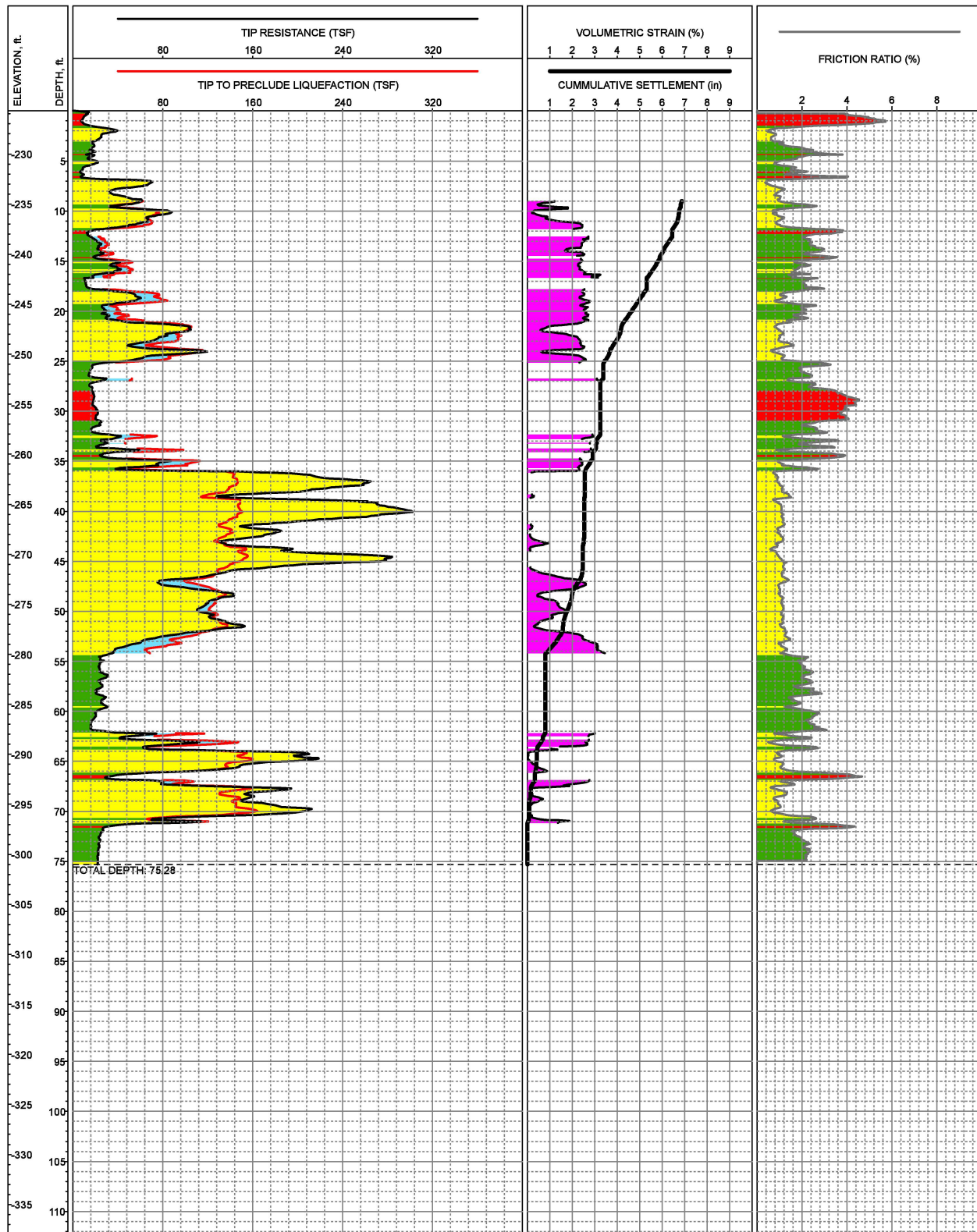


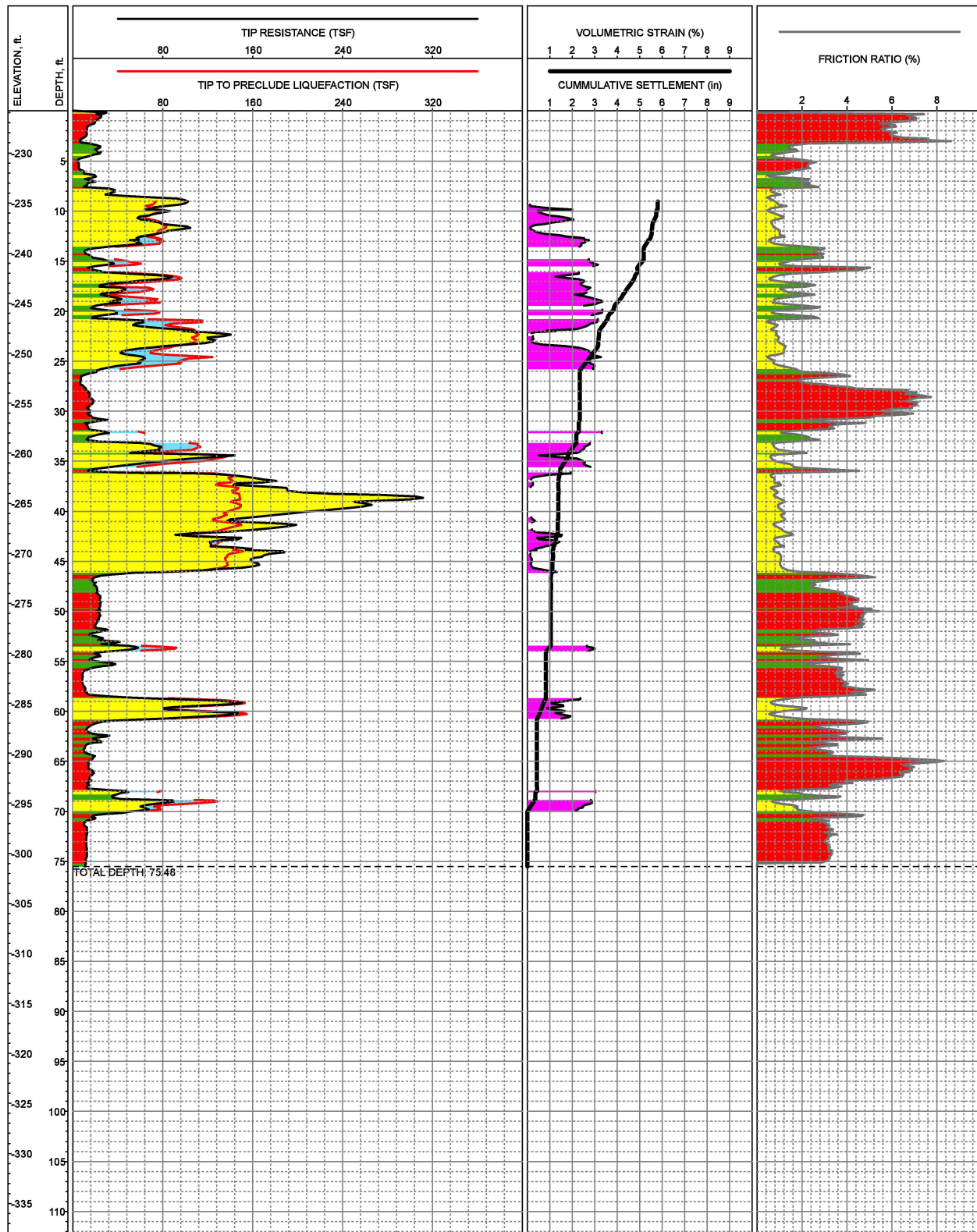
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Docket Number:	23-AFC-01
Project Title:	Morton Bay Geothermal Project (MBGP)
TN #:	252491-6
Document Title:	Morton Bay Geothermal Project Data Request Response Set 1 Part 6
Description:	N/A
Filer:	Jerry Salamy
Organization:	Jacobs
Submitter Role:	Applicant Consultant
Submission Date:	10/2/2023 7:58:39 PM
Docketed Date:	10/3/2023



LOCATION: E6,752,088, N2,003,947, CA State Plane, Zone 6, NAD83, Feet
SURFACE EL: -225.7ft +/- (NAVD88)
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TESTDATE: 10/8/2008

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Kehoe Testing & Engineering
REVIEWED BY: Jon Everett

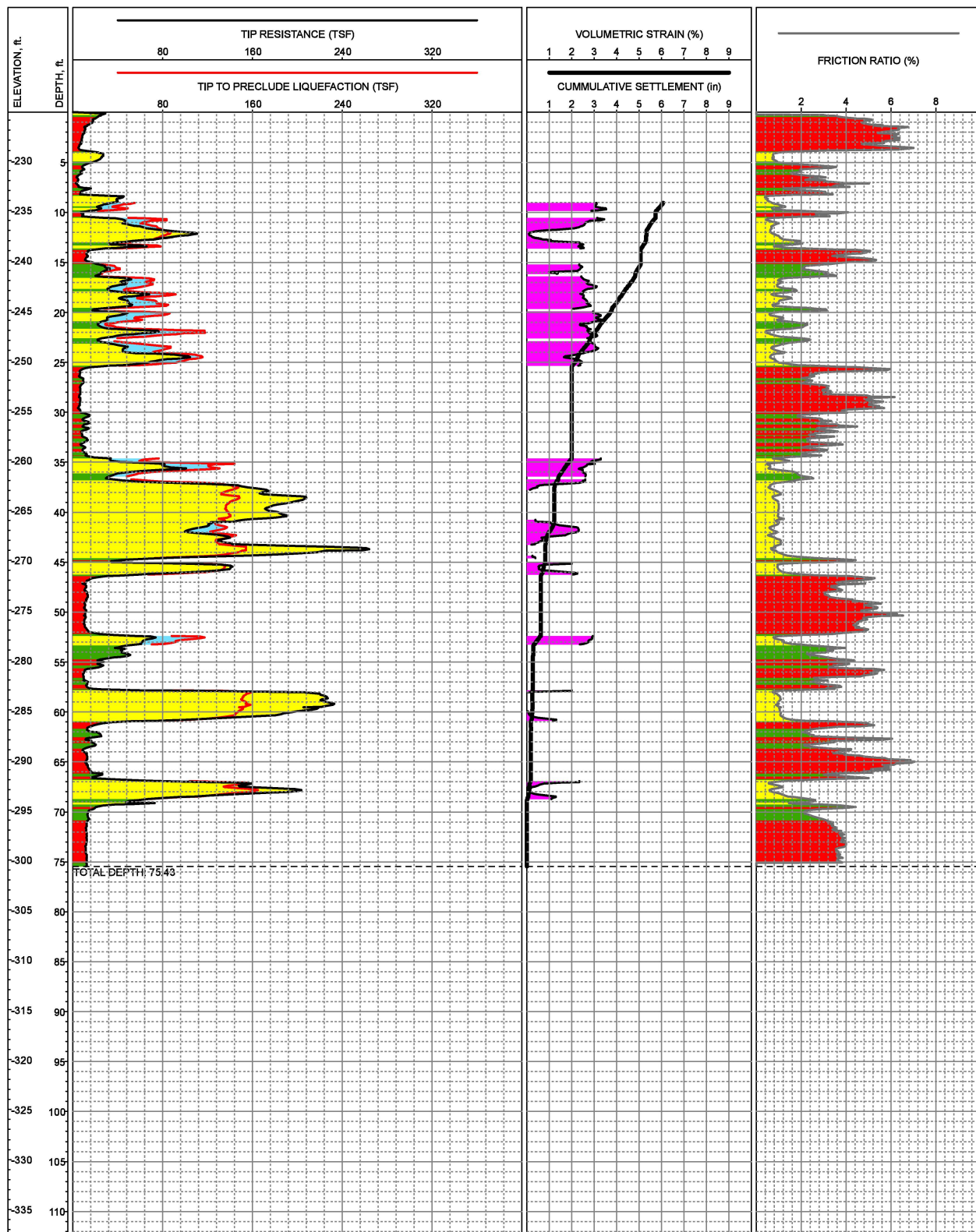
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Black Rock Units 1, 2 & 3
Calipatria, California



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TESTDATE: 10/9/2008

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Kehoe Testing & Engineering
REVIEWED BY: Jon Everett

LIQUEFACTION LOG OF CPT NO: C-115
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Black Rock Units 1, 2 & 3
Calipatria, California



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COMPLETION DEPTH: 75.43ft
TESTDATE: 10/8/2008

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Kehoe Testing & Engineering
REVIEWED BY: Jon Everett

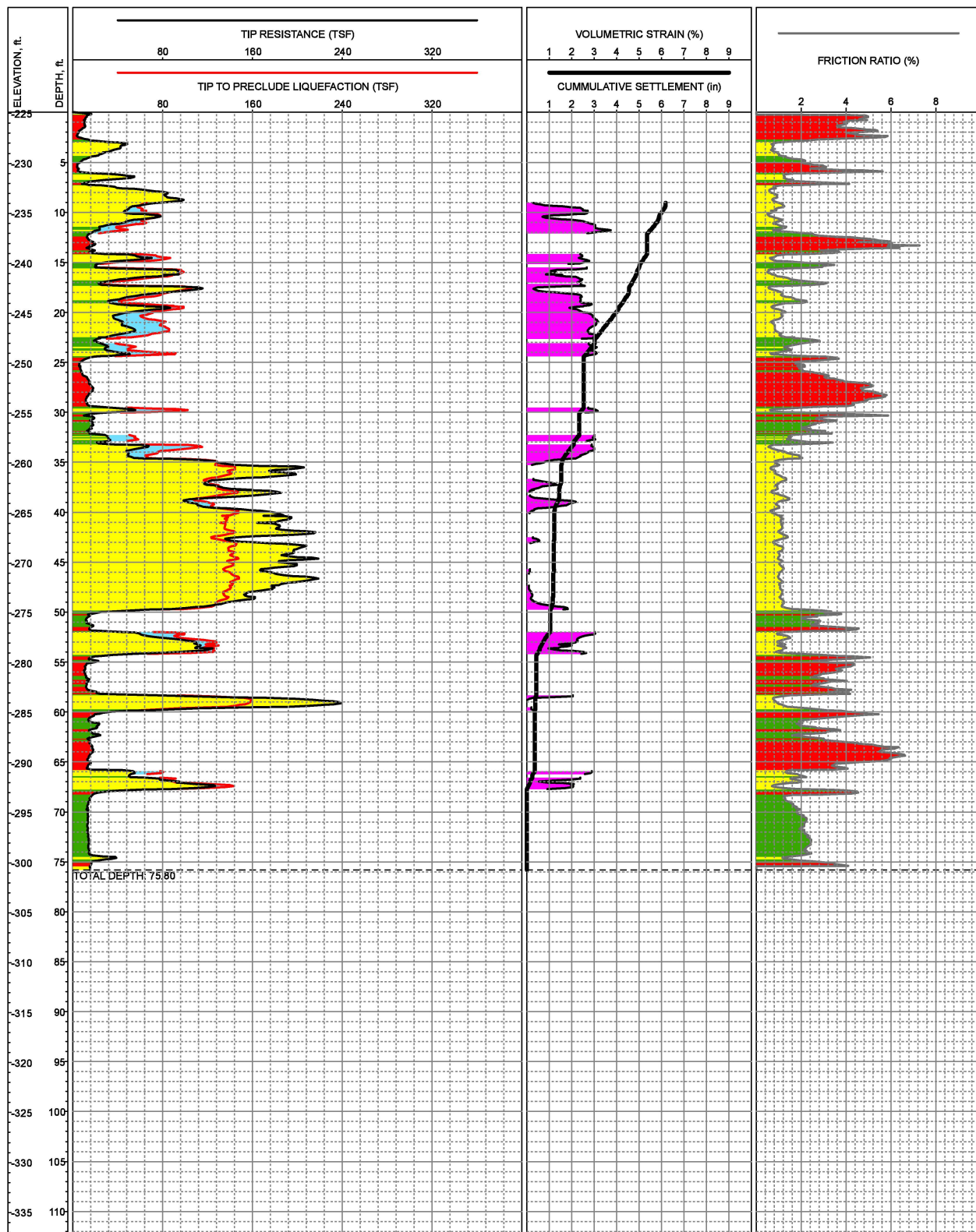
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Black Rock Units 1, 2 & 3
Calipatria, California



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COMPLETION DEPTH: 75.31ft
TESTDATE: 10/9/2008

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Kehoe Testing & Engineering
REVIEWED BY: Jon Everett

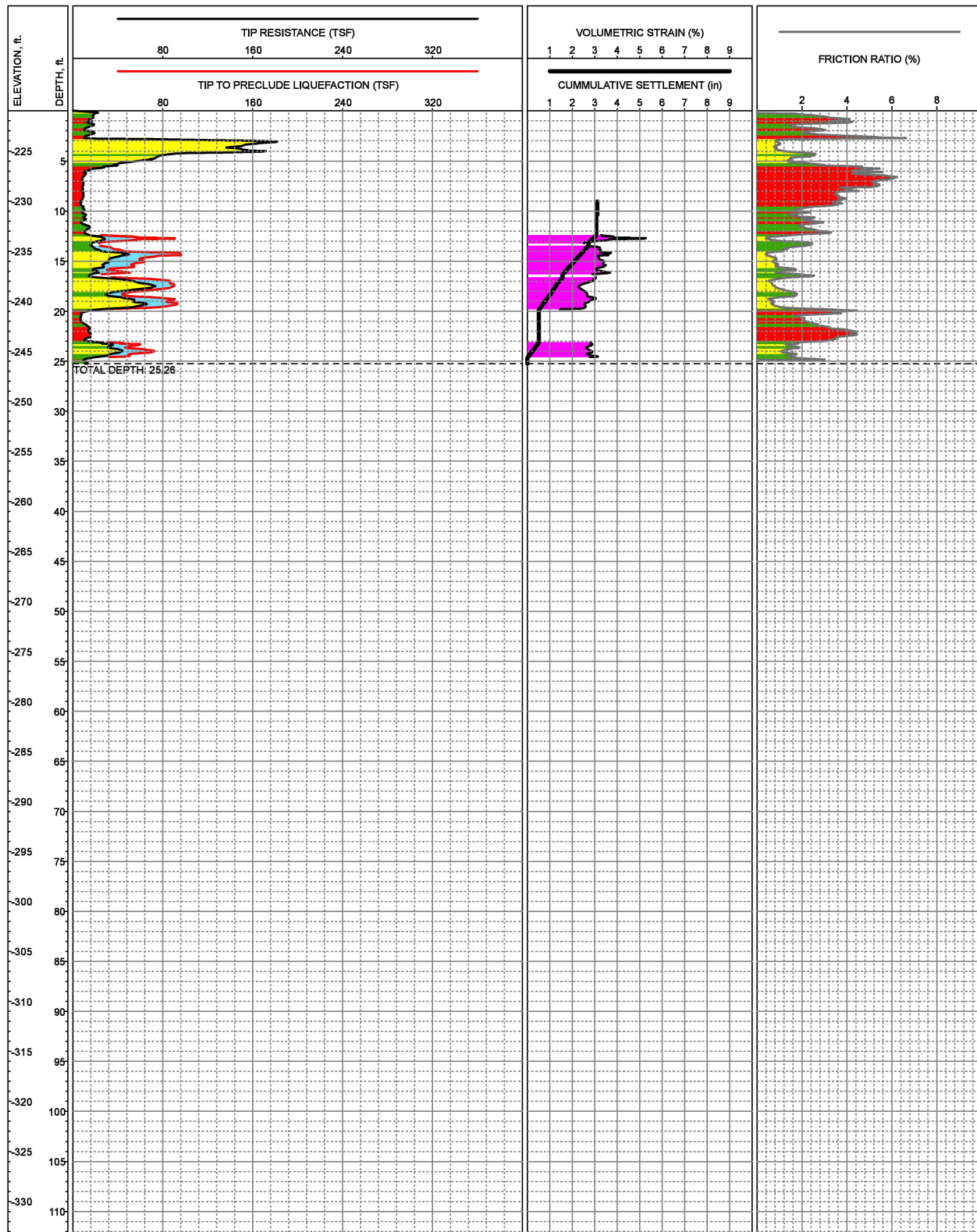
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Black Rock Units 1, 2 & 3
Calipatria, California



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COMPLETION DEPTH: 75.80ft
TESTDATE: 10/9/2008

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Kehoe Testing & Engineering
REVIEWED BY: Jon Everett

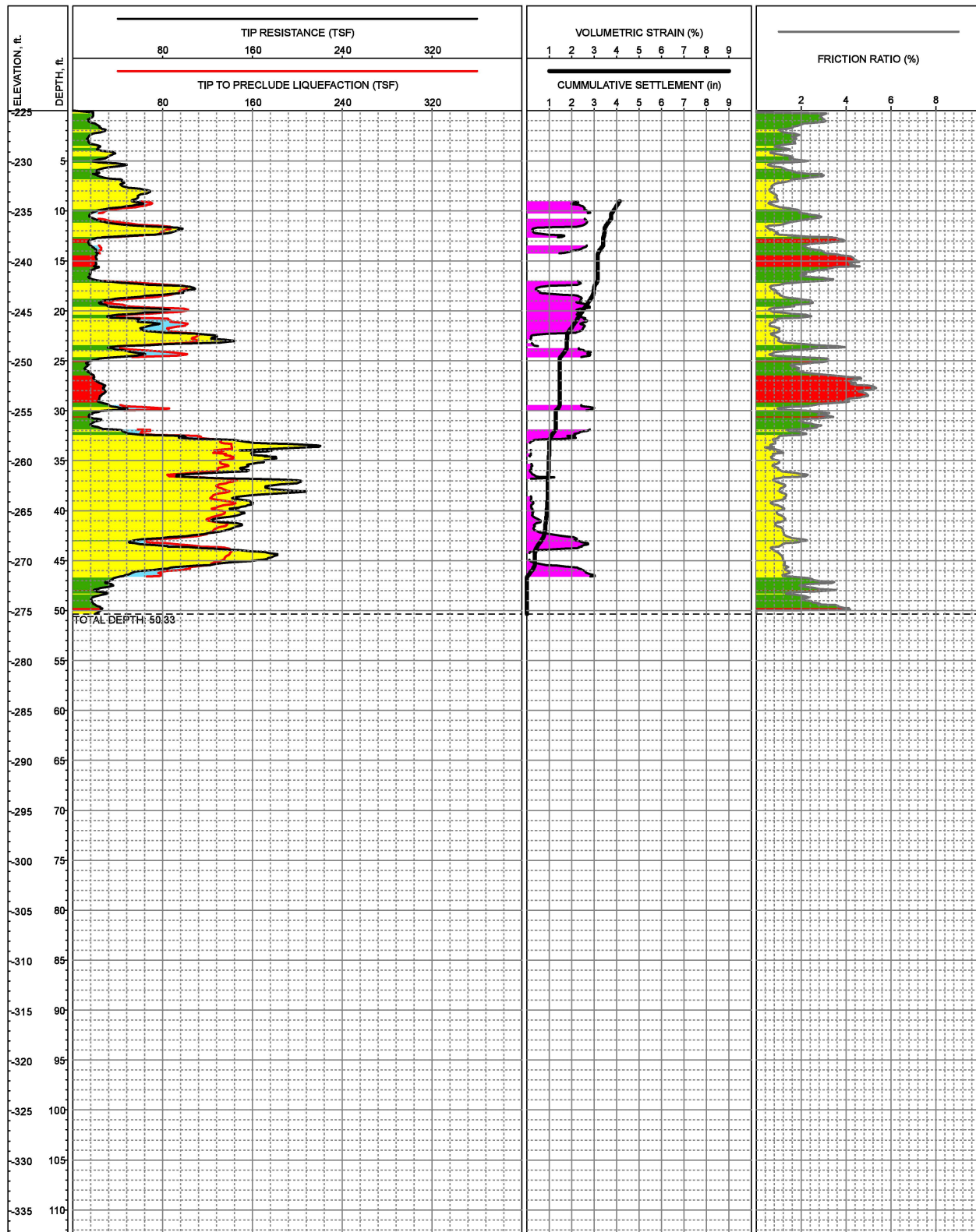
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Black Rock Units 1, 2 & 3
Calipatria, California



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COMPLETION DEPTH: 25.26ft
TESTDATE: 10/8/2008

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Kehoe Testing & Engineering
REVIEWED BY: Jon Everett

LIQUEFACTION LOG OF CPT NO: C-119
P.G.A. = 0.40g and Mw = 6.5
Black Rock Units 1, 2 & 3
Calipatria, California

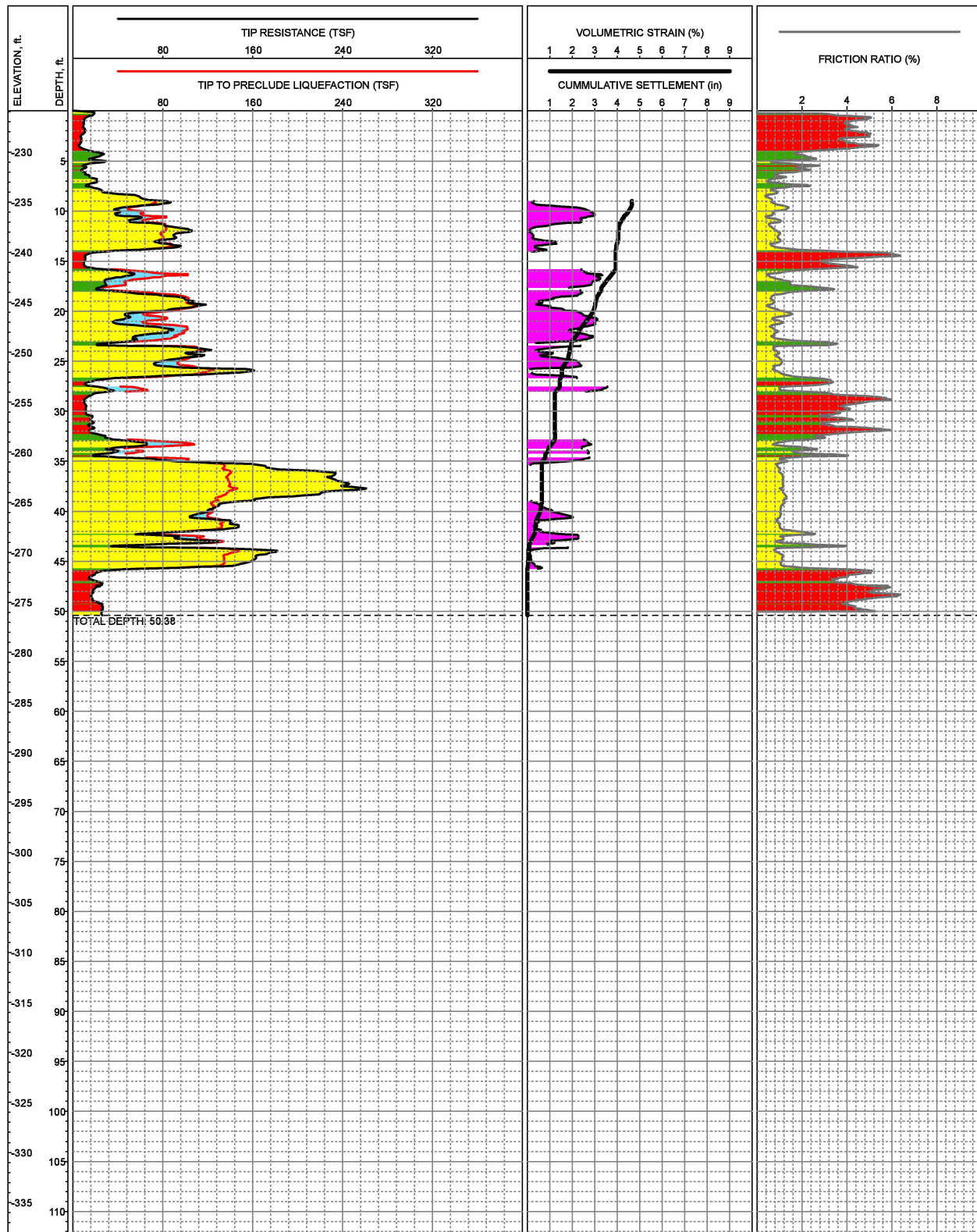


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SURFACE EL: -224.9ft +/- (NAVD88)
COMPLETION DEPTH: 50.33ft
TESTDATE: 10/8/2008

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Kehoe Testing & Engineering
REVIEWED BY: Jon Everett

LIQUEFACTION LOG OF CPT NO: C-120
P.G.A. = 0.40g and $M_w = 6.5$
Black Rock Units 1, 2 & 3
Calipatria, California

FIGURE C-21



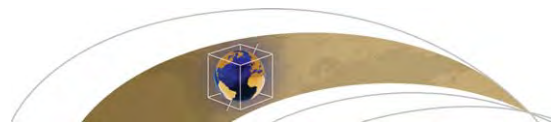
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COMPLETION DEPTH: 50.38ft
TESTDATE: 10/8/2008

EXPLORATION METHOD: Cone Penetrometer
PERFORMED BY: Kehoe Testing & Engineering
REVIEWED BY: Jon Everett

LIQUEFACTION LOG OF CPT NO: C-121
P.G.A. = 0.40g and $M_w = 6.5$
Black Rock Units 1, 2 & 3
Calipatria, California

**MBGP Attachment DRR 61 Episodic
Holocene eruption of the Salton Buttes
rhyolites, California from
paleomagnetic, U-Th, and Ar/Ar Dating**





Geochemistry, Geophysics, Geosystems

RESEARCH ARTICLE

10.1002/2015GC005714

Key Points:

- Five rhyolite obsidian domes form the Salton Buttes, CA
- We use Ar/Ar, U-Th, and paleomagnetism to date all five domes
- All domes are mid-late Holocene in age, erupted in three separate episodes

Supporting Information:

- Supporting Information S1
- Table S1
- Table S2
- Table S3

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Citation:

Wright, H. M., J. A. Vazquez, D. E. Champion, A. T. Calvert, M. T. Mangan, M. Stelten, K. M. Cooper, C. Herzig, and A. Schriener Jr. (2015), Episodic Holocene eruption of the Salton Buttes rhyolites, California, from paleomagnetic, U-Th, and Ar/Ar dating, *Geochem. Geophys. Geosyst.*, 16, 1198–1210, doi:10.1002/2015GC005714.

Received 2 JAN 2015

Accepted 12 MAR 2015

Accepted article online 20 MAR 2015

Published online 30 APR 2015

Episodic Holocene eruption of the Salton Buttes rhyolites, California, from paleomagnetic, U-Th, and Ar/Ar dating

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Abstract In the Salton Trough, CA, five rhyolite domes form the Salton Buttes: Mullet Island, Obsidian Butte, Rock Hill, North and South Red Hill, from oldest to youngest. Results presented here include ⁴⁰Ar/³⁹Ar anorthoclase ages, ²³⁸U–²³⁰Th zircon crystallization ages, and comparison of remanent paleomagnetic directions with the secular variation curve, which indicate that all domes are Holocene. ²³⁸U–²³⁰Th zircon crystallization ages are more precise than but within uncertainty of ⁴⁰Ar/³⁹Ar anorthoclase ages, suggesting that zircon crystallization proceeded until shortly before eruption in all cases except one. Remanent paleomagnetic directions require three eruption periods: (1) Mullet Island, (2) Obsidian Butte, and (3) Rock Hill, North Red Hill, and South Red Hill. Borehole cuttings logs document up to two shallow tephra layers. North and South Red Hills likely erupted within 100 years of each other, with a combined ²³⁸U–²³⁰Th zircon isochron age of: 2.83 ± 0.60 ka (2 sigma); paleomagnetic evidence suggests this age predates eruption by hundreds of years (1800 cal BP). Rock Hill erupted closely in time to these eruptions. The Obsidian Butte ²³⁸U–²³⁰Th isochron age (2.86 ± 0.96 ka) is nearly identical to the combined Red Hill age, but its Virtual Geomagnetic Pole position suggests a slightly older age. The age of aphyric Mullet Island dome is the least well constrained: zircon crystals are resorbed and the paleomagnetic direction is most distinct; possible Mullet Island ages include ca. 2300, 5900, 6900, and 7700 cal BP. Our results constrain the duration of Salton Buttes volcanism to between ca. 5900 and 500 years.

1. Introduction

Age determination of Holocene volcanic rocks is inherently difficult, especially where carbon that could be used for ¹⁴C dating is not present or the relation of the organic material to the eruption is difficult to establish [e.g., Schmitt *et al.*, 2010a; cf. Capra *et al.*, 2007]. At monogenetic volcanic fields, where there is only one phase of eruptive activity at each center, eruptive deposits from all centers likely do not form a single stratigraphic section. Thus, detailed mapping is required in order to resolve relative age relationships, if at all possible. Indeed, the use of a variety of dating techniques in combination with geologic mapping may be required in order to resolve the eruptive chronology at monogenetic volcanic fields in general [Connor and Conway, 2000]. Apart from ¹⁴C dating, radioisotope dating of Holocene rocks is challenging due to small accumulated quantities of radioactive decay daughters, but analytical advances and high-resolution sampling techniques yield meaningful dates for late Pleistocene–Holocene eruptions [e.g., Lanphere *et al.*, 2007; Vazquez and Lidzbarski, 2012]. In cases where uncertainties are large, paleomagnetic directions of primary volcanic deposits can be used to refine age determinations [Hagstrum and Champion, 2002]. Here we use the results from multiple dating techniques to resolve the timing and episodicity of rhyolitic volcanism that generated the five obsidian domes that compose the Salton Buttes, southern California, and scrutinize the advantages and shortfalls of each geochronologic technique.

2. Salton Trough Magmatism

The Salton Buttes consist of five rhyolitic obsidian domes located at the southern margin of the Salton Sea, California, USA. The domes are aligned subparallel to the axis of spreading along the boundary between the

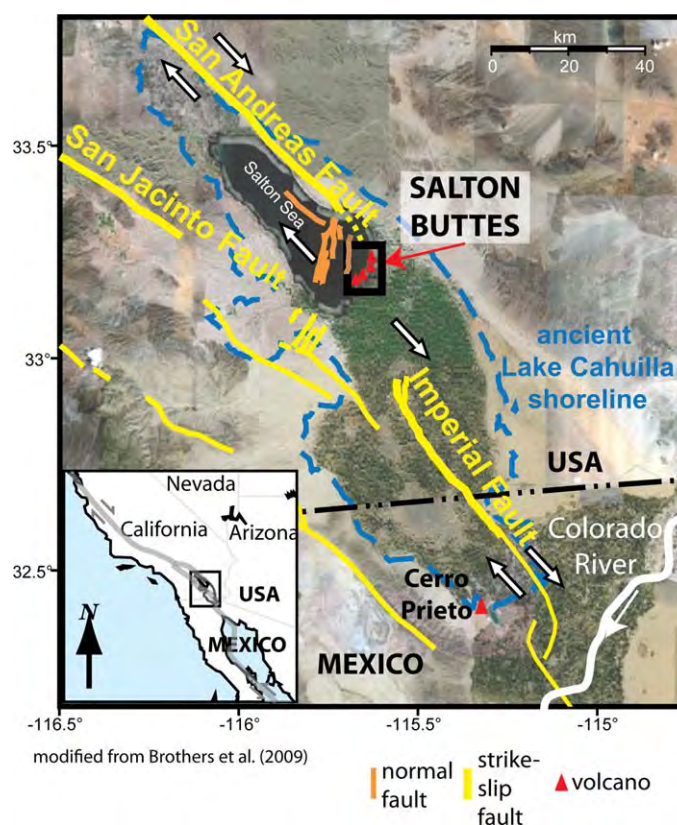


Figure 1. Location of Salton Buttes domes in a pull-apart basin between right-lateral strike slip faults along the Pacific-North American plate boundary. The location of ancient Lake Cahuilla shoreline (precursor to current Salton Sea) is shown for reference, as is the current path of the Colorado River in the southeastern corner of the figure.

estimated at $<5 \text{ km}^3$ [Robinson et al., 1976]. A young age (Holocene or late Pleistocene) for the small volume buttes is required by their subaerial exposure in an area of rapid sedimentation largely derived from the Colorado River (average 2.2–3.8 mm/yr over the past 420 ka) [Schmitt and Hulen, 2008]. However, the exact age of the buttes and the timespan required to produce all five dome-forming eruptions is more difficult to determine.

Previous eruption age determinations have largely focused on South Red Hill and Obsidian Butte. Muffler and White [1969] cite a whole-rock K-Ar age of Obsidian Butte of ca. 16 ka by R. W. Kistler and J. Obravodich (unpublished data), whereas obsidian hydration rind ages (fraught with errors) [e.g., Anovitz et al., 1999] placed Obsidian Butte at ca. 6.7–8.4 ka and Red Island (Red Hill) at ca. 2.4 ka [Friedman and Obravodich, 1981]. U-Th crystallization ages of zircon crystals in Obsidian Butte and South Red Hill span a range of ages, depending upon the component analyzed: granophyre xenoliths at South Red Hill contain ca. 26.2–20.5 ka and one 3 ka zircon (zircon isochron and zircon-whole rock model ages: Schmitt and Vazquez [2006] and Schmitt et al. [2012]), a fine-grained altered felsite xenolith at South Red Hill contains 18.3 ka zircon (zircon isochron age: Schmitt and Vazquez [2006]), rhyolitic partial melt pockets in basalt contain ca. 30.1 and 9.2 ka zircon (zircon isochron ages: Schmitt and Vazquez [2006]), and lava from Obsidian Butte and South Red Hill contains zircon cores and rims with age peaks at ca. 12.1 and 5.5 ka with minor inherited pre-Quaternary zircons (unmixed zircon model ages: Schmitt et al. [2012]). Schmitt et al. [2012] determined a $2.48 \pm 0.47 \text{ ka}$ (U-Th)/He eruption age (95% confidence interval) from analysis of zircon in a granophyre xenolith at South Red Hill. Consistent with the young age found for South Red Hill, Schmitt et al. [2012] compiled a list of dated artifacts sourced at Obsidian Butte and found that the oldest Obsidian Butte artifact was excavated above 1497 and 2259 cal BP age hearths [Kyle, 1996] (recalibrated here using OxCal v.4.2.3 Bronk Ramsey [2009] using the IntCal13 calibration curve of Reimer et al. [2013]), under about 1 m of sediment. Finally, Perrine et al. [2013] report a combined infrared stimulated luminescence age of sediment underlying Obsidian

North American and Pacific plates [Brothers et al., 2009] (Figure 1). Heat flow in the Salton Trough is high [Lachenbruch et al., 1985] and the locations of the Salton Buttes are coincident with positive magnetic and gravity anomalies [Griscom and Muffler, 1971; Mariano et al., 1986; Langenheim et al., 2012]. The five domes, from northeast to southwest, include Mullet Island (now a peninsula: Lynch et al. [2014]), North Red Hill, South Red Hill, Rock Hill, and Obsidian Butte (Figure 2). They range in vertical relief from 13 to 31 m above the adjacent Salton Sea, which itself lies 69 m below sea level (as of 2010 USGS lidar survey; Figure 2). The Salton Trough has repeatedly been submerged beneath the ancient Lake Cahuilla (predecessor to Salton Sea) and exposed over thousands of years, where at least five lake highstands have occurred since 800 CE [Philibosian et al., 2011]. The total volume of all five domes has been

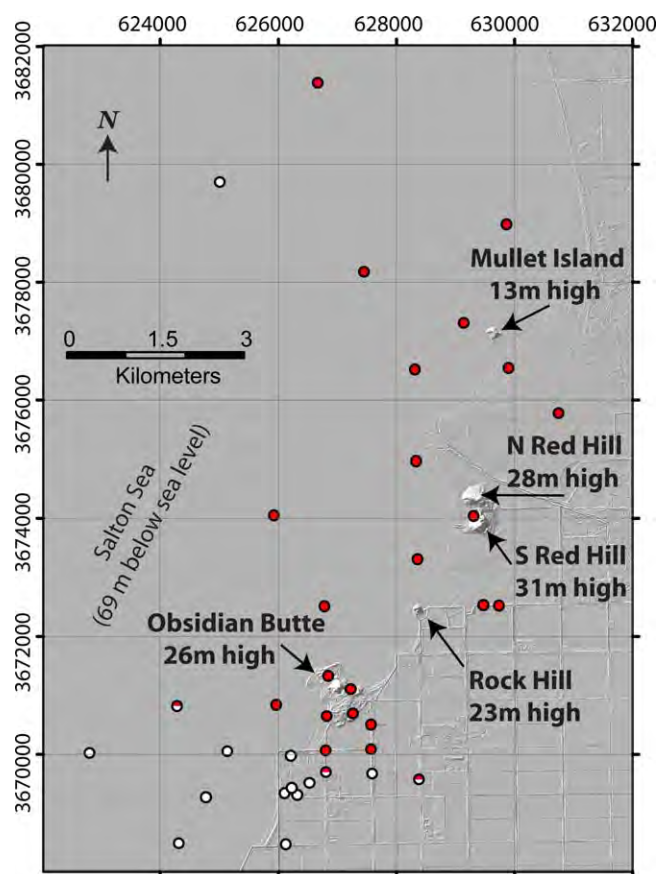


Figure 2. Shaded relief image of the southern margin of the Salton Sea and Salton Buttes from 2010 USGS LIDAR survey. Dispersal of tephra around buttes as recorded in shallow drill holes, where white dots indicate absence of tephra and red dots indicate that tephra is present. Two dots are half red, indicating the presence of tephra that is likely contamination in the hole. UTM coordinate system, see supporting information for complete well log data.

Butte at 3.3 ± 0.5 ka (2 sigma uncertainty), placing a maximum limit on the age of the Obsidian Butte eruption.

2.1. Geologic Context of Salton Buttes Volcanism

Eruptions at all five Salton Buttes consisted of an effusive eruptive phase, but at least two of these volcanoes also experienced explosive eruptions. Pyroclastic deposits from Obsidian Butte and South Red Hill are found in boreholes drilled through or in close proximity to the Salton Buttes. Six of these holes (including continuous core hole and rotary-drilled cuttings holes) intersect rhyolite flows at Obsidian Butte (five holes: 86-1, 86-2, 86-3, 84-3, and IID-8; California Department of Conservation well records: Figure 2) and South Red Hill (one hole: IID-14) in the shallow parts of the holes. There, effusive dome deposits are underlain by pumice fall deposits that are more laterally extensive than the effusive counterparts. Pumice fall deposits in these holes are found at 20–87 m depth and are thickest closest to the volcanic vent. These pumice deposits were quarried from the vicinity of Obsidian Butte as early as 1918, where quarried pumice bed thickness exceeded 3 m [Chesterman, 1956].

At South Red Hill, a pumice fall deposit

is found at 24–85 m depth. Shallow rotary-drilled temperature gradient holes around Obsidian Butte (Figure 2) intersect pumice deposits at 20–40 m depth and are thickest on the E side of the dome (cuttings were logged at ~ 1.5 m intervals). Shallow temperature-gradient boreholes drilled by the Shallow Salton Thermal Gradient Project (Lawrence Livermore National Lab and Sandia National Lab) [Newmark *et al.*, 1988] in the southeastern portion of the Salton Sea intersected tephra deposits as well (cuttings were logged at 3 m intervals). Pumiceous clasts, obsidian fragments, and ash shards were found at depths up to 80 m below the lake-bed. Depths and textural classifications of intersected tephra are recorded in supporting information Table S1. The maximum thickness of primary volcanic material (i.e., not contaminated slough from higher in the hole) is 43 m, and is located north of Obsidian Butte (Well 7F). No tephra is found in holes >1 km southeast of Obsidian Butte (white circles, Figure 2), but is found in holes up to 10 km northward of Obsidian Butte (Hole 6E, ~ 5 km north-northwest of Mullet Island); based on these and shallow observation wells near Obsidian Butte, tephra dispersal was likely to the northeast (Figure 2). Clear evidence is lacking in these core holes for multiple tephra layers separated by at least several meters of sediments (as would be expected from multiple explosive eruptions separated in time by a period of sedimentation in the lake), except in one hole, 6T (Figure 2 and supporting information Table S1), where tephra is found at 6–25 m and 60–70 m.

In addition to well-sorted fall deposits that underlie effusive deposits (lava and flow margin breccia), volcanoclastic sediments overlie the domes at North and South Red Hills (Figure 3). These deposits are matrix-supported, where the matrix consists of fine clay and quartz sediment and clasts consist of variably vesicular juvenile material. Accretionary lapilli are found in some outcrops on the southwest side of North Red Hill,



Figure 3. (a) Rock Hill viewed from South Red Hill. Total vertical relief is 23 m above water level as measured from 2010 lidar data. (b) Weakly vertically columnar jointed pyroclastic deposits at South Red Hill. Thermal demagnetization of these sediment laden pyroclastic deposits indicates emplacement temperatures in excess of 500°C, where remanent magnetization is identical to the volcanic dome rock itself.

indicating moist aggregation of ash in the atmosphere. At South Red Hill, these deposits are red-colored, coherent, and weakly columnar to vertically jointed in places.

Eruptive products are high-K rhyolites (73.2–76.4 wt. % SiO_2 ; unpublished analyses). All five domes are phenocryst-poor, containing <1–2% of anorthoclase and clinopyroxene, accessory magnetite, ilmenite, orthopyroxene, quartz, amphibole, zircon, and apatite. Several xenolith lithologies have been identified in rhyolitic lavas, including low-K tholeiitic, amphibole-bearing basalt, partially melted granophyre, altered rhyolite, and hornfelsic metasediments [Robinson *et al.*, 1976; Schmitt and Vazquez, 2006].

3. Geochronologic Techniques

In order to better constrain the timing of eruptive activity three independent geochronologic dating techniques were applied to each of the five Salton Buttes domes.

3.1. ^{238}U – ^{230}Th Geochronology

Zircon crystals were extracted from cleaned, crushed obsidian samples using standard magnetic and heavy liquid separation techniques. After separation, zircon crystals were placed in a cold, dilute hydrofluoric acid bath for 5 min to remove adhering glass. Individual grains were then hand-picked and embedded into soft indium metal in order to analyze unpolished zircon rim compositions [Vazquez and Lidzbarski, 2012]. Grains were mounted on the same mounts as reference standards. ^{238}U – ^{230}Th – ^{232}Th compositions of 109 zircon crystals (>17 crystals for each of the five domes) were determined by secondary ion mass spectrometry (SIMS) using the Stanford-USGS SHRIMP-RG ion microprobe following analytical techniques described in Vazquez and Lidzbarski [2012]. Measurements were made in 2013, which is the reference year for zircon crystallization age determinations here. All zircon grains were imaged after analysis with a cathodoluminescence (CL) detector to document grain shape and analysis spot position on the crystal face. U and Th isotope compositions of host obsidian glass were determined by multicollector Inductively Coupled Plasma Mass Spectrometer (ICP-MS) for hand-picked glass separates from each dome using standard dissolution techniques and ion-exchange chromatography as described in Cooper and Donnelly [2008] and modified in Stelten and Cooper [2012]. For each dome, isochron ^{238}U – ^{230}Th ages were calculated using respective rim compositions and the measured ^{238}U – ^{230}Th composition of host obsidian glass. Model ^{238}U – ^{230}Th crystallization ages were calculated as two-point isochrons through individual rim analyses and host obsidian glass [Reid *et al.*, 1997]. Isochron and weighted mean model ages are reported with uncertainty at the 95% confidence level. During the analytical sessions, sectioned zircon from Puy de Dome trachyte, France (PdD), and from a syenite lithic clast erupted at Laacher See, Germany (268 sanidine), were analyzed for comparison

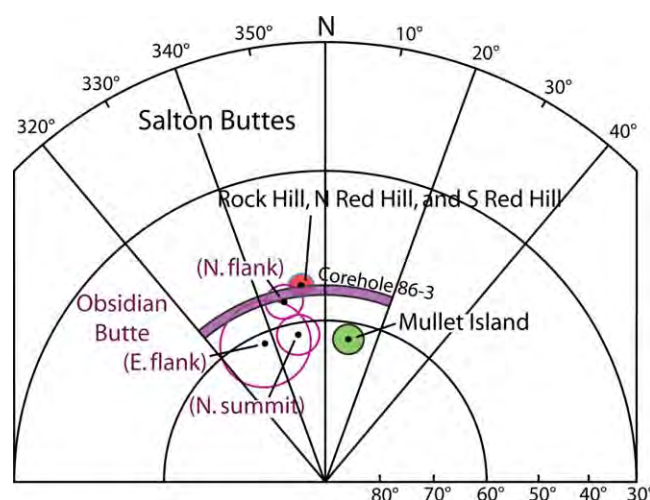


Figure 4. Lower hemisphere equal area plots of mean magnetization directions of Salton Buttes domes with 95% confidence ovals. Data represent two sites on Mullet Island, six sites on Rock Hill, North Red Hill, and South Red Hill, and three sites from Obsidian Butte (purple labels). Purple inclination band centered at 54° inclination is derived from 19 of 22 azimuthally unoriented vertical drill core samples in Obsidian Butte rhyolite from core hole 86-3. The overlap between this band and the orientation of one Obsidian Butte site supports the inference that this site was the least deformed of the three Obsidian Butte sites and thereby most closely represents the original magnetization direction.

to the results from independent studies. Together with U-Th data delimiting the initial $^{230}\text{Th}/^{232}\text{Th}$ of their host magma [Condomines, 1997], Puy de Dome zircon yield an isochron age of 10.1 ± 2.1 ka ($n = 9$, 95% confidence), which is indistinguishable from the thermal ionization mass spectrometry U-Th age of 12.1 ± 1.0 ka reported for bulk zircon separate [Condomines, 1997], and a SIMS age of 14.8 ± 2.4 [Schmitt *et al.*, 2010b]. Laacher See zircon yields an isochron age of 17.2 ± 3.1 ka ($n = 14$, 95% confidence), which is indistinguishable from the SIMS isochron age of 17.1 ± 2.6 ka reported by Schmitt [2006].

3.2. $^{40}\text{Ar}/^{39}\text{Ar}$ Geochronology

Both anorthoclase and glass separates were extracted from obsidian samples for $^{40}\text{Ar}/^{39}\text{Ar}$ geochronology. Anorthoclase crystals were separated from four of the Salton Buttes domes: Obsidian Butte, North Red Hill, South Red Hill,

and Rock Hill. 250–500 μm size whole anorthoclase crystals were extracted from the same cleaned, crushed obsidian samples used for zircon extraction, using standard magnetic and hand separation techniques. After separation, crystals were placed in a cold, dilute hydrofluoric acid bath to remove adhering glass. In addition, 500–1000 μm size anorthoclase crystals were extracted from Obsidian Butte obsidian and 250–355 μm size fresh glass chips were separated from Obsidian Butte and Mullet Island obsidians. Aliquants of anorthoclase weighing 121–161 mg and of glass weighing 104–115 mg were encapsulated in Cu foil and placed in quartz vials along with fluence monitor mineral Bodie Hills sanidine ($t = 9.6345$ Ma), an internal USGS standard calibrated to Taylor Creek sanidine (TCR-2 = 27.87 Ma). TCR-2 is calibrated to the first principles standard SB-3 (162.9 Ma) [Lanphere and Dalrymple, 2000]. Using these standard ages, the commonly employed monitor Fish Canyon sanidine yields an age of 27.63 Ma. The quartz vials were then wrapped with Cd foil and were irradiated for 60 min in the U.S. Geological Survey TRIGA reactor in Denver, Colorado. Samples were irradiated in two sets, IRR314 and IRR315, and were rotated continuously and the package was oscillated through the reactor centerline to minimize the flux gradient. Full details of the irradiation and experimental technique, with special

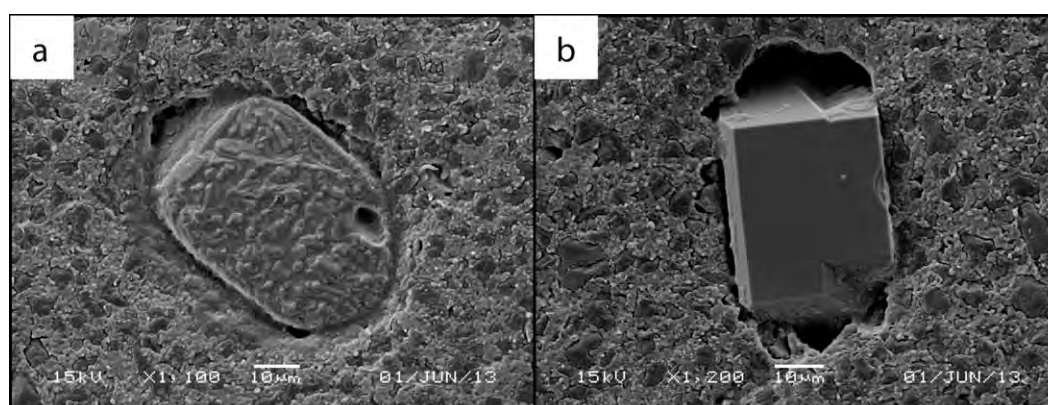


Figure 5. Secondary electron images of unpolished zircon grains mounted in indium metal, (a) Mullet Island zircon: note irregular surface, and (b) Rock Hill zircon. Zircons from Obsidian Butte, North and South Red Hills, and Rock Hill look like Rock Hill zircon shown here.

Table 1. $^{40}\text{Ar}/^{39}\text{Ar}$ Ar ages for Saltern Buttas with 2 sigma uncertainties

Table 1. $^{40}\text{Ar}/^{39}\text{Ar}$ Ar ages for Saltern Buttas with 2 sigma uncertainties												
Sample	Material	Experiment	$^{40}\text{Ar}/^{39}\text{Ar}$ Weighted mean plateau age			$^{40}\text{Ar}/^{39}\text{Ar}$ isotope correlation (isochron) age			$^{40}\text{Ar}/^{39}\text{Ar}$ total gas		Comments	
			Age (ka)	% ^{39}Ar [steps, °C]	MSWD	Age (ka)	% ^{39}Ar [steps, °C]	MSWD	$^{40}\text{Ar}/^{36}\text{Ar}_i$	Age (ka)		
1 2HW-SB08 South Red Hill (250-500 μm)	Anorthoclase	13Z0134	0.9 ± 2.8	74[700-1250]	1.98	1.7 ± 4.0	74[700-1250]	2.11	293.3 ± 6.2	5.8 ± 2.0	Climbing spectrum, acceptable plateau or isochron	
12HW-SB09 Rock Hill (250-500 μm)	Anorthoclase	13Z0131	6.5 ± 7.6	100[600-1450]	10.88	9.8 ± 7.0	73[600-1250]	1.68	289.1 ± 4.0	2.7 ± 2.6	Acceptable isochron	
12HW-SB11 North Red Hill (250-500 μm)	Anorthoclase	13Z0135	1.7 ± 1.6	68[900-1250]	0.78	2.1 ± 3.0	68[900-1250]	0.89	293.7 ± 9.6	4.4 ± 1.6	Good plateau, isochron	
13HW-SB18 Obsidian Butte (250-500 μm)	Anorthoclase	13Z0132	4.9 ± 2.0	59[900-1200]	0.52	4.9 ± 3.6	59[900-1200]	0.62	295.2 ± 5.6	7.8 ± 2.0	Good plateau, isochron	
13HW-SB18 Obsidian Butte (500-1000 μm)	Anorthoclase	13Z0137	4.7 ± 2.4	66[600-1250]	0.57	3.6 ± 3.8	66[600-1250]	0.59	298.0 ± 8.5	6.9 ± 2.2	Good plateau, isochron	
13HW-SB18 Obsidian Butte	Obsidian	13Z0133	5.8 ± 1.8	67[800-1050]	0.29	1.8 ± 1.5	67[800-1050]	0.29	319.4 ± 99.6	9.4 ± 1.8	Good plateau, isochron	
1 2HW-SB04 Mullet Island	Obsidian	13Z0136	-119.4 ± 7.6	47[600-850]	1.13	5.7 ± 335.4	47[600-850]	1.13	282.2 ± 26.9	-93.1 ± 5.2	Low precision isochron ok	

^aSamples irradiated at USGS TRIGA reactor using 9.6345 Ma Bodie Hills sanidine as a neutron flux monitor

Preferred ages in *italics*

^aSamples irradiated at USGS TRIGA reactor using 9.6345 Ma Bodie Hills sanidine as a neutron flux monitor
Preferred ages in italics

consideration for young volcanic samples with low radiogenic yields, are found in *Calvert and Lanphere* [2006]. The results are presented as age spectrum diagrams and as normal isochron (isotope correlation) plots. All analyses are shown with 2 sigma uncertainties (Table 1).

3.3. Paleomagnetism

Paleomagnetic samples were collected, processed, and interpreted using the methods described by *McElhinny* [1973]. Sites were occupied at 1–3 locations in each of the five obsidian domes. An additional site was taken in syn-eruptive volcanoclastic deposits plastered against the dome at South Red Hill. These volcanoclastic deposits are red-colored, matrix-supported, poorly sorted deposits with a sedimentary matrix (fine clay and quartz silt) surrounding abundant volcanic (pumice and obsidian) clasts. Samples were taken in the field using a handheld, gasoline-powered, 2.5 cm coring drill and were oriented using a sun compass. Eight, 10 cm long samples were taken at each site. 2.5 cm long specimens were measured using an automated cryogenic magnetometer and variously subjected to alternating-field (AF) or thermal demagnetization to remove secondary components of, and reveal the characteristic direction of remanent magnetization. The mean direction of magnetization for each site was calculated using Fisher statistics on data from line fits on vector component diagrams. Site mean directions are presented in Table 2, and illustrated in Figure 4 for each dome as part of an equal-area projection (lower hemisphere) showing mean directions and ovals of 95% confidence (α_{95}).

An additional 28 samples were subcored from vertical (6.4 cm diameter) drill cores taken through Obsidian Dome (Holes 86-1 and 86-3; Department of Conservation well log list: <http://geo-steam.conservation.ca.gov/WellSearch/GeoWellSearch.aspx>), and generously made available to us by CalEnergy Operating Corporation. These samples were not oriented with regard to azimuth and thus can only provide remanent inclination data. They too were measured in an automated cryogenic magnetometer, AF demagnetized, fit with line solutions on vector component diagrams, and average inclination values calculated using an algorithm by *McFadden and Reid* [1982, Table 2].

4. Results

4.1. ^{238}U – ^{230}Th Geochronology

All analyzed zircon crystals are euhedral, with the exception of most grains from Mullet Island, which have less distinct crystal edges and vermiform surfaces (Figure 5 and supporting information Figure S1). Isochron ages calculated from zircon populations and matrix glass compositions at North Red Hill, Obsidian Butte, and South Red Hill yield dates of 3.15 ± 0.40 , 2.86 ± 0.48 , and 2.43 ± 0.47 ka, respectively (± 1 sigma, Figure 6, Table 3; supporting information Table S2).

Mean apparent zircon rim model ages for crystallization in order of decreasing age are 8.9 ± 0.5 , 4.2 ± 0.4 , 3.1 ± 0.4 , 2.8 ± 0.5 , and

Table 2. Salton Buttes Paleomagnetic Data

Dome	Site number	LAT	LON	N/No	Exp. type	I (°)	D (°)	A ₉₅	k	R	λ _P	Φ _P
Rock Hill	0652B	33.182	244.377	8/8	AF	52.3	354.5	3.3	288	7.9757	85.4	152.4
South Red Hill	0732B	33.194	244.389	8/8	AF	52.7	354.8	2.1	692	7.9899	85.7	156.9
	1132B	33.195	244.389	8/8	AF	52.9	352.9	1.1	2343	7.997	84.1	159.3
	0013B	33.197	244.388	7/8	Th	53.2	351.8	2.2	744	6.99193	83.2	161.7
	average	33.195	244.389	3/3		52.9	353.2	1.4	7288	2.99973	84.3	159.4
North Red Hill	0812B	33.198	244.389	6/8	AF	55.7	347.2	1.7	1621	5.9969	79.1	174.1
	1212B	33.198	244.388	8/8	AF	49.6	355.5	3.2	294	7.97262	85.3	119.7
	average	33.198	244.389	2/2		52.7	351.6	17.3	211	1.99525	83	157.5
	average	33.190	244.380	3/3		52.8	352.9	2.2	925	5.9946	84.1	157.8
Obsidian Butte	1052B	33.170	244.363	7/8	AF	55.4	347.1	3.3	328	6.9817	79	172.6
	0972B	33.171	244.363	7/8	Th	62.1	349.5	3.8	260	6.97695	76.9	208.7
	6982B	33.172	244.364	4/8	Th	61.9	336.5	8.2	126	3.97613	69.1	189.6
	6732B	33.225	244.393	9/9	Th	63	10.5	3.6	206	8.96111	76.1	277.1
Mullet Island	6822B	33.226	244.392	8/8	Th	63.2	7.7	2.2	666	7.98949	77.1	269.6
	average	33.225	244.392	2/2		63.1	9.1	2.8	7982	1.99987	76.6	273.6

^aSite number is a field and laboratory identification number, all sites were drilled in rhyolite lava except 0013B that was drilled in red fragmental deposits on top of South Red Hill dome; N/No is the number of samples used in calculation of the average divided by the number of samples collected; Exp. type: AF indicates line fits on alternating field demagnetization results, Th indicates line fits on thermal demagnetization results; I, D are in situ inclination and declination directions of mean paleomagnetic directions; R is the resultant vector sum of N unit vectors; k is the concentration parameter (Fisher 1953); A₉₅ is the radius of 95% confidence, λ_P and Φ_P are the latitude and longitude of the virtual geomagnetic pole, respectively.

2.4 ± 0.5 ka for Mullet Island, Rock Hill, North Red Hill, Obsidian Butte, and South Red Hill, respectively (1 sigma uncertainty; supporting information Table S2). These model ages are well within uncertainty limits of isochron ages for North Red Hill, Obsidian Butte, and South Red Hill. A minority of zircon crystals from three domes (Obsidian Butte, North Red Hill, and Rock Hill) yield individual model ages from ca. 10 to 100 ka.

4.2. ⁴⁰Ar/³⁹Ar Geochronology

For each of the seven aliquants in Table 1, a weighted-mean plateau age, an isotope correlation age, and a total gas age has been calculated, where the preferred age is shown in bold. We define the criteria for selection of the most meaningful incremental heating age following *McDougall and Harrison* [1999] and *Calvert and Lanphere* [2006]. On this basis, weighted mean plateau ages are favored when four criteria are met: a well-defined horizontal plateau for more than 50% of the ³⁹Ar released; a well-defined isochron for the plateau gas fractions; concordant plateau and isochron ages; and a ⁴⁰Ar/³⁹Ar isochron intercept that does not significantly differ from the atmospheric value of 295.5. Where one or more of these criteria are not met, we favor the isochron age for that sample. Weighted mean plateau ages are favored for all samples, except the Rock Hill anorthoclase and the Mullet Island obsidian glass samples (Figure 7, supporting information Figure S2 and Table S3).

In order of decreasing age, our interpreted ages for incremental heating experiments are all Holocene. The Rock Hill anorthoclase yielded a climbing age spectrum with no plateau, but an isochron age for Rock Hill anorthoclase of 9.8 ± 7.0 ka (±2 sigma). Mullet Island contained no separable anorthoclase and obsidian produced all negative apparent ages and yielded a reasonable, but poorly determined isochron age of 5.7 ± 330 ka. Obsidian Butte anorthoclase analyses yielded well-determined weighted mean plateau ages of 4.9 ± 2.0 and 4.7 ± 2.4 ka, and obsidian analyses produced a weighted mean plateau age of 5.8 ± 1.8 ka; these three ages

Table 3. ²³⁸U-²³⁰Th Zircon-Glass Isochron Ages for Salton Buttes

Sample	Rhyolite	Isochron age (ka)	±1σ	N	MSWD	±95% conf.
SB08	South Red Hill	2.41	0.47	18/18	1.6	0.93
SB11	North Red Hill	3.14	0.40	20/23	1.5	0.79
SB18	Obsidian Butte	2.86	0.48	17/20	0.95	0.94
SB08+SB11	South Red Hill +North Red Hill	2.83	0.30	38/41	1.5	0.76

^aIsochron and model ages are derived using a ²³⁰Th decay constant of 9.1705 (±0.0138)×10⁻⁶a⁻¹ [Cheng *et al.*, 2013] and reported as years before 2013 (ka) with uncertainty at the 1 sigma and 95% confidence interval. N = number of analyses included for isochron age relative to number analyzed. MSWD = mean square of weighted deviates [Wendt and Carl, 1991].

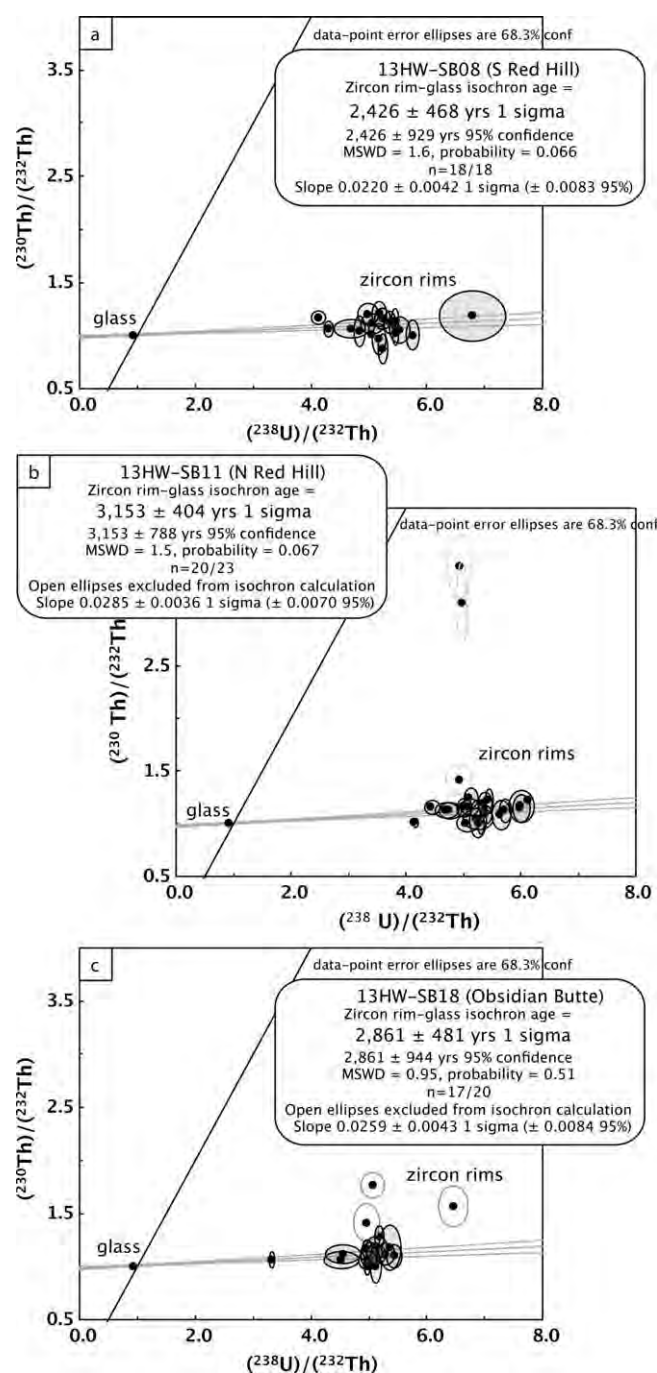


Figure 6. ^{238}U - ^{230}Th isochron age diagrams for zircon rims (supporting information Table S2 contains all U-Th data).

are within 2 sigma analytical uncertainty of each other. North Red Hill anorthoclase analyses yielded a weighted mean plateau age of 1.7 ± 1.6 ka and South Red Hill anorthoclase analyses produced a weighted mean plateau age of 0.9 ± 2.8 ka.

4.3. Paleomagnetic Directions

Mean characteristic directions for all sampled sites are shown in Table 2. North Red Hill, South Red Hill, and Rock Hill obsidian domes have identical remanent directions within the calculated uncertainty, with $I \sim 53^\circ$ and $D \sim 353^\circ$. Samples from red, clastic deposits that overlie South Red Hill also have identical directions, indicating that these deposits were emplaced at temperatures above the Curie point, and must be primary phreatomagmatic deposits (with clay and quartz sedimentary matrix supporting volcanic clasts; Figure 3). Samples from the two sites on Mullet Island are distinct from the above and cluster tightly at $I \sim 63^\circ$ and $D \sim 9^\circ$.

The remanent directions recorded by samples from the three paleomagnetic sites on Obsidian Butte, however, exhibit significant internal variation (Figure 4). Two sources of variation are possible. The scatter may be a reflection of geomagnetic secular variation occurring over the course of the eruption, or, alternatively, may be an artifact of syn or posteruption dome deformation. Geomagnetic secular variation, which occurs at a rate of 2° to 8° per 100 years [Merrill *et al.*, 1996], is dismissed because the time required to produce the observed variation is inconsistent with the characteristic days to tens of years

durations of small dome-forming eruptions [Newhall and Melson, 1983]. Instead we attribute the variation to sub-Curie point deformation (e.g., at temperatures below 580°C), either by postemplacement fracture and rotation of cold dome rocks, or, by nonuniform, plastic deformation occurring during extrusion (e.g., scatter in single Unzen lava flow directions) [Tanaka *et al.*, 2004].

Paleomagnetic inclinations of vertical drill core from Obsidian Butte (core hole 86-3 in Figure 2) can be used to determine which of the surface sample sites most faithfully represent the primary magnetic field direction at the time of eruption. The mean inclination derived from 19 of the 22 Obsidian Butte core samples analyzed is $54.0 \pm 0.9^\circ$, which is shown in Figure 4 as the purple band reflecting the 95% confidence

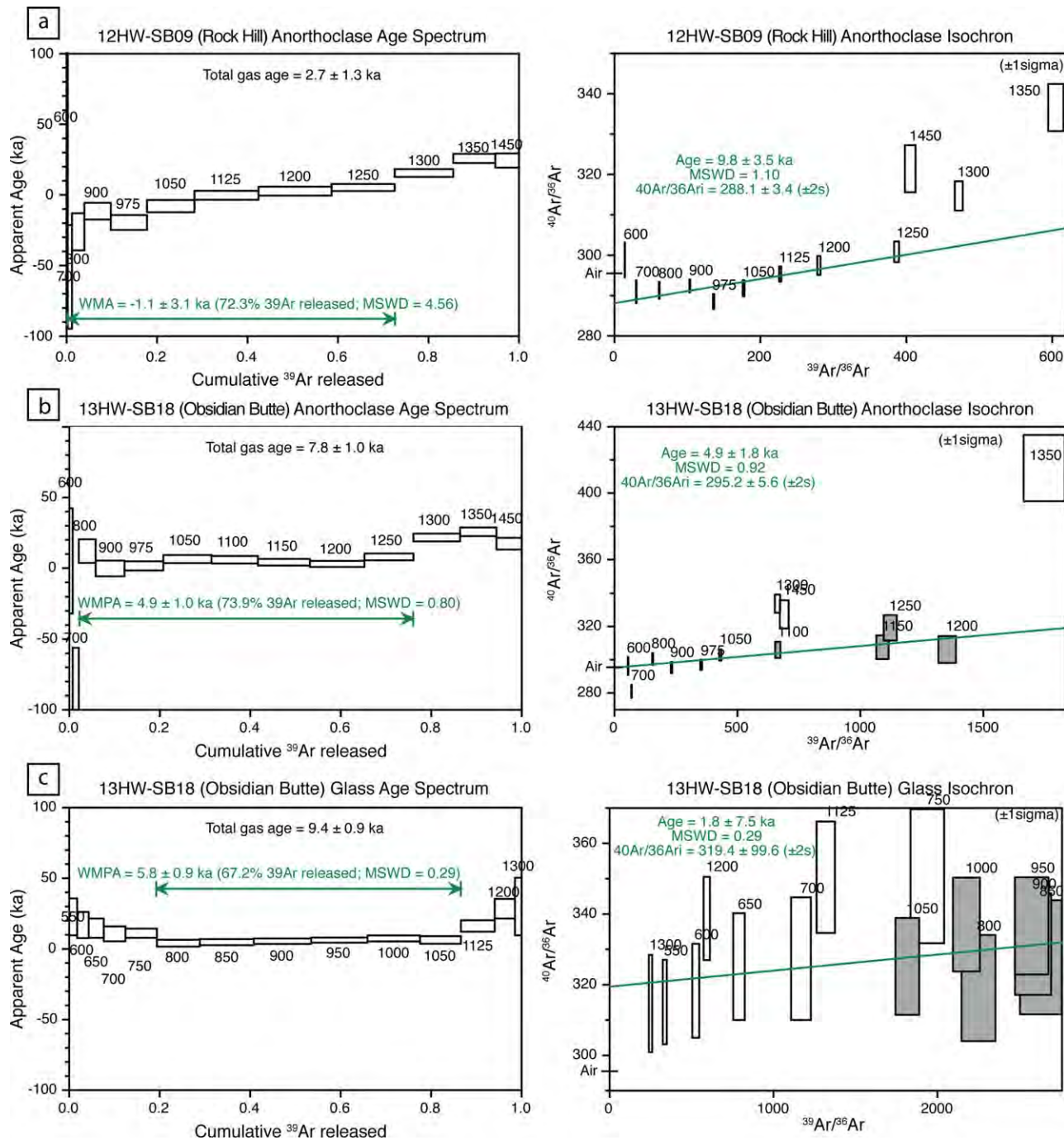


Figure 7. Sample $^{40}\text{Ar}/^{36}\text{Ar}$ age spectra diagrams and normal isochron plots for anorthoclase and glass separates from Salton Buttes (supporting information Figure S2 contains all plots). Uncertainties for apparent ages and isotopic ratio boxes are all 2 sigma. Interpreted ages, weighted mean plateau ages (WMPA), and $^{40}\text{Ar}/^{36}\text{Ar}$ ratios are 2 sigma. Horizontal lines with arrows on age spectra show which steps were used in plateau ages, filled symbols on isochron plots show steps used in isochron fit.

interval. The band only intersects the north flank magnetization direction. Data from the other two sites on Obsidian Butte are off by $\sim 8^\circ$. The best estimate for the characteristic remanent magnetization of Obsidian Butte is therefore taken as $I \sim 55^\circ$ and $D \sim 347^\circ$. The Obsidian Butte direction is slightly steeper and more westerly than the mean direction of Rock Hill, North Red Hill, and South Red Hill. The observed 4° angular separation between the two clusters suggests eruptions separated by no more than 200 years. The 13° separation of Mullet Island data from the other domes suggests the entire eruptive episode creating Salton Buttes could have lasted no more than approximately 500 years.

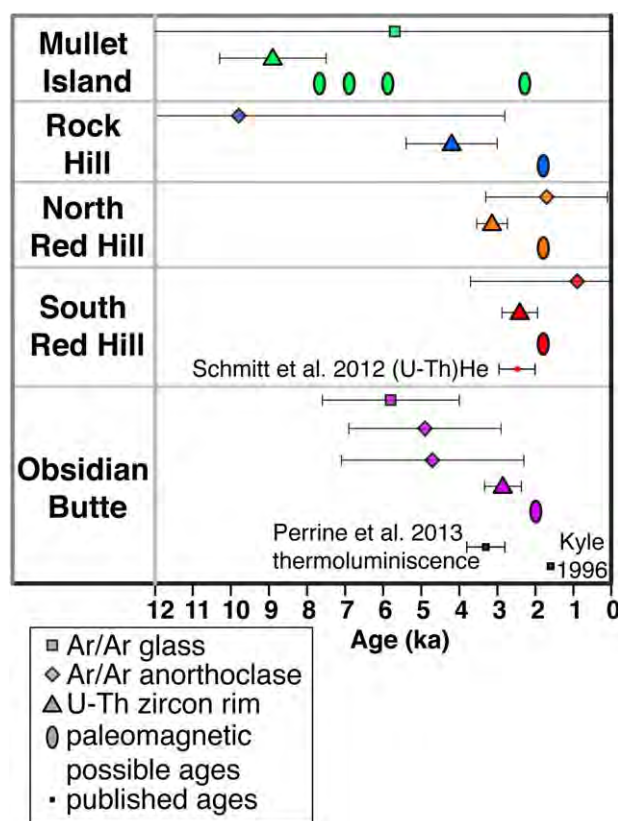


Figure 8. Compilation of $^{40}\text{Ar}/^{39}\text{Ar}$ and ^{238}U - ^{230}Th age results (with 2 sigma uncertainties for Ar ages and 95% confidence intervals for U-Th ages) from this study, including permissible ages for paleomagnetic data within uncertainty limits of other age determinations and previously published age constraints for Salton Buttes surface domes.

Rims on zircon from Obsidian Dome, North Red Hill, South Red Hill, and Rock Hill are euhedral (Figure 5), consistent with thermochemical equilibrium with their host rhyolitic melt. The irregular overall morphology of zircon grains in the Mullet Island dome suggests limited dissolution and in turn that this rhyolite batch became undersaturated in zircon prior to eruption. Partial dissolution of outer growth zones is evident in the CL images of some, but not all Mullet Island zircon grains (supporting information Figure S3). Resorption of Mullet Island zircon was rapid, lasting no more than several centuries based on the dissolution kinetics of entire 50–100 μm zircon grains in undersaturated melt [Harrison and Watson, 1983] at the 770–790°C temperatures derived from Zr-in-melt geothermometry (H. Wright, unpublished data, 2013). The thin vermiform texture on the crystal faces of the Mullet Island zircon (Figure 5) suggests that this population of crystals may have undergone a final episode of rapid crystallization, likely near the time of eruption [e.g., Roeder et al., 2001; Waters and Lange, 2013]. The relatively old U-Th model ages for the resorbed Mullet Island zircon can be reconciled with the zircon ages for the other rhyolites if the apparent episode of dissolution removed a sequence of the crystal stratigraphy equivalent to several millennia of growth. Accordingly, the Mullet Island zircon U-Th ages are likely to predate eruption by a greater interval of time than for the other domes. The ages for the resorbed Mullet Island zircon are consistent with the isochron ages reported by Schmitt and Vazquez [2006] for zircon cores from Obsidian Butte and South Red Hill (ca. 12.1 ka) that reflect the onset of zircon saturation or recycling of antecrysts.

$^{40}\text{Ar}/^{39}\text{Ar}$ ages are less precise than ^{238}U - ^{230}Th isochron ages; we find that $^{40}\text{Ar}/^{39}\text{Ar}$ ages agree with ^{238}U - ^{230}Th crystallization ages within 2 sigma uncertainty levels. The overlap in the two age determinations validates the assumption that zircon crystallization proceeded to sometime shortly before eruption (i.e., zircon rim crystallization ages are not thousands of years older than the eruption). These results inform our ultimate interpretation that all five Salton Buttes erupted in the Holocene, and at least four of the five

5. Discussion

The ^{238}U - ^{230}Th isochron ages for the final increment of zircon crystallization provide the most precise radioisotopic ages in this study (Figure 8). Crystallization ages from zircon provide a maximum limit on eruption age because crystal growth necessarily precedes eruption and U and Th are effectively retained in zircon even at magmatic temperatures. Given potential growth rates from diffusion of Zr in a cooling rhyolitic melt [e.g., Watson, 1996] and the results from depth profiling of crystallization ages in single zircon [Schmitt, 2011; Storm et al., 2011], the typical depth of $\sim 5 \mu\text{m}$ sampled during SHRIMP-RG U-Th analyses [Vazquez and Lidzbarski, 2012] may integrate several centuries to millennia of crystal stratigraphy if crystallization was continuous without hiatus or loss of the youngest zircon domains by resorption. Dating studies that directly or effectively sample the outermost rims on euhedral zircon can resolve crystallization ages that precede eruption by several millennia or less [e.g., Crowley et al., 2007; Vazquez and Lidzbarski, 2012]. Rim ages that precede eruption by tens of thousands of years indicate recycling of antecrysts [e.g., Storm et al., 2011].

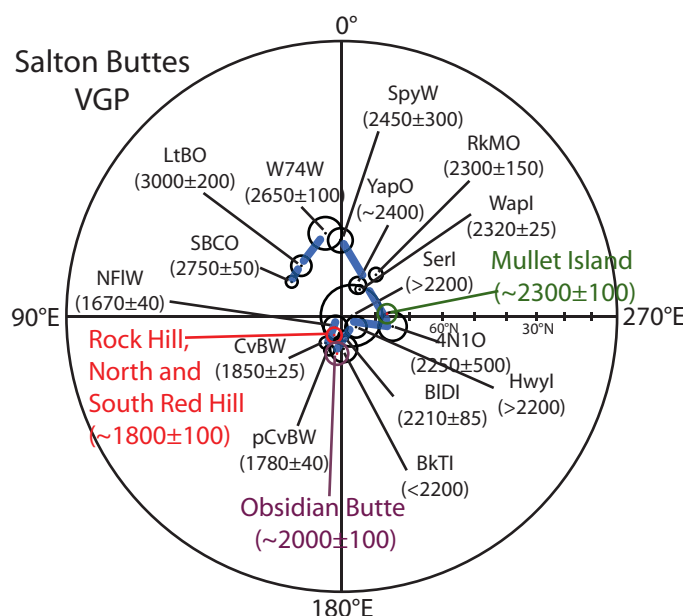


Figure 9. North polar equal area plot showing Virtual Geomagnetic Poles (VGP) from Salton Buttes units (in red, purple, and green), and calibrated ^{14}C dated reference VGP principally from Hagstrum and Champion [2002], but also unpublished Mount St. Helens area data from Clynne and Champion (written communication). Ages in parentheses are calibrated ^{14}C ages ± 1 sigma uncertainty for the reference flow VGP. Thick dashed blue line shows generalized path of geomagnetic secular variation through about 1000 years. Abbreviations of reference VGP in decreasing age order are SBCO: South Belknap Cone flow; LtBO: Little Belknap flow; W74W: W74-type basaltic andesite, Castle Creek episode, Mount St. Helens; SpyW: South Puyallup pyroclastic flow; RkMO: Rock Mesa pyroclastic flow; YapO: Yapoah lava flow; Wapl: Wapi and Kings Bowl lava fields; 4N1O: Four-in-One flow; Serl: Serrate flow; Hwyl: highway flow; BIDI: Blue Dragon flows; BkTI: Broken Top flows; pCvBW: pre-Cave basalt flows, Mount St. Helens; CvBW: Cave Basalt flows, Mount St. Helens; and NFIW: North flank basalts, Mount St. Helens.

erupted in the mid to late-Holocene. We can further refine these estimates, however, using paleomagnetic data. A comparison of paleomagnetic directions in the flows allows us to better understand the differences between eruption ages, where paleomagnetic results provide evidence for three different eruption intervals.

On their own, remanent paleomagnetic directions can discriminate between times of eruptions, but cannot provide eruption ages. However, eruption ages can be inferred through comparisons with the established Holocene paleomagnetic secular variation curve derived from ^{14}C -dated magnetic reference points for the western U.S. [Hagstrum and Champion, 2002]. This comparison is made on plots of virtual geomagnetic poles (VGP), calculated from the original site directional data, in order to remove gradients in direction inherent to the dipolar geomagnetic field, and allow regional comparisons to be made.

In Figure 9, two distinct eruption periods are evident (two clusters

of VGP positions). Reference to the calibrated ^{14}C ages on this curve assigns ages of 2000 ± 100 cal BP for Obsidian Butte, and 1800 ± 100 cal BP for Rock Hill, and South and North Red Hills. Using approximate depths to tephra in shallow drill holes near Obsidian Butte of 15–18 m and an age of 2000 BP for the Obsidian Butte eruption, implies an average sedimentation rate of 8–9 mm/yr. Reference to calibrated ^{14}C ages gives an eruption age of 2300 ± 100 cal BP for Mullet Island. The inferred eruption ages are consistent with the approximately 500 year duration of Salton Butte volcanism indicated by the site mean directions in Figure 4.

Despite textural evidence for late-stage resorption of Mullet Island zircons, the 8.9 ± 1.4 ka ^{238}U - ^{230}Th mean apparent model age of those crystals allows for the possibility that Mullet Island erupted much earlier than the other domes. By comparison to calibrated ^{14}C dated reference VGP available from the western US, and younger than ca. 9 ka, three older (than the 2300 ± 100 cal BP age listed above) possible paleomagnetic age assignments for Mullet Island (ca. 5900, 6900, and 7700 years cal BP) are suggested (Figure 10). A significantly older eruption age for the Mullet Island rhyolite may explain the apparent presence of two tephra layers separated by >20 m of sediment in shallow drill hole 6T west of Mullet Island (Figure 2).

The combination of paleomagnetism with ^{238}U - ^{230}Th and $^{40}\text{Ar}/^{39}\text{Ar}$ dating reveals that episodic volcanism generated the rhyolites at Salton Buttes. Paleomagnetic characteristics require three distinct episodes of volcanism separated by several years to hundreds of years, despite similar compositions for the rhyolites. If Mullet Island is young (ca. 2 ka, Figure 8), then Salton Buttes volcanism extended over an interval of approximately 500 years, but could be as long as approximately 5000 years if older (i.e., if zircon crystallization ages are close in time to eruptions, despite resorbed surfaces, ca. 8 ka, Figure 8). Hence, the Holocene eruptive activity that produced the five obsidian domes and pyroclastic volcanic deposits was not constrained to a single episode of eruption.

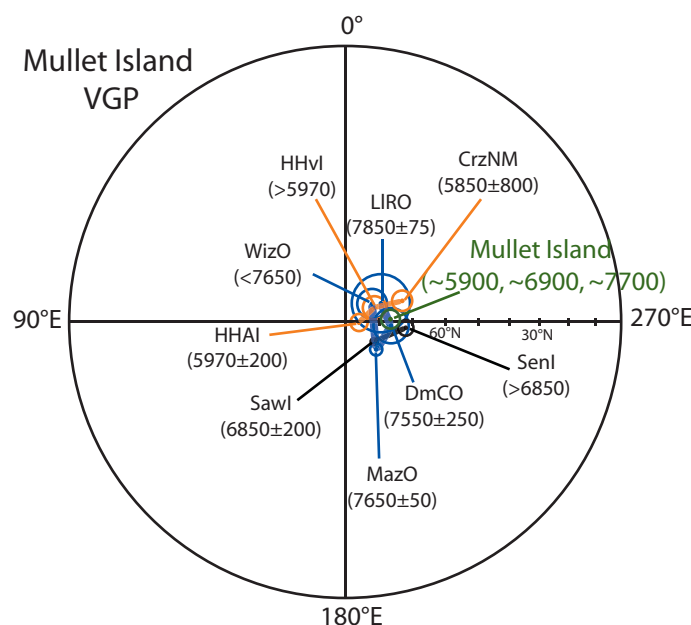


Figure 10. North polar equal area plot showing Virtual Geomagnetic Poles (VGP) from Mullet Island (in green), and calibrated ^{14}C dated reference VGP principally from Hags-trum and Champion [2002], but also from Sherrod et al. [2012]. Ages in parentheses are calibrated ^{14}C ages ± 1 sigma uncertainty for the reference flow VGP. Thick tan (~ 5900 years), black (~ 6900 years), and blue (~ 7700 years) lines show generalized paths of geomagnetic secular variation through those three different time spans. Abbreviations of reference VGP in decreasing age order are: HHAl: Hells Half Acre lava field; HHvl: Hells Half Acre vent area; CrzNM: Carrizozo lava field; Sawl: Sawtooth flow; Senl: Sentinel flow; LIRO: Llao flow; DmCO: Diamond Craters lava field; MazO: climactic pyroclastic flows of Mount Mazama; and WizO: Wizard Island.

6. Conclusions

All five Salton Buttes dome-forming eruptions occurred in Holocene time, likely mid to late-Holocene. Based on the overlap in paleomagnetic directions, the overlap in ^{238}U - ^{230}Th ages, and the overlap in $^{40}\text{Ar}/^{39}\text{Ar}$ ages, North and South Red Hills likely erupted within a century of each other. Slightly younger South Red Hill appears to be the only butte (of the five) clearly erupted through water. A combined U-Th isochron age for these two domes is 2.83 ± 0.60 ka (2 sigma), but paleomagnetic evidence suggests that this age pre-dates eruption by hundreds of years, where an age of 1800 ± 100 cal BP is found for other volcanics with identical paleomagnetic directions to South and North Red Hills. The similarity in paleomagnetic direction, the overlap in ^{238}U - ^{230}Th age, and to a lesser degree the overlap in $^{40}\text{Ar}/^{39}\text{Ar}$ age suggests that Rock Hill erupted closely in time to the Red Hill eruptions as well. Note that although the Obsid-

ian Butte ^{238}U - ^{230}Th isochron age (2.86 ± 0.48 ka) is nearly identical to the combined Red Hill age, its paleomagnetic direction is just outside the 95% confidence radius of North and South Red Hills and Rock Hill domes. This difference and the relative location of its VGP pole suggest a slightly older age (years to one hundred years) for Obsidian Butte relative to the Red Hills. Reference to the calibrated ^{14}C ages on the secular variation curve assigns an age of 2000 ± 100 cal BP for Obsidian Butte. These age constraints are consistent with the 2.48 ± 0.47 ka (U-Th)/He age of South Red Hill and thermoluminescence ($<3.3 \pm 0.5$ ka) constraints on the Obsidian Butte age. The difference in paleomagnetic direction and older ^{238}U - ^{230}Th and $^{40}\text{Ar}/^{39}\text{Ar}$ ages suggest that Mullet Island dome is older than the other domes, as little as 500 years older than the Red Hill eruptions or as much as ~ 5000 years older.

Acknowledgments

Supplementary data for this paper are available in supporting information Figures S1–S3 and Tables S1–S3. Kari Cooper would like to acknowledge funding from NSF award EAR-1144945 for U-Th analyses of glasses. We would like to acknowledge CalEnergy for access to drillcore samples from Obsidian Butte and for discussions about the geology of the volcanic buttes. We thank Marsha Lidzbarski for assistance with sample preparation, and Brad Ito for technical assistance in the SHRIMP laboratory. We thank Axel Schmitt and Erik Klemetti for helpful reviews.

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MBGP Attachment DRR 62 County Concurrence Letter





Imperial County Planning & Development Services Planning / Building

Jim Minnick
DIRECTOR

September 28, 2023

Mr. Eric Veerkamp
California Energy Commission
715 P Street
Sacramento, CA 95814

Imperial County Response to Data Request Set 1 (TN #252095) for the Morton Bay Geothermal Project (23-AFC-01)

Dear Mr. Eric Veerkamp:

In response to the California Energy Commission (CEC) Staff's Data Requests Set 1 for the Morton Bay Geothermal Project (MBGP) (23-AFC-01), this letter is intended to clarify Imperial County's (County) perspective on the potential project. Specifically, this letter addresses applicability of County development standards on the project's ancillary components, the County's perspective on potential findings for a variance to the maximum building height of 35 feet in the Open Space/Recreational (S-1-G) zone, and the County's perspective on potential findings for the issuance of Conditional Use Permits (CUP).

Applicability of Development Standards on Ancillary Components

MBGP Data Request #62 requests information on how the development of each ancillary facility is consistent with the development standards for each site's zoning designation. Ancillary facilities for the project include aboveground and underground production and injection wells, aboveground production and injection pipelines, generation tie-lines (transmission lines and poles), underground freshwater supply lines, and temporary laydown yards, parking areas, borrow pits, and construction camps.

The aboveground wells (injection), aboveground pipelines (injection), and construction camps require County review and approval of a Conditional Use Permit (CUP). During the CUP process, the County will determine applicable development standards (if any), including setbacks and maximum structure height, for the wells, pipelines, and construction camps. The County will require consistency with applicable development standards prior to the issuance of a CUP or as conditions of approval.

The generation interconnection transmission line (gen-tie) is under jurisdiction of the Imperial Irrigation District and is not subject to County development standards. The freshwater supply lines and connections are located underground and are not subject to County development standards. Due to the temporary nature of laydown yards, parking areas, and borrow pits, development standards are not applicable.

Variance to the Maximum Building Height at the Primary MBGP Site

MBGP Data Request #63 and # 64 requests material to support the statement that the County could make variance findings for multiple structures at the primary MBGP site which exceed the 35-foot maximum building height. The project proponent indicates the facility's design and engineering make it

infeasible to construct these structures at or below the 35-foot threshold. The project proponent also indicates some structures would reach heights of approximately 95 feet.

Land uses surrounding the MBGP site are shown in Table 1, below.

Table 1. Surrounding Land Uses at the MBGP Site

Location From Project Site	Current Use	Zoning
North of the Plant Site	Open Space; recreational	Open Space/Recreational with Geothermal Overlay (S-1-G)
East of the Plant Site	Open Space; Geothermal energy production	Medium Industrial Area with Geothermal and Pre-Existing Allowed/Restricted Overlays (M-2-G-PE)
South of the Plant Site	Open Space; recreational	Open Space/Recreational with Geothermal Overlay (S-1-G)
West of the Plant Site	Open Space; recreational	Open Space/Recreational with Geothermal Overlay (S-1-G)

In order to issue a variance, the County would need to make the following findings, pursuant to Section 90202.08 of the County's Land Use Ordinance:

- A. Findings. Approval or conditional approval may be granted only if the director/commission/board of supervisors first determines that the variance satisfies the criteria set forth in Government Code Section 65906, and the following findings can be made:
1. That there are special circumstances applicable to the property described in the variance application, that do not apply generally to the property or class of use in the same zone or vicinity;
 2. That the granting of such variance will not be materially detrimental to the public welfare or injurious to the property or improvements in such zone or vicinity in which the property is located;
 3. That because of special circumstances applicable to subject property, including size, shape, topography, location or surroundings, the strict application of zoning laws is found to deprive subject property of privileges enjoyed by other properties in the vicinity and under identical zone classifications;
 4. That the granting of such variance will not adversely affect the comprehensive general plan.

MBGP Data Request #65 requests information on how the project could meet the required variance findings. A high-level informal review indicates the following:

Finding #1: Special circumstances exist at the MBGP site in the form of rare geothermal resources near the surface.

Finding #2: It is possible that the granting of such a variance would not be materially detrimental to the public welfare or injurious to the property or improvements in the vicinity.

Finding #3: It is possible that the strict application of zoning laws could deprive the MBGP facility of opportunities which are utilized by existing and similar geothermal facilities located nearby.

Finding #4: It is initially believed that granting of such a variance would not adversely affect the comprehensive general plan.

Although the County is open to a variance to maximum building height at the primary MBGP site, it is critical to note that the County would require formal review to determine if the required findings, set forth in Section 90202.08 of the County's Land Use Ordinance, can be made.

Potential to Make Required Findings for Issuance of CUPs

MBGP Data Request #66 requests information on how the development of each project element, which would require a CUP if reviewed by the County, could meet the findings required for issuance of a CUP. The elements of the project, which would require permitting under a CUP if reviewed by the County, are as follows:

The MBGP components which would be subject to a CUP, if reviewed by the County, include the following:

- Primary powerplant: Per Section 90518.02 of the County's Land Use Ordinance, major facilities related to the generation and transmission of electrical energy are permitted as conditional uses.
- Injection wells and injection pipelines: Per Section 90508.02 and 90512.02 of the County's Land Use Ordinance, major facilities related to the generation and transmission of electrical energy are permitted as conditional uses.
- Temporary laydown yards and parking areas: Per Section 90509.02 and 90518.02 of the County's Land Use Ordinance, temporary contractor storage yards are permitted as conditional uses.
- Temporary construction camps: Per Section 90509.02 and 90518.02 of the County's Land Use Ordinance, labor camps are permitted as conditional uses.
- Temporary borrow pits: Per Section 90509.02 and 90507.02 of the County's Land Use Ordinance, mineral extraction and resource extraction are permitted as conditional uses.
- Gen tie-line: Per Section 90518.02, transmission lines are permitted as conditional uses.

In order to issue CUPs, the County would need to make the following findings, pursuant to Section 90203.09 of the County's Land Use Ordinance:

- A. The proposed use is consistent with the goals and policies of the adopted county general plan;
- B. The proposed use is consistent with the purpose of the zone or sub-zone within which the use will be located;
- C. The proposed use is listed as a use within the zone or sub-zone or is found to be similar to a listed conditional use according to the procedures of Section 90203.10;
- D. The proposed use meets the minimum requirements of this title applicable to the use and complies with all applicable laws, ordinances and regulations of the county of Imperial and the state of California;
- E. The proposed use will not be detrimental to the health, safety, and welfare of the public or to the property and residents in the vicinity;
- F. The proposed use does not violate any other law or ordinance;
- G. The proposed use is not granting a special privilege.

A high-level informal review indicates the following:

Finding A: There are no initial concerns regarding significant inconsistencies with the projects and the goals and policies of the adopted general plan.

Finding B: As shown in the bullet list above, the proposed uses appear to generally align with uses identified in the County's Land Use Ordinance as permitted conditional uses. If the proposed uses are consistent with the permitted conditional uses identified in the code, the proposed uses would be consistent with the purpose of the zone designation which they are located in.

Finding C: As shown in the bullet list above, the proposed uses appear to generally align with uses identified in the County's Land Use Ordinance as permitted conditional uses.

Finding D: With the approval of a variance for structure height at the primary MBGP site, the project does not appear to be inconsistent with applicable laws, ordinances, and regulations of the County or State.

Finding E: There are no initial concerns with the proposed uses being detrimental to the health, safety, and welfare of the public or to the property and residents in the vicinity.

Finding F: With the approval of a variance for structure height at the primary MBGP site, the proposed uses do not appear to violate any other law or ordinance.

Finding G: The project is similar to other existing geothermal powerplants in the area. There are no initial concerns regarding the granting of a special privilege if a CUP is issued.

In summary, based upon the information we have reviewed to date, we are presently aware of no facts that would prevent the County from issuing CUP(s) for the elements of the projects that would require a CUP if reviewed by the County. However, this is an informal and non-binding opinion. It is critical to note that the County would require formal review to determine if the required findings, set forth in Section 90203.09 of the County's Land Use Ordinance, can be made for each instance.

If the County's perspective on these land use issues requires further clarification, please feel free to contact me at 442-265-1736 or via email at jimminnick@co.imperial.ca.us.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Jim Minnick', is written over a horizontal line.

Jim Minnick, Director
Imperial County Planning & Development Services Director

CC: Michael Abraham, AICP, Planning & Development Services Assistant Director
Diana Robinson, Planning Division Manager
Files: 10.102; 10.101; 10.104
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MBGP Attachment DRR 73 Construction Health Risk Assessment



Native files for Attachment DRR 73 have been provided separately and are available upon request.

MBGP Attachment DRR 85 Raw Traffic Count Data



County of Imperial
N/S: SR-111
E/W: Sinclair Road
Weather: Clear

File Name : 01_CIM_111_Sinc Wed AM
Site Code : 23022885
Start Date : 10/5/2022
Page No : 1

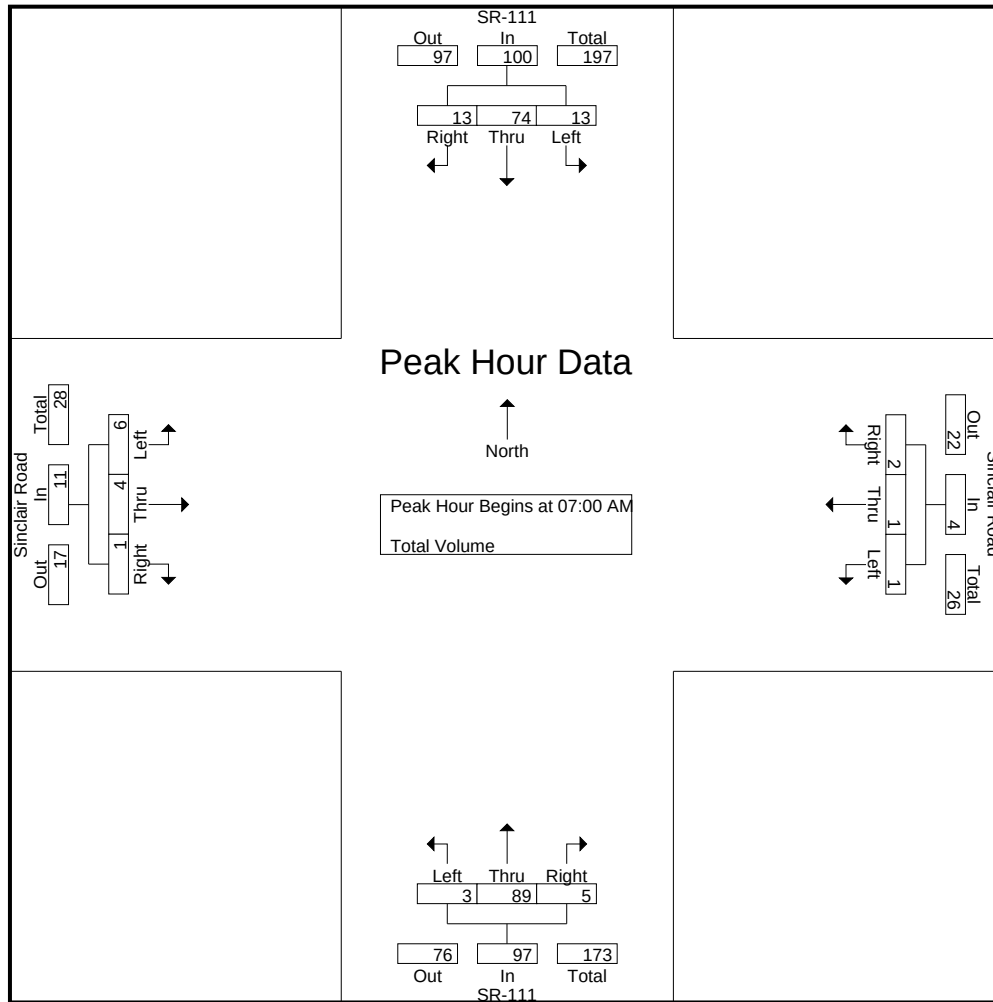
Groups Printed- Total Volume

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05:00 AM	1	3	1	5	0	0	0	0	0	21	0	21	0	0	1	1	27
05:15 AM	1	4	0	5	0	0	0	0	1	16	0	17	1	0	2	3	25
05:30 AM	6	6	3	15	0	0	0	0	3	27	0	30	0	1	1	2	47
05:45 AM	3	6	5	14	0	0	0	0	8	21	1	30	2	0	1	3	47
Total	11	19	9	39	0	0	0	0	12	85	1	98	3	1	5	9	146
06:00 AM	3	21	3	27	0	0	0	0	2	11	0	13	0	0	1	1	41
06:15 AM	1	18	1	20	0	0	0	0	1	15	0	16	2	0	0	2	38
06:30 AM	3	17	1	21	0	2	1	3	1	16	0	17	1	0	0	1	42
06:45 AM	5	11	0	16	0	0	0	0	1	23	0	24	2	0	1	3	43
Total	12	67	5	84	0	2	1	3	5	65	0	70	5	0	2	7	164
07:00 AM	4	13	3	20	0	0	1	1	0	14	1	15	4	2	0	6	42
07:15 AM	2	21	5	28	0	0	0	0	3	23	0	26	1	1	1	3	57
07:30 AM	3	21	4	28	0	0	0	0	0	27	1	28	0	1	0	1	57
07:45 AM	4	19	1	24	1	1	1	3	0	25	3	28	1	0	0	1	56
Total	13	74	13	100	1	1	2	4	3	89	5	97	6	4	1	11	212
Grand Total	36	160	27	223	1	3	3	7	20	239	6	265	14	5	8	27	522
Apprch %	16.1	71.7	12.1		14.3	42.9	42.9		7.5	90.2	2.3		51.9	18.5	29.6		
Total %	6.9	30.7	5.2	42.7	0.2	0.6	0.6	1.3	3.8	45.8	1.1	50.8	2.7	1	1.5	5.2	

	SR-111 Southbound				Sinclair Road Westbound				SR-111 Northbound				Sinclair Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 AM to 07:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	4	13	3	20	0	0	1	1	0	14	1	15	4	2	0	6	42
07:15 AM	2	21	5	28	0	0	0	0	3	23	0	26	1	1	1	3	57
07:30 AM	3	21	4	28	0	0	0	0	0	27	1	28	0	1	0	1	57
07:45 AM	4	19	1	24	1	1	1	3	0	25	3	28	1	0	0	1	56
Total Volume	13	74	13	100	1	1	2	4	3	89	5	97	6	4	1	11	212
% App. Total	13	74	13		25	25	50		3.1	91.8	5.2		54.5	36.4	9.1		
PHF	.813	.881	.650	.893	.250	.250	.500	.333	.250	.824	.417	.866	.375	.500	.250	.458	.930

County of Imperial
N/S: SR-111
E/W: Sinclair Road
Weather: Clear

File Name : 01_CIM_111_Sinc Wed AM
Site Code : 23022885
Start Date : 10/5/2022
Page No : 2



Peak Hour Analysis From 05:00 AM to 07:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00 AM				06:15 AM				05:00 AM				06:30 AM			
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+15 mins.	2	21	5	28	0	2	1	3	1	16	0	17	2	0	1	3
+30 mins.	3	21	4	28	0	0	0	0	3	27	0	30	4	2	0	6
+45 mins.	4	19	1	24	0	0	1	1	8	21	1	30	1	1	1	3
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% App. Total	13	74	13		0	50	50		12.2	86.7	1		61.5	23.1	15.4	
PHF	.813	.881	.650	.893	.000	.250	.500	.333	.375	.787	.250	.817	.500	.375	.500	.542

County of Imperial
N/S: SR-111
E/W: Sinclair Road
Weather: Clear

File Name : 01_CIM_111_Sinc Wed PM
Site Code : 23022885
Start Date : 10/5/2022
Page No : 1

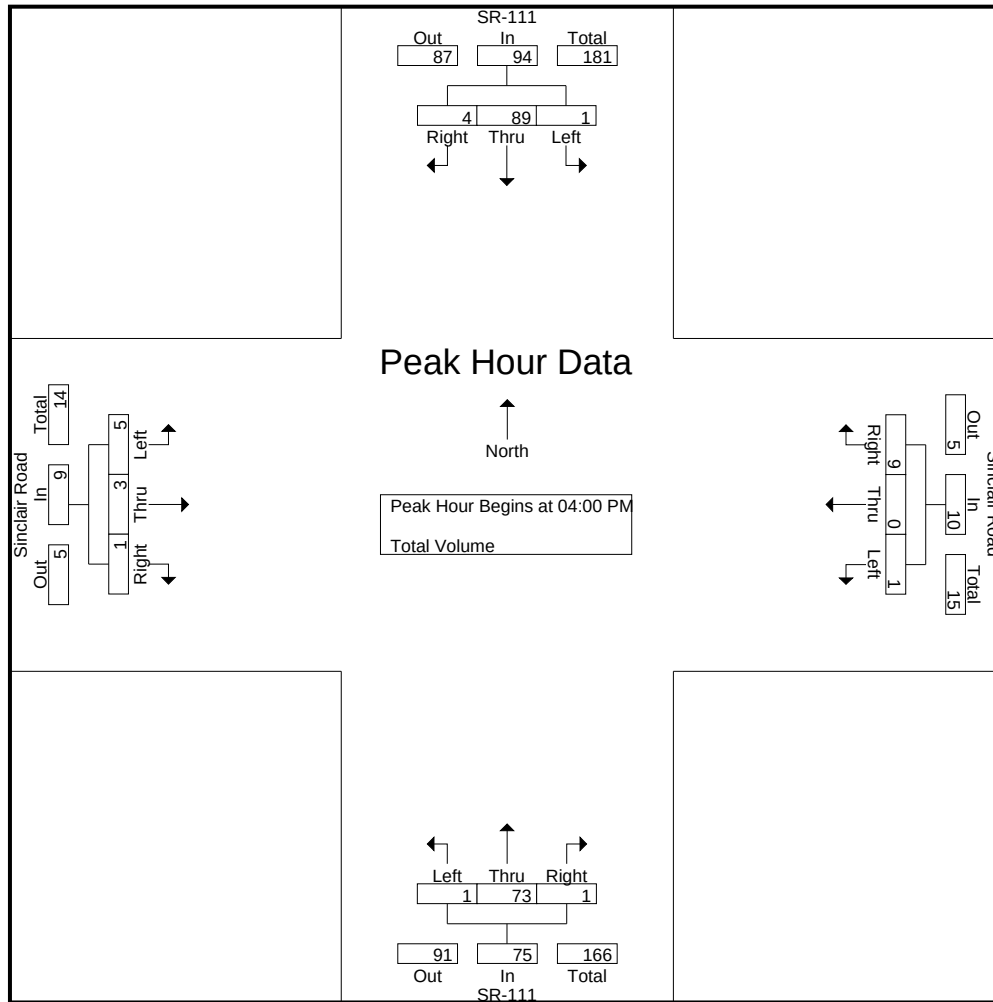
Groups Printed- Total Volume

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06:30 PM	1	20	1	22	0	0	0	0	0	15	0	15	1	0	0	1	38
06:45 PM	0	11	1	12	0	0	1	1	0	8	0	8	0	0	0	0	21
Total	1	67	4	72	0	0	2	2	0	60	0	60	1	1	1	3	137
07:00 PM	0	11	1	12	0	0	0	0	1	10	0	11	0	0	1	1	24
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07:45 PM	0	8	0	8	0	0	0	0	0	10	0	10	0	0	0	0	18
Total	0	40	5	45	1	0	0	1	1	43	0	44	2	0	1	3	93
Grand Total	2	253	16	271	2	3	11	16	3	250	1	254	15	5	7	27	568
Apprch %	0.7	93.4	5.9		12.5	18.8	68.8		1.2	98.4	0.4		55.6	18.5	25.9		
Total %	0.4	44.5	2.8	47.7	0.4	0.5	1.9	2.8	0.5	44	0.2	44.7	2.6	0.9	1.2	4.8	

	SR-111 Southbound				Sinclair Road Westbound				SR-111 Northbound				Sinclair Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 07:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	34	1	35	1	0	2	3	0	22	0	22	0	0	1	1	61
04:15 PM	1	20	1	22	0	0	2	2	0	16	0	16	1	0	0	1	41
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04:45 PM	0	14	0	14	0	0	3	3	0	12	1	13	1	1	0	2	32
Total Volume	1	89	4	94	1	0	9	10	1	73	1	75	5	3	1	9	188
% App. Total	1.1	94.7	4.3		10	0	90		1.3	97.3	1.3		55.6	33.3	11.1		
PHF	.250	.654	.500	.671	.250	.000	.750	.833	.250	.793	.250	.781	.417	.375	.250	.450	.770

County of Imperial
N/S: SR-111
E/W: Sinclair Road
Weather: Clear

File Name : 01_CIM_111_Sinc Wed PM
Site Code : 23022885
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Page No : 2



Peak Hour Analysis From 04:00 PM to 07:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:00 PM				04:00 PM				04:30 PM				04:30 PM			
+0 mins.	0	34	1	35	1	0	2	3	1	23	0	24	3	2	0	5
+15 mins.	1	20	1	22	0	0	2	2	0	12	1	13	1	1	0	2
+30 mins.	0	21	2	23	0	0	2	2	0	18	0	18	3	0	0	3
+45 mins.	0	14	0	14	0	0	3	3	1	22	0	23	2	0	1	3
Total Volume	1	89	4	94	1	0	9	10	2	75	1	78	9	3	1	13
% App. Total	1.1	94.7	4.3		10	0	90		2.6	96.2	1.3		69.2	23.1	7.7	
PHF	.250	.654	.500	.671	.250	.000	.750	.833	.500	.815	.250	.813	.750	.375	.250	.650

County of Imperial
N/S: SR-111
E/W: Sinclair Road
Weather: Clear

File Name : 01_CIM_111_Sinc Thu AM
Site Code : 23022885
Start Date : 10/6/2022
Page No : 1

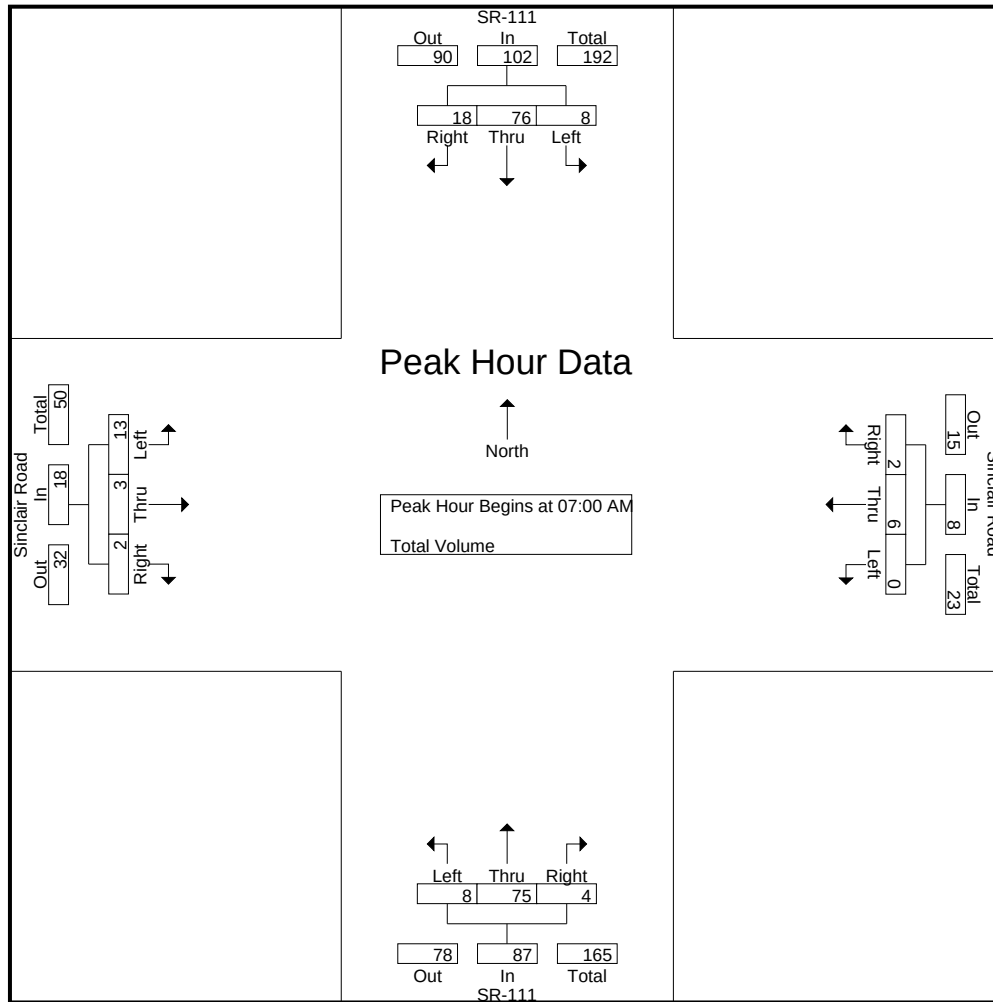
Groups Printed- Total Volume

	SR-111 Southbound				Sinclair Road Westbound				SR-111 Northbound				Sinclair Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
05:00 AM	0	7	1	8	0	0	0	0	0	13	1	14	0	0	1	1	23
05:15 AM	3	3	1	7	0	0	1	1	1	15	0	16	0	0	2	2	26
05:30 AM	2	4	3	9	0	0	0	0	2	25	0	27	1	0	0	1	37
05:45 AM	2	12	4	18	0	1	0	1	0	21	0	21	0	0	0	0	40
Total	7	26	9	42	0	1	1	2	3	74	1	78	1	0	3	4	126
06:00 AM	3	16	1	20	0	0	0	0	2	22	0	24	0	0	2	2	46
06:15 AM	1	14	1	16	0	1	0	1	0	30	0	30	2	2	0	4	51
06:30 AM	0	21	3	24	0	0	0	0	0	22	0	22	1	0	1	2	48
06:45 AM	3	13	2	18	0	0	1	1	1	18	0	19	0	2	1	3	41
Total	7	64	7	78	0	1	1	2	3	92	0	95	3	4	4	11	186
07:00 AM	0	20	6	26	0	1	0	1	0	15	0	15	2	0	0	2	44
07:15 AM	0	12	6	18	0	0	1	1	3	22	2	27	4	2	1	7	53
07:30 AM	2	20	3	25	0	2	1	3	3	21	0	24	3	1	0	4	56
07:45 AM	6	24	3	33	0	3	0	3	2	17	2	21	4	0	1	5	62
Total	8	76	18	102	0	6	2	8	8	75	4	87	13	3	2	18	215
Grand Total	22	166	34	222	0	8	4	12	14	241	5	260	17	7	9	33	527
Apprch %	9.9	74.8	15.3		0	66.7	33.3		5.4	92.7	1.9		51.5	21.2	27.3		
Total %	4.2	31.5	6.5	42.1	0	1.5	0.8	2.3	2.7	45.7	0.9	49.3	3.2	1.3	1.7	6.3	

	SR-111 Southbound				Sinclair Road Westbound				SR-111 Northbound				Sinclair Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 AM to 07:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	20	6	26	0	1	0	1	0	15	0	15	2	0	0	2	44
07:15 AM	0	12	6	18	0	0	1	1	3	22	2	27	4	2	1	7	53
07:30 AM	2	20	3	25	0	2	1	3	3	21	0	24	3	1	0	4	56
07:45 AM	6	24	3	33	0	3	0	3	2	17	2	21	4	0	1	5	62
Total Volume	8	76	18	102	0	6	2	8	8	75	4	87	13	3	2	18	215
% App. Total	7.8	74.5	17.6		0	75	25		9.2	86.2	4.6		72.2	16.7	11.1		
PHF	.333	.792	.750	.773	.000	.500	.500	.667	.667	.852	.500	.806	.813	.375	.500	.643	.867

County of Imperial
N/S: SR-111
E/W: Sinclair Road
Weather: Clear

File Name : 01_CIM_111_Sinc Thu AM
Site Code : 23022885
Start Date : 10/6/2022
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Peak Hour Analysis From 05:00 AM to 07:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00 AM				07:00 AM				05:30 AM				07:00 AM			
+0 mins.	0	20	6	26	0	1	0	1	2	25	0	27	2	0	0	2
+15 mins.	0	12	6	18	0	0	1	1	0	21	0	21	4	2	1	7
+30 mins.	2	20	3	25	0	2	1	3	2	22	0	24	3	1	0	4
+45 mins.	6	24	3	33	0	3	0	3	0	30	0	30	4	0	1	5
Total Volume	8	76	18	102	0	6	2	8	4	98	0	102	13	3	2	18
% App. Total	7.8	74.5	17.6		0	75	25		3.9	96.1	0		72.2	16.7	11.1	
PHF	.333	.792	.750	.773	.000	.500	.500	.667	.500	.817	.000	.850	.813	.375	.500	.643

County of Imperial
N/S: SR-111
E/W: Sinclair Road
Weather: Clear

File Name : 01_CIM_111_Sinc Thu PM
Site Code : 23022885
Start Date : 10/6/2022
Page No : 1

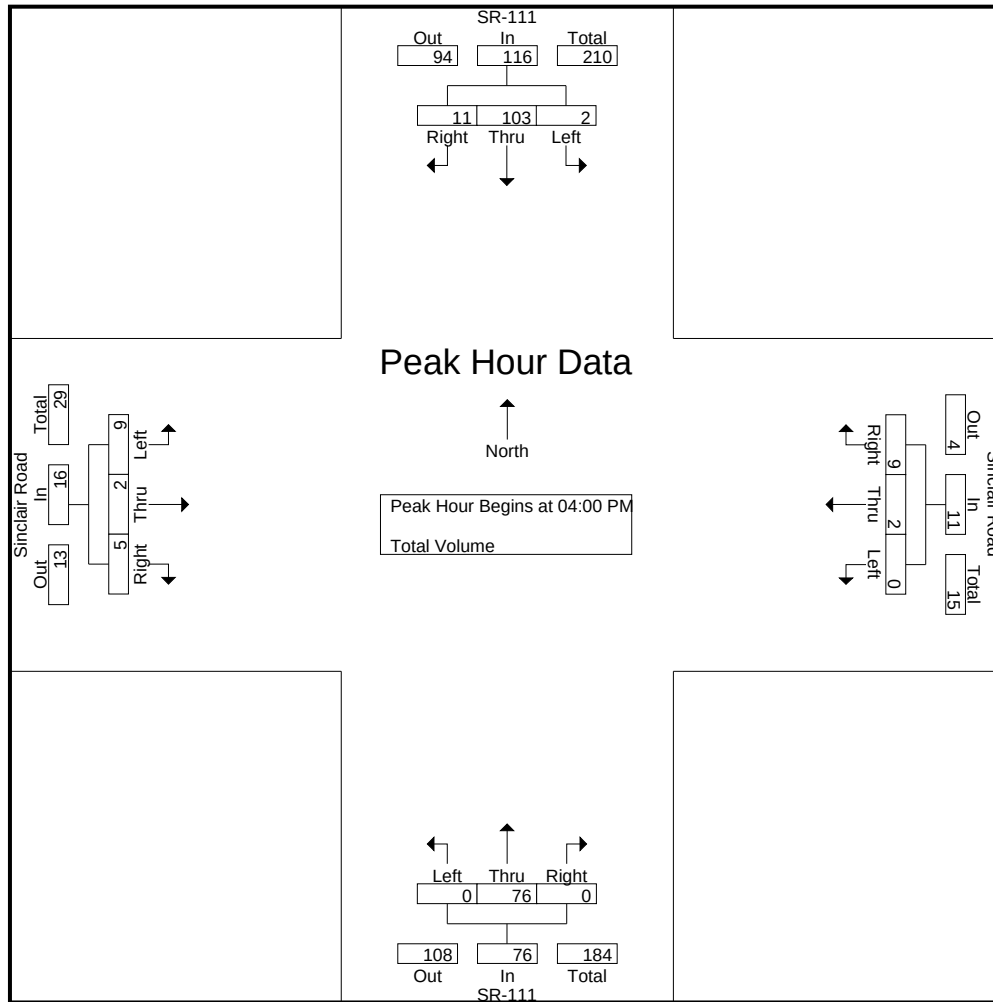
Groups Printed- Total Volume

	SR-111 Southbound				Sinclair Road Westbound				SR-111 Northbound				Sinclair Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	1	29	3	33	0	0	1	1	0	22	0	22	3	0	3	6	62
04:15 PM	1	30	6	37	0	1	4	5	0	9	0	9	3	0	0	3	54
04:30 PM	0	27	2	29	0	0	3	3	0	21	0	21	3	2	1	6	59
04:45 PM	0	17	0	17	0	1	1	2	0	24	0	24	0	0	1	1	44
Total	2	103	11	116	0	2	9	11	0	76	0	76	9	2	5	16	219
05:00 PM	0	30	1	31	0	0	1	1	2	21	0	23	4	0	0	4	59
05:15 PM	0	10	1	11	0	2	1	3	0	27	0	27	1	0	0	1	42
05:30 PM	0	15	1	16	0	0	0	0	0	13	0	13	0	0	1	1	30
05:45 PM	0	21	1	22	0	1	0	1	0	6	0	6	0	0	0	0	29
Total	0	76	4	80	0	3	2	5	2	67	0	69	5	0	1	6	160
06:00 PM	0	32	0	32	0	0	2	2	0	20	0	20	0	1	0	1	55
06:15 PM	0	19	0	19	0	0	0	0	0	12	0	12	0	0	2	2	33
06:30 PM	0	17	1	18	0	0	0	0	0	11	0	11	2	0	0	2	31
06:45 PM	0	10	1	11	0	0	1	1	0	9	0	9	0	0	2	2	23
Total	0	78	2	80	0	0	3	3	0	52	0	52	2	1	4	7	142
07:00 PM	0	12	1	13	0	0	0	0	0	10	0	10	0	2	0	2	25
07:15 PM	0	10	1	11	0	0	0	0	0	20	0	20	0	0	0	0	31
07:30 PM	0	14	1	15	1	0	1	2	0	11	0	11	0	0	0	0	28
07:45 PM	0	7	0	7	0	0	0	0	0	16	0	16	0	0	0	0	23
Total	0	43	3	46	1	0	1	2	0	57	0	57	0	2	0	2	107
Grand Total	2	300	20	322	1	5	15	21	2	252	0	254	16	5	10	31	628
Apprch %	0.6	93.2	6.2		4.8	23.8	71.4		0.8	99.2	0		51.6	16.1	32.3		
Total %	0.3	47.8	3.2	51.3	0.2	0.8	2.4	3.3	0.3	40.1	0	40.4	2.5	0.8	1.6	4.9	

	SR-111 Southbound				Sinclair Road Westbound				SR-111 Northbound				Sinclair Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 07:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	1	29	3	33	0	0	1	1	0	22	0	22	3	0	3	6	62
04:15 PM	1	30	6	37	0	1	4	5	0	9	0	9	3	0	0	3	54
04:30 PM	0	27	2	29	0	0	3	3	0	21	0	21	3	2	1	6	59
04:45 PM	0	17	0	17	0	1	1	2	0	24	0	24	0	0	1	1	44
Total Volume	2	103	11	116	0	2	9	11	0	76	0	76	9	2	5	16	219
% App. Total	1.7	88.8	9.5		0	18.2	81.8		0	100	0		56.2	12.5	31.2		
PHF	.500	.858	.458	.784	.000	.500	.563	.550	.000	.792	.000	.792	.750	.250	.417	.667	.883

County of Imperial
N/S: SR-111
E/W: Sinclair Road
Weather: Clear

File Name : 01_CIM_111_Sinc Thu PM
Site Code : 23022885
Start Date : 10/6/2022
Page No : 2



Peak Hour Analysis From 04:00 PM to 07:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:00 PM				04:00 PM				04:30 PM				04:00 PM			
+0 mins.	1	29	3	33	0	0	1	1	0	21	0	21	3	0	3	6
+15 mins.	1	30	6	37	0	1	4	5	0	24	0	24	3	0	0	3
+30 mins.	0	27	2	29	0	0	3	3	2	21	0	23	3	2	1	6
+45 mins.	0	17	0	17	0	1	1	2	0	27	0	27	0	0	1	1
Total Volume	2	103	11	116	0	2	9	11	2	93	0	95	9	2	5	16
% App. Total	1.7	88.8	9.5		0	18.2	81.8		2.1	97.9	0		56.2	12.5	31.2	
PHF	.500	.858	.458	.784	.000	.500	.563	.550	.250	.861	.000	.880	.750	.250	.417	.667

City of Calipatria
N/S: SR-111 (Sorensen Avenue)
E/W: Main Street
Weather: Clear

File Name : 02_CPA_111_Main Wed AM
Site Code : 23022885
Start Date : 10/5/2022
Page No : 1

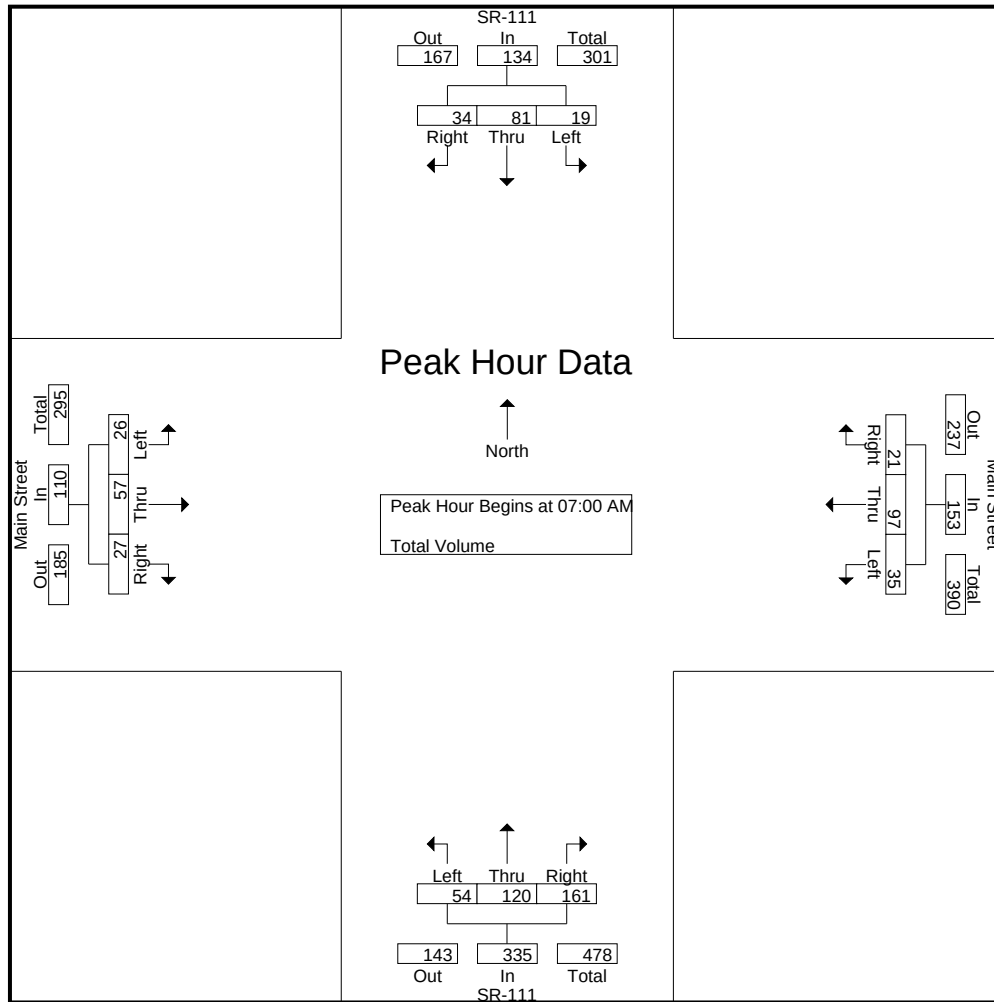
Groups Printed- Total Volume

	SR-111 Southbound				Main Street Westbound				SR-111 Northbound				Main Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
05:00 AM	3	5	3	11	6	7	0	13	3	19	14	36	2	4	2	8	68
05:15 AM	5	6	4	15	7	2	1	10	4	20	30	54	3	6	5	14	93
05:30 AM	2	3	3	8	4	13	1	18	14	29	73	116	7	17	4	28	170
05:45 AM	7	4	3	14	11	13	6	30	6	29	47	82	8	21	1	30	156
Total	17	18	13	48	28	35	8	71	27	97	164	288	20	48	12	80	487
06:00 AM	2	15	8	25	37	9	3	49	4	11	11	26	4	7	4	15	115
06:15 AM	2	14	5	21	19	5	2	26	13	19	14	46	6	12	5	23	116
06:30 AM	2	19	5	26	10	8	2	20	16	16	33	65	4	15	3	22	133
06:45 AM	1	11	4	16	6	7	4	17	8	18	58	84	9	14	4	27	144
Total	7	59	22	88	72	29	11	112	41	64	116	221	23	48	16	87	508
07:00 AM	1	16	4	21	10	7	6	23	9	24	29	62	9	7	5	21	127
07:15 AM	3	21	10	34	8	10	4	22	6	24	37	67	4	15	8	27	150
07:30 AM	5	17	12	34	8	25	3	36	14	27	39	80	6	10	4	20	170
07:45 AM	10	27	8	45	9	55	8	72	25	45	56	126	7	25	10	42	285
Total	19	81	34	134	35	97	21	153	54	120	161	335	26	57	27	110	732
Grand Total	43	158	69	270	135	161	40	336	122	281	441	844	69	153	55	277	1727
Apprch %	15.9	58.5	25.6		40.2	47.9	11.9		14.5	33.3	52.3		24.9	55.2	19.9		
Total %	2.5	9.1	4	15.6	7.8	9.3	2.3	19.5	7.1	16.3	25.5	48.9	4	8.9	3.2	16	

	SR-111 Southbound				Main Street Westbound				SR-111 Northbound				Main Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 AM to 07:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	1	16	4	21	10	7	6	23	9	24	29	62	9	7	5	21	127
07:15 AM	3	21	10	34	8	10	4	22	6	24	37	67	4	15	8	27	150
07:30 AM	5	17	12	34	8	25	3	36	14	27	39	80	6	10	4	20	170
07:45 AM	10	27	8	45	9	55	8	72	25	45	56	126	7	25	10	42	285
Total Volume	19	81	34	134	35	97	21	153	54	120	161	335	26	57	27	110	732
% App. Total	14.2	60.4	25.4		22.9	63.4	13.7		16.1	35.8	48.1		23.6	51.8	24.5		
PHF	.475	.750	.708	.744	.875	.441	.656	.531	.540	.667	.719	.665	.722	.570	.675	.655	.642

City of Calipatria
N/S: SR-111 (Sorensen Avenue)
E/W: Main Street
Weather: Clear

File Name : 02_CPA_111_Main Wed AM
Site Code : 23022885
Start Date : 10/5/2022
Page No : 2



Peak Hour Analysis From 05:00 AM to 07:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00 AM				07:00 AM				07:00 AM				07:00 AM			
+0 mins.	1	16	4	21	10	7	6	23	9	24	29	62	9	7	5	21
+15 mins.	3	21	10	34	8	10	4	22	6	24	37	67	4	15	8	27
+30 mins.	5	17	12	34	8	25	3	36	14	27	39	80	6	10	4	20
+45 mins.	10	27	8	45	9	55	8	72	25	45	56	126	7	25	10	42
Total Volume	19	81	34	134	35	97	21	153	54	120	161	335	26	57	27	110
% App. Total	14.2	60.4	25.4		22.9	63.4	13.7		16.1	35.8	48.1		23.6	51.8	24.5	
PHF	.475	.750	.708	.744	.875	.441	.656	.531	.540	.667	.719	.665	.722	.570	.675	.655

City of Calipatria
N/S: SR-111 (Sorensen Avenue)
E/W: Main Street
Weather: Clear

File Name : 02_CPA_111_Main Wed PM
Site Code : 23022885
Start Date : 10/5/2022
Page No : 1

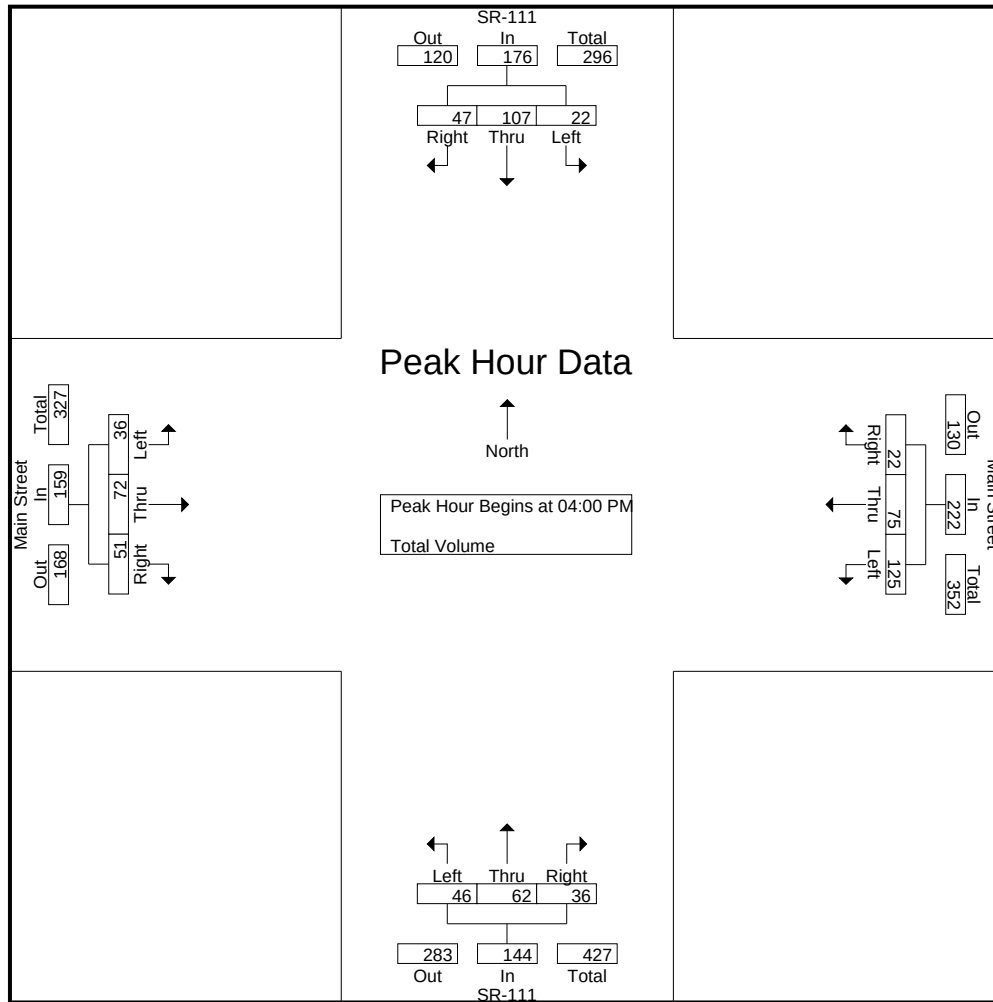
Groups Printed- Total Volume

	SR-111 Southbound				Main Street Westbound				SR-111 Northbound				Main Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	5	34	16	55	51	21	7	79	10	14	11	35	13	17	11	41	210
04:15 PM	8	29	8	45	22	9	3	34	11	17	3	31	4	15	11	30	140
04:30 PM	6	22	8	36	34	29	9	72	11	16	10	37	9	16	13	38	183
04:45 PM	3	22	15	40	18	16	3	37	14	15	12	41	10	24	16	50	168
Total	22	107	47	176	125	75	22	222	46	62	36	144	36	72	51	159	701
05:00 PM	6	25	8	39	10	5	1	16	14	23	9	46	12	21	20	53	154
05:15 PM	2	25	6	33	15	20	6	41	8	18	6	32	12	10	13	35	141
05:30 PM	4	14	10	28	18	9	8	35	14	18	8	40	17	9	2	28	131
05:45 PM	3	14	4	21	8	17	7	32	11	11	12	34	4	7	3	14	101
Total	15	78	28	121	51	51	22	124	47	70	35	152	45	47	38	130	527
06:00 PM	7	14	7	28	12	15	5	32	11	20	8	39	16	29	9	54	153
06:15 PM	7	16	5	28	4	21	0	25	10	13	9	32	4	13	2	19	104
06:30 PM	7	20	9	36	8	19	5	32	7	9	5	21	9	15	5	29	118
06:45 PM	3	10	6	19	1	18	1	20	7	8	5	20	5	9	6	20	79
Total	24	60	27	111	25	73	11	109	35	50	27	112	34	66	22	122	454
07:00 PM	5	14	3	22	10	15	3	28	7	19	7	33	10	15	8	33	116
07:15 PM	4	11	1	16	14	6	5	25	6	15	8	29	4	12	5	21	91
07:30 PM	4	10	4	18	13	12	4	29	4	18	9	31	1	13	1	15	93
07:45 PM	3	5	2	10	16	8	5	29	7	6	7	20	2	9	2	13	72
Total	16	40	10	66	53	41	17	111	24	58	31	113	17	49	16	82	372
Grand Total	77	285	112	474	254	240	72	566	152	240	129	521	132	234	127	493	2054
Apprch %	16.2	60.1	23.6		44.9	42.4	12.7		29.2	46.1	24.8		26.8	47.5	25.8		
Total %	3.7	13.9	5.5	23.1	12.4	11.7	3.5	27.6	7.4	11.7	6.3	25.4	6.4	11.4	6.2	24	

	SR-111 Southbound				Main Street Westbound				SR-111 Northbound				Main Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 07:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	5	34	16	55	51	21	7	79	10	14	11	35	13	17	11	41	210
04:15 PM	8	29	8	45	22	9	3	34	11	17	3	31	4	15	11	30	140
04:30 PM	6	22	8	36	34	29	9	72	11	16	10	37	9	16	13	38	183
04:45 PM	3	22	15	40	18	16	3	37	14	15	12	41	10	24	16	50	168
Total Volume	22	107	47	176	125	75	22	222	46	62	36	144	36	72	51	159	701
% App. Total	12.5	60.8	26.7		56.3	33.8	9.9		31.9	43.1	25		22.6	45.3	32.1		
PHF	.688	.787	.734	.800	.613	.647	.611	.703	.821	.912	.750	.878	.692	.750	.797	.795	.835

City of Calipatria
N/S: SR-111 (Sorensen Avenue)
E/W: Main Street
Weather: Clear

File Name : 02_CPA_111_Main Wed PM
Site Code : 23022885
Start Date : 10/5/2022
Page No : 2



Peak Hour Analysis From 04:00 PM to 07:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:00 PM				04:00 PM				04:45 PM				04:30 PM			
+0 mins.	5	34	16	55	51	21	7	79	14	15	12	41	9	16	13	38
+15 mins.	8	29	8	45	22	9	3	34	14	23	9	46	10	24	16	50
+30 mins.	6	22	8	36	34	29	9	72	8	18	6	32	12	21	20	53
+45 mins.	3	22	15	40	18	16	3	37	14	18	8	40	12	10	13	35
Total Volume	22	107	47	176	125	75	22	222	50	74	35	159	43	71	62	176
% App. Total	12.5	60.8	26.7		56.3	33.8	9.9		31.4	46.5	22		24.4	40.3	35.2	
PHF	.688	.787	.734	.800	.613	.647	.611	.703	.893	.804	.729	.864	.896	.740	.775	.830

City of Calipatria
N/S: SR-111 (Sorensen Avenue)
E/W: Main Street
Weather: Clear

File Name : 02_CPA_111_Main Thu AM
Site Code : 23022885
Start Date : 10/6/2022
Page No : 1

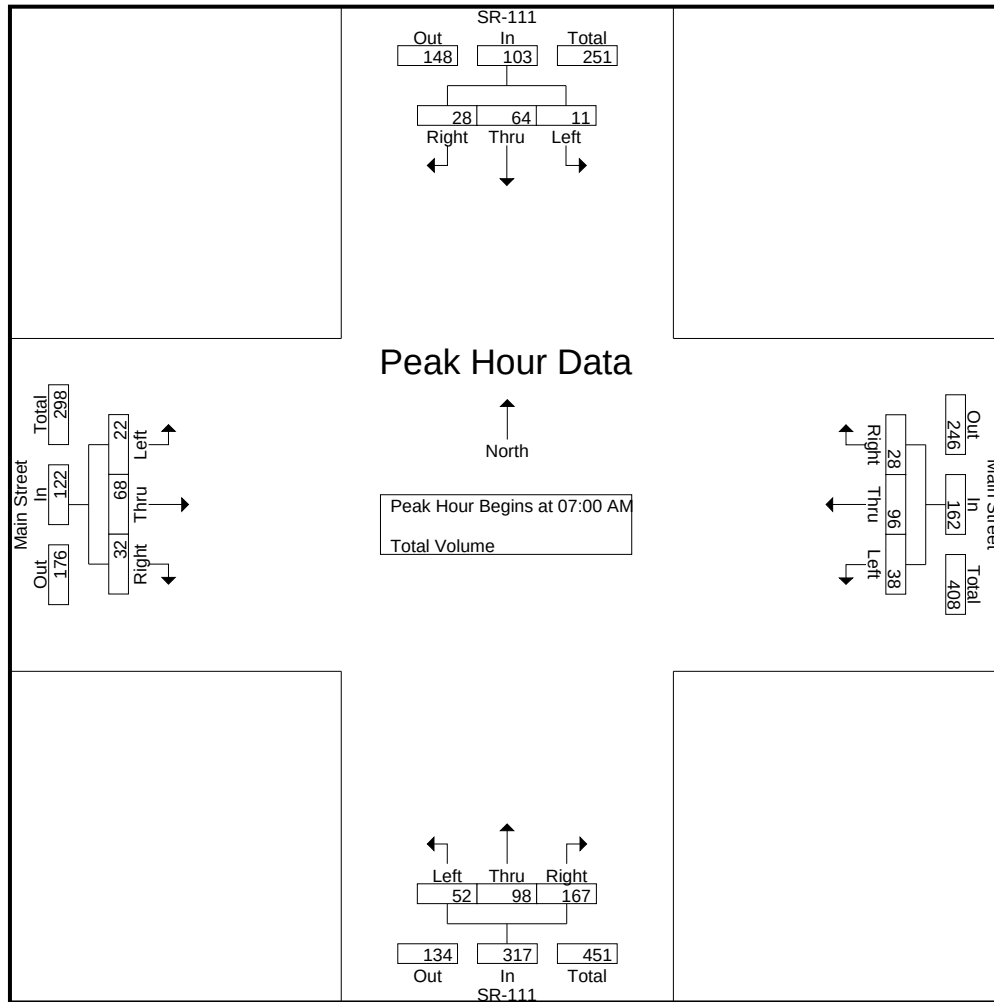
Groups Printed- Total Volume

	SR-111 Southbound				Main Street Westbound				SR-111 Northbound				Main Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
05:00 AM	2	9	0	11	7	4	0	11	4	18	12	34	2	9	2	13	69
05:15 AM	5	8	1	14	0	4	1	5	9	18	44	71	4	7	2	13	103
05:30 AM	0	4	3	7	8	8	2	18	11	21	61	93	7	14	0	21	139
05:45 AM	1	8	6	15	18	18	3	39	8	33	40	81	8	15	0	23	158
Total	8	29	10	47	33	34	6	73	32	90	157	279	21	45	4	70	469
06:00 AM	2	15	4	21	19	8	1	28	3	27	11	41	7	9	3	19	109
06:15 AM	4	13	6	23	12	9	3	24	7	18	11	36	6	11	2	19	102
06:30 AM	9	17	7	33	4	3	4	11	10	15	27	52	9	14	1	24	120
06:45 AM	2	13	6	21	8	13	4	25	8	19	60	87	11	11	3	25	158
Total	17	58	23	98	43	33	12	88	28	79	109	216	33	45	9	87	489
07:00 AM	2	12	9	23	6	11	5	22	11	17	19	47	4	6	4	14	106
07:15 AM	3	18	6	27	10	16	11	37	7	24	33	64	7	18	5	30	158
07:30 AM	3	13	8	24	10	17	5	32	9	28	44	81	5	17	11	33	170
07:45 AM	3	21	5	29	12	52	7	71	25	29	71	125	6	27	12	45	270
Total	11	64	28	103	38	96	28	162	52	98	167	317	22	68	32	122	704
Grand Total	36	151	61	248	114	163	46	323	112	267	433	812	76	158	45	279	1662
Apprch %	14.5	60.9	24.6		35.3	50.5	14.2		13.8	32.9	53.3		27.2	56.6	16.1		
Total %	2.2	9.1	3.7	14.9	6.9	9.8	2.8	19.4	6.7	16.1	26.1	48.9	4.6	9.5	2.7	16.8	

	SR-111 Southbound				Main Street Westbound				SR-111 Northbound				Main Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 AM to 07:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	2	12	9	23	6	11	5	22	11	17	19	47	4	6	4	14	106
07:15 AM	3	18	6	27	10	16	11	37	7	24	33	64	7	18	5	30	158
07:30 AM	3	13	8	24	10	17	5	32	9	28	44	81	5	17	11	33	170
07:45 AM	3	21	5	29	12	52	7	71	25	29	71	125	6	27	12	45	270
Total Volume	11	64	28	103	38	96	28	162	52	98	167	317	22	68	32	122	704
% App. Total	10.7	62.1	27.2		23.5	59.3	17.3		16.4	30.9	52.7		18	55.7	26.2		
PHF	.917	.762	.778	.888	.792	.462	.636	.570	.520	.845	.588	.634	.786	.630	.667	.678	.652

City of Calipatria
N/S: SR-111 (Sorensen Avenue)
E/W: Main Street
Weather: Clear

File Name : 02_CPA_111_Main Thu AM
Site Code : 23022885
Start Date : 10/6/2022
Page No : 2



Peak Hour Analysis From 05:00 AM to 07:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	06:30 AM				07:00 AM				07:00 AM				07:00 AM			
+0 mins.	9	17	7	33	6	11	5	22	11	17	19	47	4	6	4	14
+15 mins.	2	13	6	21	10	16	11	37	7	24	33	64	7	18	5	30
+30 mins.	2	12	9	23	10	17	5	32	9	28	44	81	5	17	11	33
+45 mins.	3	18	6	27	12	52	7	71	25	29	71	125	6	27	12	45
Total Volume	16	60	28	104	38	96	28	162	52	98	167	317	22	68	32	122
% App. Total	15.4	57.7	26.9		23.5	59.3	17.3		16.4	30.9	52.7		18	55.7	26.2	
PHF	.444	.833	.778	.788	.792	.462	.636	.570	.520	.845	.588	.634	.786	.630	.667	.678

City of Calipatria
N/S: SR-111 (Sorensen Avenue)
E/W: Main Street
Weather: Clear

File Name : 02_CPA_111_Main Thu PM
Site Code : 23022885
Start Date : 10/6/2022
Page No : 1

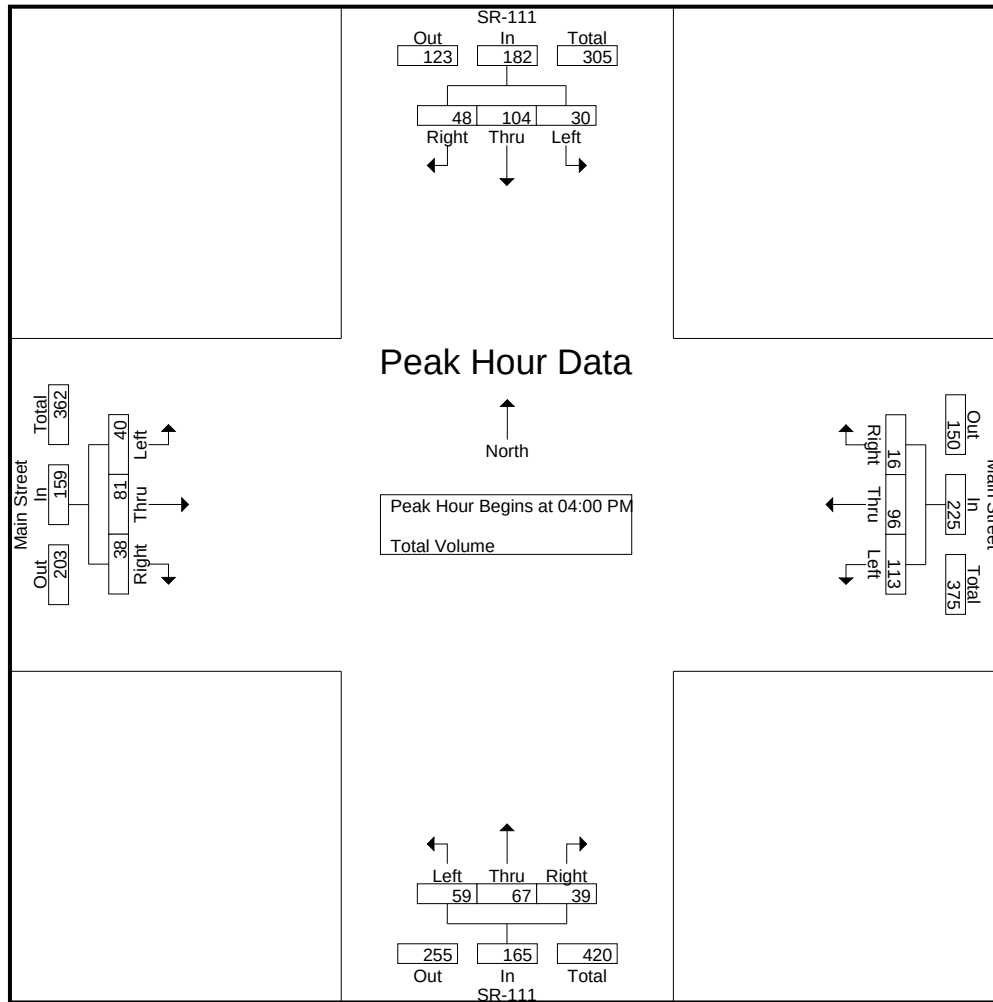
Groups Printed- Total Volume

	SR-111 Southbound				Main Street Westbound				SR-111 Northbound				Main Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	7	37	13	57	55	21	3	79	17	19	15	51	10	16	14	40	227
04:15 PM	9	24	11	44	12	30	5	47	11	18	4	33	7	22	11	40	164
04:30 PM	5	28	10	43	30	29	4	63	12	13	11	36	6	25	6	37	179
04:45 PM	9	15	14	38	16	16	4	36	19	17	9	45	17	18	7	42	161
Total	30	104	48	182	113	96	16	225	59	67	39	165	40	81	38	159	731
05:00 PM	12	24	9	45	14	18	6	38	16	17	16	49	9	18	16	43	175
05:15 PM	3	21	7	31	19	14	5	38	8	12	8	28	10	14	8	32	129
05:30 PM	4	12	6	22	8	18	2	28	7	11	5	23	4	17	10	31	104
05:45 PM	5	15	13	33	13	15	5	33	11	12	8	31	8	15	8	31	128
Total	24	72	35	131	54	65	18	137	42	52	37	131	31	64	42	137	536
06:00 PM	3	25	10	38	13	22	6	41	17	15	7	39	8	22	5	35	153
06:15 PM	4	27	2	33	11	13	4	28	9	14	9	32	8	17	9	34	127
06:30 PM	2	21	6	29	7	13	5	25	6	13	8	27	5	14	4	23	104
06:45 PM	3	17	7	27	8	18	4	30	9	9	3	21	5	18	3	26	104
Total	12	90	25	127	39	66	19	124	41	51	27	119	26	71	21	118	488
07:00 PM	3	20	5	28	8	10	0	18	6	12	15	33	7	12	7	26	105
07:15 PM	3	11	6	20	9	6	4	19	12	10	9	31	15	16	0	31	101
07:30 PM	2	8	4	14	14	8	4	26	6	12	6	24	4	8	4	16	80
07:45 PM	3	8	3	14	4	6	2	12	4	13	5	22	6	6	3	15	63
Total	11	47	18	76	35	30	10	75	28	47	35	110	32	42	14	88	349
Grand Total	77	313	126	516	241	257	63	561	170	217	138	525	129	258	115	502	2104
Apprch %	14.9	60.7	24.4		43	45.8	11.2		32.4	41.3	26.3		25.7	51.4	22.9		
Total %	3.7	14.9	6	24.5	11.5	12.2	3	26.7	8.1	10.3	6.6	25	6.1	12.3	5.5	23.9	

	SR-111 Southbound				Main Street Westbound				SR-111 Northbound				Main Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 07:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	7	37	13	57	55	21	3	79	17	19	15	51	10	16	14	40	227
04:15 PM	9	24	11	44	12	30	5	47	11	18	4	33	7	22	11	40	164
04:30 PM	5	28	10	43	30	29	4	63	12	13	11	36	6	25	6	37	179
04:45 PM	9	15	14	38	16	16	4	36	19	17	9	45	17	18	7	42	161
Total Volume	30	104	48	182	113	96	16	225	59	67	39	165	40	81	38	159	731
% App. Total	16.5	57.1	26.4		50.2	42.7	7.1		35.8	40.6	23.6		25.2	50.9	23.9		
PHF	.833	.703	.857	.798	.514	.800	.800	.712	.776	.882	.650	.809	.588	.810	.679	.946	.805

City of Calipatria
N/S: SR-111 (Sorensen Avenue)
E/W: Main Street
Weather: Clear

File Name : 02_CPA_111_Main Thu PM
Site Code : 23022885
Start Date : 10/6/2022
Page No : 2



Peak Hour Analysis From 04:00 PM to 07:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:00 PM				04:00 PM				04:00 PM				04:15 PM			
+0 mins.	7	37	13	57	55	21	3	79	17	19	15	51	7	22	11	40
+15 mins.	9	24	11	44	12	30	5	47	11	18	4	33	6	25	6	37
+30 mins.	5	28	10	43	30	29	4	63	12	13	11	36	17	18	7	42
+45 mins.	9	15	14	38	16	16	4	36	19	17	9	45	9	18	16	43
Total Volume	30	104	48	182	113	96	16	225	59	67	39	165	39	83	40	162
% App. Total	16.5	57.1	26.4		50.2	42.7	7.1		35.8	40.6	23.6		24.1	51.2	24.7	
PHF	.833	.703	.857	.798	.514	.800	.800	.712	.776	.882	.650	.809	.574	.830	.625	.942

Counts Unlimited, Inc.

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County of Imperial
Brandt Road
S/ Sinclair Road
48 Hour Directional Volume Count

PO Box 1178
Corona, CA 92878
Phone: (951) 268-6268
email: counts@countsunlimited.com

CIM002
Site Code: 230-22885

Start Time	10/5/22 Wed	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
		Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		0	0			0	0				
12:15		0	0			0	0				
12:30		0	1			0	1				
12:45		0	1	0	2	0	1	0	2	0	4
01:00		0	0			0	0				
01:15		0	0			0	1				
01:30		0	2			0	1				
01:45		0	5	0	7	0	1	0	3	0	10
02:00		0	0			0	5				
02:15		0	0			0	1				
02:30		0	1			0	0				
02:45		0	1	0	2	0	0	0	6	0	8
03:00		0	0			0	0				
03:15		0	0			0	0				
03:30		0	2			0	2				
03:45		0	0	0	2	0	4	0	6	0	8
04:00		0	1			0	2				
04:15		0	0			1	0				
04:30		0	0			0	1				
04:45		0	0	0	1	2	0	3	3	3	4
05:00		2	0			0	1				
05:15		1	0			0	1				
05:30		1	0			1	1				
05:45		4	0	8	0	0	0	1	3	9	3
06:00		3	0			1	1				
06:15		3	0			0	1				
06:30		0	0			0	0				
06:45		1	0	7	0	1	0	2	2	9	2
07:00		0	0			0	1				
07:15		2	0			1	0				
07:30		0	0			1	2				
07:45		2	0	4	0	0	0	2	3	6	3
08:00		1	0			0	1				
08:15		2	1			0	1				
08:30		1	0			1	0				
08:45		1	0	5	1	2	0	3	2	8	3
09:00		1	0			1	0				
09:15		1	2			0	0				
09:30		2	1			2	0				
09:45		1	0	5	3	2	0	5	0	10	3
10:00		0	0			0	0				
10:15		4	0			1	1				
10:30		2	0			3	0				
10:45		0	0	6	0	3	2	7	3	13	3
11:00		1	0			1	0				
11:15		2	0			0	1				
11:30		2	0			2	0				
11:45		1	0	6	0	1	1	4	2	10	2
Total		41	18	41	18	27	35	27	35	68	53
Combined Total		59		59		62		62		121	
AM Peak	-	05:30	-	-	-	10:15	-	-	-	-	-
Vol.	-	11	-	-	-	8	-	-	-	-	-
P.H.F.		0.688				0.667					
PM Peak	-	-	01:00	-	-	-	01:15	-	-	-	-
Vol.	-	-	7	-	-	-	8	-	-	-	-
P.H.F.			0.350				0.400				
Percentage		69.5%	30.5%			43.5%	56.5%				
ADT/AADT		ADT 121		AADT 121							

Counts Unlimited, Inc.

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County of Imperial
Gentry Road
S/ Sinclair Road
48 Hour Directional Volume Count

PO Box 1178
Corona, CA 92878
Phone: (951) 268-6268
email: counts@countsunlimited.com

CIM003
Site Code: 230-22885

Start Time	10/5/22 Wed	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
		Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		0	4			0	4				
12:15		0	7			1	8				
12:30		2	4			2	16				
12:45		1	8	3	23	0	6	3	34	6	57
01:00		0	6			0	3				
01:15		0	7			1	8				
01:30		3	4			2	6				
01:45		0	8	3	25	2	3	5	20	8	45
02:00		0	12			1	8				
02:15		0	10			0	6				
02:30		1	9			0	5				
02:45		0	6	1	37	0	6	1	25	2	62
03:00		0	4			0	4				
03:15		1	6			0	2				
03:30		0	1			3	2				
03:45		2	1	3	12	2	2	5	10	8	22
04:00		1	6			1	1				
04:15		0	2			0	3				
04:30		0	4			1	4				
04:45		1	1	2	13	0	0	2	8	4	21
05:00		0	1			1	0				
05:15		4	1			2	3				
05:30		1	1			0	1				
05:45		6	1	11	4	2	0	5	4	16	8
06:00		5	0			2	0				
06:15		6	1			5	1				
06:30		7	1			17	0				
06:45		6	1	24	3	12	0	36	1	60	4
07:00		6	1			8	1				
07:15		5	1			4	0				
07:30		8	2			8	3				
07:45		6	0	25	4	4	4	24	8	49	12
08:00		10	3			14	3				
08:15		10	4			10	0				
08:30		10	0			10	0				
08:45		12	1	42	8	3	1	37	4	79	12
09:00		7	1			13	2				
09:15		8	0			9	0				
09:30		6	0			8	0				
09:45		4	0	25	1	10	1	40	3	65	4
10:00		9	2			9	0				
10:15		4	1			15	0				
10:30		10	1			5	2				
10:45		12	2	35	6	12	1	41	3	76	9
11:00		4	1			6	1				
11:15		6	1			6	0				
11:30		8	2			5	0				
11:45		10	1	28	5	2	2	19	3	47	8
Total		202	141	202	141	218	123	218	123	420	264
Combined Total		343		343		341		341		684	
AM Peak	-	08:00	-	-	-	06:15	-	-	-	-	-
Vol.	-	42	-	-	-	42	-	-	-	-	-
P.H.F.		0.875				0.618					
PM Peak	-	-	01:45	-	-	-	12:00	-	-	-	-
Vol.	-	-	39	-	-	-	34	-	-	-	-
P.H.F.			0.813				0.531				
Percentage		58.9%	41.1%			63.9%	36.1%				
ADT/AADT		ADT 684		AADT 684							

Counts Unlimited, Inc.

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County of Imperial
Highway 111
S/ Sinclair Road
48 Hour Directional Volume Count

PO Box 1178
Corona, CA 92878
Phone: (951) 268-6268
email: counts@countsunlimited.com

CIM001
Site Code: 230-22885

Start Time	10/5/22 Wed	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
		Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		4	24			5	22				
12:15		1	23			2	33				
12:30		1	13			3	20				
12:45		4	21	10	81	1	24	11	99	21	180
01:00		3	20			0	27				
01:15		3	15			1	31				
01:30		0	21			3	19				
01:45		1	31	7	87	2	28	6	105	13	192
02:00		0	22			2	28				
02:15		0	16			0	28				
02:30		2	26			1	31				
02:45		1	13	3	77	1	32	4	119	7	196
03:00		1	30			3	36				
03:15		3	30			2	32				
03:30		1	18			8	25				
03:45		2	23	7	101	3	35	16	128	23	229
04:00		6	22			0	36				
04:15		4	16			2	20				
04:30		7	24			3	21				
04:45		8	13	25	75	7	14	12	91	37	166
05:00		21	18			4	19				
05:15		17	23			6	14				
05:30		30	22			7	15				
05:45		30	12	98	75	7	13	24	61	122	136
06:00		13	16			22	16				
06:15		16	21			18	21				
06:30		17	15			17	20				
06:45		24	8	70	60	12	11	69	68	139	128
07:00		15	11			13	12				
07:15		26	11			22	16				
07:30		28	12			21	6				
07:45		28	10	97	44	20	8	76	42	173	86
08:00		27	13			14	5				
08:15		27	10			22	7				
08:30		32	8			21	2				
08:45		23	5	109	36	24	4	81	18	190	54
09:00		21	7			26	7				
09:15		18	4			21	4				
09:30		19	8			33	5				
09:45		32	7	90	26	18	4	98	20	188	46
10:00		24	4			20	5				
10:15		30	3			21	2				
10:30		20	4			28	2				
10:45		22	7	96	18	15	5	84	14	180	32
11:00		20	7			17	6				
11:15		18	7			23	4				
11:30		28	1			21	5				
11:45		22	6	88	21	20	2	81	17	169	38
Total		700	701	700	701	562	782	562	782	1262	1483
Combined Total		1401		1401		1344		1344		2745	
AM Peak	-	07:45	-	-	-	08:45	-	-	-	-	-
Vol.	-	114	-	-	-	104	-	-	-	-	-
P.H.F.		0.891				0.788					
PM Peak	-	-	03:00	-	-	-	02:30	-	-	-	-
Vol.	-	-	101	-	-	-	131	-	-	-	-
P.H.F.			0.842				0.910				
Percentage		50.0%	50.0%			41.8%	58.2%				

Counts Unlimited, Inc.

County of Imperial
Highway 111
S/ Sinclair Road
48 Hour Directional Volume Count

PO Box 1178
Corona, CA 92878
Phone: (951) 268-6268
email: counts@countsunlimited.com

CIM001
Site Code: 230-22885

Start Time	10/6/22 Thu	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
		Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		2	22			2	29				
12:15		4	27			3	36				
12:30		3	22			1	27				
12:45		7	27	16	98	1	15	7	107	23	205
01:00		4	20			0	24				
01:15		1	17			0	23				
01:30		5	18			1	23				
01:45		1	16	11	71	1	18	2	88	13	159
02:00		3	19			4	30				
02:15		0	24			1	32				
02:30		3	20			1	34				
02:45		1	21	7	84	5	26	11	122	18	206
03:00		1	25			1	24				
03:15		4	23			2	31				
03:30		0	32			5	17				
03:45		6	16	11	96	1	34	9	106	20	202
04:00		3	22			5	32				
04:15		4	9			7	30				
04:30		11	21			4	28				
04:45		13	24	31	76	7	18	23	108	54	184
05:00		14	23			8	30				
05:15		16	27			5	10				
05:30		27	13			4	16				
05:45		21	6	78	69	12	21	29	77	107	146
06:00		24	20			18	32				
06:15		30	12			14	21				
06:30		22	11			22	17				
06:45		19	9	95	52	14	12	68	82	163	134
07:00		15	10			20	12				
07:15		27	20			13	10				
07:30		24	11			20	15				
07:45		21	16	87	57	25	7	78	44	165	101
08:00		21	8			27	9				
08:15		29	3			23	7				
08:30		24	9			29	3				
08:45		29	12	103	32	25	4	104	23	207	55
09:00		30	13			25	7				
09:15		23	10			34	5				
09:30		17	13			21	1				
09:45		29	6	99	42	26	5	106	18	205	60
10:00		18	5			24	5				
10:15		18	1			25	5				
10:30		18	6			24	3				
10:45		22	0	76	12	29	5	102	18	178	30
11:00		15	5			17	1				
11:15		20	5			39	1				
11:30		27	2			23	3				
11:45		26	4	88	16	16	0	95	5	183	21
Total		702	705	702	705	634	798	634	798	1336	1503
Combined Total		1407		1407		1432		1432		2839	
AM Peak	-	08:15	-	-	-	08:30	-	-	-	-	-
Vol.	-	112	-	-	-	113	-	-	-	-	-
P.H.F.		0.933				0.831					
PM Peak	-	-	02:45	-	-	-	03:45	-	-	-	-
Vol.	-	-	101	-	-	-	124	-	-	-	-
P.H.F.			0.789				0.912				
Percentage		49.9%	50.1%			44.3%	55.7%				
ADT/AADT		ADT 2,792	AADT 2,792								

DISTRICT	RTE	RTE_SFX	CNTY	PM_PFX	PM	PM_SFX	DESCRIPTION	BACK_PEAK_HOUR	BACK_PEAK_MADT	BACK_AADT	AHEAD_PEAK_HOUR	AHEAD_PEAK_MADT	AHEAD_AADT
11	078		SD		0.004		OCEANSIDE, JCT. RTE. 5				8200	81000	78000
11	078		SD		0.741		OCEANSIDE, JEFFERSON STREET	9100	122000	1180000	9300	128000	125000
11	078		SD		1.498		OCEANSIDE, EL CAMINO REAL	9300	128000	124000	10800	148000	138000
11	078		SD		3.315		OCEANSIDE, COLLEGE BOULEVARD	10500	144000	138000	10200	131000	128000
11	078		SD		4.384		VISTA, EMERALD DRIVE	10200	131000	128000	10000	137000	128000
11	078		SD		5.944		VISTA, MELROSE DRIVE	10000	137000	128000	10900	141000	123000
11	078		SD		6.940		VISTA, SUNSET DRIVE	10900	141000	123000	11200	146000	128000
11	078		SD		7.710		VISTA, MAR VISTA DRIVE	11200	146000	128000	11100	145000	126000
11	078		SD		9.083		SYCAMORE AVENUE	11100	145000	126000	11000	147000	142000
11	078		SD		10.606		SAN MARCOS,RANCHO SANTA FE	11000	146000	142000	10600	146000	142000
11	078		SD		11.183		SAN MARCOS, LAS POSAS ROAD	10600	145000	142000	10000	142000	141000
11	078		SD		12.134		SAN MARCOS, SAN MARCOS BOULEVARD	10000	142000	141000	11100	169000	167000
11	078		SD		12.911		SAN MARCOS, TWIN OAKS VALLEY ROAD	11100	169000	167000	12800	169000	168000
11	078		SD		14.241		SAN MARCOS, WOODLAND PARKWAY	12800	169000	168000	11200	168000	167000
11	078		SD		15.486		NORDAHL ROAD	11200	168000	167000	11900	172000	168000
11	078		SD	R	16.539		ESCONDIDO, JCT. RTE. 15	11800	171000	168000	6900	92000	86000
11	078		SD	R	17.268		ESCONDIDO, CENTRE CITY PARKWAY	6900	92000	86000	4400	59000	58000
11	078		SD	N	17.680		ESCONDIDO, BROADWAY/LINCOLN PARKWAY	4400	59000	58000	4400	59000	58000
11	078		SD	T	17.678		BROADWAY AND RTE 78	4400	59000	58000	2750	33500	33000
11	078		SD	T	17.822		ESCONDIDO, MISSION AVENUE	2750	33500	33000	2850	34500	34000
11	078		SD	T	18.072		ESCONDIDO, WASHINGTON AVENUE	2850	34500	34000	2650	32000	31500
11	078		SD	T	18.408		ESCONDIDO, HICKORY STREET	2650	32000	31500	1350	15600	15400
11	078		SD	T	19.094		ESCONDIDO ASH STREET	1400	15700	15400	1650	19300	19300
11	078		SD	T	19.271		ESCONDIDO, VALLEY PARKWAY BOULEVARD	1650	19300	19300	1550	17300	17000
11	078		SD	T	19.525		ESCONDIDO, GRAND AVENUE	1550	17300	17000	1400	17000	16800
11	078		SD		19.221		ESCONDIDO, OAK HILL DRIVE/5TH AVENUE	1400	17000	16800	1400	15700	15500
11	078		SD		20.190		17TH AVENUE	1400	15700	15500	1350	15600	15400
11	078		SD		20.640		BEAR VALLEY PARKWAY	1350	15600	15400	1350	16400	16300
11	078		SD		20.950		SUMMIT DRIVE	1350	16400	16300	1000	13400	13300
11	078		SD	R	22.560		CLOVERDALE/SAN PASQUAL ROAD	1000	13400	13300	1300	11900	10200
11	078		SD		23.000		SAN PASQUAL VALLEY ROAD	1200	10700	10200	1200	10700	10200
11	078		SD		24.023		WILD ANIMAL PARK ROAD	1200	10700	10200	840	8400	7300
11	078		SD	R	27.315		BANDY CANYON ROAD	840	8400	7300	1000	10500	9300
11	078		SD		33.050		WEEKEND VILLA ROAD	1000	10500	9300	1000	10800	9700

11	078	SD	34.352	ASH ST	1000	10800	9700	1150	11900	11000
11	078	SD	35.120	OLIVE STREET	1150	11900	11000	850	10700	10400
11	078	SD	35.519	JCT. RTE. 67 SOUTHWEST	850	10700	10400	2000	22000	21100
11	078	SD	35.741	RAMONA, EIGHTH STREET	1950	22000	21100	1650	21000	20700
11	078	SD	35.850	RAMONA, SEVENTH STREET	1650	21000	20700	1400	17000	16800
11	078	SD	35.960	RAMONA, SIXTH STREET	1400	17000	16800	1250	15200	14900
11	078	SD	36.290	RAMONA, THIRD STREET	1250	15200	14900	690	17500	8700
11	078	SD	37.110	MAGNOLIA AVENUE	690	17500	8700	690	7200	7000
11	078	SD	41.960	SUTHERLAND DAM ROAD	690	7200	7000	580	5300	5000
11	078	SD	51.108	WEST JCT. RTE. 79	1100	7200	6000	770	5200	4650
11	078	SD	56.910	PINE HILLS ROAD	780	5300	4650	920	6000	5100
11	078	SD	57.880	JULIAN, MAIN/ WASHINGTON STREETS	920	6000	5100	660	5100	5000
11	078	SD	58.133	EAST JCT. RTE. 79	740	5500	5000	520	4700	4200
11	078	SD	58.640	MANZANITA ROAD	490	4600	4200	280	2700	2450
11	078	SD	59.240	CANYON DRIVE	280	2700	2450	210	1900	1750
11	078	SD	60.273	WYNOLA ROAD	210	1900	1750	150	1450	1350
11	078	SD	69.693	VALLECITOS ROAD	150	1450	1350	140	1300	1250
11	078	SD	70.010	SAN FELIPE ROAD	140	1300	1250	240	2250	1350
11	078	SD	76.840	YAQUI PASS ROAD	250	2350	1350	250	1600	1150
11	078	SD	85.610	BORREGO SPRINGS ROAD	250	1600	1150	340	2250	1600
11	078	SD	95.313	SAN DIEGO/IMPERIAL COUNTY LINE	340	2250	1600			
11	078	IMP	0.000	SAN DIEGO/IMPERIAL COUNTY LINE				300	1500	1200
11	078	IMP	13.169	NORTH JCT. RTE 86	260	1350	1200	260	1300	1200
11	078	IMP R	9.203	SOUTH JCT RTE 86	300	1950	1200	800	10200	9000
11	078	IMP R	10.809	BRANDT RD	780	10400	9000	1100	14000	12200
11	078	IMP R	12.891	JCT 78/111 - WEST	2850	14700	12200	2900	16300	13600
11	078	IMP R	13.897	BEST ROAD	1150	15200	13600	1200	13200	11800
11	078	IMP	15.499	E JCT RTE 78/111	970	13200	11800	510	5200	4550
11	078	IMP	18.651	WEST JCT. RTE. 115	500	4850	4550	450	4500	3700
11	078	IMP	21.023	EAST JCT. RTE. 115	490	4350	3700	360	2500	2100
11	078	IMP	25.927	GREEN ROAD	480	2500	2100	410	2050	1800
11	078	IMP	41.004	GLAMIS	410	2050	1800	440	2100	1900
11	078	IMP	52.348	OGILBY ROAD	440	2100	1900	520	2400	2050
11	078	IMP	80.442	PALO VERDE, FOURTH/MAIN STREETS	550	2600	2150	360	2250	1950
11	078	IMP	80.743	PALO VERDE, IMPERIAL/RIVERSIDE COUNTY LINE	330	2250	1950			
08	078	RIV	0.000	PALO VERDE, IMPERIAL/RIVERSIDE COUNTY LINE				220	1600	1500
08	078	RIV	3.060	32ND AVENUE/PALO VERDE BOULEVARD	220	1600	1500	260	1900	1800
08	078	RIV	6.350	CRANNELLS BOULEVARD/28TH AVENUE	260	1900	1800	240	1950	1700
08	078	RIV	9.352	28TH AVENUE/NEIGHBORS BOULEVARD	240	1950	1700	270	2150	1900
08	078	RIV	10.620	RIPLEY, BROADWAY STREET	270	2150	1900	270	3100	2800
08	078	RIV	16.169	JCT. RTE. 10	270	3100	2800	390	3350	2800
08	078	RIV	16.411	HOBSON WAY F-OLD RTE 10	390	3350	2800			

11	086	IMP	R	0.000	JCT. RTE. 111				620	5800	4850
11	086	IMP		2.077	DOGWOOD ROAD	540	5600	5100	460	4550	4200
11	086	IMP		3.050	WEST HEBER TURN	460	4550	4200	350	3500	3300
11	086	IMP		4.530	MC CABE ROAD	350	3500	3300	630	8200	8100
11	086	IMP		6.006	JCT. RTE. 8	2100	24600	22400	3000	33500	32000
11	086	IMP	L	6.534	EL CENTRO, ROSS AVENUE	3000	33500	32000	2900	31000	30000
11	086	IMP		7.240	EL CENTRO, STATE STREET	2900	31000	30000	2650	30000	29000
11	086	IMP	L	7.308	MAIN STREET	2650	30000	29000	1700	20600	19000
11	086	IMP	L	8.028	EL CENTRO, EIGHTH STREET	1700	20600	19000	1550	18000	17000
11	086	IMP	L	8.525	ADAMS/IMPERIAL AVENUES	1600	18400	17000	2600	31500	28500
11	086	IMP		7.430	EL CENTRO, EUCLID/HOGAR AVENUES	2600	31500	28500	2350	28000	26000
11	086	IMP		7.490	EL CENTRO, WOODWARD AVENUE	2350	28000	26000	2450	29000	26500
11	086	IMP		7.643	SCOTT AVENUE	2450	29000	26500	2450	30500	27500
11	086	IMP		7.930	PICO AVENUE	2450	30500	27500	2450	29000	26500
11	086	IMP		8.180	EL DORADO AVENUE	2450	29000	26500	2000	23700	22100
11	086	IMP		15.320	KEYSTONE ROAD	1300	14500	13800	1300	15800	14000
11	086	IMP		19.190	LEGION ROAD	1350	16100	14300	1950	21700	19600
11	086	IMP		20.080	BRAWLEY, WESTERN AVENUE	1950	21700	19600	1700	19100	16900
11	086	IMP		20.250	BRAWLEY, K STREET	1700	19100	16900	1100	12900	12200
11	086	IMP		20.627	SOUTH JCT. RTE. 78	1100	12900	12300	1550	17900	17200
11	086	IMP		20.990	BRAWLEY, RIO VISTA AVENUE	1550	17900	17200	1800	20900	20000
11	086	IMP		21.250	LAS FLORES DRIVE	1800	20900	20000	1700	20700	19600
11	086	IMP	R	22.882	KALIN ROAD	1700	20700	19600	770	9500	8800
11	086	IMP	R	24.057	JCT RTE 78	760	9400	8700	1450	17200	16400
11	086	IMP	R	27.211	WESTMORLAND, B STREET	1450	17200	16400	1450	16400	15300
11	086	IMP		27.510	WESTMORLAND, CENTER STREET	1450	16400	15300	1900	24600	23400
11	086	IMP		27.760	WESTMORLAND, WEST CITY LIMITS/ H STREET	1900	24600	23400	1150	13400	12700
11	086	IMP		28.006	MARTIN ROAD	1150	13400	12700	1150	14600	12800
11	086	IMP	R	29.005	LACK ROAD	1150	14600	12800	1250	19000	17300
11	086	IMP	R	33.757	BANNISTER ROAD	1250	19000	17300	1150	14900	13200
11	086	IMP		43.559	NORTH JCT. RTE. 78	1100	14600	12400	1100	13300	11900
11	086	IMP		53.900	AIR PARK DRIVE	1100	13600	12100	2250	20000	18400
11	086	IMP		56.120	SALTON CITY, SOUTH MARINA DRIVE	2250	20000	18400	2250	20600	18900
11	086	IMP		63.630	SALTON SEA BEACH ROAD	2250	20600	18900	1500	19900	16900
11	086	IMP		66.143	DESERT SHORES DRIVE	1700	19400	16800	1500	19900	16800
11	086	IMP		67.824	IMPERIAL/RIVERSIDE COUNTY LINE	1500	19900	16800			
08	086	RIV		0.000	IMPERIAL/RIVERSIDE COUNTY LINE				1500	19900	16800
08	086	RIV		1.710	LINCOLN ST - RT	1500	19900	16800	1500	19900	16800
08	086	RIV	R	3.484	81ST AVE	1500	19900	16800	1400	19600	16800
08	086	RIV	R	11.031	JCT RTE 195	1550	19000	16500	1400	18600	16500
08	086	RIV	R	12.477	JCT RTE 111	1400	18600	16500	1650	22600	19400
08	086	RIV	R	16.744	AIRPORT BLVD	1950	27500	23500	2450	34500	29500

08	086	RIV	R	22.157	DILLON RD	2450	34500	29500	2800	39000	33500
08	086	RIV	R	23.000	JCT RTE 10	2800	39000	33500			
11	111	IMP	R	0.000	CALEXICO, SOUTH CITY LIMITS, AT MEXICAN BOUNDARY				2300	30500	29500
11	111	IMP	R	0.200	CALEXICO, SECOND STREET	2300	30500	29500	2300	32000	29500
11	111	IMP	R	0.273	THIRD ST	2300	32000	29500	2600	35500	34000
11	111	IMP		0.836	CALEXICO, GRANT STREET (EIGHTH STREET)	2600	35500	34000	2600	35500	34000
11	111	IMP	R	1.183	JCT. RTE. 98	2600	35500	34000	2500	32500	31500
11	111	IMP	R	2.211	COLE ROAD	2600	33500	31500	2850	37500	34500
11	111	IMP	R	4.741	JCT. RTE. 86 WEST	2850	37500	34500	3000	36500	34500
11	111	IMP	R	6.242	MC CABE ROAD	2950	36000	34500	2650	36000	34000
11	111	IMP	R	7.714	JCT. RTE. 8	2650	36000	34000	2800	31500	29500
11	111	IMP	R	9.503	EVAN HEWES HWY	2000	26500	24000	2000	25500	22900
11	111	IMP	R	11.299	ATEN RD	2050	26500	22900	1300	17400	16900
11	111	IMP	R	12.874	WORTHINGTON ROAD	1300	17400	16900	1450	17700	15800
11	111	IMP	R	17.385	KEYSTONE ROAD	1450	17700	15800	1300	16400	15300
11	111	IMP	R	22.015	JCT. RTE. 78	1400	17500	15300	880	8000	7600
11	111	IMP		23.538	SHANK ROAD	880	8000	7600	620	6400	6000
11	111	IMP		23.787	DEL RIO RD. RT. Y	620	6400	6000	630	6500	6000
11	111	IMP		24.682	ANDRE RD. F	620	6400	6000	710	6800	5300
11	111	IMP		26.670	RUTHERFORD ROAD	810	7700	6000	900	8600	6800
11	111	IMP		32.010	CALIPATRIA, SOUTH CITY LIMITS	800	7700	6100	790	7600	6000
11	111	IMP		32.513	JCT. RTE. 115 EAST	750	7200	5700	710	6700	5400
11	111	IMP		32.740	CALIFORNIA STREET	710	6700	5400	860	7800	5900
11	111	IMP		36.090	SINCLAIR ROAD	860	7800	5900	620	5600	3500
11	111	IMP		39.820	NILAND AVENUE	620	5600	3500	400	3550	2800
11	111	IMP		40.400	THIRD STREET	400	3550	2800	470	4100	3150
11	111	IMP		40.710	BEAL ROAD	470	4100	3150	320	3150	2350
11	111	IMP		42.470	ENGLISH ROAD	310	2950	2250	300	2800	2200
11	111	IMP		57.625	BOMBAY BEACH ROAD	260	2200	1700	240	1850	1750
11	111	IMP		65.394	IMPERIAL/RIVERSIDE COUNTY LINE	270	2150	1800			
08	111	RIV		0.001	IMPERIAL/RIVERSIDE COUNTY LINE				240	1900	1650
08	111	RIV		7.670	SALTON SEA STATE PARK ROAD	170	1750	1650	340	3450	3300
08	111	RIV		18.428	MECCA,	580	5700	5000	890	8800	7700
08	111	RIV	R	18.511	LINCOLN ST -RT	570	5800	5500	730	7400	7000
08	111	RIV	R	19.318	JCT RTE 86	730	7400	7000	730	7400	7000
08	111	RIV		47.252	PALM SPRINGS, GOLF CLUB DRIVE	2850	31500	29000	3200	35500	32600
08	111	RIV	T	47.795	EAST PALM CANYON/GENE AUTRY TRAIL	2850	31500	29000	1300	13500	12700
08	111	RIV	T	48.318	GENE AUTRY TR N/O PALM CYN	1300	13500	12700	1250	13500	12700
08	111	RIV	T	49.370	PALM SPRINGS, RAMON ROAD	1250	13500	12700	1950	20100	18900
08	111	RIV	T	51.588	VISTA CHINO	2100	21700	20400	2700	31500	29600
08	111	RIV	T	52.371	PALM SPRINGS, FARRELL DRIVE	2700	31500	29600	2150	25000	23500
08	111	RIV	T	52.876	PALM SPRINGS, SUNRISE WAY	2150	25000	23500	2000	22800	21400

08	111	RIV	T	53.376	PALM SPRINGS, AVENIDA CABALLEROS	2000	22800	21400	1300	15000	14100
08	111	RIV	T	53.627	PALM SPRINGS, VIA MIRALESTE	1300	15000	14100	1300	15000	14100
08	111	RIV	T	53.877	PALM SPRINGS, INDIAN CANYON	1300	15000	14100	990	11400	10700
08	111	RIV	T	53.944	VISTA CHINO @ PALM CNYN	990	11400	10700	2200	20800	18500
08	111	RIV		54.955	PALM SPRINGS, TRAMWAY DRIVE	2000	19100	17000	2000	19100	17000
08	111	RIV	R	63.378	JCT. RTE. 10	1650	15700	14000			

RTE	RTE_SFX	DIST	CNTY	POSTMILE_PFX	POSTMILE	POSTMILE_SFX	LEG	DESCRIPTION	VEHICLE_AADT_TOTAL	TRUCK_AADT_TOTAL	TRK_PERCENT_TOT	TRK_2_AXLE	TRK_3_AXLE	TRK_4_AXLE	TRK_5_AXLE	TRK_2_AXLE_PCT	TRK_3_AXLE_PCT	TRK_4_AXLE_PCT	TRK_5_AXLE_PCT	EAL	YEAR_VER	EST
078	11	SD			0.004		A	OCEANSIDE, JCT. RTE. 5	78000	3643	4.67	1709	369	283	1282	46.92	10.12	7.77	35.19	578 07	E	
078	11	SD			1.498		A	OCEANSIDE, EL CAMINO REAL	138000	6721	4.87	3153	680	522	2365	46.92	10.12	7.77	35.19	1,066 07	E	
078	11	SD			5.944		B	VISTA, MELROSE DRIVE	128000	6618	5.17	3105	670	514	2329	46.92	10.12	7.77	35.19	1,049 07	E	
078	11	SD			5.944		A	VISTA, MELROSE DRIVE	123000	5867	4.77	2753	594	456	2065	46.92	10.12	7.77	35.19	930 07	E	
078	11	SD			10.606		X	SAN MARCOS,RANCHO SANTA FE	118000	5410	4.58	3523	464	209	1214	65.12	8.58	3.86	22.44	616 19	V	
078	11	SD			16.539		B	ESCONDIDO, JCT. RTE. 15	168000	7644	4.55	3587	774	594	2690	46.92	10.12	7.77	35.19	1,212 07	V	
078	11	SD	R		17.268		B	ESCONDIDO, CENTRE CITY PARKWAY	86000	4558	5.3	2484	428	246	1399	54.50	9.40	5.40	30.70	645 97	E	
078	11	SD	N		17.68		B	ESCONDIDO, BROADWAY/LINCOLN PARKWAY	58000	580	1	310	138	89	44	53.40	23.80	15.30	7.50	52 86	E	
078	11	SD	T		19.094		B	ESCONDIDO ASH STREET	15400	924	6	645	114	22	143	69.80	12.30	2.40	15.50	86 96	E	
078	11	SD	T		19.094		A	ESCONDIDO ASH STREET	19300	1158	6	808	142	27	181	69.80	12.30	2.30	15.60	108 96	E	
078	11	SD			18.94		A	ESCONDIDO, GRAND AVENUE	16800	1025	6.1	715	126	25	159	69.80	12.30	2.40	15.50	95 96	E	
078	11	SD	R		22.56		A	CLOVERDALE/SAN PASQUAL ROAD	10200	599	5.87	424	60	31	84	70.78	10.02	5.18	14.02	54 19	V	
078	11	SD	R		27.315		A	BANDY CANYON ROAD	9300	874	9.4	438	139	53	244	50.10	15.90	6.10	27.90	120 81	E	
078	11	SD			35.519		B	JCT. RTE. 67 SOUTHWEST	10400	229	2.2	91	51	10	77	39.80	22.30	4.20	33.70	36 87	E	
078	11	SD			35.519		A	JCT. RTE. 67 SOUTHWEST	21100	1161	5.5	802	132	51	175	69.10	11.40	4.40	15.10	108 87	V	
078	11	SD			51.108		B	WEST JCT. RTE. 79	6000	360	6	255	42	31	32	70.90	11.60	8.50	9.00	28 93	V	
078	11	SD			51.108		A	WEST JCT. RTE. 79	4650	291	6.26	246	21	10	14	84.54	7.22	3.44	4.81	17 19	V	
078	11	SD			58.133		B	EAST JCT. RTE. 79	5000	830	16.6	652	104	37	37	78.50	12.50	4.50	4.50	51 88	E	
078	11	SD			58.133		A	EAST JCT. RTE. 79	4200	1021	24.3	825	123	36	38	80.80	12.00	3.50	3.70	59 88	E	
078	11	IMP	R		9.203		A	SOUTH JCT RTE 86	9000	2800	31.11	604	173	83	1940	21.57	6.17	2.96	69.30	719 18	V	
078	11	IMP	R		12.891		X	JCT 78/111 - WEST	8450	5141	60.84	2636	176	166	2164	51.27	3.42	3.22	42.09	879 18	V	
078	11	IMP	R		12.891		B	JCT 78/111 - WEST	12200	5704	46.75	2924	195	184	2401	51.27	3.42	3.22	42.09	976 18	V	
078	11	IMP	R		12.891		A	JCT 78/111 - WEST	13600	5592	41.12	2867	191	180	2354	51.27	3.42	3.22	42.09	957 18	V	
078	11	IMP			15.499		B	E JCT RTE 78/111	11800	5461	46.28	3092	419	291	1659	56.62	7.68	5.33	30.37	762 17	E	
078	11	IMP			15.499		A	E JCT RTE 78/111	4550	2397	52.68	1346	159	141	751	56.17	6.64	5.87	31.32	342 18	V	
078	11	IMP			18.651		A	WEST JCT. RTE. 115	3700	1158	31.3	272	71	5	811	23.50	6.10	0.40	70.00	297 85	V	
078	11	IMP			21.023		A	EAST JCT. RTE. 115	2100	572	27.24	202	35	24	311	35.31	6.12	4.20	54.37	121 19	V	
078	08	RIV			9.352		B	28TH AVENUE/NEIGHBORS BOULEVARD	1700	204	12	31	20	16	137	15.10	9.80	7.80	67.30	53 93	E	
078	08	RIV			9.352		A	28TH AVENUE/NEIGHBORS BOULEVARD	1900	143	7.5	22	14	11	96	15.30	9.70	7.60	67.40	37 93	E	
078	08	RIV			16.169		B	JCT. RTE. 10	2800	171	6.1	26	17	13	115	15.00	10.00	7.50	67.50	44 93	E	
086	11	IMP	R		0		A	JCT. RTE. 111	4850	315	6.5	229	21	13	52	72.70	6.70	4.10	16.50	30 78	V	
086	11	IMP			6.006		B	JCT. RTE. 8	22400	1344	6	927	101	44	271	69.00	7.50	3.30	20.20	142 78	E	
086	11	IMP			6.006		A	JCT. RTE. 8	32000	2016	6.3	1339	163	44	470	66.40	8.10	2.20	23.30	230 78	V	
086	11	IMP	L		8.525		B	ADAMS/IMPERIAL AVENUES	17000	1122	6.6	679	86	66	291	60.50	7.70	5.90	25.90	142 79	V	
086	11	IMP	L		8.525		A	ADAMS/IMPERIAL AVENUES	28500	1796	6.3	867	199	32	697	48.30	11.10	1.80	38.80	294 78	V	
086	11	IMP			15.32		B	KEYSTONE ROAD	13800	4658	33.75	4450	79	39	90	95.53	1.70	0.84	1.93	200 19	V	
086	11	IMP	R		24.057		B	JCT RTE 78	8700	1092	12.55	537	77	55	423	49.22	7.03	5.00	38.75	180 18	V	
086	11	IMP	R		27.211		B	WESTMORLAND, B STREET	16400	4659	28.41	699	388	932	2640	15.00	8.33	20.00	56.67	1,108 03	E	
086	11	IMP			27.51		B	WESTMORLAND, CENTER STREET	15300	4312	28.18	834	96	113	3269	19.35	2.22	2.62	75.81	1,182 03	E	
086	11	IMP			28.006		A	MARTIN ROAD	12800	4068	31.78	1221	401	314	2132	30.01	9.86	7.72	52.41	861 19	V	
086	11	IMP			43.559		B	NORTH JCT. RTE. 78	12400	2874	23.18	556	64	75	2179	19.35	2.22	2.62	75.81	788 03	E	
086	11	IMP			43.559		A	NORTH JCT. RTE. 78	11900	4284	36	651	286	1002	2343	15.19	6.68	23.40	54.70	1,005 03	E	
086	11	IMP			67.824		B	IMPERIAL/RIVERSIDE COUNTY LINE	16800	4091	24.35	963	428	297	2402	23.55	10.47	7.26	58.72	945 16	E	
086	08	RIV	R		16.744		B	AIRPORT BLVD	23500	4521	19.24	939	184	76	3322	20.77	4.07	1.67	73.49	1,207 18	V	
111	11	IMP	R		0		A	CALEXICO, SOUTH CITY LIMITS, AT MEXICAN BOUNDARY	29500	1062	3.6	592	188	21	261	55.70	17.70	2.00	24.60	131 78	V	
111	11	IMP			1.183		B	JCT. RTE. 98	34000	1632	4.8	1102	150	54	326	67.50	9.20	3.30	20.00	173 78	V	
111	11	IMP	R		1.183		A	JCT. RTE. 98	31500	2520	8	1391	262	38	829	55.20	10.40	1.50	32.90	364 78	V	
111	11	IMP	R		4.741		B	JCT. RTE. 86 WEST	34500	2760	8	1524	287	41	908	55.20	10.40	1.50	32.90	399 78	E	
111	11	IMP	R		4.741		A	JCT. RTE. 86 WEST	34500	2415	7	1273	362	116	664	52.70	15.00	4.80	27.50	324 81	E	
111	11	IMP	R		7.714		B	JCT. RTE. 8	34000	2380	7	1254	357	114	655	52.70	15.00	4.80	27.50	319 81	V	
111	11	IMP	R		7.714		A	JCT. RTE. 8	29500	3658	12.4	1716	351	55	1536	46.90	9.60	1.50	42.00	630 78	V	
111	11	IMP	R		12.874		A	WORTHINGTON ROAD	15800	7635	48.32	4711	203	120	2601	61.70	2.66	1.57	34.07	1,099 19	V	
111	11	IMP	R		17.385		A	KEYSTONE ROAD	15300	3317	21.68	1154	221	147	1795	34.79	6.67	4.42	54.12	702 15	E	
111	11	IMP			23.787		A	DEL RIO RD. RT. Y	6000	1711	28.52	1333	89	67	222	77.92	5.19	3.90	12.99	141 15	E	
111	11	IMP			26.67		B	RUTHERFORD ROAD	6000	900	15	433	49	12	407	48.10	5.40	1.30	45.20	162 85	E	
111	11	IMP			26.67		A	RUTHERFORD ROAD	6800	1435	21.1	508	75	33	819	35.40	5.20	2.30	57.10	312 78	V	
111	11	IMP			32.513		B	JCT. RTE. 115 EAST	5700	1203	21.1	426	63	28	687	35.40	5.20	2.30	57.10	262 78	E	
111	11	IMP			32.513		A	JCT. RTE. 115 EAST	5400	869	16.1	364	45	23	436	41.90	5.20	2.70	50.20	171 85	V	
111	11	IMP			39.82		B	NILAND AVENUE	3500	644	18.4	270	33	17	323	41.90	5.20	2.70	50.20	126 85	E	
111	11	IMP			39.82		A	NILAND AVENUE	2800	501	17.9	210	26	14	252	41.90	5.20	2.70	50.20	99 85	E	
111	11	IMP			65.394		B	IMPERIAL/RIVERSIDE COUNTY LINE	1800	474	26.33	115	71	53	235	24.30	14.94	11.14	49.62	99 15	E	
111	08	RIV			18.428		B	MECCA,	5000	985	19.7	413	51	27	494	41.90	5.20	2.70	50.20	194 85	E	
111	08	RIV			18.428		A	MECCA,	7700	1348	17.5	519	67	55	706	38.50	5.00	4.10	52.40	276 85	V	
111	08	RIV	T		50.8		O	TAMARISK ROAD	18900	2098	11.1	1733	183	40	143	82.60	8.70	1.90	6.80	133 92	V	
111	08	RIV	T		51.588		B	VISTA CHINO	20400	2285	11.2	1887	199	43	155	82.60	8.70	1.90	6.80	144 91	V	
111	08	RIV	T		51.588		A	VISTA CHINO	29600	2279	7.7	2072	148	18	41	90.90	6.50	0.80	1.80	103 91	V	
111	08	RIV	R		63.378																	

MBGP Attachment DRR 86 Existing LOS Calculations



HCM 6th TWSC
1: Hwy 111 & Sinclair Rd

2022 Existing Conditions

Intersection												
Int Delay, s/veh	1.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	14	5	3	2	5	3	9	107	8	15	99	22
Future Vol, veh/h	14	5	3	2	5	3	9	107	8	15	99	22
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	250	-	-	290	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	14	5	3	2	5	3	10	118	9	16	109	24
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	300	300	121	300	308	123	133	0	0	127	0	0
Stage 1	153	153	-	143	143	-	-	-	-	-	-	-
Stage 2	147	147	-	157	165	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	656	616	936	656	609	933	1464	-	-	1472	-	-
Stage 1	854	775	-	865	782	-	-	-	-	-	-	-
Stage 2	860	779	-	850	766	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	640	605	936	640	598	933	1464	-	-	1472	-	-
Mov Cap-2 Maneuver	640	605	-	640	598	-	-	-	-	-	-	-
Stage 1	848	766	-	859	777	-	-	-	-	-	-	-
Stage 2	845	774	-	832	758	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	10.6		10.4		0.5		0.8					
HCM LOS	B		B									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR					
Capacity (veh/h)	1464	-	-	661	680	1472	-	-				
HCM Lane V/C Ratio	0.007	-	-	0.034	0.016	0.011	-	-				
HCM Control Delay (s)	7.5	-	-	10.6	10.4	7.5	-	-				
HCM Lane LOS	A	-	-	B	B	A	-	-				
HCM 95th %tile Q(veh)	0	-	-	0.1	0	0	-	-				