



Grant Line Road Precise Roadway Plan Study (Bond Road to Calvine Road)

July 19, 2022

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AECOM



Rendering of potential Roundabout Alternative at Grant Line Road and Aleilani Lane

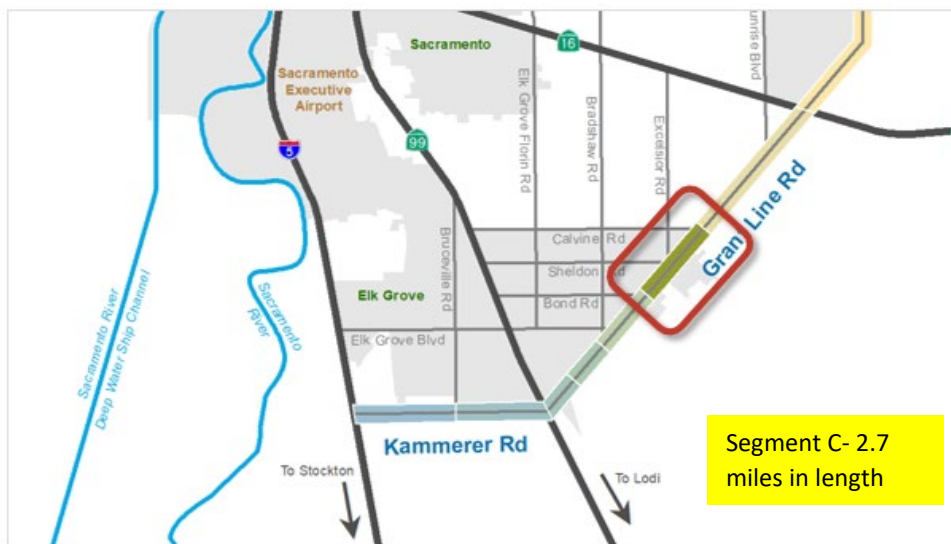
Purpose of this Study:

The Grant Line Road Precise Roadway Plan Study (STUDY) for Segment C (Bond Road to Calvine Road) provides the needed roadway geometry for the ultimate facility including turn lanes and intersection geometry. Additionally, the STUDY provides cost estimates for right of way acquisitions and construction that can be used for programming of future phases and grant opportunities.

The Study compares alternatives and makes recommendations to guide future phases of project implementation as funds become available.

Background:

The City of Elk Grove is a member of the Capital SouthEast Connector Joint Powers Authority (JPA) established to implement the 34 mile corridor known as the Capital SouthEast Connector (CSEC). The CSEC is planned to connect Interstate 5, State Route 99 (SR99), State Route 16 and US Route 50 and will serve as a bypass around the Central Business District of Sacramento.



The JPA adopted a Program Level Environmental Impact Report (PEIR) on March 7, 2012 that established Grant Line Road as the alignment for the CSEC northeast of SR 99 through the City of Elk Grove. Segment C of the CSEC from Bond

Road to Calvine Road was identified as the “Special Sheldon Segment” due to the commercial businesses through the Town of Sheldon that required special consideration to preserve the rural character of Sheldon. As such, the Capital SouthEast Connector Project Design Guidelines, Version 4 dated February 13, 2015 identified special design criteria through Segment C unique to that Segment. The PEIR identified the need for four through lanes in Segment C and identified signals at the following controlled intersections:

1. Bond Road
2. Wilton Road
3. Aleilani Lane
4. Sheldon Road
5. Calvine Road

The roadway is planned to be divided with a raised median, and all other side roads are to be revised to right in/right out only. A multi-use trail is planned for the entire length of the corridor on the west side.

After the adoption of the PEIR, the City wanted to establish the project geometry in Segment C to more precisely



Southbound Lanes on Grant Line Road toward Sheldon Roundabout

understand the required footprint for the CSEC and to establish future right of way needs as land use changes may evolve and parcels may develop. City staff initiated work on the geometrics and community outreach activities in mid-2016. City staff conducted numerous meetings with small community groups and individuals from 2016 through 2018.

The traffic forecasts developed by the JPA as part of the 2012 PEIR were based upon a horizon year 2036. The City anticipated the earliest completion of construction for this Segment would be 2030 and as such set a traffic forecast year to 2050 to provide the minimum 20 year design life. The City hired Kimley Horn to update the traffic forecasts for horizon year 2050 and develop an Updated Intersection Control Evaluation (ICE), dated June 23, 2020, based upon these forecasts.

Alternatives Considered:

The 2012 PEIR identified five signalized intersections within Segment C. At the initiation of this study, the City recognized that there would be excessive out of direction travel from Sheldon Road to Calvin Road (1.6 miles) unless an intermediate full service intersection was added. The out of direction travel is required due to the raised median with no left turn access to or from Grant Line Road, causing

vehicles to travel some distance to the next intersection before making a U-turn. Thus, one additional controlled intersection was added to this study at either Graybill Road or Bradley Ranch Road to reduce this out of direction travel for residents. Bradley Ranch Road was added as an option to the originally proposed Graybill Road location based upon community comments at Public Meeting #2. Additionally, roundabouts were viewed by the City and the JPA as being another potential intersection treatment that was evaluated in this study. Thus, the Alternatives evaluated either Signals or Roundabouts at the following six intersections:

1. Bond Road
2. Wilton Road
3. Aleilani Lane
4. Sheldon Road
5. Either Graybill Road or Bradley Ranch Road
6. Calvin Road

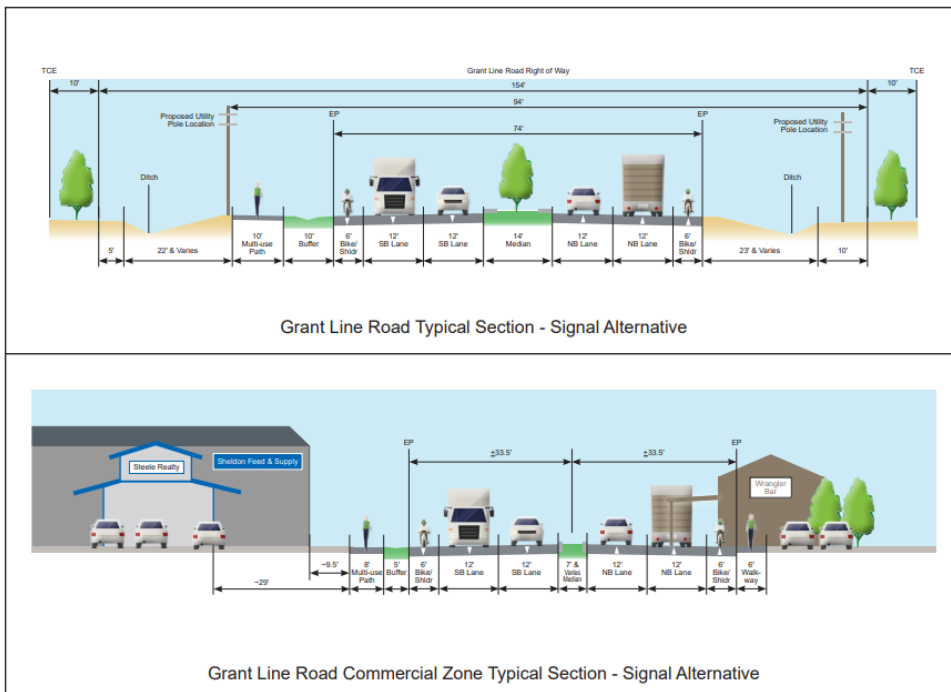
Signalized intersections and roundabouts operate differently within a given corridor. The capacity of signalized intersections is optimized within corridors by timing the signals of adjacent intersections to receive platoons while in a green phase. Roundabouts rely on random arrivals from the various legs where drivers look for and accept gaps in the circulating traffic. The lower approach speeds associated with roundabouts facilitate this gap acceptance process by increasing the number of the acceptable gaps, leading to reduced traffic delays and higher capacity intersections. NCHRP 672, *Roundabouts: An Informational Guide* provides design guidance for individual roundabouts, whereas NCHRP 772, *Evaluating the Performance of Corridors with Roundabouts* provides tools to evaluate corridors with signals versus corridors with roundabouts within a given corridor. The scope of this study involved analysis of Segment C with all signals or all roundabouts to determine which alternative was superior from an overall perspective including Operations, Safety and within the Context of the Sheldon Commercial Zone.



The following section provides details of each of the alternatives evaluated in this study as follows (Note that newly considered design options footprint is within 2012 PEIR study area and would require compliance with mitigation measures relating to ground disturbance and land acquisitions):

1. Signal Alternatives:
 - a. Alternative 1A- Signals at each intersection including Graybill Road
 - b. Alternative 1C- Signals at each intersection including Bradley Ranch Road
2. Roundabout Alternatives:
 - a. Alternative 2A- Roundabouts at each intersection including Graybill Road
 - b. Alternative 2C- Roundabouts at each intersection including Graybill Road and a realignment of Wilton Road and relocated Wilton Road intersection
 - c. Alternative 2A/2D- Roundabouts at each intersection including Bradley Ranch Road
 - d. Alternative 2C/2D- Roundabouts at each intersection including Bradley Ranch Road with a realignment of Wilton Road and relocated Wilton Road intersection

Alternative 1A- Signals. This alternative would provide four 12' lanes, 14' raised median, 6' outside shoulders, and a separated 10' multi-use path on the west side. Signals would be provided at six intersections with required turn lanes to accommodate forecast traffic to



acceptable operations. Within the commercial zone, the median would be reduced to 7' and the multi-use path to 8' as needed to reduce the right of way impacts. With the reduced section, the project would still need to acquire the Happy Garden Restaurant at the corner of Grant Line Road and Pleasant Grove School Road and the Wrangler Bar on the east side of Grant

Line Road north of Wilton Road. In addition, one residence will need to be acquired east of Calvin Road, however, this required residential acquisition is common to all alternatives and is a result of the corridor alignment that was previously set by the JPA for the adjoining Segment D near the conform with this Segment C.

Pros of Alternative 1A:	Cons of Alternative 1A:
1. Provides consistent intersection treatment with rest of the corridor when compared to Alternative 2	1. Requires full acquisition of two Business Properties when compared to Alternative 2
	2. Requires greater right of way acquisitions due to cross section width when compared to Alternative 2
	3. Will result in higher speeds through Segment C when compared to Alternative 2
	4. Higher cost alternative when compared to Alternative 2

Right of Way (ROW) Needs for Alternative 1A:

# of Parcels requiring acquisitions (Temporary Construction Easement / Fee)	100/93
# of Full Acquisitions (Businesses/Residential/Vacant)	2 / 1/ 0
Temporary Construction Easements (acres)	8.0
ROW in Fee Title (acres)	28.6
ROW Capital Costs	\$11,209,000
ROW Support Costs	\$ 2,062,000

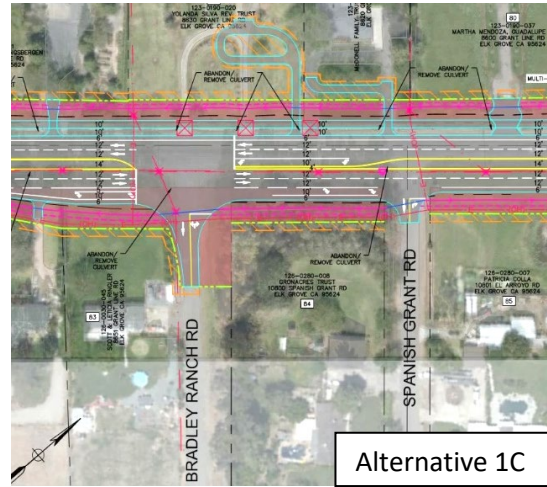
Cost Estimate for Alternative 1A:

	<u>Current Year Cost</u>
TOTAL ROADWAY COST	\$ 30,719,000
TOTAL STRUCTURES COST	\$ 4,488,000
<i>SUBTOTAL CONSTRUCTION COST</i>	\$ 35,207,000
TOTAL RIGHT OF WAY CAPITAL COST	\$ 11,209,000
TOTAL CAPITAL OUTLAY COSTS (current year)	\$ 46,416,000

Sub Variations:

Alternative 1C- Signalized Intersection at Bradley Ranch Road.

This alternative is identical to Alternative 1A except the signalized intersection at Graybill Road in Alternative 1A would be eliminated in favor of a proposed signalized intersection at Bradley Ranch Road. Neither Graybill Road nor Bradley Ranch Road have large enough traffic volumes to warrant a full-service intersection. The proposed intersection is warranted due to the substantial out of direction travel that would be required by residents accessing Grant Line Road between Sheldon Road to Calvin Road. Both roads are private. This intersection would more directly serve the Brookside Equestrian Park and the Bradley Ranch Winery.



Pros of Alternative 1C:	Cons of Alternative 1C:
1. Provides consistent intersection treatment with rest of the corridor when compared to Alternative 2	1. Requires full acquisition of two Business Properties when compared to Alternative 2
2. Serves Bradley Ranch Winery and Brookside Equestrian Park more directly than Alt 1A	2. Requires greater right of way acquisitions due to cross section width when compared to Alternative 2
	3. Greater right of way acquisitions to developed parcels adjacent to Bradley Ranch Road when compared to Alternative 1A
	4. Highest Cost Alternative

Right of Way (ROW) Needs for Alternative 1C:

# of Parcels requiring acquisitions (TCE/ Fee)	99/92
# of Full Acquisitions (Businesses/Residential/Vacant)	2 / 1 / 0
Temporary Construction Easements (TCE) (acres)	8.2
ROW in Fee Title (acres)	28.6
ROW Capital Costs	\$ 11,245,000
ROW Support Costs	\$ 2,062,000

Cost Estimate for Alternative 1C:

	<u>Current Year Cost</u>
TOTAL ROADWAY COST	\$ 31,050,000
TOTAL STRUCTURES COST	\$ 4,488,000
<i>SUBTOTAL CONSTRUCTION COST</i>	<i>\$ 35,538,000</i>
TOTAL RIGHT OF WAY CAPITAL COST	\$ 11,245,000
TOTAL CAPITAL OUTLAY COSTS (current year)	\$ 46,783,000

Alternative 2A- Roundabouts. This alternative would provide four 12’ lanes, 14’ raised median, 6’ outside shoulders, and a separated 10’ multi-use path on the west side. Multi-lane Roundabouts would be provided at 6 intersections with required turn lanes to accommodate forecast traffic to acceptable operations. Within the commercial zone, the median would be reduced to 4’ and the multi-use path to 8’ as needed to reduce the right of way acquisitions. The alignment of this alternative coupled with the reduced width eliminates the need to acquire the two business properties impacted in Alternative 1A. The business impacts of Alternative 2A with the Roundabout located at Wilton Road are more substantial than Alternative 2C with the potential removal of the septic system at the Sheldon Shopping Center and the vehicle access being restricted to a shared driveway between Sheldon Shopping Center, Sheldon Silva Inn, and Happy Garden Restaurant. Additionally, the right of way required from the two gas stations would be greater with the roundabout located at Wilton Road (Alternative 2A).



Pros of Alternative 2A:	Cons of Alternative 2A:
1. Eliminates the full acquisitions of two Business properties that were required in Alternative 1	1. Greater right of way acquisitions at Wilton Road intersection to gas stations and commercial businesses when compared to Alternative 2C
2. Requires less right of way acquisitions due to narrower median when compared to Alternative 1	2. May require full acquisition of the Sheldon Center due to impacts to the septic system leach field with limited option for relocation when compared to Alternative 2C
3. Reduces anticipated operating speed through commercial zone leading to improved safety for motorists, bicycles and pedestrians when compared to Alternative 1	
4. Overall Superior Operational and Safety performance when compared to Alternative 1	

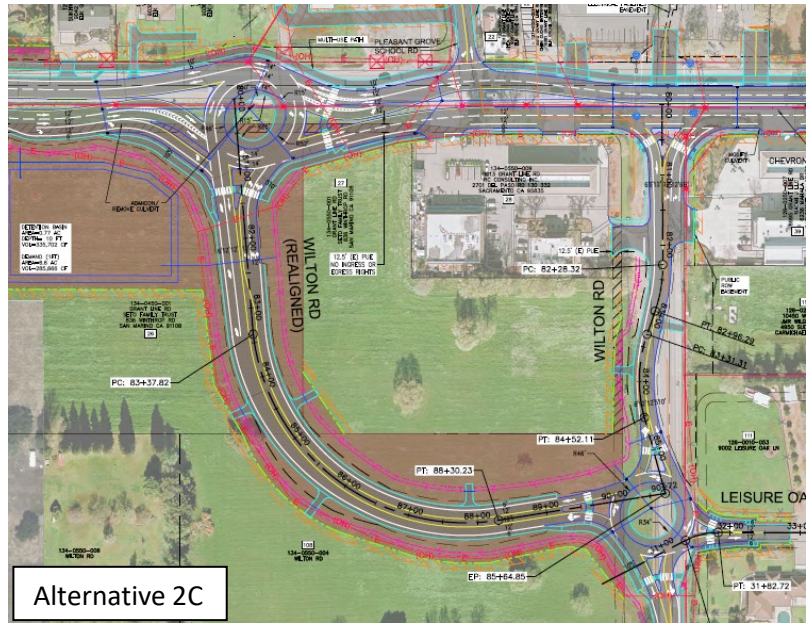
Right of Way (ROW) Needs for Alternative 2A:

# of Parcels requiring acquisitions (TCE/ Fee)	100/96
# of Full Acquisitions (Businesses/Residential/Vacant)	0 / 1 / 0
Temporary Construction Easements (TCE) (acres)	8.3
ROW in Fee Title (acres)	27.6
ROW Capital Costs	\$8,183,000
ROW Support Costs	\$1,974,000

Cost Estimate for Alternative 2A:

	<u>Current Year Cost</u>
TOTAL ROADWAY COST	\$ 30,355,000
TOTAL STRUCTURES COST	\$ 4,488,000
<i>SUBTOTAL CONSTRUCTION COST</i>	\$ 34,843,000
TOTAL RIGHT OF WAY CAPITAL COST	\$ 8,183,000
TOTAL CAPITAL OUTLAY COSTS (current year)	\$ 43,026,000

Alternative 2C- Roundabouts. This alternative would be identical to Alternative 2A except near the Wilton Road intersection. As a result, Alternative 2C proposes to realign Wilton Road near the Leisure Oak Lane intersection southwesterly and move the Wilton Road/Grant Line Road intersection approximately 600 feet south of the current intersection. The portion of existing Wilton Road from the proposed Wilton Road/Leisure Oak Lane roundabout would remain in place for local circulation and provide westbound Wilton Road traffic more direct access to northbound Grant Line Road. The current Wilton Road intersection would become right in/right out only. All access driveways into the shopping center and adjacent business would remain at their current locations.



Pros of Alternative 2C:	Cons of Alternative 2C:
1. Eliminates the full acquisitions of two Business properties that were required in Alternative 1	1. Realignment of Wilton Road requires acquisition of most of a 7 acre undeveloped parcel when compared to Alternative 2A
2. Does not require full acquisition of the Sheldon Center due to impacts to the septic system leach field and maintains individual access when compared to Alternative 2A	
3. Reduces right of way acquisitions to gas stations and businesses across from Wilton Road when compared to Alternative 1 and 2A	
4. Requires less right of way acquisitions due to narrower median when compared to Alternative 1	
4. Reduces anticipated operating speed through commercial zone leading to improved safety for motorists, bicycles and pedestrians when compared to Alternative 1	

5. Overall Superior Operational and Safety performance when compared to Alternative 1	
6. Reduces Out of Direction Travel for vehicles coming from Pleasant Grove School Road when compared to 2A	

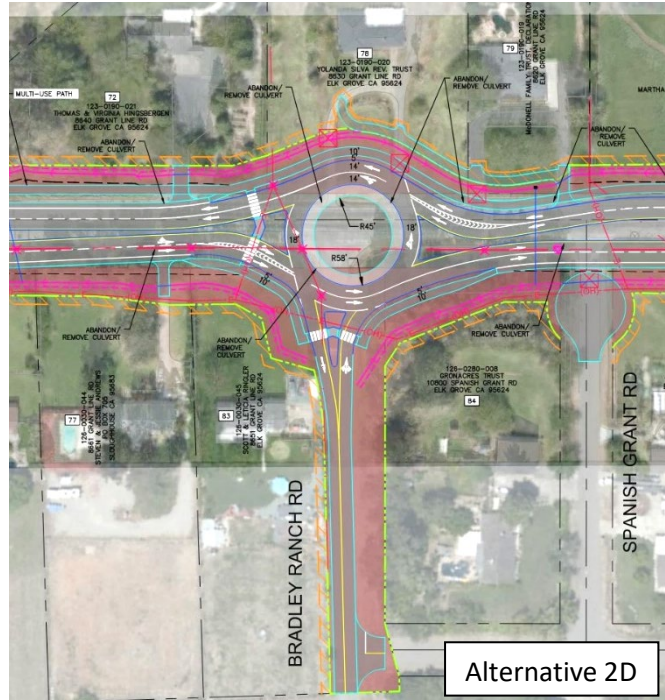
Right of Way (ROW) Needs for Alternative 2C:

# of Parcels requiring acquisitions (TCE/ Fee)	103/97
# of Full Acquisitions (Businesses/Residential/Vacant)	0 / 1 / 0
Temporary Construction Easements (TCE) (acres)	8.4
ROW in Fee Title (acres)	31.2
ROW Capital Costs	\$8,745,000
ROW Support Costs	\$2,040,000

Cost Estimate for Alternative 2C:

	<u>Current Year Cost</u>
TOTAL ROADWAY COST	\$ 32,315,000
TOTAL STRUCTURES COST	\$ 4,488,000
<i>SUBTOTAL CONSTRUCTION COST</i>	<i>\$ 36,803,000</i>
TOTAL RIGHT OF WAY CAPITAL COST	\$ 8,745,000
TOTAL CAPITAL OUTLAY COSTS (current year)	\$ 45,548,000

Alternative 2A/ 2D- Roundabouts. This alternative would be identical to Alternative 2A except near the Bradley Ranch Road intersection. Under Alternative 2D, the Bradley Ranch Road intersection is proposed to be a roundabout and Graybill Road would become a right in/ right out only intersection. Neither Graybill Road nor Bradley Ranch Road have large enough traffic volumes to warrant a full-service intersection. The proposed intersection is warranted due to the substantial out of direction travel that would be required by residents accessing Grant Line Road between Sheldon Road to Calvin Road.



Pros of Alternative 2A/2D:	Cons of Alternative 2A/2D:
1. Eliminates the full acquisitions of two Business properties that were required in Alternative 1	1. Greater right of way acquisitions at Wilton Road intersection to gas stations and commercial businesses when compared to Alternative 2C
2. Requires less right of way acquisitions due to narrower median when compared to Alternative 1	2. May require full acquisition of the Sheldon Center due to impacts to the septic system leach field with limited option for relocation when compared to Alternative 2C
3. Reduces anticipated operating speeds through commercial zone leading to improved safety for motorists, bicycles, and pedestrians when compared to Alternative 1	3. Greater right of way acquisitions on residential properties adjacent to Bradley Ranch Road intersection than Alternative 2A or 2C
4. Overall Superior Operational and Safety performance when compared to Alternative 1	
5. Serves Bradley Ranch Winery and Brookside Equestrian Park more directly than Alt 2A or 2C	

Right of Way (ROW) Needs for Alternative 2A/2D:

# of Parcels requiring acquisitions (TCE/ Fee)	99/95
# of Full Acquisitions (Businesses/Residential/Vacant)	0 / 1 / 0
Temporary Construction Easements (TCE) (acres)	8.4
ROW in Fee Title (acres)	28.4
ROW Capital Costs	\$8,494,000
ROW Support Costs	\$ 1,952,000

Cost Estimate for Alternative 2A/2D:

	<u>Current Year Cost</u>
TOTAL ROADWAY COST	\$ 30,532,000
TOTAL STRUCTURES COST	\$ 4,488,000
<i>SUBTOTAL CONSTRUCTION COST</i>	\$ 36,020,000
TOTAL RIGHT OF WAY CAPITAL COST	\$ 8,494,000
TOTAL CAPITAL OUTLAY COSTS (current year)	\$ 43,514,000

Alternative 2C/ 2D- Roundabouts. This alternative would be identical to Alternative 2C except near the Bradley Ranch Road intersection. Under Alternative 2D, the Bradley Ranch Road intersection is proposed to be a roundabout. Graybill Road would become a right in/ right out only intersection. Neither Graybill Road nor Bradley Ranch Road have large enough traffic volumes to warrant a full service intersection. The proposed intersection is warranted due to the substantial out of direction travel that would be required by residents accessing Grant Line Road between Sheldon Road to Calvine Road.

Pros of Alternative 2C/2D:	Cons of Alternative 2C/2D:
1. Eliminates the full acquisitions of two Business properties that were required in Alternative 1	1. Realignment of Wilton Road requires acquisition of most of a 7 acre undeveloped parcel when compared to Alternative 2A
2. Reduces right of way acquisitions to gas stations and businesses across from Wilton Road when compared to Alternative 1 or 2A	2. Greater right of way acquisitions to residential parcels adjacent to the Bradley Ranch Road intersection than Alternative 2A or 2C
3. Requires less right of way acquisitions due to narrower median when compared to Alternative 1	

4. Reduces anticipated operating speed through commercial zone leading to improved safety for motorists, bicycles and pedestrians when compared to Alternative 1	
5. Overall Superior Operational and Safety performance when compared to Alternative 1	
6. Reduces Out of Direction Travel for vehicles coming from Pleasant Grove School Road when compared to Alternative 2A	
7. Serves Bradley Ranch Winery and Brookside Equestrian Park more directly than Alternative 2A or 2C	

Right of Way (ROW) Needs for Alternative 2C/2D:

# of Parcels requiring acquisitions (TCE/ Fee)	103/97
#of Full Acquisitions (Businesses/Residential/Vacant)	0 / 1 / 0
Temporary Construction Easements (TCE) (acres)	8.7
ROW in Fee Title (acres)	32.2
ROW Capital Costs	\$9,186,000
ROW Support Costs	\$ 2,088,000

Cost Estimate for Alternative 2C/2D:

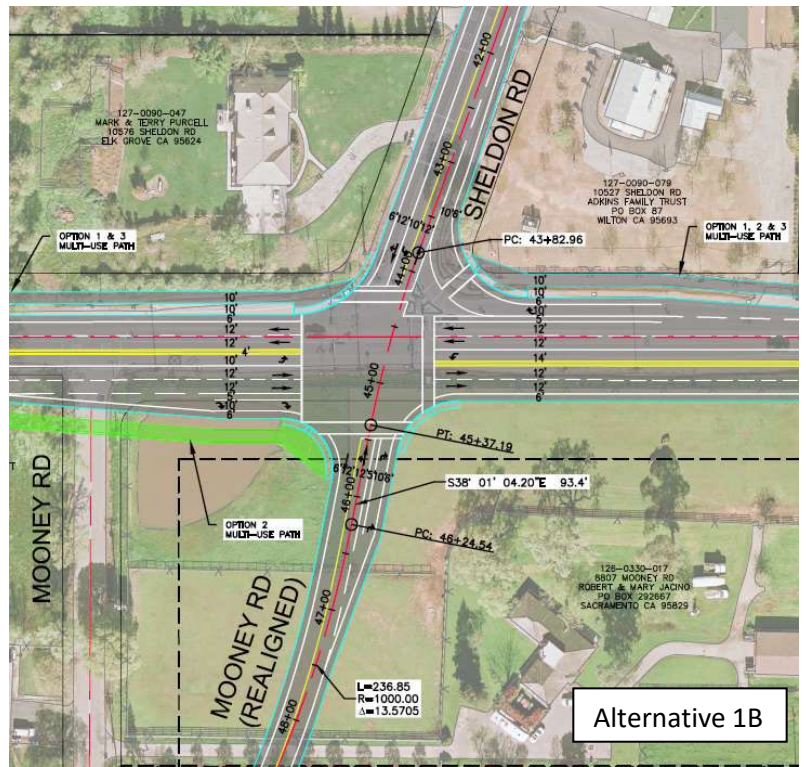
	<u>Current Year Cost</u>
TOTAL ROADWAY COST	\$ 32,187,000
TOTAL STRUCTURES COST	\$ 4,488,000
<i>SUBTOTAL CONSTRUCTION COST</i>	\$ 36,675,000
TOTAL RIGHT OF WAY CAPITAL COST	\$ 9,186,000
TOTAL CAPITAL OUTLAY COSTS (current year)	\$ 45,861,000

Comparison of Alternatives- Right of Way Acquisitions and Costs:

Description	Area of ROW Acquisition In acres (TCE / Fee)	# of Full Acquisitions	ROW Capital Costs	Construction Capital Costs	Total Capital Costs
Alternative 1A	8.0 / 28.6	3	\$11,209,000	\$35,207,000	\$46,416,000
Alternative 1C	8.2 / 28.6	3	\$11,245,000	\$35,538,000	\$46,783,000
Alternative 2A	8.3 / 27.6	1	\$8,183,000	\$34,843,000	\$43,026,000
Alternative 2C	8.4 / 31.2	1	\$8,745,000	\$36,803,000	\$45,548,000
Alternative 2A/2D	8.4 / 28.4	1	\$8,494,000	\$35,020,000	\$43,514,000
Alternative 2C/2D	8.7 / 32.2	1	\$9,186,000	\$36,675,000	\$45,861,000

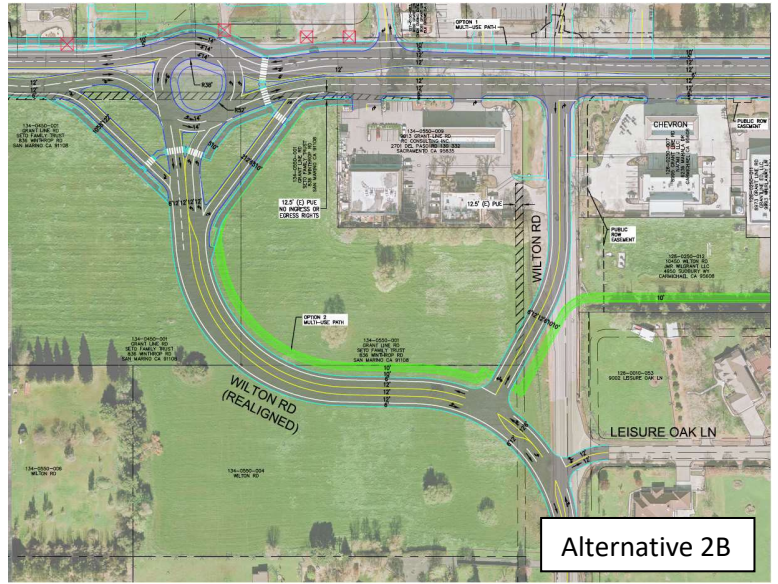
Alternatives Rejected from Further Consideration:

Alternative 1B- Realignment of Mooney Road into the Sheldon Road signalized intersection as a part of Alternative 1A. Mooney Road intersects Grant Line Road approximately 240 feet south of Sheldon Road. This alternative evaluated the option to realign Mooney Road to align with the proposed Sheldon Road intersection. The realignment would have significant acquisitions on two residential properties on the north side of Mooney Road. At Public Meeting #1, there was very little support for this realignment due to the acquisitions of property. Thus, it was determined that Alternative 1B should be dropped from further consideration as part of the STUDY.



Pros of Alternative 1B:	Cons of Alternative 1B:
1. Previously evaluated in the 2012 PEIR	1. Requires full acquisition of 2 Business Properties
2. Provides consistent intersection treatment with rest of the corridor	2. Requires greater right of way acquisitions due to cross section width when compared to Alternative 2
3. Eliminates offset (closely spaced) intersection with Sheldon Road	3. Will result in higher speeds through Segment C when compared to Alternative 2
	4. High-cost alternative
	5. Greater right of way acquisitions on residential parcels to achieve realignment of Mooney Road while serving few users

Alternative 2B- Realignment of Wilton Road from Leisure Oak Lane utilizing two closely spaced intersections. The realignment of Wilton Road is not being rejected, but rather the approach to connecting to Old Wilton Road and Leisure Oak Lane. This alternative received very little support when compared to Alternative 2C at Public Meeting #1 from the community and thus was dropped from further consideration in the STUDY.



Pros of Alternative 2B:	Cons of Alternative 2B:
1. Eliminates the full acquisitions of two Business properties that were required in Alternative 1	1. Realignment of Wilton Road requires acquisition of most of a 7 acre undeveloped parcel when compared to Alternative 2A
2. Reduces right of way acquisitions on gas stations and businesses across from Wilton Road compared to Alternative 2A	2. Requires two closely spaced intersections at start of realigned Wilton Road
3. Requires less right of way acquisitions due to narrower median when compared to Alternative 1	3. Inferior operations and circulation when compared to Alternative 2C
4. Reduces overall speed through commercial zone leading to improved safety for motorists, bicycles and pedestrians when compared to Alternative 1	
5. Overall Superior Operational and Safety performance when compared to Alternative 1	
6. Reduces Out of Direction Travel for vehicles coming from Pleasant Grove School Road when compared to Alternative 2A	

Comparison of Operations and Safety of Alternative 1 and Alternative 2:

A Traffic Study has been completed evaluating the alternatives against the 2050 traffic forecasts. Two measures of comparison between Alternative 1A (Signals) and Alternative 2A (Roundabouts) from the table below:

1. Delay- Average delay for all vehicles traversing each intersection. Total Corridor delay is also provided for the AM and PM peak periods. Roundabouts operate superior in both the AM and PM peaks.
2. Percent (%) of Performance Target- this metric is a bit more difficult to do a direct comparison because the City has established a different Performance Target for Signals and Roundabouts. However, you can see that both alternatives perform better than the target in all cases except at Calvin Road. The slight deficiency at Calvin Road is viewed to be in

Intersection Control Criteria	Elk Grove Intersection Target Percentage *				
	Signals <55.1 delay in seconds		Roundabouts <35.1 delay in seconds		
Intersection Location	Peak Hour	Alternative 1A 2050 Signalized Intersections		Alternative 2A 2050 Roundabout Intersections	
		Delay (sec)	% of Performance Target *	Delay (sec)	% of Performance Target *
Grant Line Rd @ Bond Rd	AM	28.6	52%	22.8	65%
	PM	40.5	74%	16.0	46%
Grant Line Rd @ Wilton Rd	AM	52.9	96%	16.3	46%
	PM	54.6	99%	14.7	42%
Grant Line Rd @ Aleilani Ln	AM	19.0	34%	24.7	70%
	PM	38.9	71%	25.0	71%
Grant Line Rd @ Sheldon Rd	AM	54.8	99%	18.5	53%
	PM	37.9	69%	11.6	33%
Grant Line Rd @ Graybill Ln	AM	6.3	11%	14.5	41%
	PM	7.6	14%	12.3	35%
Grant Line Rd @ Calvin Rd	AM	53.2	97%	41.9	119%
	PM	18.5	34%	28.4	81%
Total Corridor Delay	AM	214.8		138.7	
Total Corridor Delay	PM	198.0		108.0	

the acceptable range for this performance metric given that roundabouts typically perform better when in series as shown by the rest of the intersections performing well below the 100% of the performance target for roundabouts, and the delay in seconds is less than 100% of the performance target for a signalized intersection.

* Elk Grove’s General Plan establishes performance targets for intersection delay that would meet acceptable traffic operations. Delay is stated as an average time that each motorist would experience getting through the intersection during peak traffic periods. The performance targets are used to evaluate the effectiveness of design alternatives. It is important to note that the City has set different acceptable delay thresholds for Signals versus Roundabouts. See Elk Grove Transportation Analysis Guidelines dated February 2019 for more details.

It should be noted that the design variations of Alternatives 1C, 2C and 2D would not appreciably change the results shown in the previous table. When comparing the operational delay at each individual intersection, the Roundabout alternative performs better than the signals in 8 out of 12 intersection peak periods. When comparing the overall delay in the corridor, the Roundabout Alternative performs significantly better in both the AM and PM Peak Periods.

It is also important to note that Caltrans has adopted the requirement of comparing potential intersection treatments in their Intersection Control Evaluation (ICE) for every project with a default being the preference of roundabouts due to the safety benefits associated with this intersection control unless there are compelling reasons to select another control strategy. Caltrans is also seeing an air quality benefit in this strategy because the roundabouts reduce the queued idling vehicles at each intersection. Many local agencies have adopted this approach as well.

According to *NCHRP Report 672- Roundabouts: An Informational Guide*, “Roundabouts have demonstrated to be safer for motor vehicles and pedestrians than other forms of at-grade intersections. The safety benefit is particularly notable for fatal and injury crashes. The safety performance of a roundabout is a product of its design. At roundabouts, vehicles travel in the same direction, eliminating the right-angle and left-turn conflicts associated with traditional intersections. In addition, good roundabout design places great emphasis on speed control. Speed control is provided by geometric features, not just traffic control devices or the impedance of other traffic. Lower vehicle speeds promote safety benefits such as:

1. *Providing more time for entering drivers to judge and adjust for speed to enter a gap in the circulating traffic.*
2. *Reducing the size of required sight triangles needed for users to see one another*
3. *Increasing the likelihood of drivers yielding to pedestrians*
4. *Making crashes less frequent and less severe, including crashes involving bicycles and pedestrians”*

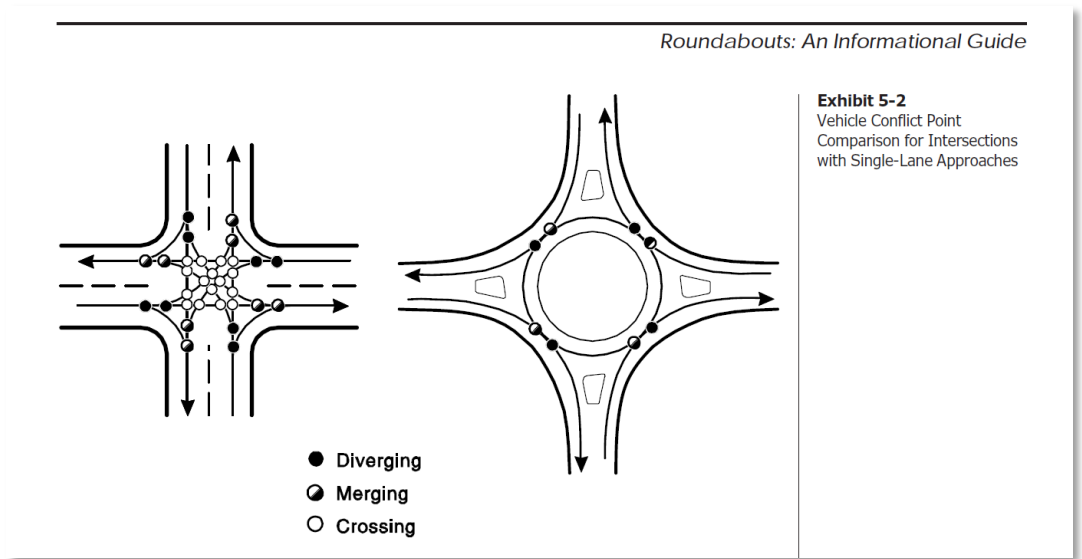
A comparison of the conflict points in a traditional intersection versus the number of conflict points in a roundabout help us understand why the safety benefits of roundabouts are so great.

According to the Federal Highway Administration, roundabouts have demonstrated these safety performance enhancements when compared to traditional intersections:

- More than 90% reduction in fatalities
- 76% reduction in injuries
- 35% reduction in all crashes

As indicated above, speed control is an essential element of roundabout design. The proposed roundabouts for this project have been designed with operating speeds of between 20 and 25 mph resulting in an overall reduction in operating speeds from Bond Road to Calvine Road, if one of the Roundabout Alternatives is selected. This speed reduction is beneficial to the long-term goal of preserving the Town of Sheldon Commercial Zone.

This would promote a more walkable and vibrant commercial zone.



Public Outreach:

The City conducted three public meetings as part of this study:

1. A Virtual Meeting (via ZOOM) was held on September 17, 2020. The team presented the alternatives that were under consideration. Approximately 125 people attended the meeting. Approximately 75 questions came in during the meeting and were all answered during the meeting. Frequently Asked Questions (FAQ) were developed and posted to the city website along with presentation materials. Survey responses were provided by 38 people.
2. An In-Person Meeting was held on August 31, 2021. Approximately 140 people attended the meeting held at the Adkins Winery. The City displayed plans depicting the alternatives on walls around the facility. STUDY Team members were stationed at the alternatives to explain the various alternatives and answer questions from the attendees. A presentation followed that summarized the study progress and discussed anticipated next steps. The evening concluded with a Question and Answer session. Following the meeting, the FAQs was updated with additional questions and posted on the city webpage along with meeting materials. One key comment that came from several attendees was that an alternative should be added for an intersection at Bradley Ranch Road in lieu of Graybill Road. As such the City decided to add alternatives (Alternatives 1C and 2D) based upon the community suggestion. Concerns were also raised regarding horse trailers access via Bradley Ranch Road for the Brookside Equestrian center. These concerns can be mitigated as follows:
 - a. The City can work with the Equestrian Center operator to identify the best routing for their patrons to and from the Equestrian Center.
 - b. Under Alternative 2, the roundabouts have been designed to accommodate U-turn movements by truck/ horse trailer combinations if needed. Other routing can eliminate the need for such maneuvers.
 - c. Under Alternative 2A, deceleration and acceleration lanes have been provided for the Bradley Ranch Road right in-right out intersection to resolve concerns raised about the acceleration of horse trailer combinations and being able to merge with traffic along Grant Line Road and to reduce speeds to make comfortable right turns.

Survey responses were received from 23 people.

3. A Virtual Meeting (ZOOM) was held on March 1, 2022. The focus of this meeting was the comparison of the Graybill Intersection versus the Bradley Ranch Road Intersection. Approximately 65 people attended the meeting. After the presentation, a Question and Answer session was conducted with the team responding to all questions. The FAQs were again updated, and all meeting materials were posted to the City webpage. Survey responses were received from 28 people.

In addition to the Public Meetings, the project team conducted more than 50 “one on one meetings”, with various residential and business property owners. Many of these meetings resulted in refinements to driveway modifications that were preferred by the owners.

Response Summary to Surveys Conducted in Association with Each Public Meeting:

Key Questions	# of Votes			Totals
	Public Meeting 1	Public Meeting 2	Public Meeting 3	Meetings Combined
1. Do you prefer Signalized Intersections or Roundabouts?	Signals= 14 Roundabouts= 24	Signals= 8 Roundabouts = 15	Signals= 10 Roundabouts= 13	Signals= 32 Roundabouts = 52
2. Under Alternative 2 would you prefer to realign Wilton Road?	Yes, (Alt 2C)= 27 No, (Alt 2A)= 11	Yes, (Alt 2C)= 8 No, (Alt 2A)= 7	Yes, (Alt 2C)= 15 No, (Alt 2A)= 5	Alt 2C=50 Alt 2A=23
3. Under Alternative 1, do you prefer the Graybill (GB) Intersection or the Bradley Ranch (BR) Intersection			GB (Alt 1A)= 6 BR (Alt 1C)= 13	
4. Under Alternative 2, do you prefer the Graybill (GB) Intersection or the Bradley Ranch (BR) Intersection			GB (Alt 2A)= 10 BR (Alt 2D)= 9	

Conclusions and Recommendations:

Recommendation 1: City Staff recommends Alternative 2 (Roundabouts) over Alternative 1 (Signals) for Segment C (from Bond Road to Calvine Road) of the Capital SouthEast Connector. It is requested that City Council provide direction for this recommendation.

This segment is the most unique segment in the 34-mile corridor. The Roundabout Alternative has numerous advantages over the Signal Alternative as follows:

1. Preserves more of the Sheldon Commercial Zone due to a reduced project footprint; eliminating the need to acquire two businesses needed to implement the signal alternative.
2. Slows traffic speeds to 35 mph or less which is appropriate for this commercial setting with closely spaced intersections, driveway access points, and the anticipated growth of pedestrian and bicycle travel through the segment.
3. Operational and Safety benefits associated with the roundabout design due to continuous flowing traffic and reduced vehicle conflicts that reduce accident severity and frequency.
4. Provides a “sense of place” opportunity for Sheldon with walkways, a multi-use path, landscaped central islands and an opportunity for potential historical or site-specific public art that enhances the commercial zone.
5. Approximately 62% of the survey respondents support the Roundabout Alternative (Alt 2) over the Signal Alternative (Alt 1).

Qualitative Comparison of Alternatives Supporting Recommendation 1:

Criteria	Alt 1 (Signals)	Alt 2 (Roundabouts)
Operations (traffic demand, access)	Inferior	Superior
Safety (peds and bikes, crash expectations)	Inferior	Superior
Right of Way Impacts (R/W needs)	Slightly Superior	Slightly Inferior
Business impacts (access, full takes, viability)	Inferior	Superior
Cost	Slightly Inferior	Slightly Superior
Community Support	Inferior	Superior
Overall	Inferior	Superior

Recommendation 2: City staff recommends the inclusion of an additional intersection between Sheldon Road and Calvine Road to reduce out of direction travel. Further analysis is needed before selecting either Graybill Road or Bradley Ranch Road for this additional intersection. It is requested that City Council provide direction for the recommendation for including an intersection between Sheldon Road and Calvine Road. Staff also requests City Council feedback on the location alternatives.

The City intends to initiate further study to determine the preferred intersection location alternative. This study would include collection of traffic data at Bradley Ranch Road, including forecasting future traffic demands. A queuing analysis could also be conducted to determine whether a traffic signal located at this location is feasible, despite the roundabouts located at Sheldon Road and Calvine Road respectively. Traffic data for the Bradley Ranch Road location would be compared to traffic data for the Graybill Road location to further assess which alternative provides superior traffic operations and community benefits.

The reasons for this recommendation are as follows:

1. While there is no operational need for this additional intersection; it is recommended to reduce out of directional travel along Grant Line Road due to the 1.6 mile spacing between Sheldon Road and Calvine Road. This additional intersection will provide a project benefit of reduced Vehicle Miles Travelled (VMT) and the resulting air quality benefit.
2. Alternative 2D, Bradley Ranch Road intersection, will serve residential properties and two businesses along Bradley Ranch Road: Brookside Equestrian Park and Bradley Ranch Winery. The acquisitions on developed private property are much larger for the intersection located at Bradley Ranch Road. For this alternative, access is severed for the residential property directly across from Bradley Ranch Road. An access easement would need to be acquired across the adjacent residential property at Bradley Ranch Road to mitigate the loss of access. Additionally, other residential parcels at Bradley Ranch Road would require more right of way acquisitions than Alternative 2A or 2C. Property owners surrounding the Bradley Ranch Road intersection, where right of way acquisition is necessary, are in unified opposition to locating a roundabout at that intersection if it results in acquisition of any of their property. Other residents and businesses along Bradley Ranch Road generally prefer the intersection being located at Bradley Ranch Road.
3. The Graybill intersection primarily impacts undeveloped land. This larger parcel may develop in the future and would benefit by locating the full intersection at Graybill as a fourth leg of the roundabout could be added to serve any future development. The owner of the undeveloped land opposes the intersection located at Graybill Road due to the required land acquisition.
4. Concerns raised regarding horse trailer access via Bradley Ranch Road for the Brookside Equestrian Park can be mitigated with geometry at the intersections accommodating horse trailer turns and acceleration/deceleration lanes along Grant Line Road with both the roundabout alternative or the right in/right out configuration.

5. 53% of the survey responses support the Graybill Roundabout (Alt 2A or 2C) over the Bradley Ranch Road Roundabout (Alt 2D). 68% of the survey responses support a Bradley Ranch Signal (Alt 1C) over Graybill Signal (Alt 1A), indicating that right of way acquisition associated with the roundabout is the primary concern with locating the intersection at Bradley Ranch Road. Further study, including a queuing analysis, could be conducted to determine whether a traffic signal located at this location is feasible, which would reduce the necessary right of way acquisition.
6. This section of Grant Line Road will not be widened for at least 10 years or more depending on project funding availability and priority. Land use changes may occur that could affect the ultimate decision about which intersection to select and thus it is recommended that further study be completed closer to the start of construction before deciding on which intersection to select.

Qualitative Comparison of Alternatives:

Criteria	Alt 2A (Roundabouts) Graybill Road	Alt 2D (Roundabouts) Bradley Ranch Road
Operations (traffic demand, access, etc.)	Similar	Similar
Safety (peds and bikes, crash expectations, etc.)	Similar	Similar
Right of Way Acquisitions (R/W needs)	Superior	Inferior
Business impacts (access, full takes, viability, etc.)	Inferior	Superior
Cost	Superior	Inferior
Community Support	Similar	Similar
Overall	Similar	Similar

Recommendation 3: Further analysis needs to be completed for the Wilton Road Intersection (Alternative 2A versus Alternative 2C). Staff requests City Council feedback on the alternatives.

The City intends to initiate further study for a portion of Segment C at the Wilton Road and Grant Line Road intersection, from south of Pleasant Grove School Road to north of Aleilani Lane. This subsequent study would encompass and evaluate alternatives 2A and 2C and provide more details regarding environmental and community impacts before a determination is made. The following are some of the issues and concerns raised between the alternatives:

1. A roundabout at the existing Wilton Road intersection (Alternative 2A) is a difficult fit between the developed commercial properties and would require substantial right-of-way from all abutting property owners.
 - a. The commercial properties on the west side of the intersection would require consolidation of driveways for access. This would necessitate cross access

easements between several abutting business owners; some of which have already indicated they would not grant such an easement. Additionally, the septic system for the Sheldon Shopping Center is believed to be within the tree area between the parking lot and Grant Line Road. There would be no place to relocate the septic system and thus may necessitate the full acquisition of the shopping center. The west side business owners oppose Alternative 2A

- b. The owner of the Chevron station favors Alternative 2A over Alternative 2C because of a perceived loss of business access and seems to have less concern about the size of right-of-way acquisitions associated with Alternative 2A. The project includes a connection from the Aleilani roundabout to the Shopping Center containing the Chevron Station to provide additional access to this center that does not currently exist.
2. Alternative 2C would realign Wilton Road and relocate the Wilton Road Grant Line intersection. The roundabout at this revised intersection location would allow the commercial zone to have reduced acquisitions. Here are some considerations related to Alternative 2C:
 - a. This alternative provides the superior safety and operational benefits of the roundabouts while also reducing the right-of-way acquisitions on the commercial core properties. The Businesses on the west side of Grant Line Road (Happy Garden, Sheldon Silva Inn, and the Sheldon shopping Center) all support Alternative 2C.
 - b. The owner of the undeveloped parcels that would be impacted with the realignment of Wilton Road is opposed to Alternative 2C because the alignment would require substantial acquisition from these parcels comprising about 7 acres. These parcels have been on the market for sale for several years and no development is currently under consideration.
 - c. A second roundabout would be proposed near Leisure Oak Lane for the intersection of New Wilton Road, Old Wilton Road and Leisure Oak Lane. Old Wilton Road would remain for circulation to and from the gas stations and would also serve as the routing for Westbound Wilton Road to Northbound Grant Line Road. The owners near Leisure Oak Lane have not expressed any concerns related to Alternative 2C.
 - d. Access to and from Pleasant Grove School Road is enhanced with Alternative 2C as there would be roundabouts just upstream and downstream providing U-turn opportunities; reducing the length of out of direction travel associated with Alternative 2A from Pleasant Grove School Road.
 - e. Driveway access for a few residential parcels opposite the roundabout would require modifications, however, none of these property owners, as of the date of this report, have expressed concerns regarding this Alternative.

Appendix:

A. 2018 Traffic Volumes (Kimley Horn Draft ICE Report December 7, 2018)

B. 2050 Traffic Volumes (Kimley Horn ICE Report June 23, 2020)

C. Precise Roadway Plan:

1. Alternative 1 (Signalized Intersections) Cross Sections
2. Alternative 2 (Roundabouts) Cross Sections
3. Alternative 1A
4. Alternative 2A
5. Alternative 2C
6. Alternative 1C (Bradley Ranch Road Variation)
7. Alternative 2D (Bradley Ranch Road Variation)

D. Alternatives Considered, But Rejected:

1. Alternative 1B (Mooney Road Variation)
2. Alternative 2B (Leisure Oak Lane Signal Variation)

E. Preliminary Cost Estimates (Roadway/Structures/ Right of Way Capital):

1. Alternative 1A
2. Alternative 2A
3. Alternative 1C (Alternative 1A except where replaced by 1C)
4. Alternative 2C (Alternative 2A except where replaced by 2C)
5. Alternative 2A/2D (Alternative 2A except where replaced by 2D)
6. Alternative 2C/2D (Alternative 2C except where replaced by 2D)

F. Frequently Asked Questions:

The questions asked during the three public meetings have been used to develop these Frequently Asked Questions and City Responses. For additional information such as presentation materials, please refer to the City's webpage at the following address.

https://www.elkgrovecity.org/city_hall/departments_divisions/public_works/capital_improvements/grant_line_sheldon_feasibility_study