SR 166 COMPREHENSIVE CORRIDOR STUDY

DRAFT FINAL REPORT

APPENDIX C

OCTOBER 2025

TO CREDCAG (Fred Luna)

PREPARED FOR:

SANTA BARBARA COUNTY ASSOCIATION OF GOVERNMENTS

SBCAG
SANTA BARBARA COUNTY ASSOCIATION OF GOVERNMENTS

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SR 166
COMPREHENSIVE CORRIDOR STUDY
Guadalupe to Santa Maria

APPENDIX C

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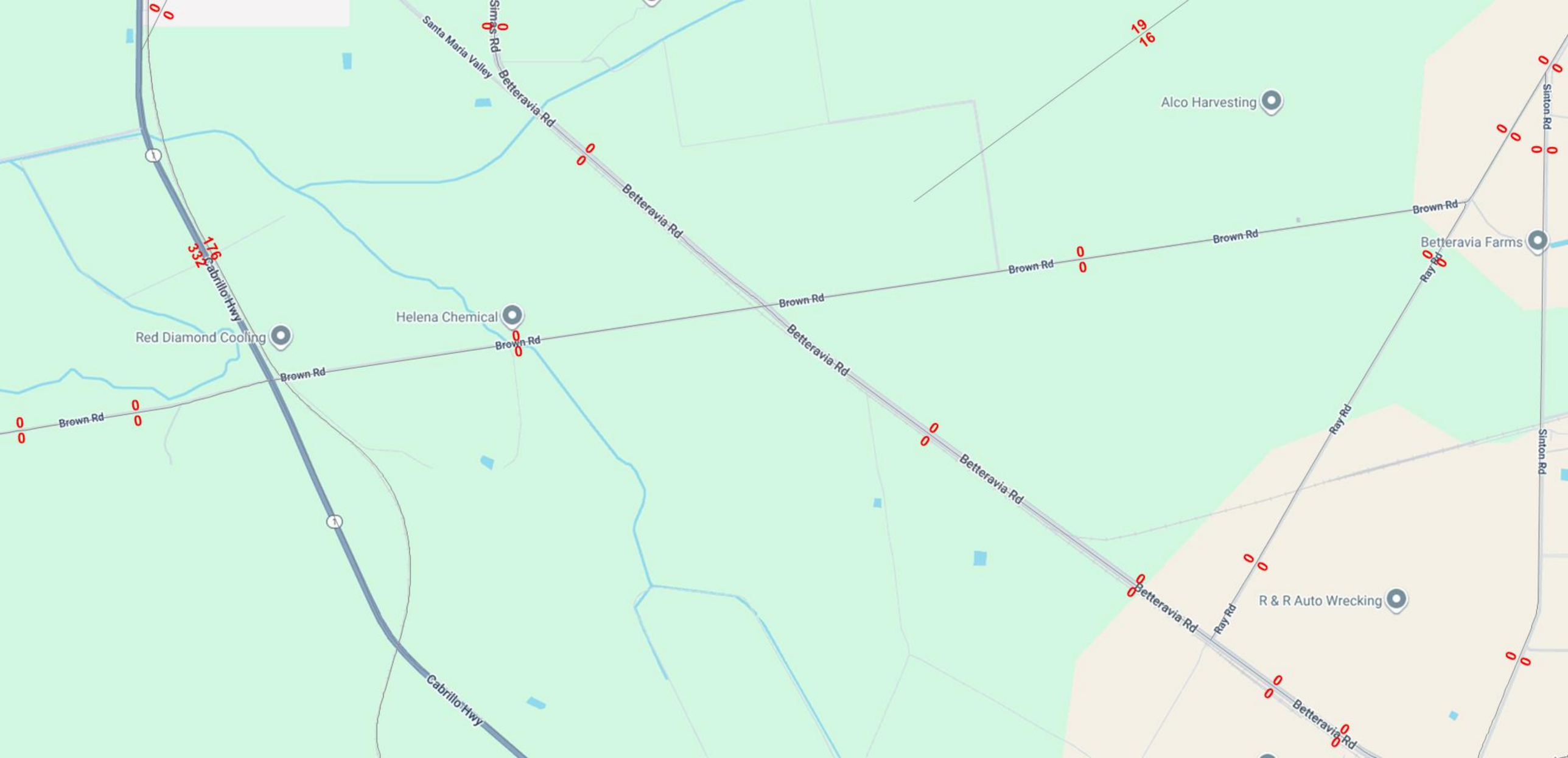
SECTION 1: FUTURE FORECASTED VOLUMES

TRAVEL DEMAND MODEL PLOTS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Cabrillo Hwy
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Ray Rd
Sinton Rd
Alco Harvesting
Helena Chemical
Red Diamond Cooling
Betteravia Farms
R & R Auto Wrecking
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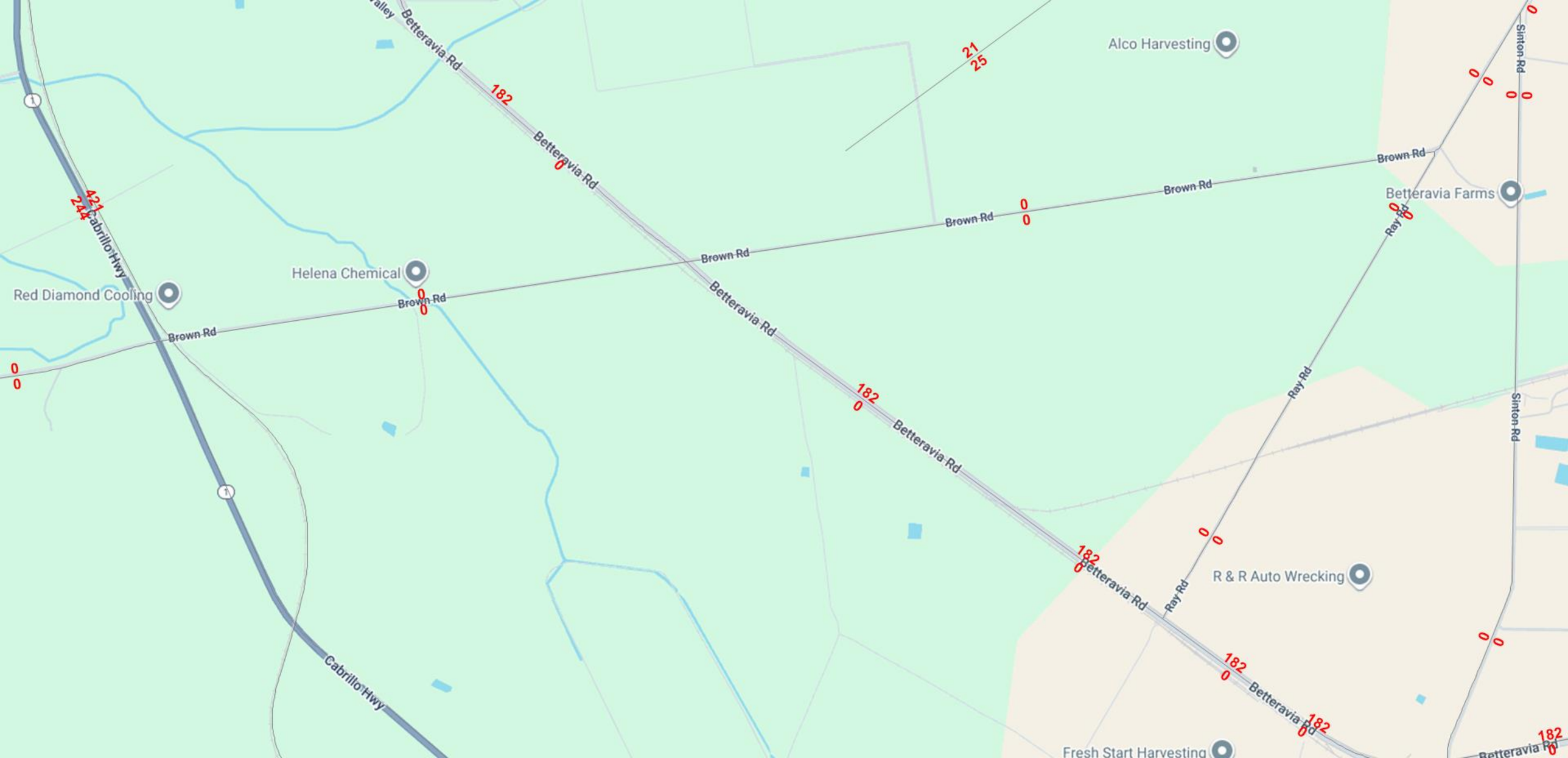
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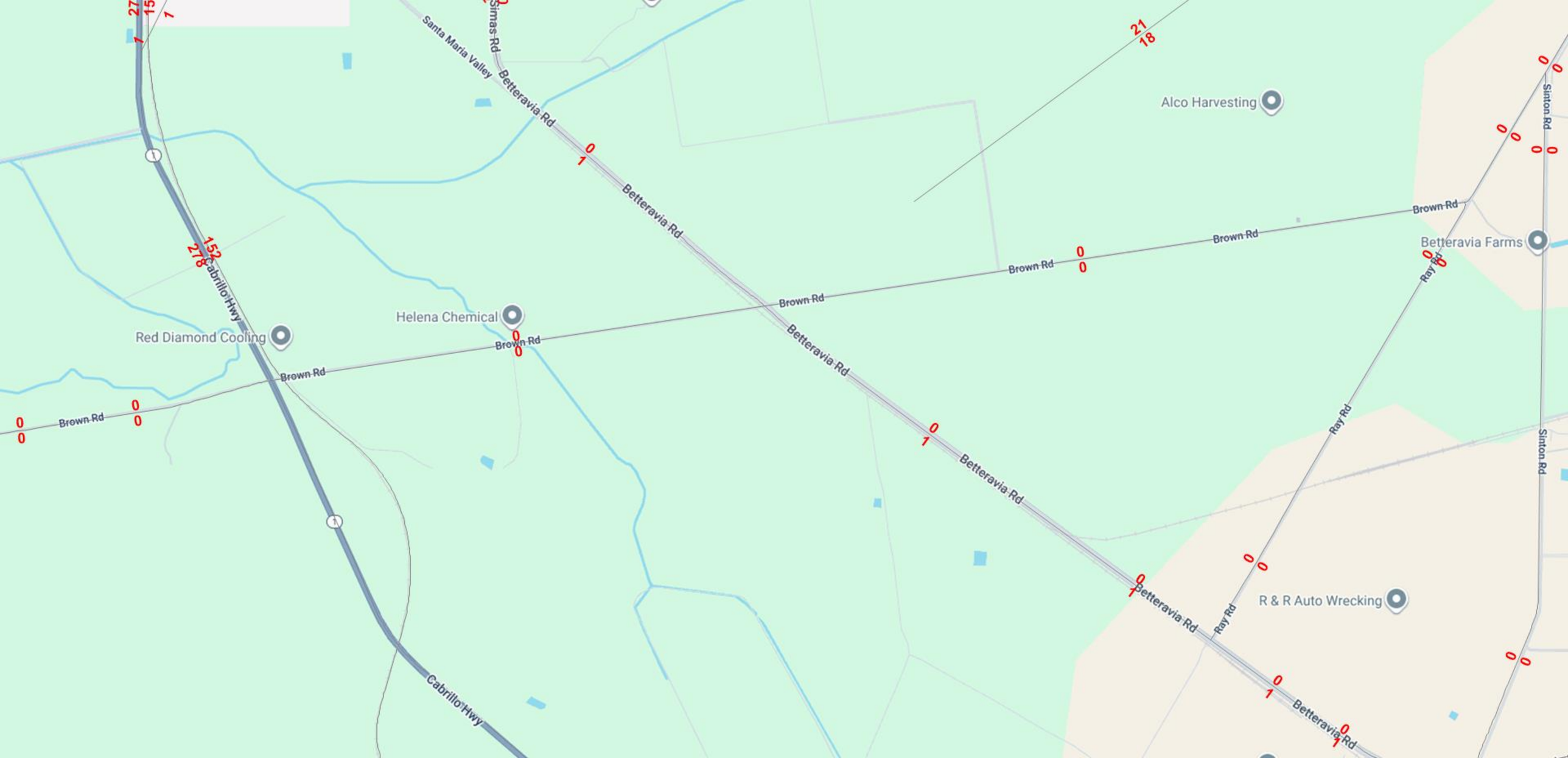
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Ray Rd
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R & R Auto Wrecking

Rancho Guadalupe
Simas Rd
Bonita-School-Rd
Frontier Cooling, Inc
Teixeira F
W Main St
Bonita Elementary School
Ray Rd
Brandt Ag Products, Inc
Engel & Gray Compost Facility
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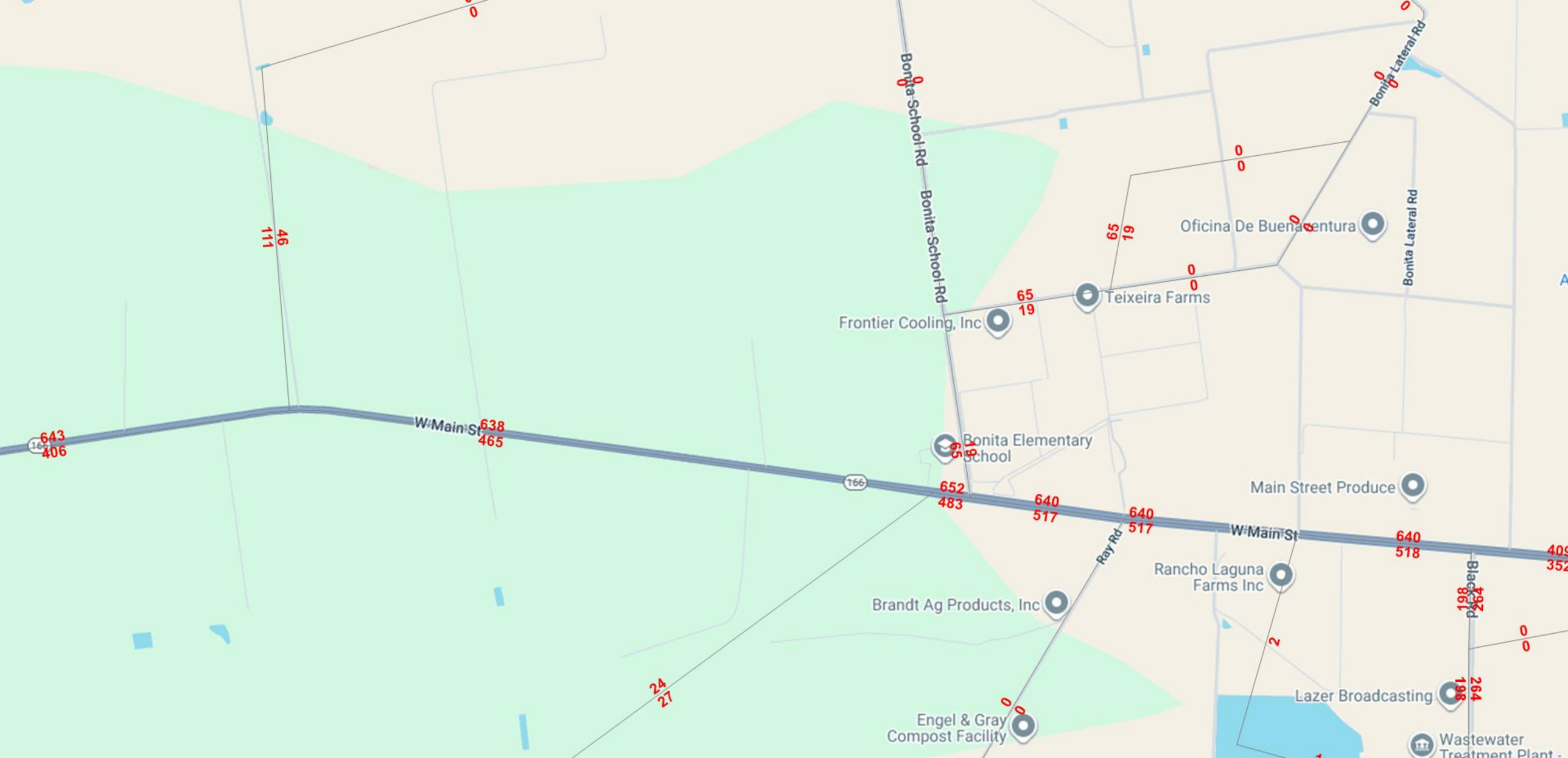

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Ray Rd
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Brandt Ag Products, Inc
Lazer Broadcasting
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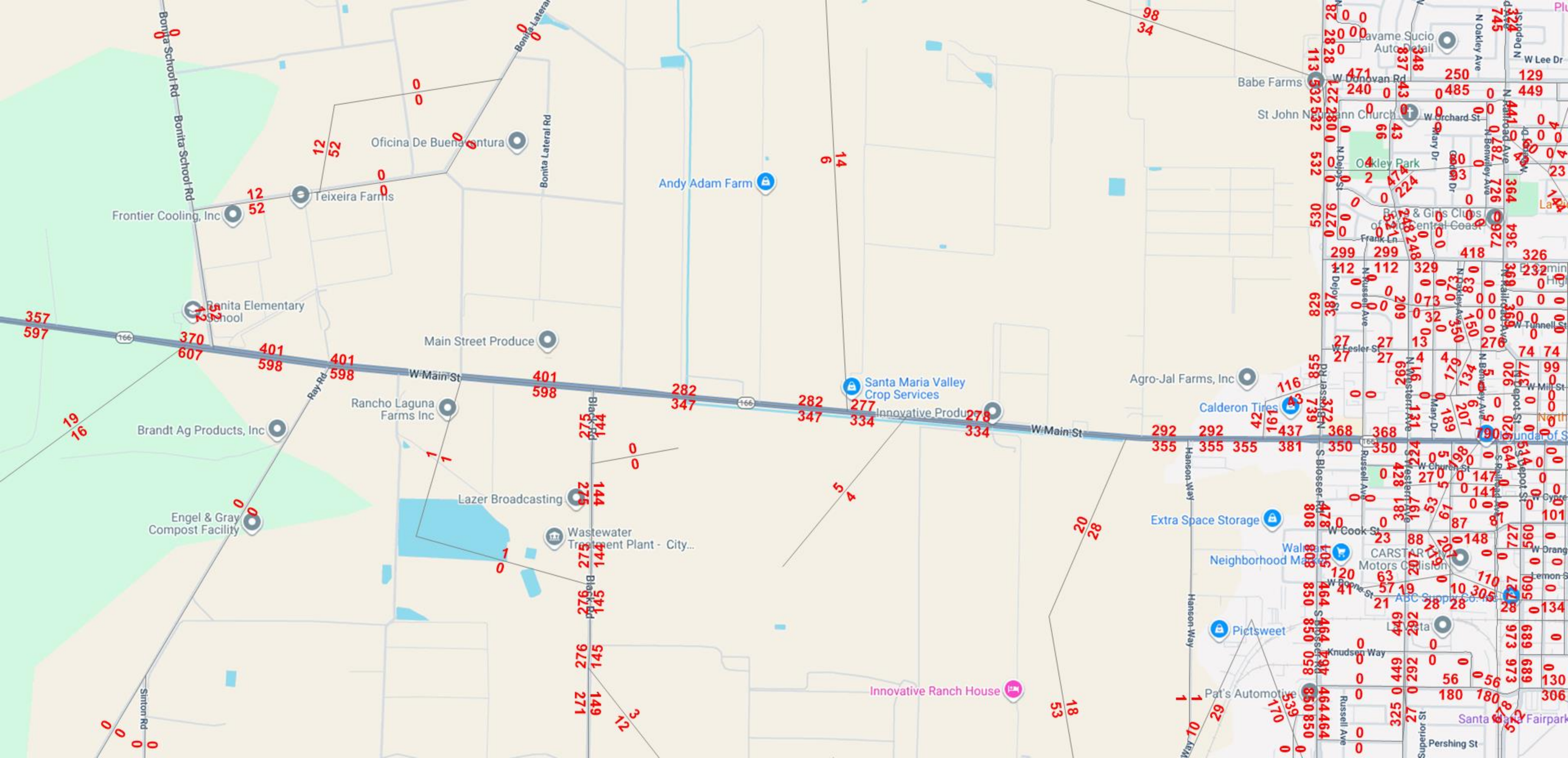
Wastewater Treatment Plant



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Ray Rd
Rancho Laguna Farms Inc
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Lazer Broadcasting
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Black Rd
Santa Maria Valley Crop Services
Innovative Produce
Agro-Jal Farms, Inc
Calderon Tires
Extra Space Storage
Walmart Neighborhood Market
CARSTAR Motors Collision
ABC Supply Co. Inc
Pictsweet
Pat's Automotive
Innovative Ranch House
Sinton Rd
Hanson Way
Babe Farms
St John Neumann Church
Oakley Park
Boys & Girls Clubs of the Central Coast
Lavame Sucio Auto Detail
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W Lee Dr
W Tunnell St
W Mill St
W Cook St
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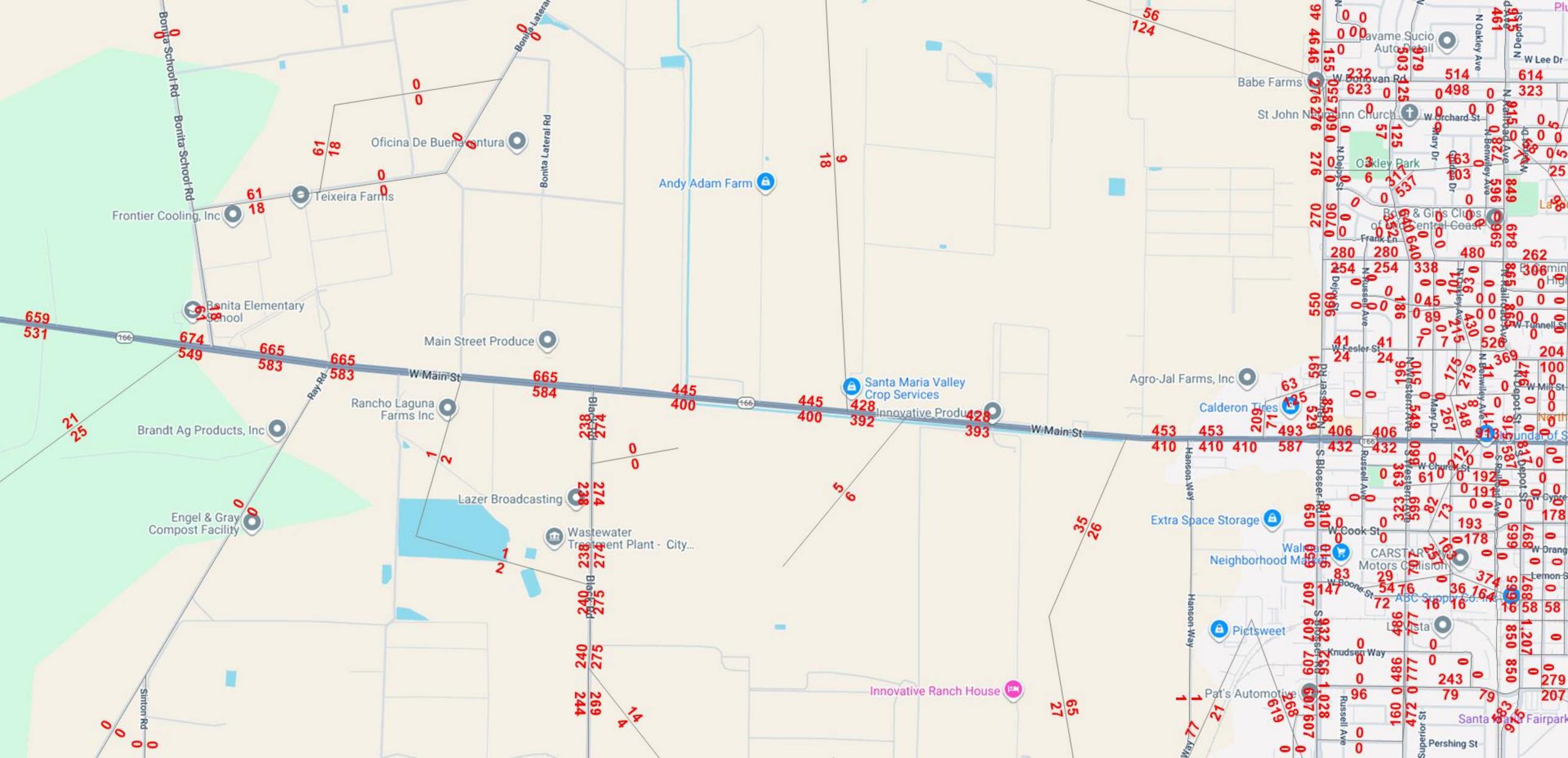
Pershing St
Santa Maria Fairpark



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Engel & Gray Compost Facility
Wastewater Treatment Plant - City...
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Walnut Neighborhood Market
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ABC Supply Co. Inc
Pictsweet
Innovative Ranch House
Pat's Automotive
Santa Maria Fairpark
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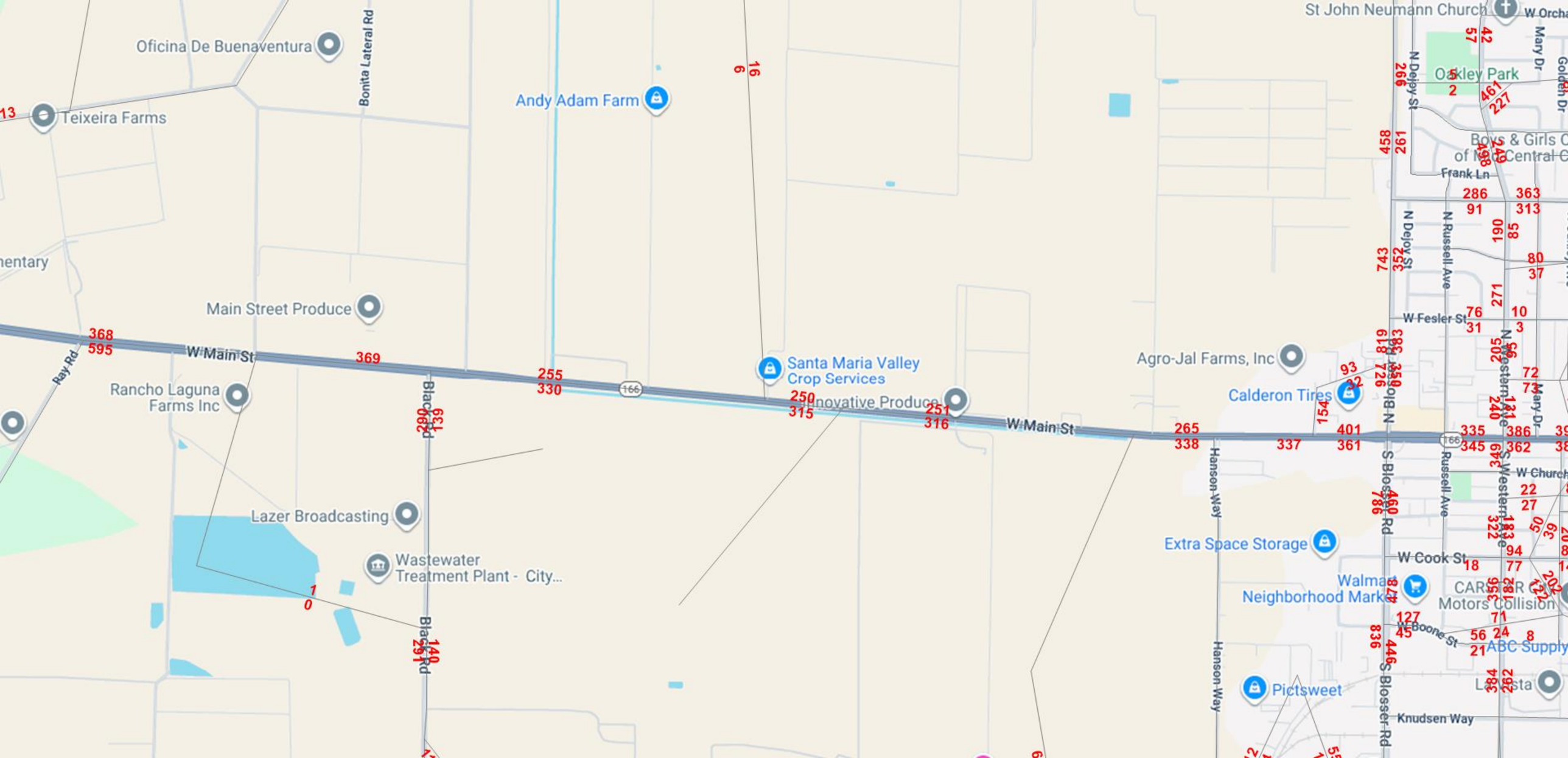
Lavame Sucio Auto Detail
Hanson Way
Knudsen Way
Pershing St
Sinton Rd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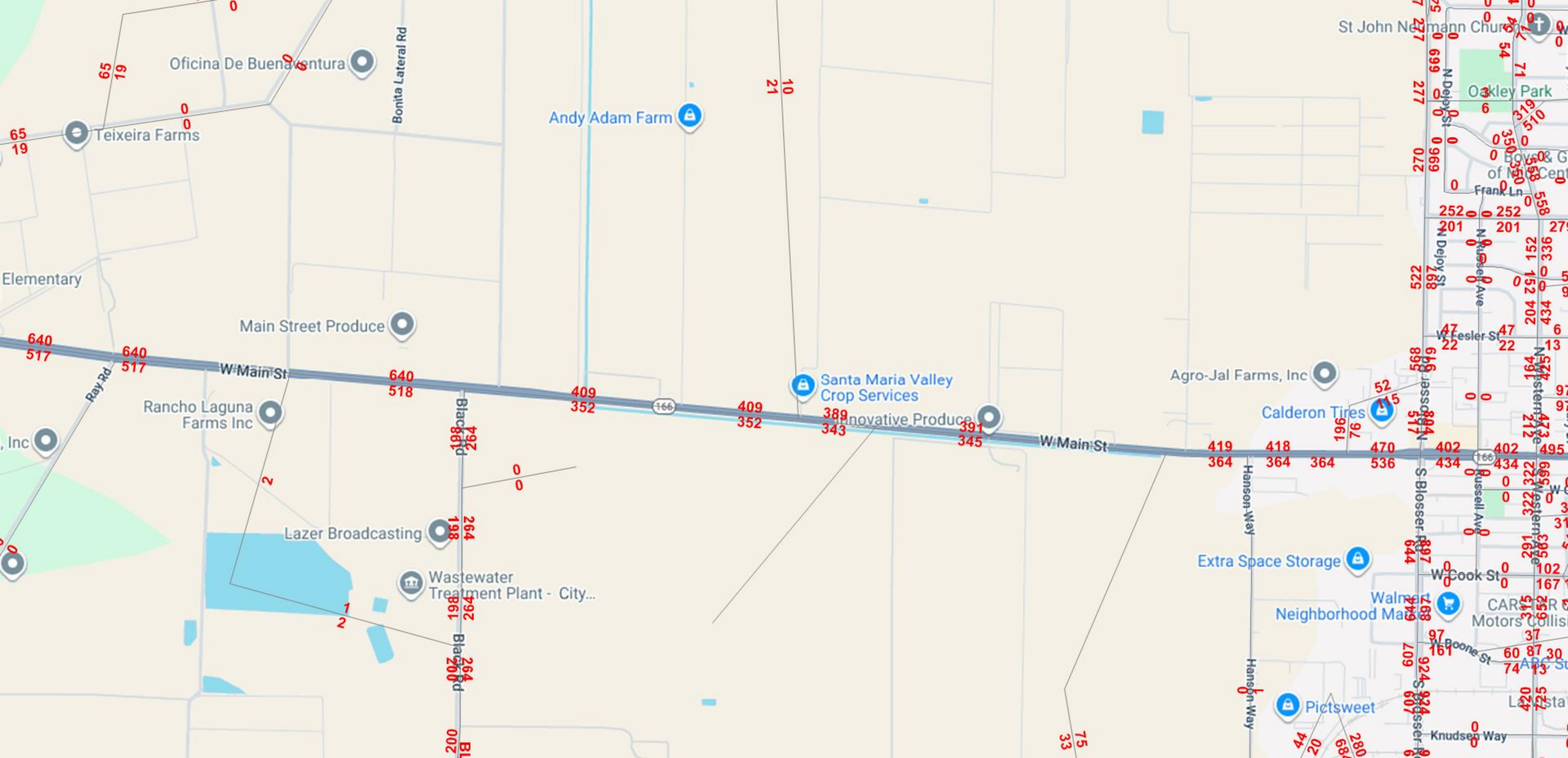
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Knudsen Way

Guadalupe-Nipomo Dunes Center
Beachside Cooling
Guadalupe
Mary Buren School
La Pasadita Oaxaqueña
No Limit Tire
Guadalupe Hardware
Guadalupe Market
Guadalupe Amtrak
Taylor Farms
Main Street Market
Fuente Dr Park
Mexiforno
Herado Park
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Engel & Gray Compost Facility
Smra Water Conservation
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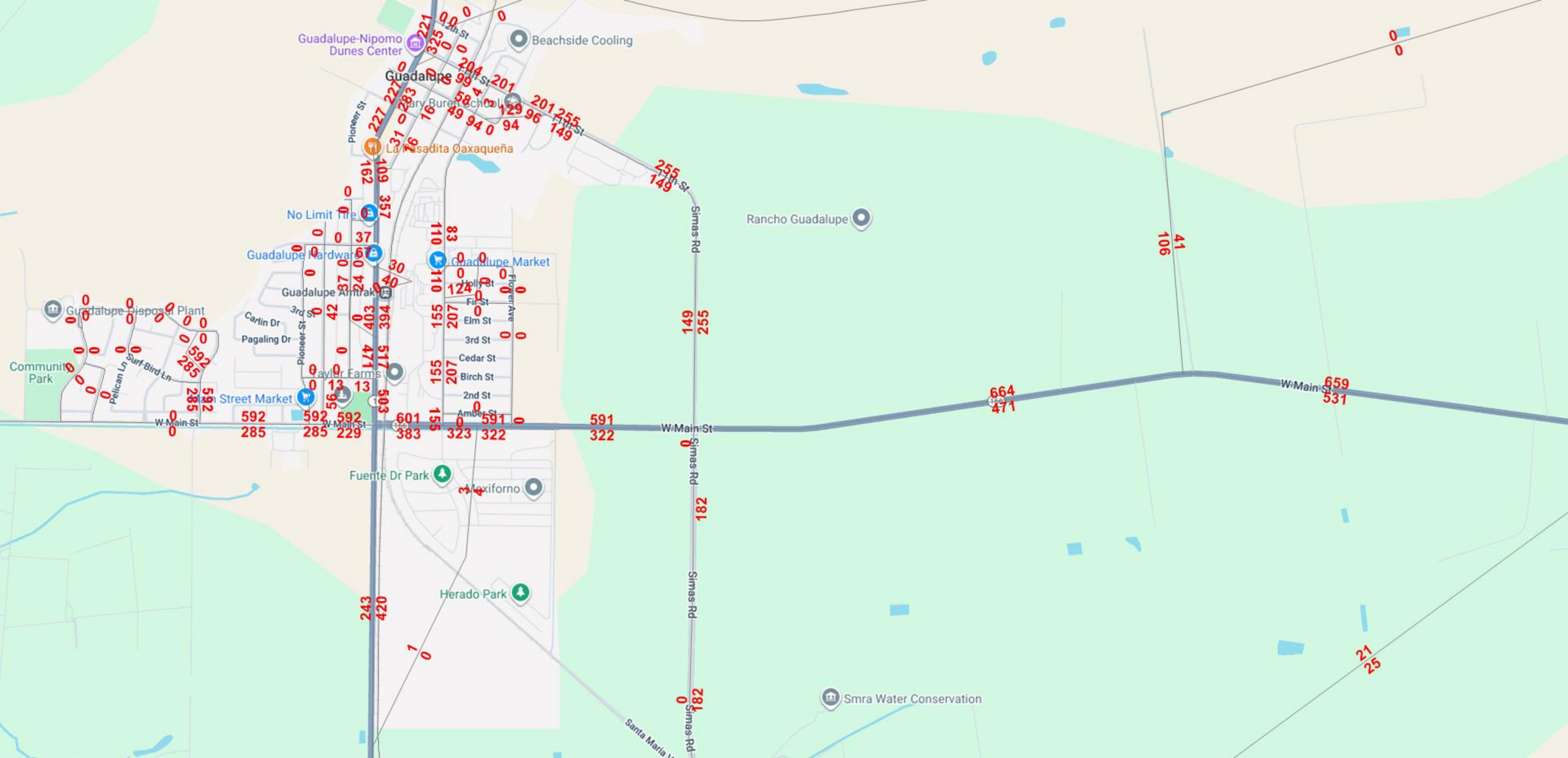
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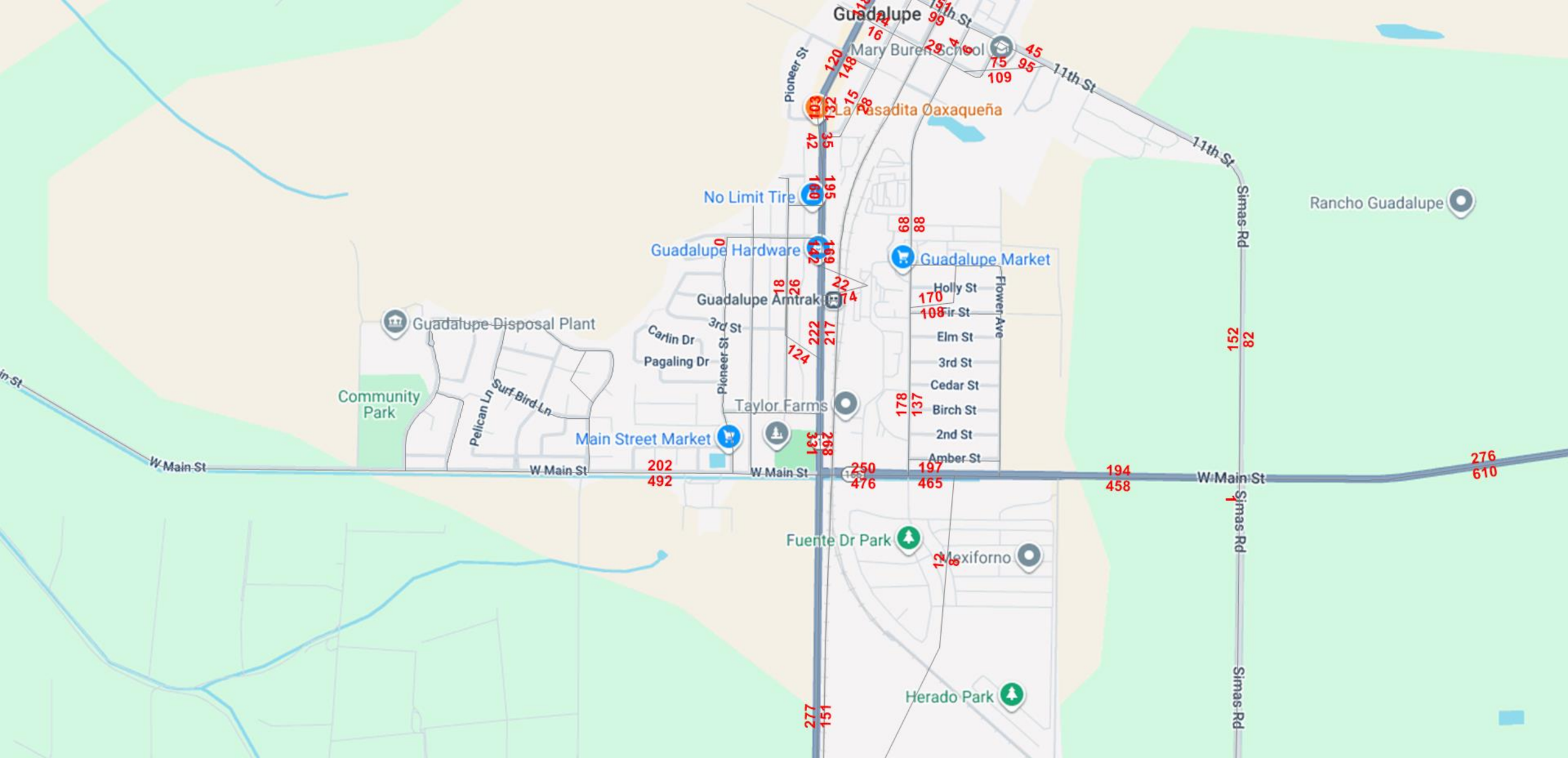
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Main Street Market
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Mexiforno
Herado Park
Rancho Guadalupe
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Flower Ave
Holly St
Fir St
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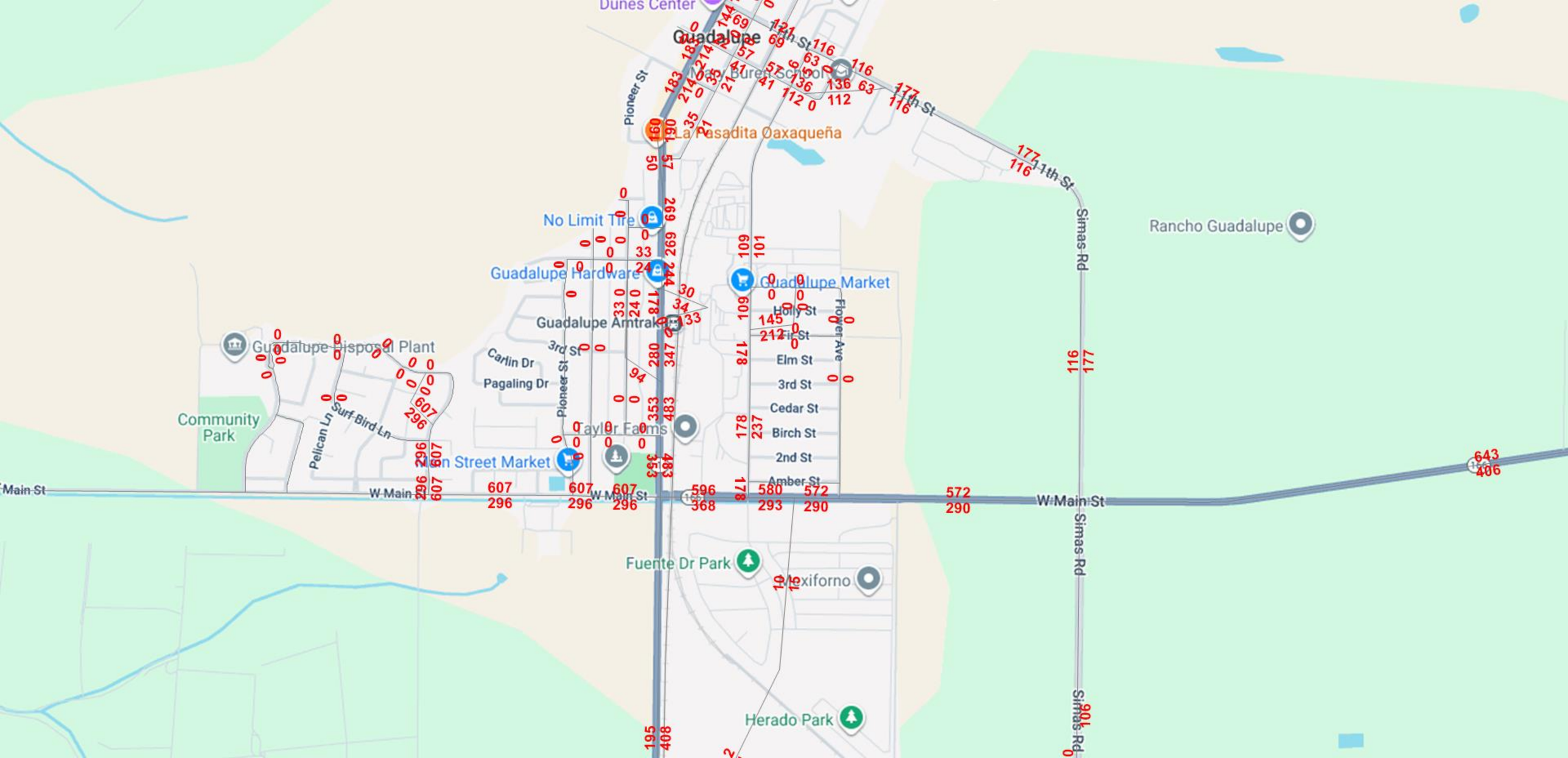
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Flower Ave
11th St
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Smra Water Conservation
Alco Harvesting
Betteravia Farms
Helena Chemical
R & R Auto Wrecking
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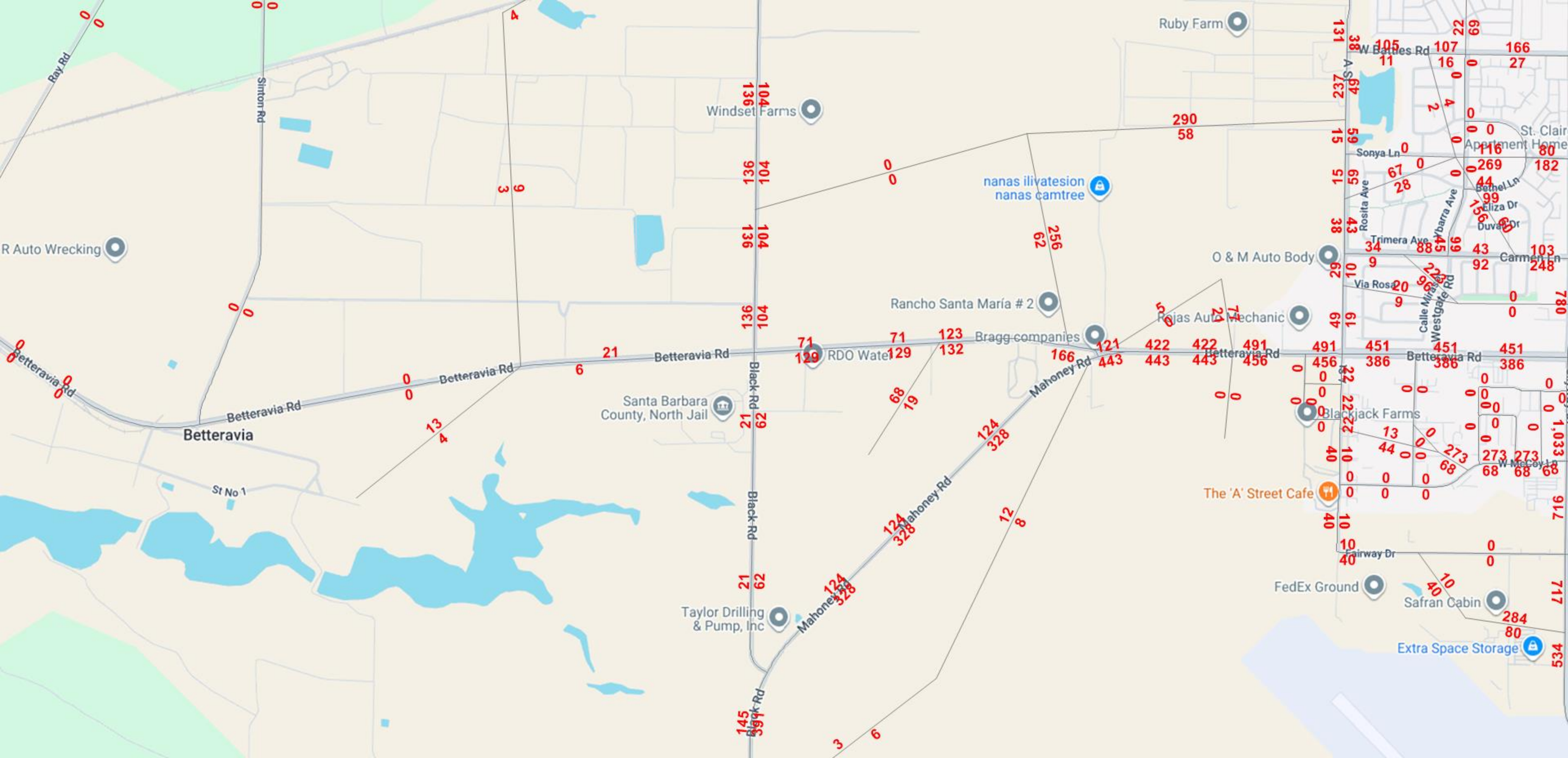
Ruby Farm
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Betteravia Rd
RDO Water
Santa Barbara
County, North Jail
Betteravia
Black Rd
Mahoney Rd
Blackjack Farms
The 'A' Street Cafe
Fairway Dr
FedEx Ground
Safran Cabin
Extra Space Storage
St. Clair
Apartment Homes
Sonya Ln
Bethel Ln
Eliza Dr
Duval Dr
Trimera Ave
Carmen Ln
Via Rosa
Westgate Rd
W McCoy Ln
Taylor Drilling
& Pump, Inc
Ray Rd
Sinton Rd
St No 1

Betteravia Farms
Ray Rd
Sinton Rd
Santa Maria Recycling Center
Pallets With Hope
Bonipak Produce
Driscoll's
California Giant
W Stowell Rd
Truck Center
Black Rd
Windset Farms
Ruby Farm
La Brea Ave
W Battles Rd
Sonya Ln
Rosita Ave
Ybarra Ave
Trimera Ave
Via Rosa
Calle Mirasol
Westgate Rd
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O & M Auto Body
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Rojas Auto Mechanic
Bragg compa
RDO Water
Betteravia Rd
Mahoney Rd
Santa Barbara County, North Jail
Blackjack Farms
The 'A' Street Cafe
Fairway Dr
Betteravia
St No 1

Santa Maria Recycling Center
Pallets With Hope
Ruby Farm
Windset Farms
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R & R Auto Wrecking
O & M Auto Body
Rancho Santa María # 2
Rojas Auto Mechanic
Bragg companies
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Fresh Start Harvesting
Betteravia
Taylor Drilling & Pump, Inc
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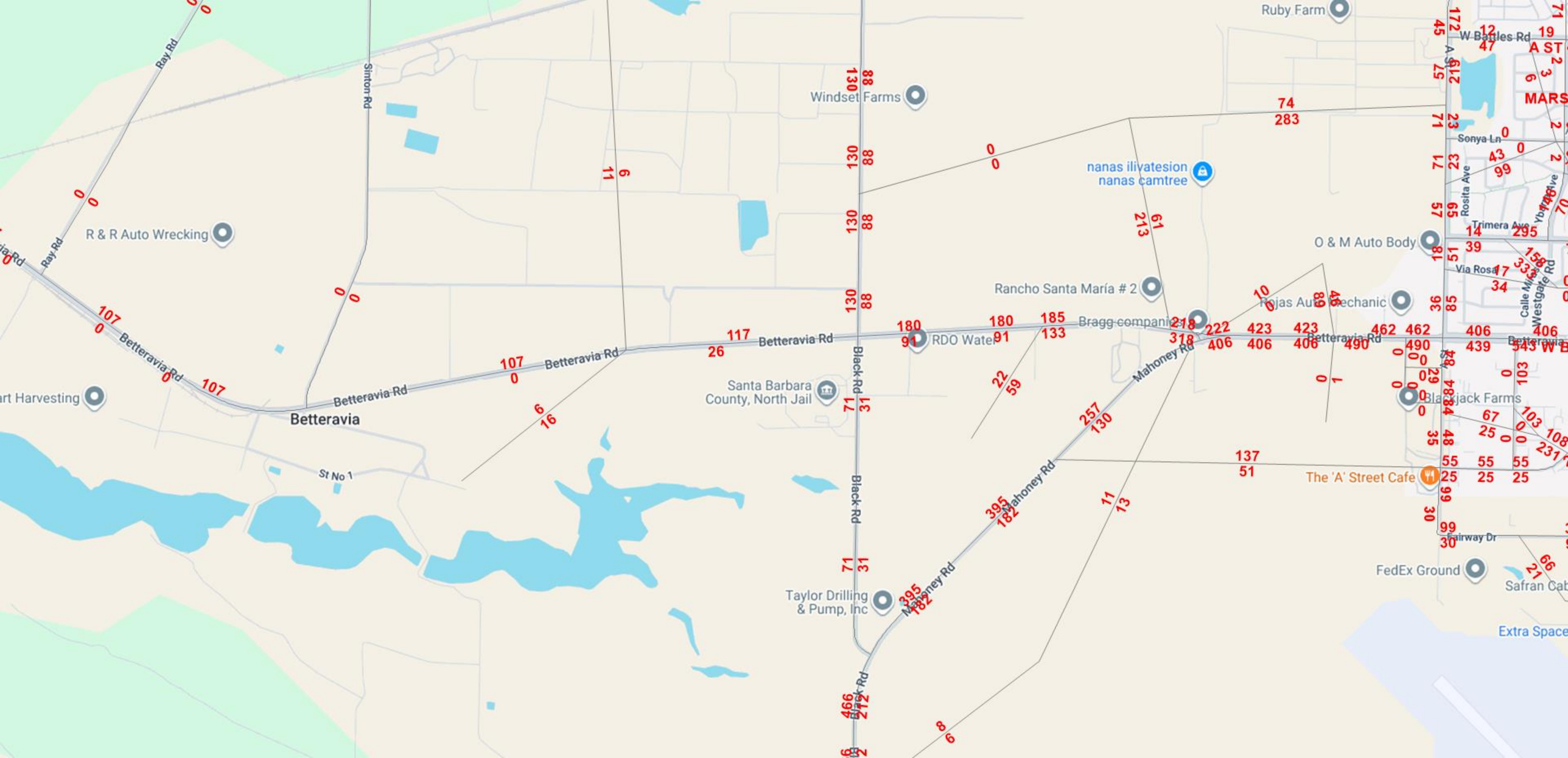

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Rojas Auto Mechanic
Bragg companies
RDO Water
Santa Barbara
County, North Jail
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The 'A' Street Cafe
Fairway Dr
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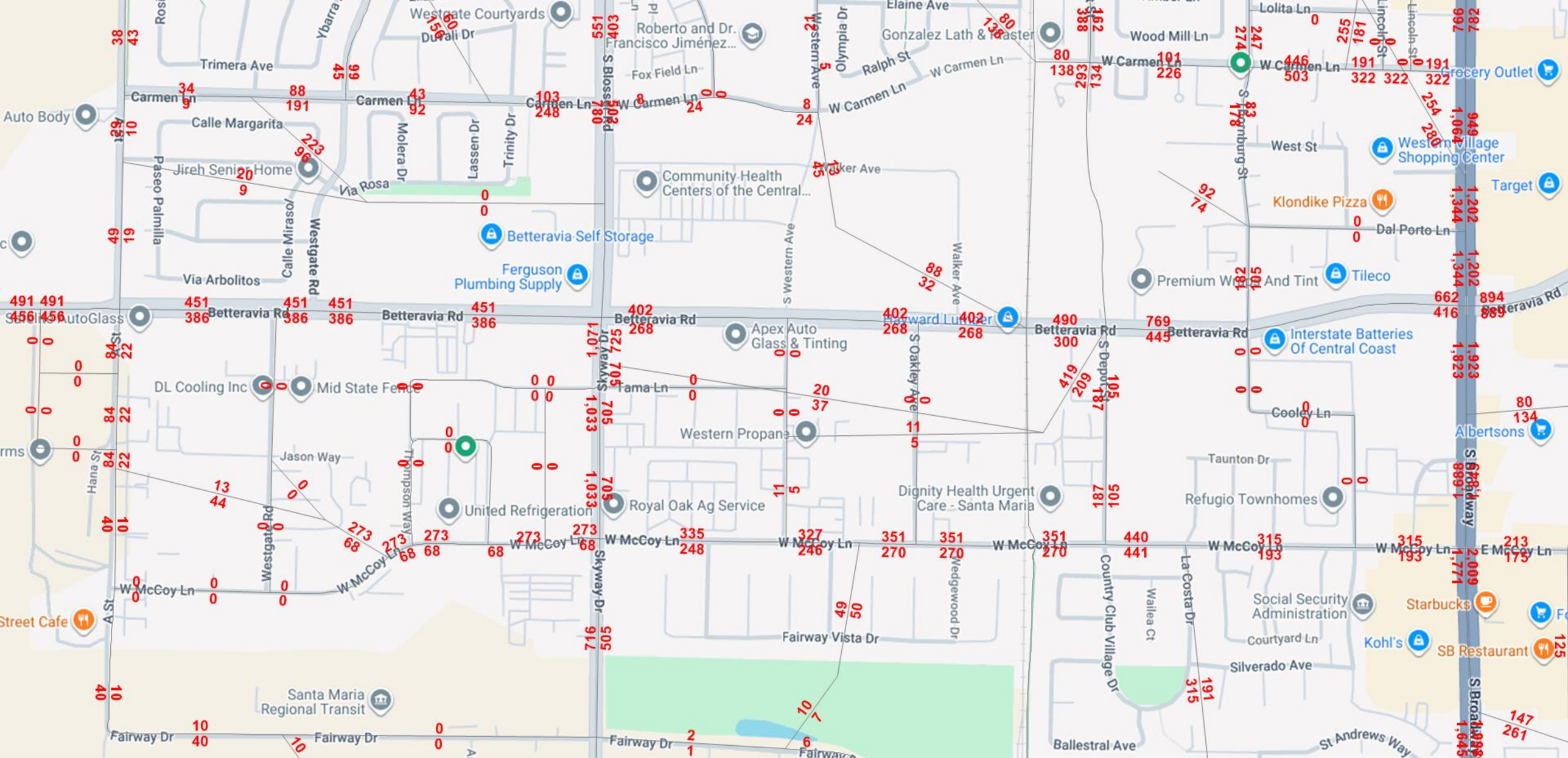
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Wood Mill Ln
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Fox Field Ln
Ralph St
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Carmen Ln
Grocery Outlet
Auto Body
Calle Margarita
Molera Dr
Lassen Dr
Trinity Dr
S Blosser Rd
Western Ave
Olympia Dr
S Thornburg St
West St
Western Village Shopping Center
Target
Jireh Senior Home
Via Rosa
Community Health Centers of the Central...
Walker Ave
Klondike Pizza
Dal Porto Ln
Paseo Palmilla
Calle Mirasol
Westgate Rd
Betteravia Self Storage
Ferguson Plumbing Supply
Via Arbolitos
S Western Ave
Walker Ave
Premium Wash And Tint
Tileco
Betteravia Rd
Apex Auto Glass & Tinting
Hayward Lumber
Interstate Batteries Of Central Coast
S Oakley Ave
S Depot Rd
Cooley Ln
Albertsons
S Broadway
DL Cooling Inc
Mid State Fence
Tama Ln
Skyway Dr
Western Propane
Jason Way
Taunton Dr
Hana St
Thompson Way
United Refrigeration
Royal Oak Ag Service
Dignity Health Urgent Care - Santa Maria
Refugio Townhomes
W McCoy Ln
E McCoy Ln
Country Club Village Dr
Wedgewood Dr
Wailea Ct
La Costa Dr
Social Security Administration
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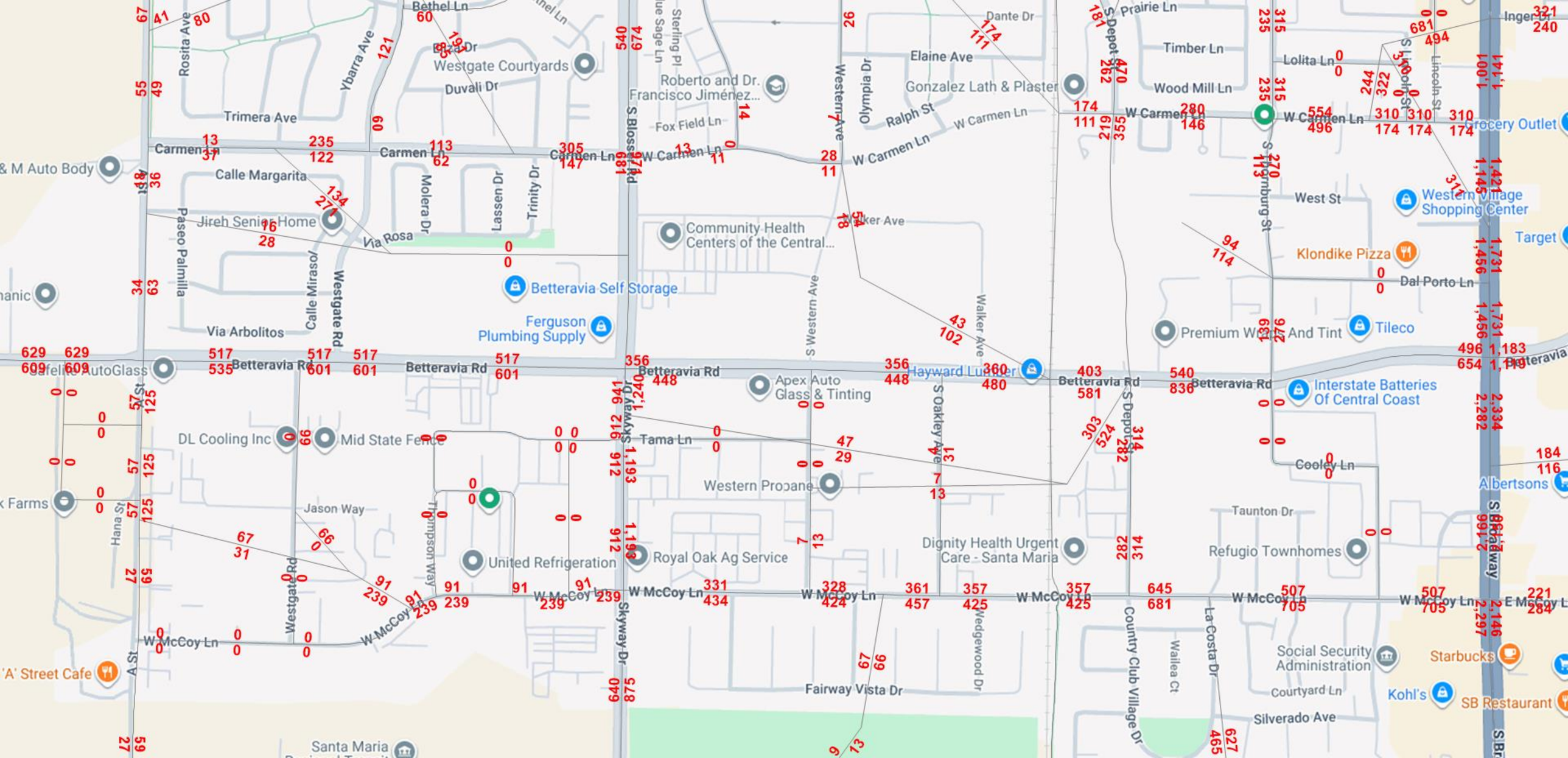
Kohl's
SB Restaurant
Courtyard Ln
Silverado Ave
Fairway Vista Dr
Santa Maria Regional Transit
Fairway Dr
Ballestral Ave
St Andrews Way



Bethel Ln
Westgate Courtyards
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Carmen Ln
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Jireh Senior Home
Via Rosa
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Calle Mirasol
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Fox Field Ln
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Community Health Centers of the Central...
Betteravia Self Storage
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Safelite AutoGlass
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Hayward Lumber
Tama Ln
DL Cooling Inc
Mid State Fence
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Fairway Vista Dr
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Santa Maria
Dante Dr
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Olympia Dr
Gonzalez Lath & Plaster
Ralph St
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S Oakley Ave
Wedgewood Dr
Dignity Health Urgent Care - Santa Maria
Country Club Village Dr
Wailea Ct
La Costa Dr
Prairie Ln
Timber Ln
Wood Mill Ln
Lolita Ln
Inger Dr
Grocery Outlet
West St
Western Village Shopping Center
Target
Klondike Pizza
Dal Porto Ln
Premium Wraps And Tint
Tileco
Interstate Batteries Of Central Coast
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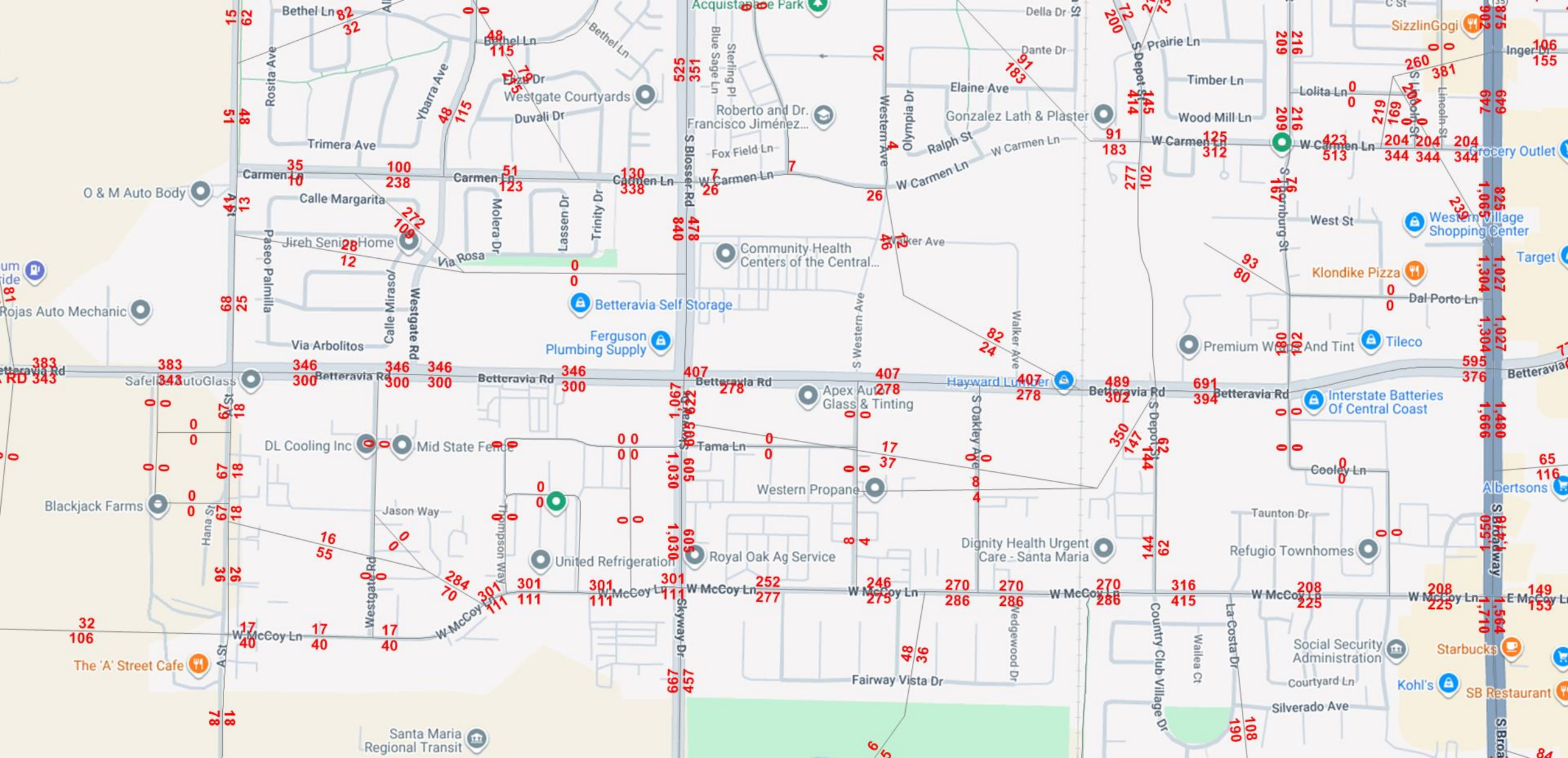
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Apex Auto Glass & Tinting
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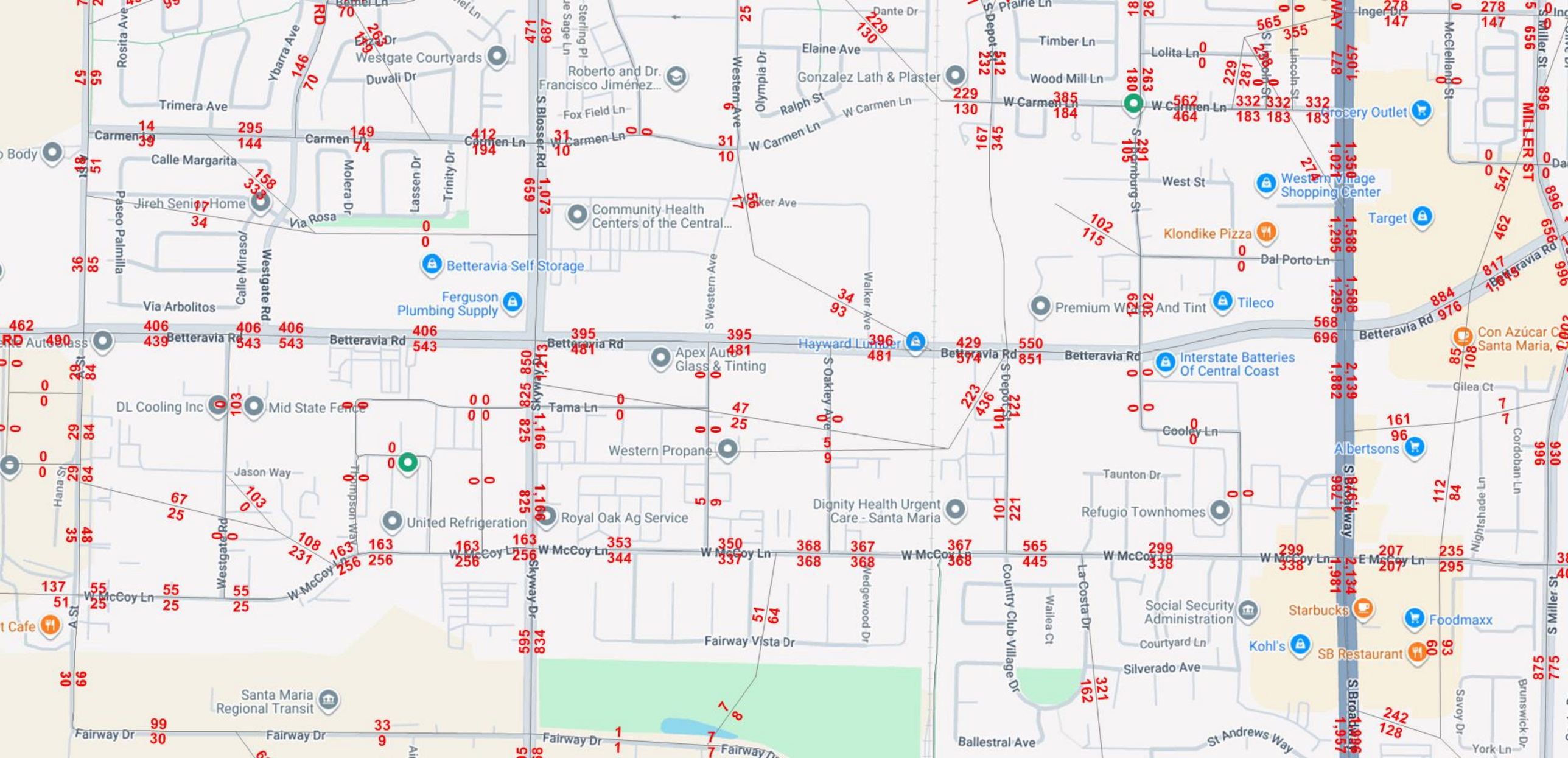
Royal Oak Ag Service
Santa Maria Regional Transit
The 'A' Street Cafe



Westgate Courtyards
Roberto and Dr. Francisco Jiménez...
Gonzalez Lath & Plaster
Grocery Outlet
Western Village Shopping Center
Target
Klondike Pizza
Community Health Centers of the Central...
Betteravia Self Storage
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Premium Wash And Tint
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Hayward Lumber
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Con Azúcar Co Santa Maria
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Refugio Townhomes
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Royal Oak Ag Service
Social Security Administration
Starbucks
Foodmaxx
Kohl's
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Santa Maria Regional Transit
Betteravia Rd
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W McCoy Ln
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Fairway Dr
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Carmen Ln
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Calle Margarita
Jireh Senior Home
Via Rosa
Via Arbolitos
Tama Ln
Jason Way
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Courtyard Ln
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Brunswick Dr
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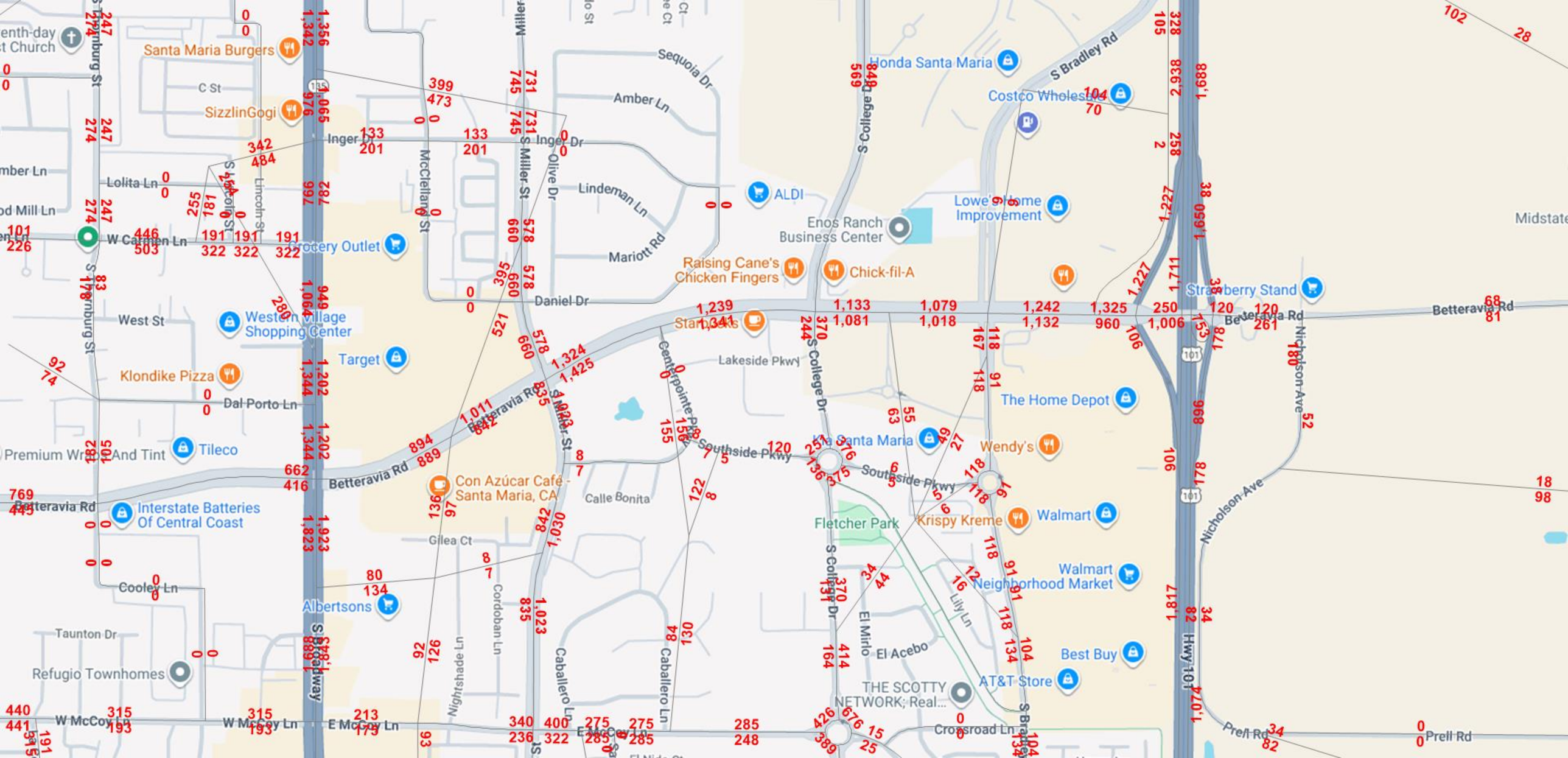

Santa Maria Burgers
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Lowe's Home Improvement
Midstate
Grocery Outlet
Raising Cane's Chicken Fingers
Chick-fil-A
Daniel Dr
Strawberry Stand
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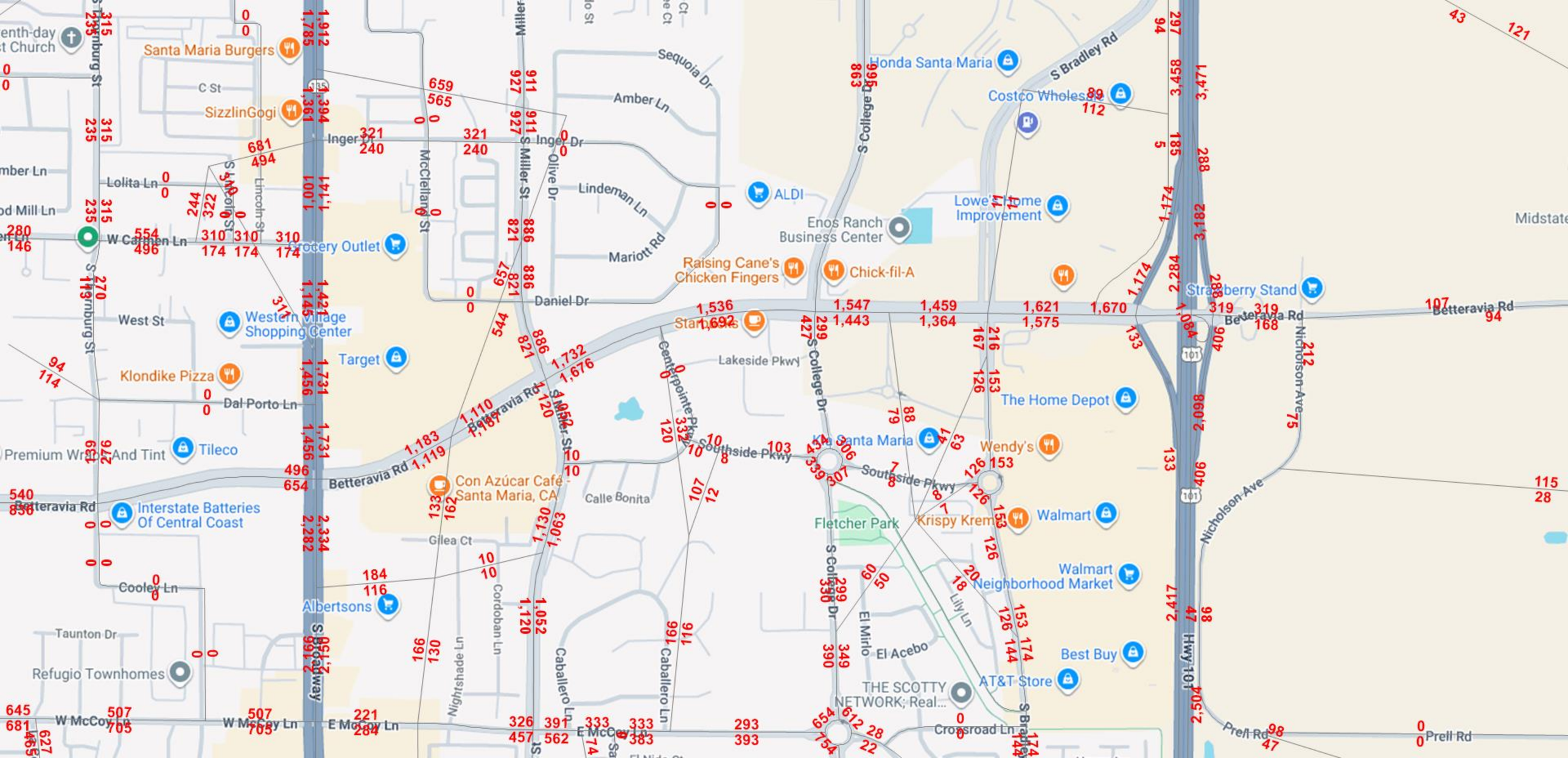
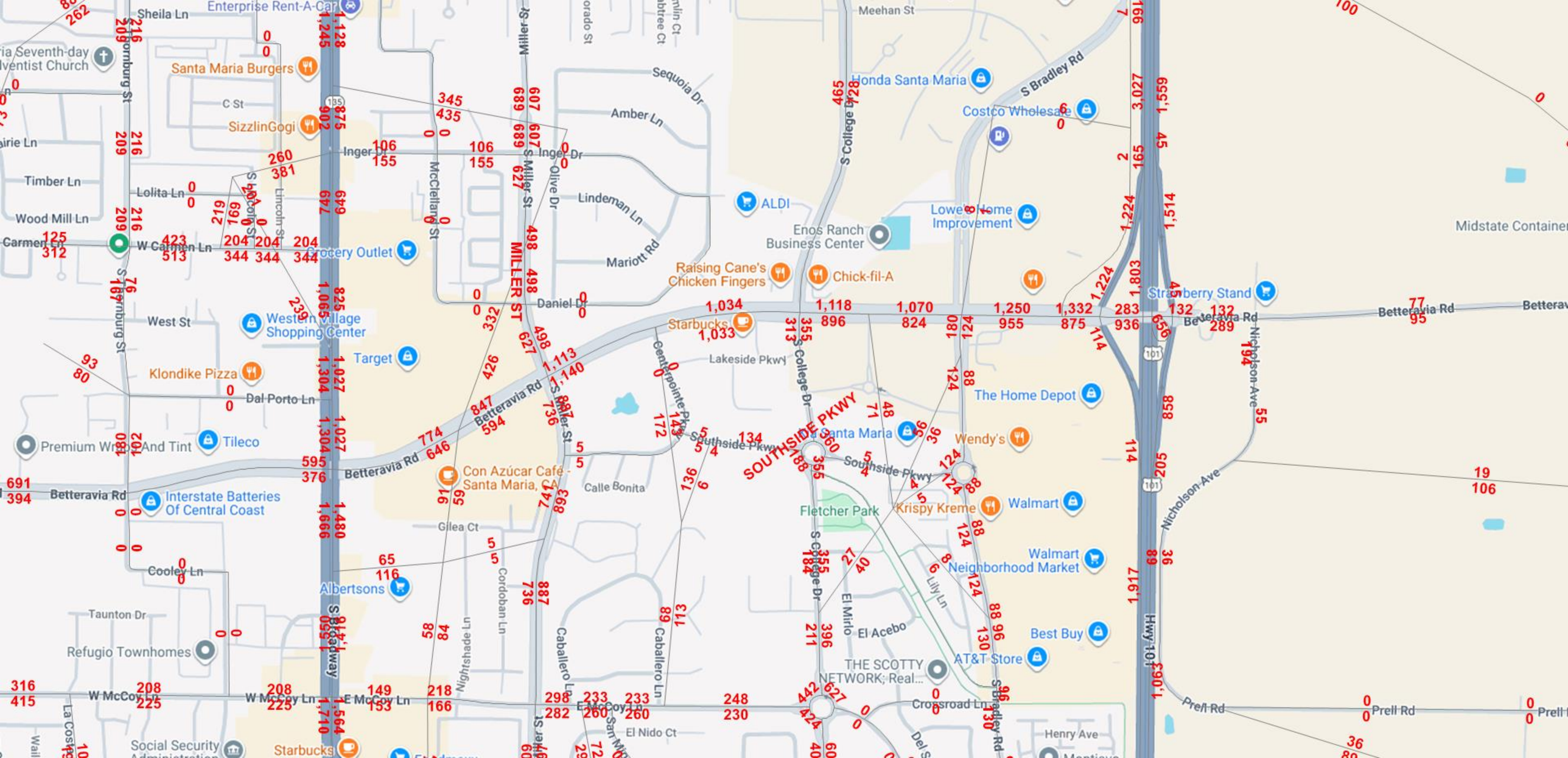
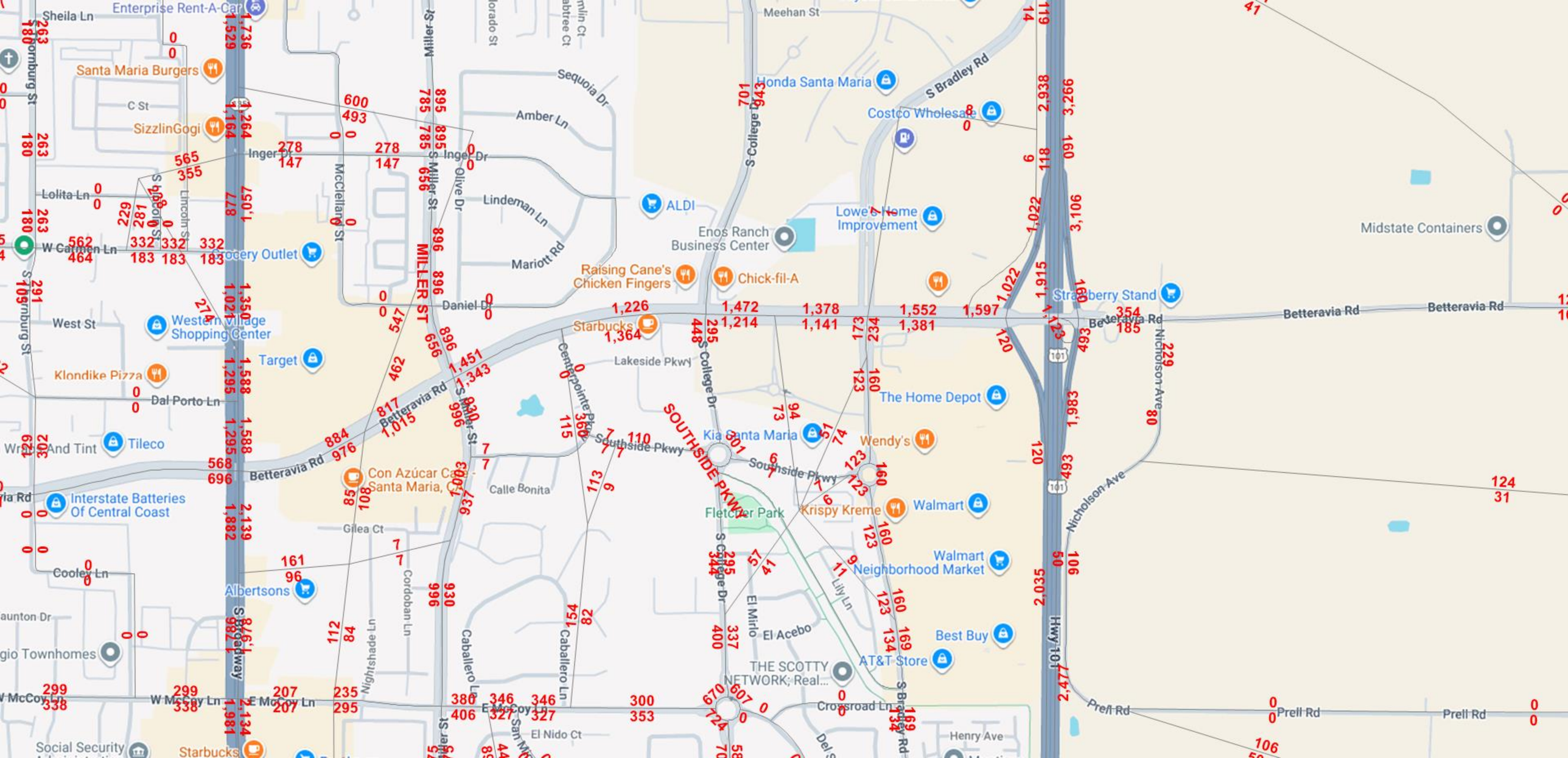
Dal Porto Ln
Lakeside Pkwy
Centerpointe Pkwy
S College Dr
The Home Depot
Nicholson Ave
Premium Wrap And Tint
Tileco
Southside Pkwy
Kia Santa Maria
Wendy's
Con Azúcar Café - Santa Maria, CA
Calle Bonita
Interstate Batteries Of Central Coast
Fletcher Park
Krispy Kreme
Walmart
Gilea Ct
Cooley Ln
Albertsons
Cordoban Ln
Walmart Neighborhood Market
Lily Ln
El Mirlo
El Acebo
Taunton Dr
Refugio Townhomes
Nightshade Ln
Caballero Ln
Best Buy
AT&T Store
THE SCOTTY NETWORK; Real...
Hwy 101
W McCoy Ln
E McCoy Ln
Crossroad Ln
Prell Rd



Santa Maria Burgers
SizzlinGogi
Honda Santa Maria
Costco Wholesale
ALDI
Lowe's Home Improvement
Enos Ranch Business Center
Raising Cane's Chicken Fingers
Chick-fil-A
Strawberry Stand
Grocery Outlet
Western Village Shopping Center
Target
Klondike Pizza
Starbucks
The Home Depot
Kia Santa Maria
Wendy's
Tileco
Premium Wrap And Tint
Con Azúcar Café - Santa Maria, CA
Interstate Batteries Of Central Coast
Fletcher Park
Krispy Kreme
Walmart
Walmart Neighborhood Market
Albertsons
Best Buy
AT&T Store
THE SCOTTY NETWORK; Real...
Refugio Townhomes
Midstate
Inger Dr
Lolita Ln
W Carmen Ln
West St
Dal Porto Ln
Betteravia Rd
Southside Pkwy
Lakeside Pkwy
Calle Bonita
Gilea Ct
Cooley Ln
Taunton Dr
W McCoy Ln
E McCoy Ln
Crossroad Ln
Prell Rd
Nicholson Ave
Hwy 101
S Broadway
S Miller St
S College Dr
S Bradley Rd
Sequoia Dr
Amber Ln
Lindeman Ln
Mariott Rd
Daniel Dr
Olive Dr
McClelland St
Lincoln St
Centerpointe Pkwy
Cordoban Ln
Nightshade Ln
Caballero Ln
El Mirlo
El Acebo
Lily Ln



Enterprise Rent-A-Car
Sheila Ln
Santa Maria Burgers
C St
SizzlinGogi
Inger Dr
Timber Ln
Lolita Ln
Wood Mill Ln
W Carmen Ln
Grocery Outlet
Western Village Shopping Center
West St
Target
Klondike Pizza
Dal Porto Ln
Premium Wraps And Tint
Tileco
Betteravia Rd
Interstate Batteries Of Central Coast
Cooley Ln
Albertsons
Taunton Dr
Refugio Townhomes
W McCoy Ln
E McCoy Ln
Social Security Administration
Starbucks
Miller St
S Miller St
Olive Dr
Lindeman Ln
Mariott Rd
Daniel Dr
MILLER ST
Sequoia Dr
Amber Ln
Meehan St
Honda Santa Maria
S Bradley Rd
Costco Wholesale
ALDI
Enos Ranch Business Center
Lowe's Home Improvement
Raising Cane's Chicken Fingers
Chick-fil-A
Starbucks
Lakeside Pkwy
S College Dr
Centerpointe Pkwy
Southside Pkwy
SOUTHSIDE PKWY
The Home Depot
Wendy's
Walmart
Krispy Kreme
Fletcher Park
Walmart Neighborhood Market
Best Buy
AT&T Store
THE SCOTTY NETWORK; Real...
Crossroad Ln
El Nido Ct
Henry Ave
Prell Rd
Nicholson Ave
Hwy 101
Midstate Container
Strawberry Stand
Calle Bonita
Gilea Ct
Cordoban Ln
Nightshade Ln
Caballero Ln
El Mirlo
El Acebo
Lily Ln
Cornburg St
Lincoln St
McClelland St
Miller St
Orado St
Abtree Ct
Lincoln St
Sheila Ln


Sheila Ln
Enterprise Rent-A-Car
Meehan St
Santa Maria Burgers
C St
SizzlinGogi
Sequoia Dr
Amber Ln
Honda Santa Maria
S Bradley Rd
Costco Wholesale
Inger Dr
Olive Dr
Lolita Ln
Lindeman Ln
ALDI
Lowe's Home Improvement
Enos Ranch Business Center
Midstate Containers
W Carmen Ln
Grocery Outlet
Mariott Rd
Raising Cane's Chicken Fingers
Chick-fil-A
Strawberry Stand
Daniel Dr
West St
Western Village Shopping Center
Starbucks
Betteravia Rd
Target
Lakeside Pkwy
Klondike Pizza
Dal Porto Ln
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Con Azúcar Cafe - Santa Maria, CA
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Starbucks
Nicholson Ave
Hwy 101
MILLER ST
SOUTHSIDE PKWY
S College Dr
S Miller St
S Broadway
Caballero Ln
Nightshade Ln
Centerpointe Pkwy
Lilly Ln

SECTION 1: FUTURE FORECASTED VOLUMES

FUTURE TURNING MOVEMENT VOLUME

			2050 Future Volumes (Rounded) - No Build Alternative											
			Northbound			Southbound			Eastbound			Westbound		
N/S	E/W	#	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
Study Intersections														
Simas Rd	SR 166	0	80	65	15	90	80	10	10	320	205	10	160	90
Bonita School Rd	SR 166	0	0	0	0	160	0	20	20	420	0	0	250	180
Ray Rd	SR 166	0	30	5	35	5	5	5	0	560	25	50	390	5
Blosser Rd	SR 166	0	120	370	115	60	885	230	115	275	120	190	190	35
Mahoney Rd	Betteravia Rd	0	65	0	435	15	15	20	0	280	50	230	335	5
Simas Rd	SR 166	0	200	125	10	170	75	10	5	255	105	5	315	125
Bonita School Rd	SR 166	0	0	0	0	200	0	25	10	490	0	0	425	95
Ray Rd	SR 166	0	20	0	100	5	0	0	0	685	20	55	495	5
Blosser Rd	SR 166	0	95	710	105	70	470	165	375	410	150	205	310	80
Mahoney Rd	Betteravia Rd	0	60	0	550	0	40	45	0	410	85	415	335	0
0	0	0	0	0	0	0	0	####	0	0	0	0	0	0
SR 135	SR 166	0	110	570	175	180	740	110	85	460	80	210	450	160
0	0	0	0	0	0	0	0	####	0	0	0	0	0	0
SR 135	SR 166	0	205	990	180	250	735	145	175	530	125	310	565	240
0	0	0	0	0	0	0	0	####	0	0	0	0	0	0
0	0	0	0	0	0	0	0	####	0	0	0	0	0	0
0	0	0	0	0	0	0	0	####	0	0	0	0	0	0
0	0	0	0	0	0	0	0	####	0	0	0	0	0	0
0	0	0	0	0	0	0	0	####	0	0	0	0	0	0
0	0	0	0	0	0	0	0	####	0	0	0	0	0	0
0	0	0	0	0	0	0	0	####	0	0	0	0	0	0
0	0	0	0	0	0	0	0	####	0	0	0	0	0	0
0	0	0	0	0	0	0	0	####	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Balance Check

EB-IN	EB-OUT	EB-BAL	WB-IN	WB-OUT	WB - BAL
535	425		260	250	-10
440	580	15	430	270	5
585	600	5	445	425	-95
510	450	-90	415	540	-5
330	730	-120	570	420	570
0	0	-730	0	0	-525
365	435	365	445	525	-5
500	690	65	520	450	5
705	790	15	555	515	-15
935	585	145	595	570	

			Final Growth (2050 - 2024)												
			Northbound			Southbound			Eastbound			Westbound			
N/S	E/W	#	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TEV
Study Intersections															
Simas Rd	SR 166		3	3	3	1	4	2	2	6	6	3	20	6	59
Bonita School Rd	SR 166		0	0	0	0	0	2	4	4	0	0	24	1	35
Ray Rd	SR 166		0	4	1	4	4	4	0	5	1	3	26	4	56
Blosser Rd	SR 166		6	15	2	3	12	8	8	9	4	11	14	4	96
Mahoney Rd	Betteravia Rd		15	0	115	4	4	3	0	15	0	40	60	0	256
															0
Simas Rd	SR 166		26	37	1	31	4	4	2	26	0	3	2	24	160
Bonita School Rd	SR 166		0	0	0	0	0	4	2	59	0	0	17	1	83
Ray Rd	SR 166		3	0	0	3	0	0	0	63	0	0	20	4	93
Blosser Rd	SR 166		2	19	3	3	2	8	27	13	4	4	9	1	95
Mahoney Rd	Betteravia Rd		10	0	30	0	6	2	0	80	25	120	55	0	328
0	0		0	0	0	0	0	####	0	0	0	0	0	0	#####
SR 135	SR 166		9	114	52	44	146	4	4	5	2	45	16	27	468
0	0		0	0	0	0	0	####	0	0	0	0	0	0	#####
SR 135	SR 166		5	182	31	46	136	4	2	2	6	62	-1	47	522
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0	0		0	0	0	0	0	####	0	0	0	0	0	0	#####
0	0														0
0	0														0

Previous Forecasts

			Comparison to Previous Forecasts												
			Northbound			Southbound			Eastbound			Westbound			
N/S	E/W	#	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TEV
Study Intersections															
Simas Rd	SR 166		80	65	15	90	80	10	10	320	205	10	160	90	1135
Bonita School Rd	SR 166		0	0	0	160	0	20	20	420	0	0	250	180	1050
Ray Rd	SR 166		30	5	35	5	5	5	0	560	25	50	390	5	1115
Blosser Rd	SR 166		120	370	115	60	885	230	115	275	120	190	190	35	2705
Mahoney Rd	Betteravia Rd		65	0	435	15	15	20	0	280	50	230	335	5	1450
0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
Simas Rd	SR 166		200	125	10	170	75	10	5	255	105	5	315	125	1400
Bonita School Rd	SR 166		0	0	0	200	0	25	10	490	0	0	425	95	1245
Ray Rd	SR 166		20	0	100	5	0	0	0	685	20	55	495	5	1385
Blosser Rd	SR 166		95	710	105	70	470	165	375	410	150	205	310	80	3145
Mahoney Rd	Betteravia Rd		60	0	550	0	40	45	0	410	85	415	335	0	1940
0	0		0	0	0	0	0	####	0	0	0	0	0	0	#####
SR 135	SR 166		110	570	175	180	740	110	85	460	80	210	450	160	3330
0	0		0	0	0	0	0	####	0	0	0	0	0	0	#####
SR 135	SR 166		205	990	180	250	735	145	175	530	125	310	565	240	4450
0	0		0	0	0	0	0	####	0	0	0	0	0	0	#####
0	0		0	0	0	0	0	####	0	0	0	0	0	0	#####
0	0		0	0	0	0	0	####	0	0	0	0	0	0	#####
0	0		0	0	0	0	0	####	0	0	0	0	0	0	#####
0	0		0	0	0	0	0	####	0	0	0	0	0	0	#####
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0	0		0	0	0	0	0	####	0	0	0	0	0	0	#####
			0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0

			Comparison to Previous Forecasts (Nov 2012)												
			Northbound			Southbound			Eastbound			Westbound			
N/S	E/W	#	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TEV
Study Intersections															
Simas Rd	SR 166		80	65	15	90	80	10	10	320	205	10	160	90	1135
Bonita School Rd	SR 166		0	0	0	160	0	20	20	420	0	0	250	180	1050
Ray Rd	SR 166		30	5	35	5	5	5	0	560	25	50	390	5	1115
Blosser Rd	SR 166		120	370	115	60	885	230	115	275	120	190	190	35	2705
Mahoney Rd	Betteravia Rd		65	0	435	15	15	20	0	280	50	230	335	5	1450
0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
Simas Rd	SR 166		200	125	10	170	75	10	5	255	105	5	315	125	1400
Bonita School Rd	SR 166		0	0	0	200	0	25	10	490	0	0	425	95	1245
Ray Rd	SR 166		20	0	100	5	0	0	0	685	20	55	495	5	1385
Blosser Rd	SR 166		95	710	105	70	470	165	375	410	150	205	310	80	3145
Mahoney Rd	Betteravia Rd		60	0	550	0	40	45	0	410	85	415	335	0	1940
0	0		0	0	0	0	0	####	0	0	0	0	0	0	#####
SR 135	SR 166		110	570	175	180	740	110	85	460	80	210	450	160	3330
0	0		0	0	0	0	0	####	0	0	0	0	0	0	#####
SR 135	SR 166		205	990	180	250	735	145	175	530	125	310	565	240	4450
0	0		0	0	0	0	0	####	0	0	0	0	0	0	#####
0	0		0	0	0	0	0	####	0	0	0	0	0	0	#####
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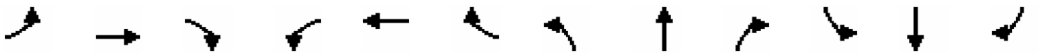
SECTION 2: MODELING SOFTWARE REPORTS

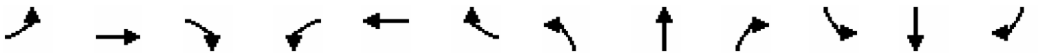


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	365	1075	195	325	865	60	170	220	280	60	315	315
Future Volume (veh/h)	365	1075	195	325	865	60	170	220	280	60	315	315
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	397	1168	212	353	940	65	185	239	304	65	342	342
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	420	1533	278	428	1230	382	300	485	411	138	888	396
Arrive On Green	0.24	0.36	0.36	0.13	0.25	0.25	0.09	0.27	0.27	0.08	0.26	0.26
Sat Flow, veh/h	1739	4240	770	3374	4985	1547	3374	1826	1547	1739	3469	1546
Grp Volume(v), veh/h	397	915	465	353	940	65	185	239	304	65	342	342
Grp Sat Flow(s),veh/h/ln	1739	1662	1687	1687	1662	1547	1687	1826	1547	1739	1735	1546
Q Serve(g_s), s	27.7	30.0	30.0	12.6	21.6	4.1	6.5	13.7	22.2	4.4	10.1	26.1
Cycle Q Clear(g_c), s	27.7	30.0	30.0	12.6	21.6	4.1	6.5	13.7	22.2	4.4	10.1	26.1
Prop In Lane	1.00		0.46	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	420	1201	610	428	1230	382	300	485	411	138	888	396
V/C Ratio(X)	0.95	0.76	0.76	0.83	0.76	0.17	0.62	0.49	0.74	0.47	0.38	0.86
Avail Cap(c_a), veh/h	429	1324	672	833	1985	616	833	727	616	429	1382	616
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.0	34.8	34.8	52.6	43.2	36.6	54.2	38.3	41.5	54.4	37.9	43.9
Incr Delay (d2), s/veh	29.6	2.4	4.7	4.1	1.0	0.2	2.1	0.8	2.6	2.5	0.3	7.8
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.0	12.0	12.6	5.4	8.7	1.6	2.8	6.2	8.7	2.0	4.3	10.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	75.7	37.2	39.4	56.7	44.2	36.8	56.3	39.1	44.1	56.8	38.2	51.7
LnGrp LOS	E	D	D	E	D	D	E	D	D	E	D	D
Approach Vol, veh/h		1777			1358			728			749	
Approach Delay, s/veh		46.4			47.1			45.6			46.0	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	20.2	50.5	15.5	37.4	34.3	36.3	14.3	38.6
Change Period (Y+Rc), s	4.5	5.8	4.5	5.8	4.5	5.8	4.5	5.8
Max Green Setting (Gmax), s	30.5	49.2	30.5	49.2	30.5	49.2	30.5	49.2
Max Q Clear Time (g_c+I1), s	14.6	32.0	8.5	28.1	29.7	23.6	6.4	24.2
Green Ext Time (p_c), s	1.1	8.2	0.6	3.4	0.1	6.8	0.1	2.4

Intersection Summary	
HCM 7th Control Delay, s/veh	46.4
HCM 7th LOS	D

HCM 7th Edition methodology does not support custom phasing.

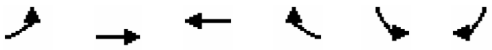


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	995	545	0	0	480	300	355	5	135	0	0	0
Future Volume (veh/h)	995	545	0	0	480	300	355	5	135	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1826	1826	0	0	1826	1826	1826	1826	1826			
Adj Flow Rate, veh/h	1082	592	0	0	522	326	390	0	147			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	5	5	0	0	5	5	5	5	5			
Cap, veh/h	1440	2514	0	0	913	407	682	0	304			
Arrive On Green	0.43	0.72	0.00	0.00	0.26	0.26	0.20	0.00	0.20			
Sat Flow, veh/h	3374	3561	0	0	3561	1547	3478	0	1547			
Grp Volume(v), veh/h	1082	592	0	0	522	326	390	0	147			
Grp Sat Flow(s),veh/h/ln	1687	1735	0	0	1735	1547	1739	0	1547			
Q Serve(g_s), s	35.2	7.4	0.0	0.0	17.0	25.6	13.2	0.0	11.0			
Cycle Q Clear(g_c), s	35.2	7.4	0.0	0.0	17.0	25.6	13.2	0.0	11.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	1440	2514	0	0	913	407	682	0	304			
V/C Ratio(X)	0.75	0.24	0.00	0.00	0.57	0.80	0.57	0.00	0.48			
Avail Cap(c_a), veh/h	1440	2514	0	0	913	407	682	0	304			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	31.4	5.9	0.0	0.0	41.6	44.7	47.3	0.0	46.4			
Incr Delay (d2), s/veh	3.7	0.2	0.0	0.0	2.6	15.2	3.5	0.0	5.4			
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	14.4	2.4	0.0	0.0	7.4	11.2	5.9	0.0	4.6			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	35.1	6.2	0.0	0.0	44.2	59.9	50.8	0.0	51.9			
LnGrp LOS	D	A			D	E	D		D			
Approach Vol, veh/h		1674			848			537				
Approach Delay, s/veh		24.9			50.2			51.1				
Approach LOS		C			D			D				
Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		100.0			60.0	40.0		30.0				
Change Period (Y+Rc), s		5.8			4.5	5.8		4.5				
Max Green Setting (Gmax), s		94.2			55.5	34.2		25.5				
Max Q Clear Time (g_c+I1), s		9.4			37.2	27.6		15.2				
Green Ext Time (p_c), s		4.1			4.2	2.4		1.4				

Intersection Summary	
HCM 7th Control Delay, s/veh	36.5
HCM 7th LOS	D

Notes

User approved volume balancing among the lanes for turning movement.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	20	420	250	180	160	20
Future Volume (veh/h)	20	420	250	180	160	20
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1693	1693	1693	1693	1693	1693
Adj Flow Rate, veh/h	22	457	272	196	174	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	14	14	14	14	14	14
Cap, veh/h	61	948	394	284	229	29
Arrive On Green	0.04	0.56	0.43	0.43	0.16	0.16
Sat Flow, veh/h	1612	1693	915	659	1405	178
Grp Volume(v), veh/h	22	457	0	468	197	0
Grp Sat Flow(s),veh/h/ln	1612	1693	0	1574	1590	0
Q Serve(g_s), s	0.5	6.6	0.0	9.7	4.8	0.0
Cycle Q Clear(g_c), s	0.5	6.6	0.0	9.7	4.8	0.0
Prop In Lane	1.00			0.42	0.88	0.11
Lane Grp Cap(c), veh/h	61	948	0	678	259	0
V/C Ratio(X)	0.36	0.48	0.00	0.69	0.76	0.00
Avail Cap(c_a), veh/h	797	2093	0	2336	1573	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	19.0	5.4	0.0	9.3	16.2	0.0
Incr Delay (d2), s/veh	3.5	0.5	0.0	1.8	4.6	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	1.6	0.0	2.8	1.8	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	22.5	5.9	0.0	11.1	20.7	0.0
LnGrp LOS	C	A		B	C	
Approach Vol, veh/h		479	468		197	
Approach Delay, s/veh		6.7	11.1		20.7	
Approach LOS		A	B		C	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		29.2		11.2	5.2	24.0
Change Period (Y+Rc), s		6.6		4.6	3.7	6.6
Max Green Setting (Gmax), s		50.0		40.0	20.0	60.0
Max Q Clear Time (g_c+I1), s		8.6		6.8	2.5	11.7
Green Ext Time (p_c), s		5.1		0.6	0.0	5.7

Intersection Summary	
HCM 7th Control Delay, s/veh	10.9
HCM 7th LOS	B

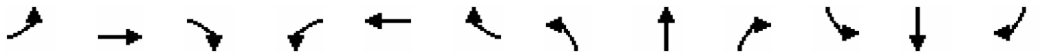
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	110	275	120	190	190	35	120	370	115	60	880	230
Future Volume (veh/h)	110	275	120	190	190	35	120	370	115	60	880	230
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	120	299	130	207	207	38	130	402	125	65	957	250
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	171	421	178	250	684	123	174	1176	514	138	1104	483
Arrive On Green	0.10	0.18	0.18	0.14	0.23	0.23	0.10	0.34	0.34	0.08	0.32	0.32
Sat Flow, veh/h	1739	2355	997	1739	2927	527	1739	3469	1516	1739	3469	1517
Grp Volume(v), veh/h	120	218	211	207	121	124	130	402	125	65	957	250
Grp Sat Flow(s),veh/h/ln	1739	1735	1617	1739	1735	1719	1739	1735	1516	1739	1735	1517
Q Serve(g_s), s	5.0	8.8	9.2	8.6	4.3	4.4	5.4	6.5	2.5	2.7	19.3	10.0
Cycle Q Clear(g_c), s	5.0	8.8	9.2	8.6	4.3	4.4	5.4	6.5	2.5	2.7	19.3	10.0
Prop In Lane	1.00		0.62	1.00		0.31	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	171	310	289	250	405	402	174	1176	514	138	1104	483
V/C Ratio(X)	0.70	0.70	0.73	0.83	0.30	0.31	0.75	0.34	0.24	0.47	0.87	0.52
Avail Cap(c_a), veh/h	560	652	608	560	652	646	327	1176	514	327	1164	509
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.5	28.7	28.9	31.0	23.5	23.6	32.6	18.4	5.9	32.8	23.9	20.7
Incr Delay (d2), s/veh	5.1	2.2	2.6	2.7	0.3	0.3	2.4	0.2	0.2	0.9	6.9	0.9
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	3.6	3.6	3.6	1.7	1.7	2.3	2.4	1.4	1.1	8.2	3.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	37.7	30.9	31.5	33.7	23.8	23.9	35.0	18.6	6.1	33.7	30.8	21.6
LnGrp LOS	D	C	C	C	C	C	C	B	A	C	C	C
Approach Vol, veh/h		549			452			657			1272	
Approach Delay, s/veh		32.6			28.4			19.5			29.1	
Approach LOS		C			C			B			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.6	18.2	11.7	29.0	11.5	22.3	10.1	30.5
Change Period (Y+Rc), s	4.9	* 4.9	4.2	5.3	4.2	4.9	4.2	5.3
Max Green Setting (Gmax), s	24.0	* 28	14.0	25.0	24.0	28.0	14.0	25.0
Max Q Clear Time (g_c+I1), s	10.6	11.2	7.4	21.3	7.0	6.4	4.7	8.5
Green Ext Time (p_c), s	0.2	1.9	0.1	2.3	0.3	1.0	0.0	2.6

Intersection Summary	
HCM 7th Control Delay, s/veh	27.5
HCM 7th LOS	C

Notes

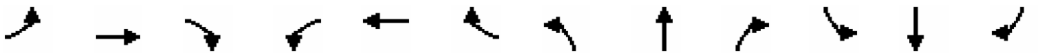
* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	85	460	80	210	450	160	110	570	175	180	740	110
Future Volume (veh/h)	85	460	80	210	450	160	110	570	175	180	740	110
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1752	1752	1752	1811	1811	1811	1841	1841	1841	1826	1826	1826
Adj Flow Rate, veh/h	92	500	87	228	489	174	120	620	190	196	804	120
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	10	10	10	6	6	6	4	4	4	5	5	5
Cap, veh/h	229	720	321	320	830	370	154	939	419	240	1106	493
Arrive On Green	0.07	0.22	0.22	0.10	0.24	0.24	0.09	0.27	0.27	0.14	0.32	0.32
Sat Flow, veh/h	3237	3328	1485	3346	3441	1535	1753	3497	1560	1739	3469	1547
Grp Volume(v), veh/h	92	500	87	228	489	174	120	620	190	196	804	120
Grp Sat Flow(s),veh/h/ln	1618	1664	1485	1673	1721	1535	1753	1749	1560	1739	1735	1547
Q Serve(g_s), s	1.9	9.8	3.5	4.7	8.9	6.9	4.8	11.2	7.2	7.8	14.6	4.1
Cycle Q Clear(g_c), s	1.9	9.8	3.5	4.7	8.9	6.9	4.8	11.2	7.2	7.8	14.6	4.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	229	720	321	320	830	370	154	939	419	240	1106	493
V/C Ratio(X)	0.40	0.69	0.27	0.71	0.59	0.47	0.78	0.66	0.45	0.82	0.73	0.24
Avail Cap(c_a), veh/h	319	1547	690	424	1696	757	296	1625	725	367	1759	785
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.6	25.7	23.2	31.2	23.8	23.1	31.7	23.1	21.6	29.7	21.5	17.9
Incr Delay (d2), s/veh	1.1	1.2	0.4	3.7	0.7	0.9	8.3	0.8	0.8	8.1	0.9	0.3
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	3.8	1.2	2.0	3.5	2.5	2.3	4.5	2.6	3.7	5.7	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	32.7	26.9	23.6	34.9	24.5	24.0	40.0	23.9	22.4	37.9	22.4	18.1
LnGrp LOS	C	C	C	C	C	C	D	C	C	D	C	B
Approach Vol, veh/h		679			891			930			1120	
Approach Delay, s/veh		27.3			27.1			25.7			24.6	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.8	20.4	11.2	27.6	10.0	22.1	14.8	24.1
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	9.0	33.0	12.0	36.0	7.0	35.0	15.0	33.0
Max Q Clear Time (g_c+I1), s	6.7	11.8	6.8	16.6	3.9	10.9	9.8	13.2
Green Ext Time (p_c), s	0.2	3.5	0.1	6.0	0.1	3.9	0.2	4.9

Intersection Summary	
HCM 7th Control Delay, s/veh	26.0
HCM 7th LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1315	100	200	635	0	0	0	0	225	0	615
Future Volume (vph)	0	1315	100	200	635	0	0	0	0	225	0	615
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.8	5.8	4.5	5.8					4.5	4.5	4.5
Lane Util. Factor		0.86	1.00	1.00	0.95					0.95	0.95	0.88
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (prot)		6225	1538	1719	3438					1633	1633	2707
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (perm)		6225	1538	1719	3438					1633	1633	2707
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1429	109	217	690	0	0	0	0	245	0	668
RTOR Reduction (vph)	0	0	65	0	0	0	0	0	0	0	0	110
Lane Group Flow (vph)	0	1429	44	217	690	0	0	0	0	122	123	558
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type		NA	Perm	Prot	NA					Split	NA	custom
Protected Phases		2		1	6					4	4	5
Permitted Phases			2									4
Actuated Green, G (s)		29.6	29.6	16.2	22.7					13.1	13.1	36.2
Effective Green, g (s)		29.6	29.6	16.2	22.7					13.1	13.1	36.2
Actuated g/C Ratio		0.40	0.40	0.22	0.31					0.18	0.18	0.49
Clearance Time (s)		5.8	5.8	4.5	5.8					4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		2500	617	377	1058					290	290	1494
v/s Ratio Prot		c0.23		0.13	c0.20					0.07	0.08	c0.12
v/s Ratio Perm			0.03									0.09
v/c Ratio		0.57	0.07	0.58	0.65					0.42	0.42	0.37
Uniform Delay, d1		17.1	13.6	25.7	22.1					26.9	26.9	11.7
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		0.3	0.0	2.1	1.5					1.0	1.0	0.2
Delay (s)		17.4	13.6	27.8	23.5					27.9	27.9	11.8
Level of Service		B	B	C	C					C	C	B
Approach Delay (s/veh)		17.2			24.6			0.0			16.2	
Approach LOS		B			C			A			B	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	18.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	73.7	Sum of lost time (s)	14.8
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	138.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	105	240	335	35	390	5	310	5	10	5	5	80
Future Vol, veh/h	105	240	335	35	390	5	310	5	10	5	5	80
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	400	-	-	160	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	114	261	364	38	424	5	337	5	11	5	5	87

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	429	0	0	625	0	0	962	1177	313	864	1356	215
Stage 1	-	-	-	-	-	-	671	671	-	503	503	-
Stage 2	-	-	-	-	-	-	291	505	-	361	853	-
Critical Hdwy	4.2	-	-	4.2	-	-	7.6	6.6	7	7.6	6.6	7
Critical Hdwy Stg 1	-	-	-	-	-	-	6.6	5.6	-	6.6	5.6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.6	5.6	-	6.6	5.6	-
Follow-up Hdwy	2.25	-	-	2.25	-	-	3.55	4.05	3.35	3.55	4.05	3.35
Pot Cap-1 Maneuver	1105	-	-	932	-	-	~ 206	185	674	243	144	781
Stage 1	-	-	-	-	-	-	405	446	-	512	532	-
Stage 2	-	-	-	-	-	-	684	531	-	621	367	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1105	-	-	932	-	-	~ 152	160	674	200	124	781
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 152	160	-	200	124	-
Stage 1	-	-	-	-	-	-	363	400	-	491	511	-
Stage 2	-	-	-	-	-	-	577	509	-	541	329	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	1.33	1.02	$ 640.25	13.2
HCM LOS			F	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	155	1105	-	-	288	-	-	536
HCM Lane V/C Ratio	2.274	0.103	-	-	0.041	-	-	0.182
HCM Ctrl Dly (s/v)	$ 640.2	8.6	-	-	9	0.3	-	13.2
HCM Lane LOS	F	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	29.3	0.3	-	-	0.1	-	-	0.7

Notes	
~: Volume exceeds capacity	$: Delay exceeds 300s
+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	555	25	50	390	5	30	5	35	5	5	5
Future Vol, veh/h	0	555	25	50	390	5	30	5	35	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	490	-	-	500	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	14	14	14	14	14	14	14	14	14	14	14	14
Mvmt Flow	0	603	27	54	424	5	33	5	38	5	5	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	429	0	0	630	0	0	1152	1155	617	1141	1166	427
Stage 1	-	-	-	-	-	-	617	617	-	535	535	-
Stage 2	-	-	-	-	-	-	535	538	-	606	630	-
Critical Hdwy	4.24	-	-	4.24	-	-	7.24	6.64	6.34	7.24	6.64	6.34
Critical Hdwy Stg 1	-	-	-	-	-	-	6.24	5.64	-	6.24	5.64	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.24	5.64	-	6.24	5.64	-
Follow-up Hdwy	2.326	-	-	2.326	-	-	3.626	4.126	3.426	3.626	4.126	3.426
Pot Cap-1 Maneuver	1069	-	-	897	-	-	165	187	469	168	184	603
Stage 1	-	-	-	-	-	-	458	463	-	508	505	-
Stage 2	-	-	-	-	-	-	508	503	-	464	456	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1069	-	-	897	-	-	149	176	469	141	173	603
Mov Cap-2 Maneuver	-	-	-	-	-	-	149	176	-	141	173	-
Stage 1	-	-	-	-	-	-	458	463	-	477	474	-
Stage 2	-	-	-	-	-	-	467	473	-	421	456	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0	1.04	28.15	23.92
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	230	1069	-	-	897	-	-	206
HCM Lane V/C Ratio	0.33	-	-	-	0.061	-	-	0.079
HCM Ctrl Dly (s/v)	28.2	0	-	-	9.3	-	-	23.9
HCM Lane LOS	D	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	1.4	0	-	-	0.2	-	-	0.3

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	330	0	330	5	65	0	0	0	30	20
Future Vol, veh/h	0	0	330	0	330	5	65	0	0	0	30	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	22	2	16	16	8	0	2	2	17	17
Mvmt Flow	0	0	359	0	359	5	71	0	0	0	33	22

Major/Minor	Major2			Minor1			Minor2			
Conflicting Flow All	-	-	0	375	364	-	-	361	361
Stage 1	-	-	-	0	0	-	-	361	-
Stage 2	-	-	-	375	364	-	-	0	-
Critical Hdwy	-	-	-	7.18	6.5	-	-	6.67	6.37
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.67	-
Critical Hdwy Stg 2	-	-	-	6.18	5.5	-	-	-	-
Follow-up Hdwy	-	-	-	3.572	4	-	-	4.153	3.453
Pot Cap-1 Maneuver	0	-	-	571	567	0	0	543	651
Stage 1	0	-	-	-	-	0	0	600	-
Stage 2	0	-	-	634	627	0	0	-	-
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	519	567	-	-	543	651
Mov Cap-2 Maneuver	-	-	-	519	567	-	-	543	-
Stage 1	-	-	-	-	-	-	-	600	-
Stage 2	-	-	-	580	627	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	0	13.03	11.83
HCM LOS		B	B

Minor Lane/Major Mvmt	NBLn1	WBT	WBR	SBLn1
Capacity (veh/h)	519	-	-	581
HCM Lane V/C Ratio	0.136	-	-	0.093
HCM Ctrl Dly (s/v)	13	-	-	11.8
HCM Lane LOS	B	-	-	B
HCM 95th %tile Q(veh)	0.5	-	-	0.3

Intersection	
Int Delay, s/veh	51.8

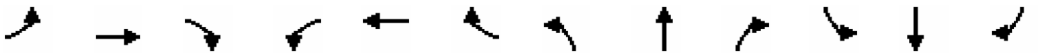
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	65	430	225	0	295	65
Future Vol, veh/h	65	430	225	0	295	65
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	8	8	16	2	22	22
Mvmt Flow	71	467	245	0	321	71

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	245	0	-	0	853	245
Stage 1	-	-	-	-	245	-
Stage 2	-	-	-	-	609	-
Critical Hdwy	4.18	-	-	-	6.62	6.42
Critical Hdwy Stg 1	-	-	-	-	5.62	-
Critical Hdwy Stg 2	-	-	-	-	5.62	-
Follow-up Hdwy	2.272	-	-	-	3.698	3.498
Pot Cap-1 Maneuver	1287	-	-	0	~ 304	748
Stage 1	-	-	-	0	752	-
Stage 2	-	-	-	0	506	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	1287	-	-	-	~ 288	748
Mov Cap-2 Maneuver	-	-	-	-	~ 288	-
Stage 1	-	-	-	-	710	-
Stage 2	-	-	-	-	506	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	1.05	0	154.11
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1
Capacity (veh/h)	1287	-	-	324
HCM Lane V/C Ratio	0.055	-	-	1.209
HCM Ctrl Dly (s/v)	8	-	-	154.1
HCM Lane LOS	A	-	-	F
HCM 95th %tile Q(veh)	0.2	-	-	17.1

Notes	
~: Volume exceeds capacity	$: Delay exceeds 300s
+: Computation Not Defined	*: All major volume in platoon

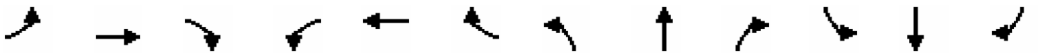


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	455	1165	340	475	1105	190	290	500	410	240	570	385
Future Volume (veh/h)	455	1165	340	475	1105	190	290	500	410	240	570	385
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	495	1266	370	516	1201	207	315	543	446	261	620	418
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	301	1068	312	555	1349	419	365	509	432	279	1150	511
Arrive On Green	0.17	0.28	0.28	0.16	0.27	0.27	0.11	0.28	0.28	0.16	0.33	0.33
Sat Flow, veh/h	1739	3829	1117	3374	4985	1547	3374	1826	1547	1739	3469	1542
Grp Volume(v), veh/h	495	1099	537	516	1201	207	315	543	446	261	620	418
Grp Sat Flow(s),veh/h/ln	1739	1662	1623	1687	1662	1547	1687	1826	1547	1739	1735	1542
Q Serve(g_s), s	30.5	49.2	49.2	26.6	40.8	19.9	16.2	49.2	49.2	26.1	25.7	43.8
Cycle Q Clear(g_c), s	30.5	49.2	49.2	26.6	40.8	19.9	16.2	49.2	49.2	26.1	25.7	43.8
Prop In Lane	1.00		0.69	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	301	927	453	555	1349	419	365	509	432	279	1150	511
V/C Ratio(X)	1.65	1.18	1.19	0.93	0.89	0.49	0.86	1.07	1.03	0.93	0.54	0.82
Avail Cap(c_a), veh/h	301	927	453	583	1391	432	583	509	432	301	1150	511
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	72.9	63.6	63.6	72.7	61.8	54.2	77.4	63.6	63.6	73.1	48.0	54.1
Incr Delay (d2), s/veh	305.1	94.1	104.4	21.0	7.4	0.9	7.7	58.6	52.1	33.9	0.5	10.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	38.9	32.5	33.1	13.0	17.9	7.9	7.4	31.0	25.5	14.3	11.3	18.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	378.0	157.7	167.9	93.7	69.2	55.1	85.1	122.1	115.7	107.0	48.5	64.1
LnGrp LOS	F	F	F	F	E	E	F	F	F	F	D	E
Approach Vol, veh/h		2131			1924			1304			1299	
Approach Delay, s/veh		211.5			74.3			111.0			65.3	
Approach LOS		F			E			F			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	33.5	55.0	23.6	64.3	35.0	53.5	32.8	55.0
Change Period (Y+Rc), s	4.5	5.8	4.5	5.8	4.5	5.8	4.5	5.8
Max Green Setting (Gmax), s	30.5	49.2	30.5	49.2	30.5	49.2	30.5	49.2
Max Q Clear Time (g_c+I1), s	28.6	51.2	18.2	45.8	32.5	42.8	28.1	51.2
Green Ext Time (p_c), s	0.4	0.0	0.9	1.8	0.0	4.1	0.2	0.0

Intersection Summary	
HCM 7th Control Delay, s/veh	123.6
HCM 7th LOS	F

HCM 7th Edition methodology does not support custom phasing.

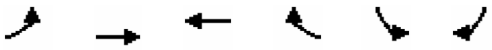


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1130	570	0	0	450	375	420	5	140	0	0	0
Future Volume (veh/h)	1130	570	0	0	450	375	420	5	140	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No				
Adj Sat Flow, veh/h/ln	1826	1826	0	0	1826	1826	1826	1826	1826			
Adj Flow Rate, veh/h	1228	620	0	0	489	408	461	0	152			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	5	5	0	0	5	5	5	5	5			
Cap, veh/h	1440	2514	0	0	913	407	682	0	303			
Arrive On Green	0.43	0.72	0.00	0.00	0.26	0.26	0.20	0.00	0.20			
Sat Flow, veh/h	3374	3561	0	0	3561	1547	3478	0	1545			
Grp Volume(v), veh/h	1228	620	0	0	489	408	461	0	152			
Grp Sat Flow(s),veh/h/ln	1687	1735	0	0	1735	1547	1739	0	1545			
Q Serve(g_s), s	42.6	7.8	0.0	0.0	15.7	34.2	16.0	0.0	11.4			
Cycle Q Clear(g_c), s	42.6	7.8	0.0	0.0	15.7	34.2	16.0	0.0	11.4			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	1440	2514	0	0	913	407	682	0	303			
V/C Ratio(X)	0.85	0.25	0.00	0.00	0.54	1.00	0.68	0.00	0.50			
Avail Cap(c_a), veh/h	1440	2514	0	0	913	407	682	0	303			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	33.6	6.0	0.0	0.0	41.1	47.9	48.4	0.0	46.6			
Incr Delay (d2), s/veh	6.6	0.2	0.0	0.0	2.3	45.2	5.3	0.0	5.8			
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	17.8	2.5	0.0	0.0	6.8	17.8	7.3	0.0	4.8			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	40.1	6.2	0.0	0.0	43.3	93.1	53.7	0.0	52.4			
LnGrp LOS	D	A			D	F	D		D			
Approach Vol, veh/h		1848			897			613				
Approach Delay, s/veh		28.8			66.0			53.4				
Approach LOS		C			E			D				
Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		100.0			60.0	40.0		30.0				
Change Period (Y+Rc), s		5.8			4.5	5.8		4.5				
Max Green Setting (Gmax), s		94.2			55.5	34.2		25.5				
Max Q Clear Time (g_c+I1), s		9.8			44.6	36.2		18.0				
Green Ext Time (p_c), s		4.3			3.9	0.0		1.4				

Intersection Summary	
HCM 7th Control Delay, s/veh	43.2
HCM 7th LOS	D

Notes

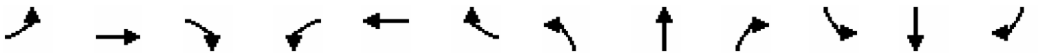
User approved volume balancing among the lanes for turning movement.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	485	425	95	200	25
Future Volume (veh/h)	10	485	425	95	200	25
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1781	1781	1781	1781	1781	1781
Adj Flow Rate, veh/h	11	527	462	103	217	27
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	8	8	8	8	8	8
Cap, veh/h	34	1002	651	145	283	35
Arrive On Green	0.02	0.56	0.46	0.46	0.19	0.19
Sat Flow, veh/h	1697	1781	1410	314	1483	184
Grp Volume(v), veh/h	11	527	0	565	245	0
Grp Sat Flow(s),veh/h/ln	1697	1781	0	1725	1674	0
Q Serve(g_s), s	0.3	8.3	0.0	11.9	6.3	0.0
Cycle Q Clear(g_c), s	0.3	8.3	0.0	11.9	6.3	0.0
Prop In Lane	1.00			0.18	0.89	0.11
Lane Grp Cap(c), veh/h	34	1002	0	796	319	0
V/C Ratio(X)	0.32	0.53	0.00	0.71	0.77	0.00
Avail Cap(c_a), veh/h	747	1961	0	2279	1474	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	22.0	6.2	0.0	9.8	17.4	0.0
Incr Delay (d2), s/veh	5.4	0.6	0.0	1.7	3.9	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	2.3	0.0	3.8	2.5	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	27.4	6.8	0.0	11.5	21.3	0.0
LnGrp LOS	C	A		B	C	
Approach Vol, veh/h		538	565		245	
Approach Delay, s/veh		7.2	11.5		21.3	
Approach LOS		A	B		C	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		32.2		13.3	4.6	27.5
Change Period (Y+Rc), s		6.6		4.6	3.7	6.6
Max Green Setting (Gmax), s		50.0		40.0	20.0	60.0
Max Q Clear Time (g_c+I1), s		10.3		8.3	2.3	13.9
Green Ext Time (p_c), s		6.1		0.8	0.0	7.0

Intersection Summary	
HCM 7th Control Delay, s/veh	11.6
HCM 7th LOS	B



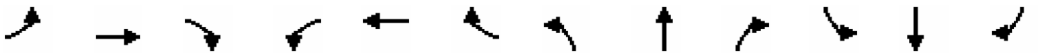
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	375	410	150	205	310	80	95	710	105	70	470	165
Future Volume (veh/h)	375	410	150	205	310	80	95	710	105	70	470	165
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	408	446	163	223	337	87	103	772	114	76	511	179
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	447	560	203	339	469	119	152	926	404	139	899	392
Arrive On Green	0.26	0.23	0.23	0.19	0.17	0.17	0.09	0.27	0.27	0.08	0.26	0.26
Sat Flow, veh/h	1739	2478	897	1739	2726	692	1739	3469	1513	1739	3469	1515
Grp Volume(v), veh/h	408	311	298	223	213	211	103	772	114	76	511	179
Grp Sat Flow(s),veh/h/ln	1739	1735	1641	1739	1735	1683	1739	1735	1513	1739	1735	1515
Q Serve(g_s), s	18.9	14.0	14.3	9.8	9.6	9.9	4.8	17.4	2.8	3.5	10.6	8.2
Cycle Q Clear(g_c), s	18.9	14.0	14.3	9.8	9.6	9.9	4.8	17.4	2.8	3.5	10.6	8.2
Prop In Lane	1.00		0.55	1.00		0.41	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	447	392	371	339	298	290	152	926	404	139	899	392
V/C Ratio(X)	0.91	0.79	0.80	0.66	0.71	0.73	0.68	0.83	0.28	0.55	0.57	0.46
Avail Cap(c_a), veh/h	503	586	554	503	586	568	294	1046	456	294	1046	457
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.9	30.3	30.4	30.8	32.4	32.5	36.7	28.7	7.7	36.7	26.7	25.8
Incr Delay (d2), s/veh	19.7	3.6	4.3	0.8	2.3	2.6	2.0	5.4	0.4	1.3	0.6	0.8
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.9	6.0	5.8	4.0	4.1	4.1	2.0	7.4	1.6	1.5	4.2	2.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	49.6	33.9	34.6	31.7	34.7	35.1	38.7	34.0	8.1	38.0	27.3	26.6
LnGrp LOS	D	C	C	C	C	D	D	C	A	D	C	C
Approach Vol, veh/h		1017			647			989			766	
Approach Delay, s/veh		40.4			33.8			31.5			28.2	
Approach LOS		D			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	21.1	23.6	11.5	26.8	25.5	19.2	10.8	27.4
Change Period (Y+Rc), s	4.9	* 4.9	4.2	5.3	4.2	4.9	4.2	5.3
Max Green Setting (Gmax), s	24.0	* 28	14.0	25.0	24.0	28.0	14.0	25.0
Max Q Clear Time (g_c+I1), s	11.8	16.3	6.8	12.6	20.9	11.9	5.5	19.4
Green Ext Time (p_c), s	0.2	2.4	0.1	3.1	0.4	1.8	0.0	2.5

Intersection Summary	
HCM 7th Control Delay, s/veh	33.8
HCM 7th LOS	C

Notes

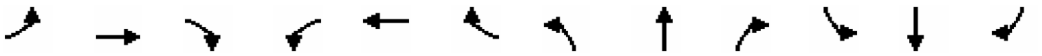
* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	175	530	125	310	565	240	205	990	180	250	735	145
Future Volume (veh/h)	175	530	125	310	565	240	205	990	180	250	735	145
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1841	1841	1870	1870	1870	1856	1856	1856
Adj Flow Rate, veh/h	190	576	136	337	614	261	223	1076	196	272	799	158
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	4	4	4	4	4	2	2	2	3	3	3
Cap, veh/h	254	732	326	378	860	384	255	1162	518	295	1237	552
Arrive On Green	0.07	0.21	0.21	0.11	0.25	0.25	0.14	0.33	0.33	0.17	0.35	0.35
Sat Flow, veh/h	3401	3497	1560	3401	3497	1560	1781	3554	1585	1767	3526	1572
Grp Volume(v), veh/h	190	576	136	337	614	261	223	1076	196	272	799	158
Grp Sat Flow(s),veh/h/ln	1700	1749	1560	1700	1749	1560	1781	1777	1585	1767	1763	1572
Q Serve(g_s), s	5.9	16.8	8.1	10.5	17.3	16.3	13.2	31.5	10.2	16.3	20.5	7.8
Cycle Q Clear(g_c), s	5.9	16.8	8.1	10.5	17.3	16.3	13.2	31.5	10.2	16.3	20.5	7.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	254	732	326	378	860	384	255	1162	518	295	1237	552
V/C Ratio(X)	0.75	0.79	0.42	0.89	0.71	0.68	0.88	0.93	0.38	0.92	0.65	0.29
Avail Cap(c_a), veh/h	347	1103	492	378	1135	506	314	1186	529	295	1237	552
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.9	40.4	36.9	47.3	37.2	36.8	45.3	35.0	27.9	44.2	29.4	25.2
Incr Delay (d2), s/veh	5.8	2.2	0.8	22.1	1.4	2.4	19.9	12.1	0.5	32.8	1.2	0.3
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	7.3	3.2	5.6	7.4	6.4	7.2	15.3	3.9	9.8	8.7	2.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	54.7	42.6	37.8	69.4	38.6	39.2	65.2	47.1	28.3	77.0	30.5	25.5
LnGrp LOS	D	D	D	E	D	D	E	D	C	E	C	C
Approach Vol, veh/h		902			1212			1495			1229	
Approach Delay, s/veh		44.4			47.3			47.3			40.2	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	17.0	27.6	20.4	42.8	13.0	31.5	23.0	40.3
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	12.0	34.0	19.0	35.0	11.0	35.0	18.0	36.0
Max Q Clear Time (g_c+I1), s	12.5	18.8	15.2	22.5	7.9	19.3	18.3	33.5
Green Ext Time (p_c), s	0.0	3.7	0.2	4.9	0.2	4.5	0.0	1.8

Intersection Summary	
HCM 7th Control Delay, s/veh	45.0
HCM 7th LOS	D



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1435	380	120	750	0	0	0	0	265	5	1020
Future Volume (vph)	0	1435	380	120	750	0	0	0	0	265	5	1020
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.8	5.8	4.5	5.8					4.5	4.5	4.5
Lane Util. Factor		0.86	1.00	1.00	0.95					0.95	0.95	0.88
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (prot)		6225	1538	1719	3438					1633	1640	2707
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (perm)		6225	1538	1719	3438					1633	1640	2707
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1560	413	130	815	0	0	0	0	288	5	1109
RTOR Reduction (vph)	0	0	197	0	0	0	0	0	0	0	0	36
Lane Group Flow (vph)	0	1560	216	130	815	0	0	0	0	147	146	1073
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type		NA	Perm	Prot	NA					Split	NA	custom
Protected Phases		2		1	6					4	4	5
Permitted Phases			2									4
Actuated Green, G (s)		48.3	48.3	14.4	29.6					15.0	15.0	48.1
Effective Green, g (s)		48.3	48.3	14.4	29.6					15.0	15.0	48.1
Actuated g/C Ratio		0.52	0.52	0.16	0.32					0.16	0.16	0.52
Clearance Time (s)		5.8	5.8	4.5	5.8					4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		3250	803	267	1100					264	265	1539
v/s Ratio Prot		0.25		0.08	c0.24					0.09	0.09	c0.25
v/s Ratio Perm			0.14									0.15
v/c Ratio		0.48	0.27	0.49	0.74					0.56	0.55	0.70
Uniform Delay, d1		14.1	12.3	35.7	28.0					35.7	35.7	16.7
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		0.1	0.2	1.4	2.7					2.5	2.5	1.4
Delay (s)		14.2	12.5	37.1	30.8					38.2	38.1	18.1
Level of Service		B	B	D	C					D	D	B
Approach Delay (s/veh)		13.8			31.6			0.0			22.3	
Approach LOS		B			C			A			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	20.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	92.5	Sum of lost time (s)	14.8
Intersection Capacity Utilization	79.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	95.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	105	230	375	35	520	5	250	0	15	5	5	55
Future Vol, veh/h	105	230	375	35	520	5	250	0	15	5	5	55
Conflicting Peds, #/hr	0	0	1	1	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	400	-	-	160	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	114	250	408	38	565	5	272	0	16	5	5	60

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	571	0	0	659	0	0	1044	1330	330	997	1531	285
Stage 1	-	-	-	-	-	-	683	683	-	644	644	-
Stage 2	-	-	-	-	-	-	361	647	-	353	887	-
Critical Hdwy	4.2	-	-	4.2	-	-	7.6	6.6	7	7.6	6.6	7
Critical Hdwy Stg 1	-	-	-	-	-	-	6.6	5.6	-	6.6	5.6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.6	5.6	-	6.6	5.6	-
Follow-up Hdwy	2.25	-	-	2.25	-	-	3.55	4.05	3.35	3.55	4.05	3.35
Pot Cap-1 Maneuver	978	-	-	905	-	-	~ 179	150	657	194	113	703
Stage 1	-	-	-	-	-	-	398	440	-	421	459	-
Stage 2	-	-	-	-	-	-	621	457	-	628	354	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	978	-	-	904	-	-	~ 132	127	657	160	95	703
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 132	127	-	160	95	-
Stage 1	-	-	-	-	-	-	352	388	-	403	440	-
Stage 2	-	-	-	-	-	-	538	438	-	541	312	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	1.36	0.89	$ 566.19	15.88
HCM LOS			F	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	138	978	-	-	222	-	-	401
HCM Lane V/C Ratio	2.087	0.117	-	-	0.042	-	-	0.176
HCM Ctrl Dly (s/v)	$ 566.2	9.2	-	-	9.2	0.3	-	15.9
HCM Lane LOS	F	A	-	-	A	A	-	C
HCM 95th %tile Q(veh)	23.4	0.4	-	-	0.1	-	-	0.6

Notes	
~: Volume exceeds capacity	$: Delay exceeds 300s
+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	685	20	55	495	5	20	0	100	5	0	0
Future Vol, veh/h	0	685	20	55	495	5	20	0	100	5	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	490	-	-	500	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	8	8	8	8	8	8	8	8	8	8	8	8
Mvmt Flow	0	745	22	60	538	5	22	0	109	5	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	543	0	0	766	0	0	1413	1418	755	1405	1427	541
Stage 1	-	-	-	-	-	-	755	755	-	660	660	-
Stage 2	-	-	-	-	-	-	658	663	-	745	766	-
Critical Hdwy	4.18	-	-	4.18	-	-	7.18	6.58	6.28	7.18	6.58	6.28
Critical Hdwy Stg 1	-	-	-	-	-	-	6.18	5.58	-	6.18	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.18	5.58	-	6.18	5.58	-
Follow-up Hdwy	2.272	-	-	2.272	-	-	3.572	4.072	3.372	3.572	4.072	3.372
Pot Cap-1 Maneuver	996	-	-	821	-	-	112	133	399	113	131	530
Stage 1	-	-	-	-	-	-	392	408	-	442	451	-
Stage 2	-	-	-	-	-	-	444	450	-	397	403	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	996	-	-	821	-	-	104	123	399	76	122	530
Mov Cap-2 Maneuver	-	-	-	-	-	-	104	123	-	76	122	-
Stage 1	-	-	-	-	-	-	392	408	-	410	418	-
Stage 2	-	-	-	-	-	-	411	417	-	289	403	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0	0.96	30.09	55.64
HCM LOS			D	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	271	996	-	-	821	-	-	76
HCM Lane V/C Ratio	0.482	-	-	-	0.073	-	-	0.071
HCM Ctrl Dly (s/v)	30.1	0	-	-	9.7	-	-	55.6
HCM Lane LOS	D	A	-	-	A	-	-	F
HCM 95th %tile Q(veh)	2.4	0	-	-	0.2	-	-	0.2

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	500	0	330	0	55	0	0	0	40	45
Future Vol, veh/h	0	0	500	0	330	0	55	0	0	0	40	45
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Yield	Yield	Yield	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	15	2	15	0	10	0	2	2	3	3
Mvmt Flow	0	0	543	0	359	0	60	0	0	0	43	49

Major/Minor	Major2			Minor2		
Conflicting Flow All	-	-	0	-	359	359
Stage 1	-	-	-	-	359	-
Stage 2	-	-	-	-	0	-
Critical Hdwy	-	-	-	-	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	4.027	3.327
Pot Cap-1 Maneuver	0	-	-	0	566	683
Stage 1	0	-	-	0	626	-
Stage 2	0	-	-	0	-	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	-	-	-	-	0	683
Mov Cap-2 Maneuver	-	-	-	-	0	-
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-

Approach	WB	SB
HCM Ctrl Dly, s/v	0	11.09
HCM LOS		B

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	683
HCM Lane V/C Ratio	-	-	0.135
HCM Ctrl Dly (s/v)	-	-	11.1
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.5

Intersection	
Int Delay, s/veh	271.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	55	560	410	0	420	120
Future Vol, veh/h	55	560	410	0	420	120
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	10	10	15	2	15	15
Mvmt Flow	60	609	446	0	457	130

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	446	0	-	0	1174	446
Stage 1	-	-	-	-	446	-
Stage 2	-	-	-	-	728	-
Critical Hdwy	4.2	-	-	-	6.55	6.35
Critical Hdwy Stg 1	-	-	-	-	5.55	-
Critical Hdwy Stg 2	-	-	-	-	5.55	-
Follow-up Hdwy	2.29	-	-	-	3.635	3.435
Pot Cap-1 Maneuver	1073	-	-	0	~ 200	586
Stage 1	-	-	-	0	619	-
Stage 2	-	-	-	0	~ 455	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	1073	-	-	-	~ 189	586
Mov Cap-2 Maneuver	-	-	-	-	~ 189	-
Stage 1	-	-	-	-	584	-
Stage 2	-	-	-	-	~ 455	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	0.76	0	$ 785.74
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1
Capacity (veh/h)	1073	-	-	222
HCM Lane V/C Ratio	0.056	-	-	2.643
HCM Ctrl Dly (s/v)	8.6	-	-	$ 785.7
HCM Lane LOS	A	-	-	F
HCM 95th %tile Q(veh)	0.2	-	-	50

Notes	
~: Volume exceeds capacity	$: Delay exceeds 300s
+: Computation Not Defined	*: All major volume in platoon

HCM 7th Edition methodology does not support custom phasing.

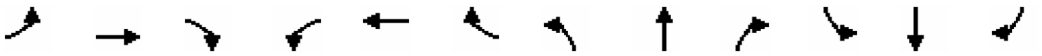
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	430	65	0	325	310	995
Future Volume (veh/h)	430	65	0	325	310	995
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1826	1826	0	1826	1826	1826
Adj Flow Rate, veh/h	467	71	0	353	337	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	0	5	5	5
Cap, veh/h	584	89	0	520	520	
Arrive On Green	0.39	0.39	0.00	0.28	0.28	0.00
Sat Flow, veh/h	1483	225	0	1826	1826	1547
Grp Volume(v), veh/h	539	0	0	353	337	0
Grp Sat Flow(s),veh/h/ln	1711	0	0	1826	1826	1547
Q Serve(g_s), s	8.9	0.0	0.0	5.5	5.2	0.0
Cycle Q Clear(g_c), s	8.9	0.0	0.0	5.5	5.2	0.0
Prop In Lane	0.87	0.13	0.00			1.00
Lane Grp Cap(c), veh/h	674	0	0	520	520	
V/C Ratio(X)	0.80	0.00	0.00	0.68	0.65	
Avail Cap(c_a), veh/h	1630	0	0	1095	1095	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	8.6	0.0	0.0	10.2	10.1	0.0
Incr Delay (d2), s/veh	2.3	0.0	0.0	1.6	1.4	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	0.0	0.0	1.8	1.6	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	10.8	0.0	0.0	11.7	11.4	0.0
LnGrp LOS	B			B	B	
Approach Vol, veh/h	539			353	337	
Approach Delay, s/veh	10.8			11.7	11.4	
Approach LOS	B			B	B	

Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		14.9		17.1		14.9
Change Period (Y+Rc), s		5.8		4.5		5.8
Max Green Setting (Gmax), s		19.2		30.5		19.2
Max Q Clear Time (g_c+I1), s		7.5		10.9		7.2
Green Ext Time (p_c), s		1.6		1.8		1.6

Intersection Summary	
HCM 7th Control Delay, s/veh	11.3
HCM 7th LOS	B

Notes

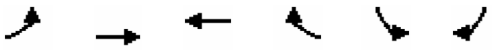
Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	320	205	10	160	90	80	65	15	90	80	10
Future Volume (veh/h)	10	320	205	10	160	90	80	65	15	90	80	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1722	1722	1722	1722	1722	1722	1722	1722	1722	1722	1722	1722
Adj Flow Rate, veh/h	11	348	223	11	174	98	87	71	16	98	87	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	12	12	12	12	12	12	12	12	12	12	12	12
Cap, veh/h	28	486	412	28	486	412	146	208	47	156	238	30
Arrive On Green	0.02	0.28	0.28	0.02	0.28	0.28	0.09	0.15	0.15	0.10	0.16	0.16
Sat Flow, veh/h	1640	1722	1459	1640	1722	1459	1640	1360	307	1640	1499	189
Grp Volume(v), veh/h	11	348	223	11	174	98	87	0	87	98	0	98
Grp Sat Flow(s),veh/h/ln	1640	1722	1459	1640	1722	1459	1640	0	1667	1640	0	1688
Q Serve(g_s), s	0.3	8.0	5.7	0.3	3.6	2.3	2.3	0.0	2.1	2.5	0.0	2.3
Cycle Q Clear(g_c), s	0.3	8.0	5.7	0.3	3.6	2.3	2.3	0.0	2.1	2.5	0.0	2.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.18	1.00		0.11
Lane Grp Cap(c), veh/h	28	486	412	28	486	412	146	0	255	156	0	268
V/C Ratio(X)	0.39	0.72	0.54	0.39	0.36	0.24	0.60	0.00	0.34	0.63	0.00	0.37
Avail Cap(c_a), veh/h	223	1209	1024	223	1209	1024	371	0	830	409	0	879
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.5	14.3	13.4	21.5	12.7	12.2	19.3	0.0	16.7	19.2	0.0	16.6
Incr Delay (d2), s/veh	8.6	2.0	1.1	8.6	0.4	0.3	3.8	0.0	0.8	4.1	0.0	0.8
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	2.4	1.4	0.2	1.0	0.5	0.8	0.0	0.6	0.9	0.0	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	30.1	16.3	14.5	30.1	13.1	12.5	23.2	0.0	17.5	23.4	0.0	17.4
LnGrp LOS	C	B	B	C	B	B	C		B	C		B
Approach Vol, veh/h		582			283			174			196	
Approach Delay, s/veh		15.9			13.6			20.3			20.4	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.8	17.5	8.9	12.0	5.8	17.5	9.2	11.8
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	6.0	31.0	10.0	23.0	6.0	31.0	11.0	22.0
Max Q Clear Time (g_c+I1), s	2.3	10.0	4.3	4.3	2.3	5.6	4.5	4.1
Green Ext Time (p_c), s	0.0	2.4	0.1	0.3	0.0	1.1	0.1	0.3

Intersection Summary	
HCM 7th Control Delay, s/veh	16.7
HCM 7th LOS	B



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	20	420	250	180	160	20
Future Volume (veh/h)	20	420	250	180	160	20
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1693	1693	1693	1693	1693	1693
Adj Flow Rate, veh/h	22	457	272	196	174	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	14	14	14	14	14	14
Cap, veh/h	61	953	396	285	251	223
Arrive On Green	0.04	0.56	0.43	0.43	0.16	0.16
Sat Flow, veh/h	1612	1693	915	659	1612	1434
Grp Volume(v), veh/h	22	457	0	468	174	22
Grp Sat Flow(s),veh/h/ln	1612	1693	0	1574	1612	1434
Q Serve(g_s), s	0.5	6.4	0.0	9.6	4.1	0.5
Cycle Q Clear(g_c), s	0.5	6.4	0.0	9.6	4.1	0.5
Prop In Lane	1.00			0.42	1.00	1.00
Lane Grp Cap(c), veh/h	61	953	0	681	251	223
V/C Ratio(X)	0.36	0.48	0.00	0.69	0.69	0.10
Avail Cap(c_a), veh/h	809	2124	0	2370	1618	1440
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.7	5.2	0.0	9.1	15.9	14.4
Incr Delay (d2), s/veh	3.5	0.5	0.0	1.8	3.4	0.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	1.5	0.0	2.8	1.5	0.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	22.2	5.7	0.0	10.9	19.4	14.6
LnGrp LOS	C	A		B	B	B
Approach Vol, veh/h		479	468		196	
Approach Delay, s/veh		6.5	10.9		18.8	
Approach LOS		A	B		B	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		29.1		10.8	5.2	23.8
Change Period (Y+Rc), s		6.6		4.6	3.7	6.6
Max Green Setting (Gmax), s		50.0		40.0	20.0	60.0
Max Q Clear Time (g_c+I1), s		8.4		6.1	2.5	11.6
Green Ext Time (p_c), s		5.1		0.6	0.0	5.7

Intersection Summary	
HCM 7th Control Delay, s/veh	10.4
HCM 7th LOS	B

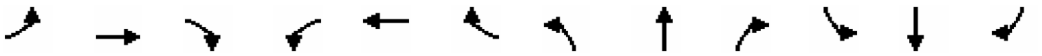
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	110	275	120	190	190	35	120	370	115	60	880	230
Future Volume (veh/h)	110	275	120	190	190	35	120	370	115	60	880	230
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	120	299	130	207	207	38	130	402	125	65	957	250
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	171	421	178	250	684	123	174	1176	514	138	1104	483
Arrive On Green	0.10	0.18	0.18	0.14	0.23	0.23	0.10	0.34	0.34	0.08	0.32	0.32
Sat Flow, veh/h	1739	2355	997	1739	2927	527	1739	3469	1516	1739	3469	1517
Grp Volume(v), veh/h	120	218	211	207	121	124	130	402	125	65	957	250
Grp Sat Flow(s),veh/h/ln	1739	1735	1617	1739	1735	1719	1739	1735	1516	1739	1735	1517
Q Serve(g_s), s	5.0	8.8	9.2	8.6	4.3	4.4	5.4	6.5	2.5	2.7	19.3	10.0
Cycle Q Clear(g_c), s	5.0	8.8	9.2	8.6	4.3	4.4	5.4	6.5	2.5	2.7	19.3	10.0
Prop In Lane	1.00		0.62	1.00		0.31	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	171	310	289	250	405	402	174	1176	514	138	1104	483
V/C Ratio(X)	0.70	0.70	0.73	0.83	0.30	0.31	0.75	0.34	0.24	0.47	0.87	0.52
Avail Cap(c_a), veh/h	560	652	608	560	652	646	327	1176	514	327	1164	509
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.5	28.7	28.9	31.0	23.5	23.6	32.6	18.4	5.9	32.8	23.9	20.7
Incr Delay (d2), s/veh	5.1	2.2	2.6	2.7	0.3	0.3	2.4	0.2	0.2	0.9	6.9	0.9
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	3.6	3.6	3.6	1.7	1.7	2.3	2.4	1.4	1.1	8.2	3.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	37.7	30.9	31.5	33.7	23.8	23.9	35.0	18.6	6.1	33.7	30.8	21.6
LnGrp LOS	D	C	C	C	C	C	C	B	A	C	C	C
Approach Vol, veh/h		549			452			657			1272	
Approach Delay, s/veh		32.6			28.4			19.5			29.1	
Approach LOS		C			C			B			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.6	18.2	11.7	29.0	11.5	22.3	10.1	30.5
Change Period (Y+Rc), s	4.9	* 4.9	4.2	5.3	4.2	4.9	4.2	5.3
Max Green Setting (Gmax), s	24.0	* 28	14.0	25.0	24.0	28.0	14.0	25.0
Max Q Clear Time (g_c+I1), s	10.6	11.2	7.4	21.3	7.0	6.4	4.7	8.5
Green Ext Time (p_c), s	0.2	1.9	0.1	2.3	0.3	1.0	0.0	2.6

Intersection Summary	
HCM 7th Control Delay, s/veh	27.5
HCM 7th LOS	C

Notes

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	0	0	0	0	0	0	0	0	20
Future Volume (veh/h)	0	0	0	0	0	0	0	0	0	0	0	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1693	1693	1693	1870	1870	1870	1870	1870	1870	1648	1648	1648
Adj Flow Rate, veh/h	0	0	0	0	0	0	0	0	0	0	0	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	14	14	14	2	2	2	2	2	2	17	17	17
Cap, veh/h	160	677	574	160	748	634	160	748	0	160	0	559
Arrive On Green	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40
Sat Flow, veh/h	1612	1693	1434	1781	1870	1585	1390	1870	0	1570	0	1397
Grp Volume(v), veh/h	0	0	0	0	0	0	0	0	0	0	0	22
Grp Sat Flow(s),veh/h/ln	1612	1693	1434	1781	1870	1585	1390	1870	0	1570	0	1397
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	160	677	574	160	748	634	160	748	0	160	0	559
V/C Ratio(X)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
Avail Cap(c_a), veh/h	160	677	574	160	748	634	160	748	0	160	0	559
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.2
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.4
LnGrp LOS												A
Approach Vol, veh/h		0			0			0			22	
Approach Delay, s/veh		0.0			0.0			0.0			8.4	
Approach LOS											A	

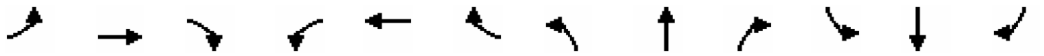
Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	22.5	22.5	22.5	22.5
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	18.0	18.0	18.0	18.0
Max Q Clear Time (g_c+I1), s	0.0	0.0	2.4	0.0
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 7th Control Delay, s/veh	8.4
HCM 7th LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	85	460	80	210	450	160	110	570	175	180	740	110
Future Volume (veh/h)	85	460	80	210	450	160	110	570	175	180	740	110
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1752	1752	1752	1811	1811	1811	1841	1841	1841	1826	1826	1826
Adj Flow Rate, veh/h	92	500	87	228	489	174	120	620	190	196	804	120
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	10	10	10	6	6	6	4	4	4	5	5	5
Cap, veh/h	221	707	315	315	820	366	153	1015	453	238	1028	153
Arrive On Green	0.07	0.21	0.21	0.09	0.24	0.24	0.09	0.29	0.29	0.14	0.34	0.34
Sat Flow, veh/h	3237	3328	1485	3346	3441	1535	1753	3497	1560	1739	3027	452
Grp Volume(v), veh/h	92	500	87	228	489	174	120	620	190	196	461	463
Grp Sat Flow(s),veh/h/ln	1618	1664	1485	1673	1721	1535	1753	1749	1560	1739	1735	1745
Q Serve(g_s), s	2.0	10.4	3.7	5.0	9.5	7.3	5.0	11.5	7.4	8.2	17.9	17.9
Cycle Q Clear(g_c), s	2.0	10.4	3.7	5.0	9.5	7.3	5.0	11.5	7.4	8.2	17.9	17.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.26
Lane Grp Cap(c), veh/h	221	707	315	315	820	366	153	1015	453	238	589	593
V/C Ratio(X)	0.42	0.71	0.28	0.72	0.60	0.48	0.78	0.61	0.42	0.82	0.78	0.78
Avail Cap(c_a), veh/h	302	1464	653	401	1605	716	280	1538	686	348	832	837
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.5	27.4	24.7	33.0	25.4	24.6	33.5	23.0	21.5	31.5	22.3	22.3
Incr Delay (d2), s/veh	1.3	1.3	0.5	4.7	0.7	1.0	8.4	0.6	0.6	9.9	3.2	3.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	4.0	1.3	2.1	3.7	2.6	2.4	4.6	2.7	4.0	7.3	7.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	34.8	28.7	25.2	37.7	26.1	25.5	42.0	23.6	22.2	41.4	25.5	25.4
LnGrp LOS	C	C	C	D	C	C	D	C	C	D	C	C
Approach Vol, veh/h		679			891			930			1120	
Approach Delay, s/veh		29.1			28.9			25.7			28.2	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.1	20.9	11.6	30.5	10.1	22.9	15.3	26.8
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	9.0	33.0	12.0	36.0	7.0	35.0	15.0	33.0
Max Q Clear Time (g_c+I1), s	7.0	12.4	7.0	19.9	4.0	11.5	10.2	13.5
Green Ext Time (p_c), s	0.2	3.5	0.1	5.6	0.1	3.8	0.2	4.8

Intersection Summary	
HCM 7th Control Delay, s/veh	27.9
HCM 7th LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1315	100	200	635	0	0	0	0	225	0	615
Future Volume (vph)	0	1315	100	200	635	0	0	0	0	225	0	615
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.8	5.8	4.5	5.8					4.5	4.5	4.5
Lane Util. Factor		0.95	1.00	1.00	0.95					0.95	0.95	0.88
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (prot)		3438	1538	1719	3438					1633	1633	2707
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (perm)		3438	1538	1719	3438					1633	1633	2707
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1429	109	217	690	0	0	0	0	245	0	668
RTOR Reduction (vph)	0	0	56	0	0	0	0	0	0	0	0	112
Lane Group Flow (vph)	0	1429	53	217	690	0	0	0	0	122	123	556
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type		NA	Perm	Prot	NA					Split	NA	custom
Protected Phases		2		1	6					4	4	5
Permitted Phases			2									4
Actuated Green, G (s)		42.4	42.4	16.2	24.6					13.0	13.0	47.0
Effective Green, g (s)		42.4	42.4	16.2	24.6					13.0	13.0	47.0
Actuated g/C Ratio		0.49	0.49	0.19	0.28					0.15	0.15	0.54
Clearance Time (s)		5.8	5.8	4.5	5.8					4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		1687	754	322	978					245	245	1613
v/s Ratio Prot		c0.42		0.13	c0.20					0.07	c0.08	0.14
v/s Ratio Perm			0.03									0.07
v/c Ratio		0.85	0.07	0.67	0.71					0.50	0.50	0.34
Uniform Delay, d1		19.2	11.6	32.6	27.7					33.7	33.7	11.1
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		4.1	0.0	5.5	2.3					1.6	1.6	0.1
Delay (s)		23.3	11.6	38.1	30.0					35.3	35.3	11.2
Level of Service		C	B	D	C					D	D	B
Approach Delay (s/veh)		22.5			31.9			0.0			17.7	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	23.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	86.4	Sum of lost time (s)	14.8
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	555	25	50	390	5	30	5	35	5	5	5
Future Vol, veh/h	0	555	25	50	390	5	30	5	35	5	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	490	-	-	500	-	-	-	-	300	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	14	14	14	14	14	14	14	14	14	14	14	14
Mvmt Flow	0	603	27	54	424	5	33	5	38	5	5	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	429	0	0	630	0	0	1152	1155	617	1141	1166	427
Stage 1	-	-	-	-	-	-	617	617	-	535	535	-
Stage 2	-	-	-	-	-	-	535	538	-	606	630	-
Critical Hdwy	4.24	-	-	4.24	-	-	7.24	6.64	6.34	7.24	6.64	6.34
Critical Hdwy Stg 1	-	-	-	-	-	-	6.24	5.64	-	6.24	5.64	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.24	5.64	-	6.24	5.64	-
Follow-up Hdwy	2.326	-	-	2.326	-	-	3.626	4.126	3.426	3.626	4.126	3.426
Pot Cap-1 Maneuver	1069	-	-	897	-	-	165	187	469	168	184	603
Stage 1	-	-	-	-	-	-	458	463	-	508	505	-
Stage 2	-	-	-	-	-	-	508	503	-	464	456	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1069	-	-	897	-	-	149	176	469	141	173	603
Mov Cap-2 Maneuver	-	-	-	-	-	-	149	176	-	141	173	-
Stage 1	-	-	-	-	-	-	458	463	-	477	474	-
Stage 2	-	-	-	-	-	-	467	473	-	421	456	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0	1.04	24.8	23.92
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	153	469	1069	-	-	897	-	-	206
HCM Lane V/C Ratio	0.249	0.081	-	-	-	0.061	-	-	0.079
HCM Ctrl Dly (s/v)	36.2	13.4	0	-	-	9.3	-	-	23.9
HCM Lane LOS	E	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.9	0.3	0	-	-	0.2	-	-	0.3

Intersection	
Int Delay, s/veh	8.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	280	50	0	0	65	430
Future Vol, veh/h	280	50	0	0	65	430
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	100
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	22	22	2	2	8	8
Mvmt Flow	304	54	0	0	71	467

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	333	179
Stage 1	-	-	-	-	332	-
Stage 2	-	-	-	-	1	-
Critical Hdwy	-	-	-	-	6.72	7.02
Critical Hdwy Stg 1	-	-	-	-	5.92	-
Critical Hdwy Stg 2	-	-	-	-	5.52	-
Follow-up Hdwy	-	-	-	-	3.576	3.376
Pot Cap-1 Maneuver	-	-	0	-	635	817
Stage 1	-	-	0	-	685	-
Stage 2	-	-	0	-	1006	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	635	817
Mov Cap-2 Maneuver	-	-	-	-	635	-
Stage 1	-	-	-	-	685	-
Stage 2	-	-	-	-	1006	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0	14.64
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBT
Capacity (veh/h)	635	817	-	-	-
HCM Lane V/C Ratio	0.111	0.572	-	-	-
HCM Ctrl Dly (s/v)	11.4	15.1	-	-	-
HCM Lane LOS	B	C	-	-	-
HCM 95th %tile Q(veh)	0.4	3.7	-	-	-

HCM 7th Edition methodology does not support custom phasing.

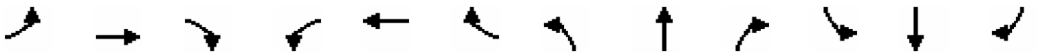
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	490	75	0	265	340	1130
Future Volume (veh/h)	490	75	0	265	340	1130
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1826	1826	0	1826	1826	1826
Adj Flow Rate, veh/h	533	82	0	288	370	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	0	5	5	5
Cap, veh/h	639	98	0	516	516	
Arrive On Green	0.43	0.43	0.00	0.28	0.28	0.00
Sat Flow, veh/h	1480	228	0	1826	1826	1547
Grp Volume(v), veh/h	616	0	0	288	370	0
Grp Sat Flow(s),veh/h/ln	1711	0	0	1826	1826	1547
Q Serve(g_s), s	11.5	0.0	0.0	4.8	6.6	0.0
Cycle Q Clear(g_c), s	11.5	0.0	0.0	4.8	6.6	0.0
Prop In Lane	0.87	0.13	0.00			1.00
Lane Grp Cap(c), veh/h	738	0	0	516	516	
V/C Ratio(X)	0.83	0.00	0.00	0.56	0.72	
Avail Cap(c_a), veh/h	1447	0	0	972	972	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	9.1	0.0	0.0	11.0	11.6	0.0
Incr Delay (d2), s/veh	2.6	0.0	0.0	0.9	1.9	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	0.0	0.0	1.6	2.3	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	11.7	0.0	0.0	12.0	13.5	0.0
LnGrp LOS	B			B	B	
Approach Vol, veh/h	616			288	370	
Approach Delay, s/veh	11.7			12.0	13.5	
Approach LOS	B			B	B	

Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		16.0		20.1		16.0
Change Period (Y+Rc), s		5.8		4.5		5.8
Max Green Setting (Gmax), s		19.2		30.5		19.2
Max Q Clear Time (g_c+I1), s		6.8		13.5		8.6
Green Ext Time (p_c), s		1.3		2.1		1.6

Intersection Summary	
HCM 7th Control Delay, s/veh	12.3
HCM 7th LOS	B

Notes

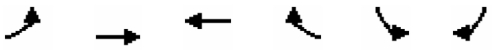
Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	255	105	5	315	125	200	125	10	165	75	10
Future Volume (veh/h)	5	255	105	5	315	125	200	125	10	165	75	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811	1811
Adj Flow Rate, veh/h	5	277	114	5	342	136	217	136	11	179	82	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	6	6	6	6	6	6	6	6	6	6	6	6
Cap, veh/h	14	463	392	14	463	392	278	289	23	233	232	31
Arrive On Green	0.01	0.26	0.26	0.01	0.26	0.26	0.16	0.17	0.17	0.13	0.15	0.15
Sat Flow, veh/h	1725	1811	1535	1725	1811	1535	1725	1653	134	1725	1564	210
Grp Volume(v), veh/h	5	277	114	5	342	136	217	0	147	179	0	93
Grp Sat Flow(s),veh/h/ln	1725	1811	1535	1725	1811	1535	1725	0	1787	1725	0	1773
Q Serve(g_s), s	0.1	6.3	2.8	0.1	8.1	3.4	5.7	0.0	3.5	4.7	0.0	2.2
Cycle Q Clear(g_c), s	0.1	6.3	2.8	0.1	8.1	3.4	5.7	0.0	3.5	4.7	0.0	2.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.07	1.00		0.12
Lane Grp Cap(c), veh/h	14	463	392	14	463	392	278	0	313	233	0	264
V/C Ratio(X)	0.36	0.60	0.29	0.36	0.74	0.35	0.78	0.00	0.47	0.77	0.00	0.35
Avail Cap(c_a), veh/h	221	965	818	221	965	818	625	0	838	625	0	832
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	23.1	15.3	14.0	23.1	16.0	14.3	18.9	0.0	17.4	19.6	0.0	17.9
Incr Delay (d2), s/veh	14.9	1.2	0.4	14.9	2.3	0.5	4.7	0.0	1.1	5.3	0.0	0.8
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	2.0	0.7	0.1	2.7	0.9	2.1	0.0	1.2	1.8	0.0	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	38.0	16.6	14.4	38.0	18.3	14.8	23.6	0.0	18.5	24.9	0.0	18.7
LnGrp LOS	D	B	B	D	B	B	C		B	C		B
Approach Vol, veh/h		396			483			364			272	
Approach Delay, s/veh		16.2			17.5			21.5			22.8	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.4	17.0	12.6	12.0	5.4	17.0	11.3	13.2
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	6.0	25.0	17.0	22.0	6.0	25.0	17.0	22.0
Max Q Clear Time (g_c+I1), s	2.1	8.3	7.7	4.2	2.1	10.1	6.7	5.5
Green Ext Time (p_c), s	0.0	1.5	0.4	0.3	0.0	1.9	0.3	0.5

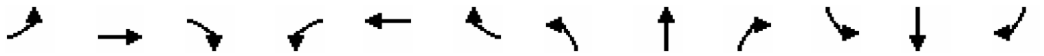
Intersection Summary	
HCM 7th Control Delay, s/veh	19.1
HCM 7th LOS	B



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	485	425	95	200	25
Future Volume (veh/h)	10	485	425	95	200	25
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1781	1781	1781	1781	1781	1781
Adj Flow Rate, veh/h	11	527	462	103	217	27
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	8	8	8	8	8	8
Cap, veh/h	34	1016	657	147	296	264
Arrive On Green	0.02	0.57	0.47	0.47	0.17	0.17
Sat Flow, veh/h	1697	1781	1410	314	1697	1510
Grp Volume(v), veh/h	11	527	0	565	217	27
Grp Sat Flow(s),veh/h/ln	1697	1781	0	1725	1697	1510
Q Serve(g_s), s	0.3	7.9	0.0	11.4	5.3	0.7
Cycle Q Clear(g_c), s	0.3	7.9	0.0	11.4	5.3	0.7
Prop In Lane	1.00			0.18	1.00	1.00
Lane Grp Cap(c), veh/h	34	1016	0	804	296	264
V/C Ratio(X)	0.32	0.52	0.00	0.70	0.73	0.10
Avail Cap(c_a), veh/h	773	2029	0	2357	1546	1376
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.2	5.8	0.0	9.3	17.2	15.2
Incr Delay (d2), s/veh	5.4	0.6	0.0	1.6	3.5	0.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	2.1	0.0	3.6	2.1	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	26.6	6.3	0.0	10.9	20.6	15.4
LnGrp LOS	C	A		B	C	B
Approach Vol, veh/h		538	565		244	
Approach Delay, s/veh		6.8	10.9		20.1	
Approach LOS		A	B		C	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		31.6		12.3	4.6	27.1
Change Period (Y+Rc), s		6.6		4.6	3.7	6.6
Max Green Setting (Gmax), s		50.0		40.0	20.0	60.0
Max Q Clear Time (g_c+I1), s		9.9		7.3	2.3	13.4
Green Ext Time (p_c), s		6.1		0.8	0.0	7.0

Intersection Summary	
HCM 7th Control Delay, s/veh	10.9
HCM 7th LOS	B



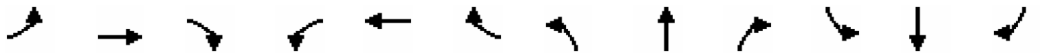
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	375	410	150	205	310	80	95	710	105	70	470	165
Future Volume (veh/h)	375	410	150	205	310	80	95	710	105	70	470	165
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	408	446	163	223	337	87	103	772	114	76	511	179
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	447	560	203	339	469	119	152	926	404	139	899	392
Arrive On Green	0.26	0.23	0.23	0.19	0.17	0.17	0.09	0.27	0.27	0.08	0.26	0.26
Sat Flow, veh/h	1739	2478	897	1739	2726	692	1739	3469	1513	1739	3469	1515
Grp Volume(v), veh/h	408	311	298	223	213	211	103	772	114	76	511	179
Grp Sat Flow(s),veh/h/ln	1739	1735	1641	1739	1735	1683	1739	1735	1513	1739	1735	1515
Q Serve(g_s), s	18.9	14.0	14.3	9.8	9.6	9.9	4.8	17.4	2.8	3.5	10.6	8.2
Cycle Q Clear(g_c), s	18.9	14.0	14.3	9.8	9.6	9.9	4.8	17.4	2.8	3.5	10.6	8.2
Prop In Lane	1.00		0.55	1.00		0.41	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	447	392	371	339	298	290	152	926	404	139	899	392
V/C Ratio(X)	0.91	0.79	0.80	0.66	0.71	0.73	0.68	0.83	0.28	0.55	0.57	0.46
Avail Cap(c_a), veh/h	503	586	554	503	586	568	294	1046	456	294	1046	457
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.9	30.3	30.4	30.8	32.4	32.5	36.7	28.7	7.7	36.7	26.7	25.8
Incr Delay (d2), s/veh	19.7	3.6	4.3	0.8	2.3	2.6	2.0	5.4	0.4	1.3	0.6	0.8
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.9	6.0	5.8	4.0	4.1	4.1	2.0	7.4	1.6	1.5	4.2	2.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	49.6	33.9	34.6	31.7	34.7	35.1	38.7	34.0	8.1	38.0	27.3	26.6
LnGrp LOS	D	C	C	C	C	D	D	C	A	D	C	C
Approach Vol, veh/h		1017			647			989			766	
Approach Delay, s/veh		40.4			33.8			31.5			28.2	
Approach LOS		D			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	21.1	23.6	11.5	26.8	25.5	19.2	10.8	27.4
Change Period (Y+Rc), s	4.9	* 4.9	4.2	5.3	4.2	4.9	4.2	5.3
Max Green Setting (Gmax), s	24.0	* 28	14.0	25.0	24.0	28.0	14.0	25.0
Max Q Clear Time (g_c+I1), s	11.8	16.3	6.8	12.6	20.9	11.9	5.5	19.4
Green Ext Time (p_c), s	0.2	2.4	0.1	3.1	0.4	1.8	0.0	2.5

Intersection Summary	
HCM 7th Control Delay, s/veh	33.8
HCM 7th LOS	C

Notes

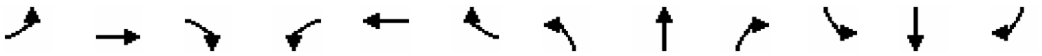
* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	175	530	125	310	565	240	205	990	180	250	735	145
Future Volume (veh/h)	175	530	125	310	565	240	205	990	180	250	735	145
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1841	1841	1870	1870	1870	1856	1856	1856
Adj Flow Rate, veh/h	190	576	136	337	614	261	223	1076	196	272	799	158
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	4	4	4	4	4	2	2	2	3	3	3
Cap, veh/h	254	732	326	378	860	384	255	1162	518	295	1030	204
Arrive On Green	0.07	0.21	0.21	0.11	0.25	0.25	0.14	0.33	0.33	0.17	0.35	0.35
Sat Flow, veh/h	3401	3497	1560	3401	3497	1560	1781	3554	1585	1767	2934	580
Grp Volume(v), veh/h	190	576	136	337	614	261	223	1076	196	272	480	477
Grp Sat Flow(s),veh/h/ln	1700	1749	1560	1700	1749	1560	1781	1777	1585	1767	1763	1751
Q Serve(g_s), s	5.9	16.8	8.1	10.5	17.3	16.3	13.2	31.5	10.2	16.3	26.2	26.2
Cycle Q Clear(g_c), s	5.9	16.8	8.1	10.5	17.3	16.3	13.2	31.5	10.2	16.3	26.2	26.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.33
Lane Grp Cap(c), veh/h	254	732	326	378	860	384	255	1162	518	295	619	615
V/C Ratio(X)	0.75	0.79	0.42	0.89	0.71	0.68	0.88	0.93	0.38	0.92	0.78	0.78
Avail Cap(c_a), veh/h	347	1103	492	378	1135	506	314	1186	529	295	619	615
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.9	40.4	36.9	47.3	37.2	36.8	45.3	35.0	27.9	44.2	31.2	31.2
Incr Delay (d2), s/veh	5.8	2.2	0.8	22.1	1.4	2.4	19.9	12.1	0.5	32.8	6.2	6.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	7.3	3.2	5.6	7.4	6.4	7.2	15.3	3.9	9.8	12.0	11.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	54.7	42.6	37.8	69.4	38.6	39.2	65.2	47.1	28.3	77.0	37.4	37.4
LnGrp LOS	D	D	D	E	D	D	E	D	C	E	D	D
Approach Vol, veh/h		902			1212			1495			1229	
Approach Delay, s/veh		44.4			47.3			47.3			46.2	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	17.0	27.6	20.4	42.8	13.0	31.5	23.0	40.3
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	12.0	34.0	19.0	35.0	11.0	35.0	18.0	36.0
Max Q Clear Time (g_c+I1), s	12.5	18.8	15.2	28.2	7.9	19.3	18.3	33.5
Green Ext Time (p_c), s	0.0	3.7	0.2	3.4	0.2	4.5	0.0	1.8

Intersection Summary	
HCM 7th Control Delay, s/veh	46.5
HCM 7th LOS	D



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1435	380	120	750	0	0	0	0	265	5	1020
Future Volume (vph)	0	1435	380	120	750	0	0	0	0	265	5	1020
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.8	5.8	4.5	5.8					4.5	4.5	4.5
Lane Util. Factor		0.95	1.00	1.00	0.95					0.95	0.95	0.88
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (prot)		3438	1538	1719	3438					1633	1640	2707
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.95	1.00
Satd. Flow (perm)		3438	1538	1719	3438					1633	1640	2707
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1560	413	130	815	0	0	0	0	288	5	1109
RTOR Reduction (vph)	0	0	188	0	0	0	0	0	0	0	0	38
Lane Group Flow (vph)	0	1560	225	130	815	0	0	0	0	147	146	1071
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type		NA	Perm	Prot	NA					Split	NA	custom
Protected Phases		2		1	6					4	4	5
Permitted Phases			2									4
Actuated Green, G (s)		48.3	48.3	11.4	27.2					14.1	14.1	46.6
Effective Green, g (s)		48.3	48.3	11.4	27.2					14.1	14.1	46.6
Actuated g/C Ratio		0.55	0.55	0.13	0.31					0.16	0.16	0.53
Clearance Time (s)		5.8	5.8	4.5	5.8					4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		1874	838	221	1055					259	260	1561
v/s Ratio Prot		c0.45		0.08	c0.24					0.09	0.09	c0.25
v/s Ratio Perm			0.15									0.14
v/c Ratio		0.83	0.27	0.59	0.77					0.57	0.56	0.69
Uniform Delay, d1		16.8	10.7	36.4	27.9					34.4	34.4	15.6
Progression Factor		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		3.3	0.2	4.0	3.6					2.8	2.8	1.3
Delay (s)		20.1	10.9	40.4	31.5					37.3	37.2	16.8
Level of Service		C	B	D	C					D	D	B
Approach Delay (s/veh)		18.2			32.7			0.0			21.1	
Approach LOS		B			C			A			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	22.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	88.6	Sum of lost time (s)	14.8
Intersection Capacity Utilization	70.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	685	20	55	495	5	20	0	100	5	0	0
Future Vol, veh/h	0	685	20	55	495	5	20	0	100	5	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	490	-	-	500	-	-	-	-	300	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	8	8	8	8	8	8	8	8	8	8	8	8
Mvmt Flow	0	745	22	60	538	5	22	0	109	5	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	543	0	0	766	0	0	1413	1418	755	1405	1427	541
Stage 1	-	-	-	-	-	-	755	755	-	660	660	-
Stage 2	-	-	-	-	-	-	658	663	-	745	766	-
Critical Hdwy	4.18	-	-	4.18	-	-	7.18	6.58	6.28	7.18	6.58	6.28
Critical Hdwy Stg 1	-	-	-	-	-	-	6.18	5.58	-	6.18	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.18	5.58	-	6.18	5.58	-
Follow-up Hdwy	2.272	-	-	2.272	-	-	3.572	4.072	3.372	3.572	4.072	3.372
Pot Cap-1 Maneuver	996	-	-	821	-	-	112	133	399	113	131	530
Stage 1	-	-	-	-	-	-	392	408	-	442	451	-
Stage 2	-	-	-	-	-	-	444	450	-	397	403	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	996	-	-	821	-	-	104	123	399	76	122	530
Mov Cap-2 Maneuver	-	-	-	-	-	-	104	123	-	76	122	-
Stage 1	-	-	-	-	-	-	392	408	-	410	418	-
Stage 2	-	-	-	-	-	-	411	417	-	289	403	-

Approach	EB	WB	NB	SB
HCM Ctrl Dly, s/v	0	0.96	22.59	55.64
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	104	399	996	-	-	821	-	-	76
HCM Lane V/C Ratio	0.21	0.273	-	-	-	0.073	-	-	0.071
HCM Ctrl Dly (s/v)	48.7	17.4	0	-	-	9.7	-	-	55.6
HCM Lane LOS	E	C	A	-	-	A	-	-	F
HCM 95th %tile Q(veh)	0.7	1.1	0	-	-	0.2	-	-	0.2

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	500	0	330	0	55	0	0	0	40	45
Future Vol, veh/h	0	0	500	0	330	0	55	0	0	0	40	45
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Yield	Yield	Yield	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	15	2	15	0	10	0	2	2	3	3
Mvmt Flow	0	0	543	0	359	0	60	0	0	0	43	49

Major/Minor	Major2			Minor2		
Conflicting Flow All	-	-	0	-	359	359
Stage 1	-	-	-	-	359	-
Stage 2	-	-	-	-	0	-
Critical Hdwy	-	-	-	-	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	4.027	3.327
Pot Cap-1 Maneuver	0	-	-	0	566	683
Stage 1	0	-	-	0	626	-
Stage 2	0	-	-	0	-	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	-	-	-	-	0	683
Mov Cap-2 Maneuver	-	-	-	-	0	-
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-

Approach	WB	SB
HCM Ctrl Dly, s/v	0	11.09
HCM LOS		B

Minor Lane/Major Mvmt	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	683
HCM Lane V/C Ratio	-	-	0.135
HCM Ctrl Dly (s/v)	-	-	11.1
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.5

Intersection	
Int Delay, s/veh	271.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	55	560	410	0	420	120
Future Vol, veh/h	55	560	410	0	420	120
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	200	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	10	10	15	2	15	15
Mvmt Flow	60	609	446	0	457	130

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	446	0	-	0	1174	446
Stage 1	-	-	-	-	446	-
Stage 2	-	-	-	-	728	-
Critical Hdwy	4.2	-	-	-	6.55	6.35
Critical Hdwy Stg 1	-	-	-	-	5.55	-
Critical Hdwy Stg 2	-	-	-	-	5.55	-
Follow-up Hdwy	2.29	-	-	-	3.635	3.435
Pot Cap-1 Maneuver	1073	-	-	0	~ 200	586
Stage 1	-	-	-	0	619	-
Stage 2	-	-	-	0	~ 455	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	1073	-	-	-	~ 189	586
Mov Cap-2 Maneuver	-	-	-	-	~ 189	-
Stage 1	-	-	-	-	584	-
Stage 2	-	-	-	-	~ 455	-

Approach	EB	WB	SB
HCM Ctrl Dly, s/v	0.76	0	$ 785.74
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1
Capacity (veh/h)	1073	-	-	222
HCM Lane V/C Ratio	0.056	-	-	2.643
HCM Ctrl Dly (s/v)	8.6	-	-	$ 785.7
HCM Lane LOS	A	-	-	F
HCM 95th %tile Q(veh)	0.2	-	-	50

Notes	
~: Volume exceeds capacity	$: Delay exceeds 300s
+: Computation Not Defined	*: All major volume in platoon

MOVEMENT SUMMARY

Site: 101 [1-lane PM (Site Folder: Betteravia & Mahoney)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
East: Betteravia Rd															
1a	L1	All MCs	446	15.0	446	15.0	0.721	13.2	LOS B	8.0	223.5	0.54	0.20	0.54	32.0
6	T1	All MCs	359	15.0	359	15.0	0.721	13.2	LOS B	8.0	223.5	0.54	0.20	0.54	32.9
16	R2	All MCs	5	0.0	5	0.0	0.721	11.9	LOS B	8.0	223.5	0.54	0.20	0.54	26.2
Approach			810	14.9	810	14.9	0.721	13.2	LOS B	8.0	223.5	0.54	0.20	0.54	32.4
North: E St															
7	L2	All MCs	1	3.0	1	3.0	0.198	10.5	LOS B	0.7	18.4	0.69	0.69	0.69	27.4
14a	R1	All MCs	43	3.0	43	3.0	0.198	10.5	LOS B	0.7	18.4	0.69	0.69	0.69	27.9
14	R2	All MCs	49	3.0	49	3.0	0.198	10.5	LOS B	0.7	18.4	0.69	0.69	0.69	27.7
Approach			93	3.0	93	3.0	0.198	10.5	LOS B	0.7	18.4	0.69	0.69	0.69	27.8
West: Betteravia Rd															
5	L2	All MCs	1	0.0	1	0.0	0.859	31.1	LOS D	12.1	339.9	1.00	1.26	2.42	21.4
2	T1	All MCs	457	15.0	457	15.0	0.859	33.9	LOS D	12.1	339.9	1.00	1.26	2.42	25.9
12b	R3	All MCs	87	15.0	87	15.0	0.859	33.9	LOS D	12.1	339.9	1.00	1.26	2.42	25.5
Approach			545	15.0	545	15.0	0.859	33.9	LOS D	12.1	339.9	1.00	1.26	2.42	25.9
SouthWest: Mahoney Rd															
5bx	L3	All MCs	60	10.0	60	10.0	0.956	46.4	LOS E	21.3	575.3	1.00	1.58	3.16	22.4
5ax	L1	All MCs	1	0.0	1	0.0	0.956	44.5	LOS E	21.3	575.3	1.00	1.58	3.16	19.1
12ax	R1	All MCs	609	10.0	609	10.0	0.956	46.4	LOS E	21.3	575.3	1.00	1.58	3.16	22.9
Approach			670	10.0	670	10.0	0.956	46.4	LOS E	21.3	575.3	1.00	1.58	3.16	22.8
All Vehicles			2117	12.8	2117	12.8	0.956	28.9	LOS D	21.3	575.3	0.81	0.93	1.86	26.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [2-Lane AM (Site Folder: Betteravia & Nicholson)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Betteravia & Nicholson
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Nicholson															
3	L2	All MCs	728	5.0	728	5.0	0.876	26.9	LOS D	23.5	611.7	1.00	1.33	2.29	24.1
8	T1	All MCs	33	5.0	33	5.0	0.876	26.9	LOS D	23.5	611.7	1.00	1.33	2.29	24.5
18	R2	All MCs	60	5.0	60	5.0	0.876	26.9	LOS D	23.5	611.7	1.00	1.33	2.29	24.3
Approach			821	5.0	821	5.0	0.876	26.9	LOS D	23.5	611.7	1.00	1.33	2.29	24.1
East: Betteravia															
1	L2	All MCs	38	5.0	38	5.0	0.415	12.8	LOS B	1.8	46.7	0.71	0.74	0.91	29.6
6	T1	All MCs	424	5.0	424	5.0	0.415	12.8	LOS B	1.8	46.7	0.71	0.74	0.91	30.4
16	R2	All MCs	5	5.0	5	5.0	0.415	12.8	LOS B	1.8	46.7	0.71	0.74	0.91	30.3
Approach			467	5.0	467	5.0	0.415	12.8	LOS B	1.8	46.7	0.71	0.74	0.91	30.3
North: Nicholson															
7	L2	All MCs	5	5.0	5	5.0	0.235	12.4	LOS B	0.7	18.2	0.71	0.72	0.74	29.8
4	T1	All MCs	5	5.0	5	5.0	0.235	12.4	LOS B	0.7	18.2	0.71	0.72	0.74	30.4
14	R2	All MCs	87	5.0	87	5.0	0.235	12.4	LOS B	0.7	18.2	0.71	0.72	0.74	30.2
Approach			98	5.0	98	5.0	0.235	12.4	LOS B	0.7	18.2	0.71	0.72	0.74	30.2
West: Betteravia															
5	L2	All MCs	87	5.0	87	5.0	0.581	8.7	LOS A	4.7	123.4	0.30	0.10	0.30	31.3
2	T1	All MCs	212	5.0	212	5.0	0.581	8.7	LOS A	4.7	123.4	0.30	0.10	0.30	32.0
12	R2	All MCs	1375	5.0	1375	5.0	0.581	3.1	LOS A	4.7	123.4	0.10	0.03	0.10	34.8
Approach			1674	5.0	1674	5.0	0.581	4.1	LOS A	4.7	123.4	0.14	0.05	0.14	34.2
All Vehicles			3060	5.0	3060	5.0	0.876	11.8	LOS B	23.5	611.7	0.47	0.52	0.85	30.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [2-Lane PM (Site Folder: Betteravia & Nicholson)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Betteravia & Nicholson
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Nicholson															
3	L2	All MCs	734	5.0	734	5.0	0.870	26.2	LOS D	23.1	601.4	1.00	1.30	2.24	24.3
8	T1	All MCs	22	5.0	22	5.0	0.870	26.2	LOS D	23.1	601.4	1.00	1.30	2.24	24.7
18	R2	All MCs	65	5.0	65	5.0	0.870	26.2	LOS D	23.1	601.4	1.00	1.30	2.24	24.5
Approach			821	5.0	821	5.0	0.870	26.2	LOS D	23.1	601.4	1.00	1.30	2.24	24.3
East: Betteravia															
1	L2	All MCs	38	5.0	38	5.0	0.540	16.2	LOS C	2.8	72.0	0.77	0.84	1.11	28.4
6	T1	All MCs	565	5.0	565	5.0	0.540	16.2	LOS C	2.8	72.0	0.77	0.84	1.11	29.0
16	R2	All MCs	5	5.0	5	5.0	0.540	16.2	LOS C	2.8	72.0	0.77	0.84	1.11	28.9
Approach			609	5.0	609	5.0	0.540	16.2	LOS C	2.8	72.0	0.77	0.84	1.11	29.0
North: Nicholson															
7	L2	All MCs	5	5.0	5	5.0	0.198	13.5	LOS B	0.5	14.3	0.74	0.74	0.74	29.3
4	T1	All MCs	5	5.0	5	5.0	0.198	13.5	LOS B	0.5	14.3	0.74	0.74	0.74	29.9
14	R2	All MCs	60	5.0	60	5.0	0.198	13.5	LOS B	0.5	14.3	0.74	0.74	0.74	29.7
Approach			71	5.0	71	5.0	0.198	13.5	LOS B	0.5	14.3	0.74	0.74	0.74	29.6
West: Betteravia															
5	L2	All MCs	92	5.0	92	5.0	0.641	9.8	LOS A	6.0	156.4	0.35	0.12	0.35	30.9
2	T1	All MCs	201	5.0	201	5.0	0.641	9.8	LOS A	6.0	156.4	0.35	0.12	0.35	31.6
12	R2	All MCs	1554	5.0	1554	5.0	0.641	3.6	LOS A	6.0	156.4	0.12	0.04	0.12	34.5
Approach			1848	5.0	1848	5.0	0.641	4.6	LOS A	6.0	156.4	0.16	0.05	0.16	33.9
All Vehicles			3348	5.0	3348	5.0	0.870	12.2	LOS B	23.1	601.4	0.49	0.52	0.85	29.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

8: Bend Performance by approach

Approach	EB	WB	All
Avg Speed (mph)	42	24	28

9: S Blosser Rd/N Blosser Rd & SR 166 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Avg Speed (mph)	16	19	21	8	10	13	11	20	28	9	9	14

9: S Blosser Rd/N Blosser Rd & SR 166 Performance by movement

Movement	All
Avg Speed (mph)	13

25: External Performance by approach

Approach	NB	All
Avg Speed (mph)	34	34

26: External Performance by approach

Approach	SB	All
Avg Speed (mph)	32	32

36: External Performance by approach

Approach	WB	All
Avg Speed (mph)	9	9

41: External Performance by approach

Approach	EB	All
Avg Speed (mph)	27	27

Total Network Performance

Avg Speed (mph)	16

8: Bend Performance by approach

Approach	EB	WB	All
Avg Speed (mph)	42	16	28

9: S Blosser Rd/N Blosser Rd & SR 166 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Avg Speed (mph)	9	11	14	8	10	13	12	20	28	10	11	15

9: S Blosser Rd/N Blosser Rd & SR 166 Performance by movement

Movement	All
Avg Speed (mph)	12

25: External Performance by approach

Approach	NB	All
Avg Speed (mph)	34	34

26: External Performance by approach

Approach	SB	All
Avg Speed (mph)	32	32

36: External Performance by approach

Approach	WB	All
Avg Speed (mph)	9	9

41: External Performance by approach

Approach	EB	All
Avg Speed (mph)	27	27

Total Network Performance

Avg Speed (mph)	15

SECTION 3: COST

PRELIMINARY CONCEPT DESIGN - CONSTRUCTION COST ESTIMATE

SR166 Comprehensive Corridor Study

Simas Road and SR 166 Traffic Signal Installation

SBCAG

8/19/2025

ITEM NO.	ITEM DESCRIPTION	UNIT		UNIT PRICE	AMOUNT
1	Traffic Control	LS	1	$108,600.00	$108,600
2	Prepare SWPPP	LS	1	$5,000.00	$5,000
3	Water Pollution Control	LS	1	$30,000.00	$30,000
4	Job Site Management	LS	1	$75,000.00	$75,000
5	Construction Area Signs	LS	1	$10,000.00	$10,000
6	Roadway Excavation	SF	100,843	$8.00	$806,744
7	Roadway Paving	SF	100,843	$15.00	$1,512,645
8	Grind and Overlay	SQYD	9,879	$25.00	$246,975
9	Remove Striping	LF	10,617	$3.00	$31,851
10	Remove Pavement Marking	SF	88	$10.00	$880
11	Striping	LF	13,309	$2.00	$26,618
12	Pavement Markings	SF	204	$15.00	$3,060
13	Roadside Signage	LS	1	$5,000.00	$5,000
14	Traffic Signal and Lighting System	LS	1	$450,000.00	$450,000
15	Drainage	LS	1	$348,000.00	$348,000
16	Utility Relocations (does not assume franchise rights)	LS	1	$25,000.00	$25,000
17	Mitigation Costs (weed control for ditches to remain clear)	LS	1	$30,000.00	$30,000
18	ROW	LS	1	$10,000.00	$10,000
19	Mobilization (10%)	LS	1	$360,700.00	$360,700

SUBTOTAL	**4,086,073**
Contingency (25%)	$1,021,518
TOTAL CONSTRUCTION COST ESTIMATE	**$5,107,591**
Project Development Support Costs (35%)	$1,787,657
TOTAL COST ESTIMATE	**$6,895,248**

Future Year Cost Escalation	2026	2027	2028	2029	2030
5.42% Annual	$7,268,971	$7,662,949	$8,078,281	$8,516,123	$8,977,697

PRELIMINARY CONCEPT DESIGN - CONSTRUCTION COST ESTIMATE

SR166 Comprehensive Corridor Study

Bonita School Road Widening Improvements

SBCAG

8/19/2025

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
1	Traffic Control	LS	1	$25,800.00	$25,800
2	Prepare SWPPP	LS	1	$5,000.00	$5,000
3	Water Pollution Control	LS	1	$15,000.00	$15,000
4	Job Site Management	LS	1	$50,000.00	$50,000
5	Construction Area Signs	LS	1	$10,000.00	$10,000
6	Roadway Excavation	SF	21,108	$8.00	$168,864
7	Roadway Paving	SF	21,108	$18.00	$379,944
8	Grind and Overlay	SQYD	2,067	$25.00	$51,675
9	Remove Striping	LF	1,053	$3.00	$3,159
10	Striping	LF	3,259	$2.00	$6,518
11	Pavement Markings	SF	60	$15.00	$900
12	Roadside Signage	LS	1	$5,000.00	$5,000
13	Relocate Light Pole	EA	1	$5,000.00	$5,000
14	Remove Guardrail	LF	150	$20.00	$3,000
15	Midwest Guardrail System (Steel Post)	LF	145	$75.00	$10,875
16	Replace Chain Link Gate	EA	2	$5,000.00	$10,000
17	Drainage	LS	1	$100,000.00	$100,000
18	Utility Relocations (does not assume franchise rights)	LS	1	$15,000.00	$15,000
19	Mitigation Costs (weed control for ditches to remain clear)	LS	1	$20,000.00	$20,000
20	ROW	LS	1	$50,000.00	$50,000
21	Mobilization (10%)	LS	1	$86,000.00	$86,000

SUBTOTAL	**1,021,735**
Contingency (25%)	$255,434
TOTAL CONSTRUCTION COST ESTIMATE	**$1,277,169**
Project Development Support Costs (35%)	$447,009
TOTAL COST ESTIMATE	**$1,724,178**

Future Year Cost Escalation	2026	2027	2028	2029	2030
5.42% Annual	$1,817,628	$1,916,144	$2,019,999	$2,129,483	$2,244,901

PRELIMINARY CONCEPT DESIGN - CONSTRUCTION COST ESTIMATE

SR166 Comprehensive Corridor Study

SR166/Ray Road Intersection Realignment and Widening

SBCAG

8/19/2025

ITEM NO.	ITEM DESCRIPTION	UNIT		UNIT PRICE	AMOUNT
1	Traffic Control	LS	1	$11,500.00	$11,500
2	Prepare SWPPP	LS	1	$5,000.00	$5,000
3	Water Pollution Control	LS	1	$10,000.00	$10,000
4	Job Site Management	LS	1	$40,000.00	$40,000
5	Construction Area Signs	LS	1	$5,000.00	$5,000
6	Roadway Excavation	SF	8,266	$8.00	$66,128
7	Roadway Paving	SF	8,266	$18.00	$148,788
8	Remove Striping	LF	50	$3.00	$150
9	Remove Pavement Markings	SF	22	$10.00	$220
10	Striping	LF	933	$2.00	$1,866
11	Pavement Markings	SF	52	$15.00	$780
12	Roadside Signage	LS	1	$5,000.00	$5,000
13	Street Lighting	EA	3	$15,000.00	$45,000
14	Drainage	LS	1	$32,300.00	$32,300
15	Utility Relocations (does not assume franchise rights)	LS	1	$10,000.00	$10,000
16	Mitigation Costs (weed control for ditches to remain clear)	LS	1	$10,000.00	$10,000
17	Mobilization (10%)	LS	1	$38,100.00	$38,100

SUBTOTAL	**429,832**
Contingency (25%)	$107,458
TOTAL CONSTRUCTION COST ESTIMATE	**$537,290**
Project Development Support Costs (35%)	$188,052
TOTAL COST ESTIMATE	**$725,342**

Future Year Cost Escalation	2026	2027	2028	2029	2030
5.42% Annual	$764,655	$806,099	$849,790	$895,849	$944,403

PRELIMINARY CONCEPT DESIGN - CONSTRUCTION COST ESTIMATE

SR166 Comprehensive Corridor Study

SR166 WB Merge Lane Extension and Shoulder Widening at Hanson Way

SBCAG

8/19/2025

ITEM NO.	ITEM DESCRIPTION	UNIT		UNIT PRICE	AMOUNT
1	Traffic Control	LS	1	$13,700.00	$13,700
2	Prepare SWPPP	LS	1	$5,000.00	$5,000
3	Water Pollution Control	LS	1	$10,000.00	$10,000
4	Job Site Management	LS	1	$50,000.00	$50,000
5	Construction Area Signs	LS	1	$10,000.00	$10,000
6	Roadway Excavation	SF	10,773	$8.00	$86,184
7	Roadway Paving	SF	10,773	$18.00	$193,914
8	Remove Striping	LF	1,615	$3.00	$4,845
9	Remove Pavement Markings	SF	126	$10.00	$1,260
10	Striping	LF	2,691	$2.00	$5,382
11	Pavement Markings	SF	126	$15.00	$1,890
12	Street Lighting	EA	2	$15,000.00	$30,000
13	Roadside Signage	LS	1	$5,000.00	$5,000
14	Drainage	LS	1	$42,100.00	$42,100
15	Mitigation Costs (weed control for ditches to remain clear)	LS	1	$10,000.00	$10,000
16	Mobilization (10%)	LS	1	$45,600.00	$45,600

SUBTOTAL	**514,875**
Contingency (25%)	$128,719
TOTAL CONSTRUCTION COST ESTIMATE	**$643,594**
Project Development Support Costs (35%)	$225,258
TOTAL COST ESTIMATE	**$868,852**

Future Year Cost Escalation	2026	2027	2028	2029	2030
5.42% Annual	$915,943	$965,587	$1,017,922	$1,073,094	$1,131,255

PRELIMINARY CONCEPT DESIGN - CONSTRUCTION COST ESTIMATE

SR166 Comprehensive Corridor Study

Betteravia and Mahoney Roundabout

SBCAG

8/19/2025

ITEM NO.	ITEM DESCRIPTION	UNIT		UNIT PRICE	AMOUNT
1	Traffic Control	LS	1	$407,200.00	$407,200
2	Prepare SWPPP	LS	1	$5,000.00	$5,000
3	Water Pollution Control	LS	1	$10,000.00	$10,000
4	Job Site Management	LS	1	$120,000.00	$120,000
5	Construction Area Signs	LS	1	$10,000.00	$10,000
6	Roadway Excavation	SF	106,093	$12.00	$1,273,116
7	Roadway Paving	SF	60,245	$25.00	$1,506,125
8	Remove Striping	LF	4,983	$3.00	$14,949
9	Remove Pavement Markings	SF	129	$10.00	$1,290
10	Striping	LF	3,565	$2.00	$7,130
11	Pavement Markings	SF	240	$15.00	$3,600
12	Street Lighting	EA	4	$15,000.00	$60,000
13	Roadside Signage	LS	1	$20,000.00	$20,000
14	Minor Concrete (Stamped Concrete)	SF	14,141	$35.00	$494,935
15	Minor Concrete (Curb)	LF	1,940	$100.00	$194,000
16	Remove Concrete (Curb)	LF	444	$40.00	$17,760
17	Remove Fence	LF	347	$15.00	$5,205
18	Drainage	LS	1	$278,000.00	$278,000
19	Clearing and Grubbing	LS	1	$20,000.00	$20,000
20	Mitigation Costs (weed control for ditches to remain clear)	LS	1	$30,000.00	$30,000
21	ROW	LS	1	$350,000.00	$350,000
22	Mobilization (10%)	LS	1	$407,200.00	$407,200

SUBTOTAL	**5,235,510**
Contingency (25%)	$1,308,878
TOTAL CONSTRUCTION COST ESTIMATE	**$6,544,388**
Project Development Support Costs (35%)	$2,290,536
TOTAL COST ESTIMATE	**$8,834,923**

Future Year Cost Escalation	2026	2027	2028	2029	2030
5.42% Annual	$9,313,776	$9,818,583	$10,350,750	$10,911,760	$11,503,178

PRELIMINARY CONCEPT DESIGN - CONSTRUCTION COST ESTIMATE

SR166 Comprehensive Corridor Study

Betteravia-E Street- Mahoney Traffic Signal

SBCAG

8/19/2025

ITEM NO.	ITEM DESCRIPTION	UNIT		UNIT PRICE	AMOUNT
1	Traffic Control	LS	1	$112,800.00	$112,800
2	Prepare SWPPP	LS	1	$5,000.00	$5,000
3	Water Pollution Control	LS	1	$10,000.00	$10,000
4	Job Site Management	LS	1	$50,000.00	$50,000
5	Construction Area Signs	LS	1	$10,000.00	$10,000
6	Roadway Excavation	SF	141,358	$8.00	$1,130,864
7	Roadway Paving	SF	112,542	$15.00	$1,688,130
8	Remove Striping	LF	7,436	$3.00	$22,308
9	Remove Pavement Markings	SF	129	$10.00	$1,290
10	Striping	LF	13,900	$2.00	$27,800
11	Pavement Markings	SF	219	$15.00	$3,285
12	Roadside Signage	LS	1	$20,000.00	$20,000
13	Traffic Signal and Lighting System	LS	1	$450,000.00	$450,000
14	Remove Fence	LF	414	$15.00	$6,210
15	Drainage	LS	1	$281,900.00	$281,900
16	Clearing and Grubbing	LS	1	$20,000.00	$20,000
17	Mitigation Costs (weed control for ditches to remain clear)	LS	1	$30,000.00	$30,000
18	ROW	LS	1	$400,000.00	$400,000
19	Mobilization (10%)	LS	1	$375,700.00	$375,700

SUBTOTAL	**4,645,287**
Contingency (25%)	$1,161,322
TOTAL CONSTRUCTION COST ESTIMATE	**$5,806,609**
Project Development Support Costs (35%)	$2,032,313
TOTAL COST ESTIMATE	**$7,838,922**

Future Year Cost Escalation	2026	2027	2028	2029	2030
5.42% Annual	$8,263,791	$8,711,689	$9,183,862	$9,681,628	$10,206,372

PRELIMINARY CONCEPT DESIGN - CONSTRUCTION COST ESTIMATE

SR166 Comprehensive Corridor Study

Paved Driveway Aprons

SBCAG

8/19/2025

ITEM NO.	ITEM DESCRIPTION	UNIT		UNIT PRICE	AMOUNT
1	Traffic Control	LS	1	$46,500.00	$46,500
2	Prepare SWPPP	LS	1	$5,000.00	$5,000
3	Water Pollution Control	LS	1	$10,000.00	$10,000
4	Job Site Management	LS	1	$30,000.00	$30,000
5	Construction Area Signs	LS	1	$10,000.00	$10,000
6	Paved Driveway Apron	SF	60,000	$12.00	$720,000
7	Mobilization (10%)	LS	1	$77,500.00	$77,500

SUBTOTAL	**899,000**
Contingency (25%)	$224,750
TOTAL CONSTRUCTION COST ESTIMATE	**$1,123,750**
Project Development Support Costs (35%)	$393,313
TOTAL COST ESTIMATE	**$1,517,063**

Future Year Cost Escalation	2026	2027	2028	2029	2030
5.42% Annual	$1,599,287	$1,685,969	$1,777,348	$1,873,680	$1,975,234

PRELIMINARY CONCEPT DESIGN - CONSTRUCTION COST ESTIMATE

SR166 Comprehensive Corridor Study

Electronic Feedback Signs

SBCAG

8/19/2025

ITEM NO.	ITEM DESCRIPTION	UNIT		UNIT PRICE	AMOUNT
1	Traffic Control	LS	1	$4,800.00	$4,800
2	Job Site Management	LS	1	$30,000.00	$30,000
3	Construction Area Signs	LS	1	$10,000.00	$10,000
4	Electronic Speed Feedback Signs	EA	4	$10,000.00	$40,000
5	Mobilization (10%)	LS	1	$16,000.00	$16,000

SUBTOTAL	**100,800**
Contingency (25%)	$25,200
TOTAL CONSTRUCTION COST ESTIMATE	**$126,000**
Project Development Support Costs (35%)	$44,100
TOTAL COST ESTIMATE	**$170,100**

Future Year Cost Escalation	2026	2027	2028	2029	2030
5.42% Annual	$179,319	$189,039	$199,284	$210,086	$221,472

PRELIMINARY CONCEPT DESIGN - CONSTRUCTION COST ESTIMATE

SR166 Comprehensive Corridor Study

Electronic Feedback Signs

SBCAG

8/19/2025

ITEM NO.	ITEM DESCRIPTION	UNIT		UNIT PRICE	AMOUNT
1	Traffic Control	LS	1	$2,700.00	$2,700
2	Job Site Management	LS	1	$10,000.00	$10,000
3	Construction Area Signs	LS	1	$2,000.00	$2,000
4	Remove Striping	LS	1	$5,000.00	$5,000
5	Striping	LS	1	$10,000.00	$10,000
6	Mobilization (10%)	LS	1	$3,400.00	$3,400

SUBTOTAL	**33,100**
Contingency (25%)	$8,275
TOTAL CONSTRUCTION COST ESTIMATE	**$41,375**
Project Development Support Costs (35%)	$14,481
TOTAL COST ESTIMATE	**$55,856**

Future Year Cost Escalation	2026	2027	2028	2029	2030
5.42% Annual	$58,884	$62,075	$65,440	$68,986	$72,726

PRELIMINARY CONCEPT DESIGN - CONSTRUCTION COST ESTIMATE

SR166 Comprehensive Corridor Study

Santa Maria River Levee Trail (SMRLT)

SBCAG

8/19/2025

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY[1]	UNIT PRICE[2]	AMOUNT
1	Surface Treatment - 12' Asphalt Pavement (6-8" depth)	SF	625,680	$8.00	$5,005,440
2	Signage and Wayfinding	LS	1	$25,000.00	$25,000
3	Guardrails - Post & Rope w/signs[3]	LF	69,520	$35.00	$2,433,200
4	Boundary Fence - Chain Link (Vinyl)	LF	34,760	$60.00	$2,085,600
5	Furnishings (7 benches, 3 trash cans, 3 bag dispensers)	LS	1	$25,000.00	$25,000
6	Staging Areas/Entry Nodes[3]	LS	2	$40,000.00	$80,000
7	Staging Area Lighting	LS	1	$62,000.00	$62,000
8	Placemaking Features[3]	LS	2	$15,000.00	$30,000
9	Security - Call boxes	LS	2	$5,000.00	$10,000
10	Security - Cameras	LS	4	$12,000.00	$48,000
11	Overlook Platforms	LS	2	$62,000.00	$124,000
12	Bike Parking	LS	1	$7,000.00	$7,000
13	Right-of-way	LS	1	$210,000.00	$210,000

SUBTOTAL	10,145,240
Contingency (25%)	$2,536,310
CONSTRUCTION COST ESTIMATE	**$12,681,550**
Project Development Support Costs (35%)[4]	$4,438,543
TOTAL COST ESTIMATE	**$17,120,093**

Future Year Cost Escalation	2026	2027	2028	2029	2030
5.42% Annual	$18,048,002	$19,026,203	$20,057,423	$23,498,718	$24,772,349

Notes:

1) Quanitities from SMRLT Study 2022

2) Rounded Unit Costs from SMRLT Study 2022 with 22.3% escalator per California Construction Cost Index (2022-2024)

3) Unit Costs adjusted based upon Caltrans Cost Database, recently-bid Psomas projects, and engineering judgement

4) PA&ED, PS&E, Right-of-way Engineering, Construction Management and Inspections

5) Current status of project: Potential Conceptual Design per the SMRLT Trail Study 2022

6) Cost Escalation based upon an annual rate of 5.42 (Construction Cost Index for San Francisco + Los Angeles, August 2015-August 2025)

SR166 Comprehensive Corridor Study Improvements Cost Summary

	Section	Capital Outlay Costs	Support Costs	Total Project Costs
1	Simas Road	$5,107,591	$1,787,657	$6,895,248
2	Bonita School Road	$1,277,169	$447,009	$1,724,178
3	Ray Road	$537,290	$188,052	$725,342
4	Hanson Way	$643,594	$225,258	$868,852
5	Betteravia/Mahoney Roundabout	$6,544,388	$2,290,536	$8,834,923
6	Paved Driveway Aprons	$1,123,750	$393,313	$1,517,063
7	Electronic Feedback Signs	$126,000	$44,100	$170,100
8	Santa Maria River Levee Trail	$12,681,550	$4,438,543	$17,120,093
	TOTAL COSTS	**$28,041,331**	**$9,814,466**	**$37,855,797**

Estimate Prepared By :

Name and Title | Date | Phone

Estimate Reviewed By :

Name and Title | Date | Phone

PRELIMINARY CONCEPT DESIGN – CONSTRUCTION COST ESTIMATE

SR 166 Comprehensive Corridor Study

Safety and Truck Improvements

9/10/2025

ITEM DESCRIPTION	UNIT	UNIT PRICE	AMOUNT
TURN RADIUS IMPROVEMENTS – RESTRIPING	1	$20,000	$20,000
TURNING RADIUS IMPROVEMENTS - RELOCATE CABINET AND POLE	1	$250,000	$250,000
ROADSIDE SIGNAGE AND INSTALLATION	17	$500	$8,500
REFLECTORS	250	$15	$3,750
ELECTRONIC SPEED FEEDBACK SIGNS	1	$170,100*	$170,100
SIGNAL DETECTION UPGRADES	4	$200,000	$800,000

SUBTOTAL	**$1,252,350**
Contingency (25%)	$313,088
TOTAL COST ESTIMATE	**$1,565,438**

***TOTAL COST ESTIMATE FROM PSOMAS "ELECTRONIC FEEDBACK SIGNS" ESTIMATE**

Enhanced Lighting

9/16/2025

ITEM DESCRIPTION	UNIT	UNIT PRICE	AMOUNT
STREET LIGHT IMPROVEMENTS	21	$12,000	$252,000
UTILITY COORDINATION & PERMITTING (LUMP SUM)	1	$50,400	$50,400

SUBTOTAL	**$302,400**
Contingency (25%)	$75,600
TOTAL COST ESTIMATE	**$378,000**

SECTION 4: BENEFITS

SR 166/SIMAS ROAD

PROJECT INFORMATION

Legend	
User-Supplied Data	0.000
Model Default	0.000
Model Calculation	0.000

Agency:	**SBCAG**
Project Title:	**SR 166 Mulitmodal Corridor Study**
Date:	**8/6/2025**
Analyst:	**ALC**
Build Alternative Name	**Imp 2 (Simas Road)**

PROJECT DATA

Enter basic project data here. The green cells require user-supplied data when a default blue cell is not adjacent. The blue cells are model defaults, but can be overridden by entering a value in the green cell next to the blue default. All orange text represents model calculations.

Select roadway facility type from list	Rural Other		
Analysis Period (Years)	20		
Length of Construction Period (Years)	3		
Total Period	23		(analysis period years plus construction period years)
Annual Discount Rate (Percent)	3%	7%	
Percent of Trucks in the Flow (Percent)	9%	11%	
Fuel Cost (Dollars/Gallon)	$2.50	$ 4.27	
Value of Time ($/Hr.) Personal	$26.58	$ 21.10	
Value of Time ($/Hr.) Freight	$37.49	$ 35.70	
Calculated Combined Value of Time ($/Hr.)	$22.71		
The following information is used only for Reliability Benefit calculations. Reliability benefits are not estimated for facilities that are classified as *Urban or Rural Other*. User may ignore the information input items below for these facilities and move to the Project Costs section. See the BCA Guide or the Reference Guide for additional explanation.			
Segment Length (Miles)	5	0.1	
Number of Lanes	2	2	(2 for two-lane roads; otherwise, number of lanes per direction)
Free Flow Speed (MPH)	40	55	
Traffic Volume (during peak period)	1240		
Link Capacity	9600		(passenger car equivalents for all lanes, or estimated by the Highway Capacity Manua
Hours of Peak Traffic per Day	2	3	(e.g., number of hours in am and/or pm peak)
Days of Analysis per Year	260	365	(e.g., 365 for analysis of all days or 260 for analysis of weekday travel time reliability)
Reliability Ratio Personal	1		
Reliability Ratio Freight	1.2		

PROJECT COSTS

Enter project life-cycle costs in table here. The green cells indicate data that is supplied by the user. The blue cells are model defaults. All orange text represents model calculations.

	DIRECT PROJECT COSTS						
	INITIAL COSTS			SUBSEQUENT COSTS			
Year	Project Support	Right-of-Way	Construction	Maintenance/ Operation	Rehabilitation	Mitigation	Present Value
			Construction Period				
1				<-- Must enter a cost -->			$0
2							$0
3							$0
4							$0
5							$0
6							$0
7							$0
8							$0
			Open to Public				
1							$0
2							$0
3							$0
4							$0
5							$0
6							$0
7							$0
8							$0
9							$0
10							$0
11							$0
12							$0
13							$0
14							$0
15							$0
16							$0
17							$0
18							$0
19							$0
20							$0
21							$0
22							$0
23							$0
24							$0
25							$0
26							$0
27							$0
28							$0
29							$0
30							$0
31							$0
32							$0
33							$0
34							$0
35							$0
36							$0
37							$0
38							$0
39							$0
40							$0
41							$0
42							$0
43							$0
44							$0
45							$0
46							$0
47							$0
48							$0
49							$0
50							$0
Total	$0	$0	$0	$0	$0	$0	$0

PROJECT CRASH DATA

This sheet calculates annual reductions in crash frequency and severity for single or multiple countermeasures.

Color Codes	
User-Supplied Data	0.00
Model Parameter	0.00
Model Calculation	0.00
Linked Cell	0.00

1) Single or Multiple Countermeasure: Multiple Countermeasures

2) Calculation Method: Additive Method

BASELINE CRASH DATA AND CRASH MODIFICATION FACTORS

CMF Clearinghouse

Enter estimated annual crashes without treatment and Crash Modification Factors (CMF).

Injury Severity Scale	Estimated Annual Crashes without Treatment	CMF1	CMF2
K	0.2	0.33	0.67
A	0.2	0.33	0.67
B	0.6	0.33	0.67
C	2.4	0.33	0.67
O	0	0.33	0.67
CMF Clearinghouse ID		323	4648

Note: CMF 323 only applies to angle crashes. Overwrote reduction in crashes where required to account for this.

Next Step

CALCULATION FOR THE ANNUAL REDUCTION IN CRASH FREQUENCY AND SEVERITY

This section automatically calculates annual reduction in crash frequency and severity. No user input is required for this table. However, if the user wishes to override or enter externally calculated Crash Reductions, they may be entered in the Green cells, Column (5).

Formula 1: Estimated Annual Reductions with Treatment (3)	= (1) Estimated Crashes without Treatment x (2) Crash Modfication Factor
Formula 2: Annual Reduction in Crashes (4)	= (3) Estimated Annual Reduction with Treatment - (1) Estimated Crashes without Treatment

	(1)	(2)	(3)	(4)	(5)
Injury Severity Scale	Estimated Annual Crashes without Treatment	Crash Modification Factor	Estimated Annual Crashes with Treatment	Annual Reduction in Crashes	User Determined Reduction in Crashes
K	0.200	0.000	0.000	0.200	0.13
A	0.200	0.000	0.000	0.200	0.13
B	0.600	0.000	0.000	0.600	0.47
C	2.400	0.000	0.000	2.400	1.74
O	0.000	0.000	0.000	0.000	0.00
Total	3.400		0.000	3.400	2.48

CMF CALCULATIONS FOR MULTIPLE COUNTERMEASURES (NOT APPLICABLE TO SINGLE COUNTERMEASURES)

This section automatically calculates a CMF value for the project when multiple countermeasures are being evaluated. Not applicable to single countermeasures. No user input is required for this table.

Analysis Type		Multiple Countermeasures
Calculation Method		Additive Method

Severity Scale	Dominant Effect	Additive Method	Multiplicative Method	Dominant Common Residuals Method
K	0.33	0.00	0.22	0.61
A	0.33	0.00	0.22	0.61
B	0.33	0.00	0.22	0.61
C	0.33	0.00	0.22	0.61
O	0.33	0.00	0.22	0.61

ANALYSIS PARAMETERS

This page lists model-defined parameters from the Lookup worksheet.
Model-defined parameters are based on the "Roadway Facility Type" selected by the user on the Project Information worksheet.

Roadway Facility Type	Rural Other		

Color Codes

User-Supplied Data	
Model Parameter	

	Parameter	User Defined
Value of Time	22.71	

Users may modify default values by entering user defined values in the green cells on the right of the Lookup entry.

Travel Time Delay Factors	(Hours/Crash)	
Fatal	104.82	0.00
Injury	13.86	0.00
PDO	10.33	0.00

Vehicle Operation Cost Factors	(Gallons/Crash)	
Fatal	36.00	0.00
Injury	9.00	0.00
PDO	8.00	0.00

Next Step

Emissions Factors (Dollars/Crash)	CO2	CO	NOx	PM10	PM2.5	SO2	VOC
Fatal	$15.47	$0.00	$6.28	$0.00	$17.54	$1.28	$0.28
Injury	$3.93	$0.00	$1.59	$0.00	$4.38	$0.32	$0.07
PDO	$3.28	$0.00	$1.34	$0.00	$3.59	$0.28	$0.06

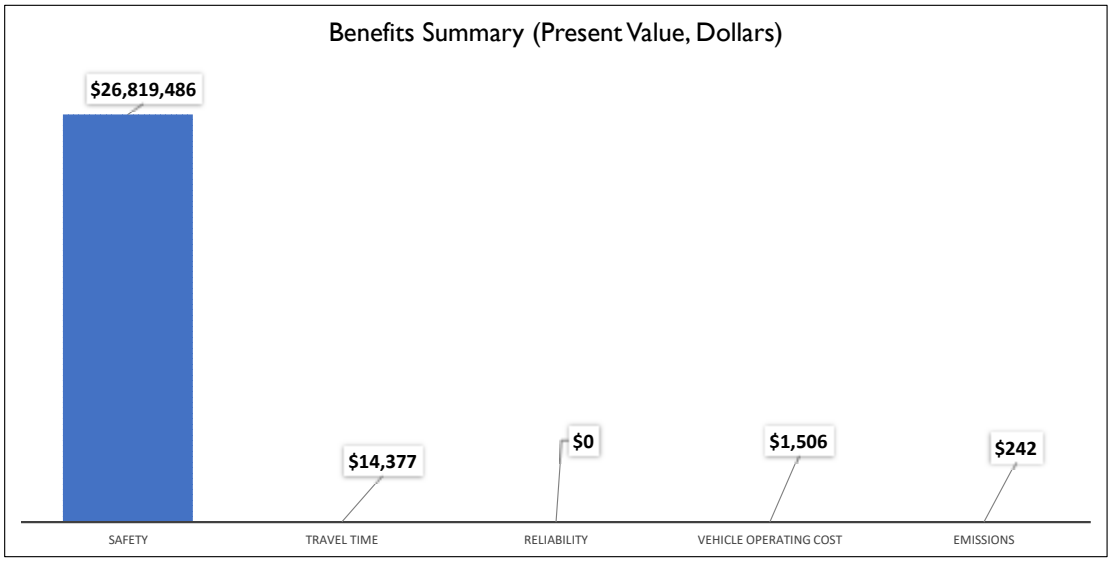
SR 166 Mulitmodal Corridor Study

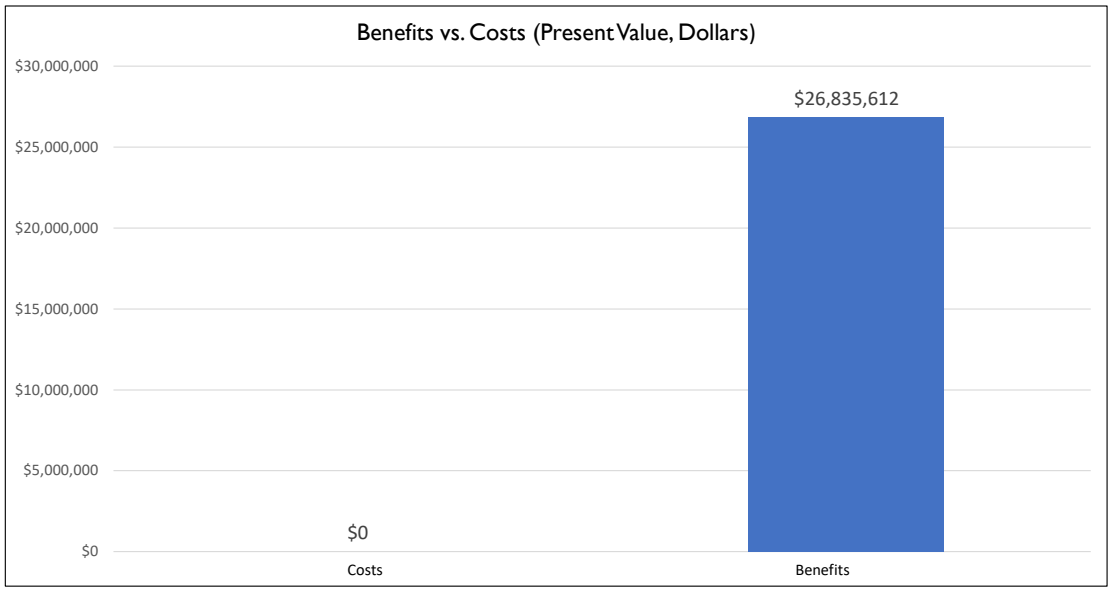
Benefit-Cost Analysis Summary Results

AGENCY: SBCAG **DATE** 8/6/2025

Present Value Costs ($ Dollars)	$0
Present Value Benefits ($ Dollars)	$26,835,612
Net Present Value ($ Dollars)	$26,835,612
Benefit / Cost Ratio:	#DIV/0!
Discount Rate	7.0%

ITEMIZED BENEFITS ($ Dollars)	Present Value
Safety	$26,819,486
Travel Time	$14,377
Reliability	$0
Vehicle Operating Cost	$1,506
Emissions	$242
TOTAL BENEFITS	**$26,835,612**





Delay Net Present Value Calculator (SR166 Multimodal Imps)

Description: This calculator was created to supplement the cost of person delay associated with the NCHRP 3-110 tool. This sheet documents assumptions made in the calculation tabs of this sheet.

Assumptions:

1. Assume that trucks have 1 person in them, therefore truck delay = person delay for trucks.
2. Assume linear growth of delay and intersection total entering vehicles between year of opening and design year.
3. Passenger and Truck driver cost/hour determined using Benefit-Cost Analysis Guidance for Discretionary Grant Programs guidance from 2025

NO BUILD ALTERNATIVE

General Parameters

Truck Percent	3%	
Passenger Veh Delay Cost	16.45	$ Per Person Hour
Truck Delay Cost	37.55	$ Per Person Hour
Avg. Passengers/Veh	1.5	Person/Veh
Discount Year	2023	
Discount Rate	7%	

Delay Parameters

	PM Peak	
2025	35	Ex Conds
2050	70	No Build
2050	19	Build

Volume Parameters

	PM Peak TEV
2025	1234
2045	1455

Year	PM Peak No Build Delay/veh	PM Peak Build Delay/veh	PM Peak Change in Delay/veh (No Build to Build)	Daily TEV	Change in Avg Annual Delay (Vehicle Hours)	Avg Annual Delay (Person Hrs) (Passenger Veh)	Avg Annual Delay (Person Hrs) (Trucks)	Passenger Veh Benefit	Truck Benefit	Total Benefit	Discounted Total Benefit
2025	35.00	-	-	12,340	-	-	-	-	-	-	-
2026	36.40	-	-	12,451	-	-	-	-	-	-	-
2027	37.80	-	-	12,561	-	-	-	-	-	-	-
2028	39.20	-	-	12,672	-	-	-	-	-	-	-
2029	40.60	-	-	12,340	-	-	-	-	-	-	-
2030	42.00	11.40	-30.60	12,893	(1,251)	(1,820.20)	(38)	$ 29,942	$ 1,409	$ 31,352	$ 19,524
2031	43.40	11.78	-31.62	13,003	(1,304)	(1,897.00)	(39)	$ 31,206	$ 1,469	$ 32,674	$ 19,017
2032	44.80	12.16	-32.64	13,114	(1,357)	(1,974.83)	(41)	$ 32,486	$ 1,529	$ 34,015	$ 18,502
2033	46.20	12.54	-33.66	13,224	(1,411)	(2,053.71)	(42)	$ 33,783	$ 1,590	$ 35,374	$ 17,982
2034	47.60	12.92	-34.68	13,335	(1,466)	(2,133.62)	(44)	$ 35,098	$ 1,652	$ 36,750	$ 17,460
2035	49.00	13.30	-35.70	13,445	(1,522)	(2,214.58)	(46)	$ 36,430	$ 1,715	$ 38,144	$ 16,937
2036	50.40	13.68	-36.72	13,556	(1,578)	(2,296.57)	(47)	$ 37,779	$ 1,778	$ 39,557	$ 16,415
2037	51.80	14.06	-37.74	13,666	(1,635)	(2,379.61)	(49)	$ 39,145	$ 1,842	$ 40,987	$ 15,895
2038	53.20	14.44	-38.76	13,777	(1,693)	(2,463.68)	(51)	$ 40,528	$ 1,907	$ 42,435	$ 15,380
2039	54.60	14.82	-39.78	13,887	(1,752)	(2,548.79)	(53)	$ 41,928	$ 1,973	$ 43,901	$ 14,871
2040	56.00	15.20	-40.80	13,998	(1,811)	(2,634.95)	(54)	$ 43,345	$ 2,040	$ 45,385	$ 14,368
2041	57.40	15.58	-41.82	14,108	(1,871)	(2,722.14)	(56)	$ 44,779	$ 2,108	$ 46,887	$ 13,872
2042	58.80	15.96	-42.84	14,219	(1,932)	(2,810.38)	(58)	$ 46,231	$ 2,176	$ 48,407	$ 13,385
2043	60.20	16.34	-43.86	14,329	(1,993)	(2,899.65)	(60)	$ 47,699	$ 2,245	$ 49,944	$ 12,907
2044	61.60	16.72	-44.88	14,440	(2,055)	(2,989.97)	(62)	$ 49,185	$ 2,315	$ 51,500	$ 12,438
2045	63.00	17.10	-45.90	14,550	(2,118)	(3,081.32)	(64)	$ 50,688	$ 2,386	$ 53,073	$ 11,979
2046	64.40	17.48	-46.92	14,661	(2,181)	(3,173.72)	(65)	$ 52,208	$ 2,457	$ 54,665	$ 11,531
2047	65.80	17.86	-47.94	14,771	(2,245)	(3,267.15)	(67)	$ 53,745	$ 2,530	$ 56,274	$ 11,094
2048	67.20	18.24	-48.96	14,882	(2,310)	(3,361.63)	(69)	$ 55,299	$ 2,603	$ 57,901	$ 10,668
2049	68.60	18.62	-49.98	14,992	(2,376)	(3,457.14)	(71)	$ 56,870	$ 2,677	$ 59,547	$ 10,254
2050	70.00	19.00	-51.00	14,550	(2,353)	(3,423.69)	(71)	$ 56,320	$ 2,651	$ 58,970	$ 9,490
NPV								**$ 435,670**	**$ 43,050**	**$ 957,742**	**$ 303,969**

Notes:
This calculator extrapolates PM Peak delay to all hours of the day using daily volume profile on SR166.
This calculator extrapolates PM Peak TEV volume to Daily TEV using 10*PM Peak TEV.

SECTION 4: BENEFITS

SR 166/BONITA SCHOOL ROAD

PROJECT INFORMATION

Legend	
User-Supplied Data	0.000
Model Default	0.000
Model Calculation	0.000

Agency:	**SBCAG**
Project Title:	**SR 166 Mulitmodal Corridor Study**
Date:	**8/6/2025**
Analyst:	**ALC**
Build Alternative Name	**Imp 3 (Bonita School Road)**

PROJECT DATA

Enter basic project data here. The green cells require user-supplied data when a default blue cell is not adjacent. The blue cells are model defaults, but can be overridden by entering a value in the green cell next to the blue default. All orange text represents model calculations.

Select roadway facility type from list	Rural Other		
Analysis Period (Years)	20		
Length of Construction Period (Years)	3		
Total Period	23		(analysis period years plus construction period years)
Annual Discount Rate (Percent)	3%	7%	
Percent of Trucks in the Flow (Percent)	9%	11%	
Fuel Cost (Dollars/Gallon)	$2.50	$ 4.27	
Value of Time ($/Hr.) Personal	$26.58	$ 21.10	
Value of Time ($/Hr.) Freight	$37.49	$ 35.70	
Calculated Combined Value of Time ($/Hr.)	$22.71		
The following information is used only for Reliability Benefit calculations. Reliability benefits are not estimated for facilities that are classified as *Urban or Rural Other*. User may ignore the information input items below for these facilities and move to the Project Costs section. See the BCA Guide or the Reference Guide for additional explanation.			
Segment Length (Miles)	5	0.1	
Number of Lanes	2	2	(2 for two-lane roads; otherwise, number of lanes per direction)
Free Flow Speed (MPH)	40	55	
Traffic Volume (during peak period)	1162		
Link Capacity	9600		(passenger car equivalents for all lanes, or estimated by the Highway Capacity Manua
Hours of Peak Traffic per Day	2	3	(e.g., number of hours in am and/or pm peak)
Days of Analysis per Year	260	365	(e.g., 365 for analysis of all days or 260 for analysis of weekday travel time reliability)
Reliability Ratio Personal	1		
Reliability Ratio Freight	1.2		

PROJECT COSTS

Enter project life-cycle costs in table here. The green cells indicate data that is supplied by the user. The blue cells are model defaults. All orange text represents model calculations.

	DIRECT PROJECT COSTS						
	INITIAL COSTS			SUBSEQUENT COSTS			
Year	Project Support	Right-of-Way	Construction	Maintenance/ Operation	Rehabilitation	Mitigation	Present Value
			Construction Period				
1				<-- Must enter a cost -->			$0
2							$0
3							$0
4							$0
5							$0
6							$0
7							$0
8							$0
			Open to Public				
1							$0
2							$0
3							$0
4							$0
5							$0
6							$0
7							$0
8							$0
9							$0
10							$0
11							$0
12							$0
13							$0
14							$0
15							$0
16							$0
17							$0
18							$0
19							$0
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35							$0
36							$0
37							$0
38							$0
39							$0
40							$0
41							$0
42							$0
43							$0
44							$0
45							$0
46							$0
47							$0
48							$0
49							$0
50							$0
Total	$0	$0	$0	$0	$0	$0	$0

PROJECT CRASH DATA

This sheet calculates annual reductions in crash frequency and severity for single or multiple countermeasures.

Color Codes	
User-Supplied Data	0.00
Model Parameter	0.00
Model Calculation	0.00
Linked Cell	0.00

1) Single or Multiple Countermeasure: Single Countermeasure

2) Calculation Method: Additive Method

BASELINE CRASH DATA AND CRASH MODIFICATION FACTORS

CMF Clearinghouse

Enter estimated annual crashes without treatment and Crash Modification Factors (CMF).

Injury Severity Scale	Estimated Annual Crashes without Treatment	CMF1	CMF2
K	0	0.95	
A	0.4	0.95	
B	0.8	0.95	
C	0.8	0.95	
O	0	0.95	
CMF Clearinghouse ID		6885	

Next Step

CALCULATION FOR THE ANNUAL REDUCTION IN CRASH FREQUENCY AND SEVERITY

This section automatically calculates annual reduction in crash frequency and severity. No user input is required for this table. However, if the user wishes to override or enter externally calculated Crash Reductions, they may be entered in the Green cells, Column (5).

Formula 1: Estimated Annual Reductions with Treatment (3)	= (1) Estimated Crashes without Treatment x (2) Crash Modfication Factor
Formula 2: Annual Reduction in Crashes (4)	= (3) Estimated Annual Reduction with Treatment - (1) Estimated Crashes without Treatment

	(1)	(2)	(3)	(4)	(5)
Injury Severity Scale	Estimated Annual Crashes without Treatment	Crash Modification Factor	Estimated Annual Crashes with Treatment	Annual Reduction in Crashes	User Determined Reduction in Crashes
K	0.000	0.950	0.000	0.000	
A	0.400	0.950	0.380	0.020	
B	0.800	0.950	0.760	0.040	
C	0.800	0.950	0.760	0.040	
O	0.000	0.950	0.000	0.000	
Total	2.000		1.900	0.100	0.00

CMF CALCULATIONS FOR MULTIPLE COUNTERMEASURES (NOT APPLICABLE TO SINGLE COUNTERMEASURES)

This section automatically calculates a CMF value for the project when multiple countermeasures are being evaluated. Not applicable to single countermeasures. No user input is required for this table.

Analysis Type	Single Countermeasure
Calculation Method	Not applicable

Severity Scale	Dominant Effect	Additive Method	Multiplicative Method	Dominant Common Residuals Method
K	0.00	-0.05	0.00	0.00
A	0.00	-0.05	0.00	0.00
B	0.00	-0.05	0.00	0.00
C	0.00	-0.05	0.00	0.00
O	0.00	-0.05	0.00	0.00

ANALYSIS PARAMETERS

This page lists model-defined parameters from the Lookup worksheet.
Model-defined parameters are based on the "Roadway Facility Type" selected by the user on the Project Information worksheet.

Roadway Facility Type	Rural Other		

Color Codes

User-Supplied Data	
Model Parameter	

	Parameter	User Defined
Value of Time	22.71	

Users may modify default values by entering user defined values in the green cells on the right of the Lookup entry.

Travel Time Delay Factors	(Hours/Crash)	
Fatal	104.82	0.00
Injury	13.86	0.00
PDO	10.33	0.00

Vehicle Operation Cost Factors	(Gallons/Crash)	
Fatal	36.00	0.00
Injury	9.00	0.00
PDO	8.00	0.00

Next Step

Emissions Factors (Dollars/Crash)	CO2	CO	NOx	PM10	PM2.5	SO2	VOC
Fatal	$15.47	$0.00	$6.28	$0.00	$17.54	$1.28	$0.28
Injury	$3.93	$0.00	$1.59	$0.00	$4.38	$0.32	$0.07
PDO	$3.28	$0.00	$1.34	$0.00	$3.59	$0.28	$0.06

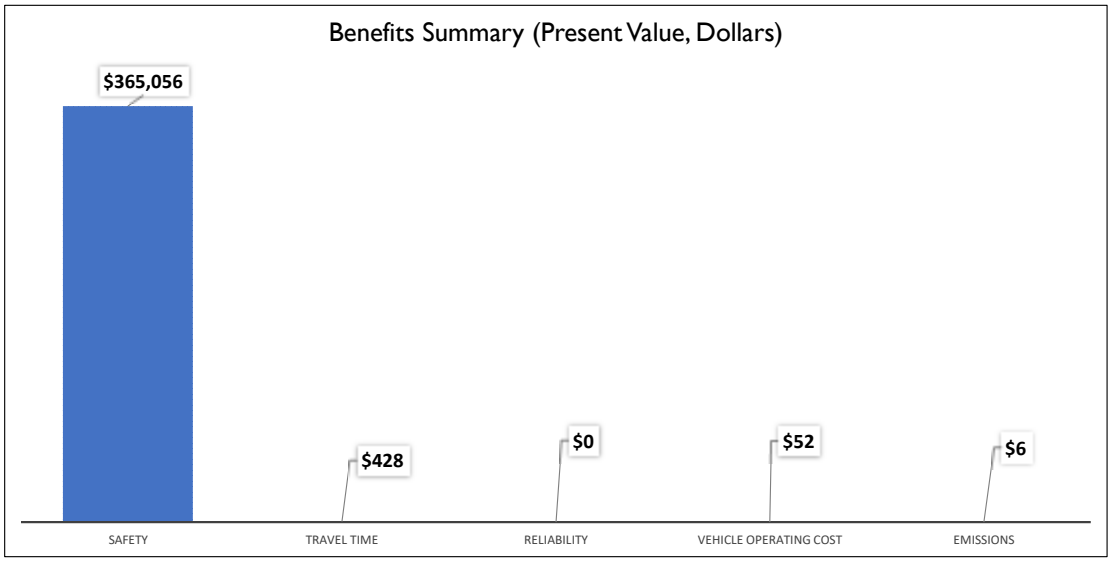
SR 166 Mulitmodal Corridor Study

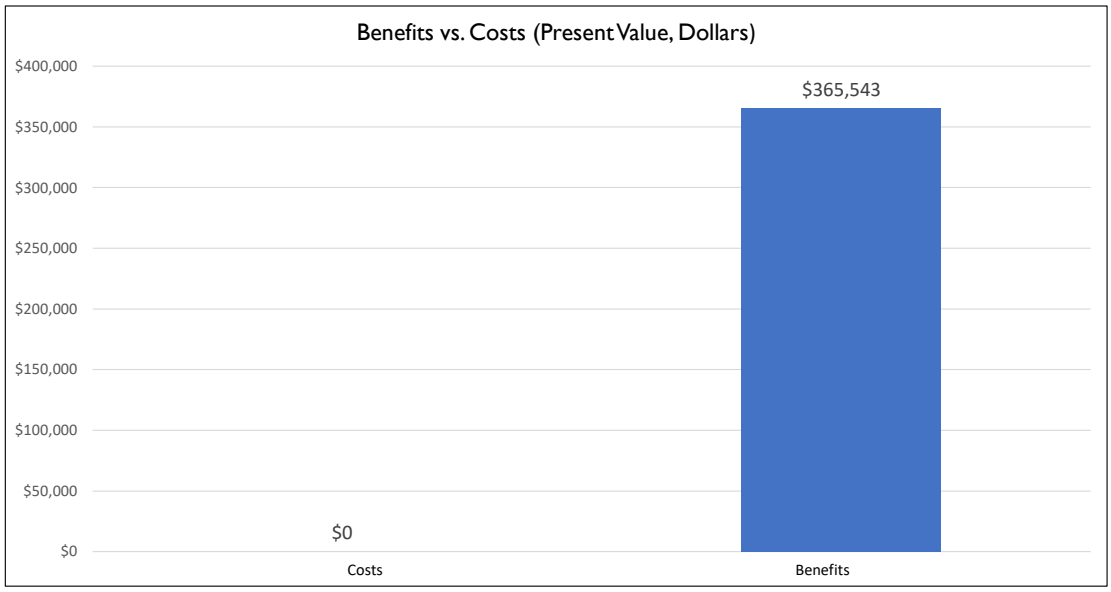
Benefit-Cost Analysis Summary Results

AGENCY: SBCAG **DATE** 8/6/2025

Present Value Costs ($ Dollars)	$0
Present Value Benefits ($ Dollars)	$365,543
Net Present Value ($ Dollars)	$365,543
Benefit / Cost Ratio:	#DIV/0!
Discount Rate	7.0%

ITEMIZED BENEFITS ($ Dollars)	Present Value
Safety	$365,056
Travel Time	$428
Reliability	$0
Vehicle Operating Cost	$52
Emissions	$6
TOTAL BENEFITS	**$365,543**





Delay Net Present Value Calculator (SR166 Multimodal Imps)

Description: This calculator was created to supplement the cost of person delay associated with the NCHRP 3-110 tool. This sheet documents assumptions made in the calculation tabs of this sheet.

Assumptions:

1. Assume that trucks have 1 person in them, therefore truck delay = person delay for trucks.
2. Assume linear growth of delay and intersection total entering vehicles between year of opening and design year.
3. Passenger and Truck driver cost/hour determined using Benefit-Cost Analysis Guidance for Discretionary Grant Programs guidance from 2025

NO BUILD ALTERNATIVE

General Parameters

Truck Percent	3%	
Passenger Veh Delay Cost	16.45	$ Per Person Hour
Truck Delay Cost	37.55	$ Per Person Hour
Avg. Passengers/Veh	1.5	Person/Veh
Discount Year	2023	
Discount Rate	7%	

Delay Parameters

	PM Peak	
2025	12	Ex Conds
2050	12	No Build
2050	11	Build

Volume Parameters

	PM Peak TEV
2025	1162
2045	1235

Year	PM Peak No Build Delay/veh	PM Peak Build Delay/veh	PM Peak Change in Delay/veh (No Build to Build)	Daily TEV	Change in Avg Annual Delay (Vehicle Hours)	Avg Annual Delay (Person Hrs) (Passenger Veh)	Avg Annual Delay (Person Hrs) (Trucks)	Passenger Veh Benefit	Truck Benefit	Total Benefit	Discounted Total Benefit
2025	12.00	-	-	11,620	-	-	-	-	-	-	-
2026	12.00	-	-	11,657	-	-	-	-	-	-	-
2027	12.00	-	-	11,693	-	-	-	-	-	-	-
2028	12.00	-	-	11,730	-	-	-	-	-	-	-
2029	12.00	-	-	11,620	-	-	-	-	-	-	-
2030	12.00	11.00	-1.00	11,803	(37)	(54.45)	(1)	$ 896	$ 42	$ 938	$ 584
2031	12.00	11.00	-1.00	11,839	(38)	(54.62)	(1)	$ 899	$ 42	$ 941	$ 548
2032	12.00	11.00	-1.00	11,876	(38)	(54.79)	(1)	$ 901	$ 42	$ 944	$ 513
2033	12.00	11.00	-1.00	11,912	(38)	(54.96)	(1)	$ 904	$ 43	$ 947	$ 481
2034	12.00	11.00	-1.00	11,949	(38)	(55.13)	(1)	$ 907	$ 43	$ 950	$ 451
2035	12.00	11.00	-1.00	11,985	(38)	(55.30)	(1)	$ 910	$ 43	$ 952	$ 423
2036	12.00	11.00	-1.00	12,022	(38)	(55.47)	(1)	$ 912	$ 43	$ 955	$ 396
2037	12.00	11.00	-1.00	12,058	(38)	(55.63)	(1)	$ 915	$ 43	$ 958	$ 372
2038	12.00	11.00	-1.00	12,095	(38)	(55.80)	(1)	$ 918	$ 43	$ 961	$ 348
2039	12.00	11.00	-1.00	12,131	(38)	(55.97)	(1)	$ 921	$ 43	$ 964	$ 327
2040	12.00	11.00	-1.00	12,168	(39)	(56.14)	(1)	$ 923	$ 43	$ 967	$ 306
2041	12.00	11.00	-1.00	12,204	(39)	(56.31)	(1)	$ 926	$ 44	$ 970	$ 287
2042	12.00	11.00	-1.00	12,241	(39)	(56.48)	(1)	$ 929	$ 44	$ 973	$ 269
2043	12.00	11.00	-1.00	12,277	(39)	(56.64)	(1)	$ 932	$ 44	$ 976	$ 252
2044	12.00	11.00	-1.00	12,314	(39)	(56.81)	(1)	$ 935	$ 44	$ 979	$ 236
2045	12.00	11.00	-1.00	12,350	(39)	(56.98)	(1)	$ 937	$ 44	$ 981	$ 222
2046	12.00	11.00	-1.00	12,387	(39)	(57.15)	(1)	$ 940	$ 44	$ 984	$ 208
2047	12.00	11.00	-1.00	12,423	(39)	(57.32)	(1)	$ 943	$ 44	$ 987	$ 195
2048	12.00	11.00	-1.00	12,460	(40)	(57.49)	(1)	$ 946	$ 45	$ 990	$ 182
2049	12.00	11.00	-1.00	12,496	(40)	(57.65)	(1)	$ 948	$ 45	$ 993	$ 171
2050	12.00	11.00	-1.00	12,350	(39)	(56.98)	(1)	$ 937	$ 44	$ 981	$ 158
NPV								**$ 9,931**	**$ 912**	**$ 20,291**	**$ 6,929**

Notes:
This calculator extrapolates PM Peak delay to all hours of the day using daily volume profile on SR166.
This calculator extrapolates PM Peak TEV volume to Daily TEV using 10*PM Peak TEV.

SECTION 4: BENEFITS

SR 166/RAY ROAD

PROJECT INFORMATION

Legend	
User-Supplied Data	0.000
Model Default	0.000
Model Calculation	0.000

Agency:	**SBCAG**
Project Title:	**SR 166 Mulitmodal Corridor Study**
Date:	**8/6/2025**
Analyst:	**ALC**
Build Alternative Name	**Imp 4 (Ray Road)**

PROJECT DATA

Enter basic project data here. The green cells require user-supplied data when a default blue cell is not adjacent. The blue cells are model defaults, but can be overridden by entering a value in the green cell next to the blue default. All orange text represents model calculations.

Select roadway facility type from list	Rural Other		
Analysis Period (Years)	20		
Length of Construction Period (Years)	3		
Total Period	23		(analysis period years plus construction period years)
Annual Discount Rate (Percent)	3%	7%	
Percent of Trucks in the Flow (Percent)	9%	11%	
Fuel Cost (Dollars/Gallon)	$2.50	$ 4.27	
Value of Time ($/Hr.) Personal	$26.58	$ 21.10	
Value of Time ($/Hr.) Freight	$37.49	$ 35.70	
Calculated Combined Value of Time ($/Hr.)	$22.71		

The following information is used only for Reliability Benefit calculations. Reliability benefits are not estimated for facilities that are classified as *Urban or Rural Other*. User may ignore the information input items below for these facilities and move to the Project Costs section. See the BCA Guide or the Reference Guide for additional explanation.

Segment Length (Miles)	5	0.1	
Number of Lanes	2	2	(2 for two-lane roads; otherwise, number of lanes per direction)
Free Flow Speed (MPH)	40	55	
Traffic Volume (during peak period)	1162		
Link Capacity	9600		(passenger car equivalents for all lanes, or estimated by the Highway Capacity Manua
Hours of Peak Traffic per Day	2	3	(e.g., number of hours in am and/or pm peak)
Days of Analysis per Year	260	365	(e.g., 365 for analysis of all days or 260 for analysis of weekday travel time reliability)
Reliability Ratio Personal	1		
Reliability Ratio Freight	1.2		

PROJECT COSTS

Enter project life-cycle costs in table here. The green cells indicate data that is supplied by the user. The blue cells are model defaults. All orange text represents model calculations.

	DIRECT PROJECT COSTS						
	INITIAL COSTS			SUBSEQUENT COSTS			
Year	Project Support	Right-of-Way	Construction	Maintenance/ Operation	Rehabilitation	Mitigation	Present Value
			Construction Period				
1				<-- Must enter a cost -->			$0
2							$0
3							$0
4							$0
5							$0
6							$0
7							$0
8							$0
			Open to Public				
1							$0
2							$0
3							$0
4							$0
5							$0
6							$0
7							$0
8							$0
9							$0
10							$0
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35							$0
36							$0
37							$0
38							$0
39							$0
40							$0
41							$0
42							$0
43							$0
44							$0
45							$0
46							$0
47							$0
48							$0
49							$0
50							$0
Total	$0	$0	$0	$0	$0	$0	$0

PROJECT CRASH DATA

This sheet calculates annual reductions in crash frequency and severity for single or multiple countermeasures.

1) Single or Multiple Countermeasure	Multiple Countermeasures
2) Calculation Method	Additive Method

Color Codes

User-Supplied Data	0.00
Model Parameter	0.00
Model Calculation	0.00
Linked Cell	0.00

BASELINE CRASH DATA AND CRASH MODIFICATION FACTORS

CMF Clearinghouse

Enter estimated annual crashes without treatment and Crash Modification Factors (CMF).

Injury Severity Scale	Estimated Annual Crashes without Treatment	CMF1	CMF2
K	0	0.59	0.75
A	0.2	0.59	0.75
B	1	0.59	0.75
C	0.4	0.59	0.75
O	0	0.59	0.75
CMF Clearinghouse ID		6602	3010

Note: CMF 6602 only applies to angle crashes. Overwrote reduction in crashes where required to account for this.

Next Step

CALCULATION FOR THE ANNUAL REDUCTION IN CRASH FREQUENCY AND SEVERITY

This section automatically calculates annual reduction in crash frequency and severity. No user input is required for this table. However, if the user wishes to override or enter externally calculated Crash Reductions, they may be entered in the Green cells, Column (5).

Formula 1: Estimated Annual Reductions with Treatment (3)	= (1) Estimated Crashes without Treatment x (2) Crash Modfication Factor
Formula 2: Annual Reduction in Crashes (4)	= (3) Estimated Annual Reduction with Treatment - (1) Estimated Crashes without Treatment

	(1)	(2)	(3)	(4)	(5)
Injury Severity Scale	Estimated Annual Crashes without Treatment	Crash Modification Factor	Estimated Annual Crashes with Treatment	Annual Reduction in Crashes	User Determined Reduction in Crashes
K	0.000	0.340	0.000	**0.000**	
A	0.200	0.340	0.068	**0.132**	
B	1.000	0.340	0.340	**0.660**	**0.41**
C	0.400	0.340	0.136	**0.264**	
O	0.000	0.340	0.000	**0.000**	
Total	1.600		0.544	1.056	0.41

CMF CALCULATIONS FOR MULTIPLE COUNTERMEASURES (NOT APPLICABLE TO SINGLE COUNTERMEASURES)

This section automatically calculates a CMF value for the project when multiple countermeasures are being evaluated. Not applicable to single countermeasures. No user input is required for this table.

Analysis Type		Multiple Countermeasures
Calculation Method		Additive Method

Severity Scale	Dominant Effect	Additive Method	Multiplicative Method	Dominant Common Residuals Method
K	0.59	0.34	0.44	0.62
A	0.59	0.34	0.44	0.62
B	0.59	0.34	0.44	0.62
C	0.59	0.34	0.44	0.62
O	0.59	0.34	0.44	0.62

ANALYSIS PARAMETERS

This page lists model-defined parameters from the Lookup worksheet.
Model-defined parameters are based on the "Roadway Facility Type" selected by the user on the Project Information worksheet.

Roadway Facility Type	Rural Other		

Color Codes

User-Supplied Data	
Model Parameter	

	Parameter	User Defined
Value of Time	22.71	

Users may modify default values by entering user defined values in the green cells on the right of the Lookup entry.

Travel Time Delay Factors	(Hours/Crash)	
Fatal	104.82	0.00
Injury	13.86	0.00
PDO	10.33	0.00

Vehicle Operation Cost Factors	(Gallons/Crash)	
Fatal	36.00	0.00
Injury	9.00	0.00
PDO	8.00	0.00

Next Step

Emissions Factors (Dollars/Crash)	CO2	CO	NOx	PM10	PM2.5	SO2	VOC
Fatal	$15.47	$0.00	$6.28	$0.00	$17.54	$1.28	$0.28
Injury	$3.93	$0.00	$1.59	$0.00	$4.38	$0.32	$0.07
PDO	$3.28	$0.00	$1.34	$0.00	$3.59	$0.28	$0.06

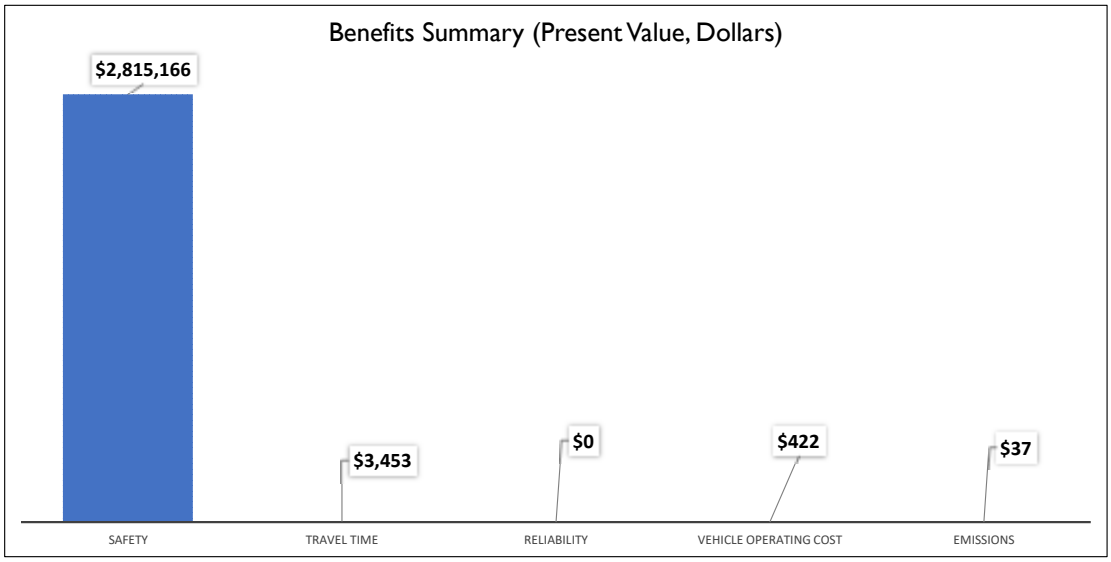
SR 166 Mulitmodal Corridor Study

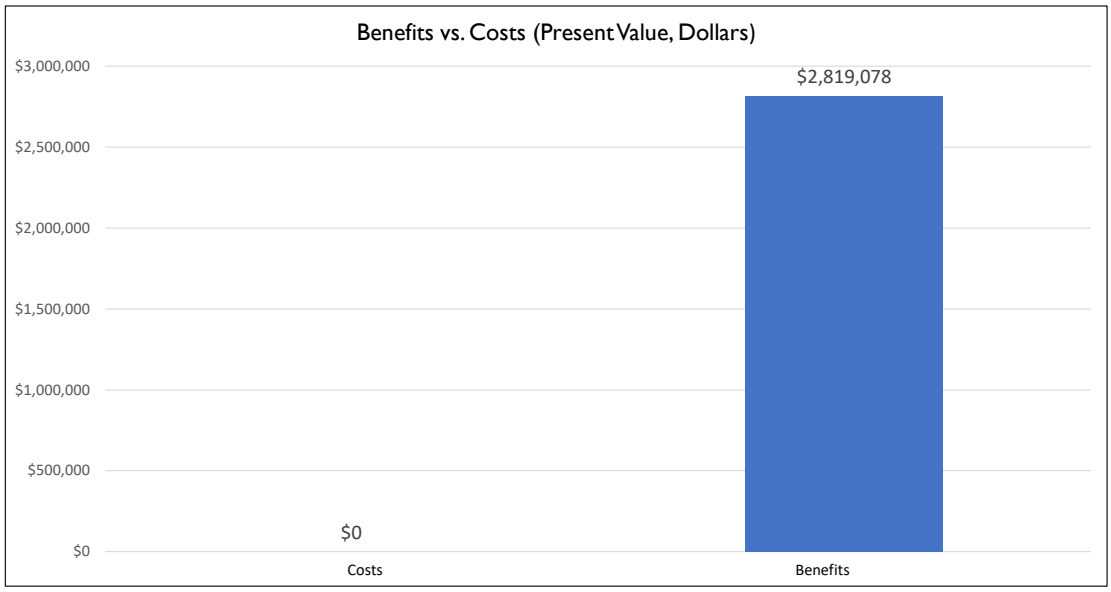
Benefit-Cost Analysis Summary Results

AGENCY: SBCAG **DATE** 8/6/2025

Present Value Costs ($ Dollars)	$0
Present Value Benefits ($ Dollars)	$2,819,078
Net Present Value ($ Dollars)	$2,819,078
Benefit / Cost Ratio:	#DIV/0!
Discount Rate	7.0%

ITEMIZED BENEFITS ($ Dollars)	Present Value
Safety	$2,815,166
Travel Time	$3,453
Reliability	$0
Vehicle Operating Cost	$422
Emissions	$37
TOTAL BENEFITS	**$2,819,078**





SECTION 4: BENEFITS

SR 166/HANSON WAY

PROJECT INFORMATION

Legend	
User-Supplied Data	0.000
Model Default	0.000
Model Calculation	0.000

Agency:	**SBCAG**
Project Title:	**SR 166 Mulitmodal Corridor Study**
Date:	**8/6/2025**
Analyst:	**ALC**
Build Alternative Name	**Imp 5 (Hanson Way)**

PROJECT DATA

Enter basic project data here. The green cells require user-supplied data when a default blue cell is not adjacent. The blue cells are model defaults, but can be overridden by entering a value in the green cell next to the blue default. All orange text represents model calculations.

Select roadway facility type from list	Rural Other		
Analysis Period (Years)	20		
Length of Construction Period (Years)	3		
Total Period	23		(analysis period years plus construction period years)
Annual Discount Rate (Percent)	3%	7%	
Percent of Trucks in the Flow (Percent)	9%	11%	
Fuel Cost (Dollars/Gallon)	$2.50	$ 4.27	
Value of Time ($/Hr.) Personal	$26.58	$ 21.10	
Value of Time ($/Hr.) Freight	$37.49	$ 35.70	
Calculated Combined Value of Time ($/Hr.)	$22.71		
The following information is used only for Reliability Benefit calculations. Reliability benefits are not estimated for facilities that are classified as *Urban or Rural Other*. User may ignore the information input items below for these facilities and move to the Project Costs section. See the BCA Guide or the Reference Guide for additional explanation.			
Segment Length (Miles)	5	0.1	
Number of Lanes	2	2	(2 for two-lane roads; otherwise, number of lanes per direction)
Free Flow Speed (MPH)	40	55	
Traffic Volume (during peak period)	1550		
Link Capacity	9600		(passenger car equivalents for all lanes, or estimated by the Highway Capacity Manua
Hours of Peak Traffic per Day	2	3	(e.g., number of hours in am and/or pm peak)
Days of Analysis per Year	260	365	(e.g., 365 for analysis of all days or 260 for analysis of weekday travel time reliability)
Reliability Ratio Personal	1		
Reliability Ratio Freight	1.2		

PROJECT COSTS

Enter project life-cycle costs in table here. The green cells indicate data that is supplied by the user. The blue cells are model defaults. All orange text represents model calculations.

	DIRECT PROJECT COSTS						
	INITIAL COSTS			SUBSEQUENT COSTS			
Year	Project Support	Right-of-Way	Construction	Maintenance/ Operation	Rehabilitation	Mitigation	Present Value
			Construction Period				
1				<-- Must enter a cost -->			$0
2							$0
3							$0
4							$0
5							$0
6							$0
7							$0
8							$0
			Open to Public				
1							$0
2							$0
3							$0
4							$0
5							$0
6							$0
7							$0
8							$0
9							$0
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40							$0
41							$0
42							$0
43							$0
44							$0
45							$0
46							$0
47							$0
48							$0
49							$0
50							$0
Total	$0	$0	$0	$0	$0	$0	$0

PROJECT CRASH DATA

This sheet calculates annual reductions in crash frequency and severity for single or multiple countermeasures.

Color Codes	
User-Supplied Data	0.00
Model Parameter	0.00
Model Calculation	0.00
Linked Cell	0.00

1) Single or Multiple Countermeasure: Single Countermeasure

2) Calculation Method: Additive Method

BASELINE CRASH DATA AND CRASH MODIFICATION FACTORS

CMF Clearinghouse

Enter estimated annual crashes without treatment and Crash Modification Factors (CMF).

Injury Severity Scale	Estimated Annual Crashes without Treatment	CMF1	CMF2
K	0	0.75	
A	0	0.75	
B	0	0.75	
C	0.2	0.75	
O	0	0.75	
CMF Clearinghouse ID	Not from CMF Clearinghouse. See BCA Summary Sheet.		

Next Step

CALCULATION FOR THE ANNUAL REDUCTION IN CRASH FREQUENCY AND SEVERITY

This section automatically calculates annual reduction in crash frequency and severity. No user input is required for this table. However, if the user wishes to override or enter externally calculated Crash Reductions, they may be entered in the Green cells, Column (5).

Formula 1: Estimated Annual Reductions with Treatment (3)	= (1) Estimated Crashes without Treatment x (2) Crash Modfication Factor
Formula 2: Annual Reduction in Crashes (4)	= (3) Estimated Annual Reduction with Treatment - (1) Estimated Crashes without Treatment

	(1)	(2)	(3)	(4)	(5)
Injury Severity Scale	Estimated Annual Crashes without Treatment	Crash Modification Factor	Estimated Annual Crashes with Treatment	Annual Reduction in Crashes	User Determined Reduction in Crashes
K	0.000	0.750	0.000	0.000	
A	0.000	0.750	0.000	0.000	
B	0.000	0.750	0.000	0.000	
C	0.200	0.750	0.150	0.050	
O	0.000	0.750	0.000	0.000	
Total	0.200		0.150	0.050	0.00

CMF CALCULATIONS FOR MULTIPLE COUNTERMEASURES (NOT APPLICABLE TO SINGLE COUNTERMEASURES)

This section automatically calculates a CMF value for the project when multiple countermeasures are being evaluated. Not applicable to single countermeasures. No user input is required for this table.

Analysis Type	Single Countermeasure
Calculation Method	Not applicable

Severity Scale	Dominant Effect	Additive Method	Multiplicative Method	Dominant Common Residuals Method
K	0.00	-0.25	0.00	0.00
A	0.00	-0.25	0.00	0.00
B	0.00	-0.25	0.00	0.00
C	0.00	-0.25	0.00	0.00
O	0.00	-0.25	0.00	0.00

ANALYSIS PARAMETERS

This page lists model-defined parameters from the Lookup worksheet.
Model-defined parameters are based on the "Roadway Facility Type" selected by the user on the Project Information worksheet.

Roadway Facility Type	Rural Other		

Color Codes

User-Supplied Data	
Model Parameter	

	Parameter	User Defined
Value of Time	22.71	

Users may modify default values by entering user defined values in the green cells on the right of the Lookup entry.

Travel Time Delay Factors	(Hours/Crash)	
Fatal	104.82	0.00
Injury	13.86	0.00
PDO	10.33	0.00

Vehicle Operation Cost Factors	(Gallons/Crash)	
Fatal	36.00	0.00
Injury	9.00	0.00
PDO	8.00	0.00

Next Step

Emissions Factors (Dollars/Crash)	CO2	CO	NOx	PM10	PM2.5	SO2	VOC
Fatal	$15.47	$0.00	$6.28	$0.00	$17.54	$1.28	$0.28
Injury	$3.93	$0.00	$1.59	$0.00	$4.38	$0.32	$0.07
PDO	$3.28	$0.00	$1.34	$0.00	$3.59	$0.28	$0.06

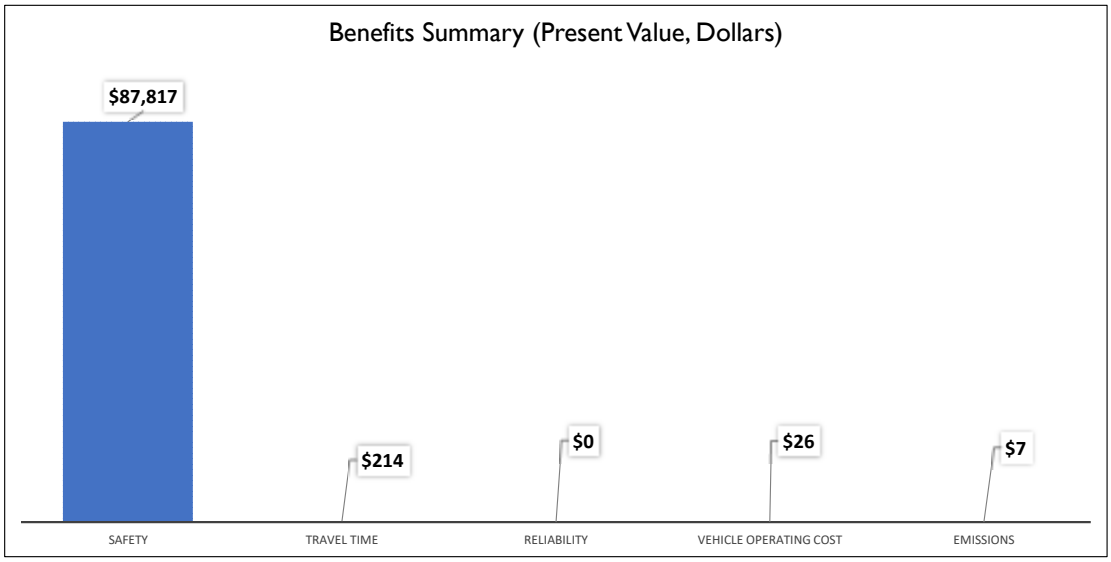
SR 166 Mulitmodal Corridor Study

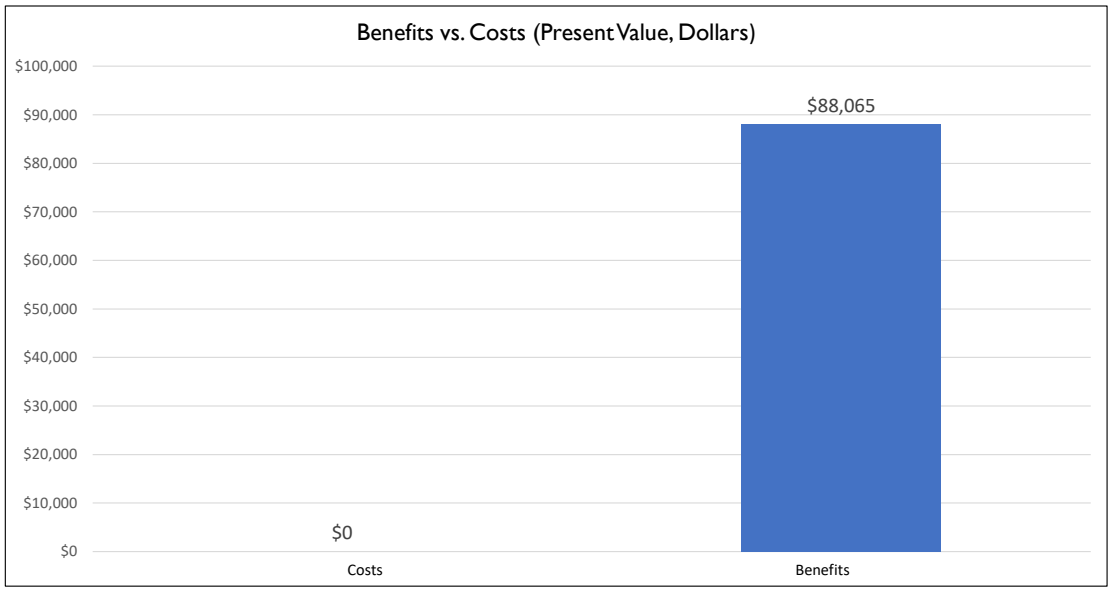
Benefit-Cost Analysis Summary Results

AGENCY: SBCAG **DATE** 8/6/2025

Present Value Costs ($ Dollars)	$0
Present Value Benefits ($ Dollars)	$88,065
Net Present Value ($ Dollars)	$88,065
Benefit / Cost Ratio:	#DIV/0!
Discount Rate	7.0%

ITEMIZED BENEFITS ($ Dollars)	Present Value
Safety	$87,817
Travel Time	$214
Reliability	$0
Vehicle Operating Cost	$26
Emissions	$7
TOTAL BENEFITS	**$88,065**





Delay Net Present Value Calculator (SR166 Multimodal Imps)

Description: This calculator was created to supplement the cost of person delay associated with the NCHRP 3-110 tool. This sheet documents assumptions made in the calculation tabs of this sheet.

Assumptions:

1. Assume that trucks have 1 person in them, therefore truck delay = person delay for trucks.
2. Assume linear growth of delay and intersection total entering vehicles between year of opening and design year.
3. Passenger and Truck driver cost/hour determined using Benefit-Cost Analysis Guidance for Discretionary Grant Programs guidance from 2025

NO BUILD ALTERNATIVE

General Parameters

Truck Percent	3%	
Passenger Veh Delay Cost	16.45	$ Per Person Hour
Truck Delay Cost	37.55	$ Per Person Hour
Avg. Passengers/Veh	1.5	Person/Veh
Discount Year	2023	
Discount Rate	7%	

Delay Parameters

	PM Peak	
2025	76	Ex Conds
2050	79	No Build
2050	53	Build

Volume Parameters

	PM Peak TEV
2025	1442
2045	1505

Year	PM Peak No Build Delay/veh	PM Peak Build Delay/veh	PM Peak Change in Delay/veh (No Build to Build)	Daily TEV	Change in Avg Annual Delay (Vehicle Hours)	Avg Annual Delay (Person Hrs) (Passenger Veh)	Avg Annual Delay (Person Hrs) (Trucks)	Passenger Veh Benefit	Truck Benefit	Total Benefit	Discounted Total Benefit
2025	76.00	-	-	14,420	-	-	-	-	-	-	-
2026	76.12	-	-	14,452	-	-	-	-	-	-	-
2027	76.24	-	-	14,483	-	-	-	-	-	-	-
2028	76.36	-	-	14,515	-	-	-	-	-	-	-
2029	76.48	-	-	14,420	-	-	-	-	-	-	-
2030	76.60	51.39	-25.21	14,578	(1,165)	(1,695.59)	(35)	$ 27,892	$ 1,313	$ 29,205	$ 18,187
2031	76.72	51.47	-25.25	14,609	(1,170)	(1,701.91)	(35)	$ 27,996	$ 1,318	$ 29,314	$ 17,061
2032	76.84	51.55	-25.29	14,641	(1,174)	(1,708.25)	(35)	$ 28,101	$ 1,323	$ 29,423	$ 16,004
2033	76.96	51.63	-25.33	14,672	(1,178)	(1,714.60)	(35)	$ 28,205	$ 1,327	$ 29,533	$ 15,013
2034	77.08	51.71	-25.37	14,704	(1,183)	(1,720.96)	(35)	$ 28,310	$ 1,332	$ 29,642	$ 14,083
2035	77.20	51.79	-25.41	14,735	(1,187)	(1,727.33)	(36)	$ 28,415	$ 1,337	$ 29,752	$ 13,210
2036	77.32	51.87	-25.45	14,767	(1,192)	(1,733.71)	(36)	$ 28,520	$ 1,342	$ 29,862	$ 12,392
2037	77.44	51.95	-25.49	14,798	(1,196)	(1,740.11)	(36)	$ 28,625	$ 1,347	$ 29,972	$ 11,624
2038	77.56	52.03	-25.53	14,830	(1,200)	(1,746.51)	(36)	$ 28,730	$ 1,352	$ 30,082	$ 10,903
2039	77.68	52.11	-25.57	14,861	(1,205)	(1,752.93)	(36)	$ 28,836	$ 1,357	$ 30,193	$ 10,227
2040	77.80	52.19	-25.61	14,893	(1,209)	(1,759.36)	(36)	$ 28,941	$ 1,362	$ 30,304	$ 9,593
2041	77.92	52.28	-25.64	14,924	(1,214)	(1,765.80)	(36)	$ 29,047	$ 1,367	$ 30,415	$ 8,999
2042	78.04	52.36	-25.68	14,956	(1,218)	(1,772.25)	(37)	$ 29,154	$ 1,372	$ 30,526	$ 8,441
2043	78.16	52.44	-25.72	14,987	(1,222)	(1,778.72)	(37)	$ 29,260	$ 1,377	$ 30,637	$ 7,917
2044	78.28	52.52	-25.76	15,019	(1,227)	(1,785.19)	(37)	$ 29,366	$ 1,382	$ 30,749	$ 7,426
2045	78.40	52.60	-25.80	15,050	(1,231)	(1,791.68)	(37)	$ 29,473	$ 1,387	$ 30,860	$ 6,966
2046	78.52	52.68	-25.84	15,082	(1,236)	(1,798.18)	(37)	$ 29,580	$ 1,392	$ 30,972	$ 6,533
2047	78.64	52.76	-25.88	15,113	(1,240)	(1,804.69)	(37)	$ 29,687	$ 1,397	$ 31,084	$ 6,128
2048	78.76	52.84	-25.92	15,145	(1,245)	(1,811.21)	(37)	$ 29,794	$ 1,402	$ 31,197	$ 5,748
2049	78.88	52.92	-25.96	15,176	(1,249)	(1,817.74)	(37)	$ 29,902	$ 1,407	$ 31,309	$ 5,391
2050	79.00	53.00	-26.00	15,050	(1,241)	(1,805.39)	(37)	$ 29,699	$ 1,398	$ 31,096	$ 5,004
NPV								**$ 310,807**	**$ 28,594**	**$ 636,127**	**$ 216,851**

Notes:
This calculator extrapolates PM Peak delay to all hours of the day using daily volume profile on SR166.
This calculator extrapolates PM Peak TEV volume to Daily TEV using 10*PM Peak TEV.

SECTION 4: BENEFITS

SR 166 DRIVEWAY PAVEMENT

PROJECT INFORMATION

Legend	
User-Supplied Data	0.000
Model Default	0.000
Model Calculation	0.000

Agency:	**SBCAG**
Project Title:	**SR 166 Mulitmodal Corridor Study**
Date:	**8/22/2025**
Analyst:	**ALC**
Build Alternative Name	**Imp 6 (Simas Road)**

PROJECT DATA

Enter basic project data here. The green cells require user-supplied data when a default blue cell is not adjacent. The blue cells are model defaults, but can be overridden by entering a value in the green cell next to the blue default. All orange text represents model calculations.

Select roadway facility type from list	Rural Other		
Analysis Period (Years)	20		
Length of Construction Period (Years)	3		
Total Period	23		(analysis period years plus construction period years)
Annual Discount Rate (Percent)	3%	7%	
Percent of Trucks in the Flow (Percent)	9%	11%	
Fuel Cost (Dollars/Gallon)	$2.50	$ 4.27	
Value of Time ($/Hr.) Personal	$26.58	$ 21.10	
Value of Time ($/Hr.) Freight	$37.49	$ 35.70	
Calculated Combined Value of Time ($/Hr.)	$22.71		
The following information is used only for Reliability Benefit calculations. Reliability benefits are not estimated for facilities that are classified as *Urban or Rural Other*. User may ignore the information input items below for these facilities and move to the Project Costs section. See the BCA Guide or the Reference Guide for additional explanation.			
Segment Length (Miles)	5	6	
Number of Lanes	2	2	(2 for two-lane roads; otherwise, number of lanes per direction)
Free Flow Speed (MPH)	40	55	
Traffic Volume (during peak period)	1240		
Link Capacity	9600		(passenger car equivalents for all lanes, or estimated by the Highway Capacity Manua
Hours of Peak Traffic per Day	2	3	(e.g., number of hours in am and/or pm peak)
Days of Analysis per Year	260	365	(e.g., 365 for analysis of all days or 260 for analysis of weekday travel time reliability)
Reliability Ratio Personal	1		
Reliability Ratio Freight	1.2		

PROJECT COSTS

Enter project life-cycle costs in table here. The green cells indicate data that is supplied by the user. The blue cells are model defaults. All orange text represents model calculations.

	DIRECT PROJECT COSTS						
	INITIAL COSTS			SUBSEQUENT COSTS			
Year	Project Support	Right-of-Way	Construction	Maintenance/ Operation	Rehabilitation	Mitigation	Present Value
			Construction Period				
1				<-- Must enter a cost -->			$0
2							$0
3							$0
4							$0
5							$0
6							$0
7							$0
8							$0
			Open to Public				
1							$0
2							$0
3							$0
4							$0
5							$0
6							$0
7							$0
8							$0
9							$0
10							$0
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22							$0
23							$0
24							$0
25							$0
26							$0
27							$0
28							$0
29							$0
30							$0
31							$0
32							$0
33							$0
34							$0
35							$0
36							$0
37							$0
38							$0
39							$0
40							$0
41							$0
42							$0
43							$0
44							$0
45							$0
46							$0
47							$0
48							$0
49							$0
50							$0
Total	$0	$0	$0	$0	$0	$0	$0

PROJECT CRASH DATA

This sheet calculates annual reductions in crash frequency and severity for single or multiple countermeasures.

Color Codes	
User-Supplied Data	0.00
Model Parameter	0.00
Model Calculation	0.00
Linked Cell	0.00

1) Single or Multiple Countermeasure: Single Countermeasure

2) Calculation Method: Additive Method

BASELINE CRASH DATA AND CRASH MODIFICATION FACTORS

CMF Clearinghouse

Enter estimated annual crashes without treatment and Crash Modification Factors (CMF).

Injury Severity Scale	Estimated Annual Crashes without Treatment	CMF1	CMF2
K	0.2	0.8	
A	0.2	0.8	
B	0.8	0.8	
C	0.6	0.8	
O	0	0.8	
CMF Clearinghouse ID		N/A	

Determined via analogous rates

Next Step

CALCULATION FOR THE ANNUAL REDUCTION IN CRASH FREQUENCY AND SEVERITY

This section automatically calculates annual reduction in crash frequency and severity. No user input is required for this table. However, if the user wishes to override or enter externally calculated Crash Reductions, they may be entered in the Green cells, Column (5).

Formula 1: Estimated Annual Reductions with Treatment (3)	= (1) Estimated Crashes without Treatment x (2) Crash Modfication Factor
Formula 2: Annual Reduction in Crashes (4)	= (3) Estimated Annual Reduction with Treatment - (1) Estimated Crashes without Treatment

	(1)	(2)	(3)	(4)	(5)
Injury Severity Scale	Estimated Annual Crashes without Treatment	Crash Modification Factor	Estimated Annual Crashes with Treatment	Annual Reduction in Crashes	User Determined Reduction in Crashes
K	0.200	0.800	0.160	0.040	
A	0.200	0.800	0.160	0.040	
B	0.800	0.800	0.640	0.160	
C	0.600	0.800	0.480	0.120	
O	0.000	0.800	0.000	0.000	
Total	1.800		1.440	0.360	0.00

CMF CALCULATIONS FOR MULTIPLE COUNTERMEASURES (NOT APPLICABLE TO SINGLE COUNTERMEASURES)

This section automatically calculates a CMF value for the project when multiple countermeasures are being evaluated. Not applicable to single countermeasures. No user input is required for this table.

Analysis Type	Single Countermeasure
Calculation Method	Not applicable

Severity Scale	Dominant Effect	Additive Method	Multiplicative Method	Dominant Common Residuals Method
K	0.00	-0.20	0.00	0.00
A	0.00	-0.20	0.00	0.00
B	0.00	-0.20	0.00	0.00
C	0.00	-0.20	0.00	0.00
O	0.00	-0.20	0.00	0.00

ANALYSIS PARAMETERS

This page lists model-defined parameters from the Lookup worksheet.
Model-defined parameters are based on the "Roadway Facility Type" selected by the user on the Project Information worksheet.

Roadway Facility Type	Rural Other		

Color Codes

User-Supplied Data	
Model Parameter	

	Parameter	User Defined
Value of Time	22.71	

Users may modify default values by entering user defined values in the green cells on the right of the Lookup entry.

Travel Time Delay Factors	(Hours/Crash)	
Fatal	104.82	0.00
Injury	13.86	0.00
PDO	10.33	0.00

Vehicle Operation Cost Factors	(Gallons/Crash)	
Fatal	36.00	0.00
Injury	9.00	0.00
PDO	8.00	0.00

Next Step

Emissions Factors (Dollars/Crash)	CO2	CO	NOx	PM10	PM2.5	SO2	VOC
Fatal	$15.47	$0.00	$6.28	$0.00	$17.54	$1.28	$0.28
Injury	$3.93	$0.00	$1.59	$0.00	$4.38	$0.32	$0.07
PDO	$3.28	$0.00	$1.34	$0.00	$3.59	$0.28	$0.06

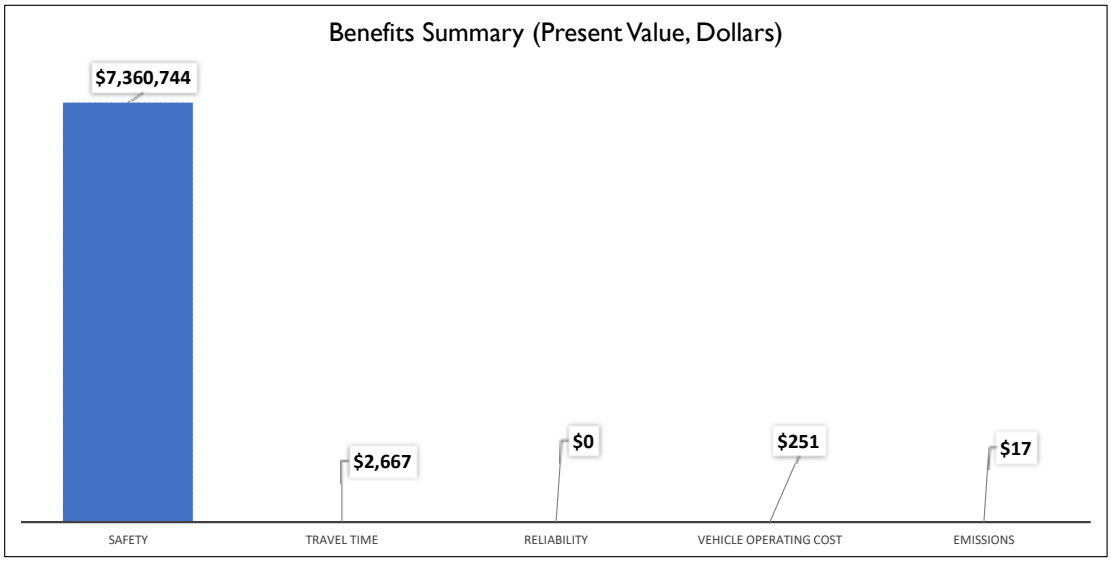
SR 166 Mulitmodal Corridor Study

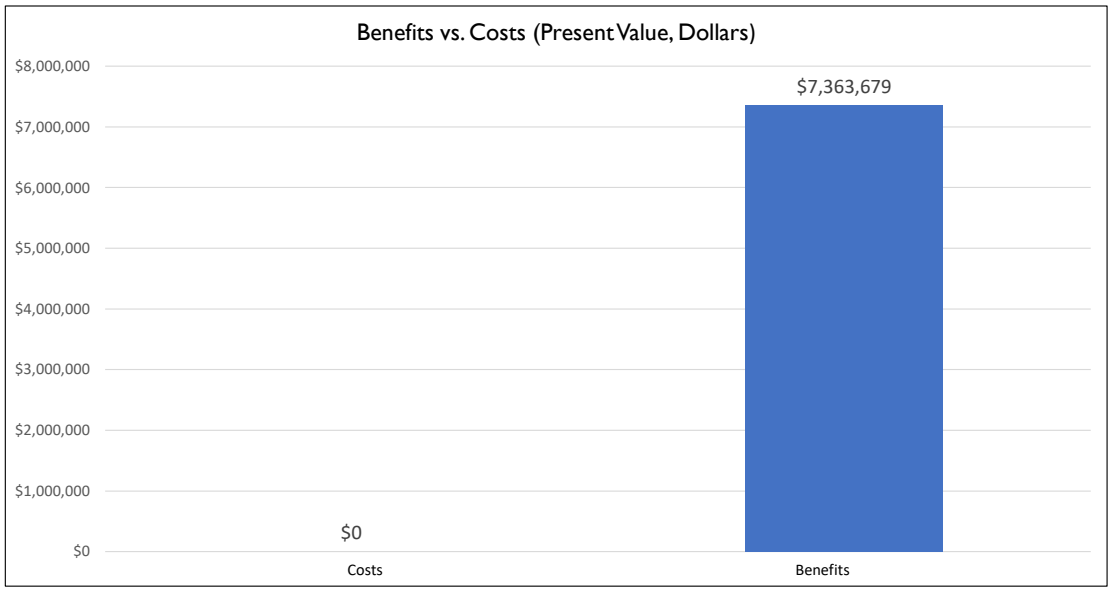
Benefit-Cost Analysis Summary Results

AGENCY: SBCAG **DATE** 8/22/2025

Present Value Costs ($ Dollars)	$0
Present Value Benefits ($ Dollars)	$7,363,679
Net Present Value ($ Dollars)	$7,363,679
Benefit / Cost Ratio:	#DIV/0!
Discount Rate	7.0%

ITEMIZED BENEFITS ($ Dollars)	Present Value
Safety	$7,360,744
Travel Time	$2,667
Reliability	$0
Vehicle Operating Cost	$251
Emissions	$17
TOTAL BENEFITS	**$7,363,679**





SECTION 4: BENEFITS

SR 166 INTERSECTION LIGHTING

PROJECT INFORMATION

Legend	
User-Supplied Data	0.000
Model Default	0.000
Model Calculation	0.000

Agency:	**SBCAG**
Project Title:	**SR 166 Mulitmodal Corridor Study**
Date:	**8/6/2025**
Analyst:	**ALC**
Build Alternative Name	**Imp 7 (Intersection Lighting)**

PROJECT DATA

Enter basic project data here. The green cells require user-supplied data when a default blue cell is not adjacent. The blue cells are model defaults, but can be overridden by entering a value in the green cell next to the blue default. All orange text represents model calculations.

Select roadway facility type from list	Rural Other		
Analysis Period (Years)	20		
Length of Construction Period (Years)	3		
Total Period	23		(analysis period years plus construction period years)
Annual Discount Rate (Percent)	3%	7%	
Percent of Trucks in the Flow (Percent)	9%	11%	
Fuel Cost (Dollars/Gallon)	$2.50	$ 4.27	
Value of Time ($/Hr.) Personal	$26.58	$ 21.10	
Value of Time ($/Hr.) Freight	$37.49	$ 35.70	
Calculated Combined Value of Time ($/Hr.)	$22.71		
The following information is used only for Reliability Benefit calculations. Reliability benefits are not estimated for facilities that are classified as *Urban or Rural Other*. User may ignore the information input items below for these facilities and move to the Project Costs section. See the BCA Guide or the Reference Guide for additional explanation.			
Segment Length (Miles)	5	0.1	
Number of Lanes	2	2	(2 for two-lane roads; otherwise, number of lanes per direction)
Free Flow Speed (MPH)	40	55	
Traffic Volume (during peak period)	992		
Link Capacity	9600		(passenger car equivalents for all lanes, or estimated by the Highway Capacity Manua
Hours of Peak Traffic per Day	2	3	(e.g., number of hours in am and/or pm peak)
Days of Analysis per Year	260	365	(e.g., 365 for analysis of all days or 260 for analysis of weekday travel time reliability)
Reliability Ratio Personal	1		
Reliability Ratio Freight	1.2		

PROJECT COSTS

Enter project life-cycle costs in table here. The green cells indicate data that is supplied by the user. The blue cells are model defaults. All orange text represents model calculations.

	DIRECT PROJECT COSTS						
	INITIAL COSTS			SUBSEQUENT COSTS			
Year	Project Support	Right-of-Way	Construction	Maintenance/ Operation	Rehabilitation	Mitigation	Present Value
			Construction Period				
1				<-- Must enter a cost -->			$0
2							$0
3							$0
4							$0
5							$0
6							$0
7							$0
8							$0
			Open to Public				
1							$0
2							$0
3							$0
4							$0
5							$0
6							$0
7							$0
8							$0
9							$0
10							$0
11							$0
12							$0
13							$0
14							$0
15							$0
16							$0
17							$0
18							$0
19							$0
20							$0
21							$0
22							$0
23							$0
24							$0
25							$0
26							$0
27							$0
28							$0
29							$0
30							$0
31							$0
32							$0
33							$0
34							$0
35							$0
36							$0
37							$0
38							$0
39							$0
40							$0
41							$0
42							$0
43							$0
44							$0
45							$0
46							$0
47							$0
48							$0
49							$0
50							$0
Total	$0	$0	$0	$0	$0	$0	$0

PROJECT CRASH DATA

This sheet calculates annual reductions in crash frequency and severity for single or multiple countermeasures.

Color Codes	
User-Supplied Data	0.00
Model Parameter	0.00
Model Calculation	0.00
Linked Cell	0.00

1) Single or Multiple Countermeasure: Single Countermeasure

2) Calculation Method: Additive Method

BASELINE CRASH DATA AND CRASH MODIFICATION FACTORS

CMF Clearinghouse

Enter estimated annual crashes without treatment and Crash Modification Factors (CMF).

Injury Severity Scale	Estimated Annual Crashes without Treatment	CMF1	CMF2
K	0	0.88	
A	0.2	0.88	
B	1.4	0.88	
C	3	0.88	
O	0	0.88	
CMF Clearinghouse ID		4462	

Note: All crashes are nighttime crashes

Next Step

CALCULATION FOR THE ANNUAL REDUCTION IN CRASH FREQUENCY AND SEVERITY

This section automatically calculates annual reduction in crash frequency and severity. No user input is required for this table. However, if the user wishes to override or enter externally calculated Crash Reductions, they may be entered in the Green cells, Column (5).

Formula 1: Estimated Annual Reductions with Treatment (3)	= (1) Estimated Crashes without Treatment x (2) Crash Modfication Factor
Formula 2: Annual Reduction in Crashes (4)	= (3) Estimated Annual Reduction with Treatment - (1) Estimated Crashes without Treatment

	(1)	(2)	(3)	(4)	(5)
Injury Severity Scale	Estimated Annual Crashes without Treatment	Crash Modification Factor	Estimated Annual Crashes with Treatment	Annual Reduction in Crashes	User Determined Reduction in Crashes
K	0.000	0.880	0.000	0.000	
A	0.200	0.880	0.176	0.024	
B	1.400	0.880	1.232	0.168	
C	3.000	0.880	2.640	0.360	
O	0.000	0.880	0.000	0.000	
Total	4.600		4.048	0.552	0.00

CMF CALCULATIONS FOR MULTIPLE COUNTERMEASURES (NOT APPLICABLE TO SINGLE COUNTERMEASURES)

This section automatically calculates a CMF value for the project when multiple countermeasures are being evaluated. Not applicable to single countermeasures. No user input is required for this table.

Analysis Type	Single Countermeasure
Calculation Method	Not applicable

Severity Scale	Dominant Effect	Additive Method	Multiplicative Method	Dominant Common Residuals Method
K	0.00	-0.12	0.00	0.00
A	0.00	-0.12	0.00	0.00
B	0.00	-0.12	0.00	0.00
C	0.00	-0.12	0.00	0.00
O	0.00	-0.12	0.00	0.00

ANALYSIS PARAMETERS

This page lists model-defined parameters from the Lookup worksheet.
Model-defined parameters are based on the "Roadway Facility Type" selected by the user on the Project Information worksheet.

Roadway Facility Type	Rural Other		

Color Codes

User-Supplied Data	
Model Parameter	

	Parameter	User Defined
Value of Time	22.71	

Users may modify default values by entering user defined values in the green cells on the right of the Lookup entry.

Travel Time Delay Factors	(Hours/Crash)	
Fatal	104.82	0.00
Injury	13.86	0.00
PDO	10.33	0.00

Vehicle Operation Cost Factors	(Gallons/Crash)	
Fatal	36.00	0.00
Injury	9.00	0.00
PDO	8.00	0.00

Next Step

Emissions Factors (Dollars/Crash)	CO2	CO	NOx	PM10	PM2.5	SO2	VOC
Fatal	$15.47	$0.00	$6.28	$0.00	$17.54	$1.28	$0.28
Injury	$3.93	$0.00	$1.59	$0.00	$4.38	$0.32	$0.07
PDO	$3.28	$0.00	$1.34	$0.00	$3.59	$0.28	$0.06

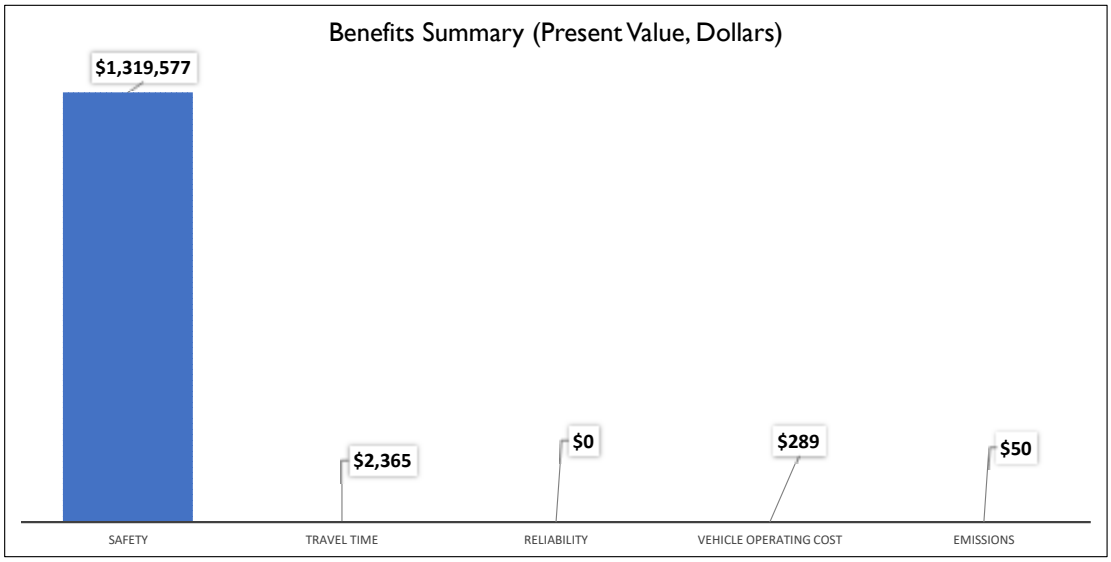
SR 166 Mulitmodal Corridor Study

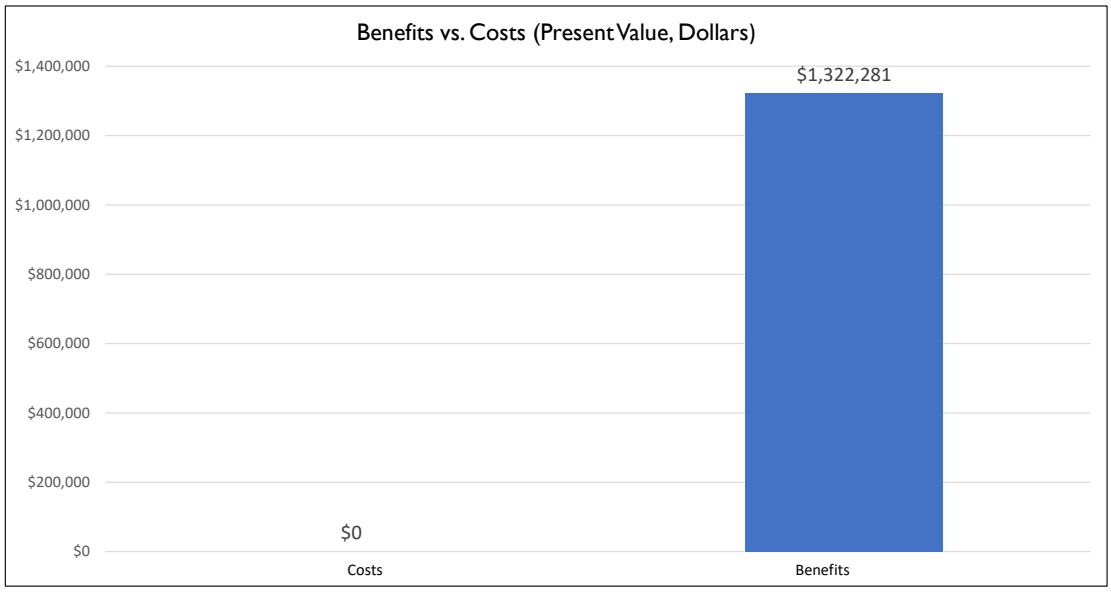
Benefit-Cost Analysis Summary Results

AGENCY: SBCAG **DATE** 8/6/2025

Present Value Costs ($ Dollars)	$0
Present Value Benefits ($ Dollars)	$1,322,281
Net Present Value ($ Dollars)	$1,322,281
Benefit / Cost Ratio:	#DIV/0!
Discount Rate	7.0%

ITEMIZED BENEFITS ($ Dollars)	Present Value
Safety	$1,319,577
Travel Time	$2,365
Reliability	$0
Vehicle Operating Cost	$289
Emissions	$50
TOTAL BENEFITS	**$1,322,281**





SECTION 4: BENEFITS

SR 166 RIDESHARE/TRANSIT IMPROVEMENTS

Input	Value	Source
General		
Discount Rate	7%	BCA Guidance for Discretionary Grant Programs
Discount Year	2023	
Discount Rate - CO2	3%	
Dollar Year	2023	
Deflator	See "Deflator" Sheet	Table 10.1: https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/budget/
Analysis Period (years)	20	BCA Guidance for Discretionary Grant Programs
Construction Begin	2027	
Construction End / Project Completion	2030	
Analysis Period Begin - Benefits Realized	2030	
Final year of analysis period	2050	
Annualization - days to year	365	General
Annualization - weeks / year	52	
100 Million Multiplier	100,000,000	
Round Trip Multiplier	2	
Conversion - minutes to hours	60	
Conversion - pound to ton	2,000	
Conversion - pounds to metric tons	2205	www.metric-conversions.org
Conversion - grams to metric tons	1,000,000	
Conversion - kg to metric tons	1,000	
Capital Costs		
Ridership		
Guadalupe Flyer Ridership	68,000	
CalVans Ridership	156,600	
Average Passenger Trip Distance (miles)	8	
Ridership Elasticity (Flyer)	90%	
Ridership Elasticity (CalVans)	100%	
CAlVans Added	15	
Auto Occupancy Rate	2.2	
Automobile Substitution Rate	0.8	
Effects on System and Service Performance		
Pavement Costs - Autos, Rural Interstate/Mile (2000$)	$0.000	https://www.fhwa.dot.gov/policy/hcas/addendum.cfm
Pavement Costs - Autos, Rural Interstate/Mile (2023$)	$0.000	
Congestion Costs - autos, rural / Mile (2023$)	$0.030	BCA Guidance for Discretionary Grant Programs
Noise Costs - autos, rural / Mile (2023$)	$0.000	
Safety, Competitiveness, Reliability, Trip or Transit Time, and Resilience		
Average Speed (mph)	55	
Value of Time - all purposes (2023$)	$21.54	BCA Guidance for Discretionary Grant Programs
PDO Crash (2023$)	$9,500	
Injury Crash (2023$)	$329,500	BCA Guidance for Discretionary Grant Programs
Fatality Crash (2023$)	$14,806,000	
Fatalities / 1,000,000 miles (2019-2023)	0.03	
Injuries / 1,000,000 miles (2019-2023)	1.0	SR 166 Existing Conditions Report
Automobile Emissions		
Pollutant	Emissions Rate - LDA (passenger cars)	Cal B/C Parameters (Assume 55 mph)
Nox (g/mile)	0.067	
PM2.5 (g/mile)	0.001	
CO2 (g/mile)	315.190	
Sox (g/mile)	0.003	
Efficiencies from Improved Connections with Other Modes		
Vehicle Operating Costs / Mile (2023$)	$0.56	BCA Guidance for Discretionary Grant Programs

Damage Costs for Emissions per Metric Ton				
Year	Nox	Sox	PM2.5	CO2
2024	$18,800	$50,900	$912,200	$56
2025	$19,000	$51,900	$928,000	$57
2026	$19,400	$52,900	$942,700	$58
2027	$19,800	$53,800	$957,700	$59
2028	$20,100	$54,800	$972,900	$60
2029	$20,500	$55,800	$988,400	$61
2030	$20,900	$56,800	$1,004,100	$62
2031	$20,900	$56,800	$1,004,100	$63
2032	$20,900	$56,800	$1,004,100	$65
2033	$20,900	$56,800	$1,004,100	$66
2034	$20,900	$56,800	$1,004,100	$67
2035	$20,900	$56,800	$1,004,100	$68
2036	$20,900	$56,800	$1,004,100	$69
2037	$20,900	$56,800	$1,004,100	$70
2038	$20,900	$56,800	$1,004,100	$72
2039	$20,900	$56,800	$1,004,100	$73
2040	$20,900	$56,800	$1,004,100	$74
2041	$20,900	$56,800	$1,004,100	$75
2042	$20,900	$56,800	$1,004,100	$76
2043	$20,900	$56,800	$1,004,100	$78
2044	$20,900	$56,800	$1,004,100	$79
2045	$20,900	$56,800	$1,004,100	$80
2046	$20,900	$56,800	$1,004,100	$81
2047	$20,900	$56,800	$1,004,100	$82
2048	$20,900	$56,800	$1,004,100	$84
2049	$20,900	$56,800	$1,004,100	$85
2050	$20,900	$56,800	$1,004,100	$86
2051	$20,900	$56,800	$1,004,100	$87
2052	$20,900	$56,800	$1,004,100	$88
2053	$20,900	$56,800	$1,004,100	$88
2054	$20,900	$56,800	$1,004,100	$88

Analysis Period Begin - Benefits Realized	2030
Ridership	
CalVans Existing Ridership	156,600
CalVans Added	15
Ridership Added	52500
VMT	
Auto Occupancy Rate	2.2
Automobile Substitution Rate	80%
Average Passenger Trip Distance (miles)	8

Year	CalVans Baseline Ridership	CalVans Ridership Added	Total Ridership Added	Passenger Miles Added	Passengers Diverted From Driving	Diverted Vehicles	VMT Avoided
2025	156600						
2026	156600						
2027	156600						
2028	156600						
2029	156600						
2030	156600	52500	52500	420000	42000	19091	152727
2031	156600	52500	52500	420000	42000	19091	152727
2032	156600	52500	52500	420000	42000	19091	152727
2033	156600	52500	52500	420000	42000	19091	152727
2034	156600	52500	52500	420000	42000	19091	152727
2035	156600	52500	52500	420000	42000	19091	152727
2036	156600	52500	52500	420000	42000	19091	152727
2037	156600	52500	52500	420000	42000	19091	152727
2038	156600	52500	52500	420000	42000	19091	152727
2039	156600	52500	52500	420000	42000	19091	152727
2040	156600	52500	52500	420000	42000	19091	152727
2041	156600	52500	52500	420000	42000	19091	152727
2042	156600	52500	52500	420000	42000	19091	152727
2043	156600	52500	52500	420000	42000	19091	152727
2044	156600	52500	52500	420000	42000	19091	152727
2045	156600	52500	52500	420000	42000	19091	152727
2046	156600	52500	52500	420000	42000	19091	152727
2047	156600	52500	52500	420000	42000	19091	152727
2048	156600	52500	52500	420000	42000	19091	152727
2049	156600	52500	52500	420000	42000	19091	152727
2050	156600	52500	52500	420000	42000	19091	152727

Discount Rate	7%
Discount Year	2023
Analysis Period Begin - Benefits Realized	2030
Pavement Costs - autos, urban interstate / Mile (2023$)	0
Congestion Costs - autos, urban interstate / Mile (2023$)	0.03
Noise Costs - autos, urban interstate / Mile (2023$)	0.0002

Year	VMT Avoided	Pavement	Congestion	Noise	Total	Discounted Total
2030	152727	$ -	$ 4,581.82	$ 30.55	$ 4,612.36	$ 2,872.35
2031	152727	$ -	$ 4,581.82	$ 30.55	$ 4,612.36	$ 2,684.44
2032	152727	$ -	$ 4,581.82	$ 30.55	$ 4,612.36	$ 2,508.82
2033	152727	$ -	$ 4,581.82	$ 30.55	$ 4,612.36	$ 2,344.69
2034	152727	$ -	$ 4,581.82	$ 30.55	$ 4,612.36	$ 2,191.30
2035	152727	$ -	$ 4,581.82	$ 30.55	$ 4,612.36	$ 2,047.94
2036	152727	$ -	$ 4,581.82	$ 30.55	$ 4,612.36	$ 1,913.97
2037	152727	$ -	$ 4,581.82	$ 30.55	$ 4,612.36	$ 1,788.75
2038	152727	$ -	$ 4,581.82	$ 30.55	$ 4,612.36	$ 1,671.73
2039	152727	$ -	$ 4,581.82	$ 30.55	$ 4,612.36	$ 1,562.37
2040	152727	$ -	$ 4,581.82	$ 30.55	$ 4,612.36	$ 1,460.16
2041	152727	$ -	$ 4,581.82	$ 30.55	$ 4,612.36	$ 1,364.63
2042	152727	$ -	$ 4,581.82	$ 30.55	$ 4,612.36	$ 1,275.36
2043	152727	$ -	$ 4,581.82	$ 30.55	$ 4,612.36	$ 1,191.92
2044	152727	$ -	$ 4,581.82	$ 30.55	$ 4,612.36	$ 1,113.95
2045	152727	$ -	$ 4,581.82	$ 30.55	$ 4,612.36	$ 1,041.07
2046	152727	$ -	$ 4,581.82	$ 30.55	$ 4,612.36	$ 972.96
2047	152727	$ -	$ 4,581.82	$ 30.55	$ 4,612.36	$ 909.31
2048	152727	$ -	$ 4,581.82	$ 30.55	$ 4,612.36	$ 849.82
2049	152727	$ -	$ 4,581.82	$ 30.55	$ 4,612.36	$ 794.23
2050	152727	$ -	$ 4,581.82	$ 30.55	$ 4,612.36	$ 742.27
	TOTAL	$ -	$ 96,218.18	$ 641.45	$ 96,859.64	$ 33,302.05

Discount Rate	7%
Discount Year	2023
Analysis Period Begin - Benefits Realized	2030
PDO Crash (2023$)	14806000
Injury Crash (2023$)	329500
Fatality Crash (2023$)	9500
Fatalities / 1,000,000 miles (2019-2023)	0.03
Injuries / 1,000,000 miles (2019-2023)	0.99
1 Million Multiplier	1000000

Year	VMT Avoided	Fatalities Avoided	Injuries Avoided	Value of Fatalities Avoided	Value of Injuries Avoided	Total	Discounted Total
2030	152727	0.00	0.15	$ 62,452.50	$ 49,687.09	$ 112,139.58	$ 69,834.90
2031	152727	0.00	0.15	$ 62,452.50	$ 49,687.09	$ 112,139.58	$ 65,266.26
2032	152727	0.00	0.15	$ 62,452.50	$ 49,687.09	$ 112,139.58	$ 60,996.50
2033	152727	0.00	0.15	$ 62,452.50	$ 49,687.09	$ 112,139.58	$ 57,006.08
2034	152727	0.00	0.15	$ 62,452.50	$ 49,687.09	$ 112,139.58	$ 53,276.71
2035	152727	0.00	0.15	$ 62,452.50	$ 49,687.09	$ 112,139.58	$ 49,791.32
2036	152727	0.00	0.15	$ 62,452.50	$ 49,687.09	$ 112,139.58	$ 46,533.94
2037	152727	0.00	0.15	$ 62,452.50	$ 49,687.09	$ 112,139.58	$ 43,489.66
2038	152727	0.00	0.15	$ 62,452.50	$ 49,687.09	$ 112,139.58	$ 40,644.55
2039	152727	0.00	0.15	$ 62,452.50	$ 49,687.09	$ 112,139.58	$ 37,985.56
2040	152727	0.00	0.15	$ 62,452.50	$ 49,687.09	$ 112,139.58	$ 35,500.52
2041	152727	0.00	0.15	$ 62,452.50	$ 49,687.09	$ 112,139.58	$ 33,178.06
2042	152727	0.00	0.15	$ 62,452.50	$ 49,687.09	$ 112,139.58	$ 31,007.53
2043	152727	0.00	0.15	$ 62,452.50	$ 49,687.09	$ 112,139.58	$ 28,979.00
2044	152727	0.00	0.15	$ 62,452.50	$ 49,687.09	$ 112,139.58	$ 27,083.18
2045	152727	0.00	0.15	$ 62,452.50	$ 49,687.09	$ 112,139.58	$ 25,311.38
2046	152727	0.00	0.15	$ 62,452.50	$ 49,687.09	$ 112,139.58	$ 23,655.50
2047	152727	0.00	0.15	$ 62,452.50	$ 49,687.09	$ 112,139.58	$ 22,107.94
2048	152727	0.00	0.15	$ 62,452.50	$ 49,687.09	$ 112,139.58	$ 20,661.63
2049	152727	0.00	0.15	$ 62,452.50	$ 49,687.09	$ 112,139.58	$ 19,309.93
2050	152727	0.00	0.15	$ 62,452.50	$ 49,687.09	$ 112,139.58	$ 18,046.66
TOTAL		0.089	3.167	$ 1,311,502.43	$ 1,043,428.80	$ 2,354,931.23	$ 809,666.78

Discount Rate	7%
Discount Year	2023
Discount Rate - CO2	3%
Analysis Period Begin - Benefits Realized	2030
Conversion - grams to metric tons	1,000,000
Conversion - kg to metric tons	1,000
Annualization - days to year	365
Automobile Emissions	
Nox (g/mile)	0.067
PM2.5 (g/mile)	0.001
CO2 (g/mile)	315.2
Sox (g/mile)	0.003

Year	VMT Avoided	Nox Avoided (MT)	Nox Avoided ($)
2030	152727	0.01	$ 214.18
2031	152727	0.01	$ 214.18
2032	152727	0.01	$ 214.18
2033	152727	0.01	$ 214.18
2034	152727	0.01	$ 214.18
2035	152727	0.01	$ 214.18
2036	152727	0.01	$ 214.18
2037	152727	0.01	$ 214.18
2038	152727	0.01	$ 214.18
2039	152727	0.01	$ 214.18
2040	152727	0.01	$ 214.18
2041	152727	0.01	$ 214.18
2042	152727	0.01	$ 214.18
2043	152727	0.01	$ 214.18
2044	152727	0.01	$ 214.18
2045	152727	0.01	$ 214.18
2046	152727	0.01	$ 214.18
2047	152727	0.01	$ 214.18
2048	152727	0.01	$ 214.18
2049	152727	0.01	$ 214.18
2050	152727	0.01	$ 214.18
TOTAL		0.22	$ 4,497.85

TOTAL Emissions Avoided (Discounted) $ 48,065.76

Discounted Nox Avoided ($)	PM2.5 Avoided (MT)	PM2.5 Avoided ($)	Discounted PM2.5 Avoided ($)	CO2 Avoided (MT)
$ 133.38	0.00	$ 153.35	$ 95.50	48.14
$ 124.66	0.00	$ 153.35	$ 89.25	48.14
$ 116.50	0.00	$ 153.35	$ 83.41	48.14
$ 108.88	0.00	$ 153.35	$ 77.96	48.14
$ 101.76	0.00	$ 153.35	$ 72.86	48.14
$ 95.10	0.00	$ 153.35	$ 68.09	48.14
$ 88.88	0.00	$ 153.35	$ 63.64	48.14
$ 83.06	0.00	$ 153.35	$ 59.47	48.14
$ 77.63	0.00	$ 153.35	$ 55.58	48.14
$ 72.55	0.00	$ 153.35	$ 51.95	48.14
$ 67.80	0.00	$ 153.35	$ 48.55	48.14
$ 63.37	0.00	$ 153.35	$ 45.37	48.14
$ 59.22	0.00	$ 153.35	$ 42.40	48.14
$ 55.35	0.00	$ 153.35	$ 39.63	48.14
$ 51.73	0.00	$ 153.35	$ 37.04	48.14
$ 48.34	0.00	$ 153.35	$ 34.61	48.14
$ 45.18	0.00	$ 153.35	$ 32.35	48.14
$ 42.23	0.00	$ 153.35	$ 30.23	48.14
$ 39.46	0.00	$ 153.35	$ 28.26	48.14
$ 36.88	0.00	$ 153.35	$ 26.41	48.14
$ 34.47	0.00	$ 153.35	$ 24.68	48.14
$ 1,546.44	0.00	$ 3,220.42	$ 1,107.24	1010.90

CO2 Avoided ($)	Discounted CO2 Avoided ($)	SOX Avoided (MT)	SOX Avoided ($)	Discounted SOX Avoided ($)
$ 2,984.56	$ 2,426.72	0.00	$ 26.89	$ 16.75
$ 3,032.70	$ 2,394.04	0.00	$ 26.89	$ 15.65
$ 3,128.97	$ 2,398.10	0.00	$ 26.89	$ 14.63
$ 3,177.11	$ 2,364.07	0.00	$ 26.89	$ 13.67
$ 3,225.25	$ 2,329.99	0.00	$ 26.89	$ 12.78
$ 3,273.39	$ 2,295.89	0.00	$ 26.89	$ 11.94
$ 3,321.52	$ 2,261.80	0.00	$ 26.89	$ 11.16
$ 3,369.66	$ 2,227.74	0.00	$ 26.89	$ 10.43
$ 3,465.94	$ 2,224.65	0.00	$ 26.89	$ 9.75
$ 3,514.08	$ 2,189.86	0.00	$ 26.89	$ 9.11
$ 3,562.21	$ 2,155.20	0.00	$ 26.89	$ 8.51
$ 3,610.35	$ 2,120.70	0.00	$ 26.89	$ 7.96
$ 3,658.49	$ 2,086.39	0.00	$ 26.89	$ 7.44
$ 3,754.77	$ 2,078.92	0.00	$ 26.89	$ 6.95
$ 3,802.90	$ 2,044.25	0.00	$ 26.89	$ 6.49
$ 3,851.04	$ 2,009.83	0.00	$ 26.89	$ 6.07
$ 3,899.18	$ 1,975.68	0.00	$ 26.89	$ 5.67
$ 3,947.32	$ 1,941.82	0.00	$ 26.89	$ 5.30
$ 4,043.59	$ 1,931.24	0.00	$ 26.89	$ 4.95
$ 4,091.73	$ 1,897.31	0.00	$ 26.89	$ 4.63
$ 4,139.87	$ 1,863.72	0.00	$ 26.89	$ 4.33
$ 74,854.64	$ 45,217.92	0.01	$ 564.74	$ 194.17

Discount Rate	7%
Discount Year	2023
Analysis Period Begin - Benefits Realized	2030
Vehicle Operating Costs / Mile	0.56

Year	VMT Avoided	Operating Cost Savings	Discounted Operating Cost Savings
2030	0	$ -	$ -
2031	152727	$ 85,527.27	$ 49,777.65
2032	152727	$ 85,527.27	$ 46,521.17
2033	152727	$ 85,527.27	$ 43,477.73
2034	152727	$ 85,527.27	$ 40,633.39
2035	152727	$ 85,527.27	$ 37,975.13
2036	152727	$ 85,527.27	$ 35,490.78
2037	152727	$ 85,527.27	$ 33,168.95
2038	152727	$ 85,527.27	$ 30,999.02
2039	152727	$ 85,527.27	$ 28,971.05
2040	152727	$ 85,527.27	$ 27,075.74
2041	152727	$ 85,527.27	$ 25,304.43
2042	152727	$ 85,527.27	$ 23,649.00
2043	152727	$ 85,527.27	$ 22,101.87
2044	152727	$ 85,527.27	$ 20,655.96
2045	152727	$ 85,527.27	$ 19,304.63
2046	152727	$ 85,527.27	$ 18,041.71
2047	152727	$ 85,527.27	$ 16,861.41
2048	152727	$ 85,527.27	$ 15,758.33
2049	152727	$ 85,527.27	$ 14,727.41
2050	152727	$ 85,527.27	$ 13,763.94
	TOTAL	$ 1,710,545.45	$ 564,259.31

Input	Value	Source
General		
Discount Rate	7%	BCA Guidance for Discretionary Grant Programs
Discount Year	2023	
Discount Rate - CO2	3%	
Dollar Year	2023	
Deflator	See "Deflator" Sheet	Table 10.1: https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/budget/
Analysis Period (years)	20	BCA Guidance for Discretionary Grant Programs
Construction Begin	2027	
Construction End / Project Completion	2030	
Analysis Period Begin - Benefits Realized	2030	
Final year of analysis period	2050	
Annualization - days to year	365	General
Annualization - weeks / year	52	
100 Million Multiplier	100,000,000	
Round Trip Multiplier	2	
Conversion - minutes to hours	60	
Conversion - pound to ton	2,000	
Conversion - pounds to metric tons	2205	www.metric-conversions.org
Conversion - grams to metric tons	1,000,000	
Conversion - kg to metric tons	1,000	
Capital Costs		
Ridership		
Guadalupe Flyer Ridership	68,000	
CalVans Ridership	156,600	
Average Passenger Trip Distance (miles)	8	
Ridership Elasticity (Flyer)	90%	
Ridership Elasticity (CalVans)	100%	
CAlVans Added	15	
Auto Occupancy Rate	2.2	
Automobile Substitution Rate	0.6	
Effects on System and Service Performance		
Pavement Costs - Autos, Rural Interstate/Mile (2000$)	$0.000	https://www.fhwa.dot.gov/policy/hcas/addendum.cfm
Pavement Costs - Autos, Rural Interstate/Mile (2023$)	$0.000	
Congestion Costs - autos, rural / Mile (2023$)	$0.030	BCA Guidance for Discretionary Grant Programs
Noise Costs - autos, rural / Mile (2023$)	$0.000	
Safety, Competitiveness, Reliability, Trip or Transit Time, and Resilience		
Average Speed (mph)	55	
Value of Time - all purposes (2023$)	$21.54	BCA Guidance for Discretionary Grant Programs
PDO Crash (2023$)	$9,500	
Injury Crash (2023$)	$329,500	BCA Guidance for Discretionary Grant Programs
Fatality Crash (2023$)	$14,806,000	
Fatalities / 1,000,000 miles (2019-2023)	0.03	
Injuries / 1,000,000 miles (2019-2023)	1.0	SR 166 Existing Conditions Report
Automobile Emissions		
Pollutant	Emissions Rate - LDA (passenger cars)	
Nox (g/mile)	0.067	Cal B/C Parameters (Assume 55 mph)
PM2.5 (g/mile)	0.001	
CO2 (g/mile)	315.190	
Sox (g/mile)	0.003	
Efficiencies from Improved Connections with Other Modes		
Vehicle Operating Costs / Mile (2023$)	$0.56	BCA Guidance for Discretionary Grant Programs

Damage Costs for Emissions per Metric Ton				
Year	Nox	Sox	PM2.5	CO2
2024	$18,800	$50,900	$912,200	$56
2025	$19,000	$51,900	$928,000	$57
2026	$19,400	$52,900	$942,700	$58
2027	$19,800	$53,800	$957,700	$59
2028	$20,100	$54,800	$972,900	$60
2029	$20,500	$55,800	$988,400	$61
2030	$20,900	$56,800	$1,004,100	$62
2031	$20,900	$56,800	$1,004,100	$63
2032	$20,900	$56,800	$1,004,100	$65
2033	$20,900	$56,800	$1,004,100	$66
2034	$20,900	$56,800	$1,004,100	$67
2035	$20,900	$56,800	$1,004,100	$68
2036	$20,900	$56,800	$1,004,100	$69
2037	$20,900	$56,800	$1,004,100	$70
2038	$20,900	$56,800	$1,004,100	$72
2039	$20,900	$56,800	$1,004,100	$73
2040	$20,900	$56,800	$1,004,100	$74
2041	$20,900	$56,800	$1,004,100	$75
2042	$20,900	$56,800	$1,004,100	$76
2043	$20,900	$56,800	$1,004,100	$78
2044	$20,900	$56,800	$1,004,100	$79
2045	$20,900	$56,800	$1,004,100	$80
2046	$20,900	$56,800	$1,004,100	$81
2047	$20,900	$56,800	$1,004,100	$82
2048	$20,900	$56,800	$1,004,100	$84
2049	$20,900	$56,800	$1,004,100	$85
2050	$20,900	$56,800	$1,004,100	$86
2051	$20,900	$56,800	$1,004,100	$87
2052	$20,900	$56,800	$1,004,100	$88
2053	$20,900	$56,800	$1,004,100	$88
2054	$20,900	$56,800	$1,004,100	$88

Ridership Growth Rate	1%
Annualization - days to year	365
Analysis Period Begin - Benefits Realized	2030

Ridership Estimation (TCRP 118, Eq. 3-11)

Base Ridership	68,000
Bus Frequency Elasticity	0.4
Original Frequency	60
Change in Frequency	30
Forecast Ridership	81,600
Ridership Added	13,600

VMT

Auto Occupancy Rate	2.2
Automobile Substitution Rate	60%
Average Passenger Trip Distance (miles)	8

Year	Flyer Ridership Added	Total Ridership Added	Passenger Miles Added	Passengers Diverted From Driving	Diverted Vehicles	VMT Avoided
2025						
2026						
2027						
2028						
2029						
2030	13600	13600	108800	8160	3709	29673
2031	13736	13736	109888	8242	3746	29969
2032	13873	13873	110984	8324	3784	30268
2033	14012	14012	112096	8407	3821	30572
2034	14152	14152	113216	8491	3860	30877
2035	14294	14294	114352	8576	3898	31187
2036	14437	14437	115496	8662	3937	31499
2037	14581	14581	116648	8749	3977	31813
2038	14727	14727	117816	8836	4016	32132
2039	14874	14874	118992	8924	4057	32452
2040	15023	15023	120184	9014	4097	32777
2041	15173	15173	121384	9104	4138	33105
2042	15325	15325	122600	9195	4180	33436
2043	15478	15478	123824	9287	4221	33770
2044	15633	15633	125064	9380	4264	34108
2045	15789	15789	126312	9473	4306	34449
2046	15947	15947	127576	9568	4349	34793
2047	16106	16106	128848	9664	4393	35140
2048	16267	16267	130136	9760	4436	35492
2049	16430	16430	131440	9858	4481	35847
2050	16594	16594	132752	9956	4526	36205

Discount Rate	7%
Discount Year	2023
Analysis Period Begin - Benefits Realized	2030
Pavement Costs - autos, urban interstate / Mile (2023$)	0
Congestion Costs - autos, urban interstate / Mile (2023$)	0.03
Noise Costs - autos, urban interstate / Mile (2023$)	0.0002

Year	VMT Avoided	Pavement	Congestion	Noise	Total	Discounted Total
2030	29673	$ -	$ 890.18	$ 5.93	$ 896.12	$ 558.06
2031	29969	$ -	$ 899.08	$ 5.99	$ 905.08	$ 526.76
2032	30268	$ -	$ 908.05	$ 6.05	$ 914.10	$ 497.21
2033	30572	$ -	$ 917.15	$ 6.11	$ 923.26	$ 469.34
2034	30877	$ -	$ 926.31	$ 6.18	$ 932.49	$ 443.02
2035	31187	$ -	$ 935.61	$ 6.24	$ 941.84	$ 418.19
2036	31499	$ -	$ 944.97	$ 6.30	$ 951.27	$ 394.74
2037	31813	$ -	$ 954.39	$ 6.36	$ 960.76	$ 372.60
2038	32132	$ -	$ 963.95	$ 6.43	$ 970.38	$ 351.71
2039	32452	$ -	$ 973.57	$ 6.49	$ 980.06	$ 331.98
2040	32777	$ -	$ 983.32	$ 6.56	$ 989.88	$ 313.37
2041	33105	$ -	$ 993.14	$ 6.62	$ 999.76	$ 295.79
2042	33436	$ -	$ 1,003.09	$ 6.69	$ 1,009.78	$ 279.21
2043	33770	$ -	$ 1,013.11	$ 6.75	$ 1,019.86	$ 263.55
2044	34108	$ -	$ 1,023.25	$ 6.82	$ 1,030.07	$ 248.78
2045	34449	$ -	$ 1,033.46	$ 6.89	$ 1,040.35	$ 234.82
2046	34793	$ -	$ 1,043.80	$ 6.96	$ 1,050.76	$ 221.66
2047	35140	$ -	$ 1,054.21	$ 7.03	$ 1,061.24	$ 209.22
2048	35492	$ -	$ 1,064.75	$ 7.10	$ 1,071.85	$ 197.49
2049	35847	$ -	$ 1,075.42	$ 7.17	$ 1,082.59	$ 186.42
2050	36205	$ -	$ 1,086.15	$ 7.24	$ 1,093.39	$ 175.96
TOTAL		$ -	$ 20,686.97	$ 137.91	$ 20,824.89	$ 6,989.87

Discount Rate	7%
Discount Year	2023
Analysis Period Begin - Benefits Realized	2030
PDO Crash (2023$)	14806000
Injury Crash (2023$)	329500
Fatality Crash (2023$)	9500
Fatalities / 1,000,000 miles (2019-2023)	0.03
Injuries / 1,000,000 miles (2019-2023)	0.99
1 Million Multiplier	1000000

Year	VMT Avoided	Fatalities Avoided	Injuries Avoided	Value of Fatalities Avoided	Value of Injuries Avoided	Total	Discounted Total
2030	29673	0.00	0.03	$ 12,133.63	$ 9,653.49	$ 21,787.12	$ 13,567.92
2031	29969	0.00	0.03	$ 12,254.96	$ 9,750.03	$ 22,004.99	$ 12,807.10
2032	30268	0.00	0.03	$ 12,377.19	$ 9,847.27	$ 22,224.46	$ 12,088.64
2033	30572	0.00	0.03	$ 12,501.21	$ 9,945.93	$ 22,447.14	$ 11,410.99
2034	30877	0.00	0.03	$ 12,626.11	$ 10,045.31	$ 22,671.42	$ 10,771.03
2035	31187	0.00	0.03	$ 12,752.80	$ 10,146.10	$ 22,898.90	$ 10,167.39
2036	31499	0.00	0.03	$ 12,880.38	$ 10,247.61	$ 23,127.99	$ 9,597.29
2037	31813	0.00	0.03	$ 13,008.86	$ 10,349.82	$ 23,358.68	$ 9,058.90
2038	32132	0.00	0.03	$ 13,139.11	$ 10,453.45	$ 23,592.57	$ 8,551.03
2039	32452	0.00	0.03	$ 13,270.26	$ 10,557.80	$ 23,828.06	$ 8,071.39
2040	32777	0.00	0.03	$ 13,403.20	$ 10,663.56	$ 24,066.76	$ 7,618.92
2041	33105	0.00	0.03	$ 13,537.02	$ 10,770.03	$ 24,307.06	$ 7,191.58
2042	33436	0.00	0.03	$ 13,672.64	$ 10,877.92	$ 24,550.56	$ 6,788.43
2043	33770	0.00	0.03	$ 13,809.14	$ 10,986.52	$ 24,795.66	$ 6,407.67
2044	34108	0.00	0.03	$ 13,947.43	$ 11,096.55	$ 25,043.97	$ 6,048.45
2045	34449	0.00	0.03	$ 14,086.61	$ 11,207.28	$ 25,293.88	$ 5,709.16
2046	34793	0.00	0.03	$ 14,227.57	$ 11,319.43	$ 25,547.00	$ 5,389.06
2047	35140	0.00	0.03	$ 14,369.43	$ 11,432.29	$ 25,801.72	$ 5,086.72
2048	35492	0.00	0.04	$ 14,513.07	$ 11,546.57	$ 26,059.64	$ 4,801.47
2049	35847	0.00	0.04	$ 14,658.49	$ 11,662.27	$ 26,320.76	$ 4,532.32
2050	36205	0.00	0.04	$ 14,804.81	$ 11,778.68	$ 26,583.49	$ 4,278.09
TOTAL		0.019	0.681	$ 281,973.91	$ 224,337.90	$ 506,311.82	$ 169,943.54

Discount Rate	7%
Discount Year	2023
Discount Rate - CO2	3%
Analysis Period Begin - Benefits Realized	2030
Conversion - grams to metric tons	1,000,000
Conversion - kg to metric tons	1,000
Annualization - days to year	365
Automobile Emissions	
Nox (g/mile)	0.067
PM2.5 (g/mile)	0.001
CO2 (g/mile)	315.2
Sox (g/mile)	0.003

Year	VMT Avoided	Nox Avoided (MT)	Nox Avoided ($)
2030	29673	0.00	$ 41.61
2031	29969	0.00	$ 42.03
2032	30268	0.00	$ 42.45
2033	30572	0.00	$ 42.87
2034	30877	0.00	$ 43.30
2035	31187	0.00	$ 43.74
2036	31499	0.00	$ 44.17
2037	31813	0.00	$ 44.61
2038	32132	0.00	$ 45.06
2039	32452	0.00	$ 45.51
2040	32777	0.00	$ 45.97
2041	33105	0.00	$ 46.43
2042	33436	0.00	$ 46.89
2043	33770	0.00	$ 47.36
2044	34108	0.00	$ 47.83
2045	34449	0.00	$ 48.31
2046	34793	0.00	$ 48.79
2047	35140	0.00	$ 49.28
2048	35492	0.00	$ 49.77
2049	35847	0.00	$ 50.27
2050	36205	0.00	$ 50.77
TOTAL		0.05	$ 967.04

TOTAL Emissions Avoided (Discounted)	$ 10,272.57

Discounted Nox Avoided ($)	PM2.5 Avoided (MT)	PM2.5 Avoided ($)	Discounted PM2.5 Avoided ($)	CO2 Avoided (MT)
$ 25.91	0.00	$ 29.79	$ 18.55	9.35
$ 24.46	0.00	$ 30.09	$ 17.51	9.45
$ 23.09	0.00	$ 30.39	$ 16.53	9.54
$ 21.79	0.00	$ 30.70	$ 15.60	9.64
$ 20.57	0.00	$ 31.00	$ 14.73	9.73
$ 19.42	0.00	$ 31.31	$ 13.90	9.83
$ 18.33	0.00	$ 31.63	$ 13.12	9.93
$ 17.30	0.00	$ 31.94	$ 12.39	10.03
$ 16.33	0.00	$ 32.26	$ 11.69	10.13
$ 15.42	0.00	$ 32.59	$ 11.04	10.23
$ 14.55	0.00	$ 32.91	$ 10.42	10.33
$ 13.74	0.00	$ 33.24	$ 9.83	10.43
$ 12.97	0.00	$ 33.57	$ 9.28	10.54
$ 12.24	0.00	$ 33.91	$ 8.76	10.64
$ 11.55	0.00	$ 34.25	$ 8.27	10.75
$ 10.90	0.00	$ 34.59	$ 7.81	10.86
$ 10.29	0.00	$ 34.94	$ 7.37	10.97
$ 9.72	0.00	$ 35.28	$ 6.96	11.08
$ 9.17	0.00	$ 35.64	$ 6.57	11.19
$ 8.66	0.00	$ 35.99	$ 6.20	11.30
$ 8.17	0.00	$ 36.35	$ 5.85	11.41
$ 324.59	0.00	$ 692.39	$ 232.40	217.34

CO2 Avoided ($)	Discounted CO2 Avoided ($)	SOX Avoided (MT)	SOX Avoided ($)	Discounted SOX Avoided ($)
$ 579.86	$ 471.48	0.00	$ 5.22	$ 3.25
$ 595.10	$ 469.78	0.00	$ 5.28	$ 3.07
$ 620.12	$ 475.27	0.00	$ 5.33	$ 2.90
$ 635.97	$ 473.22	0.00	$ 5.38	$ 2.74
$ 652.05	$ 471.06	0.00	$ 5.44	$ 2.58
$ 668.43	$ 468.82	0.00	$ 5.49	$ 2.44
$ 685.04	$ 466.48	0.00	$ 5.55	$ 2.30
$ 701.90	$ 464.04	0.00	$ 5.60	$ 2.17
$ 729.18	$ 468.04	0.00	$ 5.66	$ 2.05
$ 746.69	$ 465.31	0.00	$ 5.71	$ 1.94
$ 764.50	$ 462.54	0.00	$ 5.77	$ 1.83
$ 782.57	$ 459.68	0.00	$ 5.83	$ 1.72
$ 800.95	$ 456.77	0.00	$ 5.89	$ 1.63
$ 830.23	$ 459.68	0.00	$ 5.95	$ 1.54
$ 849.30	$ 456.54	0.00	$ 6.01	$ 1.45
$ 868.63	$ 453.33	0.00	$ 6.07	$ 1.37
$ 888.29	$ 450.09	0.00	$ 6.13	$ 1.29
$ 908.22	$ 446.78	0.00	$ 6.19	$ 1.22
$ 939.67	$ 448.79	0.00	$ 6.25	$ 1.15
$ 960.39	$ 445.33	0.00	$ 6.31	$ 1.09
$ 981.39	$ 441.81	0.00	$ 6.37	$ 1.03
$ 16,188.48	$ 9,674.82	0.00	$ 121.42	$ 40.75

Discount Rate	7%
Discount Year	2023
Analysis Period Begin - Benefits Realized	2030
Vehicle Operating Costs / Mile	0.56

Year	VMT Avoided	Operating Cost Savings	Discounted Operating Cost Savings
2030	0	$ -	$ -
2031	29673	$ 16,616.73	$ 9,671.09
2032	29969	$ 16,782.89	$ 9,128.78
2033	30268	$ 16,950.28	$ 8,616.66
2034	30572	$ 17,120.12	$ 8,133.64
2035	30877	$ 17,291.17	$ 7,677.49
2036	31187	$ 17,464.67	$ 7,247.22
2037	31499	$ 17,639.39	$ 6,840.86
2038	31813	$ 17,815.33	$ 6,457.10
2039	32132	$ 17,993.72	$ 6,095.09
2040	32452	$ 18,173.32	$ 5,753.21
2041	32777	$ 18,355.37	$ 5,430.69
2042	33105	$ 18,538.65	$ 5,126.09
2043	33436	$ 18,724.36	$ 4,838.73
2044	33770	$ 18,911.30	$ 4,567.33
2045	34108	$ 19,100.68	$ 4,311.28
2046	34449	$ 19,291.29	$ 4,069.44
2047	34793	$ 19,484.33	$ 3,841.27
2048	35140	$ 19,678.60	$ 3,625.77
2049	35492	$ 19,875.32	$ 3,422.44
2050	35847	$ 20,074.47	$ 3,230.59
TOTAL		$ 365,882.01	$ 118,084.76

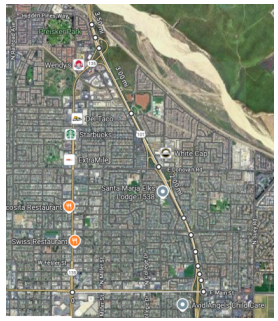
SECTION 4: BENEFITS

SR 166 SAFETY/TRUCK IMPROVEMENTS

Input	Value	Source
General		
Discount Rate	7%	BCA Guidance for Discretionary Grant Programs
Discount Year	2023	
Discount Rate - CO2	3%	
Dollar Year	2023	
Deflator	See "Deflator" Sheet	Table 10.1: https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/budget/
Analysis Period (years)	30	BCA Guidance for Discretionary Grant Programs
Construction Begin	2027	
Construction End / Project Completion	2030	
Analysis Period Begin - Benefits Realized	2030	
Final year of analysis period	2050	
Annualization - days to year	365	General
Annualization - weeks / year	52	
100 Million Multiplier	100,000,000	
Round Trip Multiplier	2	
Conversion - minutes to hours	60	
Conversion - pound to ton	2,000	
Conversion - pounds to metric tons	2205	www.metric-conversions.org
Conversion - grams to metric tons	1,000,000	
Conversion - kg to metric tons	1,000	

Truck Route Info		
SR 166 5-Axle Truck AADT	1,140	Existing Conditions Report
NB Truck Reroute Net Change in Miles	-1.17	Google Maps (See snips)
SB Truck Reroute net change in miles	-0.48	
Annual truck growth rate	4%	Annualized growth rate from Ex. Conds Report
NB vs SB Split	66%	Streetlight Analysis, Ex Conds Report
Percent of Trucks diverted	80%	Assumptions
Effects on System and Service Performance		
Pavement Costs - 5-axle trucks, urban interstate / Mile (2000$)	$0.105	https://www.fhwa.dot.gov/policy/hcas/addendum.cfm
Pavement Costs - 5-axle trucks, urban interstate / Mile (2023$)	$0.176	https://apps.bea.gov/iTable/?reqid=19&step=3&isuri=1&1921=survey&1903=11#eyJhcHBpZCI6MTksInN0ZXBzIjpbMSwyLDMsM10
Congestion Costs - trucks, urban / Mile (2023$)	$0.358	BCA Guidance for Discretionary Grant Programs
Noise Costs - truck, urban / Mile (2023$)	$0.045	
Safety, Competitiveness, Reliability, Trip or Transit Time, and Resilience		
Average Speed (mph)	55	Posted Speed
Value of Time - all purposes (2023$)	$21.54	BCA Guidance for Discretionary Grant Programs
PDO Crash (2023$)	$9,500	BCA Guidance for Discretionary Grant Programs
Injury Crash (2023$)	$329,500	
Fatality Crash (2023$)	$14,806,000	
Fatalities / 1,000,000 miles (2019-2023)	0.00	SR 166 Existing Conditions Report
Injuries / 1,000,000 miles (2019-2023)	0.6	
Truck Emissions		
Pollutant	Emission Rate - Trucks	Cal B/C Parameters (55 mph)
Nox (g/mile)	1.085	
PM2.5 (g/mile)	0.015	
CO2 (g/mile)	974.822	
Sox (g/mile)	0.009	
Efficiencies from Improved Connections with Other Modes		
Truck Operating Costs / Mile (2023$)	$1.27	BCA Guidance for Discretionary Grant Programs

Damage Costs for Emissions per Metric Ton				
Year	Nox	Sox	PM2.5	CO2
2024	$18,800	$50,900	$912,200	$56
2025	$19,000	$51,900	$928,000	$57
2026	$19,400	$52,900	$942,700	$58
2027	$19,800	$53,800	$957,700	$59
2028	$20,100	$54,800	$972,900	$60
2029	$20,500	$55,800	$988,400	$61
2030	$20,900	$56,800	$1,004,100	$62
2031	$20,900	$56,800	$1,004,100	$63
2032	$20,900	$56,800	$1,004,100	$65
2033	$20,900	$56,800	$1,004,100	$66
2034	$20,900	$56,800	$1,004,100	$67
2035	$20,900	$56,800	$1,004,100	$68
2036	$20,900	$56,800	$1,004,100	$69
2037	$20,900	$56,800	$1,004,100	$70
2038	$20,900	$56,800	$1,004,100	$72
2039	$20,900	$56,800	$1,004,100	$73
2040	$20,900	$56,800	$1,004,100	$74
2041	$20,900	$56,800	$1,004,100	$75
2042	$20,900	$56,800	$1,004,100	$76
2043	$20,900	$56,800	$1,004,100	$78
2044	$20,900	$56,800	$1,004,100	$79
2045	$20,900	$56,800	$1,004,100	$80
2046	$20,900	$56,800	$1,004,100	$81
2047	$20,900	$56,800	$1,004,100	$82
2048	$20,900	$56,800	$1,004,100	$84
2049	$20,900	$56,800	$1,004,100	$85
2050	$20,900	$56,800	$1,004,100	$86
2051	$20,900	$56,800	$1,004,100	$87
2052	$20,900	$56,800	$1,004,100	$88
2053	$20,900	$56,800	$1,004,100	$88
2054	$20,900	$56,800	$1,004,100	$88



Truck Growth Rate	4%
Annualization - days to year	365
Analysis Period Begin - Benefits Realized	2030
<u>Truck Trip Info</u>	
SR 166 5-Axle Truck AADT	1,140
NB Truck Reroute Net Change in Miles	-1.17
SB Truck Reroute net change in miles	-0.48
NB vs SB Split	0.66
Percent of Trucks diverted	80%

Year	Annual Truck Trips	NB Truck Trips	SB Truck Trips	VMT Avoided
2025	416100	274625	141475	
2026	430664	284240	146424	
2027	445737	294185	151552	
2028	461338	304485	156853	
2029	477485	315140	162345	
2030	494197	326170	168027	369817
2031	511494	337585	173909	382761
2032	529396	349400	179996	396157
2033	547925	361630	186295	410023
2034	567102	374285	192817	424372
2035	586951	387390	199561	439228
2036	607494	400945	206549	454599
2037	628756	414980	213776	470511
2038	650762	429505	221257	486979
2039	673539	444535	229004	504022
2040	697113	460095	237018	521664
2041	721512	476200	245312	539923
2042	746765	492865	253900	558819
2043	772902	510115	262787	578378
2044	799954	527970	271984	598622
2045	827952	546450	281502	619574
2046	856930	565575	291355	641259
2047	886923	585370	301553	663703
2048	917965	605855	312110	686931
2049	950094	627060	323034	710973
2050	983347	649010	334337	735859

Discount Rate	7%
Discount Year	2023
Analysis Period Begin - Benefits Realized	2030
Pavement Costs - autos, urban interstate / Mile (2021$)	0.105
Congestion Costs - autos, urban interstate / Mile (2021$)	0.358
Noise Costs - autos, urban interstate / Mile (2021$)	0.0453

Year	VMT Avoided	Pavement	Discounted Total
2030	369817	$ 38,830.84	$ 24,181.89
2031	382761	$ 40,189.86	$ 23,390.87
2032	396157	$ 41,596.47	$ 22,625.72
2033	410023	$ 43,052.41	$ 21,885.66
2034	424372	$ 44,559.11	$ 21,169.71
2035	439228	$ 46,118.99	$ 20,477.38
2036	454599	$ 47,732.93	$ 19,807.47
2037	470511	$ 49,403.68	$ 19,159.60
2038	486979	$ 51,132.83	$ 18,532.89
2039	504022	$ 52,922.34	$ 17,926.63
2040	521664	$ 54,774.70	$ 17,340.27
2041	539923	$ 56,691.92	$ 16,773.09
2042	558819	$ 58,676.02	$ 16,224.41
2043	578378	$ 60,729.67	$ 15,693.70
2044	598622	$ 62,855.29	$ 15,180.37
2045	619574	$ 65,055.27	$ 14,683.83
2046	641259	$ 67,332.14	$ 14,203.51
2047	663703	$ 69,688.78	$ 13,738.91
2048	686931	$ 72,127.70	$ 13,289.47
2049	710973	$ 74,652.19	$ 12,854.77
2050	735859	$ 77,265.17	$ 12,434.31
	TOTAL	$ 1,175,388.32	$ 371,574.47

Discount Rate	7%
Discount Year	2023
Analysis Period Begin - Benefits Realized	2030
Fatality Crash (2023$)	14806000
Injury Crash (2023$)	329500
PDO Crash (2023$)	9500
Fatalities / 1,000,000 miles (2019-2023)	0.00
Injuries / 1,000,000 miles (2019-2023)	0.60
1 Million Multiplier	1000000

Year	VMT Avoided	Fatalities Avoided	Injuries Avoided	Value of Fatalities Avoided	Value of Injuries Avoided	Total	Discounted Total
2030	369817	0.00	0.22	$ -	$ 73,212.49	$ 73,212.49	$ 45,593.06
2031	382761	0.00	0.23	$ -	$ 75,774.83	$ 75,774.83	$ 44,101.64
2032	396157	0.00	0.24	$ -	$ 78,426.87	$ 78,426.87	$ 42,659.02
2033	410023	0.00	0.25	$ -	$ 81,171.93	$ 81,171.93	$ 41,263.69
2034	424372	0.00	0.25	$ -	$ 84,012.70	$ 84,012.70	$ 39,913.83
2035	439228	0.00	0.26	$ -	$ 86,953.72	$ 86,953.72	$ 38,608.49
2036	454599	0.00	0.27	$ -	$ 89,996.68	$ 89,996.68	$ 37,345.42
2037	470511	0.00	0.28	$ -	$ 93,146.76	$ 93,146.76	$ 36,123.92
2038	486979	0.00	0.29	$ -	$ 96,406.93	$ 96,406.93	$ 34,942.31
2039	504022	0.00	0.30	$ -	$ 99,780.91	$ 99,780.91	$ 33,799.25
2040	521664	0.00	0.31	$ -	$ 103,273.39	$ 103,273.39	$ 32,693.71
2041	539923	0.00	0.32	$ -	$ 106,888.15	$ 106,888.15	$ 31,624.35
2042	558819	0.00	0.34	$ -	$ 110,629.02	$ 110,629.02	$ 30,589.85
2043	578378	0.00	0.35	$ -	$ 114,501.02	$ 114,501.02	$ 29,589.24
2044	598622	0.00	0.36	$ -	$ 118,508.70	$ 118,508.70	$ 28,621.40
2045	619574	0.00	0.37	$ -	$ 122,656.59	$ 122,656.59	$ 27,685.21
2046	641259	0.00	0.39	$ -	$ 126,949.46	$ 126,949.46	$ 26,779.59
2047	663703	0.00	0.40	$ -	$ 131,392.71	$ 131,392.71	$ 25,903.63
2048	686931	0.00	0.41	$ -	$ 135,991.11	$ 135,991.11	$ 25,056.25
2049	710973	0.00	0.43	$ -	$ 140,750.83	$ 140,750.83	$ 24,236.66
2050	735859	0.00	0.44	$ -	$ 145,677.40	$ 145,677.40	$ 23,443.92
TOTAL		0.000	6.726	$ -	$ 2,216,102.20	$ 2,216,102.20	$ 700,574.43

Discount Rate	7%
Discount Year	2023
Discount Rate - CO2	3%
Analysis Period Begin - Benefits Realized	2030
Conversion - grams to metric tons	1,000,000
Conversion - kg to metric tons	1,000
Annualization - days to year	365

Automobile Emissions

Nox (g/mile)	1.085
PM2.5 (g/mile)	0.015
CO2 (g/mile)	974.8
Sox (g/mile)	0.009

Year	VMT Avoided	Nox Avoided (MT)	Nox Avoided ($)	Discounted Nox Avoided ($)	PM2.5 Avoided (MT)	PM2.5 Avoided ($)	Discounted PM2.5 Avoided ($)	CO2 Avoided (MT)	CO2 Avoided ($)	Discounted CO2 Avoided ($)	SOX Avoided (MT)	SOX Avoided ($)	Discounted SOX Avoided ($)
2030	369817	0.40	$ 8,385.39	$ 5,222.00	0.01	$ 5,495.74	$ 3,422.47	360.51	$ 22,351.38	$ 18,173.71	0.00	$ 191.15	$ 119.04
2031	382761	0.42	$ 8,678.87	$ 5,051.18	0.01	$ 5,688.08	$ 3,310.52	373.12	$ 23,506.77	$ 18,556.46	0.00	$ 197.84	$ 115.15
2032	396157	0.43	$ 8,982.62	$ 4,885.95	0.01	$ 5,887.16	$ 3,202.23	386.18	$ 25,101.85	$ 19,238.48	0.00	$ 204.77	$ 111.38
2033	410023	0.44	$ 9,297.03	$ 4,726.14	0.01	$ 6,093.22	$ 3,097.48	399.70	$ 26,380.15	$ 19,629.31	0.00	$ 211.93	$ 107.74
2034	424372	0.46	$ 9,622.40	$ 4,571.53	0.01	$ 6,306.46	$ 2,996.16	413.69	$ 27,717.06	$ 20,023.39	0.00	$ 219.35	$ 104.21
2035	439228	0.48	$ 9,959.25	$ 4,422.02	0.01	$ 6,527.23	$ 2,898.17	428.17	$ 29,115.52	$ 20,421.04	0.00	$ 227.03	$ 100.80
2036	454599	0.49	$ 10,307.77	$ 4,277.36	0.01	$ 6,755.66	$ 2,803.36	443.15	$ 30,577.57	$ 20,821.84	0.00	$ 234.97	$ 97.51
2037	470511	0.51	$ 10,668.57	$ 4,137.45	0.01	$ 6,992.12	$ 2,711.66	458.66	$ 32,106.52	$ 21,226.19	0.00	$ 243.20	$ 94.32
2038	486979	0.53	$ 11,041.97	$ 4,002.12	0.01	$ 7,236.84	$ 2,622.97	474.72	$ 34,179.70	$ 21,938.65	0.00	$ 251.71	$ 91.23
2039	504022	0.55	$ 11,428.41	$ 3,871.20	0.01	$ 7,490.11	$ 2,537.16	491.33	$ 35,867.22	$ 22,351.27	0.00	$ 260.52	$ 88.25
2040	521664	0.57	$ 11,828.42	$ 3,744.57	0.01	$ 7,752.28	$ 2,454.17	508.53	$ 37,631.16	$ 22,767.47	0.00	$ 269.64	$ 85.36
2041	539923	0.59	$ 12,242.44	$ 3,622.09	0.01	$ 8,023.62	$ 2,373.90	526.33	$ 39,474.65	$ 23,187.19	0.00	$ 279.08	$ 82.57
2042	558819	0.61	$ 12,670.90	$ 3,503.61	0.01	$ 8,304.43	$ 2,296.25	544.75	$ 41,400.93	$ 23,610.37	0.01	$ 288.84	$ 79.87
2043	578378	0.63	$ 13,114.38	$ 3,389.00	0.01	$ 8,595.09	$ 2,221.13	563.82	$ 43,977.59	$ 24,349.32	0.01	$ 298.95	$ 77.25
2044	598622	0.65	$ 13,573.40	$ 3,278.15	0.01	$ 8,895.93	$ 2,148.48	583.55	$ 46,100.41	$ 24,781.24	0.01	$ 309.42	$ 74.73
2045	619574	0.67	$ 14,048.47	$ 3,170.93	0.01	$ 9,207.29	$ 2,078.21	603.97	$ 48,317.93	$ 25,216.76	0.01	$ 320.25	$ 72.28
2046	641259	0.70	$ 14,540.16	$ 3,067.20	0.01	$ 9,529.54	$ 2,010.23	625.11	$ 50,634.13	$ 25,655.89	0.01	$ 331.45	$ 69.92
2047	663703	0.72	$ 15,049.07	$ 2,966.87	0.01	$ 9,863.07	$ 1,944.47	646.99	$ 53,053.32	$ 26,098.72	0.01	$ 343.05	$ 67.63
2048	686931	0.75	$ 15,575.74	$ 2,869.82	0.01	$ 10,208.25	$ 1,880.86	669.63	$ 56,249.32	$ 26,864.99	0.01	$ 355.06	$ 65.42
2049	710973	0.77	$ 16,120.90	$ 2,775.95	0.01	$ 10,565.55	$ 1,819.34	693.07	$ 58,911.12	$ 27,316.78	0.01	$ 367.49	$ 63.28
2050	735859	0.80	$ 16,685.16	$ 2,685.15	0.01	$ 10,935.36	$ 1,759.83	717.33	$ 61,690.47	$ 27,772.37	0.01	$ 380.35	$ 61.21
TOTAL		12.14	$ 253,821.30	$ 80,240.30	0.17	$ 166,353.05	$ 52,589.04	10912.32	$ 824,344.74	$ 480,001.45	0.10	$ 5,786.04	$ 1,829.14

TOTAL Emissions Avoided (Discounted) $ 614,659.93

Discount Rate	7%
Discount Year	2023
Analysis Period Begin - Benefits Realized	2030
Vehicle Operating Costs / Mile	1.27

Year	VMT Avoided	Operating Cost Savings	Discounted Operating Cost Savings
2030	0	$ -	$ -
2031	369817	$ 469,668.21	$ 273,351.17
2032	382761	$ 486,105.98	$ 264,409.45
2033	396157	$ 503,119.22	$ 255,760.30
2034	410023	$ 520,729.16	$ 247,394.67
2035	424372	$ 538,953.06	$ 239,301.60
2036	439228	$ 557,820.15	$ 231,475.53
2037	454599	$ 577,341.16	$ 223,902.85
2038	470511	$ 597,549.31	$ 216,579.37
2039	486979	$ 618,463.80	$ 209,495.09
2040	504022	$ 640,108.32	$ 202,641.90
2041	521664	$ 662,513.07	$ 196,013.71
2042	539923	$ 685,702.22	$ 189,602.38
2043	558819	$ 709,700.43	$ 183,400.08
2044	578378	$ 734,539.87	$ 177,400.99
2045	598622	$ 760,249.66	$ 171,598.36
2046	619574	$ 786,858.94	$ 165,985.44
2047	641259	$ 814,398.32	$ 160,555.88
2048	663703	$ 842,902.39	$ 155,304.07
2049	686931	$ 872,401.76	$ 150,223.65
2050	710973	$ 902,935.98	$ 145,309.82
	TOTAL	$ 13,282,060.99	$ 4,059,706.31

PROJECT INFORMATION

Legend	
User-Supplied Data	0.000
Model Default	0.000
Model Calculation	0.000

Agency:	SBCAG
Project Title:	SR 166 Mulitmodal Corridor Study
Date:	8/6/2025
Analyst:	ALC
Build Alternative Name	Imp 9 (Safety Truck)

PROJECT DATA

Enter basic project data here. The green cells require user-supplied data when a default blue cell is not adjacent. The blue cells are model defaults, but can be overridden by entering a value in the green cell next to the blue default. All orange text represents model calculations.

Select roadway facility type from list	Rural Other		
Analysis Period (Years)	20		
Length of Construction Period (Years)	3		
Total Period	23		(analysis period years plus construction period years)
Annual Discount Rate (Percent)	3%	7%	
Percent of Trucks in the Flow (Percent)	9%	11%	
Fuel Cost (Dollars/Gallon)	$2.50	$ 4.27	
Value of Time ($/Hr.) Personal	$26.58	$ 21.10	
Value of Time ($/Hr.) Freight	$37.49	$ 35.70	
Calculated Combined Value of Time ($/Hr.)	$22.71		

The following information is used only for Reliability Benefit calculations. Reliability benefits are not estimated for facilities that are classified as *Urban or Rural Other*. User may ignore the information input items below for these facilities and move to the Project Costs section. See the BCA Guide or the Reference Guide for additional explanation.

Segment Length (Miles)	5	0.1	
Number of Lanes	2	2	(2 for two-lane roads; otherwise, number of lanes per direction)
Free Flow Speed (MPH)	40	55	
Traffic Volume (during peak period)	1550		
Link Capacity	9600		(passenger car equivalents for all lanes, or estimated by the Highway Capacity Manual
Hours of Peak Traffic per Day	2	3	(e.g., number of hours in am and/or pm peak)
Days of Analysis per Year	260	365	(e.g., 365 for analysis of all days or 260 for analysis of weekday travel time reliability)
Reliability Ratio Personal	1		
Reliability Ratio Freight	1.2		

PROJECT COSTS

Enter project life-cycle costs in table here. The green cells indicate data that is supplied by the user. The blue cells are model defaults. All orange text represents model calculations.

	DIRECT PROJECT COSTS						
	INITIAL COSTS			SUBSEQUENT COSTS			
Year	Project Support	Right-of-Way	Construction	Maintenance/ Operation	Rehabilitation	Mitigation	Present Value
Construction Period							
1				<-- Must enter a cost -->			$0
2							$0
3							$0
4							$0
5							$0
6							$0
7							$0
8							$0
Open to Public							
1							$0
2							$0
3							$0
4							$0
5							$0
6							$0
7							$0
8							$0
9							$0
10							$0
11							$0
12							$0
13							$0
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30							$0
31							$0
32							$0
33							$0
34							$0
35							$0
36							$0
37							$0
38							$0
39							$0
40							$0
41							$0
42							$0
43							$0
44							$0
45							$0
46							$0
47							$0
48							$0
49							$0
50							$0
Total	$0	$0	$0	$0	$0	$0	$0

PROJECT CRASH DATA

This sheet calculates annual reductions in crash frequency and severity for single or multiple countermeasures.

Color Codes	
User-Supplied Data	0.00
Model Parameter	0.00
Model Calculation	0.00
Linked Cell	0.00

1) Single or Multiple Countermeasure: Single Countermeasure

2) Calculation Method: Additive Method

BASELINE CRASH DATA AND CRASH MODIFICATION FACTORS

CMF Clearinghouse

Enter estimated annual crashes without treatment and Crash Modification Factors (CMF).

Injury Severity Scale	Estimated Annual Crashes without Treatment	CMF1	CMF2	
K	0.4	0.89		Threw out fatal crash that was DUI related at Simas
A	0.6	0.89		Threw serious injury crash that was DUI related at Simas
B	2.2	0.89		
C	5.8	0.89		
O	0			
CMF Clearinghouse ID		4855		

Next Step

CALCULATION FOR THE ANNUAL REDUCTION IN CRASH FREQUENCY AND SEVERITY

This section automatically calculates annual reduction in crash frequency and severity. No user input is required for this table. However, if the user wishes to override or enter externally calculated Crash Reductions, they may be entered in the Green cells, Column (5).

Formula 1: Estimated Annual Reductions with Treatment (3)	= (1) Estimated Crashes without Treatment x (2) Crash Modfication Factor
Formula 2: Annual Reduction in Crashes (4)	= (3) Estimated Annual Reduction with Treatment - (1) Estimated Crashes without Treatment

	(1)	(2)	(3)	(4)	(5)
Injury Severity Scale	Estimated Annual Crashes without Treatment	Crash Modification Factor	Estimated Annual Crashes with Treatment	Annual Reduction in Crashes	User Determined Reduction in Crashes
K	0.400	0.890	0.356	0.044	
A	0.600	0.890	0.534	0.066	
B	2.200	0.890	1.958	0.242	
C	5.800	0.890	5.162	0.638	
O	0.000	0.000	0.000	0.000	
Total	9.000		8.010	0.990	0.00

CMF CALCULATIONS FOR MULTIPLE COUNTERMEASURES (NOT APPLICABLE TO SINGLE COUNTERMEASURES)

This section automatically calculates a CMF value for the project when multiple countermeasures are being evaluated. Not applicable to single countermeasures. No user input is required for this table.

Analysis Type	Single Countermeasure
Calculation Method	Not applicable

Severity Scale	Dominant Effect	Additive Method	Multiplicative Method	Dominant Common Residuals Method
K	0.00	-0.11	0.00	0.00
A	0.00	-0.11	0.00	0.00
B	0.00	-0.11	0.00	0.00
C	0.00	-0.11	0.00	0.00
O	0.00	-1.00	0.00	0.00

ANALYSIS PARAMETERS

This page lists model-defined parameters from the Lookup worksheet.

Model-defined parameters are based on the "Roadway Facility Type" selected by the user on the Project Information worksheet.

Roadway Facility Type	Rural Other		

Color Codes

User-Supplied Data

Model Parameter

	Parameter	User Defined
Value of Time	22.71	

Users may modify default values by entering user defined values in the green cells on the right of the Lookup entry.

Travel Time Delay Factors	(Hours/Crash)	
Fatal	104.82	0.00
Injury	13.86	0.00
PDO	10.33	0.00

Vehicle Operation Cost Factors	(Gallons/Crash)	
Fatal	36.00	0.00
Injury	9.00	0.00
PDO	8.00	0.00

Next Step

Emissions Factors (Dollars/Crash)	CO2	CO	NOx	PM10	PM2.5	SO2	VOC
Fatal	$15.47	$0.00	$6.28	$0.00	$17.54	$1.28	$0.28
Injury	$3.93	$0.00	$1.59	$0.00	$4.38	$0.32	$0.07
PDO	$3.28	$0.00	$1.34	$0.00	$3.59	$0.28	$0.06

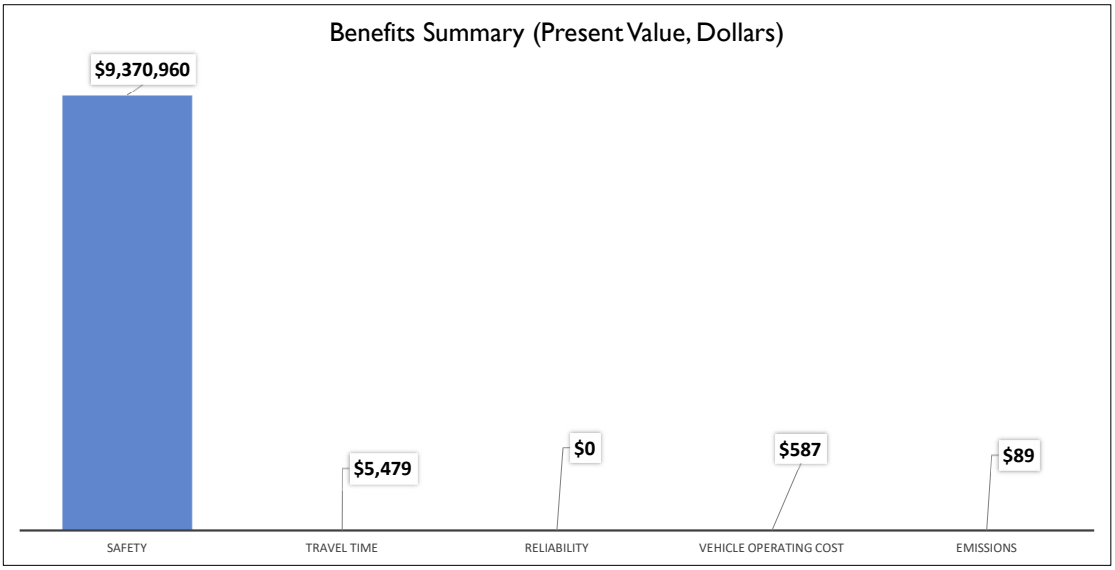
SR 166 Mulitmodal Corridor Study

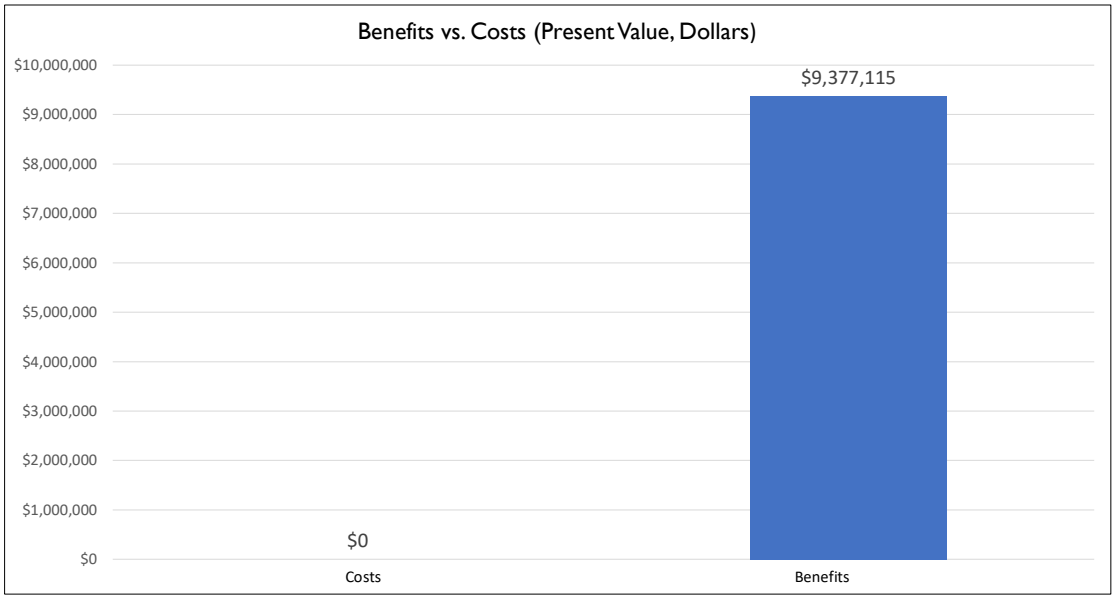
Benefit-Cost Analysis Summary Results

AGENCY: SBCAG **DATE** 8/6/2025

Present Value Costs ($ Dollars)	$0
Present Value Benefits ($ Dollars)	$9,377,115
Net Present Value ($ Dollars)	$9,377,115
Benefit / Cost Ratio:	#DIV/0!
Discount Rate	7.0%

ITEMIZED BENEFITS ($ Dollars)	Present Value
Safety	$9,370,960
Travel Time	$5,479
Reliability	$0
Vehicle Operating Cost	$587
Emissions	$89
TOTAL BENEFITS	**$9,377,115**





SECTION 4: BENEFITS

BETTERAVIA ROAD/MAHONEY ROAD

PROJECT INFORMATION

Legend	
User-Supplied Data	0.000
Model Default	0.000
Model Calculation	0.000

Agency:	**SBCAG**
Project Title:	**SR 166 Mulitmodal Corridor Study**
Date:	**8/6/2025**
Analyst:	**ALC**
Build Alternative Name	**Imp 10 (Betteravia/Mahoney RAB)**

PROJECT DATA

Enter basic project data here. The green cells require user-supplied data when a default blue cell is not adjacent. The blue cells are model defaults, but can be overridden by entering a value in the green cell next to the blue default. All orange text represents model calculations.

Select roadway facility type from list	Rural Other		
Analysis Period (Years)	20		
Length of Construction Period (Years)	3		
Total Period	23		(analysis period years plus construction period years)
Annual Discount Rate (Percent)	3%	7%	
Percent of Trucks in the Flow (Percent)	9%	11%	
Fuel Cost (Dollars/Gallon)	$2.50	$ 4.27	
Value of Time ($/Hr.) Personal	$26.58	$ 21.10	
Value of Time ($/Hr.) Freight	$37.49	$ 35.70	
Calculated Combined Value of Time ($/Hr.)	$22.71		

The following information is used only for Reliability Benefit calculations. Reliability benefits are not estimated for facilities that are classified as *Urban or Rural Other*. User may ignore the information input items below for these facilities and move to the Project Costs section. See the BCA Guide or the Reference Guide for additional explanation.

Segment Length (Miles)	5	0.1	
Number of Lanes	2	2	(2 for two-lane roads; otherwise, number of lanes per direction)
Free Flow Speed (MPH)	40	55	
Traffic Volume (during peak period)	1162		
Link Capacity	6400		(passenger car equivalents for all lanes, or estimated by the Highway Capacity Manua
Hours of Peak Traffic per Day	2		(e.g., number of hours in am and/or pm peak)
Days of Analysis per Year	260	365	(e.g., 365 for analysis of all days or 260 for analysis of weekday travel time reliability)
Reliability Ratio Personal	1		
Reliability Ratio Freight	1.2		

PROJECT COSTS

Enter project life-cycle costs in table here. The green cells indicate data that is supplied by the user. The blue cells are model defaults. All orange text represents model calculations.

	DIRECT PROJECT COSTS						
	INITIAL COSTS			SUBSEQUENT COSTS			
Year	Project Support	Right-of-Way	Construction	Maintenance/ Operation	Rehabilitation	Mitigation	Present Value
Construction Period							
1				<-- Must enter a cost -->			$0
2							$0
3							$0
4							$0
5							$0
6							$0
7							$0
8							$0
Open to Public							
1							$0
2							$0
3							$0
4							$0
5							$0
6							$0
7							$0
8							$0
9							$0
10							$0
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15							$0
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22							$0
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32							$0
33							$0
34							$0
35							$0
36							$0
37							$0
38							$0
39							$0
40							$0
41							$0
42							$0
43							$0
44							$0
45							$0
46							$0
47							$0
48							$0
49							$0
50							$0
Total	$0	$0	$0	$0	$0	$0	$0

PROJECT CRASH DATA

This sheet calculates annual reductions in crash frequency and severity for single or multiple countermeasures.

Color Codes	
User-Supplied Data	0.00
Model Parameter	0.00
Model Calculation	0.00
Linked Cell	0.00

1) Single or Multiple Countermeasure: Single Countermeasure

2) Calculation Method: Additive Method

BASELINE CRASH DATA AND CRASH MODIFICATION FACTORS

CMF Clearinghouse

Enter estimated annual crashes without treatment and Crash Modification Factors (CMF).

Injury Severity Scale	Estimated Annual Crashes without Treatment	CMF1	CMF2
K	0	0.18	
A	0.2	0.18	
B	0.6	0.18	
C	1	0.18	
O	0	0.18	
CMF Clearinghouse ID		211	

Next Step

CALCULATION FOR THE ANNUAL REDUCTION IN CRASH FREQUENCY AND SEVERITY

This section automatically calculates annual reduction in crash frequency and severity. No user input is required for this table. However, if the user wishes to override or enter externally calculated Crash Reductions, they may be entered in the Green cells, Column (5).

Formula 1: Estimated Annual Reductions with Treatment (3) = (1) Estimated Crashes without Treatment x (2) Crash Modfication Factor

Formula 2: Annual Reduction in Crashes (4) = (3) Estimated Annual Reduction with Treatment - (1) Estimated Crashes without Treatment

	(1)	(2)	(3)	(4)	(5)
Injury Severity Scale	Estimated Annual Crashes without Treatment	Crash Modification Factor	Estimated Annual Crashes with Treatment	Annual Reduction in Crashes	User Determined Reduction in Crashes
K	0.000	0.180	0.000	**0.000**	
A	0.200	0.180	0.036	**0.164**	
B	0.600	0.180	0.108	**0.492**	
C	1.000	0.180	0.180	**0.820**	
O	0.000	0.180	0.000	**0.000**	
Total	1.800		0.324	1.476	0.00

CMF CALCULATIONS FOR MULTIPLE COUNTERMEASURES (NOT APPLICABLE TO SINGLE COUNTERMEASURES)

This section automatically calculates a CMF value for the project when multiple countermeasures are being evaluated. Not applicable to single countermeasures. No user input is required for this table.

Analysis Type		Single Countermeasure
Calculation Method		Not applicable

Severity Scale	Dominant Effect	Additive Method	Multiplicative Method	Dominant Common Residuals Method
K	0.00	-0.82	0.00	0.00
A	0.00	-0.82	0.00	0.00
B	0.00	-0.82	0.00	0.00
C	0.00	-0.82	0.00	0.00
O	0.00	-0.82	0.00	0.00

ANALYSIS PARAMETERS

This page lists model-defined parameters from the Lookup worksheet.
Model-defined parameters are based on the "Roadway Facility Type" selected by the user on the Project Information worksheet.

Roadway Facility Type	Rural Other		

Color Codes

User-Supplied Data	
Model Parameter	

	Parameter	User Defined
Value of Time	22.71	

Users may modify default values by entering user defined values in the green cells on the right of the Lookup entry.

Travel Time Delay Factors	(Hours/Crash)	
Fatal	104.82	0.00
Injury	13.86	0.00
PDO	10.33	0.00

Vehicle Operation Cost Factors	(Gallons/Crash)	
Fatal	36.00	0.00
Injury	9.00	0.00
PDO	8.00	0.00

Next Step

Emissions Factors (Dollars/Crash)	CO2	CO	NOx	PM10	PM2.5	SO2	VOC
Fatal	$15.47	$0.00	$6.28	$0.00	$17.54	$1.28	$0.28
Injury	$3.93	$0.00	$1.59	$0.00	$4.38	$0.32	$0.07
PDO	$3.28	$0.00	$1.34	$0.00	$3.59	$0.28	$0.06

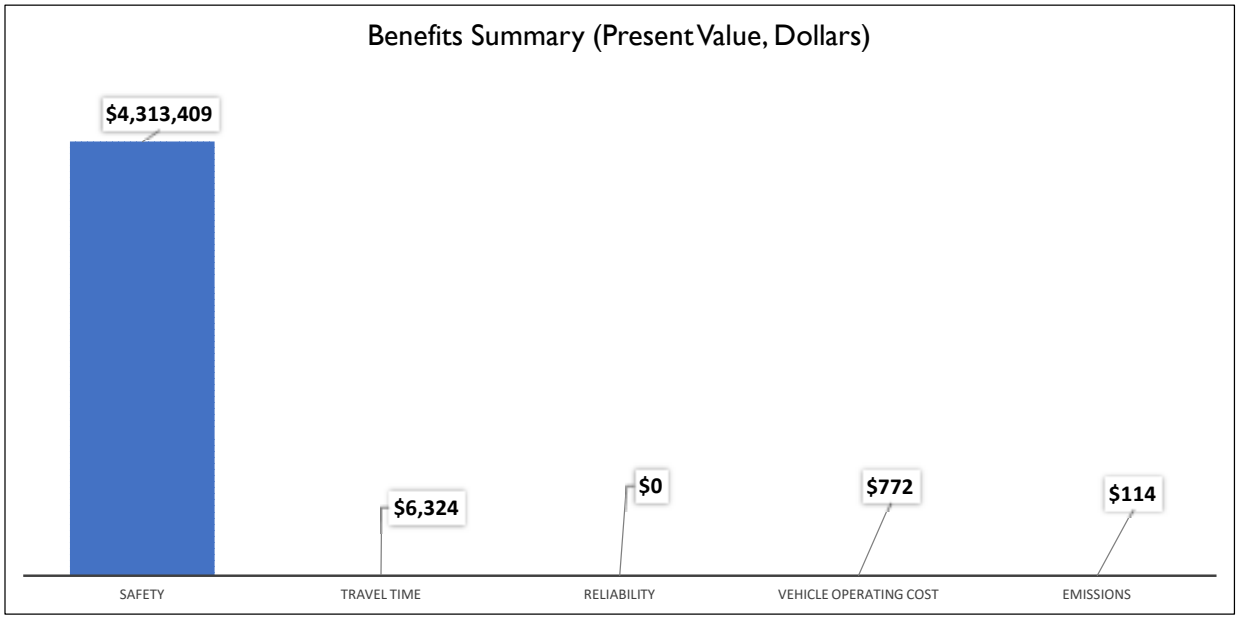
SR 166 Mulitmodal Corridor Study

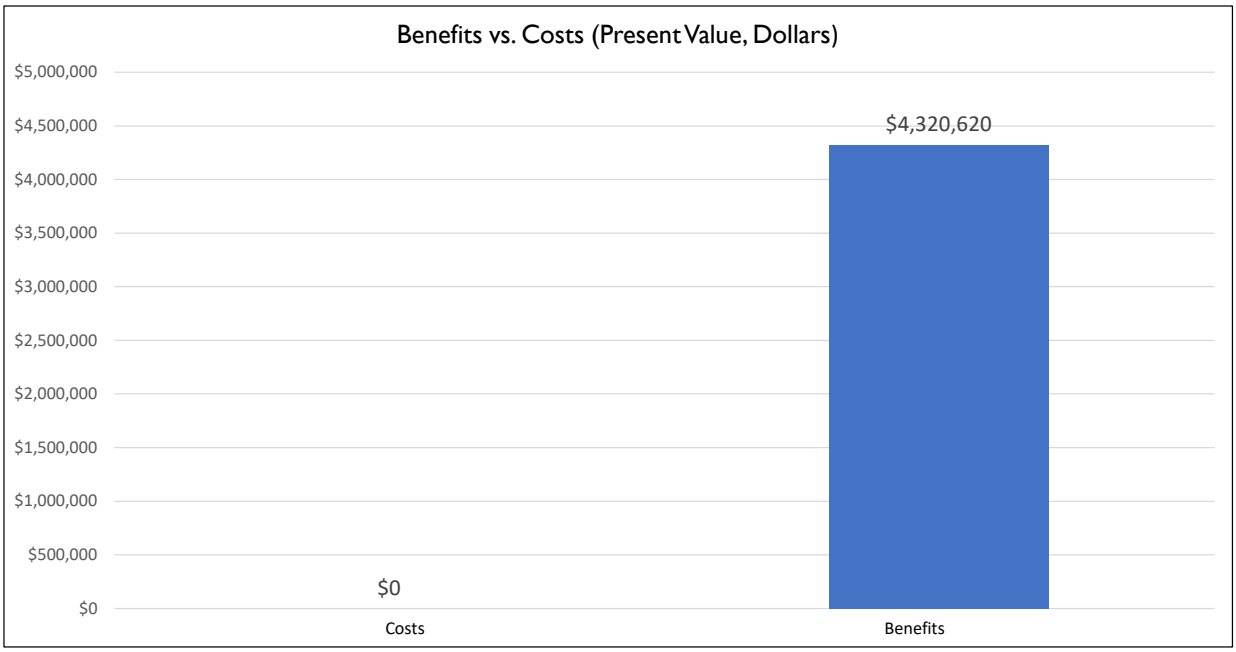
Benefit-Cost Analysis Summary Results

AGENCY: SBCAG **DATE** 8/6/2025

Present Value Costs ($ Dollars)	$0
Present Value Benefits ($ Dollars)	$4,320,620
Net Present Value ($ Dollars)	$4,320,620
Benefit / Cost Ratio:	#DIV/0!
Discount Rate	7.0%

ITEMIZED BENEFITS ($ Dollars)	Present Value
Safety	$4,313,409
Travel Time	$6,324
Reliability	$0
Vehicle Operating Cost	$772
Emissions	$114
TOTAL BENEFITS	**$4,320,620**





Delay Net Present Value Calculator (SR166 Multimodal Imps)

Description: This calculator was created to supplement the cost of person delay associated with the NCHRP 3-110 tool. This sheet documents assumptions made in the calculation tabs of this sheet.

Assumptions:

1. Assume that trucks have 1 person in them, therefore truck delay = person delay for trucks.
2. Assume linear growth of delay and intersection total entering vehicles between year of opening and design year.
3. Passenger and Truck driver cost/hour determined using Benefit-Cost Analysis Guidance for Discretionary Grant Programs guidance from 2025

NO BUILD ALTERNATIVE

General Parameters

Truck Percent	3%	
Passenger Veh Delay Cost	16.45	$ Per Person Hour
Truck Delay Cost	37.55	$ Per Person Hour
Avg. Passengers/Veh	1.5	Person/Veh
Discount Year	2023	
Discount Rate	7%	

Delay Parameters

	PM Peak	
2025	200	Ex Conds
2050	271	No Build
2050	29	Build

Volume Parameters

	PM Peak TEV
2025	1435
2045	1940

Year	PM Peak No Build Delay/veh	PM Peak Build Delay/veh	PM Peak Change in Delay/veh (No Build to Build)	Daily TEV	Change in Avg Annual Delay (Vehicle Hours)	Avg Annual Delay (Person Hrs) (Passenger Veh)	Avg Annual Delay (Person Hrs) (Trucks)	Passenger Veh Benefit	Truck Benefit	Total Benefit	Discounted Total Benefit
2025	200.46	-	-	14,350	-	-	-	-	-	-	-
2026	203.28	-	-	14,603	-	-	-	-	-	-	-
2027	206.10	-	-	14,855	-	-	-	-	-	-	-
2028	208.92	-	-	15,108	-	-	-	-	-	-	-
2029	211.74	-	-	14,350	-	-	-	-	-	-	-
2030	214.56	22.96	-191.60	15,613	(9,486)	(13,801.90)	(285)	$ 227,041	$ 10,686	$ 237,727	$ 148,044
2031	217.39	23.26	-194.12	15,865	(9,766)	(14,209.56)	(293)	$ 233,747	$ 11,001	$ 244,749	$ 142,446
2032	220.21	23.56	-196.64	16,118	(10,050)	(14,623.10)	(302)	$ 240,550	$ 11,322	$ 251,872	$ 137,001
2033	223.03	23.87	-199.16	16,370	(10,338)	(15,042.50)	(310)	$ 247,449	$ 11,646	$ 259,095	$ 131,711
2034	225.85	24.17	-201.68	16,623	(10,631)	(15,467.78)	(319)	$ 254,445	$ 11,976	$ 266,421	$ 126,574
2035	228.67	24.47	-204.20	16,875	(10,927)	(15,898.92)	(328)	$ 261,537	$ 12,309	$ 273,847	$ 121,591
2036	231.50	24.77	-206.72	17,128	(11,227)	(16,335.94)	(337)	$ 268,726	$ 12,648	$ 281,374	$ 116,760
2037	234.32	25.07	-209.24	17,380	(11,532)	(16,778.83)	(346)	$ 276,012	$ 12,991	$ 289,002	$ 112,080
2038	237.14	25.38	-211.76	17,633	(11,840)	(17,227.59)	(355)	$ 283,394	$ 13,338	$ 296,732	$ 107,549
2039	239.96	25.68	-214.28	17,885	(12,153)	(17,682.22)	(365)	$ 290,873	$ 13,690	$ 304,563	$ 103,166
2040	242.78	25.98	-216.80	18,138	(12,469)	(18,142.72)	(374)	$ 298,448	$ 14,047	$ 312,494	$ 98,928
2041	245.60	26.28	-219.32	18,390	(12,790)	(18,609.10)	(384)	$ 306,120	$ 14,408	$ 320,527	$ 94,832
2042	248.43	26.58	-221.84	18,643	(13,114)	(19,081.34)	(393)	$ 313,888	$ 14,773	$ 328,661	$ 90,878
2043	251.25	26.89	-224.36	18,895	(13,443)	(19,559.46)	(403)	$ 321,753	$ 15,143	$ 336,896	$ 87,060
2044	254.07	27.19	-226.88	19,148	(13,776)	(20,043.44)	(413)	$ 329,715	$ 15,518	$ 345,233	$ 83,378
2045	256.89	27.49	-229.40	19,400	(14,112)	(20,533.30)	(423)	$ 337,773	$ 15,897	$ 353,670	$ 79,828
2046	259.71	27.79	-231.92	19,653	(14,453)	(21,029.03)	(434)	$ 345,927	$ 16,281	$ 362,209	$ 76,407
2047	262.53	28.09	-234.44	19,905	(14,798)	(21,530.63)	(444)	$ 354,179	$ 16,670	$ 370,848	$ 73,112
2048	265.36	28.40	-236.96	20,158	(15,146)	(22,038.10)	(454)	$ 362,527	$ 17,062	$ 379,589	$ 69,939
2049	268.18	28.70	-239.48	20,410	(15,499)	(22,551.44)	(465)	$ 370,971	$ 17,460	$ 388,431	$ 66,886
2050	271.00	29.00	-242.00	19,400	(14,887)	(21,661.01)	(447)	$ 356,324	$ 16,771	$ 373,094	$ 60,042
NPV								**$ 3,050,311**	**$ 295,637**	**$ 6,577,035**	**$ 2,128,214**

Notes:

This calculator extrapolates PM Peak delay to all hours of the day using daily volume profile on SR166.

This calculator extrapolates PM Peak TEV volume to Daily TEV using 10*PM Peak TEV.

TOD	Hourly Total	% Of Peak	% of ADT
12:00 AM	36	5%	0.4%
1:00 AM	22	3%	0.2%
2:00 AM	23	3%	0.2%
3:00 AM	34	4%	0.3%
4:00 AM	201	26%	2.0%
5:00 AM	459	60%	4.6%
6:00 AM	700	91%	7.1%
7:00 AM	635	83%	6.4%
8:00 AM	523	68%	5.3%
9:00 AM	479	62%	4.8%
10:00 AM	454	59%	4.6%
11:00 AM	506	66%	5.1%
12:00 PM	637	83%	6.4%
1:00 PM	626	82%	6.3%
2:00 PM	689	90%	6.9%
3:00 PM	737	96%	7.4%
4:00 PM	767	100%	7.7%
5:00 PM	758	99%	7.6%
6:00 PM	561	73%	5.7%
7:00 PM	399	52%	4.0%
8:00 PM	274	36%	2.8%
9:00 PM	240	31%	2.4%
10:00 PM	102	13%	1.0%
11:00 PM	59	8%	0.6%

Volumes from 2024 hourly tube counts on SR166 just W of Bonita School Road

SECTION 4: BENEFITS

BETTERAVIA ROAD/US 101 INTERCHANGE IMPROVEMENTS

Betteravia at US101 SB

General Parameters

Truck Percent	3%	
Passenger Veh Delay Cost	16.45	$ Per Person Hour
Truck Delay Cost	37.55	$ Per Person Hour
Avg. Passengers/Veh	1.5	Person/Veh
Discount Year	2023	
Discount Rate	7%	

Delay Parameters

	PM Peak	
2025	14	Ex Conds
2050	21	No Build
2050	22	Build

Volume Parameters

	PM Peak TEV
2025	3165
2045	3975

Year	PM Peak No Build Delay/veh	PM Peak Build Delay/veh	PM Peak Change in Delay/veh (No Build to Build)	Daily TEV	Change in Avg Annual Delay (Vehicle Hours)	Avg Annual Delay (Person Hrs) (Passenger Veh)	Avg Annual Delay (Person Hrs) (Trucks)	Passenger Veh Benefit	Truck Benefit	Total Benefit	Discounted Total Benefit
2025	14.00	-	-	31,650	-	-	-	-	-	-	-
2026	14.28	-	-	32,055	-	-	-	-	-	-	-
2027	14.56	-	-	32,460	-	-	-	-	-	-	-
2028	14.84	-	-	32,865	-	-	-	-	-	-	-
2029	15.12	-	-	31,650	-	-	-	-	-	-	-
2030	15.40	16.13	0.73	33,675	78	113.94	2	$ (1,874)	$ (88)	$ (1,963)	$ (1,222)
2031	15.68	16.43	0.75	34,080	81	117.41	2	$ (1,931)	$ (91)	$ (2,022)	$ (1,177)
2032	15.96	16.72	0.76	34,485	83	120.92	2	$ (1,989)	$ (94)	$ (2,083)	$ (1,133)
2033	16.24	17.01	0.77	34,890	86	124.49	3	$ (2,048)	$ (96)	$ (2,144)	$ (1,090)
2034	16.52	17.31	0.79	35,295	88	128.10	3	$ (2,107)	$ (99)	$ (2,207)	$ (1,048)
2035	16.80	17.60	0.80	35,700	91	131.77	3	$ (2,168)	$ (102)	$ (2,270)	$ (1,008)
2036	17.08	17.89	0.81	36,105	93	135.49	3	$ (2,229)	$ (105)	$ (2,334)	$ (968)
2037	17.36	18.19	0.83	36,510	96	139.25	3	$ (2,291)	$ (108)	$ (2,399)	$ (930)
2038	17.64	18.48	0.84	36,915	98	143.07	3	$ (2,353)	$ (111)	$ (2,464)	$ (893)
2039	17.92	18.77	0.85	37,320	101	146.93	3	$ (2,417)	$ (114)	$ (2,531)	$ (857)
2040	18.20	19.07	0.87	37,725	104	150.85	3	$ (2,481)	$ (117)	$ (2,598)	$ (823)
2041	18.48	19.36	0.88	38,130	106	154.81	3	$ (2,547)	$ (120)	$ (2,667)	$ (789)
2042	18.76	19.65	0.89	38,535	109	158.83	3	$ (2,613)	$ (123)	$ (2,736)	$ (756)
2043	19.04	19.95	0.91	38,940	112	162.89	3	$ (2,680)	$ (126)	$ (2,806)	$ (725)
2044	19.32	20.24	0.92	39,345	115	167.01	3	$ (2,747)	$ (129)	$ (2,877)	$ (695)
2045	19.60	20.53	0.93	39,750	118	171.17	4	$ (2,816)	$ (133)	$ (2,948)	$ (665)
2046	19.88	20.83	0.95	40,155	121	175.39	4	$ (2,885)	$ (136)	$ (3,021)	$ (637)
2047	20.16	21.12	0.96	40,560	123	179.65	4	$ (2,955)	$ (139)	$ (3,094)	$ (610)
2048	20.44	21.41	0.97	40,965	126	183.97	4	$ (3,026)	$ (142)	$ (3,169)	$ (584)
2049	20.72	21.71	0.99	41,370	129	188.33	4	$ (3,098)	$ (146)	$ (3,244)	$ (559)
2050	21.00	22.00	1.00	39,750	126	183.40	4	$ (3,017)	$ (142)	$ (3,159)	$ (508)
NPV								**$ (25,338)**	**$ (2,460)**	**$ (54,733)**	**$ (17,678)**

Notes:

This calculator extrapolates PM Peak delay to all hours of the day using daily volume profile on SR166.

This calculator extrapolates PM Peak TEV volume to Daily TEV using 10*PM Peak TEV.

Betteravia at US101 NB

General Parameters

Truck Percent	3%	
Passenger Veh Delay Cost	16.45	$ Per Person Hour
Truck Delay Cost	37.55	$ Per Person Hour
Avg. Passengers/Veh	1.5	Person/Veh
Discount Year	2023	
Discount Rate	7%	

Delay Parameters

	PM Peak	
2025	51	Ex Conds
2050	43	No Build
2050	12	Build

Volume Parameters

	PM Peak TEV
2025	2185
2045	3090

Year	PM Peak No Build Delay/veh	PM Peak Build Delay/veh	PM Peak Change in Delay/veh (No Build to Build)	Daily TEV	Change in Avg Annual Delay (Vehicle Hours)	Avg Annual Delay (Person Hrs) (Passenger Veh)	Avg Annual Delay (Person Hrs) (Trucks)	Passenger Veh Benefit	Truck Benefit	Total Benefit	Discounted Total Benefit
2025	51.00	-	-	21,850	-	-	-	-	-	-	-
2026	50.68	-	-	22,303	-	-	-	-	-	-	-
2027	50.36	-	-	22,755	-	-	-	-	-	-	-
2028	50.04	-	-	23,208	-	-	-	-	-	-	-
2029	49.72	-	-	21,850	-	-	-	-	-	-	-
2030	49.40	13.79	-35.61	24,113	(2,723)	(3,962.09)	(82)	$ 65,176	$ 3,068	$ 68,244	$ 42,499
2031	49.08	13.70	-35.38	24,565	(2,756)	(4,010.29)	(83)	$ 65,969	$ 3,105	$ 69,074	$ 40,202
2032	48.76	13.61	-35.15	25,018	(2,789)	(4,057.54)	(84)	$ 66,746	$ 3,141	$ 69,888	$ 38,014
2033	48.44	13.52	-34.92	25,470	(2,820)	(4,103.82)	(85)	$ 67,508	$ 3,177	$ 70,685	$ 35,933
2034	48.12	13.43	-34.69	25,923	(2,852)	(4,149.13)	(86)	$ 68,253	$ 3,212	$ 71,466	$ 33,953
2035	47.80	13.34	-34.46	26,375	(2,882)	(4,193.49)	(86)	$ 68,983	$ 3,247	$ 72,230	$ 32,071
2036	47.48	13.25	-34.23	26,828	(2,912)	(4,236.88)	(87)	$ 69,697	$ 3,280	$ 72,977	$ 30,283
2037	47.16	13.16	-34.00	27,280	(2,941)	(4,279.30)	(88)	$ 70,395	$ 3,313	$ 73,708	$ 28,585
2038	46.84	13.07	-33.77	27,733	(2,970)	(4,320.77)	(89)	$ 71,077	$ 3,345	$ 74,422	$ 26,974
2039	46.52	12.98	-33.54	28,185	(2,997)	(4,361.27)	(90)	$ 71,743	$ 3,377	$ 75,119	$ 25,446
2040	46.20	12.89	-33.31	28,638	(3,025)	(4,400.80)	(91)	$ 72,393	$ 3,407	$ 75,800	$ 23,996
2041	45.88	12.80	-33.08	29,090	(3,051)	(4,439.38)	(92)	$ 73,028	$ 3,437	$ 76,465	$ 22,623
2042	45.56	12.71	-32.85	29,543	(3,077)	(4,476.99)	(92)	$ 73,646	$ 3,466	$ 77,113	$ 21,322
2043	45.24	12.63	-32.61	29,995	(3,102)	(4,513.63)	(93)	$ 74,249	$ 3,495	$ 77,744	$ 20,090
2044	44.92	12.54	-32.38	30,448	(3,127)	(4,549.32)	(94)	$ 74,836	$ 3,522	$ 78,358	$ 18,925
2045	44.60	12.45	-32.15	30,900	(3,151)	(4,584.04)	(95)	$ 75,407	$ 3,549	$ 78,957	$ 17,822
2046	44.28	12.36	-31.92	31,353	(3,174)	(4,617.80)	(95)	$ 75,963	$ 3,575	$ 79,538	$ 16,778
2047	43.96	12.27	-31.69	31,805	(3,196)	(4,650.59)	(96)	$ 76,502	$ 3,601	$ 80,103	$ 15,792
2048	43.64	12.18	-31.46	32,258	(3,218)	(4,682.42)	(97)	$ 77,026	$ 3,625	$ 80,651	$ 14,860
2049	43.32	12.09	-31.23	32,710	(3,239)	(4,713.29)	(97)	$ 77,534	$ 3,649	$ 81,183	$ 13,979
2050	43.00	12.00	-31.00	30,900	(3,038)	(4,419.59)	(91)	$ 72,702	$ 3,422	$ 76,124	$ 12,251
NPV								**$ 763,071**	**$ 71,014**	**$ 1,579,847**	**$ 532,397**

Notes:

This calculator extrapolates PM Peak delay to all hours of the day using daily volume profile on SR166.

This calculator extrapolates PM Peak TEV volume to Daily TEV using 10*PM Peak TEV.

Betteravia at Nicholson

General Parameters

Truck Percent	3%	
Passenger Veh Delay Cost	16.45	$ Per Person Hour
Truck Delay Cost	37.55	$ Per Person Hour
Avg. Passengers/Veh	1.5	Person/Veh
Discount Year	2023	
Discount Rate	7%	

Delay Parameters

	PM Peak	
2025	1	Ex Conds
2050	95	No Build
2050	12	Build

Volume Parameters

	PM Peak TEV
2025	728
2045	1600

Year	PM Peak No Build Delay/veh	PM Peak Build Delay/veh	PM Peak Change in Delay/veh (No Build to Build)	Daily TEV	Change in Avg Annual Delay (Vehicle Hours)	Avg Annual Delay (Person Hrs) (Passenger Veh)	Avg Annual Delay (Person Hrs) (Trucks)	Passenger Veh Benefit	Truck Benefit	Total Benefit	Discounted Total Benefit
2025	1.00	-	-	7,280	-	-	-	-	-	-	-
2026	4.76	-	-	7,716	-	-	-	-	-	-	-
2027	8.52	-	-	8,152	-	-	-	-	-	-	-
2028	12.28	-	-	8,588	-	-	-	-	-	-	-
2029	16.04	-	-	7,280	-	-	-	-	-	-	-
2030	19.80	2.50	-17.30	9,460	(519)	(755.04)	(16)	$ 12,420	$ 585	$ 13,005	$ 8,099
2031	23.56	2.98	-20.58	9,896	(646)	(939.83)	(19)	$ 15,460	$ 728	$ 16,188	$ 9,422
2032	27.32	3.45	-23.87	10,332	(782)	(1,137.84)	(23)	$ 18,717	$ 881	$ 19,598	$ 10,660
2033	31.08	3.93	-27.15	10,768	(927)	(1,349.06)	(28)	$ 22,192	$ 1,044	$ 23,237	$ 11,812
2034	34.84	4.40	-30.44	11,204	(1,081)	(1,573.50)	(32)	$ 25,884	$ 1,218	$ 27,102	$ 12,876
2035	38.60	4.88	-33.72	11,640	(1,245)	(1,811.16)	(37)	$ 29,794	$ 1,402	$ 31,196	$ 13,851
2036	42.36	5.35	-37.01	12,076	(1,417)	(2,062.03)	(43)	$ 33,920	$ 1,596	$ 35,517	$ 14,738
2037	46.12	5.83	-40.29	12,512	(1,599)	(2,326.12)	(48)	$ 38,265	$ 1,801	$ 40,066	$ 15,538
2038	49.88	6.30	-43.58	12,948	(1,789)	(2,603.43)	(54)	$ 42,826	$ 2,016	$ 44,842	$ 16,253
2039	53.64	6.78	-46.86	13,384	(1,989)	(2,893.95)	(60)	$ 47,605	$ 2,241	$ 49,846	$ 16,885
2040	57.40	7.25	-50.15	13,820	(2,198)	(3,197.69)	(66)	$ 52,602	$ 2,476	$ 55,078	$ 17,436
2041	61.16	7.73	-53.43	14,256	(2,416)	(3,514.64)	(72)	$ 57,816	$ 2,721	$ 60,537	$ 17,911
2042	64.92	8.20	-56.72	14,692	(2,642)	(3,844.82)	(79)	$ 63,247	$ 2,977	$ 66,224	$ 18,311
2043	68.68	8.68	-60.00	15,128	(2,878)	(4,188.20)	(86)	$ 68,896	$ 3,243	$ 72,139	$ 18,642
2044	72.44	9.15	-63.29	15,564	(3,124)	(4,544.81)	(94)	$ 74,762	$ 3,519	$ 78,281	$ 18,906
2045	76.20	9.63	-66.57	16,000	(3,378)	(4,914.63)	(101)	$ 80,846	$ 3,805	$ 84,651	$ 19,107
2046	79.96	10.10	-69.86	16,436	(3,641)	(5,297.67)	(109)	$ 87,147	$ 4,102	$ 91,248	$ 19,249
2047	83.72	10.58	-73.14	16,872	(3,913)	(5,693.93)	(117)	$ 93,665	$ 4,408	$ 98,073	$ 19,335
2048	87.48	11.05	-76.43	17,308	(4,195)	(6,103.40)	(126)	$ 100,401	$ 4,725	$ 105,126	$ 19,369
2049	91.24	11.53	-79.71	17,744	(4,485)	(6,526.09)	(135)	$ 107,354	$ 5,053	$ 112,407	$ 19,356
2050	95.00	12.00	-83.00	16,000	(4,211)	(6,127.17)	(126)	$ 100,792	$ 4,744	$ 105,536	$ 16,984
NPV								**$ 479,773**	**$ 55,284**	**$ 1,229,896**	**$ 334,740**

Notes:

This calculator extrapolates PM Peak delay to all hours of the day using daily volume profile on SR166.

This calculator extrapolates PM Peak TEV volume to Daily TEV using 10*PM Peak TEV.

PROJECT INFORMATION

Legend	
User-Supplied Data	0.000
Model Default	0.000
Model Calculation	0.000

Agency:	SBCAG
Project Title:	SR 166 Mulitmodal Corridor Study
Date:	8/6/2025
Analyst:	ALC
Build Alternative Name	Imp 10 (Betteravia Interchange RAB)

PROJECT DATA

Enter basic project data here. The green cells require user-supplied data when a default blue cell is not adjacent. The blue cells are model defaults, but can be overridden by entering a value in the green cell next to the blue default. All orange text represents model calculations.

Select roadway facility type from list	Urban Other		
Analysis Period (Years)	20		
Length of Construction Period (Years)	10		
Total Period	30		(analysis period years plus construction period years)
Annual Discount Rate (Percent)	3%	7%	
Percent of Trucks in the Flow (Percent)	4%	11%	
Fuel Cost (Dollars/Gallon)	$2.50	$ 4.27	
Value of Time ($/Hr.) Personal	$26.20	$ 21.10	
Value of Time ($/Hr.) Freight	$35.83	$ 35.70	
Calculated Combined Value of Time ($/Hr.)	$22.71		

The following information is used only for Reliability Benefit calculations. Reliability benefits are not estimated for facilities that are classified as *Urban or Rural Other*. User may ignore the information input items below for these facilities and move to the Project Costs section. See the BCA Guide or the Reference Guide for additional explanation.

Segment Length (Miles)	5	0.1	
Number of Lanes	2	2	(2 for two-lane roads; otherwise, number of lanes per direction)
Free Flow Speed (MPH)	35	40	
Traffic Volume (during peak period)	1162		
Link Capacity	6400		(passenger car equivalents for all lanes, or estimated by the Highway Capacity Manua
Hours of Peak Traffic per Day	2	2	(e.g., number of hours in am and/or pm peak)
Days of Analysis per Year	260	365	(e.g., 365 for analysis of all days or 260 for analysis of weekday travel time reliability)
Reliability Ratio Personal	1		
Reliability Ratio Freight	1.2		

PROJECT COSTS

Enter project life-cycle costs in table here. The green cells indicate data that is supplied by the user. The blue cells are model defaults. All orange text represents model calculations.

	DIRECT PROJECT COSTS						
	INITIAL COSTS			SUBSEQUENT COSTS			
Year	Project Support	Right-of-Way	Construction	Maintenance/ Operation	Rehabilitation	Mitigation	Present Value
Construction Period							
1				<-- Must enter a cost -->			$0
2							$0
3							$0
4							$0
5							$0
6							$0
7							$0
8							$0
Open to Public							
1							$0
2							$0
3							$0
4							$0
5							$0
6							$0
7							$0
8							$0
9							$0
10							$0
11							$0
12							$0
13							$0
14							$0
15							$0
16							$0
17							$0
18							$0
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21							$0
22							$0
23							$0
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26							$0
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28							$0
29							$0
30							$0
31							$0
32							$0
33							$0
34							$0
35							$0
36							$0
37							$0
38							$0
39							$0
40							$0
41							$0
42							$0
43							$0
44							$0
45							$0
46							$0
47							$0
48							$0
49							$0
50							$0
Total	$0	$0	$0	$0	$0	$0	$0

PROJECT CRASH DATA

This sheet calculates annual reductions in crash frequency and severity for single or multiple countermeasures.

Color Codes	
User-Supplied Data	0.00
Model Parameter	0.00
Model Calculation	0.00
Linked Cell	0.00

1) Single or Multiple Countermeasure: Single Countermeasure

2) Calculation Method: Additive Method

BASELINE CRASH DATA AND CRASH MODIFICATION FACTORS

CMF Clearinghouse

Enter estimated annual crashes without treatment and Crash Modification Factors (CMF).

Injury Severity Scale	Estimated Annual Crashes without Treatment	CMF1	CMF2
K	0		
A	0	0.3	
B	0.8	0.3	
C	0.6	0.3	
O	0		
CMF Clearinghouse ID		4880	

Next Step

CALCULATION FOR THE ANNUAL REDUCTION IN CRASH FREQUENCY AND SEVERITY

This section automatically calculates annual reduction in crash frequency and severity. No user input is required for this table. However, if the user wishes to override or enter externally calculated Crash Reductions, they may be entered in the Green cells, Column (5).

Formula 1: Estimated Annual Reductions with Treatment (3) = (1) Estimated Crashes without Treatment x (2) Crash Modfication Factor

Formula 2: Annual Reduction in Crashes (4) = (3) Estimated Annual Reduction with Treatment - (1) Estimated Crashes without Treatment

	(1)	(2)	(3)	(4)	(5)
Injury Severity Scale	Estimated Annual Crashes without Treatment	Crash Modification Factor	Estimated Annual Crashes with Treatment	Annual Reduction in Crashes	User Determined Reduction in Crashes
K	0.000	0.000	0.000	**0.000**	
A	0.000	0.300	0.000	**0.000**	
B	0.800	0.300	0.240	**0.560**	
C	0.600	0.300	0.180	**0.420**	
O	0.000	0.000	0.000	**0.000**	
Total	1.400		0.420	0.980	0.00

CMF CALCULATIONS FOR MULTIPLE COUNTERMEASURES (NOT APPLICABLE TO SINGLE COUNTERMEASURES)

This section automatically calculates a CMF value for the project when multiple countermeasures are being evaluated. Not applicable to single countermeasures. No user input is required for this table.

Analysis Type		Single Countermeasure
Calculation Method		Not applicable

Severity Scale	Dominant Effect	Additive Method	Multiplicative Method	Dominant Common Residuals Method
K	0.00	-1.00	0.00	0.00
A	0.00	-0.70	0.00	0.00
B	0.00	-0.70	0.00	0.00
C	0.00	-0.70	0.00	0.00
O	0.00	-1.00	0.00	0.00

ANALYSIS PARAMETERS

This page lists model-defined parameters from the Lookup worksheet.
Model-defined parameters are based on the "Roadway Facility Type" selected by the user on the Project Information worksheet.

Roadway Facility Type	Urban Other		

Color Codes

User-Supplied Data	
Model Parameter	

	Parameter	User Defined
Value of Time	22.71	

Users may modify default values by entering user defined values in the green cells on the right of the Lookup entry.

Travel Time Delay Factors	(Hours/Crash)	
Fatal	207.88	0.00
Injury	15.40	0.00
PDO	10.32	0.00

Vehicle Operation Cost Factors	(Gallons/Crash)	
Fatal	39.00	0.00
Injury	17.00	0.00
PDO	10.00	0.00

Next Step

Emissions Factors (Dollars/Crash)	CO2	CO	NOx	PM10	PM2.5	SO2	VOC
Fatal	$16.37	$0.00	$3.95	$0.00	$8.92	$1.41	$0.27
Injury	$7.18	$0.00	$1.72	$0.00	$3.76	$0.62	$0.12
PDO	$4.33	$0.00	$1.05	$0.00	$2.25	$0.36	$0.08

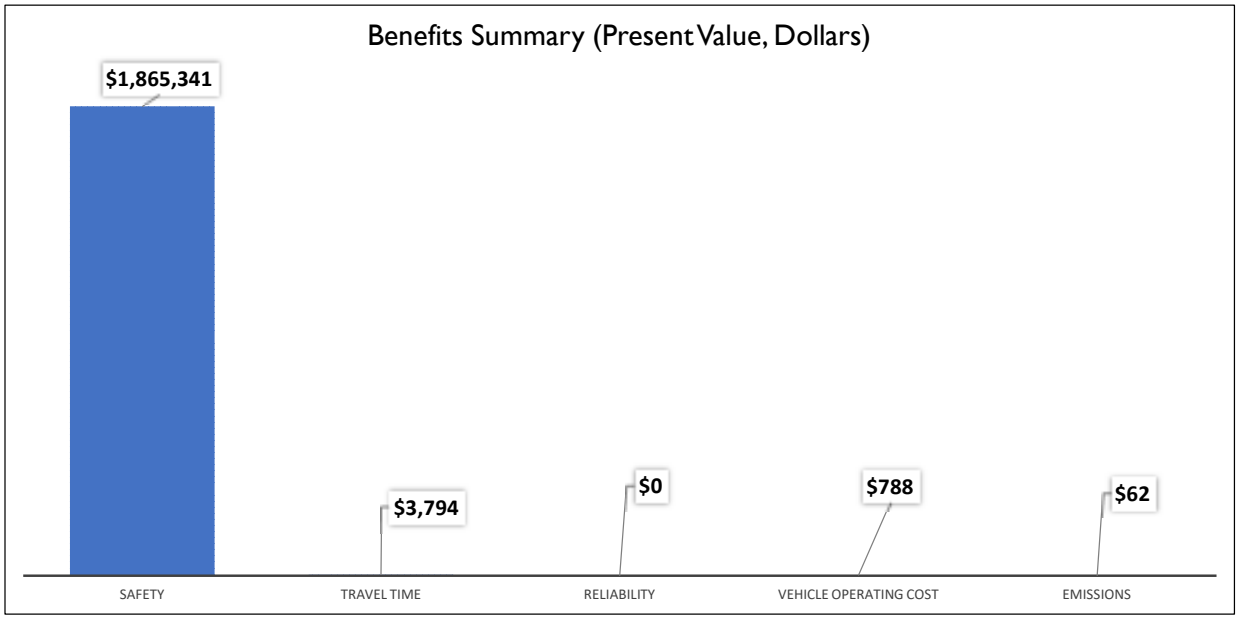
SR 166 Mulitmodal Corridor Study

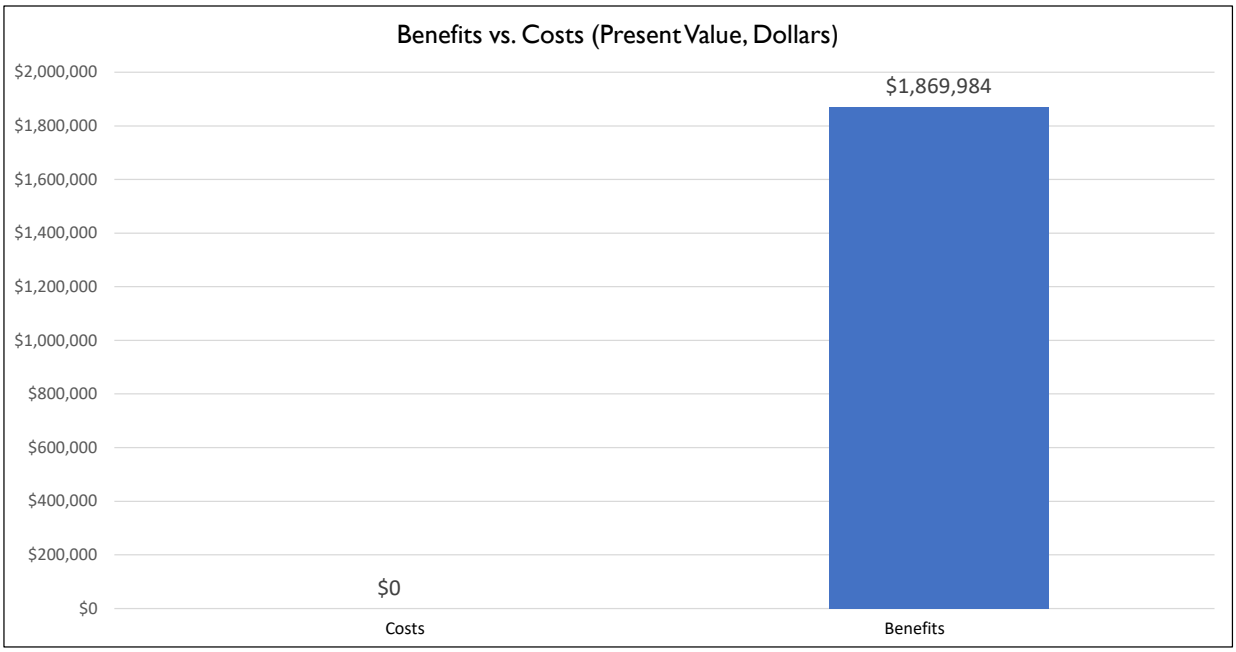
Benefit-Cost Analysis Summary Results

AGENCY: SBCAG **DATE** 8/6/2025

Present Value Costs ($ Dollars)	$0
Present Value Benefits ($ Dollars)	$1,869,984
Net Present Value ($ Dollars)	$1,869,984
Benefit / Cost Ratio:	#DIV/0!
Discount Rate	7.0%

ITEMIZED BENEFITS ($ Dollars)	Present Value
Safety	$1,865,341
Travel Time	$3,794
Reliability	$0
Vehicle Operating Cost	$788
Emissions	$62
TOTAL BENEFITS	**$1,869,984**





District: HQ

PROJECT: SR 166 Improvements - Betteravia Interchange PnR

EA:
PPNO:

1A PROJECT DATA

Type of Project	
Select project type from list	New Park and Ride Lot
Project Location (enter 1 for So. Cal., 2 for No. Cal., or 3 for rural)	3
Length of Construction Period	3 years

1B PARK-AND-RIDE LOT INFORMATION

Lot Design	No Build	Build
Number of Parking Spaces		40

Park-and-Ride Demand	No Build	Build
Typical Percent Filled (for current or opening year)		50%
Number of Years until Lot Reaches Capacity		20
Number of Bicycle/Pedestrian Users		0
Average Vehicle Occupancy of Lot Users		1.50

1C DESTINATION INFORMATION

Destination Description	Dest 1	Dest 2	Dest 3
Destination Name	Santa Maria Town Center	Santa Barbara	
Distance from Park-and-Ride Lot (miles)	2.5	60.7	
Distance to Next Lot (miles)			
Parking Cost at Destination (avg $/day)	$30.00	$30.00	

Demand for Travel to Destination		Dest 1	Dest 2	Dest 3
Percent of Lot Users to Destination		20%	80%	
Distribution (percent)	New Transit Riders	30%	30%	
	Existing Transit Riders	50%	50%	
	New Carpoolers	10%	10%	
	Existing Carpoolers	10%	10%	

Highway Travel to Destination	Dest 1	Dest 2	Dest 3
HOV Travel Time (in min)	10.0	70.0	
Non-HOV Travel Time (in min)	10.0	70.0	
Crash Rate (per million vehicle-miles)			
Percent Fatal Crashes (Pct Fat)			
Percent Injury Crashes (Pct Inj)			

Transit Travel to Destination		Dest 1	Dest 2	Dest 3
Express Bus	Travel Time (in min)			
	Average Fare			
	Headway (in min)			
Local Bus	Travel Time (in min)	10.0	120.0	
	Average Fare	$5.00	$5.00	

Carpool/Vanpool Travel to Destination	Dest 1	Dest 2	Dest 3
Average Carpool Size (people/vehicle)	2.2	2.2	
Average Carpool Wait Time (in min)	30.0	30.0	

Prepare Model for Next Set of Destinations

Enter all project costs (in today's dollars) in columns 1 to 7. Costs during construction should be entered in the first eight rows.
Project costs (including maintenance and operating costs) should be net of costs without project.

1D

PROJECT COSTS (enter costs in thousands of dollars)

Col. no.	(1)	(2)	(3)	(4)	(5)	(6)	(7)		
Year	DIRECT PROJECT COSTS					Mitigation	Transit Agency Cost Savings	TOTAL COSTS (in dollars)	
	INITIAL COSTS			SUBSEQUENT COSTS					
	Project Support	R / W	Construction	Maint./ Op.	Rehab.			Constant Dollars	Present Value
Construction Period									
1				<-- Must enter a cost -->				$0	$0
2				<-- Must enter a cost -->				0	0
3				<-- Must enter a cost -->				0	0
4								0	0
5								0	0
6								0	0
7								0	0
8								0	0
Project Open									
1								$0	$0
2								0	0
3								0	0
4								0	0
5								0	0
6								0	0
7								0	0
8								0	0
9								0	0
10								0	0
11								0	0
12								0	0
13								0	0
14								0	0
15								0	0
16								0	0
17								0	0
18								0	0
19								0	0
20								0	0
Total	$0	$0	$0	$0	$0	$0	$0	$0	$0

Residual Value in Year 21
(in thousands of dollars) $0

Present Value = Future Value (in Constant Dollars) / (1 + Real Discount Rate) ^ Year

District: HQ

PROJECT: SR 166 Improvements - Betteravia Interchange PnR

EA:
PPNO:

2

INVESTMENT ANALYSIS

SUMMARY RESULTS

Life-Cycle Costs (mil. $)	$0.0
Life-Cycle Benefits (mil. $)	$7.6
Net Present Value (mil. $)	$7.6
Benefit / Cost Ratio:	N/A
Rate of Return on Investment:	#NUM!
Payback Period:	N/A

ITEMIZED BENEFITS (mil. $)	Total Over 20 Years	Average Annual
Travel Time Savings	$4.81	$0.2
Veh. Op. Cost Savings	$2.78	$0.1
Accident Cost Savings	$0.00	$0.0
Emission Cost Savings	$0.06	$0.0
Residual Value	$0.00	
TOTAL BENEFITS	$7.64	
Person-Hours of Time Saved	682,660	34,133
VMT Reduction	7,011,365	350,568

Should benefit-cost results include:

1) Induced Travel is not considered		
2) Vehicle Operating Costs? (y/n)	Y	Default = Y
3) Accident Costs? (y/n)	Y	Default = Y
4) Vehicle Emissions? (y/n) includes value for CO_2e	Y	Default = Y

EMISSIONS REDUCTION	Tons: Total Over 20 Years	Tons: Average Annual	Value (mil. $): Total Over 20 Years	Value (mil. $): Average Annual
CO Emissions Saved	5	0	$0.0	$0.0
CO_2 Emissions Saved	2,034	102	$0.1	$0.0
NO_X Emissions Saved	0	0	$0.0	$0.0
PM_{10} Emissions Saved	0	0	$0.0	$0.0
$PM_{2.5}$ Emissions Saved	0	0		
SO_X Emissions Saved	0	0	$0.0	$0.0
VOC Emissions Saved	0	0	$0.0	$0.0

Mobility Benefit	Levee Trail								
Existing Commuters	0								
Total New Commuters	36								
Value of Time	$ 20.62	per Caltrans Life-Cycle		**VOT**	**16.45**	$	Per Hour	Per person	
Weeks per Year	47			Truck/Car Comp	22.85				
Day per Week	5				**Auto**	Truck			
Trips	2			Non fuel costs per mi	**0.356**	0.44			
				Fuel costs per gallon	**3.81**	3.87			
Off-Street Trail	20.38				20.616				
Bicycle Lane without Parking	18.02								
Bicycle Lane with Parking	15.83								
Off-Street Trail per Trip Benefit	$ 7.00								
Bicycle Lane without Parking per Trip Benefit	$ 6.19								
Bicycle Lane with Parking per Trip Benefit	$ 5.44								
Annual Mobility Benefit, Off-Street Trail	**$ 118,483**		0.14986376	$ 17,756.38					
Annual Mobility Benefit, Bicycle Lane without Parking	$ 104,763								
Annual Mobility Benefit, Bicycle Lane with Parking	$ 92,031								

Mobility Benefit	**Betteravia IC**							
Existing Commuters	0							
Total New Commuters	79							
Value of Time	$ 20.62	per Caltrans Life-Cycle		**VOT**	**16.45**	$	Per Hour	Per person
Weeks per Year	47			Truck/Car Comp	22.85			
Day per Week	5				**Auto**	Truck		
Trips	2			Non fuel costs per mi	**0.356**	0.44		
				Fuel costs per gallon	**3**	2.8		
Off-Street Trail	20.38				19.806			
Bicycle Lane without Parking	18.02							
Bicycle Lane with Parking	15.83							
Off-Street Trail per Trip Benefit	$ 7.00							
Bicycle Lane without Parking per Trip Benefit	$ 6.19							
Bicycle Lane with Parking per Trip Benefit	$ 5.44							
Annual Mobility Benefit, Off-Street Trail	$ 260,005		0.14986376	$ 38,965.38				
Annual Mobility Benefit, Bicycle Lane without Parking	$ 229,897							
Annual Mobility Benefit, Bicycle Lane with Parking	$ 201,957							

Annual Benefit (Levvee Trail)	$ 118,483
Annual Benefit (Interchange)	$ 229,897
Discount Rate	7%
Discount Year	2023
Year of Opening	2030

Year	Levvee Trail	Levvee Trail Discounted Total	Interchange
2030	$ 118,483.45	$ 73,785.54	$ 229,896.78
2031	$ 118,483.45	$ 68,958.45	$ 229,896.78
2032	$ 118,483.45	$ 64,447.15	$ 229,896.78
2033	$ 118,483.45	$ 60,230.98	$ 229,896.78
2034	$ 118,483.45	$ 56,290.63	$ 229,896.78
2035	$ 118,483.45	$ 52,608.07	$ 229,896.78
2036	$ 118,483.45	$ 49,166.42	$ 229,896.78
2037	$ 118,483.45	$ 45,949.92	$ 229,896.78
2038	$ 118,483.45	$ 42,943.86	$ 229,896.78
2039	$ 118,483.45	$ 40,134.44	$ 229,896.78
2040	$ 118,483.45	$ 37,508.83	$ 229,896.78
2041	$ 118,483.45	$ 35,054.98	$ 229,896.78
2042	$ 118,483.45	$ 32,761.66	$ 229,896.78
2043	$ 118,483.45	$ 30,618.38	$ 229,896.78
2044	$ 118,483.45	$ 28,615.30	$ 229,896.78
2045	$ 118,483.45	$ 26,743.27	$ 229,896.78
2046	$ 118,483.45	$ 24,993.71	$ 229,896.78
2047	$ 118,483.45	$ 23,358.61	$ 229,896.78
2048	$ 118,483.45	$ 21,830.48	$ 229,896.78
2049	$ 118,483.45	$ 20,402.32	$ 229,896.78
2050	$ 118,483.45	$ 19,067.59	$ 229,896.78
TOTAL	###########	$ 855,470.58	###########

Interchange Discounted Total	
$	143,168.16
$	133,802.02
$	125,048.62
$	116,867.87
$	109,222.30
$	102,076.92
$	95,398.99
$	89,157.94
$	83,325.17
$	77,873.99
$	72,779.43
$	68,018.16
$	63,568.38
$	59,409.70
$	55,523.08
$	51,890.73
$	48,496.01
$	45,323.37
$	42,358.29
$	39,587.19
$	36,997.37
$	1,659,893.70

Health Benefit	
Total New Cyclists, High	429
Total New Cyclists, Moderate	379
Total New Cyclists, Low	355
Annual Per Capita Cost Savings from Physical Activity	$128
Annual Health Benefit, High	$54,912
Annual Health Benefit, Moderate	$48,512
Annual Health Benefit, Low	$45,440

Health Benefit	
Total New Cyclists, High	835
Total New Cyclists, Moderate	711
Total New Cyclists, Low	653
Annual Per Capita Cost Savings from Physical Activity	$128
Annual Health Benefit, High	$106,880
Annual Health Benefit, Moderate	$91,008
Annual Health Benefit, Low	$83,584

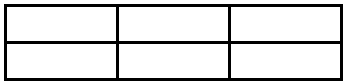
Annual Benefit (Levvee Trail)	$ 45,440
Annual Benefit (Interchange)	$ 83,584
Discount Rate	7%
Discount Year	2023
Year of Opening	2030

Year	Levvee Trail	Levvee Trail Discounted Total	Interchange
2030	$ 45,440.00	$ 28,297.75	$ 83,584.00
2031	$ 45,440.00	$ 26,446.49	$ 83,584.00
2032	$ 45,440.00	$ 24,716.35	$ 83,584.00
2033	$ 45,440.00	$ 23,099.39	$ 83,584.00
2034	$ 45,440.00	$ 21,588.22	$ 83,584.00
2035	$ 45,440.00	$ 20,175.90	$ 83,584.00
2036	$ 45,440.00	$ 18,855.98	$ 83,584.00
2037	$ 45,440.00	$ 17,622.42	$ 83,584.00
2038	$ 45,440.00	$ 16,469.55	$ 83,584.00
2039	$ 45,440.00	$ 15,392.10	$ 83,584.00
2040	$ 45,440.00	$ 14,385.14	$ 83,584.00
2041	$ 45,440.00	$ 13,444.06	$ 83,584.00
2042	$ 45,440.00	$ 12,564.54	$ 83,584.00
2043	$ 45,440.00	$ 11,742.56	$ 83,584.00
2044	$ 45,440.00	$ 10,974.35	$ 83,584.00
2045	$ 45,440.00	$ 10,256.41	$ 83,584.00
2046	$ 45,440.00	$ 9,585.43	$ 83,584.00
2047	$ 45,440.00	$ 8,958.34	$ 83,584.00
2048	$ 45,440.00	$ 8,372.28	$ 83,584.00
2049	$ 45,440.00	$ 7,824.56	$ 83,584.00
2050	$ 45,440.00	$ 7,312.68	$ 83,584.00
TOTAL	$ 954,240.00	$ 328,084.50	###########

Interchange Discounted Total	
$	52,051.91
$	48,646.65
$	45,464.16
$	42,489.87
$	39,710.16
$	37,112.30
$	34,684.39
$	32,415.32
$	30,294.69
$	28,312.79
$	26,460.55
$	24,729.49
$	23,111.67
$	21,599.69
$	20,186.63
$	18,866.01
$	17,631.78
$	16,478.30
$	15,400.28
$	14,392.79
$	13,451.20
$	603,490.64

Recreation Benefit

Total New Cyclists, High	429
Total New Cyclists, Moderate	379
Total New Cyclists, Low	355
Total New Commuters, 1600m	36
Total New Recreation Cyclists, High	393
Total New Recreation Cyclists, Moderat	343
Total New Recreation Cyclists, Low	319
Value of an Hour of Recreation	$10
Annual Recreation Benefit, High	$ 1,434,450
Annual Recreation Benefit, Moderate	$ 1,251,950
Annual Recreation Benefit, Low	$ 1,164,350



Recreation Benefit

Total New Cyclists, High		835
Total New Cyclists, Moderate		711
Total New Cyclists, Low		653
	0	79
Total New Recreation Cyclists, High		756
Total New Recreation Cyclists, Moderat		675
Total New Recreation Cyclists, Low		617
Value of an Hour of Recreation		$10
Annual Recreation Benefit, High		$ 2,759,400
Annual Recreation Benefit, Moderate		$ 2,463,750
Annual Recreation Benefit, Low		$ 2,252,050

2 Trip Ends	e HBW trip l	ommute days/year
158	632	123240

Annual Benefit (Levvee Trail)	$ 1,164,350
Annual Benefit (Interchange)	$ 2,252,050
Discount Rate	7%
Discount Year	2023
Year of Opening	2030

Year	Levvee Trail	Levvee Trail Discounted Total	Interchange
2030	$ 1,164,350.00	$ 725,098.66	$ 2,252,050.00
2031	$ 1,164,350.00	$ 677,662.30	$ 2,252,050.00
2032	$ 1,164,350.00	$ 633,329.25	$ 2,252,050.00
2033	$ 1,164,350.00	$ 591,896.50	$ 2,252,050.00
2034	$ 1,164,350.00	$ 553,174.30	$ 2,252,050.00
2035	$ 1,164,350.00	$ 516,985.32	$ 2,252,050.00
2036	$ 1,164,350.00	$ 483,163.85	$ 2,252,050.00
2037	$ 1,164,350.00	$ 451,555.00	$ 2,252,050.00
2038	$ 1,164,350.00	$ 422,014.02	$ 2,252,050.00
2039	$ 1,164,350.00	$ 394,405.63	$ 2,252,050.00
2040	$ 1,164,350.00	$ 368,603.39	$ 2,252,050.00
2041	$ 1,164,350.00	$ 344,489.15	$ 2,252,050.00
2042	$ 1,164,350.00	$ 321,952.48	$ 2,252,050.00
2043	$ 1,164,350.00	$ 300,890.17	$ 2,252,050.00
2044	$ 1,164,350.00	$ 281,205.76	$ 2,252,050.00
2045	$ 1,164,350.00	$ 262,809.12	$ 2,252,050.00
2046	$ 1,164,350.00	$ 245,616.00	$ 2,252,050.00
2047	$ 1,164,350.00	$ 229,547.67	$ 2,252,050.00
2048	$ 1,164,350.00	$ 214,530.53	$ 2,252,050.00
2049	$ 1,164,350.00	$ 200,495.82	$ 2,252,050.00
2050	$ 1,164,350.00	$ 187,379.27	$ 2,252,050.00
TOTAL	############	$ 8,406,804.22	############

Interchange Discounted Total	
$	1,402,463.56
$	1,310,713.60
$	1,224,965.98
$	1,144,828.02
$	1,069,932.73
$	999,937.13
$	934,520.68
$	873,383.82
$	816,246.56
$	762,847.25
$	712,941.36
$	666,300.33
$	622,710.59
$	581,972.52
$	543,899.55
$	508,317.33
$	475,062.93
$	443,984.05
$	414,938.36
$	387,792.86
$	362,423.23
$	16,260,182.45

Project VMT Reduction

Project # 1

Project Name	**Levee Trail**	
Total New Bike Commuters	36	
Net Benefit Per Mile, Urban	$ 0.13	
Net Benefit Per Mile, Suburban	$ 0.08	
Net Benefit Per Mile, Small Town/Rural	$ 0.01	
Total New Recreational Cyclists	96	
	132.22	
Average Round Trip Length	20.00	(based on 10 mile trail length)
Weeks per Year	47	
Days a Week	5	
Annual Decreased Auto Use Benefit	$ 13,536.00	
Daily VMT Reduction from Bike Commuters	**720.00**	
Annual VMT Reduction from Bike Commuters	**169,200.00**	
Daily VMT Reduction from Recreational Bike Users[1]	**288.00**	
Annual VMT Reduction from Recreational Bike Users[1]	**67,680.00**	
Total Daily VMT Reduction from New Bike Users	**1,008.00**	
Total Annual VMT Reduction from New Bike Users	**236,880.00**	

[1]15% recreational trip substitution rate assumed by DKS Associates.

Project VMT Reduction

Project # 2

Project Name	**Betteravia IC**
Total New Bike Commuters	316
Net Benefit Per Mile, Urban	$ 0.13
Net Benefit Per Mile, Suburban	$ 0.08
Net Benefit Per Mile, Small Town/Rural	$ 0.01
Total New Recreational Cyclists	238
	554.22
Average Round Trip Length	7.34
Weeks per Year	47
Days a Week	5
Annual Decreased Auto Use Benefit	$ 43,605.47
Daily VMT Reduction from Bike Commuters	**2319.44**
Annual VMT Reduction from Bike Commuters	**545,068.40**
Daily VMT Reduction from Recreational Bike Users[1]	**262.04**
Annual VMT Reduction from Recreational Bike Users[1]	**61,578.93**
Total Daily VMT Reduction from New Bike Users	**2,581.48**
Total Annual VMT Reduction from New Bike Users	**606,647.33**

[1]15% recreational trip substitution rate assumed by DKS Associates.

P#	Name	Daily VMT Reduction from Bike Commuters
1	Levee Trail	720
2	Betteravia IC	2319.44

Annual VMT Reduction from Bike Commuters	Daily VMT Reduction from Recreational Bike Users[1]	Annual VMT Reduction from Recreational Bike Users[1]
169200	288	67680
545068.4	262.038	61578.93

Total Daily VMT Reduction from New Bike Users	Total Annual VMT Reduction from New Bike Users
1008	236880
2581.478	606647.33

Input	Value	Source
General		
Discount Rate	7%	BCA Guidance for Discretionary Grant Programs
Discount Year	2023	
Discount Rate - CO2	3%	
Dollar Year	2023	
Deflator	See "Deflator" Sheet	Table 10.1: https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/budget/
Analysis Period (years)	20	BCA Guidance for Discretionary Grant Programs
Construction Begin	2027	
Construction End / Project Completion	2030	
Analysis Period Begin - Benefits Realized	2030	
Final year of analysis period	2050	
Annualization - days to year	365	General
Annualization - weeks / year	52	
100 Million Multiplier	100,000,000	
Round Trip Multiplier	2	
Conversion - minutes to hours	60	www.metric-conversions.org
Conversion - pound to ton	2,000	
Conversion - pounds to metric tons	2205	
Conversion - grams to metric tons	1,000,000	
Conversion - kg to metric tons	1,000	

Damage Costs for Emissions per Metric Ton				
Year	Nox	Sox	PM2.5	CO2
2024	$18,800	$50,900	$912,200	$56
2025	$19,000	$51,900	$928,000	$57
2026	$19,400	$52,900	$942,700	$58
2027	$19,800	$53,800	$957,700	$59
2028	$20,100	$54,800	$972,900	$60
2029	$20,500	$55,800	$988,400	$61
2030	$20,900	$56,800	$1,004,100	$62
2031	$20,900	$56,800	$1,004,100	$63
2032	$20,900	$56,800	$1,004,100	$65
2033	$20,900	$56,800	$1,004,100	$66
2034	$20,900	$56,800	$1,004,100	$67
2035	$20,900	$56,800	$1,004,100	$68
2036	$20,900	$56,800	$1,004,100	$69
2037	$20,900	$56,800	$1,004,100	$70
2038	$20,900	$56,800	$1,004,100	$72
2039	$20,900	$56,800	$1,004,100	$73
2040	$20,900	$56,800	$1,004,100	$74
2041	$20,900	$56,800	$1,004,100	$75
2042	$20,900	$56,800	$1,004,100	$76
2043	$20,900	$56,800	$1,004,100	$78
2044	$20,900	$56,800	$1,004,100	$79
2045	$20,900	$56,800	$1,004,100	$80
2046	$20,900	$56,800	$1,004,100	$81
2047	$20,900	$56,800	$1,004,100	$82
2048	$20,900	$56,800	$1,004,100	$84
2049	$20,900	$56,800	$1,004,100	$85
2050	$20,900	$56,800	$1,004,100	$86
2051	$20,900	$56,800	$1,004,100	$87
2052	$20,900	$56,800	$1,004,100	$88
2053	$20,900	$56,800	$1,004,100	$88
2054	$20,900	$56,800	$1,004,100	$88

Effects on System and Service Performance		
Pavement Costs - Autos, Rural Interstate/Mile (2000$)	$0.000	https://www.fhwa.dot.gov/policy/hcas/addendum.cfm
Pavement Costs - Autos, Rural Interstate/Mile (2023$)	$0.000	
Congestion Costs - autos, rural / Mile (2023$)	$0.030	BCA Guidance for Discretionary Grant Programs
Noise Costs - autos, rural / Mile (2023$)	$0.000	
Safety, Competitiveness, Reliability, Trip or Transit Time, and Resilience		
Average Speed (mph)	55	
Value of Time - all purposes (2023$)	$21.54	BCA Guidance for Discretionary Grant Programs
PDO Crash (2023$)	$9,500	
Injury Crash (2023$)	$329,500	BCA Guidance for Discretionary Grant Programs
Fatality Crash (2023$)	$14,806,000	
Fatalities / 1,000,000 miles (2019-2023)	0.03	
Injuries / 1,000,000 miles (2019-2023)	1.0	SR 166 Existing Conditions Report
Automobile Emissions		
Pollutant	Emissions Rate - LDA (passenger cars)	
Nox (g/mile)	0.067	
PM2.5 (g/mile)	0.001	Cal B/C Parameters (Assume 55 mph)
CO2 (g/mile)	315.190	
Sox (g/mile)	0.003	
Efficiencies from Improved Connections with Other Modes		
Vehicle Operating Costs / Mile (2023$)	$0.56	BCA Guidance for Discretionary Grant Programs

Discount Rate	7%
Discount Year	2023
Analysis Period Begin - Benefits Realized	2030
Pavement Costs - autos, urban interstate / Mile (2023$)	0
Congestion Costs - autos, urban interstate / Mile (2023$)	0.03
Noise Costs - autos, urban interstate / Mile (2023$)	0.0002

Year	VMT Avoided	Pavement	Congestion	Noise	Total	Discounted Total
2030	606,647	$ -	$ 18,199.42	$ 121.33	$ 18,320.75	$ 11,409.24
2031	606,647	$ -	$ 18,199.42	$ 121.33	$ 18,320.75	$ 10,662.84
2032	606,647	$ -	$ 18,199.42	$ 121.33	$ 18,320.75	$ 9,965.27
2033	606,647	$ -	$ 18,199.42	$ 121.33	$ 18,320.75	$ 9,313.34
2034	606,647	$ -	$ 18,199.42	$ 121.33	$ 18,320.75	$ 8,704.06
2035	606,647	$ -	$ 18,199.42	$ 121.33	$ 18,320.75	$ 8,134.63
2036	606,647	$ -	$ 18,199.42	$ 121.33	$ 18,320.75	$ 7,602.46
2037	606,647	$ -	$ 18,199.42	$ 121.33	$ 18,320.75	$ 7,105.10
2038	606,647	$ -	$ 18,199.42	$ 121.33	$ 18,320.75	$ 6,640.28
2039	606,647	$ -	$ 18,199.42	$ 121.33	$ 18,320.75	$ 6,205.87
2040	606,647	$ -	$ 18,199.42	$ 121.33	$ 18,320.75	$ 5,799.88
2041	606,647	$ -	$ 18,199.42	$ 121.33	$ 18,320.75	$ 5,420.45
2042	606,647	$ -	$ 18,199.42	$ 121.33	$ 18,320.75	$ 5,065.84
2043	606,647	$ -	$ 18,199.42	$ 121.33	$ 18,320.75	$ 4,734.43
2044	606,647	$ -	$ 18,199.42	$ 121.33	$ 18,320.75	$ 4,424.70
2045	606,647	$ -	$ 18,199.42	$ 121.33	$ 18,320.75	$ 4,135.23
2046	606,647	$ -	$ 18,199.42	$ 121.33	$ 18,320.75	$ 3,864.70
2047	606,647	$ -	$ 18,199.42	$ 121.33	$ 18,320.75	$ 3,611.87
2048	606,647	$ -	$ 18,199.42	$ 121.33	$ 18,320.75	$ 3,375.58
2049	606,647	$ -	$ 18,199.42	$ 121.33	$ 18,320.75	$ 3,154.75
2050	606,647	$ -	$ 18,199.42	$ 121.33	$ 18,320.75	$ 2,948.36
	TOTAL	$ -	$ 382,187.82	$ 2,547.92	$ 384,735.74	$ 132,278.91

Discount Rate	7%
Discount Year	2023
Analysis Period Begin - Benefits Realized	2030
PDO Crash (2023$)	14806000
Injury Crash (2023$)	329500
Fatality Crash (2023$)	9500
Fatalities / 1,000,000 miles (2019-2023)	0.03
Injuries / 1,000,000 miles (2019-2023)	0.99
1 Million Multiplier	1000000

Year	VMT Avoided	Fatalities Avoided	Injuries Avoided	Value of Fatalities Avoided	Value of Injuries Avoided	Total	Discounted Total
2030	606,647	0.02	0.60	$ 248,067.29	$ 197,361.86	$ 445,429.14	$ 277,390.88
2031	606,647	0.02	0.60	$ 248,067.29	$ 197,361.86	$ 445,429.14	$ 259,243.82
2032	606,647	0.02	0.60	$ 248,067.29	$ 197,361.86	$ 445,429.14	$ 242,283.94
2033	606,647	0.02	0.60	$ 248,067.29	$ 197,361.86	$ 445,429.14	$ 226,433.59
2034	606,647	0.02	0.60	$ 248,067.29	$ 197,361.86	$ 445,429.14	$ 211,620.18
2035	606,647	0.02	0.60	$ 248,067.29	$ 197,361.86	$ 445,429.14	$ 197,775.87
2036	606,647	0.02	0.60	$ 248,067.29	$ 197,361.86	$ 445,429.14	$ 184,837.26
2037	606,647	0.02	0.60	$ 248,067.29	$ 197,361.86	$ 445,429.14	$ 172,745.10
2038	606,647	0.02	0.60	$ 248,067.29	$ 197,361.86	$ 445,429.14	$ 161,444.02
2039	606,647	0.02	0.60	$ 248,067.29	$ 197,361.86	$ 445,429.14	$ 150,882.26
2040	606,647	0.02	0.60	$ 248,067.29	$ 197,361.86	$ 445,429.14	$ 141,011.46
2041	606,647	0.02	0.60	$ 248,067.29	$ 197,361.86	$ 445,429.14	$ 131,786.41
2042	606,647	0.02	0.60	$ 248,067.29	$ 197,361.86	$ 445,429.14	$ 123,164.87
2043	606,647	0.02	0.60	$ 248,067.29	$ 197,361.86	$ 445,429.14	$ 115,107.36
2044	606,647	0.02	0.60	$ 248,067.29	$ 197,361.86	$ 445,429.14	$ 107,576.97
2045	606,647	0.02	0.60	$ 248,067.29	$ 197,361.86	$ 445,429.14	$ 100,539.22
2046	606,647	0.02	0.60	$ 248,067.29	$ 197,361.86	$ 445,429.14	$ 93,961.89
2047	606,647	0.02	0.60	$ 248,067.29	$ 197,361.86	$ 445,429.14	$ 87,814.85
2048	606,647	0.02	0.60	$ 248,067.29	$ 197,361.86	$ 445,429.14	$ 82,069.95
2049	606,647	0.02	0.60	$ 248,067.29	$ 197,361.86	$ 445,429.14	$ 76,700.89
2050	606,647	0.02	0.60	$ 248,067.29	$ 197,361.86	$ 445,429.14	$ 71,683.08
TOTAL		0.352	12.578	$ 5,209,413.05	$ 4,144,598.96	$ 9,354,012.01	$ 3,216,073.86

Discount Rate	7%
Discount Year	2023
Discount Rate - CO2	3%
Analysis Period Begin - Benefits Realized	2030
Conversion - grams to metric tons	1,000,000
Conversion - kg to metric tons	1,000
Annualization - days to year	365

Automobile Emissions

Nox (g/mile)	0.067
PM2.5 (g/mile)	0.001
CO2 (g/mile)	315.2
Sox (g/mile)	0.003

Year	VMT Avoided	Nox Avoided (MT)	Nox Avoided ($)
2030	606,647	0.04	$ 850.76
2031	606,647	0.04	$ 850.76
2032	606,647	0.04	$ 850.76
2033	606,647	0.04	$ 850.76
2034	606,647	0.04	$ 850.76
2035	606,647	0.04	$ 850.76
2036	606,647	0.04	$ 850.76
2037	606,647	0.04	$ 850.76
2038	606,647	0.04	$ 850.76
2039	606,647	0.04	$ 850.76
2040	606,647	0.04	$ 850.76
2041	606,647	0.04	$ 850.76
2042	606,647	0.04	$ 850.76
2043	606,647	0.04	$ 850.76
2044	606,647	0.04	$ 850.76
2045	606,647	0.04	$ 850.76
2046	606,647	0.04	$ 850.76
2047	606,647	0.04	$ 850.76
2048	606,647	0.04	$ 850.76
2049	606,647	0.04	$ 850.76
2050	606,647	0.04	$ 850.76
TOTAL		0.85	$ 17,865.88

TOTAL Emissions Avoided (Discounted) $ 190,921.81

Discounted Nox Avoided ($)	PM2.5 Avoided (MT)	PM2.5 Avoided ($)	Discounted PM2.5 Avoided ($)	CO2 Avoided (MT)
$ 529.81	0.00	$ 609.13	$ 379.34	191.21
$ 495.15	0.00	$ 609.13	$ 354.52	191.21
$ 462.75	0.00	$ 609.13	$ 331.33	191.21
$ 432.48	0.00	$ 609.13	$ 309.65	191.21
$ 404.19	0.00	$ 609.13	$ 289.40	191.21
$ 377.75	0.00	$ 609.13	$ 270.46	191.21
$ 353.03	0.00	$ 609.13	$ 252.77	191.21
$ 329.94	0.00	$ 609.13	$ 236.23	191.21
$ 308.35	0.00	$ 609.13	$ 220.78	191.21
$ 288.18	0.00	$ 609.13	$ 206.33	191.21
$ 269.33	0.00	$ 609.13	$ 192.84	191.21
$ 251.71	0.00	$ 609.13	$ 180.22	191.21
$ 235.24	0.00	$ 609.13	$ 168.43	191.21
$ 219.85	0.00	$ 609.13	$ 157.41	191.21
$ 205.47	0.00	$ 609.13	$ 147.11	191.21
$ 192.03	0.00	$ 609.13	$ 137.49	191.21
$ 179.46	0.00	$ 609.13	$ 128.50	191.21
$ 167.72	0.00	$ 609.13	$ 120.09	191.21
$ 156.75	0.00	$ 609.13	$ 112.23	191.21
$ 146.50	0.00	$ 609.13	$ 104.89	191.21
$ 136.91	0.00	$ 609.13	$ 98.03	191.21
$ 6,142.60	0.01	$ 12,791.83	$ 4,398.05	4015.39

CO2 Avoided ($)	Discounted CO2 Avoided ($)	SOX Avoided (MT)	SOX Avoided ($)	Discounted SOX Avoided ($)
$ 11,854.95	$ 9,639.16	0.00	$ 106.82	$ 66.52
$ 12,046.16	$ 9,509.35	0.00	$ 106.82	$ 62.17
$ 12,428.58	$ 9,525.47	0.00	$ 106.82	$ 58.10
$ 12,619.79	$ 9,390.31	0.00	$ 106.82	$ 54.30
$ 12,810.99	$ 9,254.93	0.00	$ 106.82	$ 50.75
$ 13,002.20	$ 9,119.48	0.00	$ 106.82	$ 47.43
$ 13,193.41	$ 8,984.07	0.00	$ 106.82	$ 44.33
$ 13,384.62	$ 8,848.81	0.00	$ 106.82	$ 41.43
$ 13,767.04	$ 8,836.54	0.00	$ 106.82	$ 38.72
$ 13,958.25	$ 8,698.32	0.00	$ 106.82	$ 36.18
$ 14,149.46	$ 8,560.65	0.00	$ 106.82	$ 33.82
$ 14,340.67	$ 8,423.63	0.00	$ 106.82	$ 31.60
$ 14,531.87	$ 8,287.32	0.00	$ 106.82	$ 29.54
$ 14,914.29	$ 8,257.68	0.00	$ 106.82	$ 27.60
$ 15,105.50	$ 8,119.95	0.00	$ 106.82	$ 25.80
$ 15,296.71	$ 7,983.24	0.00	$ 106.82	$ 24.11
$ 15,487.92	$ 7,847.60	0.00	$ 106.82	$ 22.53
$ 15,679.13	$ 7,713.09	0.00	$ 106.82	$ 21.06
$ 16,061.54	$ 7,671.08	0.00	$ 106.82	$ 19.68
$ 16,252.75	$ 7,536.32	0.00	$ 106.82	$ 18.39
$ 16,443.96	$ 7,402.89	0.00	$ 106.82	$ 17.19
$ 297,329.79	$ 179,609.90	0.04	$ 2,243.19	$ 771.25

Discount Rate	7%
Discount Year	2023
Analysis Period Begin - Benefits Realized	2030
Vehicle Operating Costs / Mile	0.56

Year	VMT Avoided	Operating Cost Savings	
2030	606,647	$	339,722.50
2031	606,647	$	339,722.50
2032	606,647	$	339,722.50
2033	606,647	$	339,722.50
2034	606,647	$	339,722.50
2035	606,647	$	339,722.50
2036	606,647	$	339,722.50
2037	606,647	$	339,722.50
2038	606,647	$	339,722.50
2039	606,647	$	339,722.50
2040	606,647	$	339,722.50
2041	606,647	$	339,722.50
2042	606,647	$	339,722.50
2043	606,647	$	339,722.50
2044	606,647	$	339,722.50
2045	606,647	$	339,722.50
2046	606,647	$	339,722.50
2047	606,647	$	339,722.50
2048	606,647	$	339,722.50
2049	606,647	$	339,722.50
2050	606,647	$	339,722.50
	TOTAL	$	7,134,172.60

Discounted Operating Cost Savings	
$	211,562.10
$	197,721.59
$	184,786.53
$	172,697.69
$	161,399.71
$	150,840.85
$	140,972.76
$	131,750.24
$	123,131.07
$	115,075.77
$	107,547.44
$	100,511.63
$	93,936.10
$	87,790.75
$	82,047.43
$	76,679.84
$	71,663.40
$	66,975.14
$	62,593.59
$	58,498.68
$	54,671.67
$	2,452,854.03

SECTION 4: BENEFITS

SANTA MARIA RIVER TRAIL

Mobility Benefit	Levee Trail								
Existing Commuters	0								
Total New Commuters	36								
Value of Time	$ 20.62	per Caltrans Life-Cycle		**VOT**	**16.45**	$	Per Hour	Per person	
Weeks per Year	47			Truck/Car Comp	22.85				
Day per Week	5				**Auto**	Truck			
Trips	2			Non fuel costs per mi	**0.356**	0.44			
				Fuel costs per gallon	**3.81**	3.87			
Off-Street Trail	20.38				20.616				
Bicycle Lane without Parking	18.02								
Bicycle Lane with Parking	15.83								
Off-Street Trail per Trip Benefit	$ 7.00								
Bicycle Lane without Parking per Trip Benefit	$ 6.19								
Bicycle Lane with Parking per Trip Benefit	$ 5.44								
Annual Mobility Benefit, Off-Street Trail	**$ 118,483**		0.14986376	$ 17,756.38					
Annual Mobility Benefit, Bicycle Lane without Parking	$ 104,763								
Annual Mobility Benefit, Bicycle Lane with Parking	$ 92,031								

Mobility Benefit	**Betteravia IC**							
Existing Commuters	0							
Total New Commuters	79							
Value of Time	$ 20.62	per Caltrans Life-Cycle		**VOT**	**16.45**	$	Per Hour	Per person
Weeks per Year	47			Truck/Car Comp	22.85			
Day per Week	5				**Auto**	Truck		
Trips	2			Non fuel costs per mi	**0.356**	0.44		
				Fuel costs per gallon	**3**	2.8		
Off-Street Trail	20.38				19.806			
Bicycle Lane without Parking	18.02							
Bicycle Lane with Parking	15.83							
Off-Street Trail per Trip Benefit	$ 7.00							
Bicycle Lane without Parking per Trip Benefit	$ 6.19							
Bicycle Lane with Parking per Trip Benefit	$ 5.44							
Annual Mobility Benefit, Off-Street Trail	$ 260,005		0.14986376	$ 38,965.38				
Annual Mobility Benefit, Bicycle Lane without Parking	$ 229,897							
Annual Mobility Benefit, Bicycle Lane with Parking	$ 201,957							

Annual Benefit (Levvee Trail)	$ 118,483
Annual Benefit (Interchange)	$ 229,897
Discount Rate	7%
Discount Year	2023
Year of Opening	2030

Year	Levvee Trail	Levvee Trail Discounted Total	Interchange
2030	$ 118,483.45	$ 73,785.54	$ 229,896.78
2031	$ 118,483.45	$ 68,958.45	$ 229,896.78
2032	$ 118,483.45	$ 64,447.15	$ 229,896.78
2033	$ 118,483.45	$ 60,230.98	$ 229,896.78
2034	$ 118,483.45	$ 56,290.63	$ 229,896.78
2035	$ 118,483.45	$ 52,608.07	$ 229,896.78
2036	$ 118,483.45	$ 49,166.42	$ 229,896.78
2037	$ 118,483.45	$ 45,949.92	$ 229,896.78
2038	$ 118,483.45	$ 42,943.86	$ 229,896.78
2039	$ 118,483.45	$ 40,134.44	$ 229,896.78
2040	$ 118,483.45	$ 37,508.83	$ 229,896.78
2041	$ 118,483.45	$ 35,054.98	$ 229,896.78
2042	$ 118,483.45	$ 32,761.66	$ 229,896.78
2043	$ 118,483.45	$ 30,618.38	$ 229,896.78
2044	$ 118,483.45	$ 28,615.30	$ 229,896.78
2045	$ 118,483.45	$ 26,743.27	$ 229,896.78
2046	$ 118,483.45	$ 24,993.71	$ 229,896.78
2047	$ 118,483.45	$ 23,358.61	$ 229,896.78
2048	$ 118,483.45	$ 21,830.48	$ 229,896.78
2049	$ 118,483.45	$ 20,402.32	$ 229,896.78
2050	$ 118,483.45	$ 19,067.59	$ 229,896.78
TOTAL	###########	$ 855,470.58	###########

Interchange Discounted Total	
$	143,168.16
$	133,802.02
$	125,048.62
$	116,867.87
$	109,222.30
$	102,076.92
$	95,398.99
$	89,157.94
$	83,325.17
$	77,873.99
$	72,779.43
$	68,018.16
$	63,568.38
$	59,409.70
$	55,523.08
$	51,890.73
$	48,496.01
$	45,323.37
$	42,358.29
$	39,587.19
$	36,997.37
$	1,659,893.70

Health Benefit	
Total New Cyclists, High	429
Total New Cyclists, Moderate	379
Total New Cyclists, Low	355
Annual Per Capita Cost Savings from Physical Activity	$128
Annual Health Benefit, High	$54,912
Annual Health Benefit, Moderate	$48,512
Annual Health Benefit, Low	$45,440

Health Benefit	
Total New Cyclists, High	835
Total New Cyclists, Moderate	711
Total New Cyclists, Low	653
Annual Per Capita Cost Savings from Physical Activity	$128
Annual Health Benefit, High	$106,880
Annual Health Benefit, Moderate	$91,008
Annual Health Benefit, Low	$83,584

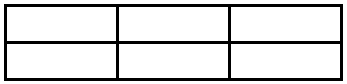
Annual Benefit (Levvee Trail)	$ 45,440
Annual Benefit (Interchange)	$ 83,584
Discount Rate	7%
Discount Year	2023
Year of Opening	2030

Year	Levvee Trail	Levvee Trail Discounted Total	Interchange
2030	$ 45,440.00	$ 28,297.75	$ 83,584.00
2031	$ 45,440.00	$ 26,446.49	$ 83,584.00
2032	$ 45,440.00	$ 24,716.35	$ 83,584.00
2033	$ 45,440.00	$ 23,099.39	$ 83,584.00
2034	$ 45,440.00	$ 21,588.22	$ 83,584.00
2035	$ 45,440.00	$ 20,175.90	$ 83,584.00
2036	$ 45,440.00	$ 18,855.98	$ 83,584.00
2037	$ 45,440.00	$ 17,622.42	$ 83,584.00
2038	$ 45,440.00	$ 16,469.55	$ 83,584.00
2039	$ 45,440.00	$ 15,392.10	$ 83,584.00
2040	$ 45,440.00	$ 14,385.14	$ 83,584.00
2041	$ 45,440.00	$ 13,444.06	$ 83,584.00
2042	$ 45,440.00	$ 12,564.54	$ 83,584.00
2043	$ 45,440.00	$ 11,742.56	$ 83,584.00
2044	$ 45,440.00	$ 10,974.35	$ 83,584.00
2045	$ 45,440.00	$ 10,256.41	$ 83,584.00
2046	$ 45,440.00	$ 9,585.43	$ 83,584.00
2047	$ 45,440.00	$ 8,958.34	$ 83,584.00
2048	$ 45,440.00	$ 8,372.28	$ 83,584.00
2049	$ 45,440.00	$ 7,824.56	$ 83,584.00
2050	$ 45,440.00	$ 7,312.68	$ 83,584.00
TOTAL	$ 954,240.00	$ 328,084.50	###########

Interchange Discounted Total	
$	52,051.91
$	48,646.65
$	45,464.16
$	42,489.87
$	39,710.16
$	37,112.30
$	34,684.39
$	32,415.32
$	30,294.69
$	28,312.79
$	26,460.55
$	24,729.49
$	23,111.67
$	21,599.69
$	20,186.63
$	18,866.01
$	17,631.78
$	16,478.30
$	15,400.28
$	14,392.79
$	13,451.20
$	603,490.64

Recreation Benefit

Total New Cyclists, High	429
Total New Cyclists, Moderate	379
Total New Cyclists, Low	355
Total New Commuters, 1600m	36
Total New Recreation Cyclists, High	393
Total New Recreation Cyclists, Moderat	343
Total New Recreation Cyclists, Low	319
Value of an Hour of Recreation	$10
Annual Recreation Benefit, High	$ 1,434,450
Annual Recreation Benefit, Moderate	$ 1,251,950
Annual Recreation Benefit, Low	$ 1,164,350



Recreation Benefit

Total New Cyclists, High		835
Total New Cyclists, Moderate		711
Total New Cyclists, Low		653
	0	79
Total New Recreation Cyclists, High		756
Total New Recreation Cyclists, Moderat		675
Total New Recreation Cyclists, Low		617
Value of an Hour of Recreation		$10
Annual Recreation Benefit, High		$ 2,759,400
Annual Recreation Benefit, Moderate		$ 2,463,750
Annual Recreation Benefit, Low		$ 2,252,050

2 Trip Ends	e HBW trip l	ommute days/year
158	632	123240

Annual Benefit (Levvee Trail)	$ 1,164,350
Annual Benefit (Interchange)	$ 2,252,050
Discount Rate	7%
Discount Year	2023
Year of Opening	2030

Year	Levvee Trail	Levvee Trail Discounted Total	Interchange
2030	$ 1,164,350.00	$ 725,098.66	$ 2,252,050.00
2031	$ 1,164,350.00	$ 677,662.30	$ 2,252,050.00
2032	$ 1,164,350.00	$ 633,329.25	$ 2,252,050.00
2033	$ 1,164,350.00	$ 591,896.50	$ 2,252,050.00
2034	$ 1,164,350.00	$ 553,174.30	$ 2,252,050.00
2035	$ 1,164,350.00	$ 516,985.32	$ 2,252,050.00
2036	$ 1,164,350.00	$ 483,163.85	$ 2,252,050.00
2037	$ 1,164,350.00	$ 451,555.00	$ 2,252,050.00
2038	$ 1,164,350.00	$ 422,014.02	$ 2,252,050.00
2039	$ 1,164,350.00	$ 394,405.63	$ 2,252,050.00
2040	$ 1,164,350.00	$ 368,603.39	$ 2,252,050.00
2041	$ 1,164,350.00	$ 344,489.15	$ 2,252,050.00
2042	$ 1,164,350.00	$ 321,952.48	$ 2,252,050.00
2043	$ 1,164,350.00	$ 300,890.17	$ 2,252,050.00
2044	$ 1,164,350.00	$ 281,205.76	$ 2,252,050.00
2045	$ 1,164,350.00	$ 262,809.12	$ 2,252,050.00
2046	$ 1,164,350.00	$ 245,616.00	$ 2,252,050.00
2047	$ 1,164,350.00	$ 229,547.67	$ 2,252,050.00
2048	$ 1,164,350.00	$ 214,530.53	$ 2,252,050.00
2049	$ 1,164,350.00	$ 200,495.82	$ 2,252,050.00
2050	$ 1,164,350.00	$ 187,379.27	$ 2,252,050.00
TOTAL	############	$ 8,406,804.22	############

Interchange Discounted Total	
$	1,402,463.56
$	1,310,713.60
$	1,224,965.98
$	1,144,828.02
$	1,069,932.73
$	999,937.13
$	934,520.68
$	873,383.82
$	816,246.56
$	762,847.25
$	712,941.36
$	666,300.33
$	622,710.59
$	581,972.52
$	543,899.55
$	508,317.33
$	475,062.93
$	443,984.05
$	414,938.36
$	387,792.86
$	362,423.23
$	16,260,182.45

Project VMT Reduction

Project # 1

Project Name	**Levee Trail**	
Total New Bike Commuters	36	
Net Benefit Per Mile, Urban	$ 0.13	
Net Benefit Per Mile, Suburban	$ 0.08	
Net Benefit Per Mile, Small Town/Rural	$ 0.01	
Total New Recreational Cyclists	96	
	132.22	
Average Round Trip Length	20.00	(based on 10 mile trail length)
Weeks per Year	47	
Days a Week	5	
Annual Decreased Auto Use Benefit	$ 13,536.00	
Daily VMT Reduction from Bike Commuters	**720.00**	
Annual VMT Reduction from Bike Commuters	**169,200.00**	
Daily VMT Reduction from Recreational Bike Users[1]	**288.00**	
Annual VMT Reduction from Recreational Bike Users[1]	**67,680.00**	
Total Daily VMT Reduction from New Bike Users	**1,008.00**	
Total Annual VMT Reduction from New Bike Users	**236,880.00**	

[1]15% recreational trip substitution rate assumed by DKS Associates.

Project VMT Reduction

Project # 2

Project Name	**Betteravia IC**
Total New Bike Commuters	316
Net Benefit Per Mile, Urban	$ 0.13
Net Benefit Per Mile, Suburban	$ 0.08
Net Benefit Per Mile, Small Town/Rural	$ 0.01
Total New Recreational Cyclists	238
	554.22
Average Round Trip Length	7.34
Weeks per Year	47
Days a Week	5
Annual Decreased Auto Use Benefit	$ 43,605.47
Daily VMT Reduction from Bike Commuters	**2319.44**
Annual VMT Reduction from Bike Commuters	**545,068.40**
Daily VMT Reduction from Recreational Bike Users[1]	**262.04**
Annual VMT Reduction from Recreational Bike Users[1]	**61,578.93**
Total Daily VMT Reduction from New Bike Users	**2,581.48**
Total Annual VMT Reduction from New Bike Users	**606,647.33**

[1]15% recreational trip substitution rate assumed by DKS Associates.

P#	Name	Daily VMT Reduction from Bike Commuters
1	Levee Trail	720
2	Betteravia IC	2319.44

Annual VMT Reduction from Bike Commuters	Daily VMT Reduction from Recreational Bike Users[1]	Annual VMT Reduction from Recreational Bike Users[1]
169200	288	67680
545068.4	262.038	61578.93

Total Daily VMT Reduction from New Bike Users	Total Annual VMT Reduction from New Bike Users
1008	236880
2581.478	606647.33

Input	Value	Source
General		
Discount Rate	7%	BCA Guidance for Discretionary Grant Programs
Discount Year	2023	
Discount Rate - CO2	3%	
Dollar Year	2023	
Deflator	See "Deflator" Sheet	Table 10.1: https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/budget/
Analysis Period (years)	20	BCA Guidance for Discretionary Grant Programs
Construction Begin	2027	
Construction End / Project Completion	2030	
Analysis Period Begin - Benefits Realized	2030	
Final year of analysis period	2050	
Annualization - days to year	365	General
Annualization - weeks / year	52	
100 Million Multiplier	100,000,000	
Round Trip Multiplier	2	
Conversion - minutes to hours	60	
Conversion - pound to ton	2,000	
Conversion - pounds to metric tons	2205	www.metric-conversions.org
Conversion - grams to metric tons	1,000,000	
Conversion - kg to metric tons	1,000	

Damage Costs for Emissions per Metric Ton				
Year	Nox	Sox	PM2.5	CO2
2024	$18,800	$50,900	$912,200	$56
2025	$19,000	$51,900	$928,000	$57
2026	$19,400	$52,900	$942,700	$58
2027	$19,800	$53,800	$957,700	$59
2028	$20,100	$54,800	$972,900	$60
2029	$20,500	$55,800	$988,400	$61
2030	$20,900	$56,800	$1,004,100	$62
2031	$20,900	$56,800	$1,004,100	$63
2032	$20,900	$56,800	$1,004,100	$65
2033	$20,900	$56,800	$1,004,100	$66
2034	$20,900	$56,800	$1,004,100	$67
2035	$20,900	$56,800	$1,004,100	$68
2036	$20,900	$56,800	$1,004,100	$69
2037	$20,900	$56,800	$1,004,100	$70
2038	$20,900	$56,800	$1,004,100	$72
2039	$20,900	$56,800	$1,004,100	$73
2040	$20,900	$56,800	$1,004,100	$74
2041	$20,900	$56,800	$1,004,100	$75
2042	$20,900	$56,800	$1,004,100	$76
2043	$20,900	$56,800	$1,004,100	$78
2044	$20,900	$56,800	$1,004,100	$79
2045	$20,900	$56,800	$1,004,100	$80
2046	$20,900	$56,800	$1,004,100	$81
2047	$20,900	$56,800	$1,004,100	$82
2048	$20,900	$56,800	$1,004,100	$84
2049	$20,900	$56,800	$1,004,100	$85
2050	$20,900	$56,800	$1,004,100	$86
2051	$20,900	$56,800	$1,004,100	$87
2052	$20,900	$56,800	$1,004,100	$88
2053	$20,900	$56,800	$1,004,100	$88
2054	$20,900	$56,800	$1,004,100	$88

Effects on System and Service Performance		
Pavement Costs - Autos, Rural Interstate/Mile (2000$)	$0.000	https://www.fhwa.dot.gov/policy/hcas/addendum.cfm
Pavement Costs - Autos, Rural Interstate/Mile (2023$)	$0.000	
Congestion Costs - autos, rural / Mile (2023$)	$0.030	BCA Guidance for Discretionary Grant Programs
Noise Costs - autos, rural / Mile (2023$)	$0.000	
Safety, Competitiveness, Reliability, Trip or Transit Time, and Resilience		
Average Speed (mph)	55	
Value of Time - all purposes (2023$)	$21.54	BCA Guidance for Discretionary Grant Programs
PDO Crash (2023$)	$9,500	
Injury Crash (2023$)	$329,500	BCA Guidance for Discretionary Grant Programs
Fatality Crash (2023$)	$14,806,000	
Fatalities / 1,000,000 miles (2019-2023)	0.03	
Injuries / 1,000,000 miles (2019-2023)	1.0	SR 166 Existing Conditions Report
Automobile Emissions		
Pollutant	Emissions Rate - LDA (passenger cars)	
Nox (g/mile)	0.067	
PM2.5 (g/mile)	0.001	Cal B/C Parameters (Assume 55 mph)
CO2 (g/mile)	315.190	
Sox (g/mile)	0.003	
Efficiencies from Improved Connections with Other Modes		
Vehicle Operating Costs / Mile (2023$)	$0.56	BCA Guidance for Discretionary Grant Programs

Discount Rate	7%
Discount Year	2023
Analysis Period Begin - Benefits Realized	2030
Pavement Costs - autos, urban interstate / Mile (2023$)	0
Congestion Costs - autos, urban interstate / Mile (2023$)	0.03
Noise Costs - autos, urban interstate / Mile (2023$)	0.0002

Year	VMT Avoided	Pavement	Congestion	Noise	Total	Discounted Total
2030	236,880	$ -	$ 7,106.40	$ 47.38	$ 7,153.78	$ 4,455.01
2031	236,880	$ -	$ 7,106.40	$ 47.38	$ 7,153.78	$ 4,163.56
2032	236,880	$ -	$ 7,106.40	$ 47.38	$ 7,153.78	$ 3,891.18
2033	236,880	$ -	$ 7,106.40	$ 47.38	$ 7,153.78	$ 3,636.62
2034	236,880	$ -	$ 7,106.40	$ 47.38	$ 7,153.78	$ 3,398.71
2035	236,880	$ -	$ 7,106.40	$ 47.38	$ 7,153.78	$ 3,176.36
2036	236,880	$ -	$ 7,106.40	$ 47.38	$ 7,153.78	$ 2,968.56
2037	236,880	$ -	$ 7,106.40	$ 47.38	$ 7,153.78	$ 2,774.36
2038	236,880	$ -	$ 7,106.40	$ 47.38	$ 7,153.78	$ 2,592.86
2039	236,880	$ -	$ 7,106.40	$ 47.38	$ 7,153.78	$ 2,423.23
2040	236,880	$ -	$ 7,106.40	$ 47.38	$ 7,153.78	$ 2,264.70
2041	236,880	$ -	$ 7,106.40	$ 47.38	$ 7,153.78	$ 2,116.54
2042	236,880	$ -	$ 7,106.40	$ 47.38	$ 7,153.78	$ 1,978.08
2043	236,880	$ -	$ 7,106.40	$ 47.38	$ 7,153.78	$ 1,848.67
2044	236,880	$ -	$ 7,106.40	$ 47.38	$ 7,153.78	$ 1,727.73
2045	236,880	$ -	$ 7,106.40	$ 47.38	$ 7,153.78	$ 1,614.70
2046	236,880	$ -	$ 7,106.40	$ 47.38	$ 7,153.78	$ 1,509.07
2047	236,880	$ -	$ 7,106.40	$ 47.38	$ 7,153.78	$ 1,410.34
2048	236,880	$ -	$ 7,106.40	$ 47.38	$ 7,153.78	$ 1,318.08
2049	236,880	$ -	$ 7,106.40	$ 47.38	$ 7,153.78	$ 1,231.85
2050	236,880	$ -	$ 7,106.40	$ 47.38	$ 7,153.78	$ 1,151.26
	TOTAL	$ -	$ 149,234.40	$ 994.90	$ 150,229.30	$ 51,651.47

Discount Rate	7%
Discount Year	2023
Analysis Period Begin - Benefits Realized	2030
PDO Crash (2023$)	14806000
Injury Crash (2023$)	329500
Fatality Crash (2023$)	9500
Fatalities / 1,000,000 miles (2019-2023)	0.03
Injuries / 1,000,000 miles (2019-2023)	0.99
1 Million Multiplier	1000000

Year	VMT Avoided	Fatalities Avoided	Injuries Avoided	Value of Fatalities Avoided	Value of Injuries Avoided	Total	Discounted Total
2030	236,880	0.01	0.23	$ 96,863.82	$ 77,064.67	$ 173,928.49	$ 108,313.92
2031	236,880	0.01	0.23	$ 96,863.82	$ 77,064.67	$ 173,928.49	$ 101,227.97
2032	236,880	0.01	0.23	$ 96,863.82	$ 77,064.67	$ 173,928.49	$ 94,605.58
2033	236,880	0.01	0.23	$ 96,863.82	$ 77,064.67	$ 173,928.49	$ 88,416.43
2034	236,880	0.01	0.23	$ 96,863.82	$ 77,064.67	$ 173,928.49	$ 82,632.17
2035	236,880	0.01	0.23	$ 96,863.82	$ 77,064.67	$ 173,928.49	$ 77,226.33
2036	236,880	0.01	0.23	$ 96,863.82	$ 77,064.67	$ 173,928.49	$ 72,174.14
2037	236,880	0.01	0.23	$ 96,863.82	$ 77,064.67	$ 173,928.49	$ 67,452.47
2038	236,880	0.01	0.23	$ 96,863.82	$ 77,064.67	$ 173,928.49	$ 63,039.69
2039	236,880	0.01	0.23	$ 96,863.82	$ 77,064.67	$ 173,928.49	$ 58,915.60
2040	236,880	0.01	0.23	$ 96,863.82	$ 77,064.67	$ 173,928.49	$ 55,061.31
2041	236,880	0.01	0.23	$ 96,863.82	$ 77,064.67	$ 173,928.49	$ 51,459.16
2042	236,880	0.01	0.23	$ 96,863.82	$ 77,064.67	$ 173,928.49	$ 48,092.68
2043	236,880	0.01	0.23	$ 96,863.82	$ 77,064.67	$ 173,928.49	$ 44,946.43
2044	236,880	0.01	0.23	$ 96,863.82	$ 77,064.67	$ 173,928.49	$ 42,006.01
2045	236,880	0.01	0.23	$ 96,863.82	$ 77,064.67	$ 173,928.49	$ 39,257.95
2046	236,880	0.01	0.23	$ 96,863.82	$ 77,064.67	$ 173,928.49	$ 36,689.67
2047	236,880	0.01	0.23	$ 96,863.82	$ 77,064.67	$ 173,928.49	$ 34,289.41
2048	236,880	0.01	0.23	$ 96,863.82	$ 77,064.67	$ 173,928.49	$ 32,046.18
2049	236,880	0.01	0.23	$ 96,863.82	$ 77,064.67	$ 173,928.49	$ 29,949.70
2050	236,880	0.01	0.23	$ 96,863.82	$ 77,064.67	$ 173,928.49	$ 27,990.38
TOTAL		0.137	4.912	$ 2,034,140.27	$ 1,618,358.07	$ 3,652,498.34	$ 1,255,793.17

Discount Rate	7%
Discount Year	2023
Discount Rate - CO2	3%
Analysis Period Begin - Benefits Realized	2030
Conversion - grams to metric tons	1,000,000
Conversion - kg to metric tons	1,000
Annualization - days to year	365
Automobile Emissions	
Nox (g/mile)	0.067
PM2.5 (g/mile)	0.001
CO2 (g/mile)	315.2
Sox (g/mile)	0.003

Year	VMT Avoided	Nox Avoided (MT)	Nox Avoided ($)
2030	236,880	0.02	$ 332.20
2031	236,880	0.02	$ 332.20
2032	236,880	0.02	$ 332.20
2033	236,880	0.02	$ 332.20
2034	236,880	0.02	$ 332.20
2035	236,880	0.02	$ 332.20
2036	236,880	0.02	$ 332.20
2037	236,880	0.02	$ 332.20
2038	236,880	0.02	$ 332.20
2039	236,880	0.02	$ 332.20
2040	236,880	0.02	$ 332.20
2041	236,880	0.02	$ 332.20
2042	236,880	0.02	$ 332.20
2043	236,880	0.02	$ 332.20
2044	236,880	0.02	$ 332.20
2045	236,880	0.02	$ 332.20
2046	236,880	0.02	$ 332.20
2047	236,880	0.02	$ 332.20
2048	236,880	0.02	$ 332.20
2049	236,880	0.02	$ 332.20
2050	236,880	0.02	$ 332.20
TOTAL		0.33	$ 6,976.16

TOTAL Emissions Avoided (Discounted)	$ 74,550.00

Discounted Nox Avoided ($)	PM2.5 Avoided (MT)	PM2.5 Avoided ($)	Discounted PM2.5 Avoided ($)	CO2 Avoided (MT)
$ 206.88	0.00	$ 237.85	$ 148.12	74.66
$ 193.34	0.00	$ 237.85	$ 138.43	74.66
$ 180.69	0.00	$ 237.85	$ 129.38	74.66
$ 168.87	0.00	$ 237.85	$ 120.91	74.66
$ 157.82	0.00	$ 237.85	$ 113.00	74.66
$ 147.50	0.00	$ 237.85	$ 105.61	74.66
$ 137.85	0.00	$ 237.85	$ 98.70	74.66
$ 128.83	0.00	$ 237.85	$ 92.24	74.66
$ 120.40	0.00	$ 237.85	$ 86.21	74.66
$ 112.53	0.00	$ 237.85	$ 80.57	74.66
$ 105.17	0.00	$ 237.85	$ 75.30	74.66
$ 98.29	0.00	$ 237.85	$ 70.37	74.66
$ 91.86	0.00	$ 237.85	$ 65.77	74.66
$ 85.85	0.00	$ 237.85	$ 61.47	74.66
$ 80.23	0.00	$ 237.85	$ 57.44	74.66
$ 74.98	0.00	$ 237.85	$ 53.69	74.66
$ 70.08	0.00	$ 237.85	$ 50.17	74.66
$ 65.49	0.00	$ 237.85	$ 46.89	74.66
$ 61.21	0.00	$ 237.85	$ 43.82	74.66
$ 57.20	0.00	$ 237.85	$ 40.96	74.66
$ 53.46	0.00	$ 237.85	$ 38.28	74.66
$ 2,398.53	0.00	$ 4,994.88	$ 1,717.33	1567.90

CO2 Avoided ($)	Discounted CO2 Avoided ($)	SOX Avoided (MT)	SOX Avoided ($)	Discounted SOX Avoided ($)
$ 4,629.05	$ 3,763.84	0.00	$ 41.71	$ 25.97
$ 4,703.71	$ 3,713.15	0.00	$ 41.71	$ 24.28
$ 4,853.04	$ 3,719.45	0.00	$ 41.71	$ 22.69
$ 4,927.70	$ 3,666.67	0.00	$ 41.71	$ 21.20
$ 5,002.36	$ 3,613.81	0.00	$ 41.71	$ 19.82
$ 5,077.02	$ 3,560.92	0.00	$ 41.71	$ 18.52
$ 5,151.68	$ 3,508.05	0.00	$ 41.71	$ 17.31
$ 5,226.35	$ 3,455.23	0.00	$ 41.71	$ 16.18
$ 5,375.67	$ 3,450.44	0.00	$ 41.71	$ 15.12
$ 5,450.33	$ 3,396.47	0.00	$ 41.71	$ 14.13
$ 5,524.99	$ 3,342.71	0.00	$ 41.71	$ 13.20
$ 5,599.66	$ 3,289.21	0.00	$ 41.71	$ 12.34
$ 5,674.32	$ 3,235.98	0.00	$ 41.71	$ 11.53
$ 5,823.64	$ 3,224.41	0.00	$ 41.71	$ 10.78
$ 5,898.31	$ 3,170.63	0.00	$ 41.71	$ 10.07
$ 5,972.97	$ 3,117.25	0.00	$ 41.71	$ 9.41
$ 6,047.63	$ 3,064.28	0.00	$ 41.71	$ 8.80
$ 6,122.29	$ 3,011.76	0.00	$ 41.71	$ 8.22
$ 6,271.62	$ 2,995.36	0.00	$ 41.71	$ 7.69
$ 6,346.28	$ 2,942.74	0.00	$ 41.71	$ 7.18
$ 6,420.94	$ 2,890.64	0.00	$ 41.71	$ 6.71
$ 116,099.55	$ 70,132.99	0.02	$ 875.91	$ 301.15

Discount Rate	7%
Discount Year	2023
Analysis Period Begin - Benefits Realized	2030
Vehicle Operating Costs / Mile	0.56

Year	VMT Avoided	Operating Cost Savings	Discounted Operating Cost Savings
2030	236,880	$ 132,652.80	$ 82,609.50
2031	236,880	$ 132,652.80	$ 77,205.14
2032	236,880	$ 132,652.80	$ 72,154.33
2033	236,880	$ 132,652.80	$ 67,433.96
2034	236,880	$ 132,652.80	$ 63,022.39
2035	236,880	$ 132,652.80	$ 58,899.43
2036	236,880	$ 132,652.80	$ 55,046.20
2037	236,880	$ 132,652.80	$ 51,445.04
2038	236,880	$ 132,652.80	$ 48,079.48
2039	236,880	$ 132,652.80	$ 44,934.09
2040	236,880	$ 132,652.80	$ 41,994.48
2041	236,880	$ 132,652.80	$ 39,247.18
2042	236,880	$ 132,652.80	$ 36,679.60
2043	236,880	$ 132,652.80	$ 34,280.00
2044	236,880	$ 132,652.80	$ 32,037.39
2045	236,880	$ 132,652.80	$ 29,941.48
2046	236,880	$ 132,652.80	$ 27,982.69
2047	236,880	$ 132,652.80	$ 26,152.05
2048	236,880	$ 132,652.80	$ 24,441.17
2049	236,880	$ 132,652.80	$ 22,842.21
2050	236,880	$ 132,652.80	$ 21,347.86
TOTAL		$ 2,785,708.80	$ 957,775.68

SECTION 4: BENEFITS

TRAVEL TIME RELIABILITY

Buffer Time in Minutes

Existing

	Autos			Trucks			Autos & Trucks		
Westbound	Ag.AM	AM	PM	Ag.AM	AM	PM	Ag.AM	AM	PM
Blosser Rd to SR 1	24.1	8.0	6.3	23.9	21.2	22.4	19.8	9.9	8.9
	Autos			Trucks			Autos & Trucks		
Eastbound	Ag.AM	AM	PM	Ag.AM	AM	PM	Ag.AM	AM	PM
Blosser Rd to SR 1	4.6	4.4	4.9	4.5	3.5	4.6	4.5	3.5	4.6

Future No Build

	Autos			Trucks			Autos & Trucks		
Westbound	Ag.AM	AM	PM	Ag.AM	AM	PM	Ag.AM	AM	PM
Blosser Rd to SR 1	24.5	8.1	6.8	24.3	21.4	24.5	20.1	10.0	9.7
	Autos			Trucks			Autos & Trucks		
Eastbound	Ag.AM	AM	PM	Ag.AM	AM	PM	Ag.AM	AM	PM
Blosser Rd to SR 1	4.7	4.4	4.9	4.6	3.6	4.6	4.6	3.6	4.6

Future Build

	Autos			Trucks			Autos & Trucks		
Westbound	Ag.AM	AM	PM	Ag.AM	AM	PM	Ag.AM	AM	PM
Blosser Rd to SR 1	20.7	6.9	4.9	20.5	18.2	17.7	17.0	8.5	7.0
	Autos			Trucks			Autos & Trucks		
Eastbound	Ag.AM	AM	PM	Ag.AM	AM	PM	Ag.AM	AM	PM
Blosser Rd to SR 1	3.5	3.3	3.7	3.4	2.7	3.4	3.4	2.7	3.4

TTI (Blosser to Rte 1)

	Congested Speed (mph)				Free Flow Speed	TTI			
	AM		PM			AM		PM	
	EB	WB	EB	WB	EB	EB	WB	EB	WB
Existing	42.9	44.8	42.9	44.8	58	1.35	1.29	1.35	1.29
Future	42.7	44.7	42.9	41.2		1.36	1.3	1.35	1.41

% Change (Ex to Future)

AG AM		AM		PM	
EB	WB	EB	WB	EB	WB
0.9%	1.6%	0.7%	0.8%	0.0%	9.3%

% Change (No Build to Build)

AG AM		AM		PM	
EB	WB	EB	WB	EB	WB
-26%	-16%	-26%	-15%	-25%	-28%

Congested Speed from TDM

EX				Fut			
AM		PM		AM		PM	
WB	EB	WB	EB	WB	EB	WB	EB
44.36	43.53	44.36	43.53	44	43.5	43.21	44.49
44.92	43.7	44.92	43.7	44.87	43.58	43.83	44.78
44.94	43.79	44.94	43.79	44.9	43.6	43.84	43.6
44.93	40.35	44.93	40.35	44.89	40.35	44.12	42.52
44.57	40.75	44.57	40.75	44.35	40.74	44.13	42.1
44.58	40.4	44.58	40.4	44.36	40.41	43.94	41.15
44.73	40.78	44.73	40.78	44.57	40.69	38.14	41.12
44.78	44.76	44.78	44.76	44.64	40.68	38.15	44.37
44.9	44.81	44.9	44.81	44.83	44.69	37.81	44.43
44.98	44.73	44.98	44.73	44.96	44.74	38.44	44.42
	44.62		44.62	44.91	44.65	38.26	44.29
					44.49	40.95	44.28
						40.88	40.93
						40.63	

	Delay Savings								
	No Build Delay			Build Delay			% Change		
	AG AM	AM	PM	AG AM	AM	PM	AG AM	AM	PM
SR 166 / Simas									
EB	61	48	59	20	16	16	-67%	-67%	-73%
WB	32	16	112	28	14	18	-13%	-13%	-84%
All	56	31	70	31	17	19	-45%	-45%	-73%
SR 166 / Bonita School									
All	20	11	12	18	10	11	-10%	-9%	-8%
SR 166 / Ray									
NB	51	28	30	45	25	23	-12%	-11%	-23%
SB	44	24	56	44	24	56	0%	0%	0%
SR 166 / WB Merge									
All	29	16		44	24		-52%	-50%	#DIV/0!
SR 166 / SR 135									
All	47	26	45	51	28	47	9%	8%	4%

Data for Cost Savings

Volume (Existing)

Ag.AM	AM	PM
700	619	813

Existing hours	3
Shoulder hours	5
Days / year	250
Total # of years	20
% growth / year	1.50%
Value of time	$22.85
Discount Rate	7%
Discount Year	2023

Cost Savings

	No Build	Build	Savings	Discount Total
1	$2,719,939.42	$2,208,384.66	$511,554.76	$318,570.59
2	$2,760,135.57	$2,241,020.89	$519,114.68	$302,129.47
3	$2,800,331.72	$2,273,657.12	$526,674.60	$286,476.09
4	$2,840,527.87	$2,306,293.34	$534,234.52	$271,577.74
5	$2,880,724.02	$2,338,929.57	$541,794.45	$257,402.64
6	$2,920,920.17	$2,371,565.80	$549,354.37	$243,919.91
7	$2,961,116.31	$2,404,202.02	$556,914.29	$231,099.63
8	$3,001,312.46	$2,436,838.25	$564,474.21	$218,912.83
9	$3,041,508.61	$2,469,474.48	$572,034.14	$207,331.50
10	$3,081,704.76	$2,502,110.70	$579,594.06	$196,328.56
11	$5,203,168.18	$4,224,578.22	$978,589.97	$309,796.52
12	$5,270,161.77	$4,278,971.93	$991,189.84	$293,257.31
13	$5,337,155.35	$4,333,365.64	$1,003,789.71	$277,556.22
14	$5,404,148.93	$4,387,759.35	$1,016,389.58	$262,654.38
15	$5,471,142.51	$4,442,153.06	$1,028,989.45	$248,514.42
16	$5,538,136.09	$4,496,546.77	$1,041,589.32	$235,100.42
17	$5,605,129.67	$4,550,940.48	$1,054,189.19	$222,377.92
18	$5,672,123.26	$4,605,334.19	$1,066,789.06	$210,313.86
19	$5,739,116.84	$4,659,727.90	$1,079,388.93	$198,876.52
20	$5,806,110.42	$4,714,121.61	$1,091,988.81	$188,035.55
			$15,808,637.94	**$4,980,232.09**