

4-Way Ranch Commercial Phase 1 Traffic Technical Memorandum

Prepared for:

Craig Dossey | President
Vertex Consulting Services
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NOVEMBER 30, 2023

LSC Transportation Consultants
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LSC #S224451



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November 30, 2023

Craig Dossey | President
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455 East Pikes Peak Avenue, Suite 101
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RE: 4-Way Ranch Commercial
Phase 1
El Paso County, CO
Traffic Technical Memorandum
LSC #S224451

Dear Mr. Dossey:

LSC Transportation Consultants, Inc. has prepared this traffic technical memorandum for the first phase of the 4-Way Ranch Commercial development. As shown in Figure 1, the site is located north and south of Stapleton Drive and northwest of US Highway 24 (US Hwy 24) in El Paso County, Colorado. LSC recently prepared a Master traffic impact study (MTIS) for the 4-Way Ranch Commercial Rezone (CS-22-003) that included trips by the currently-proposed phase. This memorandum is intended as a site-specific, final plat traffic report.

REPORT CONTENTS

site development
plan

This report presents:

- A summary of the proposed land use and access plan;
- The projected average weekday and peak-hour vehicle trips to be generated by the currently proposed filings;
- The assignment of the site-generated traffic volumes to the area roadways;
- Improvements needed with the currently proposed filings; and
- The project's obligation to the County roadway improvement fee program.

RECENT TRAFFIC REPORTS

- LSC completed an updated master traffic study (TIS) for the entire 4-Way Ranch development, dated October 21, 2022.
- LSC prepared a master traffic study (MTIS) for the 4-Way Ranch Rezone, December 20, 2022. The currently proposed land uses were accounted for within that recent report.
- A list of other traffic studies in the vicinity of area of study completed within the past five years (that LSC is aware of) is attached for reference (Appendix Table 1).
- El Paso County is currently studying the Briargate Stapleton Corridor as part of a Pikes Peak Rural Transportation Authority (PPRTA) study. A draft version of the Briargate-Stapleton Corridor Study by Wilson & Company was published December 9, 2021.

verify based on
site plan



LAND USE AND ACCESS

The 4-Way Ranch Commercial MTIS assumed the initial development would include the area south of Stapleton Drive adjacent to US Hwy 24 and east of the draining area including about four to six acres of general commercial uses, three to five acres of mini-warehouse, three to four acres for Boat/RV storage, and three to four acres for contractor equipment storage. The currently proposed first phase includes two 24,000 square-foot mini-warehouse buildings, 60 Boat/RV spaces, and 48,000 square feet for outdoor contractor equipment storage. The general commercial uses are no longer included in the initial phase. However, the remaining developable area south of Stapleton Drive and east of the drainage area is still intended to be developed for commercial uses in the future. The remaining buildable area outside of what is being submitted with the currently-proposed site development plan that could be developed with commercial uses is approximately 5.4 acres. Figure 2 shows the proposed site plan.

Access is proposed to the future Dumont Drive to be located about 845 feet west of US Hwy 24. This access does not meet the intersection spacing requirements for an Urban Principal Arterial found in the *El Paso County Engineering Criteria Manual (ECM)*. However, the location of the Stapleton/Dumont intersection was established with the Stapleton Corridor Study and access control plan. Generally, a deviation should not be necessary as a corridor-specific access management plan essentially overrides the general *ECM* criteria. However, at the request of the County, a deviation request has been submitted with this application.

Dumont Drive will initially be built as a private drive south of Stapleton Drive to serve this initial phase. Dumont Drive will be improved to an Urban Non-Residential Collector standard as part of future submittals.

INTERSECTION SIGHT DISTANCE

Based on a design speed of 50 miles per hour (mph) and the criteria contained in Table 2.21 of the *Engineering Criteria Manual (ECM)*, the required intersection sight distance at the intersection of Dumont Drive/Stapleton Drive is 555 feet. These measurements were conducted in the field by LSC. The measurements were taken from a driver's eye height of 3.5 feet to an approaching vehicle height of 3.5 feet. The available sight distance is greater than 1,000 feet to both the east and the west.

The lines of sight for both access-point intersections will need to be kept clear of any sight distance obstructions. This includes landscaping, signage, etc. proposed for the development.

EXISTING TRAFFIC

Figure 3 shows the existing morning and afternoon peak-hour traffic volumes at the intersection of Stapleton/US Hwy 24. The morning peak hour was assumed to occur for one hour between 6:30 a.m. and 8:30 a.m. The afternoon peak hour was assumed to occur for one hour between 4:00 p.m. and 6:00 p.m. These volumes are based on manual intersection turning-movement counts conducted by LSC in January 2023. The count-data sheets are attached for reference.

TRIP GENERATION

4-Way Ranch Commercial Phase 1 site-generated vehicle trips have been estimated, in part, using the nationally-published trip-generation rates from *Trip Generation, 11th Edition, 2021* by the Institute of Transportation Engineers (ITE). ITE does not have trip-generation rates for RV/boat storage or for outdoor contractor storage. The trip-generation rates used for the RV/boat storage in the 4-Way Ranch Commercial MTIS were based on traffic counts conducted by LSC at similar facilities in 2018. The trip-generation rates for this use shown in Table 1 are based on more recent estimates derived from traffic studies completed by several other traffic consultants. Please refer to Appendix A for details.

The trip-generation rates for the outdoor contractor storage in the 4-Way Ranch Commercial MTIS were based on ITE Land Use 180: Specialty Trade Contractor. The trip-generation rates for this use shown in Table 1 are based on a trip-generation study of similar, existing storage businesses conducted by LSC in October 2023. Please refer to Appendix B for details.

Table 1 shows the trip-generation estimate. Table 1 also shows a comparison of the trip-generation estimate for the area south of Stapleton Drive between the drainage area and US Hwy 24 based on the currently-proposed plan and the estimate assumed in the 4-Way Ranch Commercial MTIS for the same parcels. As shown in Table 1, the current trip-generation estimate is lower than what was assumed in the MTIS.

The currently proposed 4-Way Ranch Commercial Phase 1 is expected to generate 113 vehicle trips on the average weekday, with about half entering and half exiting the site during a 24-hour period. During the morning peak hour, which generally occurs for one hour between 6:30 and 8:30 a.m., about five vehicles would enter and three vehicles would exit the site. During the afternoon peak hour, which generally occurs for one hour between 4:15 and 6:15 p.m., about five vehicles would enter and six vehicles would exit the site.

TRIP DISTRIBUTION AND ASSIGNMENT

The directional distribution of the site-generated traffic volumes on the area roadways is an important factor in determining the site's traffic impacts. Figure 4 shows the directional distribution estimates for the site-generated traffic volumes. The estimates are consistent with the directional distribution estimate from the 4-Way Ranch MTIS.

When the distribution percentages from Figure 4 are applied to the new, external trip-generation estimates (from Table 1), the resulting Phase 1 site-generated traffic volumes can be determined. Figure 5 shows the Phase 1 site-generated traffic volumes.

TOTAL TRAFFIC VOLUMES AND LEVELS OF SERVICE

Figure 6 shows the projected short-term (Year 2026) total-traffic volumes following buildout of the currently proposed Phase 1 at the intersection of Stapleton/Dumont. The short-term total traffic volumes are the sum of the short-term background-traffic volumes (from Figure 4 of the 4-Way Ranch MTIS) plus the phase 1 site-generated traffic volumes from Figure 5 of this report. As shown in Figure 6, the intersection of Stapleton/Dumont is projected to operate at LOS C or better for all movements as a stop-sign-controlled intersection, based on the projected 2026 total traffic volumes.

Please refer to the 2042 peak-hour traffic-volume projections and level of service analysis shown in Figure 10 of the *4-Way Ranch Commercial MTIS*. The proposed land use and access is in compliance with the MTIS. As such, there are no changes to these projected volumes or level of service results.

SIGNAL WARRANT THRESHOLD ANALYSIS – AM AND PM PEAK HOURS

The intersection of Stapleton/Dumont was analyzed to determine if the thresholds for Four-Hour and/or Eight-Hour Vehicular-Volume Traffic-Signal Warrant thresholds would be reached or exceeded, based on the projected short-term peak-hour traffic volumes.

Based on the criteria contained in the *Manual of Uniform Traffic Control Devices (MUTCD)* the minimum minor-street volume with one approach on a major street with one through lane in each direction when the posted speed limit exceeds 40 miles per hour (mph) is 60 vehicles per hour for a Four-Hour Vehicular-Volume Traffic-Signal Warrant and 53 vehicles per hour for an Eight-Hour Vehicular-Volume Traffic-Signal Warrant based on Condition B – Interruption of continuous Traffic. The projected northbound left-turn volume at the intersection of

Stapleton/Dumont following buildout of Phase 1 is two vehicles during the morning peak hour and three vehicles during the afternoon peak hour. Based on these peak-hour volumes, a vehicular-volume traffic-signal warrant is not anticipated to be met at the intersection of Stapleton/Dumont with Phase 1 of the 4-Way Ranch Commercial development.

DEVIATION REQUESTS

A deviation request to the criteria contained in the *El Paso County Engineering Criteria Manual (ECM)* for intersection spacing requirements for an Urban Principal Arterial for the intersection of Stapleton/Dumont **has been submitted with this application.**

 verify if needed

ROADWAY IMPROVEMENTS

Table 6 from the *4-Way Ranch Commercial MTIS* contained a summary of needed improvements and recommendations for auxiliary turn-lane lengths for the entire 4-Way Ranch Commercial development. A copy of this table has been attached with notes added in November 2023.

Based on the projected short-term total traffic volumes shown in Figure 6 and the criteria contained in the *ECM*, a left-turn lane is **not** projected to be required on Stapleton Drive approaching Dumont Drive with the initial phase of development.

Based on the projected short-term total traffic volumes shown in Figure 6 and the criteria contained in the *ECM*, an eastbound right-turn lane would **not** be required on Stapleton Drive approaching Dumont with the initial phase. There is, however, existing pavement width to provide this lane if Stapleton is restriped as shown in Figure 7. Based on the criteria contained in the *ECM*, this lane should be 235 feet long plus a 200-foot taper.

The US Highway 24/Stapleton intersection is planned to be signalized. The CDOT comment letters for other area projects indicate a requirement to escrow a fair share amount toward the future traffic signal at the US Hwy 24/Stapleton Road intersection. An access permit will be required to process the escrow.

LSC Note: There are a number of developments in the area – in progress and future/planned – which will also add traffic to this intersection and impact the Four-hour warrant. As CDOT collects escrow for other developments, LSC recommends that as the collective impact trips (directly impacting the Four-hour warrant volumes) by area developments begins to exceed the 60 vehicle-per-hour denominator, fair-share recalculation of pro-rata share escrow amounts and credit be provided to developments according to the updated fair-share calculations. As shown in Figure 5, the initial phase is projected to add one eastbound left-turn movement to this intersection during the peak hour. Based on a total signal cost of \$700,000 and a ratio of one new vehicle per 60 vehicles-to-warrant this development would be responsible for \$11,666.66 towards the cost of the signal. Also, once the signal is installed, credit should be provided from the Countywide Fee Program based on a ratio of fee program unit signal cost divided by the \$700K signal cost.

4-WAY RANCH COMMERCIAL BOARD OF COUNTY COMMISSIONERS RESOLUTIONS

Table 2 shows a summary of the requirements set by Resolution No. 23-41 of Board of County Commissioners County of El Paso, State of Colorado: Approval of Map Amendment (Rezone) to CS 4-Way Commercial Rezoning (CS-22-003) and the associated improvement from Table 6 of the MTIS. Table 2 also shows the responsibility for each improvement and the recommended basis to calculate a fair-share contribution towards future improvements that Phase 1 could potentially be required to participate in.

ROADWAY IMPROVEMENT FEE

This project will be required to participate in the El Paso County Road Improvement Fee Program. The applicant will opt-out of the PID options. The 2019 “full fee” building permit fee associated with the opt-out option for the mini-warehouse portion of the development is \$725 per 1,000 square feet of floor area. Based on 48,000 square feet, the “full fee” payable at building permit for the mini-warehouse use would be \$34,800. The Road Impact Fee Schedule does not include outdoor contractor equipment storage spaces or Boat/RV storage or outdoor contractor storage. Based on a fee of \$398.55 per trip, the “full fee” for the for outdoor contractor equipment storage spaces would be \$13,949.25 and the “full fee” for the RV/Boat storage would be \$3,188.40. Note: program fees are subject to change.

* * * * *

Please contact me if you have any questions regarding this report.

Respectfully Submitted,

LSC TRANSPORTATION CONSULTANTS, INC.

By: Jeffrey C. Hodsdon, P.E.
Principal

JCH/KDF:jas

Enclosures: Tables 1-2
Figures 1-7
Level of Service Reports
Appendix Table 1
Appendix A and Appendix B
Table 6 from *4-Way Ranch Commercial MTIS* with notes by LSC

Tables



**Table 1
Trip Generation Estimate
4-Way Ranch Commercial Phase 1**

Land Use Code	Land Use Description	Trip Generation Units	Trip Generation Rates ⁽¹⁾				Total Trips Generated					Passby Trips ⁽²⁾ (%)	New Trips Generated Average Weekday Traffic	
			Average Weekday Traffic	Morning Peak Hour In	Morning Peak Hour Out	Afternoon Peak Hour In	Afternoon Peak Hour Out	Average Weekday Traffic	Morning Peak Hour In	Morning Peak Hour Out	Afternoon Peak Hour In			Afternoon Peak Hour Out
Trip Generation Estimate For the The Currently Proposed Phase 1 of The 4-Way Ranch Commercial Development														
---	RV/Boat Storage ⁽³⁾	0.6 100 storage units	12.94	0.50	0.47	0.65	0.80	8	0	0	0	0	0%	8
151	Mini-Warehouse	48 KSF ⁽⁴⁾	1.45	0.05	0.04	0.07	0.08	70	3	2	3	4	0%	70
---	Outdoor Contractor Storage ⁽⁵⁾	0.93 Acres	37.68	2.02	1.33	2.19	1.74	35	2	1	2	2	0%	35
Total								113	5	3	5	6		113
Potential Future Trip Generation Estimate For the Remaing Area South of Stapleton Road and East of the Drainage Area (not a part of the current proposal)														
821	Shopping Plaza (40-150 KSF No Supermarket)	47 KSF	67.52	1.07	0.66	2.54	2.65	3,173	50	31	120	124	34%	2,094
Total								3,286	55	34	125	130		2,207
For Reference: Trip Generation from the 2022 Master TIS														
Trip Generation Estimate For the Area South of Stapleton Road and East of the Drainage Area From the 4-Way Ranch Commercial Master Traffic Impact Analysis , December 20, 2022														
---	RV/Boat Storage ⁽⁶⁾	4 Acres	10.90	0.62	0.67	0.37	0.52	44	2	3	1	2	0%	44
151	Mini-Warehouse	54 KSF ⁽⁴⁾	1.45	0.05	0.04	0.07	0.08	78	3	2	4	4	0%	78
180	Specialty Trade Contractor	17 KSF	9.82	1.23	0.43	0.62	1.31	167	21	7	10	22	0%	167
821	Shopping Plaza (40-150 KSF No Supermarket)	52 KSF	67.52	1.07	0.66	2.54	2.65	3,511	56	34	132	138	34%	2,317
Total								3,800	82	46	147	166		2,606
Change (Decrease)								-514	-27	-12	-22	-36		-399

Notes:

- (1) Source: "Trip Generation, 11th Edition, 2021" by the Institute of Transportation Engineers (ITE).
- (2) Source: "Trip Generation Handbook - An ITE Proposed Recommended Practice 3rd Edition, September 2017" by ITE
- (3) See Appendix A for "RV/Boat Storage" rate calculations
- (4) KSF = one thousand square feet of floor space
- (5) See Appendix B for "Outdoor Contractor Storage" rate calculations

Source: LSC Transportation Consultants, Inc.

Nov-23

Table 2

4-Way Ranch Commercial Phase 1

Fair Share Contributions Towards Improvements Required by the Conditions of Approval for the 4-Way Ranch Commercial Rezoning

Resolution No. 23-41 Board of County Commissioners County of El Paso, State of Colorado Approval of Map Amendment (Rezoning) to CS 4-Way Commercial Rezoning (CS-22-003)		Roadway Improvement from Table 6 of the 4-Way Ranch Commercial Master Traffic Impact Analysis, (CS-22-003) December 20, 2023		Quantity	Units	Unit Cost	Total Estimated Cost	Fair Share Contribution Basis	Percent for Phase 1	Phase 1 Amt.
4) a.	US Highway 24/Stapleton Drive Intersection: Design, construction and/or deposit of escrow funds per Colorado Department of Transportation access permit conditions	2	Widen US Hwy 24 to provide two lanes in each direction	CDOT Responsibility						
		18	Convert from two-way, stop-sign control to signal control ⁽¹⁾	1	ea	\$650,000	\$650,000	2026 Total AM and PM total intersection volumes	0.31%	\$1,984
		19	Add northeast-bound dual left-turn lane (On US 24 approaching Stapleton Dr)	To Be Determined			2026 AM and PM northwest bound left-turn volume	0.73%	TBD	
		20	Add Southwest-bound dual left-turn lane (On US 24 approaching Stapleton Dr)	To Be Determined			2042 AM and PM southwest bound left-turn volume	0.00%	TBD	
			Potentially add Southeast-bound dual left-turn lane (On Stapleton Dr approaching US 24)	To Be Determined			2042 AM and PM southeast bound left-turn volume	0.35%	TBD	
		21	Potentially add Northwest-bound dual left-turn lane (On Stapleton Dr approaching US 24)	To Be Determined			2042 AM and PM northwest bound left-turn volume	0.00%	TBD	
21	Potential long-term capacity upgrades (jughandle, a Jr Interchange, etc.)	To Be Determined			2042 Total AM and PM total intersection volumes	0.13%	TBD			
4) b.	Eastonville Road/Stapleton Drive: Design, construction, contribution and/or escrow of funds as appropriate for intersection improvements and traffic signals, as warranted	3	Reconstruct as modern roundabout	Responsibility of PPRTA Eastonville Phase 1 Project/EI Paso County						
4) c.	Eastonville Road: Construction, contribution, and/or escrow of funds for final grading and asphalt paving between Latigo Boulevard and Stapleton Drive. ⁽²⁾	---		To Be Determined			2042 Daily Traffic Volume on Eastonville Road north of Stapleton Drive	0.14%	TBD	
4) d.	Stapleton Drive/Dumont Drive intersection: Design and construction of intersection improvements	11	Construct a westbound left-turn lane on Stapleton Dr approaching Dumont Dr. This lane should be 315 feet long plus a 200-foot taper.	To Be Determined			2042 AM and PM westbound left-turn volume	7.69%	TBD	
		12	Construct an eastbound right-turn deceleration lane on Stapleton Dr approaching Dumont Dr. This lane should be 235 feet long plus a 200-foot taper.	To Be Determined			2042 AM and PM eastbound right-turn volume	3.70%	TBD	
		13	Construct an eastbound right-turn acceleration lane on Stapleton Dr at Dumont Dr. This lane should be 760 feet long plus a 180-foot taper.	To Be Determined			2042 AM and PM northbound right-turn volume	3.96%	TBD	
		14	Construct an eastbound left-turn lane on Stapleton Dr approaching Dumont Dr. This lane should be 375 feet long plus a 200-foot taper.	To Be Determined			2042 AM and PM eastbound left-turn volume	0.00%	TBD	
		15	Construct a westbound right-turn deceleration lane on Stapleton Dr approaching Dumont DR. This lane should be 235 feet long plus a 200-foot taper (or continuous right turn acceleration lane)	To Be Determined			2042 AM and PM westbound right-turn volume	0.00%	TBD	
		16	Construct a westbound right-turn acceleration lane on Stapleton Dr at Dumont Dr. This lane should be 760 feet long plus a 180-foot taper (or continuous right turn accel/decel. lane)	To Be Determined			2042 AM and PM southbound right-turn volume	0.00%	TBD	
		17	Convert from Two-Way, Stop-Sign Control to Signal Control	To Be Determined			2042 AM and PM northbound and southbound left-turn and through volumes	0.76%	TBD	
4) e. i.	Stapleton Drive: Design, construction, contribution, and/or escrow of funds for the second two lanes from Eastonville Road to Highway 24	1	Stapleton Drive - US Hwy 24 to Eastonville Road complete southern (eastbound) half	4,965	ft	\$248	\$1,230,923	4-Way Ranch Metro District Generated Average Daily Traffic on Stapleton Drive ⁽³⁾	0.61%	\$7,502
4) e. ii.	Design, construction, contribution and/or escrow of funds as appropriate to construct intersection improvements, including traffic signals, as warranted	4-10	Various improvements at the intersection of Stapleton Drive/Saybrook Drive	Responsibility of future phases of the 4-Way Ranch Commercial Rezone Area						
4) f.	Other offsite impacts as identified in any new/updated traffic impact analysis for this development	No new offsite impacts have been identified								

Notes:

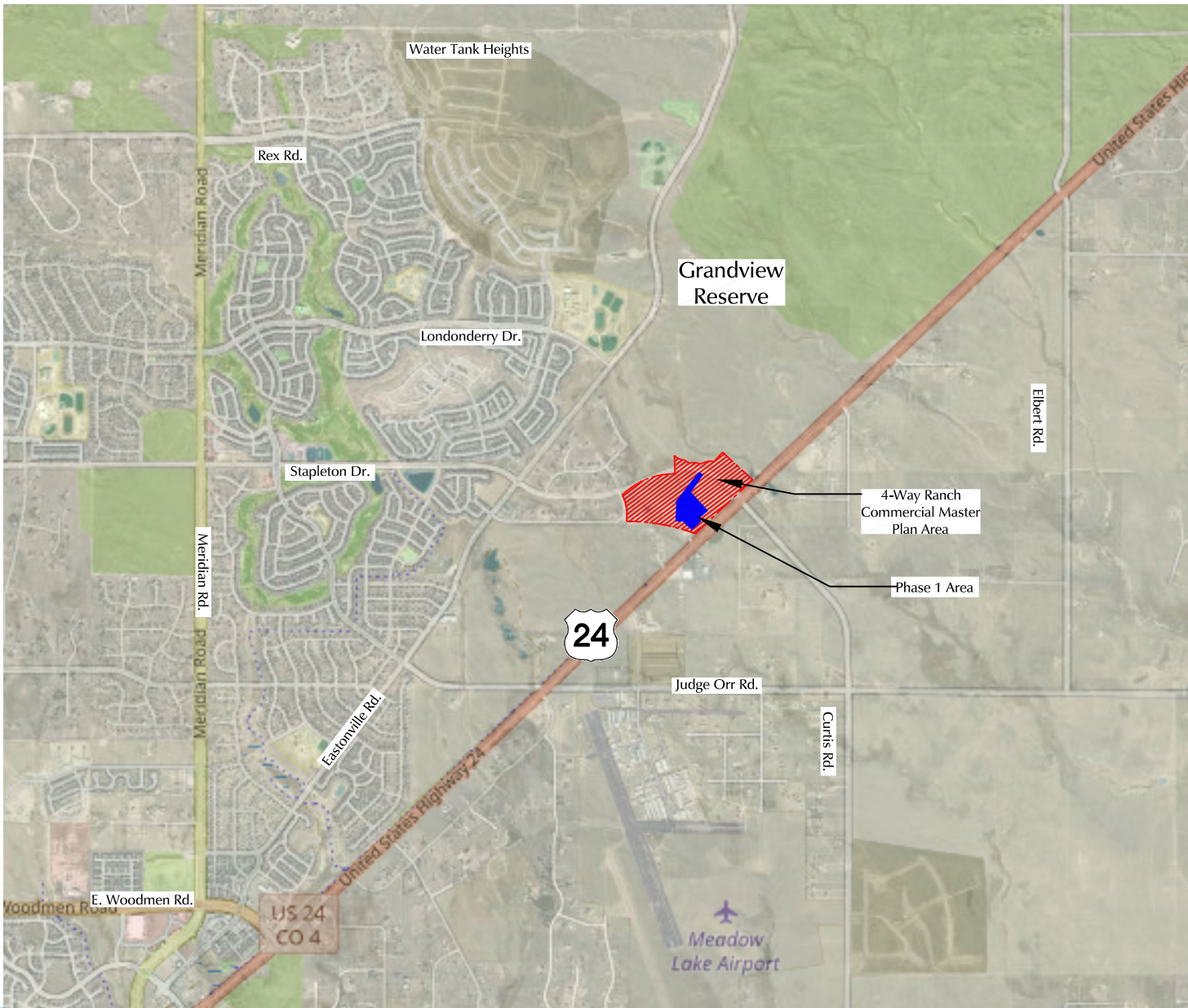
(1) This development will need to escrow funds as participation in a future traffic signal. The amount will be determined through the CDOT access permit process. It is our understanding that this intersection is considered an "eligible intersection" with respect to a future traffic signal in the County Road Improvement Fee Program. Therefore, once a signal is installed, the applicant may be entitled to a credit and reimbursement for a portion of the amount escrowed to CDOT. The credit would be based on the Fee Program rules and would be based on the fee program signal unit cost. As such any credit would likely be a prorated portion of the total amount escrowed.

(2) PPRTA Project No. U19 - potentially reimbursable under the Fee Program

(3) Source: 4-Way Ranch Commercial Master Traffic Impact Analysis (CS-22-003), December 20, 2023 and 4 Way Ranch Updated Traffic Impact Analysis (PUD 123), January 29, 2009

Figures 1-7





Approximate Scale
Scale: 1" = 4,000'

Figure 1
Vicinity
Map

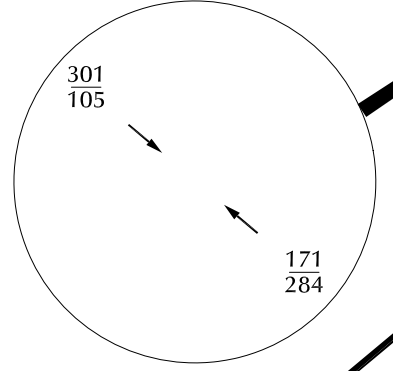
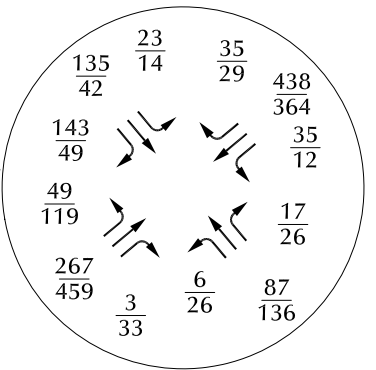
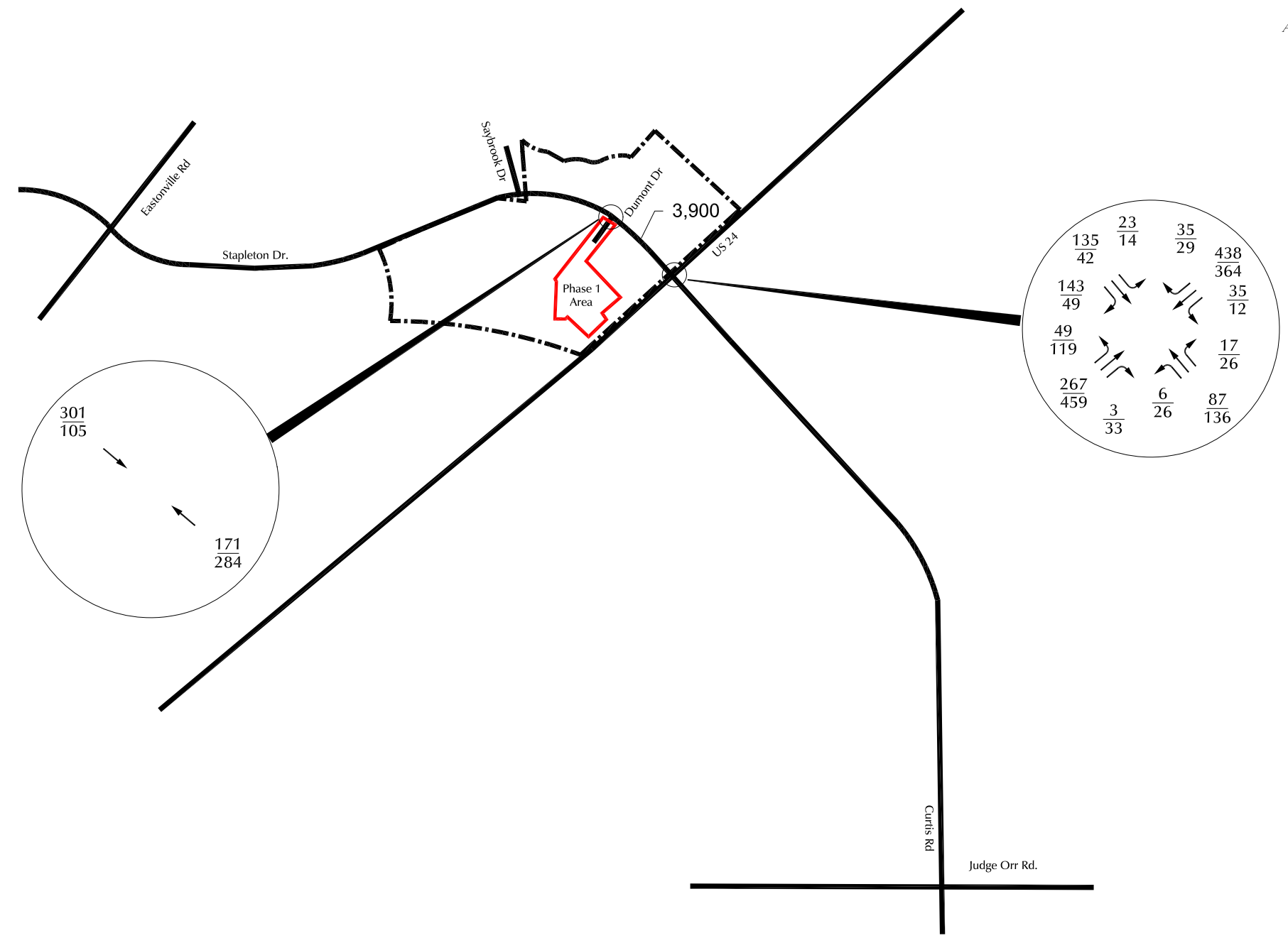
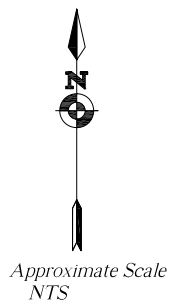
4-Way Ranch Commercial Phase 1 (LSC# S224451)



Approximate Scale
1" = 200'

Figure 2
Site
Plan

4-Way Ranch Commercial Phase 1 (LSC# S224451)



LEGEND:

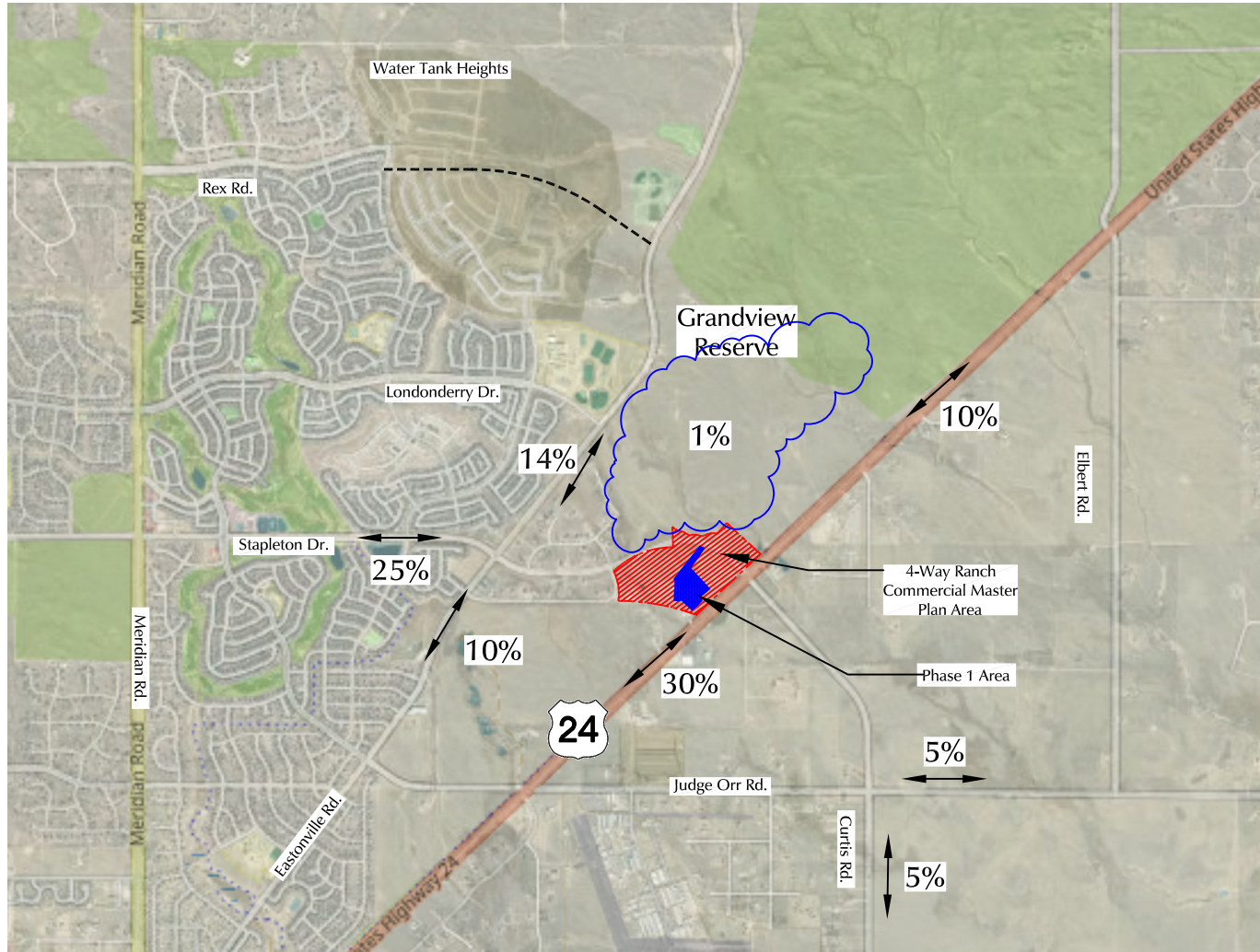
$\frac{XX}{XX}$ = AM Weekday Peak-Hour Traffic (vehicles per hour) / PM Weekday Peak-Hour Traffic (vehicles per hour) Based on counts by LSC: Jan 2023


X,XXX= Average Daily Traffic (vehicles per day)



Figure 3
Existing Traffic Volumes

4-Way Ranch Commercial Phase 1 (LSC# S224451)




 Approximate Scale
 Scale: 1" = 4,000'


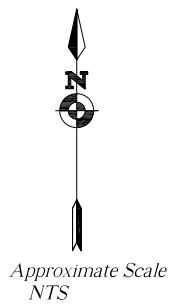
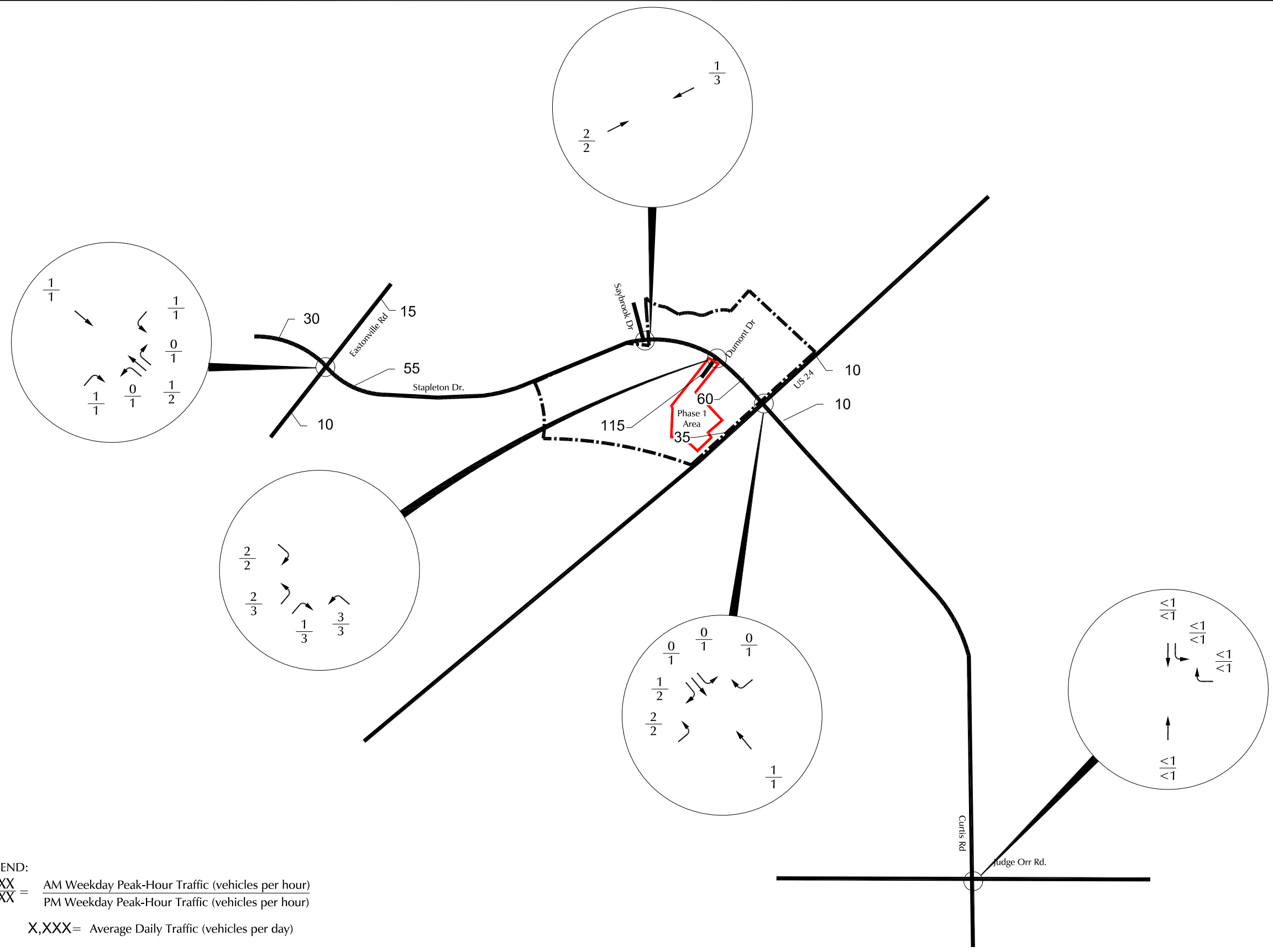
LEGEND:
 XX% = Percent Estimated Directional Distribution

Figure 4
**Directional Distribution
 of Site-Generated Traffic**

4-Way Ranch Commercial Phase 1 (LSC# S224451)

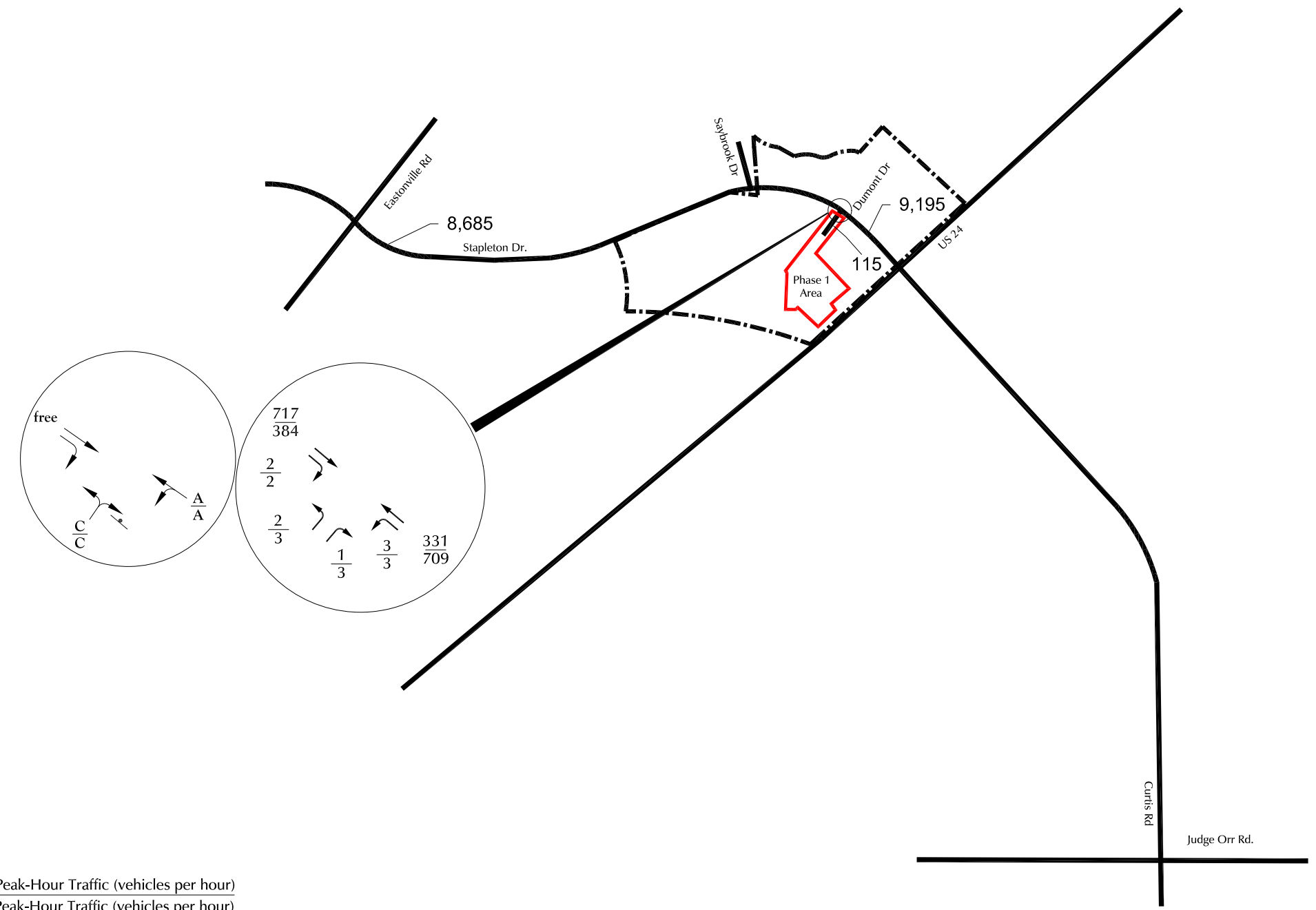
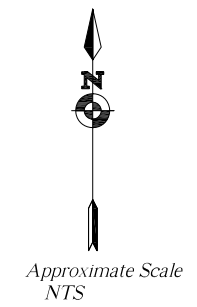




LEGEND:
 $\frac{XX}{XX}$ = AM Weekday Peak-Hour Traffic (vehicles per hour)
 $\frac{XX}{XX}$ = PM Weekday Peak-Hour Traffic (vehicles per hour)
 X,XXX= Average Daily Traffic (vehicles per day)

Figure 5
**Assignment of Phase 1
 Site-Generated Traffic**
 4-Way Ranch Commercial Phase 1 (LSC# S224451)





LEGEND:


-  = Stop Sign
- $\frac{XX}{XX}$ = AM Weekday Peak-Hour Traffic (vehicles per hour)
PM Weekday Peak-Hour Traffic (vehicles per hour)
- $\frac{A}{B}$ = AM Individual Movement Peak-Hour Level of Service
PM Individual Movement Peak-Hour Level of Service
- X,XXX = Average Daily Traffic (vehicles per day)

Figure 6
**2026 Total Traffic,
 Lane Geometry and Traffic Control**

4-Way Ranch Commercial Phase 1 (LSC# S224451)





Which side will be expanded when this becomes a public non-res. collector? Ensure that sidewalk is not "throwaway" and the road on the north side will align. As designed, the road appears to be on the west side of the ROW bumpout on Stapleton, which would lead to expansion to the east.

Figure 7
Recommended Restriping
4-Way Ranch Commercial Phase 1 (LSC# S224451)

Level of Service Reports



Intersection						
Int Delay, s/veh	0.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑		↑	↑	
Traffic Vol, veh/h	717	2	3	331	2	1
Future Vol, veh/h	717	2	3	331	2	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	235	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	844	2	4	389	2	1

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	846	0	1241
Stage 1	-	-	-	-	844
Stage 2	-	-	-	-	397
Critical Hdwy	-	-	4.12	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	-	-	2.218	-	3.518
Pot Cap-1 Maneuver	-	-	791	-	193
Stage 1	-	-	-	-	422
Stage 2	-	-	-	-	679
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	791	-	192
Mov Cap-2 Maneuver	-	-	-	-	192
Stage 1	-	-	-	-	422
Stage 2	-	-	-	-	675

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	21
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	228	-	-	791	-
HCM Lane V/C Ratio	0.015	-	-	0.004	-
HCM Control Delay (s)	21	-	-	9.6	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection						
Int Delay, s/veh	0.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑		↑	↑	
Traffic Vol, veh/h	384	2	3	709	3	3
Future Vol, veh/h	384	2	3	709	3	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	235	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	452	2	4	834	4	4

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	454	0	1294
Stage 1	-	-	-	-	452
Stage 2	-	-	-	-	842
Critical Hdwy	-	-	4.12	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	-	-	2.218	-	3.518
Pot Cap-1 Maneuver	-	-	1107	-	179
Stage 1	-	-	-	-	641
Stage 2	-	-	-	-	423
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1107	-	178
Mov Cap-2 Maneuver	-	-	-	-	178
Stage 1	-	-	-	-	641
Stage 2	-	-	-	-	420

Approach	EB	WB	NB
HCM Control Delay, s	0	0	18.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	275	-	-	1107	-
HCM Lane V/C Ratio	0.026	-	-	0.003	-
HCM Control Delay (s)	18.4	-	-	8.3	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Appendix Table 1



Appendix Table 1
Area Traffic Impact Studies by LSC
4-Way Ranch Commercial Phase 1

Study	Date
4-Way Ranch/Waterbury	
4-Way Ranch Updated TIA	January 29, 2009
Waterbury PUD Development Plan Updated TIA	January 10, 2013
Waterbury Filing Nos. 1 and 2 TIA	December 18, 2020
4-Way Ranch Commercial Master Traffic Impact Analysis	December 20, 2022
Meridian Ranch	
Meridian Ranch Sketch Plan TIA	April 11, 2011
Meridian Ranch Filing 11 Updated TIA	November 26, 2013
Stonebridge at Meridian Ranch Filing No. 1 Updated TIA	April 23, 2014
Stonebridge at Meridian Ranch Transportation Memorandum	July 28, 2015
Meridian Ranch Filing 8 Updated TIA	December 23, 2014
Meridian Ranch Filing 9 Updated TIA	May 21, 2015
Meridian Ranch Sketch Plan 2015 Amendment TIA	July 30, 2015
The Vistas at Meridian Ranch TIA	March 24, 2016
Meridian Ranch Estates Filing No. 2 Transportation Memorandum	August 27, 2015
The Vistas at Meridian Ranch Updated Transportation Memorandum	June 20, 2017
Londonderry Drive Pedestrian Operations and Safety Study	February 8, 2017
Stonebridge Filing 3 at Meridian Ranch Updated TIA	March 20, 2017
Meridian Ranch Sketch Plan 2017 Amendment TIA	October 3, 2017
WindingWalk at Meridian Ranch and The Enclave at Stonebridge at Meridian Ranch Updated Traffic Impact Analysis	May 10, 2018
Rolling Hills Ranch at Meridian Ranch PUDSP Traffic Impact Analysis	June 29, 2020
The Estates at Rolling Hills Ranch Filing No. 1 Traffic Impact Analysis	May 13, 2020
Rolling Hills Ranch at Meridian Ranch Filing No. 1 Traffic Impact Analysis	July 14, 2020
The Estates at Rolling Hills Ranch Filing No. 2 Traffic Impact Study	October 8, 2020
Rolling Hills Ranch at Meridian Ranch Filing No. 2 Transportation Memorandum	December 29, 2020
Rolling Hills Ranch at Meridian Ranch Filing No. 3 Transportation Memorandum	June 29, 2021
Meridian Ranch 2021 Sketch Plan Amendment Traffic Impact Study	June 25, 2021
The Sanctuary at Meridian Ranch Transportation Memorandum	May 3, 2022
Grandview Reserve	
Grandview Reserve Updated Master TIA	December 5, 2020
Grandview Reserve Phase 1 TIA	March 8, 2022
Meadowlake Ranch	
Meadowlake Ranch Traffic Impact Analysis	May 29, 2019
Latigo Preserve	
Latigo Preserve Filing No. 10	March 31, 2022
<i>Source: LSC Transportation Consultants, Inc.</i>	
<i>Oct-23</i>	

Appendix A



Appendix A

Trip Generation Rate Estimate

Land Use: RV & Boat Storage

(LSC Revised 6-15-2023)

LSC estimates of trip-generation rates for the proposed RV & Boat Storage land use for this project have been based on averages of rates from other studies summarized in the following table:

ITE Land Use Code	Land Use	Units ¹	Trip Generation Rates				
			Average Weekday	Weekday A.M.		Weekday P.M.	
				In	Out	In	Out
<u>RV Storage Trip Generation Report - Valley Park, St. Louis, MO for the RV Storage facility to be located at 802 Forest Avenue by The Traffic Group</u>							
-	RV Storage - Data Point 1	100 Storage Units	10.78				
-	RV Storage - Data Point 2	100 Storage Units	10.8				
-	RV Storage - Data Point 3	100 Storage Units	17.23	(duplicate data point)			
<u>Trip Generation Analysis for the Proposed Self-Storage and RV Storage Facility at 3701 Pacific Place, Long Beach, California, by LSA Associates</u>							
-	RV Storage - Data Point 1	100 Storage Units	17.23	0.50	0.47	0.93	1.12
<u>Route 52 RV Traffic Impact Study in Weld County, CO (2017) -- by Sustainable Traffic Solutions, Inc.</u>							
-	RV Storage - Data Point 1	100 Storage Units				0.36	0.48
Average Rates			12.94	0.50	0.47	0.65	0.80
Revised JCH 6-15-2023							

LSC estimates of trip-generation rates shown in the table above and used to estimate the trip generation for the proposed RV & Boat Storage land use for this project have been based on averages of rates from the following studies:

Route 52 RV Traffic Impact Study 8/28/2017 by Sustainable Traffic Solutions, Inc.

Outdoor RV Storage Trip Generation

Trip Generation Summary

Location	Area (100 Spaces)	Peak Hour Volume					
		Weekday Evening			Sunday Afternoon		
		Total	In	Out	Total	In	Out
Recreational Storage Solutions	6.52	9	3	6	19	9	10
Brighton Outdoor Storage	9.67	5	3	2	36	25	16
Total	16.59	14	6	8	55	29	26
Average	8.30	7	3	4	28	15	13
Percentage	---	100%	43%	57%	100%	52%	47%
Rates (trips/100 spaces)	---	0.84	0.36	0.48	3.32	1.75	1.57

Data Summary

Recreational Storage Solutions				Brighton Outdoor Storage			
Weekday				Weekday			
Interval	In	Out	Total	Interval	In	Out	Total
1	1	2		1	0	0	
2	0	2		2	2	0	
3	2	2		3	0	1	
4	0	0	3	4	0	1	4
5	1	1	8	5	1	0	5
6	1	0	7	6	0	1	4
7	0	1	4	7	1	0	4
8	1	1	5	8	0	1	4
Total	6	9	---	Total	4	4	---
Sunday				Sunday			
Interval	In	Out	Total	Interval	In	Out	Total
1	2	3		1	5	0	
2	2	2		2	5	3	
3	2	2		3	6	6	
4	3	3	19	4	4	7	36
5	1	3	18	5	3	2	36
6	1	2	17	6	4	3	35
7	1	4	18	7	2	2	37
8	4	0	16	8	3	3	22
Total	16	19	---	Total	32	26	---

**Trip-Generation Analysis for the Proposed Self-Storage and RV Storage Facility
at 3701 Pacific Place, Long Beach, California, 2/27/2020 by LSA Associates**

Table B: Project Trip Generation (Gate Trip Rates)

Land Use	Size	Unit	ADT	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
Trip Rates¹									
Self-Storage		100 storage units	12.90	0.53	0.40	0.93	0.93	0.79	1.72
RV Storage		100 RV spaces	17.23	0.50	0.47	0.97	0.93	1.12	2.05
Project Trip Generation									
Self-Storage	11.00	100 storage units	142	6	4	10	10	9	19
RV Storage	5.80	100 RV spaces	100	3	3	6	5	7	12
Total			242	9	7	16	15	16	31

¹ Trip rates developed from gate data for the Moreno Valley Self Storage and Desert Hot Springs Self Storage and RV Storage facilities (November 2019 to January 2020).

ADT = average daily traffic
RV = recreational vehicle

**RV Storage Trip Generation Report - Valley Park, St. Louis, MO, for the RV storage
facility to be located at 802 Forest Avenue 1/6/2022 by The Traffic Group**

Source/Land Use		Daily
ITE -151 (Trip Generation Manual, 11th Ed.)		
Trip Rates	Rate per 100 spaces	17.96
RV Storage	265 RV Spaces	48
Fort Collins - 60% Reduction		
Trip Rates	Rate per 100 spaces	10.78
RV Storage	265 RV Spaces	29
McBride Traffic Study		
Trip Rates	Rate per 100 spaces	10.80
RV Storage	265 RV Spaces	29
Long Beach, CA		
Trip Rates	Rate per 100 spaces	17.23
RV Storage	265 RV Spaces	46
Average Trips for 265 RV Spaces		38

Appendix B



Appendix B
Trip Generation Rate Estimate
Land Use: Outdoor Contractor Storage
(LSC Revised November 9, 2023)

Location	Value	Units	Trip Generation Rates				Driveway Trips Generated ¹					
			Average	A.M.		P.M.		Average	A.M.		P.M.	
			Weekday	In	Out	In	Out	Weekday	In	Out	In	Out
2420 Victor Pl, Colorado Springs, CO	8.690	Acres	40.28	3.11	2.42	1.27	1.27	350	27	21	11	11
1970 S. Valentia St., Greenwood Village, CO	9.800	Acres	52.76	1.33	1.02	4.59	2.86	517	13	10	45	28
2100 W Stanford Ave, Englewood CO	5.500	Acres	20.00	1.64	0.55	0.73	1.09	110	9	3	4	6
Average			37.68	2.02	1.33	2.19	1.74					

¹ Source: local entering and exiting count data at contractor storage yards in October 2023

Additional Attachments

Table 6 from 4-Way Ranch Commercial MTIS with notes by LSC



Source: 4-Way Ranch Commercial Master Traffic Impact Analysis (CS-22-003) December 20, 2022
 With notes added November 2023

The trigger is not projected to be met with Phase 1, however, as existing pavement is available for this turn lane LSC recommends Stapleton Drive be restriped as shown in Figure 6.

Table 6 Roadway Improvements 4-Way Ranch Commercial				
Item #	Improvement	Trigger	Timing	Responsibility
Roadway Segment Improvements				
1	Stapleton Drive - US Hwy 24 to Eastonville Road complete southern (eastbound) half	average daily traffic > 18,000 vehicles per day	Shown in 2040 MTCP	4-Way Ranch Metro District east of Eastonville Road (El Paso County west of Eastonville Road)
2	Widen US Hwy 24 to provide two lanes in each direction	dependent on CDOT funding priorities	Shown in US Highway 24 PEL Study; 2040 MTCP	CDOT
Eastonville/Stapleton				
3	Reconstruct as modern roundabout	- - -	Short-Term (under design)	PPRTA Eastonville Phase 1 Project/El Paso County
Stapleton/Saybrook Intersection				
4	Construct a westbound left-turn lane on Stapleton Dr approaching Saybrook. This lane should be 375 feet long plus a 200-foot taper.	westbound left-turn volume > 10 vph	With development of 4-Way Ranch parcels south of Stapleton and west of the drainage area	4-Way Ranch Commercial
5	Construct an eastbound right-turn deceleration lane on Stapleton Dr approaching Saybrook Dr. This lane should be 235 feet long plus a 200-foot taper.	eastbound right-turn volume > 25 vph	With development of 4-Way Ranch parcels south of Stapleton and west of the drainage area	4-Way Ranch Commercial
6	Construct an eastbound right-turn acceleration lane on Stapleton Dr at Saybrook Dr. This lane should be 760 feet long plus a 180-foot taper.	northbound right-turn volume > 50 vph	With development of 4-Way Ranch parcels south of Stapleton and west of the drainage area	4-Way Ranch Commercial
7	Construct an eastbound left-turn lane on Stapleton Dr approaching Saybrook Dr. This lane should be 335 feet long plus a 200-foot taper.	eastbound left-turn volume > 10 vph	With Waterbury Filing Nos. 1 and 2	Waterbury Phase 1
8	Construct a westbound right-turn deceleration lane on Stapleton Dr approaching Saybrook Dr. This lane should be 235 feet long plus a 200-foot taper.	westbound right-turn volume > 25 vph	With Waterbury Filing Nos. 1 and 2	Waterbury Phase 1
9	Construct a westbound right-turn acceleration lane on Stapleton Dr at Saybrook Dr. This lane should be 760 feet long plus a 180-foot taper.	southbound right-turn volume > 50 vph	With Future Waterbury Filings	Waterbury Phase 1
10	Convert from Two-Way, Stop-Sign Control to Signal Control	When Traffic Signal Warrant(s) are met. The decision on timing of traffic signal installation rests with El Paso County	Future	4-Way Ranch Commercial and Waterbury
Stapleton/Dumont Intersection				
11	Construct a westbound left-turn lane on Stapleton Dr approaching Dumont Dr. This lane should be 315 feet long plus a 200-foot taper.	westbound left-turn volume > 10 vph not projected with Phase 1	With development of 4-Way Ranch parcels south of Stapleton and east of the drainage area	4-Way Ranch Commercial
12	Construct an eastbound right-turn deceleration lane on Stapleton Dr approaching Dumont Dr. This lane should be 235 feet long plus a 200-foot taper.	eastbound right-turn volume > 25 vph	With development of 4-Way Ranch parcels south of Stapleton and east of the drainage area	4-Way Ranch Commercial
13	Construct an eastbound right-turn acceleration lane on Stapleton Dr. at Dumont Dr. This lane should be 760 feet long plus a 180-foot taper.	northbound right-turn volume > 50 vph not projected with Phase 1	With development of 4-Way Ranch parcels south of Stapleton and east of the drainage area	4-Way Ranch Commercial
14	Construct an eastbound left-turn lane on Stapleton Dr approaching Dumont Dr. This lane should be 375 feet long plus a 200-foot taper.	eastbound left-turn volume > 10 vph	With future Waterbury Phases or with development of 4-Way Ranch parcels north of Stapleton; potential other development participation, such as if development occurs on the adjacent parcel(s).	4-Way Ranch Commercial and/or Waterbury
15	Construct a westbound right-turn deceleration lane on Stapleton Dr approaching Dumont Dr. This lane should be 235 feet long plus a 200-foot taper (or continuous right turn accel/decel. lane).	westbound right-turn volume > 25 vph	With future Waterbury Phases or with development of 4-Way Ranch parcels north of Stapleton; potential other development participation, such as if development occurs on the adjacent parcel(s).	4-Way Ranch Commercial and/or Waterbury
16	Construct a westbound right-turn acceleration lane on Stapleton Dr at Dumont Dr. This lane should be 760 feet long plus a 180-foot taper (or continuous right turn accel/decel. lane)	southbound right-turn volume > 50 vph	With future Waterbury Phases or with development of 4-Way Ranch parcels north of Stapleton; potential other development participation, such as if development occurs on the adjacent parcel(s).	4-Way Ranch Commercial or Waterbury
17	Convert from Two-Way, Stop-Sign Control to Signal Control	When Traffic Signal Warrant(s) are met. The decision on timing of traffic signal installation rests with El Paso County not projected with Phase 1	With future Waterbury Phases or with development of 4-Way Ranch parcels north of Stapleton; potential other development participation, such as if development occurs on the adjacent parcel(s).	4-Way Ranch Commercial and/or Waterbury
Stapleton/US Hwy 24 Intersection				
18	Convert from Two-Way, Stop-Sign Control to Signal Control	When Traffic Signal Warrant(s) are met. The decision on timing of traffic signal installation rests with the Colorado Department of Transportation	Anticipated in the short-term but likely beyond initial phase of 4-Way Ranch Commercial. It is our understanding that this is on the CDOT list of intersections planned for signalization.	CDOT; along with any available escrow collected from area developments through the access permitting process, including those within this 4 Way Ranch commercial development
19	Add northeast-bound dual left-turn lane	As needed with future developments (Will require Stapleton Drive to be widened to two westbound through lanes between US Hwy 24 and Dumont Dr)	At buildout of 4-Way Ranch Commercial initial phase, Grandview Reserve Phase 1 and the Meridian Ranch Sketch Plan 2021 Amendment Area	Area developments as required or potentially escrow participation toward future improvements.
20	Add other dual left-turn lanes	As needed with future developments (Will require Items Stapleton and US Hwy 24 widened to two through lanes in all directions)	Future	Area developments as required
21	Potential long-term capacity upgrades (jughandle, a Jr Interchange, etc.)	When level of service degrades below acceptable levels	Shown in US Highway 24 PEL Study;	CDOT; along with any available escrow collected from area developments, including this project, through the access permitting process.

Source: LSC Transportation Consultants, Inc. (Sept 2022)