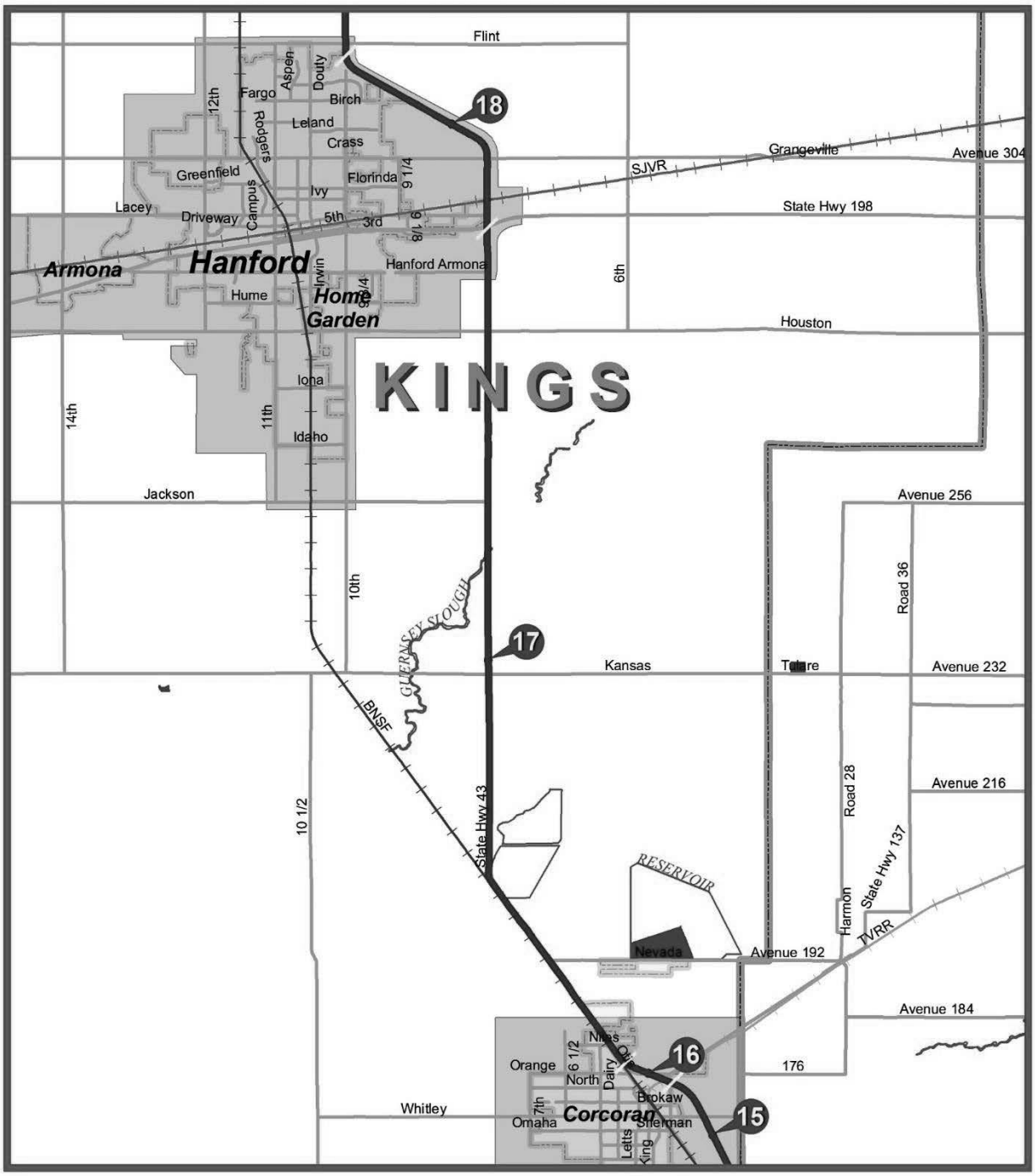
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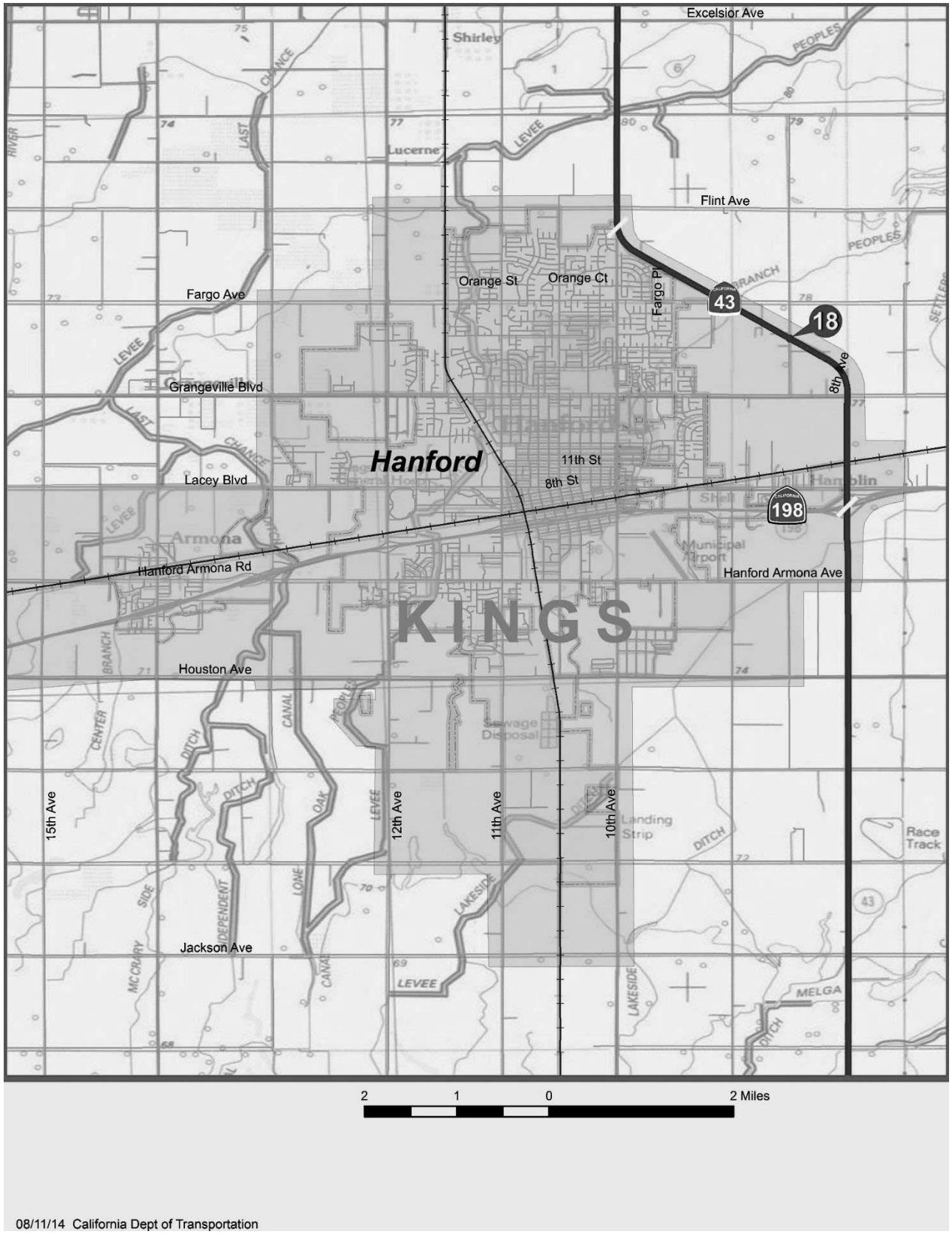
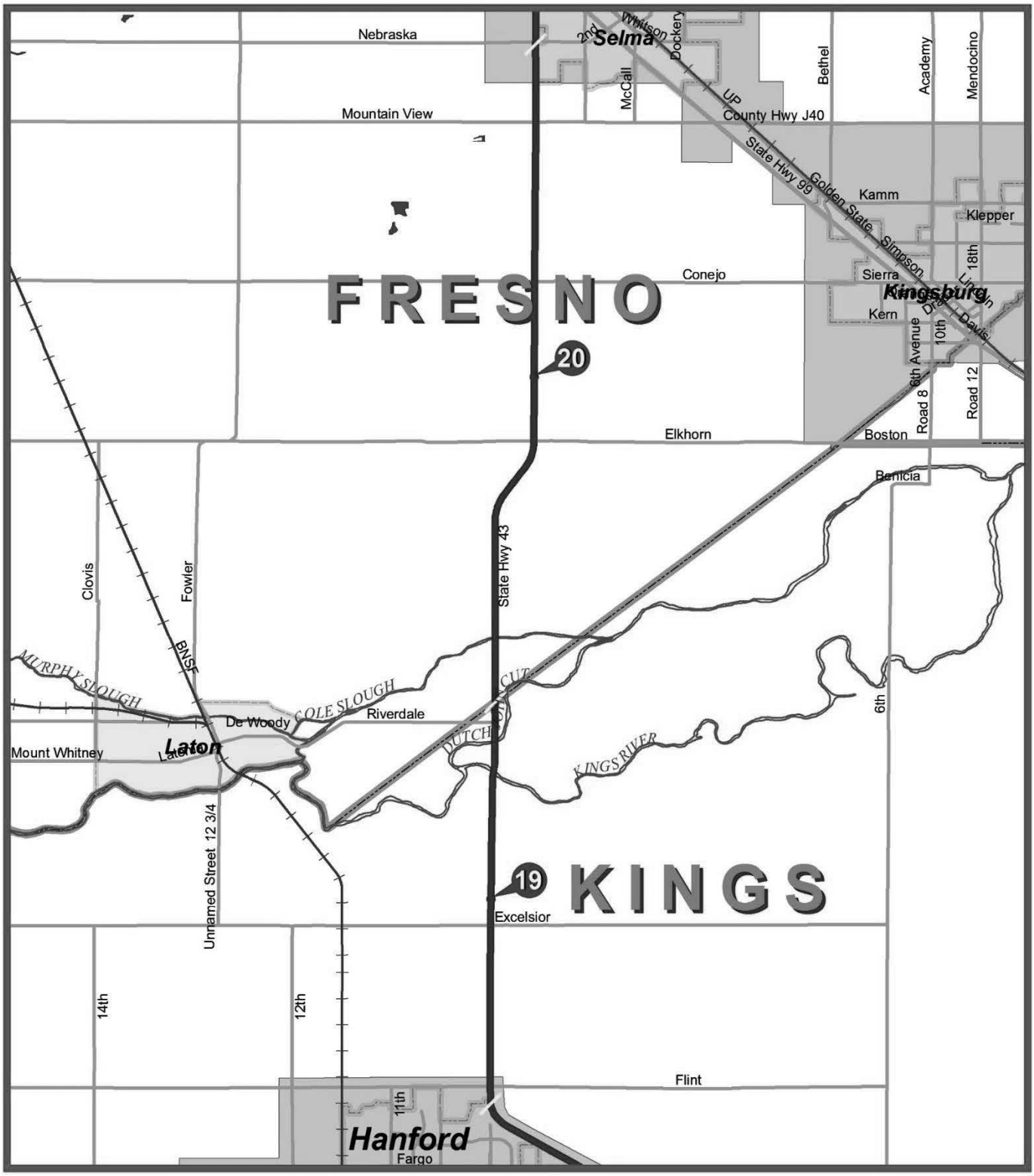
43


Excelsior Ave
Shirley
Lucerne
Flint Ave
Orange St
Orange Ct
Fargo Ave
Grangeville Blvd
Hanford
11th St
8th St
Lacey Blvd
Armona
Hanford Armona Rd
Hanford Armona Ave
KINGS
Houston Ave
Jackson Ave
15th Ave
12th Ave
11th Ave
10th Ave
8th Ave
43
18
198
Municipal Airport
Landing Strip
Race Track
2 1 0 2 Miles
08/11/14 California Dept of Transportation


Nebraska
Selma
2nd
Whitson
Dockery
McCall
Bethel
Academy
Mendocino
Mountain View
UP
County Hwy J40
State Hwy 99
Golden State
Kamm
Klepper
Simpson
18th
Conejo
Sierra
Kingsburg
Lincoln
Kern
Davis
10th
6th Avenue
Road 8
Road 12
FRESNO
20
Elkhorn
Boston
Benicia
Clovis
Fowler
State Hwy 43
BNSF
MURPHY SLOUGH
COLE SLOUGH
De Woody
Riverdale
Mount Whitney
Laton
DUTCH CUT
KINGS RIVER
6th
Unnamed Street 12 3/4
19
KINGS
Excelsior
14th
12th
Flint
11th
Hanford
Fargo
1.5 0.75 0 1.5 Miles
07/30/14 California Dept of Transportation
STATE ROUTE
TRANSPORTATION CONCEPT REPORT
CALIFORNIA
43
SEGMENT MAP


McCall Substation
McCall Ave
Highland Ave
FRESNO
Floral Ave
Selma
Rose Ave
21
Nebraska Ave
99
43
Golden State Blvd
Mountain View Ave
Lang Pond
1
0.5
0
1 Miles
08/11/14 California Dept of Transportation

Route Designations and Characteristics:

ROUTE DESIGNATIONS AND CHARACTERISTICS																					
Segment #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
Freeway & Expressway	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
National Highway System	No	No	Yes	No	Part	Yes	Yes	No	Part	No	No	No	No	No	No	Part	Part	No	No	No	Yes
Strategic Highway Network	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Scenic Highway	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Interregional Road System	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
High Emphasis	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Focus Route	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Federal Functional Classification	Minor Arterial	Minor Arterial	Minor Arterial	Minor Arterial	Minor Arterial/ Principal Arterial	Principal Arterial	Principal Arterial	Principal Arterial	Principal Arterial	Principal Arterial	Principal Arterial	Principal Arterial	Principal Arterial	Principal Arterial	Principal Arterial	Principal Arterial	Principal Arterial	Principal Arterial	Principal Arterial	Principal Arterial	Principal Arterial
Goods Movement Route	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Truck Designation	Terminal Access (STAA)	Terminal Access (STAA)	Terminal Access (STAA)	Terminal Access (STAA)	Terminal Access (STAA)	Terminal Access (STAA)	Terminal Access (STAA)	Terminal Access (STAA)	Terminal Access (STAA)	Terminal Access (STAA)	Terminal Access (STAA)	Terminal Access (STAA)	Terminal Access (STAA)	Terminal Access (STAA)	Terminal Access (STAA)	Terminal Access (STAA)	Terminal Access (STAA)	Terminal Access (STAA)	Terminal Access (STAA)	Terminal Access (STAA)	Terminal Access (STAA)
Rural/Urban/ Urbanized	Rural	Rural	Rural	Rural	Rural/Urban	Urban	Urban	Rural	Urban	Urban	Rural	Rural	Rural	Rural	Rural	Urban	Urban/Rural	Rural	Rural	Rural	Urban
Metropolitan Planning Organization	Kern COG	Kern COG	Kern COG	Kern COG	Kern COG	Kern COG	Kern COG	Kern COG	Kern COG	Kern COG	Kern COG	Kern COG	TCAG	TCAG	KCAG	KCAG	KCAG	KCAG	KCAG	Fresno COG	Fresno COG
Regional Transportation Planning Agency	Kern COG	Kern COG	Kern COG	Kern COG	Kern COG	Kern COG	Kern COG	Kern COG	Kern COG	Kern COG	Kern COG	Kern COG	TCAG	TCAG	KCAG	KCAG	KCAG	KCAG	KCAG	Fresno COG	Fresno COG
Congestion Management Agency	Kern COG	Kern COG	Kern COG	Kern COG	Kern COG	Kern COG	Kern COG	Kern COG	Kern COG	Kern COG	Kern COG	Kern COG	TCAG	TCAG	None	None	None	None	None	Fresno COG	Fresno COG
County Transportation Commission	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Local Agency	Kern County	Kern County	Kern County	Kern County	Kern County/ City of Shafter	Kern County/ City of Shafter	Kern County/ City of Shafter	Kern County	Kern County/ City of Wasco	Kern County/ City of Wasco	Kern County	Kern County	Tulare County	Tulare County	Kings County	Kings County/ City of Corcoran	Kings County/ City of Corcoran	Kings County	Kings County	Fresno County	Fresno County/ City of Selma
Tribes	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Air District	San Joaquin Valley Air Pollution Control District	San Joaquin Valley Air Pollution Control District	San Joaquin Valley Air Pollution Control District	San Joaquin Valley Air Pollution Control District	San Joaquin Valley Air Pollution Control District	San Joaquin Valley Air Pollution Control District	San Joaquin Valley Air Pollution Control District	San Joaquin Valley Air Pollution Control District	San Joaquin Valley Air Pollution Control District	San Joaquin Valley Air Pollution Control District	San Joaquin Valley Air Pollution Control District	San Joaquin Valley Air Pollution Control District	San Joaquin Valley Air Pollution Control District	San Joaquin Valley Air Pollution Control District	San Joaquin Valley Air Pollution Control District	San Joaquin Valley Air Pollution Control District	San Joaquin Valley Air Pollution Control District	San Joaquin Valley Air Pollution Control District	San Joaquin Valley Air Pollution Control District	San Joaquin Valley Air Pollution Control District	San Joaquin Valley Air Pollution Control District
Terrain	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat

* Santa Rosa Rancheria Tachi Tribe, Santa Rosa Tachi Yokut Tribe, Sierra Nevada Native American Coalition (Mono/Yokut), Tejon Indian Tribe, Tinoqui-Chalola Council of Kitanemuk and Yowlumne Tejon Indians, Tule River Indian Tribe, Tule River Yokuts

COMMUNITY CHARACTERISTICS

Traversing from south to north, Shafter is the first city located on SR 43. Shafter's population as of the 2010 U.S. Census, was 16,988. Over 80% of the population is of Hispanic descent. The location was originally a loading dock for the Santa Fe Railroad. The first post office was set up in 1898, but the city did not start growing until 1914, when land in the area was being sold and developed. The city was incorporated in 1938 and named after General William Rufus Shafter, also known as Pecos Bill. He served in both the Union Army of the Civil War, in which he earned the Medal of Honor, and Spanish-American War. He eventually retired and settled in Bakersfield.

Shafter is mainly an agricultural-based community. Crops grown in the area are almonds, pistachios, alfalfa, cotton, carrots, and other row crops. Packing houses, almond hulling, and other agricultural industries are also found locally.

Shafter is also becoming more of an industrial city. Two large industrial complexes are located in the Shafter area. These complexes are home to distribution centers, warehouses, and manufacturing. With Shafter's central location in California, it has drawn these companies and is in the process of becoming an inland port. More information on this is in the "Freight" section of this report on page 37.

Shafter is also a very community-oriented city. "Shafter Vision" is a report published every few years to focus on the community to develop goals and recommendations for improvements to the city. Citizens divide up into groups and develop plans in conjunction with city staff. In the latest vision, downtown beautification, economic development, education, and recreation were the focus areas. Some of the suggestions include: murals, solar, curbside recycling, community college extension courses, develop Shafter Youth Sports Council, more public recreational areas, and to create a path for bicycling and pedestrian use.

Further north on the route is the City of Wasco. Wasco's population as of the 2010 U.S. Census was 25,545. Over 75% of the population is of Hispanic descent. The early years of Wasco were driven by the Santa Fe Railroad. Wasco owes its early development to Marshall V. Hartranft for the initial development of Wasco. He obtained land from the Kern County Land Company for the settlement which was called the Fourth Home Extension Colony. Wasco was originally named Dewey and Deweyville, after Admiral George Dewey. However, in 1900, William Bonham from Wasco County, Oregon, proposed the name "Wasco" for the community and it was adopted.

Wasco is an agricultural community, with cotton and orchards being prime crops. But, most noteworthy are its roses. Wasco is known as the Rose Capital, and produces 55% of all roses in the United States. The Festival of Roses takes place in September. Vintage Nursery and Weeks Roses are the main rose growers.

Employment in Wasco is found mainly at the Wasco State Prison, local school districts and in agriculture. The prison has over 1,400 employees and is located west of the city on over 600 acres. The prison houses over 5,000 inmates. A few of the largest agricultural employers are Sun World, Sunny Gem, Primex Farms, LLC, and South Valley Farms. Sun World is a grower, packer, and marketer with over 10,000 acres of such agricultural products as grapes, peppers, plums, apricots, and citrus. Sunny Gem is in food production of mainly juice products and hulls and processes almonds. Primex Farms, LLC is a pistachio processor. South Valley Farms is an almond grower, packer, and shipper.

Allensworth State Historical Park

Moving north into Tulare County is the community of Allensworth. Allensworth's population as of the 2010 U.S. Census was 471, with over 92% of the population being of Hispanic descent. Allensworth was founded in 1908 by Lt. Col. Allen Allensworth, an African-American who served in the Union Army. He also was a Baptist minister and served as a chaplain. The site is now a California State historic park.

A little further north on the route is the community of Alpaugh, also in Tulare County. Alpaugh's population as of the 2010 U.S. Census was 1,026, with just over 84% of the population being of Hispanic descent. The community is named after John Alpaugh, who was part of a group of southern California real estate developers called the California Home Extension. Both Alpaugh and Allensworth were on the shoreline of the now drained Tulare Lake.

Crossing into Kings County, is the City of Corcoran. Corcoran's population as of the 2010 U.S. Census was 24,813, with over 62% of the population being of Hispanic descent. Corcoran was one of the last cities to be claimed, purchased, and planned by Hobart Johnstone Whitley, who was a prominent land developer. The city served as a railroad junction. In 1914, Corcoran became incorporated. It is mainly a farming community with cotton, alfalfa, tomatoes, and wheat as the main crops grown. The Corcoran State Prison (I and II) houses nearly 12,000 inmates.

City of Hanford

North of Corcoran, is Hanford, the county seat for Kings County. Hanford was settled in 1877 from a sheep herder's camp along railroad lines. The city is named after James Madison Hanford, who was an executive with the Southern Pacific Railroad. Hanford was incorporated in 1891 and became the county seat of Kings County in 1893, when Kings County was carved out of Tulare County.

As of the 2010 U.S. Census, Hanford's population was 53,967, with approximately 47% being of Hispanic descent. Hanford is the focal point of the surrounding agricultural farming region. Major employers in Hanford include: Kings County, Adventist Health System, Hanford Elementary School District, Del Monte Foods, and Marquez Brothers International (cheese and dairy products).

Hanford is dedicated to keeping its small town charm. Back in 1980, a Historic District was created to maintain the downtown's historic buildings. In 1985, Hanford won the Helen Putnam Award for Excellence by the League of California Cities, due to its preservation of its downtown. Thus, downtown Hanford is thriving and remains an active, yet quaint theme.

Just crossing the county line into Fresno County, is the community of Laton, which is west of SR 43. Laton was named after Charles Laton who was one of the early developers of the community and also was part-owner of the Laguna de Tache Ranch, which was a Mexican land grant. Laton's population as of the 2010 U.S. Census was 1,824, with just over 76% being of Hispanic descent. Laton is a farming community and holds an annual rodeo.

At the end of the route in Fresno County where SR 43 ties into SR 99, is the city of Selma. The town was founded in 1890 and incorporated in 1893. Selma is a center for agriculture. The original crop was wheat, later it shifted

to peaches, and now to grapes and raisins. Selma is known as the "Raisin Capital of the World", as 90 percent of raisins in the United States are grown in and near Selma.

LAND USE

Kern County Raceway Park

At its beginning in Kern County, SR 43 exists in dry farming land. Just west of the interchange with I-5 is Kern County Raceway Park. It is a NASCAR home track on a half-mile oval. It opened in 2013 and features several different types of racing, including stock cars and late models. The raceway hosts many events throughout the year.

North of the track is the Kern River and the Kern River Parkway Bike Trail. A canal crosses under the route. The Pioneer Canal is further north and agricultural crops are found along with cattle. Almond orchards are also sprinkled in the mix of agriculture. Between SR 58 both east and west, is a small semi-rural community of larger lot sizes on the west side of SR 43. At Kratzmeyer Road, the Rio Bravo-Greeley School District has its elementary and middle school. There are no crosswalks to cross the highway and no sidewalks.

Upon crossing Seventh Standard Road and nearing Shafter, more industrial development occurs. Industries can possibly access the rail line and become more intermodal. In Shafter, the railroad runs on the east side of SR 43 and industrial uses are found. On the west side of the route, residences, offices, and retail dominate.

Between Shafter and Wasco, agriculture and agricultural-related businesses take over. Almond orchards and almond hulling services are found. Entering Wasco, the west side of the highway is residential with some retail, and the east side is a mix of residences and some smaller industries. The Wasco Amtrak station is a block to the east of SR 43. There is a break in the route at SR 46 and the route moves to the east and the railroad runs on the west side of the route.

Heading north out of Wasco, the route returns to agriculture (mainly almonds) and agriculture-related industries. North of Phillips Road a canal runs under the highway. North of Taussig Avenue is a stream bed. Another canal runs just north of Sherwood Avenue.

Just south of the Tulare County line, at Garces Highway is the Kern National Wildlife Refuge's headquarters. There is a drivable route for tours in the refuge. Further information on the refuge is included in the Environmental Considerations section of this report.

In Tulare County the route remains primarily in agricultural land. Allensworth and its State historical park are to the west of the highway. Alpaugh is just further north and to the west.

At Avenue 56/Sierra Avenue, is the entrance to the Pixley National Wildlife Refuge. The refuge has a 1.5-mile trail and is the only public use area on the refuge; the remainder is closed to the public. Further information on the refuge is included in the Environmental Considerations section of this report.

North of Avenue 56/Sierra Avenue is a solar power farm on the west side of the route and the railroad line. Deer Creek runs north of the solar power farm. A larger canal crosses under the highway north of Avenue 88. Silage

and alfalfa are more predominate as dairies are found. North of Avenue 112, another canal crosses under the route.

Before entering Kings County, SR 43 crosses over the Tule River. Just in Kings County is Corcoran. At Poplar Avenue/Quebec Avenue just west of SR 43, is the Corcoran State Prison. On the west side of the highway, just north of Plymouth Avenue, is a private airport. At the end of the runway, is SR 137. There is a planned roundabout at this location. As the route begins to run at a northwest - southeast direction on the northern fringe of Corcoran, it crosses the Sweet Canal. Leaving Corcoran, the route once again traverses agricultural land.

At Nevada Avenue, it once again crosses a diversion of the Sweet Canal. Just north of that, it crosses over the West Branch Lakeland Canal. As SR 43 runs in a north – south direction, it crosses another canal. It then crosses Cross Creek and crosses over a few more canals. Large dairies also are found in this area, along with crops that support the dairies.

The City of Hanford is to the west of the highway. Just north of the current SR 43/SR 198 Interchange, a roundabout is planned between Lacey Boulevard and the railroad tracks to the north. A major development is underway for a Costco on the west side of the highway at this location. For further information on this issue, please see the Key Corridor Issues section of this report.

The route remains on the eastern fringes of Hanford until after it crosses the East Branch of Peoples Ditch just south of Fargo Avenue. The west side of the route becomes residential with the east side remaining agricultural. North of Flint Avenue, the route again returns to an agricultural setting. After crossing Elder Avenue, the route also crosses the Peoples Ditch. The Kings River-Hardwick Elementary School, a kindergarten through eighth grade charter school, is located on the northwest quadrant of SR 43 and Excelsior Avenue. Another ditch is crossed before the Kings River is crossed at two locations. To the west of the highway is the community of Laton. Walnut orchards and stone fruit orchards start to appear upon entering Fresno County.

LAND USE	
Segment	**Place Type**
1	Rural settlements and Agricultural lands/Special use areas
2	Rural settlements and Agricultural lands
3	Rural settlements and Agricultural lands
4	Rural settlements and Agricultural lands
5	Special use areas/Rural settlements and Agricultural lands
6	Suburban dedicated use areas
7	Suburban center
8	Rural settlements and Agricultural lands
9	Suburban neighborhoods
10	Suburban center
11	Rural settlements and Agricultural lands
12	Rural settlements and Agricultural lands
13	Rural settlements and Agricultural lands
14	Rural settlements and Agricultural lands/Protected lands
15	Rural settlements and Agricultural lands
16	Special use areas (industrial)
17	Rural settlements and Agricultural lands
18	Rural settlements and Agricultural lands/Suburban neighborhoods
19	Rural settlements and Agricultural lands
20	Rural settlements and Agricultural lands
21	Suburban corridor

The outskirts of Selma are agricultural with dairies, orchards, and vineyards. On corners fueling facilities and convenience stores are found. The Selma Branch canal crosses under the highway. Residential areas start

appearing near Nebraska Avenue. A city park, Ringo Park, is just off to the east of the highway. Near the route's end at SR 99, more businesses occur. An auto dealership, Kaiser Permanente medical offices, restaurants, and a retail center are located on the west side of the route near its terminus.

Long Term ROW Needs:
See Corridor Concept section, page 56.

SYSTEM CHARACTERISTICS

Much of the route exists as a two-lane conventional highway, with a few segments existing as a four-lane conventional highway. The 2035 Concept Facility calls for many improvements, most of which are maintaining two-lanes with improvements such as: turn lanes, passing lanes, signals, and other operational improvements. At the northern part of the route, a four-lane expressway is called for in 2035. Currently, in the existing four-lane conventional highway segments, no change is called for in 2035.

There are various proposed transportation management system (TMS) elements in the future. Nearly every segment currently has a traffic count station.

SYSTEM CHARACTERISTICS																					
Segment #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
Existing Facility																					
Facility Type	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
General Purpose Lanes	2	2	2	2	2	2	4	4	4	2	2	2	2	2	2	2	2	2	2	2	4
Lane Miles	3.508	12.494	2.10	6.056	6.26	2.0	9.032	20.184	2.0	2.0	2.332	25.034	19.774	25.574	4.52	1.52	30.396	8.108	10.028	16.68	3.872
Centerline Miles	1.754	6.247	1.05	3.028	3.13	1.0	2.258	5.046	0.5	1.0	1.166	12.517	9.887	12.787	2.26	0.76	15.198	4.054	5.014	8.34	0.968
Auxiliary Lanes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passing Lanes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Climbing Lanes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Concept Facility																					
Facility Type	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	E	E	E	C
General Purpose Lanes	2	2	4	4	4	4	4	4	4	2	2	2	2	2	2	2	2	4	4	4	4
Lane Miles	3.508	12.494	4.20	12.112	12.52	4.0	9.032	20.184	2.0	2.0	2.332	25.034	19.774	25.547	4.52	1.52	30.396	16.216	20.056	33.36	2.872
Centerline Miles	1.754	6.247	1.05	3.028	3.13	1.0	2.258	5.046	0.5	1.0	1.166	12.517	9.887	12.787	2.26	0.76	15.198	4.054	5.014	8.34	0.968
TMS Elements																					
TMS Elements (BY)	Traffic count stations	Changeable message sign	Traffic count station	Traffic count stations	Traffic count station	Traffic count station	Signals, traffic count stations	Signal, traffic count stations	Traffic count stations	Traffic count stations	Traffic count station	Traffic count stations	Traffic count stations	Traffic count stations	Traffic count stations	None	Signals, traffic count stations, vehicle detection system	Signals, traffic count stations	Signals, traffic count stations	Signals, traffic count stations	Signals, traffic count stations
TMS Elements (HY)	None	Closed circuit TVs	Changeable message sign	Closed circuit TV, changeable message sign, vehicle detection system	Closed circuit TV	None	Closed circuit TV	None	None	None	None	Vehicle detection system	None	Vehicle detection system	Highway advisory radio, remote processing unit (roadside weather information system)	None	Changeable message sign	Changeable message sign	None	Changeable message signs, vehicle detection system	None

*For definitions of facility types, please see Appendix A, Glossary of Terms and Acronyms, Page 60
**BY = Base Year, 2012
***HY = Horizon Year, 2035

BICYCLE FACILITY

State Route 43 is open to bicycle traffic through its entire length. Most of the route has striped shoulders. The majority of the route has wide shoulders, except in the southernmost segment in Kern County and in Tulare County. The route has flat terrain throughout making it conducive to bicycling. SR 43 has been proposed as an alternate bicycle route for SR 99. State Route 99 prohibits bicycle access on the entire route within District 6. Bicycle Plans from several counties have shown future needs for bicycle improvements on SR 43. The Kern County Bicycle Master Plan has proposed Class II bicycle lanes, on an eleven mile stretch, from Panama Lane to Beech Avenue. The Tulare County Regional Bicycle Transportation Plan shows a proposed Class II segment just north of the Kern/Tulare County line. The Kings County Regional Bicycle Plan identifies SR 43 as a proposed touring bikeway from Flint Avenue to the Kings/Fresno County line. For further details and information, please see Appendix C: Bicycle Information, page 74.

As the transportation system expands, the regional agencies may consider a future bikeway system on SR 43 that would convert it into a vital multi-modal corridor. A bicycle facility, whether it be Class I, Class II, or Class III, could significantly enhance circulation of bicycle travel within the four counties. Improved bicycle facilities along the state route would give residents another choice of transportation, reduce carbon dioxide emissions, and reduce congestion.

California's transportation system cannot meet the State's needs by just accommodating vehicle travel. Caltrans supports guidance meant to provide flexibility for bicycle facility design. The American Association of State Highway Transportation Officials and the National Association of City Transportation Officials publications help as a guide to Caltrans' philosophy and flexible approach toward designing multimodal transportation projects. For more information, please see: http://www.dot.ca.gov/Documents/2014-4-2-Flexibility-in-Design.pdf.

These guides promote a network of Class I, Class II and Class III bicycle facilities that connect major origins and destinations. Please see Appendix A: Glossary of Acronyms and Terms, page 58, for a definition of the different bicycle facility types.

These guides should be considered in all transportation system developments so as to include flexibility in future design options.

BICYCLE FACILITIES		
Segment #	State Bicycle Facility	
	Bicycle Access Prohibited	Facility Type
1	N	None
2	N	Proposed Class II
3	N	Proposed Class II
4	N	Proposed Class II
5	N	Proposed Class II
6	N	Proposed Class II
7	N	None
8	N	None
9	N	None
10	N	None
11	N	None
12	N	None
13	N	Proposed Class II from Ave 40 to Ave 56/Sierra Ave
14	N	None
15	N	None
16	N	None
17	N	None
18	N	None
19	N	Proposed Touring Bikeway
20	N	None
21	N	None

PEDESTRIAN FACILITY

Most of SR 43 lacks sidewalks and crosswalks. This is due to the route's rural nature. Only in the urbanized areas are there any sidewalks or crosswalks.

PEDESTRIAN FACILITY				
Segment	Ped. Access Prohibited	Sidewalk Present	Junction	
			Location	Type
1	No	No	SR 119	Signalized, at-grade
				No crosswalk, no sidewalk, curb
			Raceway Blvd	Not signalized, at-grade
				No crosswalk, no sidewalk
2	No	No	I-5	Not signalized, grade separated
				No crosswalk, no sidewalk
			Panama Ln	Not signalized, at-grade
				No crosswalk, no sidewalk
			Munzer Rd	Not signalized, at-grade
				No crosswalk, no sidewalk
			Olen Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Stockdale Hwy	Not signalized, at-grade
				No crosswalk, now sidewalk
			Railroad Crossing PM 7.010	Lighted crossing arms, at-grade
				No crosswalk, no sidewalk
			Brimhall Rd	Not signalized, at-grade
				No crosswalk, no sidewalk
3	No	Varies	SR 58/Rosedale Hwy	Flashing light, at-grade
				No crosswalk, sidewalk on north side
			Gribben Ct	Not signalized, at-grade
				No crosswalk, no sidewalk
			Acari Rd	Not signalized, at-grade
				No crosswalk, no sidewalk
			Meachum Rd	Not signalized, at-grade
				No crosswalk, no sidewalk
			SR 58 West	Flashing light, at-grade
				No crosswalk, no sidewalk
4	No	No	Noriega Rd	Not signalized, at-grade
				No crosswalk, no sidewalk
			Sullivan Rd	Not signalized, at-grade
				No crosswalk, no sidewalk
			Kratzmeyer Rd (in front of school)	Not signalized, at-grade
				No crosswalk, no sidewalk
			Stricklind Ct	Not signalized, at-grade
				No crosswalk, no sidewalk
			Snow Rd	Not signalized, at-grade
				No crosswalk, no sidewalk
			Howze Rd	Not signalized, at-grade
				No crosswalk, no sidewalk
			Ronnie Ct	Not signalized, at-grade
				No crosswalk, no sidewalk
			Baker Rd	Not signalized, at-grade
				No crosswalk, no sidewalk
5	No	No	7th Std Rd	Not signalized, at-grade
				No crosswalk, no sidewalk, curb on NE corner
			Coberly Rd	Not signalized, at-grade
				No crosswalk, no sidewalk
			Railroad crossing PM 12.864	Railroad lights and arms, at-grade
				No crosswalk, no sidewalk
			Ashley Emilie Ln	Not signalized, at-grade
				No crosswalk, no sidewalk
			Imperial St	Not signalized, at-grade
				No crosswalk, no sidewalk
			Sharp Wy	Not signalized, at-grade
				No crosswalk, no sidewalk
			Waymon Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			San Diego St	Not signalized, at-grade
				No crosswalk, no sidewalk
			Burbank St	Not signalized, at-grade
				No crosswalk, no sidewalk
			Elliot St	Not signalized, at-grade
				No crosswalk, no sidewalk
			Orange St	Not signalized, at-grade
				No crosswalk, no sidewalk
			Riverside St	Not signalized, at-grade
				No crosswalk, no sidewalk
6	No	Varies	Los Angeles Ave/Beech Ave/Santa Fe Wy	Not signalized, at-grade
				No crosswalk, no sidewalk
			Ash Ave	Not signalized, at-grade
				No crosswalk, sidewalk on SW corner
7	No	Varies	Euclid Ave	Not signalized, at-grade
				No crosswalk, sidewalk on west side
			Lerdo Hwy	Signalized, at-grade
				Crosswalk, sidewalk on all corners except SE curb

PEDESTRIAN FACILITY				
Segment	Ped. Access Prohibited	Sidewalk Present	Junction	
			Location	Type
			Jackson Ave	Not signalized, at-grade
				No crosswalk, sidewalk
			State Ave	Not signalized, at-grade
				No crosswalk, sidewalk
			Pacific Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Central Ave	Signalized, at-grade
				Crosswalk, sidewalk
			California Ave	Not signalized, at-grade
				No crosswalk, sidewalk
			Sunset Ave	Not signalized, at-grade
				No crosswalk, sidewalk
			Poso Ave	Not signalized, at-grade
				Crosswalk, sidewalk
			Shafter Ave	Signalized, at-grade
				Crosswalk, sidewalk
			Tulare Ave	Not signalized, at-grade
				No crosswalk, sidewalk on SW corner
			Voth Ln	Not signalized, at-grade
				No crosswalk, no sidewalk
			Venable Ln	Not signalized, at-grade
				No crosswalk, no sidewalk
			Klassen St	Not signalized, at-grade
				No crosswalk, no sidewalk
			Sunny Ln	Not signalized, at-grade
				No crosswalk, no sidewalk
			Fresno Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Mayer Ln	Not signalized, at-grade
				No crosswalk, no sidewalk
8	No	No	Poplar Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Bender Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Merced Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Scaroni Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Jack Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Dresser Ave (east)	Not signalized, at-grade
				No crosswalk, no sidewalk
			Dresser Ave (west)	Not signalized, at-grade
				No crosswalk, no sidewalk
			Wasco Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Main St	Not signalized, at-grade
				No crosswalk, no sidewalk
			Kimberlina Rd	Signalized, at-grade
				No crosswalk, no sidewalk
			Prospect Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Jackson Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
9	No	Varies	Filburn St	Not signalized, at-grade
				No crosswalk, sidewalk on north side, curb
			16th St	Not signalized, at-grade, frontage road
				No crosswalk, sidewalk
			Almond Ct	Not signalized, at-grade, frontage on east side
				Crosswalk, sidewalk
10	No	Varies	Poso Ave	Flashing light, at-grade
				Crosswalk, some sidewalk, curb
			12th St	Not signalized, at-grade
				No crosswalk, some sidewalk, curb
			11th St	Not signalized, at-grade
				No crosswalk, sidewalk
			10th St	Not signalized, at-grade
				No crosswalk, sidewalk
			9th St	Not signalized, at-grade
				No crosswalk, sidewalk
			8th St	Not signalized, at-grade
				Crosswalk, sidewalk
			7th St	Not signalized, at-grade
				Crosswalk, sidewalk
			6th St	Not signalized, at-grade
				Crosswalk, sidewalk
			5th St	Not signalized, at-grade
				No crosswalk, sidewalk
			4th St	Not signalized, at-grade
				No crosswalk, sidewalk

PEDESTRIAN FACILITY				
Segment	Ped. Access Prohibited	Sidewalk Present	Junction	
			Location	Type
			2nd St	Not signalized, at-grade
				No crosswalk, sidewalk on west side
11	No	Varies	SR 46	Signalized, at-grade
				Crosswalk, some sidewalk, curb
			Railroad Track	Not signalized, grade separated
				No crosswalk, no sidewalk
			Wasco-Pond Rd	Flashing red light, at-grade
				No crosswalk, no sidewalk
			Gromer Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
12	No	No	McCombs Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Whisler Rd	Not signalized, at-grade
				No crosswalk, no sidewalk
			Taussig Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Blankenship Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Sherwood Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Elmo Hwy	Not signalized, at-grade
				No crosswalk, no sidewalk
			Peterson Rd	Not signalized, at-grade
				No crosswalk, no sidewalk
			Pond Rd	Not signalized, at-grade
				No crosswalk, no sidewalk
			Schuster Rd	Not signalized, at-grade
				No crosswalk, no sidewalk
			Woollomes Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Garces Hwy	Not signalized, at-grade
				No crosswalk, no sidewalk
			Cecil Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
13	No	No	Ave 8	Not signalized, at-grade
				No crosswalk, no sidewalk
			Ave 16	Not signalized, at-grade
				No crosswalk, no sidewalk
			Ave 24	Not signalized, at-grade
				No crosswalk, no sidewalk
			Rd 88	Not signalized, at-grade
				No crosswalk, no sidewalk
			Rd 85	Not signalized, at-grade
				No crosswalk, no sidewalk
			Palmer Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Ave 56/Sierra Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
14	No	No	Rd 64	Not signalized, at-grade
				No crosswalk, no sidewalk
			Ave 84	Not signalized, at-grade
				No crosswalk, no sidewalk
			Ave 88	Not signalized, at-grade
				No crosswalk, no sidewalk
			Ave 108	Not signalized, at-grade
				No crosswalk, no sidewalk
			Ave 112	Not signalized, at-grade
				No crosswalk, no sidewalk
			Ave 120/Hesse Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Rd 36	Not signalized, at-grade
				No crosswalk, no sidewalk
			Ave 128	Not signalized, at-grade
				No crosswalk, no sidewalk
			Rd 32	Not signalized, at-grade
				No crosswalk, no sidewalk
			Ave 136	Not signalized, at-grade
				No crosswalk, no sidewalk
			Ave 144/Poplar Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Ave 152	Not signalized, at-grade
				No crosswalk, no sidewalk
15	No	No	Rd 19/Oregon Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			SR 137/Whitley Ave	Not signalized, at-grade (roundabout programmed)
				No crosswalk, no sidewalk
16	No	No	5th Ave/Pickerell Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Orange Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			5 ½ Ave	Not signalized, at-grade
				No crosswalk, no sidewalk

PEDESTRIAN FACILITY				
Segment	Ped. Access Prohibited	Sidewalk Present	Junction	
			Location	Type
17	No	No	Santa Fe Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Nevada Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Lansing Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Kansas Ave	Signalized, at-grade
				No crosswalk, no sidewalk
			Kent Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Jersey Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Jackson Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Idaho Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Iona Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Houston Ave	Signalized, at-grade
				No crosswalk, no sidewalk
			Hanford-Armona Rd	Not signalized, at-grade
				No crosswalk, no sidewalk
18	No	No	SR 198	Signalized off-ramps, grade separated
				No crosswalk, no sidewalk
			Lacey Blvd	Not signalized, at-grade
				Crosswalks, no sidewalk
			R. R. Crossing PM 18.702	R.R. Crossing signal, at-grade
				No crosswalk, no sidewalk
			Grangeville Blvd	Signalized, at-grade
				Crosswalks, no sidewalks
			8 ½ Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Fargo Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			10th Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
19	No	No	Flint Ave	Signalized, at-grade
				Crosswalk, no sidewalk
			Elder Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Excelsior Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Dover Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Denver Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Cairo Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
20	No	No	Davis Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Elkhorn Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Clarkson Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Conejo Ave	Signalized, at-grade
				Crosswalks, no sidewalk, curb
			Kamm Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Caruthers Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
			Mountain View Ave	Signalized, at-grade
				Crosswalks, no sidewalk
			Saginaw Ave	Not signalized, at-grade
				No crosswalk, no sidewalk
21	No	Varies	Nebraska Ave	Signalized, at-grade
				Crosswalks, some sidewalk
			Rose Ave	Not signalized, at-grade
				No crosswalk, sidewalk on east side
			Arrants St	Not signalized, at-grade
				No crosswalk, sidewalk
			Stillman St	Signalized, at-grade
				Crosswalks, sidewalk
			SR 99	Not signalized, grade separated
				No crosswalk, no sidewalk

TRANSIT FACILITY

Several transit agencies provide service to communities on and near the route. These agencies also provide connectivity between one another for ease of ridership. The cities of Shafter, Wasco, and Corcoran provide services along with Kern Regional Transit, Tulare County Area Transit, Kings Area Rural Transit, and Fresno County Rural Transit Agency. Also, Amtrak has stations in Bakersfield, Wasco, Corcoran, Hanford, and Fresno. There is also a park and ride lot in Hanford adjacent to the route. Transit ridership numbers are from the 2013/2014 fiscal year.

The California High Speed Rail Authority (CHSRA) is a State agency responsible for planning, designing, building, and operating a high speed rail system consistent with the Safe, Reliable High-Speed Passenger Train Bond Act. As such, CHSRA has developed a plan to build a high-speed rail line to service the major metropolitan areas of California by connecting San Diego and Los Angeles to San Francisco and Sacramento via the San Joaquin Valley. A large part of the Initial Operating Section (IOS) will be constructed in the San Joaquin Valley and will connect proposed stops in Fresno, Kings County (servicing Hanford/Tulare/Visalia), and Bakersfield, all of which lie within Caltrans District 6. From Fresno to Bakersfield, the system will cover 114 miles. This initial system may spur the need to modify or relocate some portions of SR 43. Caltrans is working closely with the CHSRA to identify those impacts and is planning both systems accordingly.

The future of California's High-Speed Train (HST) service will be dependent on funding and is slated to become a part of the State's transportation system. It therefore should be considered in concert with local and regional non-motorized transportation, transit, airports, and highways. Moreover, the HST stations should be situated and built as multimodal transportation hubs.

The Caltrans Division of Transportation Planning's High-Speed Rail Transit Connectivity Program was created on July 1, 2012 to assist Caltrans California Intercity Rail (CIR), CHSRA, regional and local agencies, and transit operators in providing connectivity to HSR and feeder services. Caltrans District contacts are available to provide support of connectivity activities.

TRANSIT FACILITY										
Segment#	Mode & Collateral Facility	Name	Route End Points	Annual Ridership	Operating Period	Stations/Stops		Bikes Allowed on Transit	Location Description	# Parking Spaces
						Cities	Postmiles			
5 -7	Traditional Bus	City of Shafter Dial-A-Ride	Shafter	27,355	Weekdays	Shafter	VAR	N		
7 - 10	Traditional Bus	Kern Regional Transit – Lost Hills	Lost Hills to Bakersfield	2,315	Monday through Saturday	Lost Hills, Shafter, Wasco, Bakersfield	16.78	Y		
7 - 10	Traditional Bus	Kern Regional Transit – North Kern	Delano to Bakersfield	67,875	Daily	Delano, McFarland, Wasco, Shafter, Bakersfield	16.78	Y		
8 - 11	Traditional Bus	City of Wasco Dial-A-Ride	Wasco	25,184	Weekdays	Wasco	VAR	N		
13	Traditional Bus	Tulare County Area Transit – Dial-A-Ride	Pixley to Richgrove	2,817	Weekdays	Pixley, Tipton, Teviston, Earlimart, Alpaugh, Allensworth, Richgrove	VAR	Y		
14 - 17	Traditional Bus	Corcoran Area Transit – Dial-A-Ride	Corcoran	36,056	Weekdays	Corcoran	VAR	Y		
15 - 18	Traditional Bus	Kings Area Rural Transit – Corcoran to Hanford	Corcoran to Hanford	14,015	Monday through Saturday	Corcoran, Hanford	NA	Y		
17 - 18	Traditional Bus	Kings Area Rural Transit – Dial-A-Ride	Hanford	23,267	Monday through Saturday	Hanford	VAR	Y		
18 - 21	Traditional Bus	Kings Area Rural Transit – Hanford to Fresno	Hanford to Fresno	9,040	Monday through Saturday	Hanford, Selma, Fresno, Children's Hospital	9.06	Y		
19	Traditional Bus	Kings Area Rural Transit - Laton	Laton to Hanford	15,396	Monday through Saturday	Laton	NA	Y		
21	Traditional Bus	Fresno County Rural Transit Agency (FCRTA) – Selma	Selma	6,321	Weekdays	Selma	NA	Y		
21	Traditional Bus	FCRTA – Dial-A-Ride Selma	Selma	56,528	Monday through Saturday	Selma	VAR	Y		
21	Traditional Bus	FCRTA – Intercity Southeast Transit	Selma to Fresno	13,841	Monday through Saturday	Selma, Kingsburg, Fowler, Fresno	NA	Y		
10, 15, 18	Rail	Amtrak: San Joaquin	San Francisco to Southern California	1,200,000 (entire San Joaquin route)	Daily	Bakersfield, Wasco, Corcoran, Hanford, Fresno	NA	Y	Wasco, Corcoran, Hanford	VAR
19	Park and Ride Lot	Hanford							PM 22.30	37

Please see Appendix E, Transit Maps, page 85.

FREIGHT

State Route 43 is primarily a rural agricultural route that connects small cities that are located in the center of the Central Valley. The route serves the farm to market/processors realm. Truck traffic ranges from 9 to 25 percent of traffic on the route. A typical highway is considered to have significant regional goods movement traffic if 10% of the total traffic on a highway is composed of trucks, and is considered to be a significant interregional goods movement route if 30% of the total trucks on a particular route are 5-axle trucks. The entire route is an STAA route. There are no weigh stations or weight in motion scales along the route. Truck companies are located in almost every city along this route, typically on the outskirts of each city. There are no official truck stops along the route, but there a few commercial fueling stations.

The Burlington Northern and Santa Fe (BNSF) Railroad generally follows the SR 43 alignment with some deviations. It is a Class I railway, and second only to the Union Pacific Railroad (UPRR) in terms of size. In North America, the BNSF has become the largest intermodal carrier. The railroad has rail yards in Fresno and Bakersfield.

There are two Class III railways near the route. Class III railways are also known as short-line railroads and are on a much smaller scale than Class I railways. The larger one is the San Joaquin Valley Railroad (SJVRR) from the parent company of Genesee and Wyoming Incorporated. The railway operates over 400 miles of track. It travels west to east and crosses SR 43 near the SR 198 corridor in Kings County. Another section of the SJVR crosses SR 43 west of Bakersfield near SR 58. The other Class III railway is the West Isle Line Incorporated (WFS) from the parent company of Crop Production Services. The WFS operates just over five miles of track and runs to the west side of SR 43 near Alpaugh. Both railways haul primarily agricultural products.

There are three intermodal stations in close proximity to SR 43, allowing for the interchange of goods between train to truck and vice versa. The City of Shafter is home to Paramount Logistics Park which utilizes the BNSF railroad tracks. The site is expanding to handle additional intermodal services. The city is also developing a container yard and freight station. The city is also looking forward to the facility becoming an inland port with its mid-California location. There is also one in Wasco, which is operated by Savage Industries. The other intermodal station is Van-G Logistics in Selma just north of the junction of SR 43 with SR 99. Van-G Logistics also provides warehouse space and transport by rail and truck.

There are three at-grade railroad crossings with the highway. The first has railroad crossing arms with lights and is located at post mile 7.010, just north of Development Avenue and south of Brimhall Road in Kern County. This crossing is of the SJVR. The second is also in Kern County, just south of Shafter, at post mile 12.864, north of Coberly Road and south of Ashley Emily Lane. It also has railroad crossing arms with lights. This crossing is of the BNSF railroad. The final at-grade crossing is in Kings County, near Hanford, at post mile 18.702, north of SR 198 and Lacey Boulevard, south of Grangeville Boulevard. This crossing is of the SJVRR.

There are numerous warehouses and distribution centers near the route with its close proximity to BNSF railway and central location to California's ports. The Shafter area has the Paramount Logistics Park with large warehouses and distribution centers. The industrial park is on over 1,600 acres and includes: American Tire Distribution, Ross Dress for Less, Baker Hughes (oil exploration), Formica, Hillman Group (fasteners and other products), Target, Weatherford Company (oil drilling services), Schlumberger (oilfield services), and State Farm Insurance. The industrial park is located east of SR 43. Just east of the route and adjacent to the BNSF tracks are numerous warehouses and industrial developments, these include: Cal Coast Acidizing (fertilizers for agriculture), Midas Pump Supply, Simplot Grower Solutions (fertilizers for agriculture), Brinderson Company (oilfield equipment maintenance), and FMS Technologies (energy). Within fifty miles of Shafter are additional warehouses and distribution centers, which include: Bolthouse Farms, Camping World, Carquest, Caterpillar, Dollar General, Famous Footwear, Frito-Lay, Grimmway Farms, IKEA, Nestle-Dreyers, Paramount Farms, Sears, U.S. Cold Storage of California, and Wal-Mart.

Minter Field Industrial Center is located just east of Shafter and includes the Shafter-Minter Airport, which is a public use airport. The center has over 1,100 acres of industrial development and has room to expand. Among the tenants are: Bayer Crop Science, G.K. Lewis Irrigation, Weststar Trucking, West Coast Pipe Inspection, Asphalt Pavement and & Recycling Technologies, Incorporated, Atlas Crane, Lyday Welding, Granite Construction, Williams and Sonoma, Zambelli Fireworks International, and the United States Department of Agriculture.

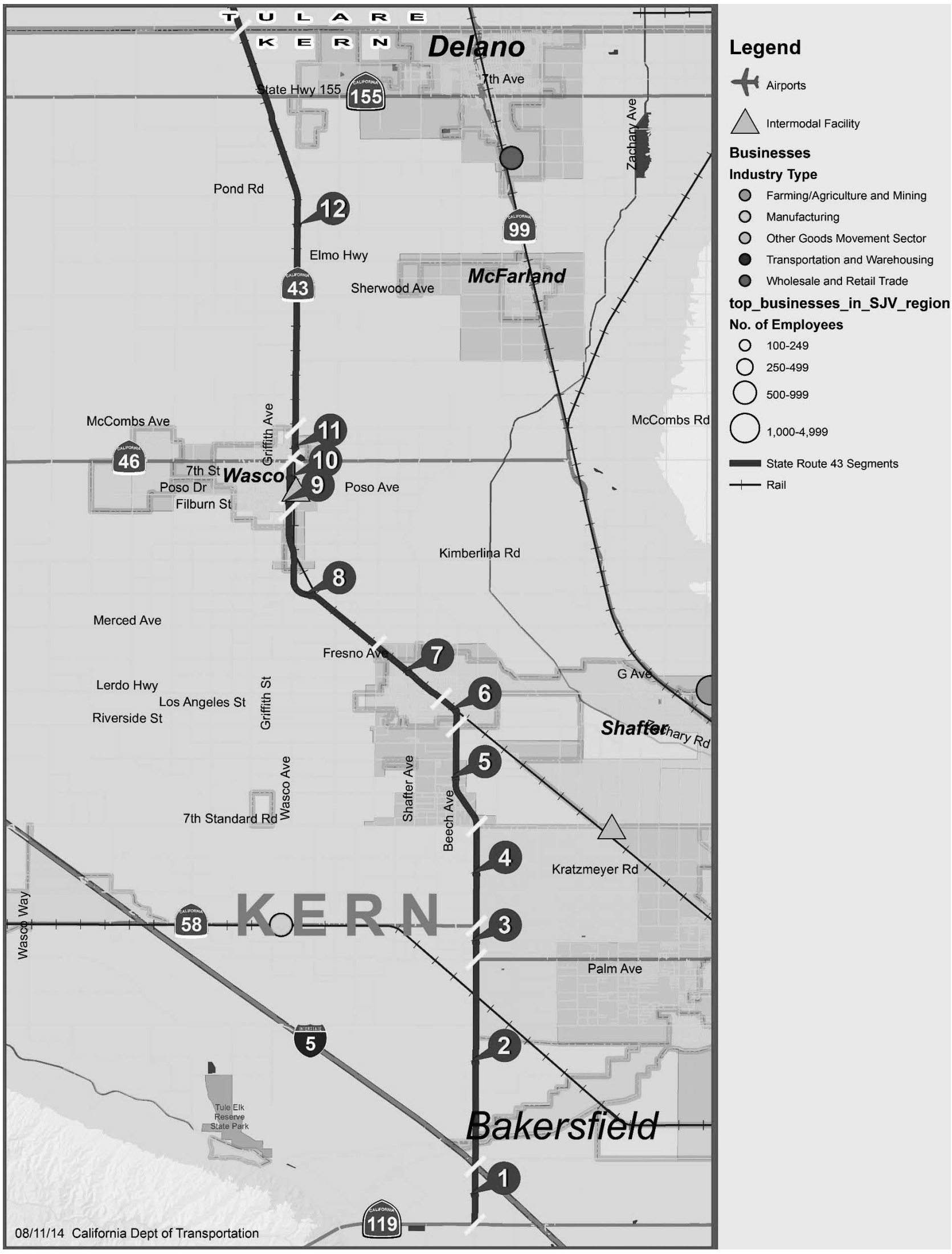
The City of Wasco has two industrial development areas. Both are located on the eastern edge of town. They are also seeking larger industries and perhaps to develop rail access to some areas. Wasco currently has SunnyGem, an almond processor and packing facility, and Sandrini Farms packing facility that require truck service. Also, the Savage Coal facility, which is a coal terminal and transloading facility, and Bethlehem Construction, which produces concrete casts for large structures, require access to freight services. A hydrogen energy plant is proposed in southwestern Kern County that would utilize the coal from the Savage Coal facility. If this plant is approved and is developed it would generate more freight traffic on SR 43 hauling the coal to the plant.

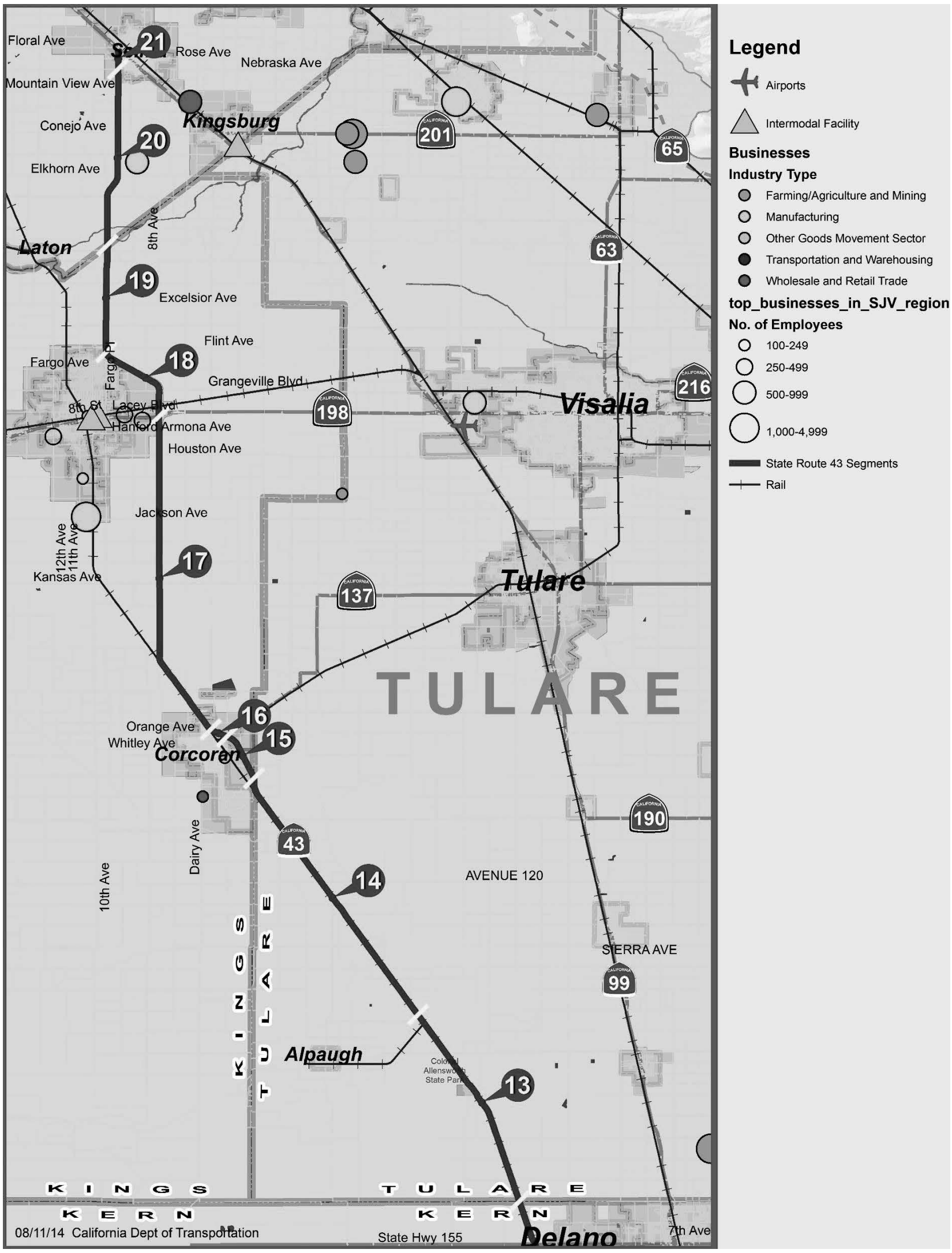
In Kings County, various livestock feed companies, other agricultural businesses, packing houses, and food processing plants also rely on the route and its close proximity to railroads.

Improving the movement of goods in California is a high priority. The State's economy and quality of life depend upon the efficient, safe delivery of goods to and from our ports and borders. It is important to ensure a dependable level of service for movement into and through major gateways and to ensure connectivity to key intermodal transfer facilities, seaports, air cargo terminals, and freight distribution centers. Improving goods movement infrastructure is also pivotal to relieve congestion on freeways and increase mobility for everyone in California.

Caltrans has the responsibility for developing, maintaining, and operating a multi-modal transportation network. This network must function at a high-level with respect to goods movement, interregional, interstate, and cross-border travel. In addition to continuing support for the regional Blueprint Planning programs, Caltrans has developed a statewide interregional, multi-modal blueprint known as the *California Interregional Blueprint (CIB).* It is being incorporated into the California Transportation Plan (CTP) 2040 update, scheduled for completion in December 2015. The CIB analyzes the benefits of multi-modal, interregional projects on the transportation system, and helps to expand understanding of the interactions between land use and transportation investments in meeting critical strategic growth and sustainability goals. The benefit of this effort will be stronger partnerships with regional and local agencies and tribal governments, as well as better data for improved decision making at the State, regional, and local level. The CIB establishes a basis for integrating the interregional system into the Smart Mobility Framework, and delivers support for economic stewardship, connectivity, and reliability valued by freight shippers and carriers. The Inter-regional Blueprint synthesizes the Blueprint Planning work by regional agencies while focusing on the interregional system that is Caltrans' responsibility.

FREIGHT				
Facility Type/Freight Generator	**Location**	**Mode**	**Name**	**Major Commodity/ Industry**
Manufacturing company	East of SR 43, on SR 58	Truck/Rail	Frito-Lay	Food
Truck companies	Shafter area	Truck	Atlas Crane & Rigging Inc., Cummings Transportation, Doby Hagar Trucking Inc., GF Trucking, Lone Star Trucking LLC, RTS, Weststar	General, contaminated soil, oilfield equipment, building materials, crane booms, machinery, dry bulk, chemicals, fresh produce, intermodal, livestock feed, paper products, construction, metal sheet, refrigerated food, liquids and gases, agricultural farm supplies, water well
Intermodal facility	East of Shafter, on BNSF tracks north of Seventh Std Rd	Truck/Rail	Paramount Logistics Park	Warehousing, manufacturing, agriculture, wholesale and retail
Farming and agriculture, wholesale and retail, warehouses	East of SR 43, on the west side of SR 99	Truck	Minter Field Industrial Center	Various
Intermodal facility	West of SR 43, in Wasco	Truck/Rail	Savage Industries	Coal
Farming and agriculture, manufacturing	Wasco	Truck	Sunny Gem, Bethlehem Construction	Various
Farming and agriculture	South of Garces Hwy	Truck	Sandrini Farms	Agriculture
Truck companies	Corcoran area	Truck	Coyote Ag Service Inc., Morris Proctor Inc.	General, dry bulk, livestock feed, livestock, cotton, lumber
Wholesale and retail, manufacturing	West of SR 43 in Corcoran	Truck	J G Boswell Companies	Cotton, wholesale
Intermodal facilities	West of SR 43, in Hanford	Truck/Rail	Lacey Milling Co, George Verhoeven Feed Co	Grains, livestock feed
Manufacturing, wholesale and retail, farming and agriculture	West of SR 43 in Hanford area	Truck	Con Agra Foods, Central Valley Meat Co, Del Monte, Exopack, Nichols Farms, The Sentinel, Wal-Mart, Warmerdam Packing	Meat, food broker, canned food, plastics, newspaper, retail, fruit and vegetable packing
Truck companies	Hanford area	Truck	Ag-West Logistics Inc., E&B Bulk Transportation Inc., Hanford Commodities Inc., Dias Brothers Trucking, Triple C Trucking Inc., Valley Star Transportation Inc.	Fresh produce, machinery, general, agricultural farm supplies, dry bulk, construction, livestock feed, building materials, meat, livestock
Truck companies	Selma area	Truck	Best Freight LLC, BMGT Enterprises Inc., Henry Boyajian Inc., Harris Ranch Beef Co., Highland Transport LLC, L&K Express	Fresh produce, beverages, general, meat, refrigerated food, intermodal, machinery
Manufacturing	South of Selma	Truck	Harris Ranch Beef Co	Meat and agricultural products
Intermodal facility	North of the SR 43/SR 99 Jct	Truck/Rail	Van-G Logistics	Various


TULARE
KERN
Delano
7th Ave
State Hwy 155
155
Zachary Ave
Pond Rd
12
99
Elmo Hwy
43
McFarland
Sherwood Ave
McCombs Ave
McCombs Rd
46
11
10
9
7th St
Wasco
Poso Dr
Filburn St
Poso Ave
Griffith Ave
Kimberlina Rd
8
Merced Ave
Fresno Ave
7
6
G Ave
Lerdo Hwy
Los Angeles St
Riverside St
Griffith St
Shafter
Zachary Rd
5
Shafter Ave
Beech Ave
Wasco Ave
7th Standard Rd
4
Kratzmeyer Rd
Wasco Way
58
KERN
3
Palm Ave
5
2
Tule Elk
Reserve
State Park
Bakersfield
1
119
08/11/14 California Dept of Transportation
Legend
Airports
Intermodal Facility
Businesses
Industry Type
Farming/Agriculture and Mining
Manufacturing
Other Goods Movement Sector
Transportation and Warehousing
Wholesale and Retail Trade
top_businesses_in_SJV_region
No. of Employees
100-249
250-499
500-999
1,000-4,999
State Route 43 Segments
Rail


Legend
Airports
Intermodal Facility
Businesses
Industry Type
Farming/Agriculture and Mining
Manufacturing
Other Goods Movement Sector
Transportation and Warehousing
Wholesale and Retail Trade
top_businesses_in_SJV_region
No. of Employees
100-249
250-499
500-999
1,000-4,999
State Route 43 Segments
Rail
Floral Ave
Rose Ave
Nebraska Ave
Mountain View Ave
Conejo Ave
Elkhorn Ave
Kingsburg
Laton
8th Ave
Excelsior Ave
Flint Ave
Fargo Ave
Fargo St
Grangeville Blvd
8th St
Lacey Blvd
Hanford Armona Ave
Houston Ave
Jackson Ave
12th Ave
11th Ave
Kansas Ave
Visalia
Tulare
TULARE
Orange Ave
Whitley Ave
Corcoran
Dairy Ave
10th Ave
AVENUE 120
SIERRA AVE
Alpaugh
Colonel Allensworth State Park
KINGS
KERN
TULARE
KERN
State Hwy 155
Delano
7th Ave
08/11/14 California Dept of Transportation
21
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17
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14
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201
65
63
198
216
137
190
43
99

ENVIRONMENTAL CONSIDERATIONS

In northern Kern County a little over 13 miles west of the route, is the Kern National Wildlife Refuge. This area was once part of the Tulare Lake region. It once harbored large mammals, like grizzlies, mountain lions, elk, and antelope. Unfortunately, these majestic creatures are extinct from the area. It is still a wetland with marshes and riparian habitat for migrating and wintering birds. The refuge was established in 1960 and covers over 11,000 acres. It has a visitor center and headquarters located at Garces Highway and Corcoran Road. There is also a six-mile drivable tour. Today, wildlife viewers can enjoy egrets, falcons, shorebirds, a wide variety of waterfowl, and various songbirds. Some of the critical birds and mammals that are found here include: Swainson's hawk, snowy plover, burrowing owl, tri-colored blackbird, Buena Vista Lake shrew, horned lark, badger, San Joaquin kit fox, Tipton kangaroo rat, San Joaquin pocket mouse, and the hoary bat. The refuge does allow hunting seasonally.

In Tulare County is the Pixley National Wildlife Refuge. The refuge is just to the east of the route off of Avenue 56/Sierra Avenue. Like the Kern National Wildlife Refuge, it also was part of the Tulare Lake region. It was established in 1959 and encompasses over 6,000 acres. The refuge has a one-and-a-half-mile walking trail to view the habitat. The refuge is most noted for its wintering Sandhill Cranes, which arrive in September and leave by the end of March. Many waterfowl, shore and wading birds, hawks, and songbirds may be found on the refuge at various seasons. Some of the critical fauna that may be found here include: horned lark, burrowing owl, badger, western spadefoot, blunt-nosed lizard, Buena Vista Lake shrew, hoary bat, San Joaquin kit fox, San Joaquin pocket mouse, Tipton kangaroo rat, mountain plover, Swainson's hawk, snowy plover, and the tri-colored blackbird. The refuge has banned all hunting.

The chart on Page 47 shows the critical species and habitats by segment. Some of the species are not listed with a special status, i.e. endangered or threatened, federally or by the state. Regardless, they are all crucial and are impacted.

ENVIRONMENTAL CRITICAL SPECIES AND HABITAT			
Segment	**Flora**	**Fauna**	**Habitat**
1	Slough thistle, oil neststraw, heartscale, Lost Hills crownscale, Horn's milk-vetch, Kern mallow*, Tejon poppy, Hoover's eriastrum, recurved larkspur, San Joaquin woolythreads*, California jewlflower*, alkali mariposa lily	Swainson's hawk*, mountain plover, burrowing owl, Le Conte's thrasher, tricolored blackbird, Buena Vista Lake ornate shrew*, Nelson's antelope squirrel*, San Joaquin pocket mouse, giant kangaroo rat*, Tipton kangaroo rat*, short-nosed kangaroo rat, San Joaquin kit fox*, American badger, western pond turtle, blunt-nosed leopard lizard*, San Joaquin whipsnake, giant garter snake*, western spadefoot, white-tailed kite, California horned lark, Tulare grasshopper mouse, silvery legless lizard, coast horned lizard	Valley Sink Scrub, Valley Saltbrush Scrub, Great Valley Mesquite Scrub, Great Valley Cottonwood Riparian Forest
2	Slough thistle, oil neststraw, heartscale, Lost Hills crownscale, Horn's milk-vetch, Kern mallow*, Tejon poppy, Hoover's eriastrum, recurved larkspur, San Joaquin woolythreads*, California jewelflower*, alkali mariposa lily	Swainson's hawk*, mountain plover, burrowing owl, Le Conte's thrasher, tricolored blackbird, Buena Vista Lake ornate shrew*, Nelson's antelope squirrel*, San Joaquin pocket mouse, giant kangaroo rat*, Tipton kangaroo rat*, short-nosed kangaroo rat, San Joaquin kit fox*, American badger, western pond turtle, blunt-nosed leopard lizard*, San Joaquin whipsnake, giant garter snake*, western spadefoot, white-tailed kite, California horned lark, Tulare grasshopper mouse, silvery legless lizard, coast horned lizard	Valley Sink Scrub, Valley Saltbrush Scrub, Great Valley Mesquite Scrub, Great Valley Cottonwood Riparian Forest
3	Hoover's eriastrum	Burrowing owl, San Joaquin pocket mouse, Tipton kangaroo rat*, San Joaquin kit fox*, blunt-nosed leopard lizard*, coast horned lizard	Valley Saltbush Scrub
4	Hoover's eriastrum	Burrowing owl, San Joaquin pocket mouse, Tipton kangaroo rat*, San Joaquin kit fox*, blunt-nosed leopard lizard*, coast horned lizard	Valley Saltbush Scrub
5	Hoover's eriastrum	Burrowing owl, San Joaquin pocket mouse, Tipton kangaroo rat*, San Joaquin kit fox*, blunt-nosed leopard lizard*, coast horned lizard	Valley Saltbush Scrub
6	Hoover's eriastrum	Burrowing owl, San Joaquin pocket mouse, Tipton kangaroo rat*, San Joaquin kit fox*, blunt-nosed leopard lizard*, coast horned lizard	Valley Saltbush Scrub
7	California jewelflower*, recurved larkspur	Swainson's hawk*	None
8	California jewelflower*, recurved larkspur	Swainson's hawk*	None
9	California jewelflower*, recurved larkspur	Swainson's hawk*	None
10	California jewelflower*, recurved larkspur	Swainson's hawk*	None
11	California jewelflower*, recurved larkspur	Swainson's hawk*	None
12	Munz's tidy-tips, California jewelflower*, Earlimart orache, recurved larkspur, alkali mariposa lily	Burrowing owl, Tipton kangaroo rat*, San Joaquin kit fox*, blunt-nosed leopard lizard*, coast horned lizard, western spadefoot, San Joaquin pocket mouse, Tipton kangaroo rat*, Dulzura pocket mouse, American badger, San Joaquin whipsnake, Hopping's blister beetle, molestan blister beetle	Valley Saltbush Scrub, Valley Sink Scrub
13	California jewelflower*, Earlimart orache, recurved larkspur, alkali mariposa lily, brittlescale, Coulter's goldfields	Western spadefoot, burrowing owl, San Joaquin pocket mouse, Tipton kangaroo rat*, Dulzura pocket mouse, San Joaquin kit fox*, American badger, blunt-nosed leopard lizard*, coast horned lizard, San Joaquin whipsnake, Hopping's blister beetle, molestan blister beetle, Nelson's antelope squirrel*, Swainson's hawk*, western snowy plover*, mountain plover, tricolored blackbird, vernal pool fairy shrimp*	Valley Sink Scrub, Valley Saltbush Scrub, Valley Sacaton Grassland, Northern Claypan Vernal Pool
14	Coulter's goldfields, Earlimart orache	Swainson's hawk*, western snowy plover*, mountain plover, burrowing owl, tricolored blackbird, San Joaquin pocket mouse, Tipton kangaroo rat*, San Joaquin kit fox*, blunt-nosed leopard lizard*, vernal pool fairy shrimp*, hoary bat	Valley Sacaton Grassland, Northern Claypan Vernal Pool
15	Subtle orache, Earlimart orache, recurved larkspur	Swainson's hawk*, burrowing owl, tricolored blackbird, hoary bat, San Joaquin kit fox*, blunt-nosed leopard lizard*, vernal pool fairy shrimp*	None
16	Subtle orache, Earlimart orache, recurved larkspur	Swainson's hawk*, burrowing owl, San Joaquin kit fox*, blunt-nosed leopard lizard*, vernal pool fairy shrimp*	None
17	Subtle orache, Earlimart orache, recurved larkspur	Swainson's hawk*, burrowing owl, San Joaquin kit fox*, blunt-nosed leopard lizard*, vernal pool fairy shrimp*	Valley Sacaton Grassland
18	None	Swainson's hawk*, San Joaquin kit fox*, hoary bat	Valley Sacaton Grassland
19	Brittlescale	Hoary bat, San Joaquin kit fox*	None
20	Brittlescale	San Joaquin kit fox*, Swainson's hawk*	None
21	None	Swainson's hawk*	None

* Species has a special federal and/or state status

There are a few properties within close proximity to the route that are listed on the National Register of Historic Places. The chart below shows the various properties and in what segment they exist.

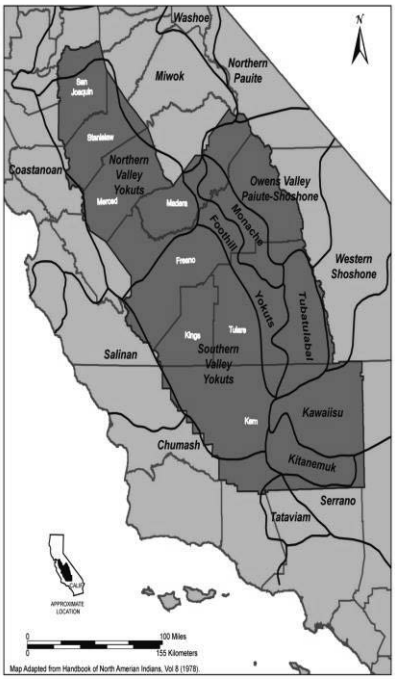
NATIONAL REGISTER OF HISTORIC PLACES			
Segment	**Name**	**Location**	**Description/Significance**
1	None	NA	NA
2	None	NA	NA
3	None	NA	NA
4	None	NA	NA
5	None	NA	NA
6	None	NA	NA
7	None	NA	NA
8	Green Hotel/Hitchcock Hotel/Shafter Hotel	James St and Central Ave block west of SR 43	Built 1913 Listed 1989 Shafter's first commercial building, Bungalow architectural style, now has "open house" visitations and antique collections
9	Santa Fe Passenger and Freight Depot – Shafter	On SR 43 between Shafter Ave and Poso Ave	Built 1917 Listed 1982 Station closed in 1978, is now Shafter's Historical Society's museum
10	None	NA	NA
11	None	NA	NA
12	None	NA	NA
13	Allensworth Historic District	Allensworth along SR 43	Built 1908 Listed 1972 Colonel Allen Allensworth founded the town to be financed and governed by African-Americans. Allensworth was a former slave and his leadership helped to empower many African-Americans. The site is now a state historic park.
14	None	NA	NA
15	None	NA	NA
16	None	NA	NA
17	None	NA	NA
18	None	NA	NA
19	None	NA	NA
20	None	NA	NA
21	None	NA	NA

The chart on the next page lists possible contamination sites and the contaminants. This is only a partial list of ongoing clean-up of sites. Locations continue to be monitored by the State Water Resources Board so that

contaminants remain below authorized levels. Some of the locations have long been in existence and have contamination histories decades back, prior to more stringent laws and regulations.

POSSIBLE CONTAMINATION SITES			
Segment	**Name**	**Location**	**Contaminants**
1	None	NA	NA
2	Uhler Fire Fighting Facility	In Kern County, east of SR 43 on Munzer Rd	Arsenic, chromium, crude oil, lead, PCE, TCE
3	None	NA	NA
4	None	NA	NA
5	None	NA	NA
6	Brown and Bryant	In Shafter, south of Lerdo Hwy, just east of SR 43	PHC
7	None	NA	NA
8	None	NA	NA
9	None	NA	NA
10	None	NA	NA
11	None	NA	NA
12	None	NA	NA
13	None	NA	NA
14	None	NA	NA
15	None	NA	NA
16	Hang 'em High	In Corcoran, west of SR 43, north of Patterson Ave	Glaze ceramics
17	Corcoran Landfill	Near Nevada Ave, east of SR 43	VOC
	Puregro Company	At Nevada Ave	PHC, PET
	Hanford Landfill	East of SR 43, south of Hanford-Armona Rd	VOC
	Baker Commodities	East of SR 43, on Hanford-Armona Rd	NA
18	None	NA	NA
19	None	NA	NA
20	None	NA	NA
21	None	NA	NA

NATIVE AMERICAN CONSIDERATIONS



Map of Ethnographic Territories in Eight County Study Area

Many California roads and highways originated along Tribal hunting and trading routes. The study, "*California Central Valley Tribal Transportation Environmental Justice Collaborative Project*" identified a number of Tribes that consider the Central Valley as their ancestral land. This study was funded by a Caltrans Environmental Justice grant and was prepared for the Kern County Council of Governments (KCOG) and the Tubatulabals of Kern Valley Tribe on behalf of the eight San Joaquin Valley Metropolitan Planning Organizations (MPOs). These consist of the San Joaquin Council of Governments (SJCOG), Stanislaus Council of Governments (StanCOG), Merced County Association of Governments (MCAG), Madera County Transportation Commission (MCTC), Fresno Council of Governments (FCOG), Kings County Association of Governments (KCAG), KCOG, and the Tulare County Association of Governments (TCAG), in coordination with the tribal governments and communities of the region. The final report is available at: http://www.kerncog. org/attachments/265_SJVTribalEJSummary.pdf.

According to the *"Map of Ethnographic Territories in Eight County Study Area*" from the "*California Central Valley Tribal Transportation Environmental Justice Collaborative Project"* report, SR 43 passes through areas considered to be the traditional indigenous territories of the Southern Valley Yokuts. Please note that many of the ethnographic territories overlap.

Caltrans consults and coordinates with Tribal Governments and Communities in developing the TCR. The Tribal Governments and Communities are listed under "Tribes" in the chart on page 19.

CORRIDOR PERFORMANCE

Most of the route operates at LOS "B" and "C" with a few segments operating at LOS "D". Segments 2 and 6 in Kern County, segments 18 and 19 in Kings County, and segment 20 in Fresno County currently operate at LOS "D". By the horizon year of 2035, more segments fall to LOS "D" and even "E" without improvements. Traffic volumes tend to be heavier in Kern, Kings, and Fresno Counties. The Tulare County segments tend to have better LOS than the other counties' segments.

CORRIDOR PERFORMANCE

CORRIDOR PERFORMANCE																					
Segment #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
Basic System Operations																					
AADT (BY)	7,100	9,500	7,810	6,300	4,600	11,400	12,800	10,800	10,200	7,000	3,900	3,000	3,000	6,100	4,400	7,500	6,000	13,400	12,200	11,600	14,000
AADT (HY)	12,400	16,100	12,600	11,300	8,500	18,400	21,000	16,400	16,000	11,500	7,500	5,500	4,700	9,600	6,900	10,800	9,700	18,900	16,800	17,000	21,200
Truck Traffic																					
Total Average Annual Daily Truck Traffic (AADTT) (BY)	1,361	1,469	1,370	1,127	990	854	962	944	708	708	474	474	716	1,080	935	790	1,103	2,286	1,839	2,440	2,219
Total Trucks (% of AADT) (BY)	20.62	20.58	25.13	22.09	20.41	11.67	9.50	10.50	12.00	12.00	13.35	13.35	22.32	20	20	20	20	20.06	18.77	20	14
5+ Axle Average Annual Daily Truck Traffic (AADTT)(BY)	299	480	442	363	319	232	245	232	163	163	244	244	364	508	440	371	504	904	456	1,415	1,221
5+ Axle Trucks (as % of AADT)(BY)	21	22	25	25	16	10	10	9	12	12	13	13	22	22	20	20	22	18	10	8	8

Note: Table above contains only the applicable and required data for a TCR, if it does not have PeMS detection, based on the Caltrans, HQ TCR guidelines 2012.

KEY CORRIDOR ISSUES

State Route 43 is evolving from primarily a rural route to a more urbanized route with increased development occurring in the cities served by the route. This is especially true in the Hanford area. At the southwest quadrant of SR 43 and Lacey Boulevard, there is a large commercial development going in. This development covers 58 acres with nearly 500,000 square feet of building area. It is to be developed in four phases covering a ten year period. As mitigation for this project, a roundabout is proposed on SR 43 between Lacey Boulevard and the railroad crossing north of the project. Please see Appendix D: Correspondence.

A priority of the local agencies along the route is to increase the availability of funds for improvements to SR 43. Including SR 43 to the IRRS has been tried and supported, to no avail. The State Legislature would have to approve expanding the IRRS to include SR 43, which would make the route eligible for ITIP funds.

The high speed train's (HST) alignment has not been finalized in this corridor. However, there is no doubt it will impact the SR 43 corridor, as the proposed alignments generally follow the BNSF railroad tracks. As of April 2014, some bypasses were identified, those bypassing Allensworth, Corcoran, and Hanford. Of primary concern is right-of-way, especially for grade separations.

HIGH SPEED-TRAIN'S IMPACTS TO STATE ROUTE 43			
Segment	**County**	**Location**	**Description**
14	Tulare	At Road 88	Construct overcrossing and realign Road 88 for connection to SR 43; intersection improvements
14	Tulare	North of Road 88	Radio site and utility station with duct bank corridor below SR 43
14	Tulare	At Avenue 112	Construct overcrossing and realign Avenue 112 for connection to SR 43; intersection improvements
14	Tulare	At Hesse Avenue	Construct overcrossing and realign Hesse Avenue for connection to SR 43; intersection improvements
14	Tulare	At Avenue 128	Construct overcrossing and realign Avenue 128 for connection to SR 43; intersection improvements
14	Tulare	South of Poplar Avenue, north of the Tule River	Construct HSR crossing going over SR 43 at a skew angle. Straddle bents proposed within R/W and in median for long distance. HSR crossing BNSF at skew angle with straddle bents as well
15	Kings	At Oregon Road	Construct HSR system access road connection to SR 43
15	Kings	At SR 137/Whitley Avenue	Reconstruct intersection with lower east leg of SR 137/Whitley Avenue to accommodate Oregon Road location to work
16	Kings	At Corcoran Highway/Orange Avenue	Reconstruct intersection and realign Corcoran Highway/Orange Avenue
17	Kings	At Nevada Avenue	Construct overcrossing and realign Nevada Avenue for connection to SR 43 and realign canal; intersection improvements
17	Kings	South of Lansing Avenue	Construct HSR crossing going over SR 43 at skew angle. Straddle bents proposed within R/W and in median. Realign ditch and existing driveway
17	Kings	South of Lansing Avenue	Construct HSR system access road connection to SR 43
17	Kings	South of Jersey Avenue, north of Kent Avenue	Construct HSR crossing going over SR 43 and depress or lower SR 43 profile. Straddle bents proposed within R/W and in median. Also requires new basin and pump station
18	Kings	At SR 198, between 7th Avenue and SR 43 I/C	Construct HSR crossing going above Lacey Boulevard, SR 198, and 7th Avenue. Straddle bents proposed within R/W only
20	Fresno	North of Cole Slough	Construct HSR system access road connection to SR 43
20	Fresno	North of Cole Slough	Construct HSR crossing (steel truss) over SR 43
20	Fresno	North of Cole Slough	Construct HSR system access road connection to SR 43

Caltrans is looking into roundabouts at intersections over signals. Caltrans utilizes the intersection control evaluation (ICE) process to assess proposed improvements to intersections on State highways. This requires the evaluation of a roundabout improvement, in addition to signals, and other intersection improvements. Signals have a higher cost and require more maintenance than typical roundabouts. Roundabouts tend to eliminate head-on and broadside collisions.

Also, some interchanges may reach capacity in the years to come, and right-of-way is difficult to come by as some these areas are built out. In particular, the Floral Avenue Interchange in Selma has some concerns. It is predicted that it will need to increase capacity in future years, but the area is built out and additional right-of-way is not available. This is a major interchange as it connects SR 99 to SR 43. The City of Selma has considered a new interchange at Dinuba Avenue and realignment of SR 43 to the west. This proposal has not received Caltrans approval and requires additional studies.

CORRIDOR CONCEPT

CONCEPT RATIONALE

The route meets the 2035 concept in segments 7 through 9 and 21. The majority of the route will require widening or improvements to meet the 2035 concept. Segments 1 through 2 and segments 10 through 17 require improvements, such as: signals or roundabouts, turn lanes, and passing lanes, to meet the 2035 concept. Widening to four lanes is required in segments 3 through 6 and 18 through 20 to meet the 2035 concept. In segments 18 and 19, a four-lane expressway is needed to meet the 2035 concept. These improvements are needed due to increased traffic in these areas.

PLANNED AND PROGRAMMED PROJECTS AND STRATEGIES

PLANNED AND PROGRAMMED PROJECTS				
Segment	**Description**	**Planned or Programmed**	**Location**	**Source**
1	Intersection improvements	Programmed	At SR 119	Caltrans District 6 Status of Projects
1 – 3	AC overlay (CAPM) and digouts	Planned	From just south of SR 119 to SR 58 W	Caltrans District 6 Status of Projects
5 – 6	Widen to four lanes	Planned (Unconstrained)	In Shafter, from 7th Std Rd to Euclid Ave	2014 Kern COG RTP
6 & 10	High speed rail heavy maintenance facility	Planned (Constrained)	In Shafter and Wasco	2014 Kern COG RTP
6 – 10	ADA curb ramps	Programmed	In Shafter and Wasco	Caltrans District 6 Status of Projects
15	AC overlay and widen shoulders	Planned	From the Tulare County line to SR 137	2014 KCAG RTP
15	Construct roundabout	Programmed	On SR 43 and SR 137 and Whitley Ave	Caltrans District 6 Status of Projects/2014 KCAG RTP
15 – 17	Widen to 4E	Planned (unconstrained) 2021 - 2035	From the Tulare County line to Houston Ave	2014 KCAG RTP
16	Relocate intersection	Planned	In Corcoran, at 5 ½ Ave	2011 KCAG RTP*
17 – 18	Modify existing interchange	Planned (unconstrained)	In Hanford, at SR 198	2014 KCAG RTP
17 – 18	Widen to 4E	Planned (unconstrained) 2021 - 2035	From Houston Ave to 10th Ave	2014 KCAG RTP
18 – 19	Interchange modifications	Planned	In Hanford, from SR 198 to Flint Ave	2014 KCAG RTP
19	Widen to 4E	Planned (unconstrained) 2021 - 2035	From 10th Ave to the Fresno County line	2014 KCAG RTP
20	AC overlay	Planned	From the Kings County line to Nebraska Ave	2014 FCOG RTP
20 – 21	2C to 4C	Partially programmed	From the Kings County line/Fresno County to SR 99	Caltrans District 6 Status of Projects
21	Replace bridge structures and widen Floral Ave	Planned	At SR 99 and SR 43/Floral Ave Interchange	2014 FCOG RTP
21	Construct a new interchange and highway to provide a connection between SR 43 and SR 99	Planned	SR 99 and SR 43	2014 FCOG RTP
21	Transit stop with bus shelter, landscaping	Planned	SR 43 and Rose Ave	2014 FCOG RTP
21	Construct traffic signal and associated improvements	Planned	In Selma, at the SR 43 and Rose Ave	2014 FCOG RTP

* Left on this list per request of Terri King, Executive Director, KCAG

PROJECTS AND STRATEGIES TO ACHIEVE CONCEPT

PROJECTS AND STRATEGIES TO ACHIEVE CONCEPT			
Segment	**Description**	**Location**	**Source**
1	Intersection improvements	At SR 119	Caltrans District 6 Status of Projects
2	None	NA	NA
3	None	NA	NA
4	None	NA	NA
5	Widen to four lanes	In Shafter, from 7th Std Rd to Euclid Ave	2014 Kern COG RTP
6	Widen to four lanes	In Shafter, from 7th Std Rd to Euclid Ave	2014 Kern COG RTP
7	Already meets Concept	NA	NA
8	Already meets Concept	NA	NA
9	Already meets Concept	NA	NA
10	None	NA	NA
11	None	NA	NA
12	None	NA	NA
13	None	NA	NA
14	None	NA	NA
15	Widen to 4E (UTC)	From the Tulare County line to Houston Ave	2014 KCAG RTP
16	Widen to 4E (UTC)	From the Tulare County line to Houston Ave	2014 KCAG RTP
	Relocate intersection	In Corcoran, at Ave 5 ½	2014 KCAG RTP
17	Widen to 4E (UTC)	From the Tulare County line to Houston Ave	2014 KCAG RTP
	Modify existing interchange	At SR 198	2014 KCAG RTP
	Widen to 4E (UTC)	From Houston Ave to 10th Ave	2014 KCAG RTP
18	Modify existing interchange	At SR 198	2014 KCAG RTP
	Widen to 4E	From Houston Ave to 10th Ave	2014 KCAG RTP
	Interchange modifications	In Hanford, from SR 198 to Flint Ave	2014 KCAG RTP
19	Widen to 4E	From 10th Ave to the Fresno County line	2014 KCAG RTP
20	2C to 4C	From the Kings County line to SR 99	Caltrans District 6 Status of Projects
21	2C to 4C	From the Kings County line to SR 99	Caltrans District 6 Status of Projects

LONG TERM RIGHT-OF-WAY NEEDS:

The amount of right-of-way identified in this summary chart is based on the typical amount needed for this type of facility and is only meant to serve as a guideline. The TCR identifies the future right-of-way needs as a range of width with the intent to accommodate site-specific variations. These include site conditions (slope, utilities, etc.), operational needs, and potential design features that may require additional right-of-way. These design features include, but are not limited to, roundabouts, turn-lanes, on-street parking, bike lanes, and passing lanes. Additional right-of-way may also be needed on the facility to mitigate potential air quality impacts. Exact right-of-way needs will be determined on a case-by-case basis.

Please note: The number of lanes needed to meet the UTC for this route is only a guideline. The minimum ROW is "subject to change" in urban and suburban areas where a route also serves local circulation needs. The need to widen the roadway beyond the UTC may be necessary to maintain the target LOS. The local jurisdictions should endeavor to maintain adequate ROW to maintain the target LOS, which in an urban setting could exceed the UTC number of lanes. Where the State legislature has designated the Route as part of the Freeway and Expressway System, interchange and freeway right-of-way should be part of the General Plan so as not to adversely affect development.

The UTC may not be achievable in some areas due to existing development. In urban areas, it is also possible that the UTC may not reflect the local jurisdiction's vision for community, and that they may not want the highway to be widened. Maintaining the Route as it currently exists would necessitate the local jurisdiction accepting a lower level of service. Caltrans will work with our local partners to develop context sensitive solutions for those sections of the Route that serve local communities.

APPENDICES

APPENDIX A

GLOSSARY OF ACRONYMS AND TERMS

Acronyms

AADT - Annual Average Daily Traffic
ADA – Americans with Disabilities Act of 1990
ADT - Average Daily Traffic
BRT - Bus rapid transit
CALTRANS – California Department of Transportation
CAPM - Capital Preventative Maintenance
CCTV - Closed Circuit Television Cameras
CEQA - California Environmental Quality Act
CMA - Congestion Management Agencies
CMAQ - Congestion Mitigation and Air Quality
CMIA - Corridor Mobility Improvement Account
CMS - Changeable Message Sign
COG - Council of Governments
CSMP - Corridor System Management Plan
CSS – Context Sensitive Solutions
CT - Caltrans
CTC - California Transportation Commission
FHWA – Federal highway Administration
FSR – Feasibility Study Report
FSTIP - Federal Statewide Transportation Improvement Program
FTIP – Federal Transportation Improvement Program
GHG - Green House Gas
GIS – Geographic Information System
HAR - Highway Advisory Radio
HCP - Habitat Conservation Plan
HOT - High occupancy toll lane
HOV - High occupancy vehicle lane
IIP – Interregional Improvement Plan
IGR - Intergovernmental Review
IRRS - Interregional Road System
ITIP - Interregional Transportation Improvement Program
ITMS - Intermodal Transportation Management System
ITS – Intelligent Transportation System
ITSP - Interregional Transportation Strategic Plan
LOS – Level of Service
MOU - Memorandum of Understanding
MPO - Metropolitan Planning Organizations
MTC - Metropolitan Transportation Commission
MTCE - Maintenance (State program)
NA - Not available/Not applicable
NH - National Highway System

NOA – Naturally Occurring Asbestos
NCCP - Natural Community Conservation Plan
NEPA - National Environmental Policy Act
OC - Overcrossing
OH – Overhead
PCE – Perchloroethylene
PET – Polyethylene terephthalate
PHC – Petroleum hydrocarbons
PID - Project Initiation Document
PM - Post mile
PSR - Project Study Report
PSSR - Project Scope Summary Report
RCR - Route Concept Report
RHNA - Regional Housing Needs Allocation
RIP - Regional Improvement Program
ROW or R/W - Right-of-Way
RPU - Remote Processing Unit – was known as RWIS (Remote Weather Information Station)
RTIP – Regional Transportation Improvement Program
RTP - Regional Transportation Plan
RTPA - Regional Transportation Planning Agencies
SAFETEA - Safe, Accountable, Flexible and Efficient Transportation Equity Act of 2005
SCS - Sustainable Community Strategies
SHOPP - State Highway Operation Protection Program
SJVUAPCD - San Joaquin Valley Air Pollution Control District
SR – State Route
STAA – Surface Transportation Assistance Act of 1982
STIP – State Transportation Improvement Program
TASAs - Traffic Accident Surveillance and Analysis System
TCE - Trichloroethylene
TCM - Transportation Control Measure
TCR - Transportation Concept Report
TCS - Traffic Count Station
TDM – Transportation Demand Management
TEA-21 - Transportation Equity Act for the 21st Century
TMC - Transportation Management Center
TMS – Transportation Management System
TSN - Transportation System Network
UC - Undercrossing
UTC - Ultimate Transportation Concept
VDS - Vehicle Detection System
VHT - Vehicle Hours Traveled
VMT – Vehicle Miles Traveled
VOC – Volatile Organic Compound

Definitions

AADT – Annual Average Daily Traffic is the total volume for the year divided by 365 days. The traffic count year is from October 1st through September 30th. Traffic counting is generally performed by electronic counting instruments moved from location throughout the state in a program of continuous traffic count sampling. The resulting counts are adjusted to an estimate of annual average daily traffic by compensating for seasonal

influence, weekly variation and other variables which may be present. Annual ADT is necessary for presenting a statewide picture of traffic flow, evaluating traffic trends, computing accident rates, planning and designing highways and other purposes.

Base year – The year that the most current data is available to the Districts

Bikeway Class I (Bike Path) – Provides a completely separated right of way for the exclusive use of bicycles and pedestrians with cross flow by motorists minimized.

Bikeway Class II (Bike Lane) – Provides a striped lane for one-way bike travel on a street or highway.

Bikeway Class III (Bike Route) – Provides for shared use with pedestrian or motor vehicle traffic.

Bottleneck – A bottleneck is a location where traffic demand exceeds the effective carrying capacity of the roadway. In most cases, the cause of a bottleneck relates to a sudden reduction in capacity, such as a lane drop, merging and weaving, driver distractions, a surge in demand, or a combination of factors.

Capacity – The maximum sustainable hourly flow rate at which persons or vehicles reasonably can be expected to traverse a point or a uniform section of a lane or roadway during a given time period under prevailing roadway, environmental, traffic, and control conditions.

Capital Facility Concept – The 20-25 year vision of future development on the route to the capital facility. The capital facility can include capacity increasing, State Highway, bicycle facility, pedestrian facility, transit facility (Intercity Passenger Rail, Mass Transit Guideway etc.), grade separation, and new managed lanes.

Concept LOS – The minimum acceptable LOS over the next 20-25 years

Conceptual Project – A conceptual improvement or action is a project that is needed to maintain mobility or serve multimodal users, but is not currently included in a fiscally constrained plan and is not currently programmed. It could be included in a General Plan or in the unconstrained section of a long-term plan.

Corridor – A broad geographical band that follows a general directional flow connecting major sources of trips that may contain a number of streets, highways, bicycle, pedestrian, and transit route alignments. Off system facilities are included as informational purposes and not analyzed in the TCR.

Facility Concept – Describe the Facility and strategies that may be needed within 20-25 years. This can include capacity increasing, State Highway, bicycle facility, pedestrian facility, transit facility, Non-capacity increasing operational improvements, new managed lanes, conversion of existing managed lanes to another managed lane type or characteristic, TMS field elements, Transportation Demand Management and Incident Management.

Facility Type – The facility type describes the State Highway facility type. The facility could be freeway, expressway, conventional, or one-way city street.

Freight Generator – Any facility, business, manufacturing plant, distribution center, industrial development, or other location (convergence of commodity and transportation system) that produces significant commodity flow, measured in tonnage, weight, carload, or truck volume.

Headway – The time between two successive vehicles as they pass a point on the roadway, measured from the same common feature of both vehicles.

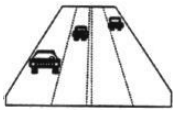
Horizon Year – The year that the future (20-25 years) data is based on.

Intermodal Freight Facility – Intermodal transport requires more than one mode of transportation. An intermodal freight facility is a location where different transportation modes and networks connect and freight is transferred (or "transloaded") from one mode, such as rail, to another, such as truck.

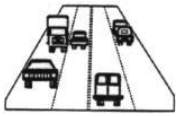
IRRS – Ninety-three routes (throughout California) outside urbanized areas that provide access and links: economic centers, urban and rural regions, major recreation – eligible for Interregional Transportation Improvement Program (ITIP) funding.

ITS – Intelligent Transportation System improves transportation safety and mobility and enhances productivity through the integration of advanced communications technologies into the transportation infrastructure and in vehicles. Intelligent transportation systems encompass a broad range of wireless and wire line communications-based information and electronics technologies to collect information, process it, and take appropriate actions.

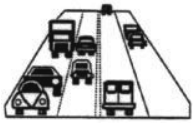
LOS – Level of Service is a qualitative measure describing operational conditions within a traffic stream and their perception by motorists. A LOS definition generally describes these conditions in terms of speed, travel time, freedom to maneuver, traffic interruption, comfort, and convenience. Six levels of LOS can generally be categorized as follows:



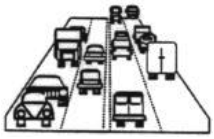
LOS A describes free flowing conditions. The operation of vehicles is virtually unaffected by the presence of other vehicles, and operations are constrained only by the
geometric features of the highway.



LOS B is also indicative of free-flow conditions. Average travel speeds are the same as in LOS A, but drivers have slightly less freedom to maneuver.



LOS C represents a range in which the influence of traffic density on operations becomes marked. The ability to maneuver with the traffic stream is now clearly affected by the presence of other vehicles.



LOS D demonstrates a range in which the ability to maneuver is severely restricted because of the traffic congestion. Travel speed begins to be reduced as traffic volume increases.

LOS E reflects operations at or near capacity and is quite unstable. Because the limits of the level of service are approached, service disruptions cannot be damped or readily dissipated.

LOS F a stop and go, low speed conditions with little or poor maneuverability. Speed and traffic flow may drop to zero and considerable delays occur. For intersections, LOS F describes operations with delay in excess of 60 seconds per vehicle. This level, considered by most drivers unacceptable often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of the intersection.

Multi-modal – The availability of transportation options using different modes within a system or corridor, such as automobile, subway, bus, rail, or air.

System Operations and Management Concept – Describe the system operations and management elements that may be needed within 20-25 years. This can include Non-capacity increasing operational improvements (Aux. lanes, channelization's, turnouts, etc.), conversion of existing managed lanes to another managed lane type or characteristic (e.g. HOV land to HOT lane), TMS Field Elements, Transportation Demand Management, and Incident Management.

Peak Hour – The hour of the day in which the maximum volume occurs across a point on the highway.

Peak Hour Volume – The hourly volume during the highest hour traffic volume of the day traversing a point on a highway segment. It is generally between 6 percent and 10 percent of the ADT. The lower values are generally found on roadways with low volumes.

Peak Period – Is a part of the day during which traffic congestion on the road is at its highest. Normally, this happens twice a day, once in the morning and once in the evening; the time periods when the most people commute. Peak Period is defined for individual routes, not a District or statewide standard.

Planned Project – A planned improvement or action is a project in a fiscally constrained section of a long-term plan, such as an approved Regional or Metropolitan Transportation Plan (RTP or MTP), Capital Improvement Plan, or measure.

Post-25 Year Concept – This dataset may be defined and re-titled at the District's discretion. In general, the Post-25 Year concept could provide the maximum reasonable and foreseeable roadway needed beyond a 20-25 year horizon. The post-25 year concept can be used to identify potential widening, realignments, future facilities, and rights-of-way required to complete the development of each corridor.

Post Mile – A post mile is an identified point on the State Highway System. The milepost values increase from the beginning of a route within a count to the next county line. The milepost values start over again at each county line. Milepost values usually increase from south to north or west to east depending upon the general direction the route follows within the state. The milepost at a given location will remain the same year after year. When a section of road is relocated, new milepost (usually noted by an alphabetical prefix such as "R" or "M") are established for it. If relocation results in a change in length, "milepost equations" are introduced at the end of each relocated portion so that mileposts on the reminder of the route within the county will remain unchanged.

Programmed Project – A programmed improvement or action is a project in a near-term programming document identifying funding amounts by year, such as the State Transportation Improvement Program or the State Highway Operations and Protection Program.

Railroad Class I – The Surface Transportation Board (STB) defines a Class I railroad in the U.S. as a carrier having annual operating revenues of $250 million or more. This class includes the nation's major railroads. In California, Class I railroads include Union Pacific Railroad (UP) and Burlington Northern Santa Fe Railway (BNSF).

Railroad Class II – STB defines a Class II railroad in the U.S. as having annual carrier operating revenues of less than $250 million but more than $20 million. Class II railroads are considered mid-sized freight-hauling railroad in terms of operating revenues. They are considered "regional railroads" by the Association of American Railroads.

Railroad Class III – Railroads with annual carrier operating revenues of $20 million or less. The typical Class III is a short line railroad, which feeds traffic to or delivers traffic from a Class I or Class II railroad.

Roundabout -- A roundabout is a British word for a road junction in which vehicles move in one direction around a central island with priority given to the vehicles already in the circulating flow of the roundabout. The roundabout is a circular intersection that creates a circular traffic flow pattern using yield controls on each approach and signage to inform the driver about slowing down and recognizing who has the right of way. Vehicles enter the roundabout and navigate counter-clockwise with the option to make an immediate right-turn, go straight, or continue around the roundabout.

Route Designation – A route's designation is adopted through legislation and identifies what system the route is associated with on the State Highway System. A designation denotes what design standards should apply during project development and design. Typical designations include but not limited to National Highway System (NHS), Interregional Route System (IRRS), Scenic Highway System, and Scenic Highway System.

Rural – Fewer than 5,000 in population designates a rural area. Limits are based upon population density as determined by the U.S. Census Bureau.

Segment – A portion of a facility between two points.

Surface Transportation Assistance Act (STAA) of 1982 – Determines size (length and width) of commercial trucks. Oversees routing of large commercial haulers.

TDM – Transportation Demand Management programs designed to reduce or shift demand for transportation through various means, such as the use of public transportation, carpooling, telework, and alternative work hours. Transportation Demand Management strategies can be used to manage congestion during peak periods and mitigate environmental impacts.

TMS – Transportation Management System is the business processes and associated tools, field elements and communications systems that help maximize the productivity of the transportation system. TMS includes, but is not limited to, advanced operational hardware, software, communications systems and infrastructure, for integrated Advanced Transportation Management Systems and Information Systems, and for Electronic Toll Collection System.

Transloading - The process of transferring a shipment from one mode of transportation to another. It is most commonly employed when one mode cannot be used for the entire trip, such as when goods must be shipped internationally from one inland point to another.

Urban – From 5,000 to 49,999 in population designates an urban area. Limits are based upon population density as determined by the U.S. Census Bureau.

Urbanized – Over 50,000 in population designates an urbanized area. Limits are based upon population density as determined by the U.S. Census Bureau.

VMT – Is the total number of miles traveled by motor vehicles on a road or highway segments.

APPENDIX B
SUMMARY CHARTS

Transportation Concept Report

State Route 43

SUMMARY CHART 1A

LEGEND

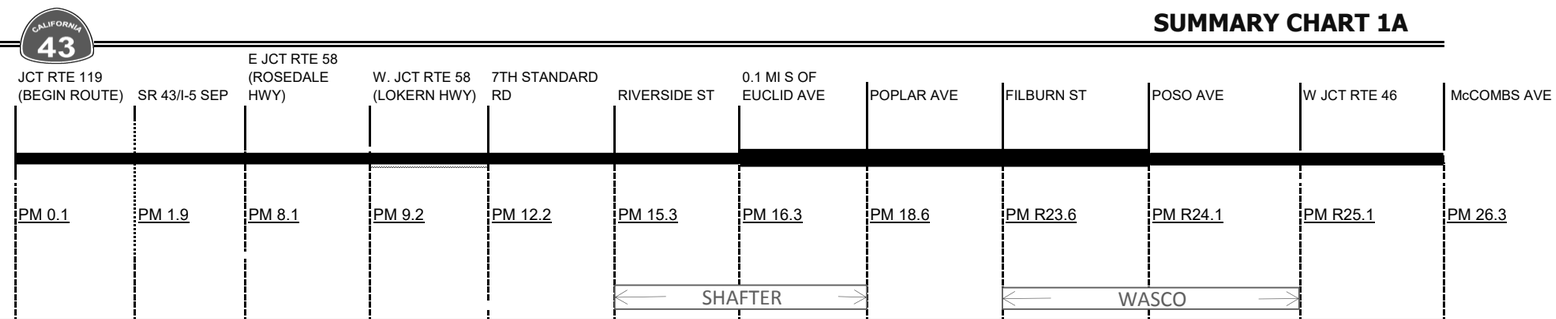
Existing Lanes: Conventional; Expressway; Freeway

Planned or Programmed by 2035

Number of Lanes: 2; 4

Add Through Lanes

* Not to scale



Segment: Is self-explanatory except for several data sets:

Rural/Urban: Indicates whether the segment is in a rural area or city limits.

Terrain: Shows the general highway grade: minimal grade = level; moderate grade = rolling; and severe grade = mountainous.

ROW: Portrays Right-of-Way (ROW) and geometric data in feet.

Shoulder Range: Is a range of treated surface (8' standard), both inside and outside shoulders.

Ultimate Transportation Corridor (UTC): Is the typical ROW needed for the ultimate facility,i.e., 8 lane freeway(8F) 218 feet is the standard typical UTC ROW - will be updated upon corridor plan lining by specific sections of highway.

Facility: Shows the Existing Facility, the desired facility type (2035 Concept) by 2035-RTPAs and Caltrans, and the Ultimate Facility to preserve ROW and plan line beyond 2035. 2C(I) indicates that the highway has been improved in select locations with operational or safety improvements.

LOS: The current LOS (level of service) for traffic volumes, along with the expected calculated LOS in 2020 and 2035. The 2035 Concept is the target LOS desired, i.e., LOS C, for attainment by 2035.

Deficiency: Occurs when the target LOS is degraded with the year of occurrence shown. It also shows whether a capacity improving project is in the STIP, and what the LOS would be with the 2035 Concept improvement.

Directional Split: Denotes the split in the peak hour traffic flow on a directional basis (NB/SB or WB/EB) either in the morning (AM) or evening (PM).

(I)++ 2-lane conventional highway improvements, turn lanes, signals, passing lanes, etc. Ultimate R/W will reflect existing R/W

AADT: signifies Annual Average Daily Traffic.

Peak Hour: Indicates a representation of the maximum hour of traffic flow during the day.

N/A Not deficient, no project recommended/not applicable.

N/A- Deficient, no project recommended.

SEGMENT	1	2	3	4	5	6	7	8	9	10	11
County / State Route	KER / 43	KER / 43	KER / 43	KER / 43	KER / 43	KER / 43	KER / 43	KER / 43	KER / 43	KER / 43	KER / 43
Description Begin	JCT RTE 119	RTE 43/I-5 SEP	E JCT RTE 58	W JCT RTE 58	7TH STANDARD RD	RIVERSIDE ST	0.1 MI S OF EUCLID AVE	POPLAR AVE	FILBURN ST	POSO AVE	W JCT RTE 46
Description End	RTE 43/I-5 SEP	E JCT 58	W JCT RTE 58	7TH STANDARD RD	RIVERSIDE ST	0.1 MI S OF EUCLID AVE	POPLAR AVE	FILBURN ST	POSO AVE	W JCT RTE 46	McCOMBS AVE
Postmile Limits Begin/End (PM)	0.111 / 1.865	1.865 / 8.112	8.112 / 9.162	9.162 / 12.190	12.190 / 15.320	15.320 /16.320	16.320 / 18.578	18.578 / R23.624	R23.624/ R24.124	R24.124 / R25.124	R25.124 / 26.290
Length (MI)	1.8	6.2	1.1	3.0	3.1	1.0	2.3	5.0	0.5	1.0	1.2
Rural / Urban	RURAL	RURAL	RURAL	RURAL	RURAL	URBAN	URBAN	RURAL	URBAN	URBAN	RURAL
Terrain	FLAT	FLAT	FLAT	FLAT	FLAT	FLAT	FLAT	FLAT	FLAT	FLAT	FLAT
ROW: Range Existing (FT)	80 / 80	80 / 80	50 / 110	50 / 80	80 / 80	80 / 80	80 / 169	110 / 140	80 / 115	80 / 80	60 / 80
Median Range (FT)	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 22	12 / 22	4 / 22	12 / 12	0 / 0
Shoulder Range (FT) Treated	2 / 8	2 / 4	4 / 4	4 / 4	4 / 4	8 / 8	8 / 8	8 / 8	8 / 8	8 / 8	5 / 8
Lane Width (FT)	12	12	12	12	12	12	12	12	12	12	11
Ultimate ROW (FT)	146	146	146	146	146	110	110	146	+	230 (I)++	230 (I)++
Facility: Existing	2C	2C	2C	2C	2C	2C	4C	4C	4C	2C	2C
2035 Concept	2C(I)++	2C(I)++	4C	4C	4C	4C	4C	4C	4C	2C(I)++	2C(I)++
UTC	4C	4C	4C	4C	4C	4C	4C	4C	4C	4E	4E
LOS: 2013	C	D	C	C	B	D	B	B	B	C	B
LOS: 2020	D	D	C	D	C	D	B	B	B	C	B
LOS: 2035	D	E	D	D	D	E	B	B	B	C	C
LOS: Concept 2035	D	D	D	D	D	D	D	D	D	D	D
Deficiency/Year Deficient	N/A	2035	N/A	N/A	N/A	2035	N/A	N/A	N/A	N/A	N/A
Project in STIP/RTP (Y/N)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
LOS W/ Concept Improvement	N/A	NA-	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Directional Split (Peak Hour)	70	70	56	68	54	53	51	50	52	51	63
AADT: 2013	7,100	9,500	7,810	6,300	4,600	11,400	12,800	10,800	10,200	7,000	3,900
AADT: 2020	8,800	11,600	9,300	7,600	5,500	13,600	15,500	12,600	12,100	8,500	5,000
AADT: 2035	12,400	16,100	12,600	11,300	8,500	18,400	21,000	16,400	16,000	11,500	7,500
Peak Hour: 2013	690	900	620	610	470	1,010	1,090	1,010	920	580	330
Peak Hour: 2020	840	1,100	740	730	560	1,200	1,320	1,170	1,090	700	430
Peak Hour: 2035	1,150	1,510	1,000	1,090	870	1,600	1,790	1,520	1,450	950	640
% Trucks: AADT	21%	22%	25%	25%	16%	10%	10%	9%	12%	12%	13%
% Trucks: Peak Hour	17%	15%	18%	18%	10%	6%	6%	5%	7%	7%	8%

Transportation Concept Report

State Route 43

SUMMARY CHART 1B

LEGEND

Existing Lanes — Conventional / Expressway / Freeway

Planned or Programmed by 2035 — Number of Lanes: 2, 4

Add Through Lanes

* Not to scale

JCT RTE 119 (BEGIN ROUTE)	SR 43/I-5 SEP	E JCT RTE 58 (ROSEDALE HWY)	W. JCT RTE 58 (LOKERN HWY)	7TH STANDARD RD	RIVERSIDE ST	0.1 MI S OF EUCLID AVE	POPLAR AVE	FILBURN ST	POSO AVE	W JCT RTE 46	McCOMBS AVE
PM 0.1	PM 1.9	PM 8.1	PM 9.2	PM 12.2	PM 15.3	PM 16.3	PM 18.6	PM R23.6	PM R24.1	PM R25.1	PM 26.3
					SHAFTER	SHAFTER		WASCO	WASCO		

Segment: Is self-explanatory except for several data sets:

Functional Classification: A process by which streets and highways are grouped into or classification systems.

Freeway/Expressway System: The Statewide system of highways declared to be essential to the future development of California.

Regionally Significant: Serves regional transportation needs including at a minimum all principal arterial highways and all fixed guideway transit facilities.

STRAHNET: A highway that provides defense access, continuity, and emergency capabilities for movements of personnel and equipment in both peace and war.

Lifeline: A route on the State highway system that is deemed so critical to emergency response/life-saving activities of a region or the state that it must remain open.

IRRS: (Interregional Road System): A series of State highway routes, outside the urbanized areas, that provide access to the State's economic centers, major recreational areas, and urban and rural regions.

STAA (Surface Transportation Assistance Act): This act required states to allow larger trucks on the National Network. "Terminal Access" routes are State highways that can accommodate STAA trucks. Other designations i,e., California Legal offer more limited access.

Scenic: A highway may be designated scenic depending upon how much of the natural landscape can be seen by travelers.

ICES (Intermodal Corridor of Economic Significance): Significant National Highway System Corridors that link intermodal facilites most directly, conveniently and efficiently to intrastate, interstate, and international markets.

SEGMENT	1	2	3	4	5	6	7	8	9	10	11
County / State Route	KER / 43	KER / 43	KER / 43	KER / 43	KER / 43	KER / 43	KER / 43	KER / 43	KER / 43	KER / 43	KER / 43
Description Begin	JCT RTE 119	RTE 43/I-5 SEP	E JCT RTE 58	W JCT RTE 58	7TH STANDARD RD	RIVERSIDE ST	0.1 MI S OF EUCLID AVE	POPLAR AVE	FILBURN ST	POSO AVE	W JCT RTE 46
Description End	RTE 43/I-5 SEP	E JCT 58	W JCT RTE 58	7TH STANDARD RD	RIVERSIDE ST	0.1 MI S OF EUCLID AVE	POPLAR AVE	FILBURN ST	POSO AVE	W JCT RTE 46	McCOMBS AVE
Postmile Limits Begin/End (PM)	0.111 / 1.865	1.865 / 8.112	8.112 / 9.162	9.162 / 12.190	12.190 / 15.320	15.320 /16.320	16.320 / 18.578	18.578 / R23.624	R23.624/ R24.124	R24.124 / R25.124	R25.124 / 26.290
Length (MI)	1.8	6.2	1.1	3.0	3.1	1.0	2.3	5.0	0.5	1.0	1.2
Functional Classification	MINOR ARTERIAL	MINOR ARTERIAL	MINOR ARTERIAL	MINOR ARTERIAL	MINOR ARTERIAL	PRINCIPAL ARTERIAL	PRINCIPAL ARTERIAL	MINOR ARTERIAL	PRINCIPAL ARTERIAL (Extension of minor arterial-rural	PRINCIPAL ARTERIAL (Extension of minor arterial-rural	PRINCIPAL ARTERIAL (Extension of minor arterial-
National Highway System (NHS) (Y/N)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Freeway/Expressway System (Y/N)	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Regionally Significant (Y/N)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
STRAHNET (Y/N)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Lifeline (Y/N)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
IRRS (Yes: HE=High Emphasis, F=Focus, G=Gateway or No)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
TRUCK NETWORK, STAA: (NN=National Network, TA=Terminal Access, CL= California Legal, R= Special Restrictions, or A=Advisory)	TA	TA	TA	TA	TA	TA	TA	TA	TA	TA	TA
Scenic (Yes: Officially Designated, Eligible or No)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
ICES (Intermodal Corridor of Economic Significance) (Y/N)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
General Plan/RTP LOS Standard	KERN CO LOS D FOR CMP & RTP REGIONALLY SIGNIFICANT SYSTEM	KERN CO LOS D FOR CMP & RTP REGIONALLY SIGNIFICANT SYSTEM	KERN CO LOS D FOR CMP & RTP REGIONALLY SIGNIFICANT SYSTEM	KERN CO LOS D FOR CMP & RTP REGIONALLY SIGNIFICANT SYSTEM	KERN CO LOS D FOR CMP & RTP REGIONALLY SIGNIFICANT SYSTEM	KERN CO LOS D FOR CMP & RTP REGIONALLY SIGNIFICANT SYSTEM	KERN CO LOS D FOR CMP & RTP REGIONALLY SIGNIFICANT SYSTEM	KERN CO LOS D FOR CMP & RTP REGIONALLY SIGNIFICANT SYSTEM	KERN CO LOS D FOR CMP & RTP REGIONALLY SIGNIFICANT SYSTEM	KERN CO LOS D FOR CMP & RTP REGIONALLY SIGNIFICANT SYSTEM	KERN CO LOS D FOR CMP & RTP REGIONALLY SIGNIFICANT SYSTEM
General Plan/RTP Standard Highway Classification	EXPRESSWAY	EXPRESSWAY	EXPRESSWAY	EXPRESSWAY	EXPRESSWAY	ARTERIAL (4 LANES)	ARTERIAL (4 LANES)	EXPRESSWAY	ARTERIAL COLLECTOR	ARTERIAL COLLECTOR	EXPRESSWAY
Passing Lanes (Y/N)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Bike Use Allowed (Y/N)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Transportation Concept Report

State Route 43

SUMMARY CHART 2A

LEGEND

Existing Lanes — Conventional / Expressway

Planned or Programmed by 2035 — Number of Lanes: 2, 4

Add Through Lanes

* Not to scale

	McCOMBS AVE	KERN / TULARE CO. LINE	0.2 MI S OF DEER CREEK	TULARE / KINGS CO. LINE	PICKERELL AVE	SANTA FE AVE	RTE 43 / 198 SEP	10TH AVE	FRESNO / KINGS CO LINE	NEBRASKA AVE	RTE 99 / 43 SEP (END OF RTE)
	PM 26.3	PM 38.8 / 0.0	PM R9.9	PM 22.7 / 0.0	PM 2.2	PM 3.07	PM 18.2	PM 22.3	PM 27.3 / 0.0	PM 8.3	PM 9.3
					CORCORAN		HANFORD			SELMA	

Segment: Is self-explanatory except for several data sets:

Rural/Urban: Indicates whether the segment is in a rural area or city limits.

Terrain: Shows the general highway grade: minimal grade = level; moderate grade = rolling; and severe grade = mountainous.

ROW: Portrays Right-of-Way (ROW) and geometric data in feet.

Shoulder Range: Is a range of treated surface (8' standard), both inside and outside shoulders.

Ultimate Transportation Corridor (UTC): Is the typical ROW needed for the ultimate facility,i.e., 8 lane freeway(8F) 218 feet is the standard typical UTC ROW - will be updated upon corridor plan lining by specific sections of highway.

Facility: Shows the Existing Facility, the desired facility type (2035 Concept) by 2035-RTPAs and Caltrans, and the Ultimate Facility to preserve ROW and plan line beyond 2035. 2C(I) indicates that the highway has been improved in select locations with operational or safety improvements.

LOS: The current LOS (level of service), along with the expected calculated LOS in 2020 and 2035. The 2035 Concept is the target LOS desired, i.e., LOS C, for attainment by 2035.

Deficiency: Occurs when the target LOS is degraded with the year of occurrence shown. It also shows whether a capacity improving project is in the STIP, and what the LOS would be with the 2035 Concept improvement.

Directional Split: Denotes the split in the peak hour traffic flow on a directional basis (NB/SB or WB/EB) either in the morning (AM) or evening (PM).

(I)++ 2-lane conventional highway improvements, turn lanes, signals, passing lanes, etc. Ultimate R/W will reflect existing R/W.

AADT: signifies Annual Average Daily Traffic.

Peak Hour: Indicates a representation of the maximum hour of traffic flow during the day.

N/A Not deficient, no project recommended/not applicable.

N/A- Deficient, no project recommended.

***:** Expressway -An arterial highway with at least partial control access, which may or may not be divided or have grade separations at intersections.

SEGMENT	12	13	14	15	16	17	18	19	20	21
County / State Route	KER / 43	TUL / 43	TUL / 43	KIN / 43	KIN / 43	KIN / 43	KIN / 43	KIN / 43	FRE / 43	FRE / 43
Description Begin	McCOMBS AVE	KERN / TULARE CO LINE	0.2 MI S OF DEER CREEK	TULARE / KINGS CO LINE	PICKERELL AVE	SANTA FE AVE	RTE 43 / 198 SEP	10TH AVE	KINGS / FRESNO CO LINE	NEBRASKA AVE
Description End	KERN / TULARE CO LINE	0.2 MI S OF DEER CREEK	TULARE / KINGS CO LINE	PICKERELL AVE	SANTA FE AVE	RTE 43 / 198 SEP	10TH AVE	KINGS / FRESNO CO LINE	NEBRASKA AVE	RTE 99 / 43 SEP
Postmile Limits Begin/End (PM)	26.290 / 38.807	0.000 / R9.887	R9.887 / 22.674	0.000 / 2.261	2.261 / 3.020	3.020 / 18.218	18.218 / 22.272	22.272 / 27.286	0.000 / 8.340	8.340 / 9.308
Length (MI)	12.5	9.9	12.8	2.3	0.8	15.2	4.1	5.0	8.3	1.0
Rural / Urban	RURAL	RURAL	RURAL	RURAL	URBAN	RURAL	RURAL/URBAN	RURAL	RURAL	URBAN
Terrain	FLAT	FLAT	FLAT	FLAT	FLAT	FLAT	FLAT	FLAT	FLAT	FLAT
ROW: Range Existing (FT)	60 / 80	80 / 120	100 / 260	142 / 142	142 / 142	142 / 220	80 / 80	80 / 80	60 / 140	80 / 146
Median Range (FT)	0 / 0	0 / 0	0 / 24	0 / 20	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	12 / 12
Shoulder Range (FT) Treated	6 / 8	3 / 3	2 / 8	8 / 8	8 / 8	8 / 8	3 / 8	8 / 8	6 / 8	8 / 8
Lane Width (FT)	12	12	12	12	12	12	12	12	12	12
Ultimate ROW (FT)	230 (I)++	230 (I)++	230 (I)++	230 (I)++	230 (I)++	230 (I)++	230	230	210	146
Facility: Existing	2C	2C	2C	2C(I)++	2C	2C*	2C	2C	2C	4C
2035 Concept	2C(I)++	2C(I)++	2C(I)++	2C(I)++	2C(I)++	2C(I)++	4E	4E	4C	4C
UTC	4E	4E	4E	4E	4E	4E	4E	4E	4E	4C
LOS: 2013	B	B	C	B	C	C	D	D	D	B
LOS: 2020	B	B	C	B	C	D	D	D	D	B
LOS: 2035	B	C	D	C	D	D	E	D	D	B
LOS: Concept 2035	D	D	D	D	D	D	D	D	D	D
Deficiency/Year Deficient	N/A	N/A	N/A	N/A	N/A	N/A	2035	N/A	N/A	N/A
Project in STIP/RTP (Y/N)	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO
LOS W/ Concept Improvement	N/A	N/A	N/A	N/A	N/A	N/A	NA-	N/A	N/A	N/A
Directional Split (Peak Hour)	58	56	60	60	58	60	64	54	50	57
AADT: 2013	3,000	3,000	6,100	4,400	7,500	6,000	13,400	12,200	11,600	14,000
AADT: 2020	3,800	3,600	7,200	5,200	8,500	7,200	15,100	13,700	13,300	16,300
AADT: 2035	5,500	4,700	9,600	6,900	10,800	9,700	18,900	16,800	17,000	21,200
Peak Hour: 2013	260	240	570	360	600	530	1,080	950	960	1,260
Peak Hour: 2020	330	290	670	420	690	630	1,280	1,060	1,100	1,470
Peak Hour: 2035	470	340	900	570	880	860	1,560	1,300	1,400	1,920
% Trucks: AADT	13%	22%	22%	20%	20%	22%	18%	18%	14%	14%
% Trucks: Peak Hour	9%	14%	14%	12%	12%	14%	10%	10%	8%	8%

Transportation Concept Report

SUMMARY CHART 2B

State Route 43

LEGEND

Existing Lanes — Conventional / Expressway / Freeway

Planned or Programmed by 2035 — Number of Lanes

Add Through Lanes

* Not to scale

	McCOMBS AVE	KERN / TULARE CO. LINE	0.2 MI S OF DEER CREEK	TULARE / KINGS CO. LINE	0.1 MI S OF PICKERELL AVE	JCT SANTA FE AVE	RTE 43 / 198 SEP	10TH AVE	FRESNO / KINGS CO LINE	NEBRASKA AVE	RTE 99 / 43 SEP (END OF RTE)
Number of Lanes	2	2	2	2	2	2	2	2	2	2	
	PM 26.3	PM 38.8 / 0.0	PM R9.9	PM 22.7 / 0.0	PM 2.2	PM 3.02	PM 18.2	PM 22.3	PM 27.3 / 0.0	PM 8.3	PM 9.3
Add Through Lanes					CORCORAN		HANFORD			SELMA	

Segment: Is self-explanatory except for several data sets:

Functional Classification: A process by which streets and highways are grouped into or classification systems.

Freeway/Expressway System: The Statewide system of highways declared to be essential to the future development of California.

Regionally Significant: Serves regional transportation needs including at a minimum all principal arterial highways and all fixed guideway transit facilities.

STRAHNET: A highway that provides defense access, continuity, and emergency capabilities for movements of personnel and equipment in both peace and war.

Lifeline: A route on the State highway system that is deemed so critical to emergency response/life-saving activities of a region or the state that it must remain open.

IRRS: (Interregional Road System): A series of State highway routes, outside the urbanized areas, that provide access to the State's economic centers, major recreational areas, and urban and rural regions.

STAA (Surface Transportation Assistance Act): This act required states to allow larger trucks on the National Network. "Terminal Access" routes are State highways that can accommodate STAA trucks. Other designations i,e., California Legal offer more limited access.

Scenic: A highway may be designated scenic depending upon how much of the natural landscape can be seen by travelers.

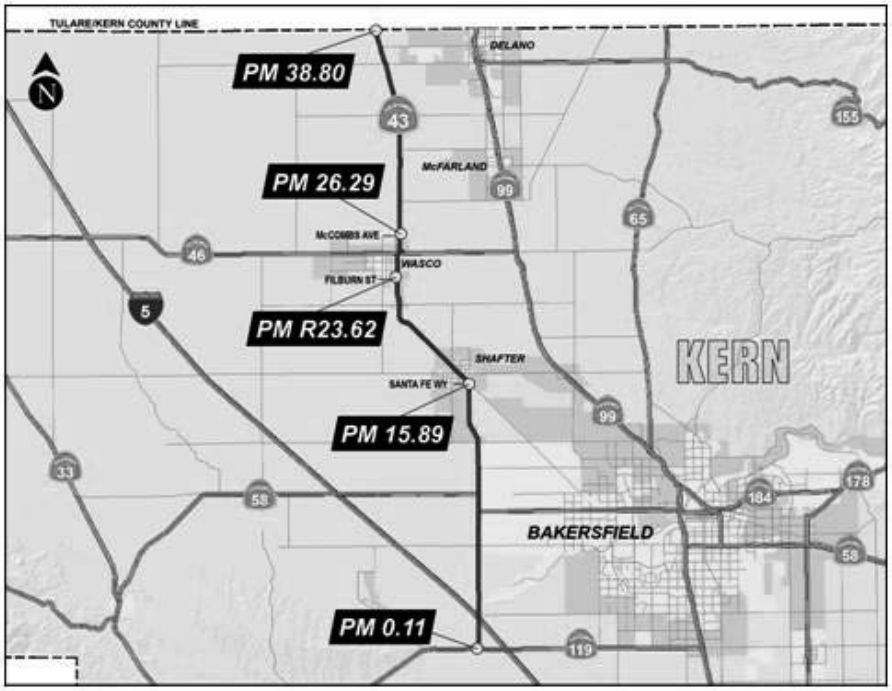
ICES (Intermodal Corridor of Economic Significance): Significant National Highway System Corridors that link intermodal facilites most directly, conveniently and efficiently to intrastate, interstate, and international markets.

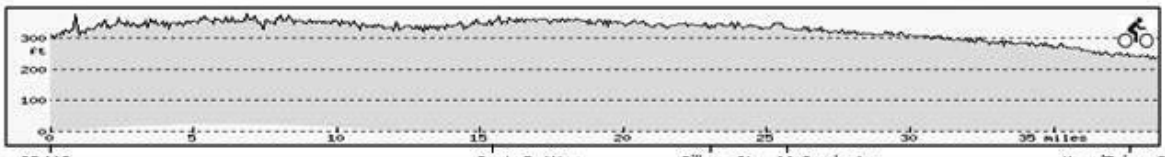
SEGMENT	12	13	14	15	16	17	18	19	20	21
County / State Route	KER / 43	TUL / 43	TUL / 43	KIN / 43	KIN / 43	KIN / 43	KIN / 43	KIN / 43	FRE / 43	FRE / 43
Description Begin	McCOMBS AVE	KERN / TULARE CO LINE	0.2 MI S OF DEER CREEK	TULARE / KINGS CO LINE	PICKERELL AVE	JCT SANTA FE AVE	RTE 43 / 198 SEP	10TH AVE	KINGS / FRESNO CO LINE	NEBRASKA AVE
Description End	KERN / TULARE CO LINE	0.2 MI S OF DEER CREEK	TULARE / KINGS CO LINE	PICKERELL AVE	JCT SANTA FE AVE	RTE 43 / 198 SEP	10TH AVE	KINGS / FRESNO CO LINE	NEBRASKA AVE	RTE 99 / 43 SEP
Postmile Limits Begin/End (PM)	26.290 / 38.807	0.000 / R9.887	R9.887 / 22.674	0.000 / 2.221	2.221 / 3.066	3.006 / 18.218	18.218 / 22.272	22.272 / 27.286	0.000 / 8.340	8.340 / 9.308
Length (MI)	12.5	9.9	12.8	2.2	0.8	15.2	4.1	5.0	8.3	1.0
Functional Classification	MINOR ARTERIAL	MINOR ARTERIAL	MINOR ARTERIAL	MINOR ARTERIAL	PRINCIPAL ARTERIAL (Extension of minor arterial-rural to urban)	MINOR ARTERIAL	MINOR ARTERIAL	MINOR ARTERIAL	MINOR ARTERIAL	PRINCIPAL ARTERIAL (Extension of minor arterial-rural to urban)
National Highway System (NHS) (Y/N)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Freeway/Expressway System (Y/N)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Regionally Significant (Y/N)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
STRAHNET (Y/N)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Lifeline (Y/N)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
IRRS (Yes: HE=High Emphasis, F=Focus, G=Gateway or No)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
TRUCK NETWORK, STAA: (NN=National Network, TA=Terminal Access, CL= California Legal, R= Special Restrictions, or A=Advisory)	TA	TA	TA	TA	TA	TA	TA	TA	TA	TA
Scenic (Yes: Officially Designated, Eligible or No)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
ICES (Intermodal Corridor of Economic Significance) (Y/N)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
General Plan/RTP LOS Standard	KERN CO LOS D FOR CMP & RTP REGIONALLY SIGNIFICANT SYSTEM	TULARE CO LOS D FOR CMP & RTP REGIONALLY SIGNIFICANT SYSTEM	TULARE CO LOS D FOR CMP & RTP REGIONALLY SIGNIFICANT SYSTEM	KINGS CO LOS D FOR RTP REGIONALLY SIGNIFICANT SYSTEM	KINGS CO LOS D FOR RTP REGIONALLY SIGNIFICANT SYSTEM	KINGS CO LOS D FOR RTP REGIONALLY SIGNIFICANT SYSTEM	KINGS CO LOS D FOR RTP REGIONALLY SIGNIFICANT SYSTEM	KINGS CO LOS D FOR RTP REGIONALLY SIGNIFICANT SYSTEM	FRESNO CO LOS D FOR RTP REGIONALLY SIGNIFICANT SYSTEM	FRESNO CO LOS D FOR RTP REGIONALLY SIGNIFICANT SYSTEM
General Plan/RTP Standard Highway Classification	EXPRESSWAY	MINOR ARTERIAL	MINOR ARTERIAL	MINOR ARTERIAL	MINOR ARTERIAL	PRINCIPAL ARTERIAL / MINOR ARTERIAL	PRINCIPAL ARTERIAL	MINOR ARTERIAL / PRINCIPAL ARTERIAL	SUPER ARTERIAL	SUPER ARTERIAL
Passing Lanes (Y/N)	NO	NO	NO	YES	NO	NO	NO	NO	NO	NO
Bike Use Allowed (Y/N)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Segment 1: SR 119/SR 43 intersection to be taken into account in analyzing the segment.
Intersection will be at LOS E by 2030 per HECA project TIS.
Yearly Growth rate increased to 2.5% since there is growth potential in this area.

APPENDIX C
BICYCLE INFORMATION

STATE ROUTE 43 Kern County Bicycle Map

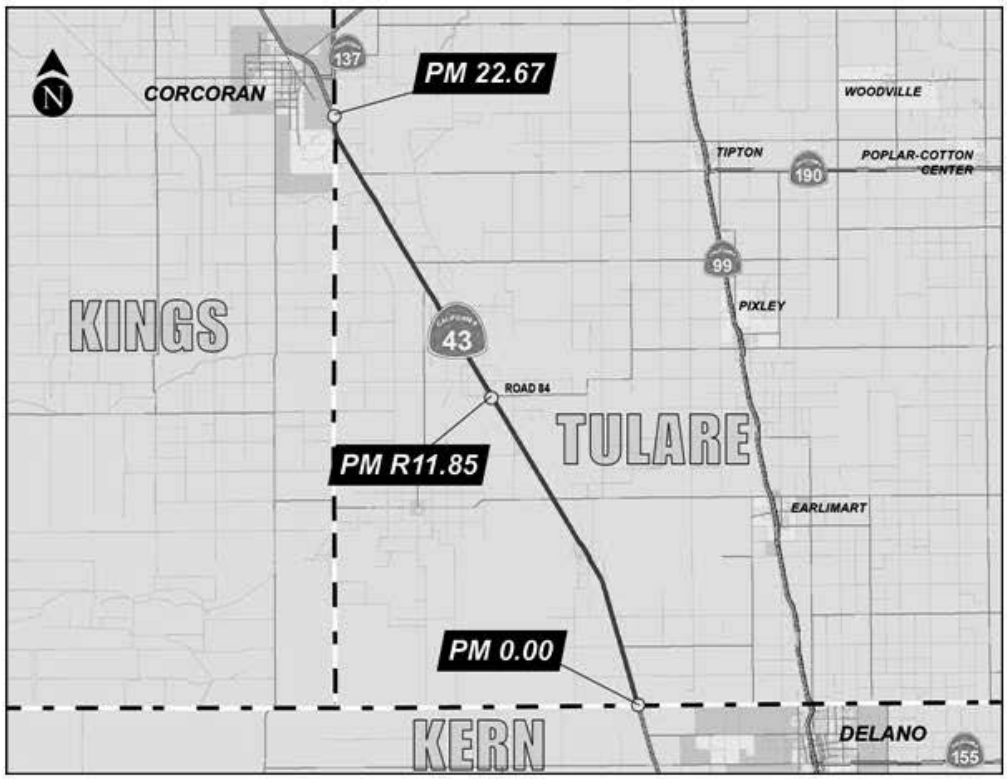


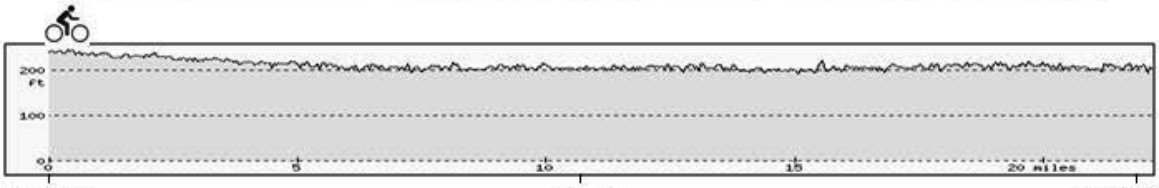


SR 119 PM 0.11 — Santa Fe Way PM 15.89 — Filburn St PM R23.62 — McCombs Ave PM 26.29 — Kern/Tulare Co Line PM 38.80

Location *(Postmile)*	Facility (Lanes)	Rural/ Urban	Shoulder (Treated)	Terrain	Speed Limit Posted	Facility Description
State Route 119 to Santa Fe Way *(PM 0.11 – 15.89)*	2 Lane Highway	Rural	2 - 4 feet	Level	55	Very narrow shoulders south of SR 58 (PM 8.11), Mostly agriculture land areas with few structures, 6 call boxes available
Santa Fe Way to Filburn Street *(PM 15.89 – R23.62)*	2 to 4 Lane Highway	Rural/ Urban	8 feet	Level	40, 55 & 65	Mostly wide shoulders, City of Shafter city limits, Surrounding agriculture land area, 2 call boxes available
Filburn Street to McCombs Avenue *(PM R23.62 – 26.29)*	2 to 4 Lane Highway	Urban	8 feet	Level	35 & 55	Wide shoulders, City of Wasco city limits, Surrounding agriculture land area , 1 call box available
McCombs Avenue to Kern/Tulare County Line *(PM 26.29 – 38.80)*	2 Lane Highway	Rural	6 - 8 feet	Level	55	Mostly wide shoulders, Agriculture land use in rural area, 6 call boxes available

STATE ROUTE 43 Tulare County Bicycle Map

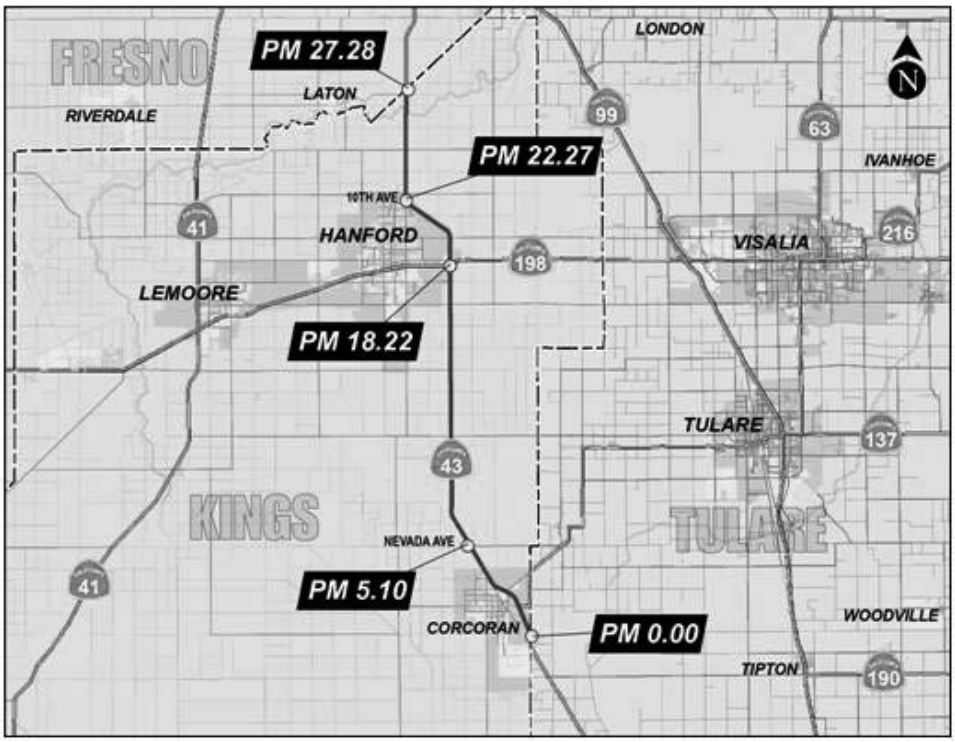


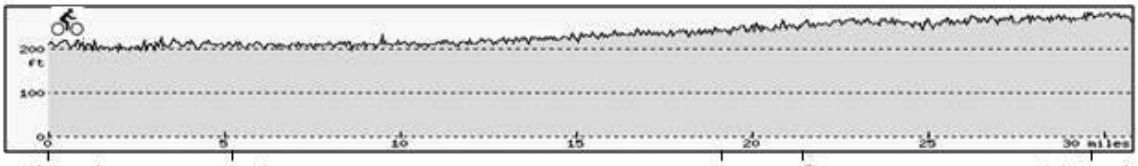


Kern/Tulare PM 0.00 | Road 84 PM R11.85 | Tulare/Kings Co Line PM 22.67

Location *(Postmile)*	Facility (Lanes)	Rural/ Urban	Shoulder (Treated)	Terrain	Speed Limit Posted	Facility Description
Kern/Tulare County Line to Road 84 *(PM 0.00 – R11.85)*	2 Lane Highway	Rural	0 - 1 foot	Level	55	Very narrow shoulders, Allensworth State Historical Park near Road 85 (PM R11.93) is a bike friendly park where staff discuss types of bicycles that were used there, Mostly agriculture land areas with few structures
Road 84 to Tulare/ Kings County Line *(PM R11.85 – 22.67)*	2 Lane Highway	Rural	0 - 2 feet	Level	55	Narrow shoulders, Surrounding agriculture land area with few structures

STATE ROUTE 43 Kings County Bicycle Map

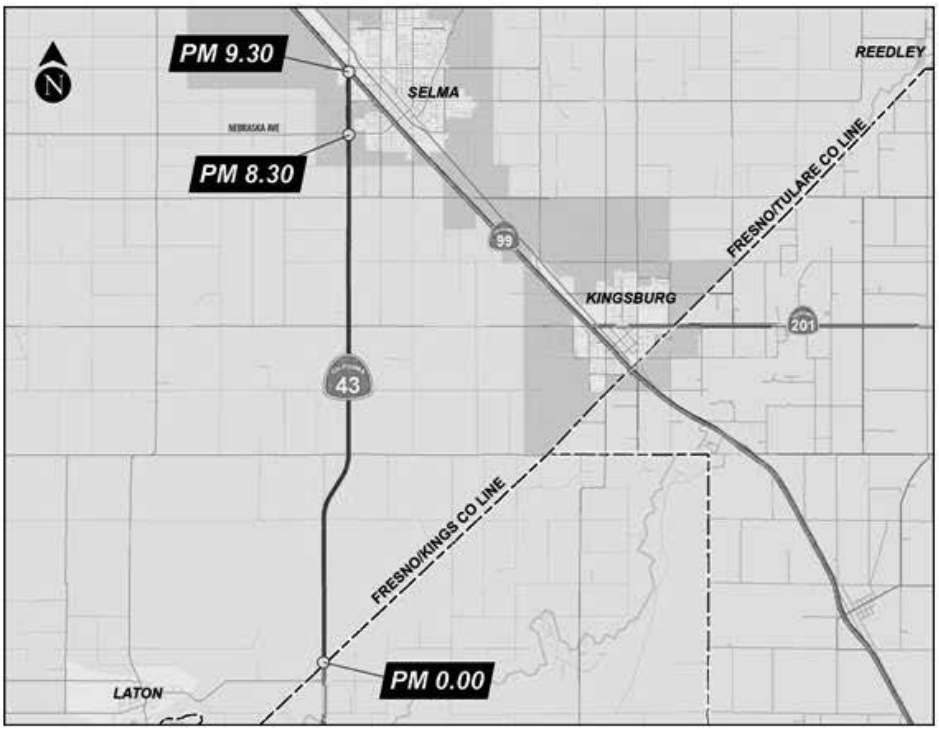


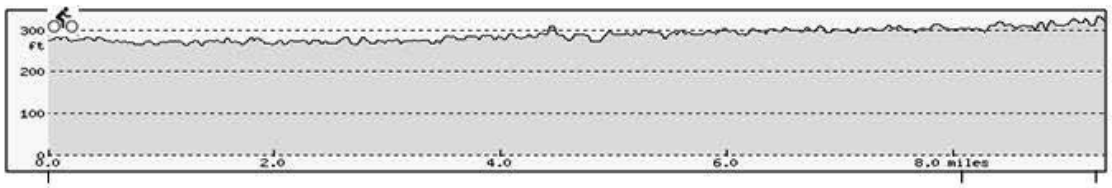


Tul/Kin Co Line PM 0.00 | Nevada Ave PM 5.10 | SR 198 PM 18.22 | 10th Ave PM 22.27 | Kin/Fre Co Line PM 27.29

Location *(Postmile)*	Facility (Lanes)	Rural/ Urban	Shoulder (Treated)	Terrain	Speed Limit Posted	Facility Description
Tulare/Kings Co Line to Nevada Avenue *(PM 0.00 – 5.10)*	2 Lane Expressway	Rural/ Urban	8 feet	Level	55	Wide shoulders, City of Corcoran city limits, Surrounded mostly by agriculture land, Restaurants, gas stations and lodging services available
Nevada Avenue to State Route 198 *(PM 5.10 – 18.22)*	2 Lane Expressway	Rural	8 feet	Level	55	Wide shoulders, Surrounding agriculture land area with few structures
State Route 198 to 10th Avenue *(PM 18.22 – 22.27)*	2 Lane Expressway	Rural/ Urban	3 - 8 feet	Level	35 & 55	Wide shoulders, City of Hanford, Surrounding agriculture land area in rural area, Restaurants, gas stations and lodging services available
10th Avenue to Kings/Fresno Co Line *(PM 22.27 – 27.29)*	2 Lane Highway	Rural	8 feet	Level	55	Wide shoulders, Agricultural land use

STATE ROUTE 43 Fresno County Bicycle Map





Kings/Fresno Co Line PM 0.00 — Nebraska Ave PM 8.30 — State Route 99 PM 9.30

Location *(Postmile)*	Facility (Lanes)	Rural/ Urban	Shoulder (Treated)	Terrain	Speed Limit Posted	Facility Description
Kings/Fresno County Line to Nebraska Avenue *(PM 0.00 – 8.30)*	2 Lane Highway	Rural	6 feet	Flat	55	Wide shoulders, Agricultural land use in rural area
Nebraska Avenue to State Route 99 *(PM 8.30 – 9.30)*	4 Lane Highway	Urban	6 - 11 feet	Flat	45 & 55	Wide shoulders, Within City of Selma city limits, Sidewalks on most of the segment

APPENDIX D
CORRESPONDENCE

City of HANFORD
CALIFORNIA 93230
CITY OFFICES 319 NORTH DOUTY STREET

October 25, 2013

Mrs. Bender-Ehlert
DOT Director, District 6
1352 W. Olive Ave.
PO Box 12616
Fresno, CA 93778-2616

Abandonment of CalTrans Right of Way at Route 43/Lacy Blvd. in Hanford, CA

I would like to take this opportunity to formally request that the California Department of Transportation abandon to the City of Hanford that "sliver" of right-of-way on the south-west corner of State Route 43 at Lacy Blvd.

It is the City's understanding that this "sliver" was retained by CalTrans in anticipation of the City of Hanford requesting a grade-separated crossing over Route 43 at some point in the future. All traffic models now show the need to relocate the intersection of Lacy at 43 to the north by some 400'. With this in mind, in the near future there will no longer be an intersection or future grade-separation at that location.

The City of Hanford has NO desire to develop a grade-separation at the existing location of Lacy at 43, and therefore request that CalTrans relinquish that real property to the City of Hanford.

The City of Hanford will continue to work closely with CalTrans District 6 to address facility needs along the Route 43 and Route 198 corridors as development moves towards our easterly boundaries.

We look forward to a communication from your office with action items needed to facilitate this relinquishment. Thank you for your consideration and assistance in this matter.

Respectfully,

Darrel L. Pyle
City Manager
City of Hanford

Cc: Malcolm Dougherty, Director, California Department of Transportation

DEPARTMENT OF TRANSPORTATION
DISTRICT 6
1352 WEST OLIVE AVENUE
P.O. BOX 12616
FRESNO, CA 93778-2616
PHONE (559) 488-4057
FAX (559) 488-4195
TTY 711
www.dot.ca.gov

Flex your power!
Be energy efficient!

November 25, 2013

Mr. Darrel L. Pyle
City Manager
City of Hanford
319 North Douty Street
Hanford, CA 93230

Dear Mr. Pyle:

This is in response to your recent request to the California Department of Transportation (Caltrans) regarding Caltrans right of way located along the southwest corner of State Route (SR) 43 at Lacey Boulevard. Currently, this area is not considered Excess Lands and is incorporated into our operating right of way. Caltrans does not abandon right of way and relinquishments are for the conveyance of actual roads or highways, not strips of right of way.

Caltrans does offer a process that is used when adjoining owners or public agencies are interested in purchasing State-owned land that is not considered excess. The process is called Decertification. During the Decertification process, each division within Caltrans will review the parcel to determine if it is needed for State highway operations or whether it can be declared excess land. Once the parcel is declared excess land after the process is complete, the parcel is appraised and can be sold to the interested party. The cost to start the Decertification process is $20,000. The funds are used to cover the cost to process the request by each division, including appropriate overhead assessments and the cost of appraising the parcel. The appraisal of the property will be for the highest and best use of the parcel. At the end of the Decertification process, the remaining funds can be applied to the sales price of the property if the requesting party decides to complete the purchase.

Since the City of Hanford has indicated in your letter dated October 25, 2013, that you have no desire to build a grade-separation at this location, the Decertification process should not be difficult. However, this decision means that at some future date the connection of Lacey Boulevard at SR 43 may need to be revisited if operational and/or safety issues become a reality.

If this is an option that you or the developer would like to pursue, please contact Maria Toles, Chief, Excess Lands Branch, at (559) 445-6072.

Sincerely,

SHARRI BENDER EHLERT
District 6 Director

c: Malcolm Dougherty, Director, California Department of Transportation
Maria Toles, Chief, Excess Lands Branch

DEPARTMENT OF TRANSPORTATION
DISTRICT 6
1352 WEST OLIVE AVENUE
P.O. BOX 12616
FRESNO, CA 93778-2616
PHONE (559) 488-4325
FAX (559) 445-4088
TTY 711

Serious drought.
Help save water!

July 7, 2014

2133 IGR/CEQA
6-KIN-43-18.40
Final EIR
SR 43 / SR 198 Commercial Center
SCH #2012061013

Ms. Melody N. Haigh, Senior Planner
City of Hanford
Community Development Department
317 North Douty Street
Hanford, California 93230

Dear Ms. Haigh:

Thank you for the opportunity to review the Final Environmental Impact Report (FEIR) for the State Route (SR) 43 / SR 198 Commercial Center Project. The project proposes to amend the General Plan Map and Text to redesignate and rezone 58 acres for Planned Commercial Development and then subdivide the property into 27 parcels, in order to develop a new shopping center with 498,624 square feet of building area on approximately 58 acres. The project is proposed to be developed in four phases, and is anticipated to take 10 years to complete. The project site is located on the southwest corner of the SR 43/Lacey Boulevard intersection in the City of Hanford.

Per the comment in Caltrans' letter dated November 15, 2013, as an Opening Day mitigation measure, Caltrans' preference is for the roundabout option at the newly relocated SR 43/Lacey Boulevard intersection. Please reflect the roundabout option under mitigation measures in the text of the FEIR, specifically on Page 4.10-38 and on Page 6-11 in Table FEIR 6-1.

Caltrans has been meeting with City of Hanford staff and the project proponent to discuss the details of the roundabout option and its comparison to the signalized option at the relocated SR 43/Lacey Boulevard intersection. Given the viability of the roundabout option, it should also be included as an alternative mitigation measure in the FEIR.

If you have any questions regarding this matter please call me at (559) 488-4325.

Sincerely,

ALEC KIMMEL, Transportation Planner
Planning South Branch

c: Johnathan L. Doyel, PE/PLS, City of Hanford
State Clearinghouse

Appendix E
Transit Maps