

SAFARI HIGHLANDS RANCH  
STREET DESIGN DEVIATION REQUESTS



To: Engineering Department, City of Escondido  
 From: Ray Martin, Hunsaker & Associates  
 Date: 10/19/18  
 Re: Safari Highlands Ranch – Private Estate Street Design Standards  
 Cc: Mr. Jeb Hall, Concordia Homes

This memo requests a deviation from standards to apply appropriate AASHTO<sup>1</sup> standards for private estate street design, based on the 25 mph design speed allowed by the City of Escondido Design Standards. Below is a tabulation of selected design criteria for public and private residential streets from the Escondido Standards, as well as the AASHTO minimum requirements for a 25 mph design speed.

Design Criteria	Public Street	Private Street	AASHTO
Design Speed	30	25	25
Curb to Curb	36	36/32**	
Stopping Sight Distance#	200'	200'	155'
Min Hor. Radius (Std. crown)	435'	300'	198'

\*\* NOTE: Reduction to 32' c-c would restrict parking to one side of the street

# NOTE: Headlight Sight Distance = Stopping Sight Distance within crest vertical curves. Value shown is for level roads per AASHTO Table 3-1

A review of the City standards for private residential street classification reveals that the listed minimum horizontal radius and sight distance exceeds minimums per AASHTO for private streets. The project desires to implement minimum AASHTO standards for a 25 mph design speed for estate residential streets in neighborhood E-1 & E-2. A minimum 200' centerline radius is proposed for several areas as shown on the attached exhibit. Use of a 200' minimum radius is supported by the AASHTO minimum of 198' per Table 3-13b, Minimum Radii and Superelevation for Low-Speed Urban Streets, attached for reference.

This deviation from standards request would also provide a minimum AASHTO stopping sight distance of 165' per Table 3-2, "Stopping Sight Distance on Grades", also attached. The value of 165' was selected based on a 6% downgrade, but could be increased to 175' where continuous downgrades up to 9% are included in the design. Use of the AASHTO minimum allows horizontal radii and vertical curve lengths to match the 25 mph design speed which provides required visibility within the proposed graded width of the private roads on this project.

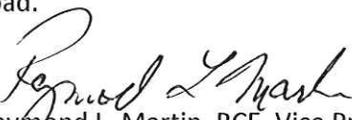
<sup>1</sup> From AASHTO "A Policy on Geometric Design of Highways and Streets (Green Book) 2011, 6<sup>th</sup> Edition  
 Engineering East\Projects\Safari Highlands Ranch\STreet Design Waiver documentation\Deviation from Standards for Private Residential streets.docx  
 H&A w.o. 2374-17

A closer look at AASHTO Table 3-13b indicates that private streets designed using a 300' minimum centerline radius allow driver to comfortably travel at 30 mph. In other words, the result is a street that is designed to allow 30 mph speeds although regulated to 25 mph maximum. When streets are provided with longer centerline radii, they fail to discourage drivers from exceeding the speed limit. Therefore, drivers will feel more comfortable exceeding the 25 mph prima facie speed limit within the residential areas. Increased speeds pose a safety hazard to pedestrians and implementing the reduction proposed in this memo will act as a deterrent to speeding, in my opinion.

A graphical analysis of the effect of using minimum AASHTO centerline radius and stopping sight distance is attached. Both the 25 mph Escondido residential private street (300' cl radius & 200' sight distance) and the 25 mph residential road implementing AASHTO standards (198' cl radius & 165' sight distance) are presented. These illustrate that the line of sight remains within the same 28' ROW per the Escondido Standards, traversing over the parkway area, and therefore lines of visibility do not become obstructed by private improvements outside the roadbed.

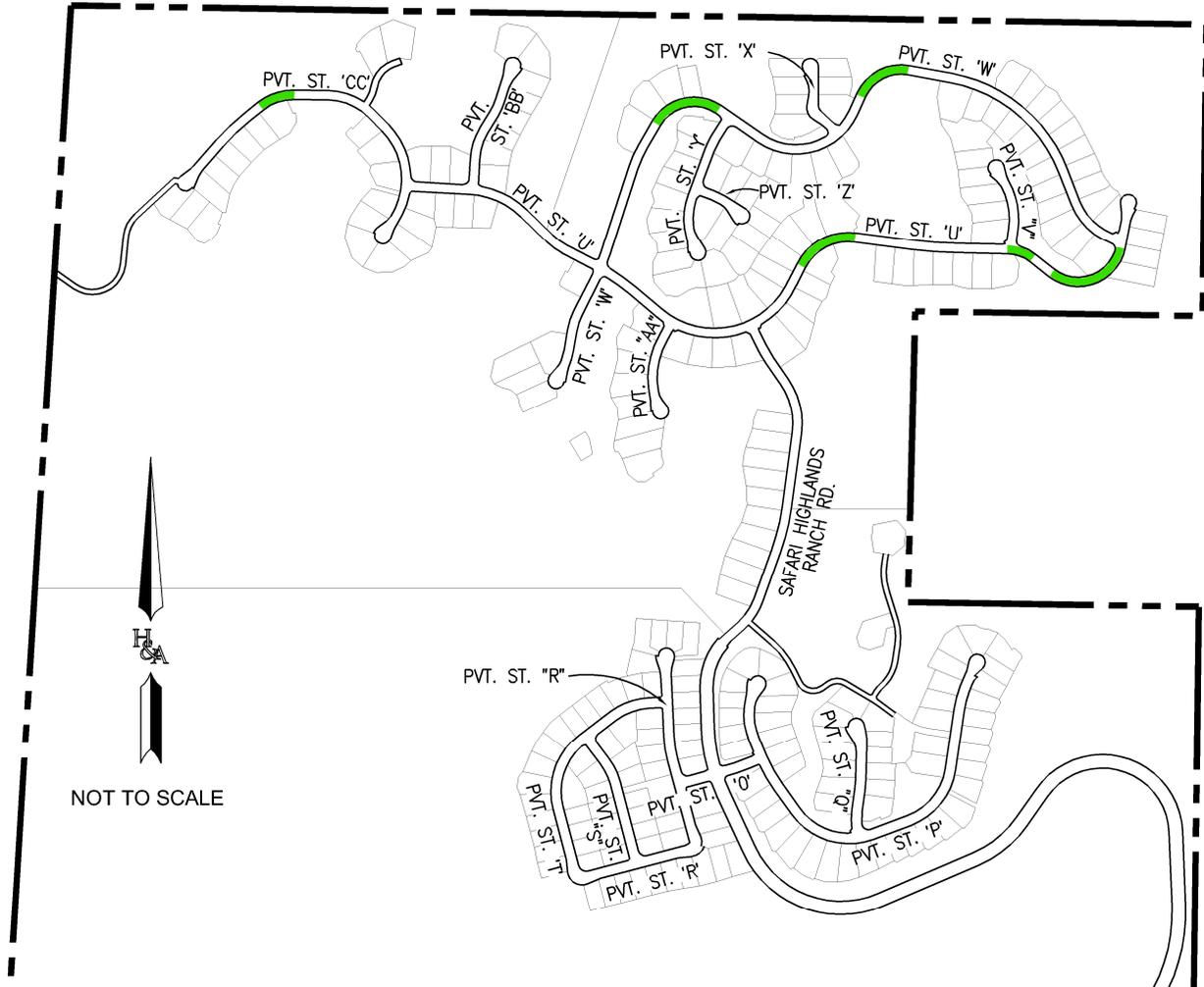
A second exhibit is provided to illustrate horizontal sight distance using these AASHTO standard on the specific typical section proposed for Safari Highlands Private Estate streets. The exhibit also shows each side, since the graded width varies as evidence to support approval of this deviation from standards request. The exhibit shows that the sight line stays within the graded parkway area, as is the case with the City's standard residential street.

Lastly, this request specifically seeks approval to plot intersection sight distance on private residential streets using a design distance of 240'/280' per AASHTO Tables 9-6 and 9-8 for right and left turns at intersections with 25 mph design speed streets. Intersection sight distance requirements in most local agencies implement a requirement of 11 times design speed. This is true in the City of Escondido as reflected in Figure no 14, "Sight Distance Detail" attached for reference. The detail however includes a 330' requirement on both public and private residential streets, making no allowance for the lower 25 mph design speed for private residential streets. Provision of AASHTO intersection sight distance provides needed visibility for the driver stopped on the minor street to see oncoming traffic at 25 mph prior to commencing a left or right turn movement without affecting the speed of traffic on the major road.

  
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# SAFARI HIGHLANDS RANCH NEIGHBORHOODS E-1 & E-2



 200' CENTERLINE RADIUS LOCATIONS

Table 3-1. Stopping Sight Distance on Level Roadways

Metric					U.S. Customary				
Design Speed (km/h)	Brake Reaction Distance (m)	Braking Distance on Level (m)	Stopping Sight Distance		Design Speed (mph)	Brake Reaction Distance (ft)	Braking Distance on Level (ft)	Stopping Sight Distance	
			Calculated (m)	Design (m)				Calculated (ft)	Design (ft)
20	13.9	4.6	18.5	20	15	55.1	21.6	76.7	80
30	20.9	10.3	31.2	35	20	73.5	38.4	111.9	115
40	27.8	18.4	46.2	50	25	91.9	60.0	151.9	155
50	34.8	28.7	63.5	65	30	110.3	86.4	196.7	200
60	41.7	41.3	83.0	85	35	128.6	117.6	246.2	250
70	48.7	56.2	104.9	105	40	147.0	153.6	300.6	305
80	55.6	73.4	129.0	130	45	165.4	194.4	359.8	360
90	62.6	92.9	155.5	160	50	183.8	240.0	423.8	425
100	69.5	114.7	184.2	185	55	202.1	290.3	492.4	495
110	76.5	138.8	215.3	220	60	220.5	345.5	566.0	570
120	83.4	165.2	248.6	250	65	238.9	405.5	644.4	645
130	90.4	193.8	284.2	285	70	257.3	470.3	727.6	730
					75	275.6	539.9	815.5	820
					80	294.0	614.3	908.3	910

Note: Brake reaction distance predicated on a time of 2.5 s; deceleration rate of 3.4 m/s<sup>2</sup> [11.2 ft/s<sup>2</sup>] used to determine calculated sight distance.

### Design Values

The stopping sight distance is the sum of the distance traversed during the brake reaction time and the distance to brake the vehicle to a stop. The computed distances for various speeds at the assumed conditions on level roadways are shown in Table 3-1 and were developed from the following equation:

Metric	U.S. Customary
$SSD = 0.278Vt + 0.039\frac{V^2}{a}$	$SSD = 1.47Vt + 1.075\frac{V^2}{a} \quad (3-2)$
<p>where:</p> <p>SSD = stopping sight distance, m</p> <p>V = design speed, km/h</p> <p>t = brake reaction time, 2.5 s</p> <p>a = deceleration rate, m/s<sup>2</sup></p>	<p>where:</p> <p>SSD = stopping sight distance, ft</p> <p>V = design speed, mph</p> <p>t = brake reaction time, 2.5 s</p> <p>a = deceleration rate, ft/s<sup>2</sup></p>

Stopping sight distances exceeding those shown in Table 3-1 should be used as the basis for design wherever practical. Use of longer stopping sight distances increases the margin for error for all drivers and, in particular, for those who operate at or near the design speed during wet pavement conditions. New pavements should have initially, and should retain, friction coefficients consistent with the deceleration rates used to develop Table 3-1.

Table 3-13b. Minimum Radii and Superelevation for Low-Speed Urban Streets

U.S. Customary							
e (%)	$V_d = 15$ mph	$V_d = 20$ mph	$V_d = 25$ mph	$V_d = 30$ mph	$V_d = 35$ mph	$V_d = 40$ mph	$V_d = 45$ mph
	R (ft)						
-6.0	58	127	245	429	681	1067	1500
-5.0	56	121	231	400	628	970	1350
-4.0	54	116	219	375	583	889	1227
-3.0	52	111	208	353	544	821	1125
-2.8	51	110	206	349	537	808	1107
-2.6	51	109	204	345	530	796	1089
-2.4	51	108	202	341	524	784	1071
-2.2	50	108	200	337	517	773	1055
-2.0	50	107	198	333	510	762	1039
-1.5	49	105	194	324	495	736	1000
0	47	99	181	300	454	667	900
1.5	45	94	170	279	419	610	818
2.0	44	92	167	273	408	593	794
2.2	44	91	165	270	404	586	785
2.4	44	91	164	268	400	580	776
2.6	43	90	163	265	396	573	767
2.8	43	89	161	263	393	567	758
3.0	43	89	160	261	389	561	750
3.2	43	88	159	259	385	556	742
3.4	42	88	158	256	382	550	734
3.6	42	87	157	254	378	544	726
3.8	42	87	155	252	375	539	718
4.0	42	86	154	250	371	533	711
4.2	41	85	153	248	368	528	703
4.4	41	85	152	246	365	523	696
4.6	41	84	151	244	361	518	689
4.8	41	84	150	242	358	513	682
5.0	41	83	149	240	355	508	675
5.2	40	83	148	238	352	503	668
5.4	40	82	147	236	349	498	662
5.6	40	82	146	234	346	494	655
5.8	40	81	145	233	343	489	649
6.0	39	81	144	231	340	485	643
6.2	39	80	143	229	337	480	637
6.4	39	80	142	227	335	476	631
6.6	39	79	141	226	332	472	625
6.8	39	79	140	224	329	468	619
7.0	38	78	139	222	327	464	614
7.2	38	78	138	221	324	460	608
7.4	38	78	137	219	322	456	603
7.6	38	77	136	217	319	452	597
7.8	38	77	135	216	317	448	592
8.0	38	76	134	214	314	444	587
8.2	37	76	134	213	312	441	582
8.4	37	75	133	211	309	437	577
8.6	37	75	132	210	307	434	572
8.8	37	74	131	208	305	430	567
9.0	37	74	130	207	302	427	563
9.2	36	74	129	205	300	423	558
9.4	36	73	129	204	298	420	553
9.6	36	73	128	203	296	417	549
9.8	36	72	127	201	294	413	544
10.0	36	72	126	200	292	410	540
10.2	36	72	126	199	290	407	536
10.4	35	71	125	197	288	404	531
10.6	35	71	124	196	286	401	527
10.8	35	71	123	195	284	398	523
11.0	35	70	123	194	282	395	519
11.2	35	70	122	192	280	392	515
11.4	35	69	121	191	278	389	511
11.6	34	69	120	190	276	386	508
11.8	34	69	120	189	274	384	504
12.0	34	68	119	188	272	381	500

Notes:

1. Computed using Superelevation Distribution Method 2.
2. Superelevation may be optional on low-speed urban streets.
3. Negative superelevation values beyond -2.0 percent should be used for unpaved surfaces such as gravel, crushed stone, and earth. However, a normal cross slope of -2.5 percent may be used on paved surfaces in areas with intense rainfall.

**Effect of Grade on Stopping**

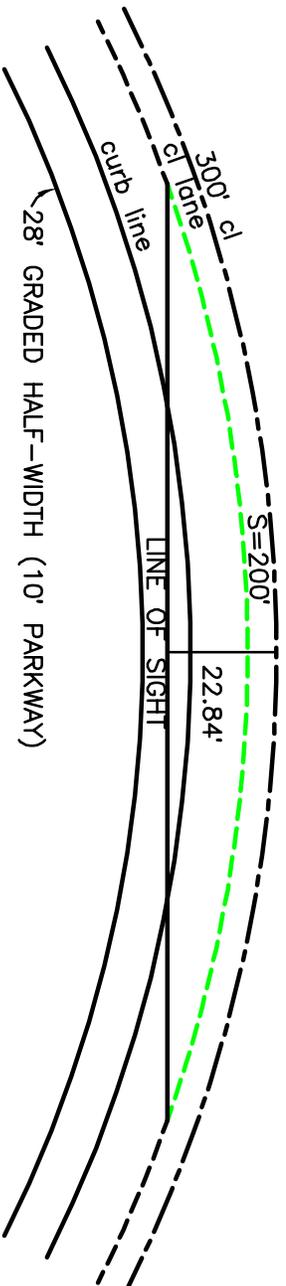
When a highway is on a grade, Equation 3-1 for braking distance is modified as follows:

Metric	U.S. Customary
$d_B = \frac{V^2}{254 \left[ \left( \frac{a}{9.81} \right) \pm G \right]}$	$d_B = \frac{V^2}{30 \left[ \left( \frac{a}{32.2} \right) \pm G \right]} \quad (3-3)$
where:	where:
$d_B$ = braking distance on grade, m	$d_B$ = braking distance on grade, ft
$V$ = design speed, km/h	$V$ = design speed, mph
$a$ = deceleration, m/s <sup>2</sup>	$a$ = deceleration, ft/s <sup>2</sup>
$G$ = grade, rise/run, m/m	$G$ = grade, rise/run, ft/ft

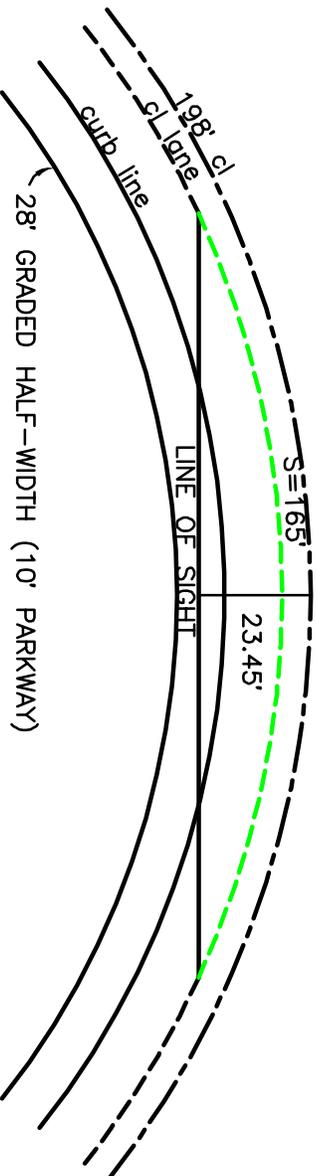
In this equation,  $G$  is the rise in elevation divided by the distance of the run and the percent of grade divided by 100, and the other terms are as previously stated. The stopping distances needed on upgrades are shorter than on level roadways; those on downgrades are longer. The stopping sight distances for various grades shown in Table 3-2 are the values determined by using Equation 3-3 in place of the second term in Equation 3-2. These adjusted sight distance values are computed for wet-pavement conditions using the same design speeds and brake reaction times used for level roadways in Table 3-1.

**Table 3-2. Stopping Sight Distance on Grades**

Metric							U.S. Customary						
Design Speed (km/h)	Stopping Sight Distance (m)						Design Speed (mph)	Stopping Sight Distance (ft)					
	Downgrades			Upgrades				Downgrades			Upgrades		
	3 %	6 %	9 %	3 %	6 %	9 %		3 %	6 %	9 %	3 %	6 %	9 %
20	20	20	20	19	18	18	15	80	82	85	75	74	73
30	32	35	35	31	30	29	20	116	120	126	109	107	104
40	50	50	53	45	44	43	25	158	165	173	147	143	140
50	66	70	74	61	59	58	30	205	215	227	200	184	179
60	87	92	97	80	77	75	35	257	271	287	237	229	222
70	110	116	124	100	97	93	40	315	333	354	289	278	269
80	136	144	154	123	118	114	45	378	400	427	344	331	320
90	164	174	187	148	141	136	50	446	474	507	405	388	375
100	194	207	223	174	167	160	55	520	553	593	469	450	433
110	227	243	262	203	194	186	60	598	638	686	538	515	495
120	263	281	304	234	223	214	65	682	728	785	612	584	561
130	302	323	350	267	254	243	70	771	825	891	690	658	631
							75	866	927	1003	772	736	704
							80	965	1035	1121	859	817	782



Residential Street (private) @ 25 mph  
Per City of Escondido standards



Rural Residential Street @ 25 mph  
AASHTO Standards for 6% Downgrade



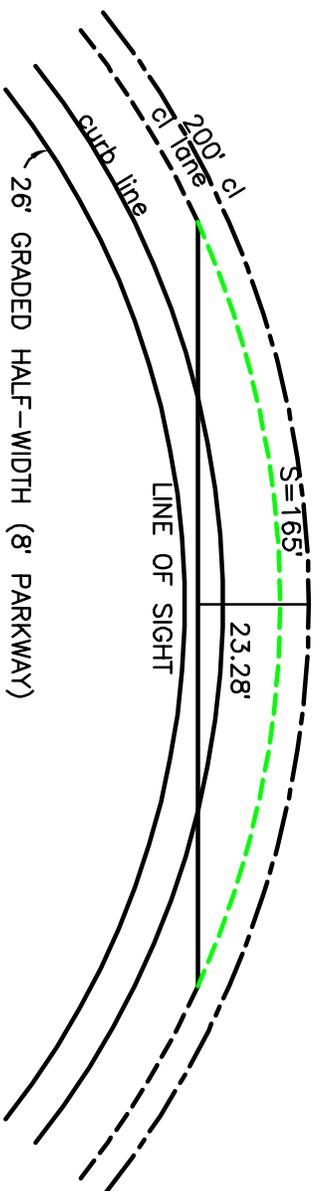
**HUNSAKER  
& ASSOCIATES**  
SAN DIEGO, INC.

PLANNING 9707 Wiggins Street  
ENGINEERING San Diego, CA 92121  
SURVEYING PH:619-594-4500 FAX:619-594-4114

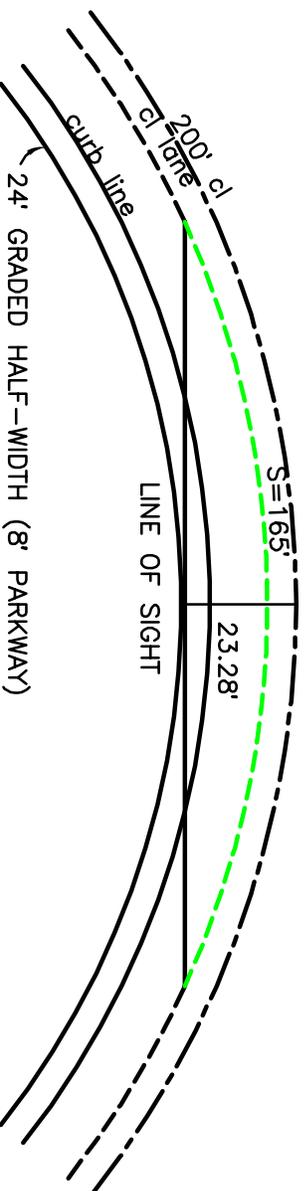
**ESCONDIDO & AASHTO  
HORIZONTAL SIGHT DIST STUDY  
PER STANDARDS**

PREPARED ON 03/21/17

SHT. 1 OF 1



Private Estate Street @ 25 mph  
 AASHTO standards for 6% Downgrade



Private Estate Street @ 25 mph  
 AASHTO standards for 6% Downgrade



**HUNSAKER  
 & ASSOCIATES**  
 SAN DIEGO, INC.

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**SAFARI HIGHLANDS RANCH  
 HORIZONTAL SIGHT DIST STUDY  
 DEVIATIONS**

PREPARED ON 03/21/17

SHT. 1 OF 1

intersection is located on a 4 percent upgrade, then the time gap selected for intersection sight distance design for left turns should be increased from 8.0 to 8.8 s, equivalent to an increase of 0.2 s for each percent grade.

The design values for intersection sight distance for passenger cars are shown in Table 9-6. Figure 9-17 includes design values, based on the time gaps for the design vehicles included in Table 9-5.

No adjustment of the recommended sight distance values for the major-road grade is generally needed because both the major- and minor-road vehicle will be on the same grade when departing from the intersection. However, if the minor-road design vehicle is a heavy truck and the intersection is located near a sag vertical curve with grades over 3 percent, then an adjustment to extend the recommended sight distance based on the major-road grade should be considered.

**Table 9-6. Design Intersection Sight Distance—Case B1, Left Turn from Stop**

Metric				U.S. Customary			
Design Speed (km/h)	Stopping Sight Distance (m)	Intersection Sight Distance for Passenger Cars		Design Speed (mph)	Stopping Sight Distance (ft)	Intersection Sight Distance for Passenger Cars	
		Calculated (m)	Design (m)			Calculated (ft)	Design (ft)
20	20	41.7	45	15	80	165.4	170
30	35	62.6	65	20	115	220.5	225
40	50	83.4	85	25	155	275.6	280
50	65	104.3	105	30	200	330.8	335
60	85	125.1	130	35	250	385.9	390
70	105	146.0	150	40	305	441.0	445
80	130	166.8	170	45	360	496.1	500
90	160	187.7	190	50	425	551.3	555
100	185	208.5	210	55	495	606.4	610
110	220	229.4	230	60	570	661.5	665
120	250	250.2	255	65	645	716.6	720
130	285	271.1	275	70	730	771.8	775
—	—	—	—	75	820	826.9	830
—	—	—	—	80	910	882.0	885

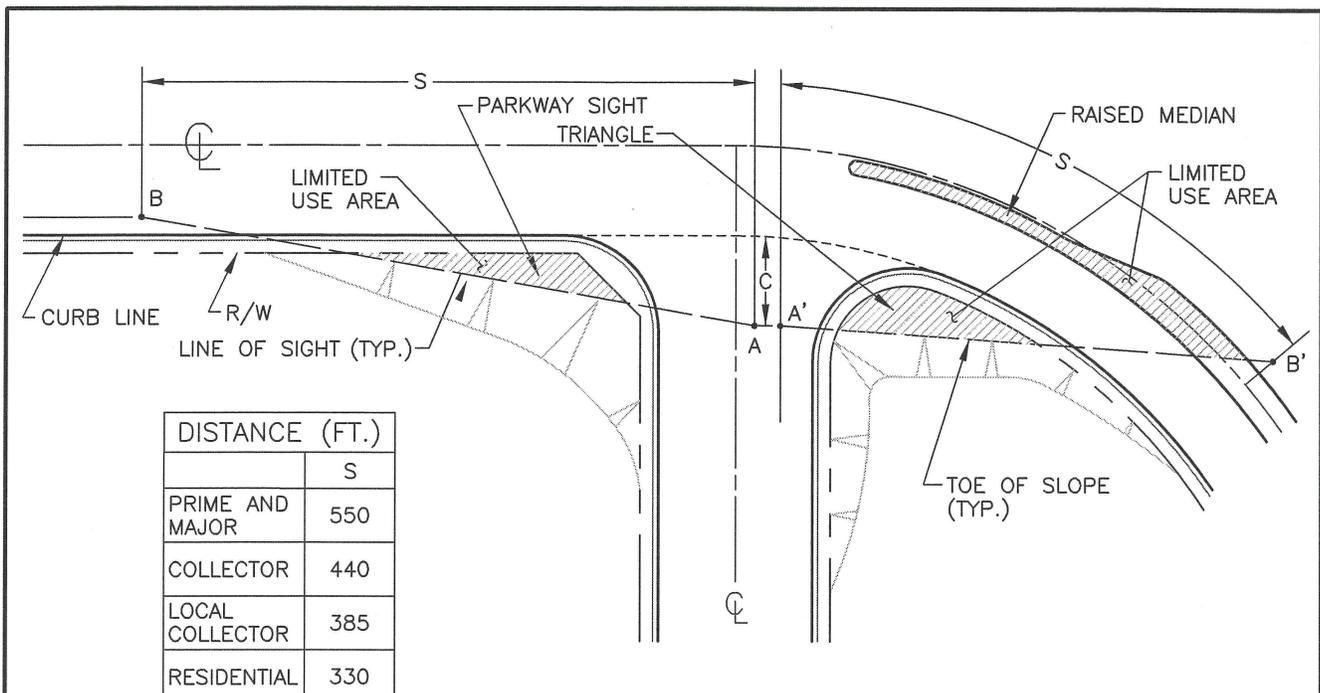
Note: Intersection sight distance shown is for a stopped passenger car to turn left onto a two-lane highway with no median and grades 3 percent or less. For other conditions, the time gap should be adjusted and the sight distance recalculated.

Sight distance design for left turns at divided-highway intersections should consider multiple design vehicles and median width. If the design vehicle used to determine sight distance for a divided-highway intersection is larger than a passenger car, then sight distance for left turns will need to be checked for that selected design vehicle and for smaller design vehicles as well. If the divided-highway median is wide enough to store the design vehicle with a clearance to the through lanes of approximately 1 m [3 ft] at both ends of the vehicle, no separate analysis for the departure sight triangle for left turns is needed on the minor-road approach for the near roadway to the left. In most cases, the departure sight triangle for right

**Table 9-8. Design Intersection Sight Distance—Case B2, Right Turn from Stop, and Case B3, Crossing Maneuver**

Metric				U.S. Customary			
Design Speed (km/h)	Stopping Sight Distance (m)	Intersection Sight Distance for Passenger Cars		Design Speed (mph)	Stopping Sight Distance (ft)	Intersection Sight Distance for Passenger Cars	
		Calculated (m)	Design (m)			Calculated (ft)	Design (ft)
20	20	36.1	40	15	80	143.3	145
30	35	54.2	55	20	115	191.1	195
40	50	72.3	75	25	155	238.9	240
50	65	90.4	95	30	200	286.7	290
60	85	108.4	110	35	250	334.4	335
70	105	126.5	130	40	305	382.2	385
80	130	144.6	145	45	360	430.0	430
90	160	162.6	165	50	425	477.8	480
100	185	180.7	185	55	495	525.5	530
110	220	198.8	200	60	570	573.3	575
120	250	216.8	220	65	645	621.1	625
130	285	234.9	235	70	730	668.9	670
—	—	—	—	75	820	716.6	720
—	—	—	—	80	910	764.4	765

Note: Intersection sight distance shown is for a stopped passenger car to turn right onto or to cross a two-lane highway with no median and with grades of 3 percent or less. For other conditions, the time gap should be adjusted and the sight distance recalculated.



**NOTES:**

1. THE LIMITED USE AREA IS DETERMINED BY THE GRAPHICAL METHOD USING THE APPROPRIATE DISTANCES GIVEN IN THE ABOVE TABLE. IT SHALL BE USED FOR THE PURPOSE OF PROHIBITING OR CLEARING OBSTRUCTIONS IN ORDER TO MAINTAIN ADEQUATE SIGHT DISTANCE AT INTERSECTIONS. VERTICAL CURVE OR STEEP SLOPES ON THE STREETS MAY REQUIRE CHANGES TO THE SIGHT DISTANCE RESTRICTIONS.
2. THE LINE OF SIGHT SHALL BE SHOWN AT INTERSECTIONS ON ALL LANDSCAPING PLANS, PLOT PLANS, GRADING PLANS AND TENTATIVE TRACT PLANS WHERE SIGHT DISTANCE IS QUESTIONABLE. IN CASES WHERE AN INTERSECTION IS LOCATED ON A VERTICAL CURVE, A PROFILE OF LOCATED ON A VERTICAL CURVE, A PROFILE OF THE SIGHT LINE MAY BE REQUIRED.
3. WALLS, SIGNS, SLOPES, OR ANY OTHER OBSTRUCTIONS THAT COULD RESTRICT THE VIEW WITHIN THE LIMITED USE AREA SHALL NOT BE PERMITTED.
4. THE LIMITED USE AREA SHALL BE AS NEAR LEVEL AS POSSIBLE YET MAINTAIN PROPER DRAINAGE.
5. PLANTS AND SHRUBS SHALL BE OF THE TYPE THAT WILL GROW NO HIGHER THAN 24 INCHES ABOVE THE GROUND SHALL NOT BE PERMITTED.
6. POINTS A AND A' ARE THE LOCATIONS OF A DRIVER'S LINE OF SIGHT WHILE IN A VEHICLE AT AN INTERSECTION 15 FEET OR MORE BACK FROM THE PROJECTION OF THE CURB LINE. ON MULTILANE CROSSROADS, A IS THE MID-POINT OF THE INSIDE TRAVEL LANE AND A' IS THE MID-POINT OF THE OUTSIDE TRAVEL LANE (ON TWO LANE CROSSROADS A AND A' ARE THE SAME).
7. DISTANCE C, WHICH IS THE SETBACK FOR THE DRIVER OF THE VEHICLE ON THE CROSSROAD, SHALL BE A MINIMUM OF 10 FEET PLUS THE SHOULDER WIDTH OF THE MAJOR ROAD, BUT NOT LESS THAN 15 FEET.
8. THE DISTANCE S REPRESENTS THE STOPPING SIGHT DISTANCE MEASURED ALONG THE CENTERLINE OF THE ROAD.
9. POINTS B AND B' ARE LOCATIONS WHERE THE DRIVER OF A VEHICLE, TRAVELING AT A GIVEN SPEED, HAS THE MINIMUM STOPPING SIGHT DISTANCE REQUIRED TO BRING HIS VEHICLE TO A SAFE STOP. ON MULTILANE MAJOR ROADS B IS THE MID-POINT OF THE OUTSIDE TRAVEL LANE AND B' IS THE MID-POINT OF THE INSIDE TRAVEL LANE.
10. THE PARKWAY SIGHT TRIANGLE SHALL BE DEDICATED TO THE CITY AS SIGHT DISTANCE EASEMENT BY THE PROPOSED DEVELOPMENTS.
11. TREES THAT ARE OF THE SIZE AND SPACING THAT WILL NOT CONFLICT WITH THE SIGHT DISTANCE WILL BE ALLOWED ON A CASE BY CASE BASIS.
12. THIS SIGHT DISTANCE DETAIL APPLIES TO INTERSECTIONS WITHOUT TRAFFIC SIGNALS OR WITHOUT FOUR WAY STOP SIGNS. MINIMUM STOPPING DISTANCE PER LATEST VERSION OF HIGHWAY DESIGN MANUAL SHALL ALWAYS BE MET UNDER ANY CONDITION.
13. USE THIS SIGHT DISTANCE STANDARDS ON PUBLIC AND PRIVATE ROADS.
14. LATEST VERSION OF HIGHWAY DESIGN MANUAL SHALL BE USED ON DOWNGRADES STEEPER THAN 3 PERCENT, WHERE THERE ARE HIGH TRUCK VOLUMES ON THE CROSSROAD AND SUBSTANTIALLY SKEWED INTERSECTIONS.
15. UNDER SPECIAL CIRCUMSTANCES WHERE THE GIVEN MINIMUM SIGHT DISTANCE MIGHT NOT BE ACHIEVABLE DUE TO RESTRICTIVE CONDITIONS, MINIMUM STOPPING SIGHT DISTANCE PER THE LATEST VERSION OF HIGHWAY DESIGN MANUAL SHALL BE USED UPON CITY ENGINEERS APPROVAL.

APPROVED: *[Signature]* DATE: 04-02-2014  
 P. W. DIRECTOR/CITY ENGINEER

**CITY OF ESCONDIDO**  
 DEPARTMENT OF PUBLIC WORKS

SCALE:  
 NOT TO SCALE

REVISED	APPROVED

**SIGHT DISTANCE  
 DETAIL**

FIGURE NO.  
 14

# TABLE A CITY OF CARLSBAD STREET DESIGN CRITERIA

DESIGN CLASSIFICATION	PRIME ARTERIAL	MAJOR ARTERIAL	SECONDARY ARTERIAL	COLLECTOR STREET	INDUSTRIAL STREET	LOCAL STREET	CUL-DE-SAC STREET	ALLEY	HILLSIDE STREET
ANTICIPATED ADT RANGES	40,000 OR MORE	20,000 TO 40,000	10,000 TO 20,000	2,000 TO 10,000	----	20 TO 2,000	20 TO 1000	----	----
Design Speed	60 MPH	50 MPH	40 MPH	30 MPH	30 MPH	25 MPH	25 MPH	----	20 MPH
Minimum Spacing of Intersections (including right-turn in/out) (in feet)	2,600	1,200	600	300	300	150 T's others 200	150 T's others 200	----	150
Right-of-Way Width (in feet)	126	102	84	60 or 68	72	60/68 <sup>(11)</sup>	56 <sup>(12)</sup> /60/68 <sup>(11)</sup>	24	64
Private Access to Adjoining Property	None	None	Where no other access is possible	Limited subject to approval	Limited subject to approval	O.K.	O.K.	O.K.	Limited subject to approval
Curb-to-Curb Distance (in feet)	106 (18' median)	82 (18' median)	64	40 or 48	52	34/42 <sup>(11)</sup>	36 <sup>(12)</sup> /40/42 <sup>(11)</sup>	24	42
Minimum Traffic Index	9	8.5	8.0	6.0	7.0	5.0	4.5	4.0	5.0
Minimum Structural Section (in inches) <sup>(6)</sup>	6 AC 6 AB	5 AC 6 AB	4 AC 6 AB	4 AC 6 AB	4 AC 6 AB	4 AC 4 AB <sup>(10)</sup>	4 AC 4 AB <sup>(10)</sup>	5-1/2" PCC <sup>(8)</sup>	4 AC 4 AB <sup>(10)</sup>
Stopping Sight Distance <sup>(5)</sup> (in feet)	580	430	300	200	200	150	150	----	125 <sup>(2)</sup>
Corner Sight Distance <sup>(9)</sup> (in feet)	660	550	440	330	330	275	275	----	220
Minimum Centerline Radius (in feet)	2,400 <sup>(6)</sup>	1,400 <sup>(6)</sup>	670	300	300	200	200	----	200
Maximum Centerline Grade (not thru intersec.) <sup>(4)</sup>	7%	7%	10%	12% <sup>(3)</sup>	8%	12% <sup>(10)</sup>	12% <sup>(10)</sup>	----	15% <sup>(10)</sup>
Minimum Flowline Grade	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%

**NOTES:**

- (1) N.A.
- (2) Reduction to 100' with approval of City Engineer.
- (3) Grades greater than 10% will require specific approval, chip seal, etc.
- (4) Maximum intersection grades must comply with federal, state, and local accessibility standards, subject to City Engineer approval. Consult with PROWAG, Caltrans accessibility guidelines or a Certified Accessibility Specialist person (CASp).
- (5) Stopping Sight Distance per CALTRANS Highway Design Manual Topic 201 and Volume 3 Section 8 in Chapter 3 of City Standards.
- (6) Assumes no superelevations; includes standard crossfall.
- (7) Minimum grade of 2.0% is encouraged. If 1.0% minimum is not possible, special construction may be used with City Engineer approval. Gutter line of cul-de-sac bulbs and knuckles shall have minimum grade of 1.0%. Typical centerline grades at the upper reach of cul-de-sacs shall be 2% minimum.
- (8) Alley sections shall conform to SDRSD G-21.
- (9) Corner Sight Distance per Caltrans Highway Design manual Topic 405 and Volume 3 Section 8 in Chapter 3 of City Standards.
- (10) PCC pavement required for grades over 10%
- (11) 28-foot clear travel way required where adjacent lots contain any portion of a Fire Hazard Zone/Fire Suppression Zone within the property line.
- (12) 36-foot curb-to-curb distance permissible when serving 24 or fewer lots and where adjacent lots do not contain any portion of a Fire Hazard Zone/Fire Suppression Zone within the property line.

# CITY OF SAN MARCOS URBAN STREET DESIGN CRITERIA

1 Civic Center Dr., San Marcos, CA 92069-2918 (760) 744-1050 FAX (760) 591-4135

DESIGN CRITERIA	PRIME ARTERIAL	6-LANE MAJOR ARTERIAL	4-LANE MAJOR ARTERIAL	SECONDARY ARTERIAL	COLLECTOR STREET	INDUSTRIAL STREET(S)	RESIDENTIAL STREET	CUL-DE-SAC STREET	ALLEY STREET	HILLSIDE STREET
Estimated Ultimate Capacity ADT (LOS "E")	60,000	50,000	40,000	30,000	15,000	5,000 or 15,000	1,000	300 *(16)	----	----
LOS "C" Capacity (ADT)	42,000	35,000	28,000	21,000	10,000	N/A or 10,000	N/A	N/A	N/A	N/A
LOS "D" Capacity (ADT)	51,000	41,000	35,000	24,500	12,500	N/A or 12,500	N/A	N/A	N/A	N/A
Design Speed	60 mph *(1)	50 mph	50 mph	40 mph	30 mph	30 mph	25 mph	20 mph	----	25 mph
Curb-to-Curb Distance *(2,3)	106' 18'Median	94' 18' Median	82' 18'Median	64'	48'	48' or 64'	40'	40' Shaft 50' Bulb	20'	40' or 48'
Right-of-Way *(2,3)	126'	114'	102'	84'	68'	68' or 84'	60'	60' Shaft 60'R Bulb	24'	40' - 60'
Min. Traffic Index	9.0	9.0	8.5	8.0	6.0	8.0	5.0	5.0	4.0	5.0
Min. Structural Section *(4)	<u>5" AC</u> 8" AB	<u>5" AC</u> 8" AB	<u>5" AC</u> 6" AB	<u>4" AC</u> 6" AB	<u>3" AC</u> 6" AB	<u>4" AC</u> 6" AB	<u>3" AC</u> 6" AB	<u>3" AC</u> 6" AB	<u>3" AC</u> 4" AB	<u>3" AC</u> 6" AB
Min. Horizontal Radius *(6)	2200'	1400'	1400'	600'	300'	300'	200'	150'	----	200'
Curb Return Radius *(11)	35'	35'	35'	35'	35'	35'	25'	25'	10'	25'
Maximum Grade *(9)	7%	7%	7%	10%	12%	7%	12% (14%RPCC)	12% (14%RPCC)	----	15%
Minimum Grade	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%

\*See attached Footnotes

N/A = Not Applicable

NR = Not Recommended

AB = Class II Aggregate Base

# CITY OF SAN MARCOS URBAN STREET DESIGN CRITERIA

1 Civic Center Dr., San Marcos, CA 92069-2918 (760) 744-1050 FAX (760) 591-4135

DESIGN CRITERIA	PRIME ARTERIAL	6-LANE MAJOR ARTERIAL	4-LANE MAJOR ARTERIAL	SECONDARY ARTERIAL	COLLECTOR STREET	INDUSTRIAL STREET(S)	RESIDENTIAL STREET	CUL-DE-SAC STREET	ALLEY STREET	HILLSIDE STREET
Minimum "Recovery" Tangent	200'	150'	150'	100'	100'	50' or 100'	50'	50'	----	----
Max. Intersection Skew	10°	10°	10°	10°	10°	10°	10°	10°	0°	10°
Vertical Curve "K" Sag "K" Crest *(5)	120-160 190-310	90-110 110-160	90-110 110-160	60-70 60-80	40 30	40 30	30 20	20 10	----	30 20
Max. Super elevation *(7)	4%	4%	4%	4%	2%	-2%(NR)	-2%(NR)	-2%(NR)	----	-2%(NR)
Minimum Intersection Tangent *(8)	100'	100'	100'	50'	50'	50'	25'	25'	----	25'
Min. Intersection Spacing Offset "T's"	2600' 1300'	1200' 600'	1200' 600'	600' 300'	600' 300'	300'or 600' 200'or 300'	200' 200'	----	----	150'
Lighting *(10) Intersection. Non-Intersection	180W 180W	180W 135W	180W 135W	135W 90W	90W 55W	135W 90W	90W 55W	55W 55W	----	55W 55W
Stopping Sight Distance	525' to 650'	400' to 475'	400' to 475'	275' to 325'	200'	200'	150'	125'	325'	125'
Driveway Access *(12)	None *(13)	None *(13)	None *(13)	None *(13)	OK *(14)	OK *(14)	OK	OK	OK	OK
Driveway/Intersection Spacing *(15)	300'	300'	200'	200'	100'	100'	50'	----	----	----
Driveway to Driveway Separation	250'	250'	250'	175'	50'	75'	**	**	**	**
On-Street Parking	None	None	None	None	OK *(14)	OK *(14)	OK	None	None	One side Only

\*See attached Footnotes

N/A = Not Applicable

NR = Not Recommended

AB = Class II Aggregate Base



To: Engineering Department, City of Escondido  
From: Ray Martin, Hunsaker & Associates  
Date: 10/19/18  
Re: Safari Highlands Ranch – Collector Street Design Speed Deviation request.  
Cc: Mr. Jeb Hall, Concordia Homes

This memo requests a deviation from standards to use a 30-mph design speed for Safari Highlands Ranch Road (“SHR Rd.”), a private collector serving the Safari Highlands Ranch community (“the project”), with associated design standards meeting minimum AASHTO<sup>1</sup> requirements. Use of a 30-mph design speed will carry more flexibility for the road alignment necessary for obtaining access to the project, comprised of steep hillside terrain while minimizing environmental impacts of a longer alignment with larger curve radii. This deviation request includes traffic calming mitigation measures designed to reduce travel speed of motorists on this road, provided by Linscott Law and Greenspan.

The project proposes to develop 550 single family residential lots, with an average daily traffic less than 10,000 ADT. The City of Escondido Standards identify public streets estimated to convey an average daily traffic of 2000-10000 vehicles as a Local Collector Road, assigning a design speed of 35 mph. A copy of the City’s “Summary of Minimum Street Design Standards” is attached for reference showing the design criterion applicable to this and other road designations. The standards do not address private streets conveying more than 2,000 ADT, and this request seeks to obtain approval for use of a 30-mph design speed.

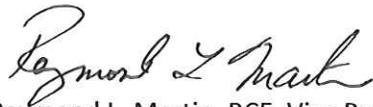
One of the challenges presented for development of this site was the primary access which needed to ascend from the valley floor at Rockwood Road, elevation 422 to the developable portion of the site, elevation 1760 in the NE corner. The road alignment studies found the least impactful alignment would need to use centerline radius less than the minimum 610’ and a maximum grade steeper than the 12% maximum normally required for a 35 mph public street. See the attached exhibits depicting the location where the proposed road includes radii less than 610’ or street grade exceeding 12%.

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<sup>1</sup> References to AASHTO are from “A Policy on Geometric Design of Highways and Streets (Green Book) 2011, 6<sup>th</sup> Edition

The alignment presented on our tentative map uses a 15% maximum grade in two locations, matching the design criteria for residential public streets carrying a 30-mph design speed. The steeper grade is critical to obtaining access to the site in the lower section to stay above the elevation of the onsite drainage course. A second location completes the run up to the upper portion of the site and is also necessary to raise the road profile above the existing drainage course at this location.

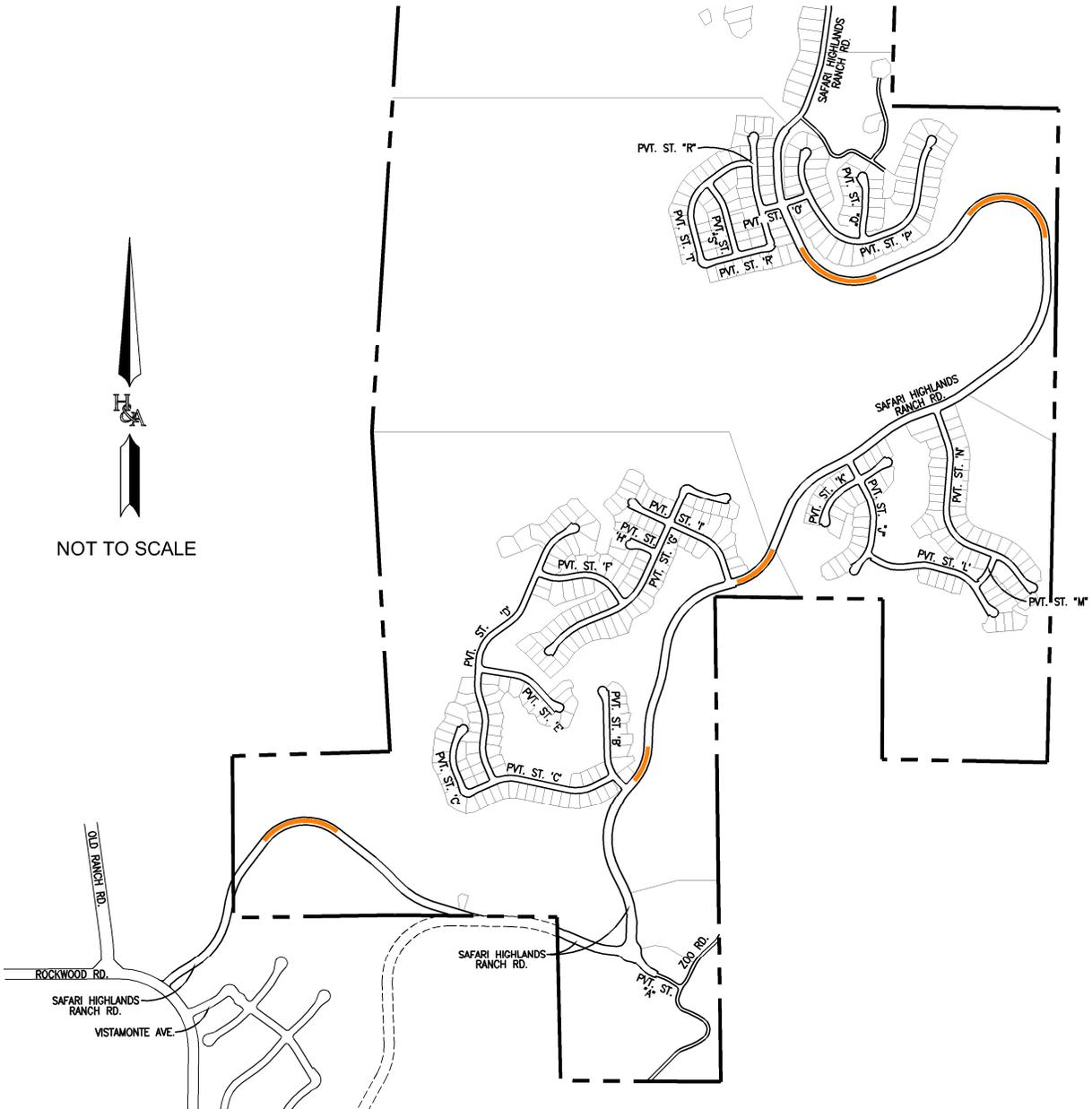
In our opinion use of the steeper grade is best implemented with a 30-mph design speed. In order to deter excessive speeds, traffic calming measures will be implemented to mitigate this request. These are shown on the project tentative map, as outlined in the traffic mitigation report prepared by Linscot Law and Greenspan. In addition, centerline radii meeting AASHTO minimums for 30-mph will be included to discourage speeding through curves. Longer radius curves are comfortable to drive at higher speed; a behavior we hope to deter in the design of this road. With the application of the 30-mph design speed to SHR Rd., other compatible design criteria will be used from AASHTO, including application of appropriate stopping and intersection sight distance per Tables 3-2, 9-6 and 9-8 attached for reference. Guard rails will also be incorporated into the design at appropriate locations where the Caltrans equal severity curve indicate they should be considered.



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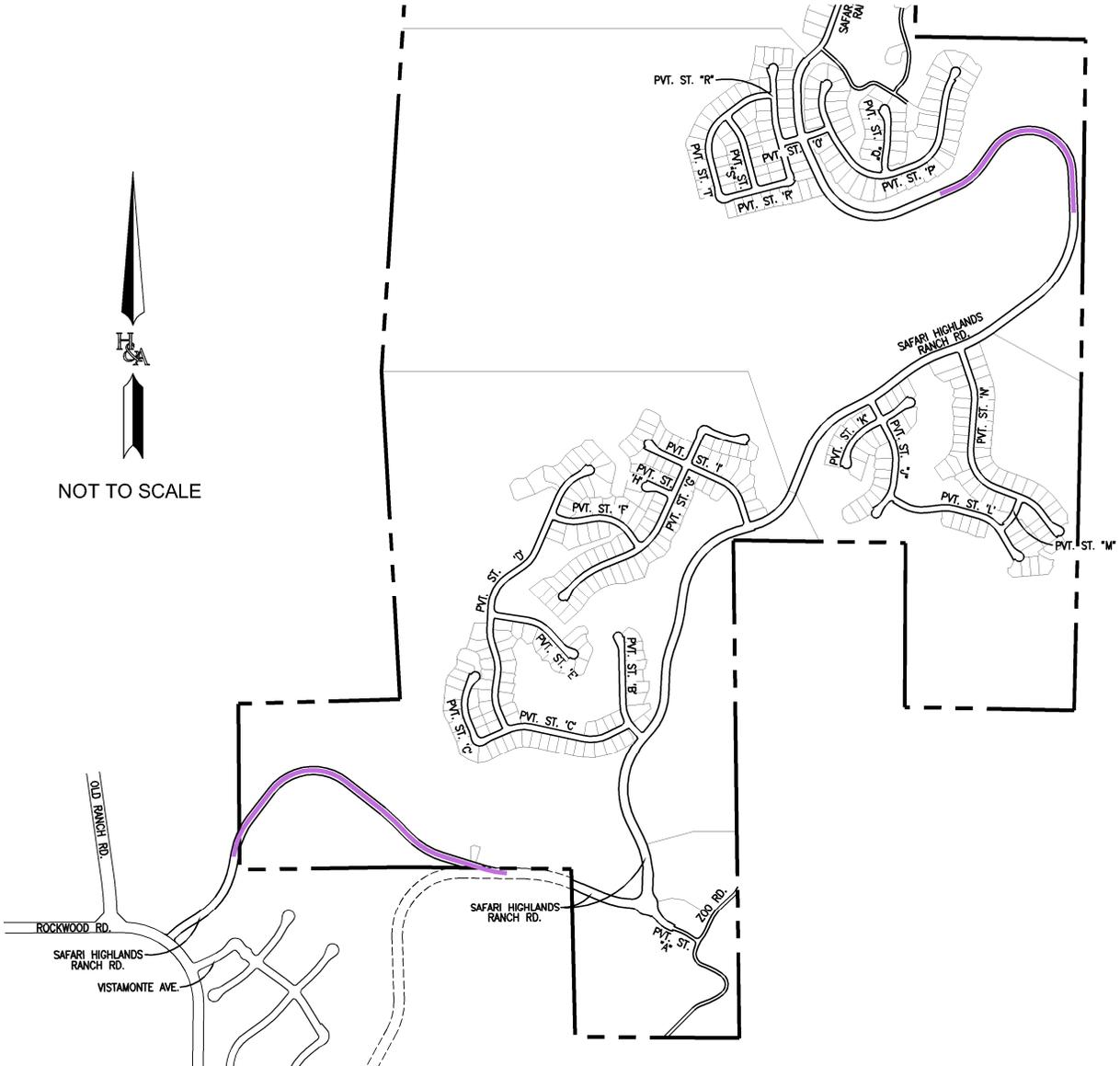
# SAFARI HIGHLANDS RANCH DESIGN SPEED DEVIATION REQUEST



NOT TO SCALE

— CENTERLINE RADIUS < 610'

# SAFARI HIGHLANDS RANCH DESIGN SPEED DEVIATION REQUEST



NOT TO SCALE

— GRADE EXCEEDS 12%

## SUMMARY OF MINIMUM STREET DESIGN STANDARDS

Design Criteria	Prime Arterial	Major Road	Collector	Local Collector	Residential Street (Public)
1) Estimated Ultimate 24 Hr. Traffic (Volume)	28,000+	20,000 to 28,000	10,000 to 20,000	2,000 to 10,000	Less Than 2,000
2) Design Speed (MPH)	50	50	40	35	30
3) Spacing of Four-Way Intersections (Feet)	1,200	750	600	300	200
4) Spacing of Median Openings (Feet)	600	500	400	N/A	N/A
5) Right-of-Way (Feet)	136-126	110-102	84(80)***	66(62)***	56/(60)****
6) Access to Adjoining Property	Intersection Only	Intersection Only	Avoid (No Vehicle Backing )	Avoid (No Vehicle Backing)	OK
7) Curb to Curb (Feet)	116-106 14' Median	90-82 14' Median	64	42	36
8) Traffic Index	9	8.5	8	6	4.5
9) Min. Thickness of Pavement (Inches)	5AC/8AB	5AC/8AB	4AC/8AB	3AC/6AB*	3AC/6AB*
10) Stopping Sight Distance (Summits) (Feet)	430	430	300	250	200
11) Headlight Distance (Sags) (Feet)	430	430	300	250	200
12) Min. Horizontal Radius (Feet) for standard crown	1400	1400	825	610	435
13) Min. Tangent Between Reversing Horizontal Curves (Feet) ( 2 Sec. Recovery Time)	150	150	120	100	90
14) Maximum Grade (%)					
A.C.	7	7	7	12	15
P.C.C.	7	7	7	12	20
15) Minimum Grade (%)	0.5	0.5	0.5	0.5	0.5
16) Street Lights					
Min/Max (Lumens)	13600/ 18600	12600/ 17600	12600/ 16600	8600/ 12600	5600/ 8600
Spacing** (Feet)	180	200	300	400	440

\* NOTE: Add ½" of AC for each 2% of fraction thereof in grade added over 12%, up to 15%.

\*\* NOTE: Spacing intervals are staggered for Residential, Local Collector, Industrial, Commercial and Collector streets. Spacing intervals are on both sides for Major and Prime Arterial roadways. Additional lighting at intersections, high use driveways or other geometric features may be required by the City Engineer.

\*\*\* NOTE: Width identified in parentheses subject to approval by City Engineer.

\*\*\*\* NOTE: Non- Contiguous sidewalk.

## SUMMARY OF MINIMUM STREET DESIGN STANDARDS

Design Criteria	Residential Street (Private)	Rural Residential Street (Public or Private)	Suburban Residential Street (Public or Private)
1) Estimated Ultimate 24 Hr. Traffic (Volume)	Less Than 2,000	Less Than 2,000	Less Than 2000
2) Design Speed (MPH)	25	25	25
3) Spacing of Four-Way Intersections (Feet)	--	--	--
4) Spacing of Median Openings (Feet)	N/A	N/A	N/A
5) Right-of-Way (Feet)	56/52**(P.U.E)	43	48
6) Access to Adjoining Property	OK	OK	OK
7) Curb to Curb (Feet)	36/32**	28***	28***
8) Traffic Index	4	4	4
9) Min. Thickness of Pavement (Inches)	3AC/6AB*	3AC/6AB*	3AC/6AB*
10) Stopping Sight Distance (Summits) (Feet)	200	200	200
11) Headlight Distance (Sags) (Feet)	200	200	200
12) Min. Horizontal Radius (Feet)	300	300	300
13) Min. Tangent Between Reversing Horizontal Curves (Ft.) (Assumes 2 Sec. Recovery Time)	90	90	90
14) Maximum Grade (%)			
A.C.	15	15	15
P.C.C.	20	20	20
15) Minimum Grade (%)	0.5	0.5	0.5
16) Street Lights			
Min/Max (Lumens)	5600/ 8600	5600/ 8600	5600/ 8600
Spacing** (Feet)	440	750****	750****

\* NOTE: Add ½" of A.C. for each 2% of fraction thereof in grade added over 12%, up to 15%.

\*\* NOTE: 36'/56' may be reduced to 32'/52' (parking on one side) for planned developments with private streets within gated communities with approval of the City Engineer and Fire Marshal.

\*\*\* NOTE: 28' - Parking on one side.

\*\*\*\* NOTE: Additional lighting required at intersections, vertical and horizontal curves.

Table 3-13b. Minimum Radii and Superelevation for Low-Speed Urban Streets

U.S. Customary							
e (%)	$V_d = 15$ mph	$V_d = 20$ mph	$V_d = 25$ mph	$V_d = 30$ mph	$V_d = 35$ mph	$V_d = 40$ mph	$V_d = 45$ mph
	R (ft)						
-6.0	58	127	245	429	681	1067	1500
-5.0	56	121	231	400	628	970	1350
-4.0	54	116	219	375	583	889	1227
-3.0	52	111	208	353	544	821	1125
-2.8	51	110	206	349	537	808	1107
-2.6	51	109	204	345	530	796	1089
-2.4	51	108	202	341	524	784	1071
-2.2	50	108	200	337	517	773	1055
-2.0	50	107	198	333	510	762	1039
-1.5	49	105	194	324	495	736	1000
0	47	99	181	300	454	667	900
1.5	45	94	170	279	419	610	818
2.0	44	92	167	273	408	593	794
2.2	44	91	165	270	404	586	785
2.4	44	91	164	268	400	580	776
2.6	43	90	163	265	396	573	767
2.8	43	89	161	263	393	567	758
3.0	43	89	160	261	389	561	750
3.2	43	88	159	259	385	556	742
3.4	42	88	158	256	382	550	734
3.6	42	87	157	254	378	544	726
3.8	42	87	155	252	375	539	718
4.0	42	86	154	250	371	533	711
4.2	41	85	153	248	368	528	703
4.4	41	85	152	246	365	523	696
4.6	41	84	151	244	361	518	689
4.8	41	84	150	242	358	513	682
5.0	41	83	149	240	355	508	675
5.2	40	83	148	238	352	503	668
5.4	40	82	147	236	349	498	662
5.6	40	82	146	234	346	494	655
5.8	40	81	145	233	343	489	649
6.0	39	81	144	231	340	485	643
6.2	39	80	143	229	337	480	637
6.4	39	80	142	227	335	476	631
6.6	39	79	141	226	332	472	625
6.8	39	79	140	224	329	468	619
7.0	38	78	139	222	327	464	614
7.2	38	78	138	221	324	460	608
7.4	38	78	137	219	322	456	603
7.6	38	77	136	217	319	452	597
7.8	38	77	135	216	317	448	592
8.0	38	76	134	214	314	444	587
8.2	37	76	134	213	312	441	582
8.4	37	75	133	211	309	437	577
8.6	37	75	132	210	307	434	572
8.8	37	74	131	208	305	430	567
9.0	37	74	130	207	302	427	563
9.2	36	74	129	205	300	423	558
9.4	36	73	129	204	298	420	553
9.6	36	73	128	203	296	417	549
9.8	36	72	127	201	294	413	544
10.0	36	72	126	200	292	410	540
10.2	36	72	126	199	290	407	536
10.4	35	71	125	197	288	404	531
10.6	35	71	124	196	286	401	527
10.8	35	71	123	195	284	398	523
11.0	35	70	123	194	282	395	519
11.2	35	70	122	192	280	392	515
11.4	35	69	121	191	278	389	511
11.6	34	69	120	190	276	386	508
11.8	34	69	120	189	274	384	504
12.0	34	68	119	188	272	381	500

## Notes:

1. Computed using Superelevation Distribution Method 2.
2. Superelevation may be optional on low-speed urban streets.
3. Negative superelevation values beyond -2.0 percent should be used for unpaved surfaces such as gravel, crushed stone, and earth. However, a normal cross slope of -2.5 percent may be used on paved surfaces in areas with intense rainfall.

**Effect of Grade on Stopping**

When a highway is on a grade, Equation 3-1 for braking distance is modified as follows:

Metric	U.S. Customary
$d_B = \frac{V^2}{254 \left[ \left( \frac{a}{9.81} \right) \pm G \right]}$	$d_B = \frac{V^2}{30 \left[ \left( \frac{a}{32.2} \right) \pm G \right]} \tag{3-3}$
where:	where:
$d_B$ = braking distance on grade, m	$d_B$ = braking distance on grade, ft
$V$ = design speed, km/h	$V$ = design speed, mph
$a$ = deceleration, m/s <sup>2</sup>	$a$ = deceleration, ft/s <sup>2</sup>
$G$ = grade, rise/run, m/m	$G$ = grade, rise/run, ft/ft

In this equation,  $G$  is the rise in elevation divided by the distance of the run and the percent of grade divided by 100, and the other terms are as previously stated. The stopping distances needed on upgrades are shorter than on level roadways; those on downgrades are longer. The stopping sight distances for various grades shown in Table 3-2 are the values determined by using Equation 3-3 in place of the second term in Equation 3-2. These adjusted sight distance values are computed for wet-pavement conditions using the same design speeds and brake reaction times used for level roadways in Table 3-1.

**Table 3-2. Stopping Sight Distance on Grades**

Metric							U.S. Customary						
Design Speed (km/h)	Stopping Sight Distance (m)						Design Speed (mph)	Stopping Sight Distance (ft)					
	Downgrades			Upgrades				Downgrades			Upgrades		
	3 %	6 %	9 %	3 %	6 %	9 %		3 %	6 %	9 %	3 %	6 %	9 %
20	20	20	20	19	18	18	15	80	82	85	75	74	73
30	32	35	35	31	30	29	20	116	120	126	109	107	104
40	50	50	53	45	44	43	25	158	165	173	147	143	140
50	66	70	74	61	59	58	30	205	215	227	200	184	179
60	87	92	97	80	77	75	35	257	271	287	237	229	222
70	110	116	124	100	97	93	40	315	333	354	289	278	269
80	136	144	154	123	118	114	45	378	400	427	344	331	320
90	164	174	187	148	141	136	50	446	474	507	405	388	375
100	194	207	223	174	167	160	55	520	553	593	469	450	433
110	227	243	262	203	194	186	60	598	638	686	538	515	495
120	263	281	304	234	223	214	65	682	728	785	612	584	561
130	302	323	350	267	254	243	70	771	825	891	690	658	631
							75	866	927	1003	772	736	704
							80	965	1035	1121	859	817	782

\* WHERE DOWNGRADES EXCEED 9%, ADDITIONAL STOPPING SIGHT DISTANCE WILL BE PROVIDED DURIGN FINAL DESIGN, AS CALCULATED BY FORMULA (3-3)

intersection is located on a 4 percent upgrade, then the time gap selected for intersection sight distance design for left turns should be increased from 8.0 to 8.8 s, equivalent to an increase of 0.2 s for each percent grade.

The design values for intersection sight distance for passenger cars are shown in Table 9-6. Figure 9-17 includes design values, based on the time gaps for the design vehicles included in Table 9-5.

No adjustment of the recommended sight distance values for the major-road grade is generally needed because both the major- and minor-road vehicle will be on the same grade when departing from the intersection. However, if the minor-road design vehicle is a heavy truck and the intersection is located near a sag vertical curve with grades over 3 percent, then an adjustment to extend the recommended sight distance based on the major-road grade should be considered.

**Table 9-6. Design Intersection Sight Distance—Case B1, Left Turn from Stop**

Metric				U.S. Customary			
Design Speed (km/h)	Stopping Sight Distance (m)	Intersection Sight Distance for Passenger Cars		Design Speed (mph)	Stopping Sight Distance (ft)	Intersection Sight Distance for Passenger Cars	
		Calculated (m)	Design (m)			Calculated (ft)	Design (ft)
20	20	41.7	45	15	80	165.4	170
30	35	62.6	65	20	115	220.5	225
40	50	83.4	85	25	155	275.6	280
50	65	104.3	105	30	200	330.8	335
60	85	125.1	130	35	250	385.9	390
70	105	146.0	150	40	305	441.0	445
80	130	166.8	170	45	360	496.1	500
90	160	187.7	190	50	425	551.3	555
100	185	208.5	210	55	495	606.4	610
110	220	229.4	230	60	570	661.5	665
120	250	250.2	255	65	645	716.6	720
130	285	271.1	275	70	730	771.8	775
—	—	—	—	75	820	826.9	830
—	—	—	—	80	910	882.0	885

Note: Intersection sight distance shown is for a stopped passenger car to turn left onto a two-lane highway with no median and grades 3 percent or less. For other conditions, the time gap should be adjusted and the sight distance recalculated.

Sight distance design for left turns at divided-highway intersections should consider multiple design vehicles and median width. If the design vehicle used to determine sight distance for a divided-highway intersection is larger than a passenger car, then sight distance for left turns will need to be checked for that selected design vehicle and for smaller design vehicles as well. If the divided-highway median is wide enough to store the design vehicle with a clearance to the through lanes of approximately 1 m [3 ft] at both ends of the vehicle, no separate analysis for the departure sight triangle for left turns is needed on the minor-road approach for the near roadway to the left. In most cases, the departure sight triangle for right

Table 9-8. Design Intersection Sight Distance—Case B2, Right Turn from Stop, and Case B3, Crossing Maneuver

Metric				U.S. Customary			
Design Speed (km/h)	Stopping Sight Distance (m)	Intersection Sight Distance for Passenger Cars		Design Speed (mph)	Stopping Sight Distance (ft)	Intersection Sight Distance for Passenger Cars	
		Calculated (m)	Design (m)			Calculated (ft)	Design (ft)
20	20	36.1	40	15	80	143.3	145
30	35	54.2	55	20	115	191.1	195
40	50	72.3	75	25	155	238.9	240
50	65	90.4	95	30	200	286.7	290
60	85	108.4	110	35	250	334.4	335
70	105	126.5	130	40	305	382.2	385
80	130	144.6	145	45	360	430.0	430
90	160	162.6	165	50	425	477.8	480
100	185	180.7	185	55	495	525.5	530
110	220	198.8	200	60	570	573.3	575
120	250	216.8	220	65	645	621.1	625
130	285	234.9	235	70	730	668.9	670
—	—	—	—	75	820	716.6	720
—	—	—	—	80	910	764.4	765

Note: Intersection sight distance shown is for a stopped passenger car to turn right onto or to cross a two-lane highway with no median and with grades of 3 percent or less. For other conditions, the time gap should be adjusted and the sight distance recalculated.



To: Engineering Department, City of Escondido

From: Ray Martin, Hunsaker & Associates

Date: 10/07/18

Re: Safari Highlands Ranch – Emergency Access Road Design Speed Deviation request.

Cc: Mr. Jeb Hall, Concordia Homes

This memo requests a deviation from standards to use a 20-mph design speed for two emergency access roads, Stonebridge and Zoo Roads, collectively “EA Roads” serving the Safari Highlands Ranch community (“the project”), with associated design standards meeting minimum AASHTO<sup>1</sup> requirements. These EA roads are proposed to be aligned on existing offsite roads within private property that are currently in use.

- Stonebridge Road lies within land currently in agricultural use whose owners have granted permission for widening this road along the current alignment.
- Zoo Road extends from the City of San Diego boundary through the property and provides access to County of San Diego residents east of the property

Use of a 20-mph design speed will carry more flexibility for the road alignment to match current alignments as it rises steeply to the site, while minimizing environmental impacts to realign using larger curve radii. The proposed design shall comply with City of Escondido Standards for a Private Access Easements with a reduced Design Speed of 20 mph, as requested herein. Minimum design criteria per City standards and as modified for this project is shown on the attached table.

The modifications implement AASHTO standards for a 20 mph design speed, allowing reduction of the centerline radius. As mitigation for the reduction in the design speed, appropriate traffic calming measures will be included in the project, as presented in the traffic mitigation report prepared by Linscott Law and Greenspan. These are shown on the project tentative map, and include warning signs and reflective markings to warn motorists of the reduced speed on those curve. In the locations where tighter radii than the 107’ AASHTO minimum are necessary, appropriate super-elevation of the road is included to maintain a 20 mph design speed. The original alignment has been modified to limit these areas to a 90’ radius. The attached exhibits show locations where centerline radii are less than 200’ and where the 90’ radius with super elevation will be provided.

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<sup>1</sup> References to AASHTO are from “A Policy on Geometric Design of Highways and Streets (Green Book) 2011, 6<sup>th</sup> Edition

Since there EA Roads will be used by the Escondido Fire Department, there are two turnouts included, as well as fire hydrants connected to water tanks for filling fire apparatus during a wildland fire scenario. These areas will be lighted to facilitate use during nighttime. No other lighting is proposed for these EA Roads. Guard rails will also be incorporated into the design at appropriate locations where the Caltrans equal severity curve indicate they should be considered.



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Safari Highlands Ranch –Offsite Emergency Access Road Design Standards

	Design Criteria	Private Access Easement	Private Access Easement (Modified)
1)	Estimated Ultimate 24 Hr. Traffic (volume)	Less than 750	Less than 750
2)	Design Speed (MPH)	25	20
3)	Spacing of four-way Intersections (Feet)	--	--
4)	Spacing of Median Openings	N/A	N/A
5)	Right-Of-Way (Feet)	--	--
6)	Access to Adjoining Property	OK	OK
7)	Curb to Curb (Feet)	24/32/36***	24***
8)	Traffic Index	4	4
9)	Min. Thickness of Pavement (Inches)	3AC/6AC*	3AC/6AC*
10)	Stopping Sight Distance (Summits) (Feet)	150	Per AASHTO
11)	Headlight Distance (Sags) (Feet)	--	Per AASHTO
12)	Min. Horizontal Radius (Feet)	200	107**
13)	Min. Tangent Between Reversing Horizontal Curves (Ft.)	None	None
14)	Maximum Grade (%)****		
	A.C.	15	15
	P.C.C.	20	20
15)	Minimum Grade (%)	0.5	0.5
16)	Street Lights	None	None

\* NOTE: Add ½" of A.C. for each 2% or fraction thereof in grade added over 1%, up to 15%

\*\* NOTE: Centerline Radii less than 107' are allowed with Superelevation per AASHTO Table 3-13b

\*\*\* NOTE: 24'-No Parking, 32'- Parking on One Side, 36'-Paking on both Sides

\*\*\*\* NOTE: Maximum grade = 16% within horizontal curves less than 200' CL radius

Table 3-13b. Minimum Radii and Superelevation for Low-Speed Urban Streets

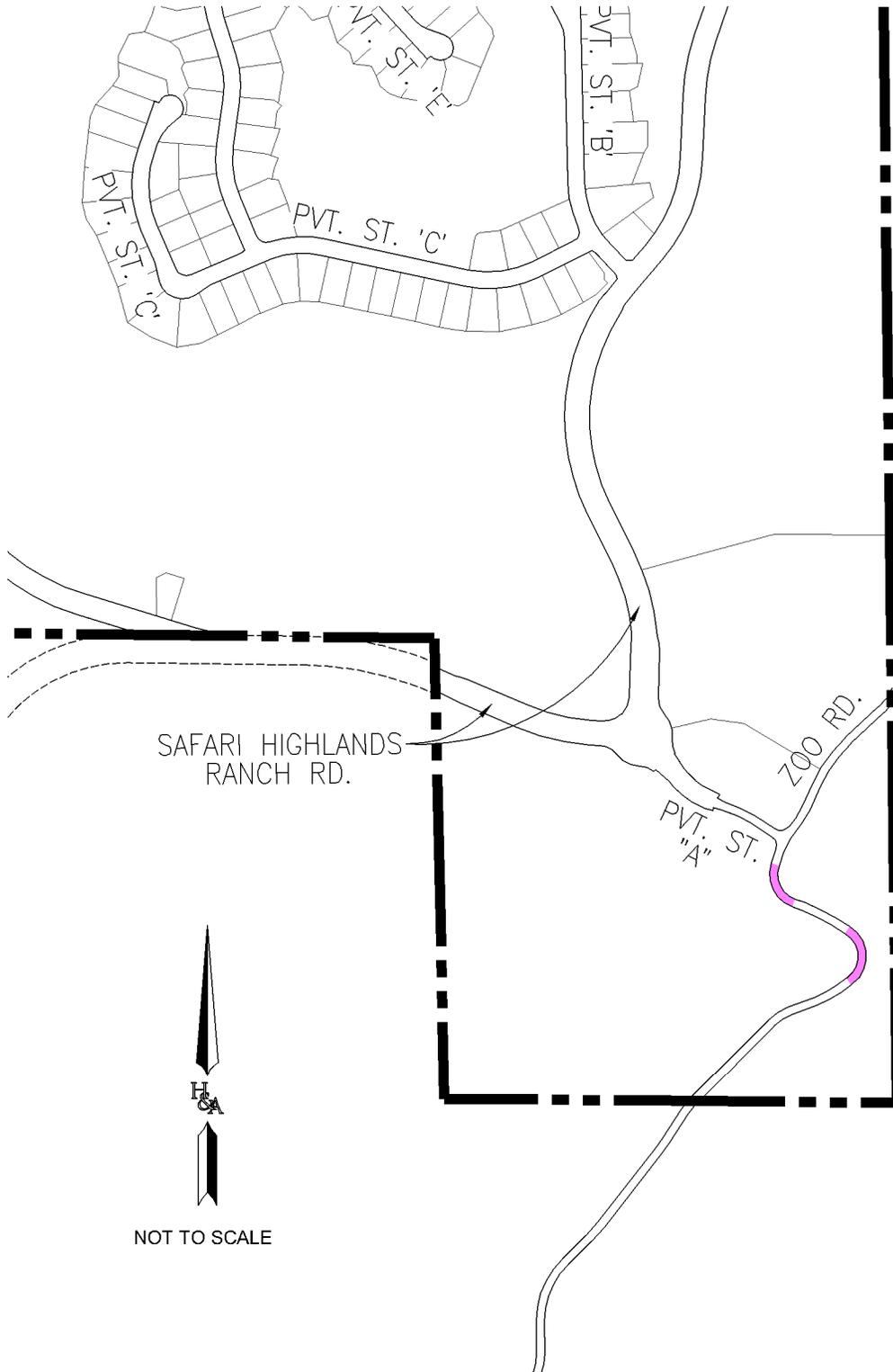
U.S. Customary							
e (%)	$V_d = 15$ mph	$V_d = 20$ mph	$V_d = 25$ mph	$V_d = 30$ mph	$V_d = 35$ mph	$V_d = 40$ mph	$V_d = 45$ mph
	R (ft)						
-6.0	58	127	245	429	681	1067	1500
-5.0	56	121	231	400	628	970	1350
-4.0	54	116	219	375	583	889	1227
-3.0	52	111	208	353	544	821	1125
-2.8	51	110	206	349	537	808	1107
-2.6	51	109	204	345	530	796	1089
-2.4	51	108	202	341	524	784	1071
-2.2	50	108	200	337	517	773	1055
-2.0	50	107	198	333	510	762	1039
-1.5	49	105	194	324	495	736	1000
0	47	99	181	300	454	667	900
1.5	45	94	170	279	419	610	818
2.0	44	92	167	273	408	593	794
2.2	44	91	165	270	404	586	785
2.4	44	91	164	268	400	580	776
2.6	43	90	163	265	396	573	767
2.8	43	89	161	263	393	567	758
3.0	43	89	160	261	389	561	750
3.2	43	88	159	259	385	556	742
3.4	42	88	158	256	382	550	734
3.6	42	87	157	254	378	544	726
3.8	42	87	155	252	375	539	718
4.0	42	86	154	250	371	533	711
4.2	41	85	153	248	368	528	703
4.4	41	85	152	246	365	523	696
4.6	41	84	151	244	361	518	689
4.8	41	84	150	242	358	513	682
5.0	41	83	149	240	355	508	675
5.2	40	83	148	238	352	503	668
5.4	40	82	147	236	349	498	662
5.6	40	82	146	234	346	494	655
5.8	40	81	145	233	343	489	649
6.0	39	81	144	231	340	485	643
6.2	39	80	143	229	337	480	637
6.4	39	80	142	227	335	476	631
6.6	39	79	141	226	332	472	625
6.8	39	79	140	224	329	468	619
7.0	38	78	139	222	327	464	614
7.2	38	78	138	221	324	460	608
7.4	38	78	137	219	322	456	603
7.6	38	77	136	217	319	452	597
7.8	38	77	135	216	317	448	592
8.0	38	76	134	214	314	444	587
8.2	37	76	134	213	312	441	582
8.4	37	75	133	211	309	437	577
8.6	37	75	132	210	307	434	572
8.8	37	74	131	208	305	430	567
9.0	37	74	130	207	302	427	563
9.2	36	74	129	205	300	423	558
9.4	36	73	129	204	298	420	553
9.6	36	73	128	203	296	417	549
9.8	36	72	127	201	294	413	544
10.0	36	72	126	200	292	410	540
10.2	36	72	126	199	290	407	536
10.4	35	71	125	197	288	404	531
10.6	35	71	124	196	286	401	527
10.8	35	71	123	195	284	398	523
11.0	35	70	123	194	282	395	519
11.2	35	70	122	192	280	392	515
11.4	35	69	121	191	278	389	511
11.6	34	69	120	190	276	386	508
11.8	34	69	120	189	274	384	504
12.0	34	68	119	188	272	381	500

## Notes:

1. Computed using Superelevation Distribution Method 2.
2. Superelevation may be optional on low-speed urban streets.
3. Negative superelevation values beyond -2.0 percent should be used for unpaved surfaces such as gravel, crushed stone, and earth. However, a normal cross slope of -2.5 percent may be used on paved surfaces in areas with intense rainfall.



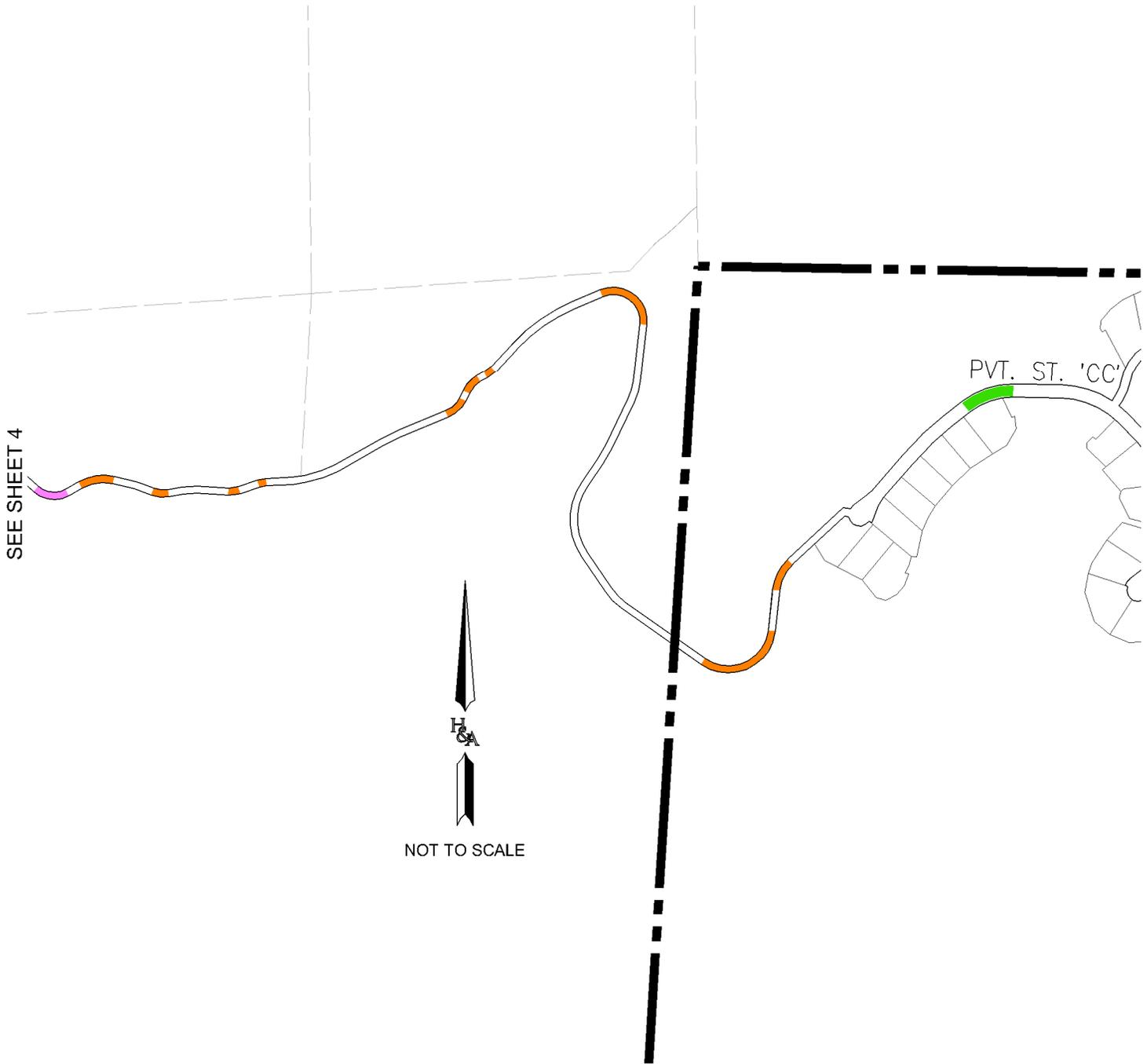
# SAFARI HIGHLANDS RANCH OFFSITE EMERGENCY ACCESS ROAD DESIGN SPEED DEVIATION REQUEST



- HORIZONTAL RADIUS LESS THAN 200'
- HORIZONTAL RADIUS= 90' WITH APPROPRIATE SUPER ELEVATION FOR 20 MPH DESIGN SPEED

NOTE:  
 PRIVATE ACCESS EASEMENT TO BE BASED ON AASHTO STANDARDS. DESIGN SPEED 20 MPH, HORIZONTAL RADIUS 107' MINIMUM. HORIZONTAL RADIUS 90' WITH 2.6% SUPER ELEVATION.

# SAFARI HIGHLANDS RANCH OFFSITE EMERGENCY ACCESS ROAD DESIGN SPEED DEVIATION REQUEST



-  HORIZONTAL RADIUS LESS THAN 200'
-  HORIZONTAL RADIUS= 90' WITH APPROPRIATE SUPER ELEVATION FOR 20 MPH DESIGN SPEED

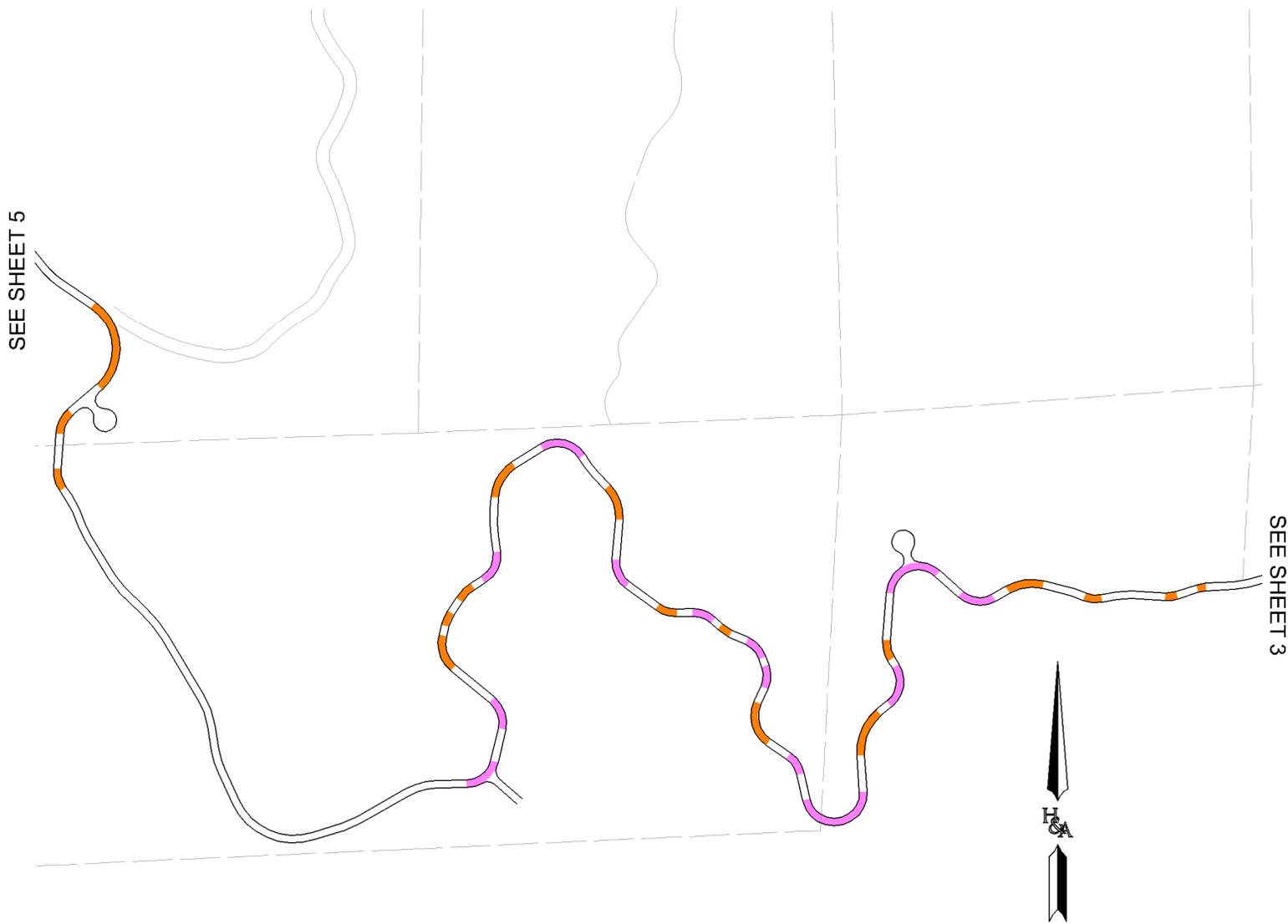
NOTE:  
PRIVATE ACCESS EASEMENT TO BE BASED ON AASHTO STANDARDS. DESIGN SPEED 20 MPH, HORIZONTAL RADIUS 107' MINIMUM. HORIZONTAL RADIUS 90' WITH 2.6% SUPER ELEVATION.

SHEET 3 OF 5



HUNSAKER  
& ASSOCIATES  
SAN DIEGO, INC

# SAFARI HIGHLANDS RANCH OFFSITE EMERGENCY ACCESS ROAD DESIGN SPEED DEVIATION REQUEST



NOT TO SCALE

-  HORIZONTAL RADIUS LESS THAN 200'
-  HORIZONTAL RADIUS= 90' WITH APPROPRIATE SUPER ELEVATION FOR 20 MPH DESIGN SPEED

NOTE:  
PRIVATE ACCESS EASEMENT TO BE BASED ON AASHTO STANDARDS. DESIGN SPEED 20 MPH, HORIZONTAL RADIUS 107' MINIMUM. HORIZONTAL RADIUS 90' WITH 2.6% SUPER ELEVATION.

SHEET 4 OF 5

# SAFARI HIGHLANDS RANCH OFFSITE EMERGENCY ACCESS ROAD DESIGN SPEED DEVIATION REQUEST



NOT TO SCALE

SEE SHEET 4

-  HORIZONTAL RADIUS LESS THAN 200'
-  HORIZONTAL RADIUS= 90' WITH APPROPRIATE SUPER ELEVATION FOR 20 MPH DESIGN SPEED

NOTE:  
PRIVATE ACCESS EASEMENT TO BE BASED ON AASHTO STANDARDS. DESIGN SPEED 20 MPH, HORIZONTAL RADIUS 107' MINIMUM. HORIZONTAL RADIUS 90' WITH 2.6% SUPER ELEVATION.

SHEET 5 OF 5



HUNSAKER  
& ASSOCIATES  
SAN DIEGO, INC



To: Engineering Department, City of Escondido  
From: Ray Martin, Hunsaker & Associates  
Date: 10/19/18  
Re: Safari Highlands Ranch – Sidewalk deviation request.  
Cc: Mr. Jeb Hall, Concordia Homes

This memo requests a deviation from standards to provide a walk on one side of the private streets and use DG trail in place of 4" PCC sidewalk within the estate lot neighborhood of the development. These deviations are requested in support of the project vision to create a rural community feel for the subdivision.

The City of Escondido Design Standards, section 7.A. covers sidewalk in includes the following requirement;

“P.C.C. sidewalks in conformance with SDRSD G-7 shall be required along both sides of all streets, with exception of certain rural residential, suburban residential and private residential street.”

The project specific plan envisions a rural character which starts with Safari Highlands Ranch Road, the main collector providing vehicular and pedestrian access to the site. This design deviation request provides one PCC sidewalk on this road in support of the rural vision. Consider the following justification;

- This road ascends steeply from the valley floor and has been designed with limited destination locations on the alignment. The low volume of pedestrian use anticipated due to steep terrain and road length between destinations fails to support a mandate for sidewalk on both sides.
- A public trail system separate from the street provides an alternative second pedestrian route through the project.
- Reduction of street width by excluding area for the second sidewalk helps reduce grading footprint and reduces slope heights where streets abut open space.
- Elimination of sidewalk on one side reduces impervious area, which is a design goal for green streets and a more sensitive alternative for mitigating water quality and hydromodification impacts.
- Sidewalks will be located to provide access to all public amenity spaces, including the recreation lot, Fire station, trail heads and neighborhood street access.
  - Where the sidewalk changes sides of streets to meet this goal, crosswalks will be provided to meet CBC chapter 11 accessibility requirements

The rural character of the street scene will be further developed within neighborhoods R-1 through R-5 by this design deviation request to allow PCC sidewalk on one side of each street, and thus comparable with Safari Highlands Ranch Road. Consider the following justification;

- Subdivision design of each neighborhood provides lower volume pedestrian traffic to the collector road, Safari Highlands Ranch Rd, than a denser development with smaller lot sizes.
  - These areas have average lot sizes exceeding 10,000 s.f. and our design spreads these lots across larger areas than a typical densely subdivides project, mainly due to the steep terrain and additional HOA owned OS slope areas.
- Reduction of street width by excluding area for the second sidewalk helps reduce grading footprint and reduces slope heights where streets abut open space. A similar impact occurs in perimeter slopes when the lots are pushed back for the wider street section.
- Elimination of sidewalk on one side reduces impervious area, which is a design goal for green streets and a more sensitive alternative for mitigating water quality and hydromodification impacts.
- Sidewalks will be located to provide access in front of homes when a street is single loaded, and provide access to all public amenity spaces to meet CBC chapter 11 accessibility requirements.

The rural character of the street scene is further enhanced within neighborhoods E-1 through E-2 by this design deviation request to allow DG trail on one side of the streets, in lieu of PCC sidewalk. Consider the following justification in addition to that cited previously for neighborhoods R-1 through R-5;

- Subdivision design of each neighborhood provides lower volume pedestrian traffic to the collector road, Safari Highlands Ranch Rd, than a denser development with smaller lot sizes.
  - The upper areas of the project, neighborhoods E-1 and E2 have lot sizes averaging over 20,000 s.f. and most closely matches the depiction of the rural residential street on Figure 19 of the City standards which allows sidewalk on one side of the street.
- Use of DG trail instead of PCC provides a necessary distinction in the street scene from the other neighborhoods below.
  - Where street grades exceed 5%, stabilization measures will be included for the surface to reduce maintenance and provide an accessible surface.



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