

Appendix V

Modification to a Road Standard: Driveway Spacing



County of San Diego

JOHN L. SNYDER
DIRECTOR

DEPARTMENT OF PUBLIC WORKS

5201 RUFFIN ROAD, SUITE D
SAN DIEGO, CALIFORNIA 92123-4310
(858) 694-2055 FAX: (858) 694-8928
Web Site: sdcdpw.org

RICHARD E. CROMPTON
ASSISTANT DIRECTOR

December 10, 2008

Ms. Karen Van Ert
Rick Engineering Co.
5620 Friars Road
San Diego, CA 92110-2596

Dear Ms. Van Ert:

REQUEST FOR MODIFICATION TO A ROAD STANDARD AND/OR TO PROJECT CONDITIONS – TM 5354

Department of Public Works (DPW) staff reviewed your request for modification of Public Road Standards for TM 5354. The request was for a waiver of the 200 feet minimum separation between intersections of driveways/public roads and between driveways and public roads for the minimum 6000 square feet lots proposed to front on residential and residential cul-de-sac streets.

DPW is able to support your request for this modification to Public Road Standards. The portion of TM 5354 involved in this request is designed with minimum lot frontages of 60 feet. For such designs, modification of this standard is reasonable, and is supported, provided that: 1) adequate sight distance is provided and is engineer-certified from these driveways; 2) Clear sight distance easements may be required, and 3) consideration be given to avoid a driveway being hidden around a corner by landscaping. It has been determined that your request for exception will not adversely affect the safety and flow of traffic.

If you have any questions or need additional information, please contact Nael Areigat, DPW Project Manager, at (858) 495-5747, or facsimile at (858) 694-8928.

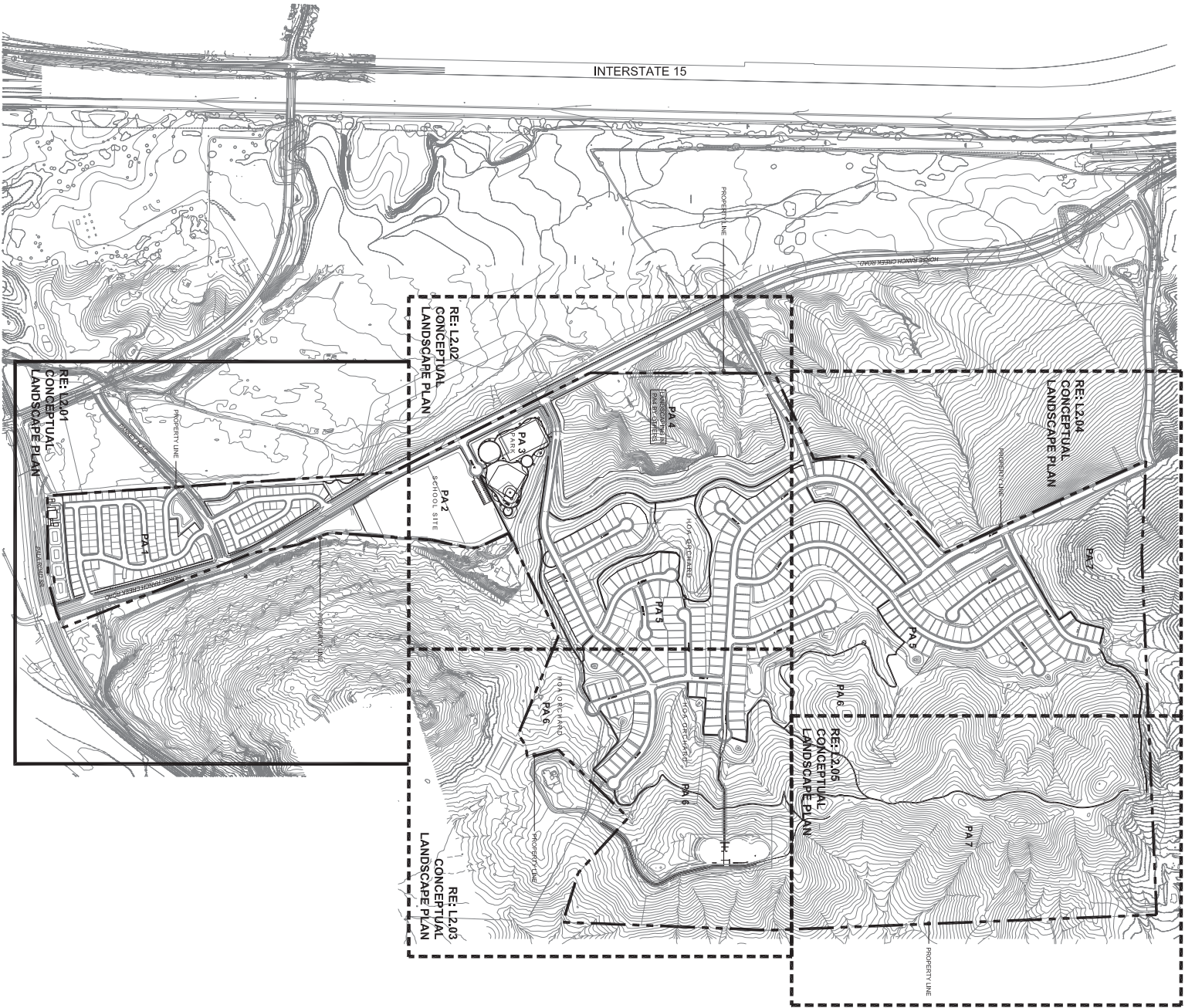
Sincerely,

RICHARD E. CROMPTON
Assistant Director

REC:NA:yl

Appendix W

Landscape Plan



THE LANDSCAPE DESIGN CONCEPT

THE LANDSCAPE DESIGN CONCEPT FOR THE COMMUNITY IS DESIGNED TO CAPTURE THE ESSENCE OF THE REGIONAL CHARACTER AND BEAUTY OF THE REGION. MATERIALS WILL BE CHOSEN TO REFLECT THE REGIONAL CHARACTER AND BEAUTY OF THE REGION. THE LANDSCAPE DESIGN CONCEPT IS A STATE-OF-THE-ART AUTOMATICALLY CONTROLLED ELECTRICALLY OPERATED SYSTEM THAT PROVIDES A HIGH LEVEL OF MAINTENANCE AND WATER CONSERVATION. RE-VEGETATION AREAS ARE CAREFULLY DEVELOPED WITH NATIVE AND BROUGHT TO EMERY PLANTINGS THAT PROVIDE PROPER GROUND AND LOW GROUND SUBSTRATE TO ALL LANDSCAPE AND IRRIGATION SHALL CONFORM TO THE STANDARDS OF THE LANDSCAPE WATER CONSERVATION DESIGN MANUAL AND REGIONAL STANDARDS.

IRRIGATION SYSTEM

PLANTING AREAS SHALL BE IRRIGATED ACCORDING TO PLANT TYPE, DESIGN AND ENVIRONMENTAL EXPOSURE. THESE PLANTING AREAS (WHETHER PUBLIC OR PRIVATE) SHALL BE IRRIGATED BY A STATE-OF-THE-ART AUTOMATICALLY CONTROLLED ELECTRICALLY OPERATED SYSTEM THAT PROVIDES A HIGH LEVEL OF MAINTENANCE AND WATER CONSERVATION. RE-VEGETATION AREAS ARE CAREFULLY DEVELOPED WITH NATIVE AND BROUGHT TO EMERY PLANTINGS THAT PROVIDE PROPER GROUND AND LOW GROUND SUBSTRATE TO ALL LANDSCAPE AND IRRIGATION SHALL CONFORM TO THE STANDARDS OF THE LANDSCAPE WATER CONSERVATION DESIGN MANUAL AND REGIONAL STANDARDS.

MAINTENANCE

ALL STREET PLANTINGS, PUBLIC STREETS, PARKS, AND PLAZAS SHALL BE MAINTAINED BY THE PUBLIC RIGHT-OF-WAY. AN ENVIRONMENTAL PERMIT WILL BE REQUIRED FOR THE PLANTING OF TREES AND SHRUBS IN THE PUBLIC RIGHT-OF-WAY. ALL PLANTING AREAS SHALL BE MAINTAINED FREE OF DEBRIS AND LITTER. ALL PLANTS SHALL BE MAINTAINED IN A HEALTHY GROWING CONDITION, CONDITIONS OF THE PERMIT.

NOTE:

TO THE EXTENT FEASIBLE, A COMBINATION OF WALLS AND BERRING WILL BE USED TO PROTECT THE SOIL FROM EROSION. THIS IS NOT A SUBSTITUTE FOR EROSION CONTROL MEASURES. THIS IS NOT A SUBSTITUTE FOR EROSION CONTROL MEASURES. THIS IS NOT A SUBSTITUTE FOR EROSION CONTROL MEASURES.

GENERAL NOTES:

1. MINIMUM 15 GAL. SIZE STREET TREES SHOULD BE INSTALLED OUTSIDE AND INSIDE OF THE PUBLIC RIGHT-OF-WAY. AN ENVIRONMENTAL PERMIT WILL BE REQUIRED FOR THE PLANTING OF TREES AND SHRUBS IN THE PUBLIC RIGHT-OF-WAY. ALL PLANTING AREAS SHALL BE MAINTAINED FREE OF DEBRIS AND LITTER. ALL PLANTS SHALL BE MAINTAINED IN A HEALTHY GROWING CONDITION, CONDITIONS OF THE PERMIT.
2. THE PLANTING OF TREES AND SHRUBS IN THE PUBLIC RIGHT-OF-WAY SHALL BE DESIGNED SO AS NOT TO PROHIBIT THE PLACEMENT OF STREET TREES, ALL TO THE SHIRING OF THE OCCUPY.
3. THE PLANTING OF TREES AND SHRUBS IN THE PUBLIC RIGHT-OF-WAY SHALL BE DESIGNED SO AS NOT TO PROHIBIT THE PLACEMENT OF STREET TREES, ALL TO THE SHIRING OF THE OCCUPY.
4. THE PLANTING OF TREES AND SHRUBS IN THE PUBLIC RIGHT-OF-WAY SHALL BE DESIGNED SO AS NOT TO PROHIBIT THE PLACEMENT OF STREET TREES, ALL TO THE SHIRING OF THE OCCUPY.
5. THE PLANTING OF TREES AND SHRUBS IN THE PUBLIC RIGHT-OF-WAY SHALL BE DESIGNED SO AS NOT TO PROHIBIT THE PLACEMENT OF STREET TREES, ALL TO THE SHIRING OF THE OCCUPY.
6. THE PLANTING OF TREES AND SHRUBS IN THE PUBLIC RIGHT-OF-WAY SHALL BE DESIGNED SO AS NOT TO PROHIBIT THE PLACEMENT OF STREET TREES, ALL TO THE SHIRING OF THE OCCUPY.
7. THE PLANTING OF TREES AND SHRUBS IN THE PUBLIC RIGHT-OF-WAY SHALL BE DESIGNED SO AS NOT TO PROHIBIT THE PLACEMENT OF STREET TREES, ALL TO THE SHIRING OF THE OCCUPY.
8. THE PLANTING OF TREES AND SHRUBS IN THE PUBLIC RIGHT-OF-WAY SHALL BE DESIGNED SO AS NOT TO PROHIBIT THE PLACEMENT OF STREET TREES, ALL TO THE SHIRING OF THE OCCUPY.

AREA CALCULATIONS:

PA 1	SF	PERCENTAGE
TURF	7,000	6.7%
ORNAMENTALS	1,000	0.9%
PA1 TOTAL	8,000	7.6%
PA 2	103,336	100%
PA 3 (PARK)	89,886	35.2%
TURF - ELECTRIC USE	67,285	26.2%
TURF - NON-ELECTRIC USE	28,735	11.2%
ORNAMENTALS	69,989	27.4%
PA3 TOTAL	235,815	100%
REMAINING PROJECT AREA	12,560	0.9%
TURF	19,780	10.6%
ORNAMENTALS	1,000	0.9%
REMAINING AREA TOTAL	1,855,193	100%

Prepared By:

THE OFFICE OF
JAMES BURNETT
LANDSCAPE ARCHITECTURE PLANNING
415 SOUTH GENESEE, STE. 400
SOLANA BEACH, CA 92083
951.712.0000
WWW.OJA.COM

MEADOWOOD

Prepared By:

JAMES BURNETT
Address: 415 SOUTH GENESEE, STE. 400
SOLANA BEACH, CA 92083
Phone #: 951.712.0000
Fax #: 951.712.0000
Project Address: 415 SOUTH GENESEE, STE. 400
PA1 AND DIST. OF WATER IS
Project Name: MEADOWOOD
Revision 1: 11/11/2004
Revision 2: 11/11/2004
Revision 3: 11/11/2004
Revision 4: 11/11/2004
Revision 5: 11/11/2004
Revision 6: 11/11/2004
Revision 7: 11/11/2004
Revision 8: 11/11/2004
Revision 9: 11/11/2004
Revision 10: 11/11/2004
Revision 11: 11/11/2004
Revision 12: 11/11/2004
Revision 13: 11/11/2004
Revision 14: 11/11/2004
Revision 15: 11/11/2004
Revision 16: 11/11/2004
Revision 17: 11/11/2004
Revision 18: 11/11/2004
Revision 19: 11/11/2004
Revision 20: 11/11/2004
Revision 21: 11/11/2004
Revision 22: 11/11/2004
Revision 23: 11/11/2004
Revision 24: 11/11/2004
Revision 25: 11/11/2004
Revision 26: 11/11/2004
Revision 27: 11/11/2004
Revision 28: 11/11/2004
Revision 29: 11/11/2004
Revision 30: 11/11/2004
Revision 31: 11/11/2004
Revision 32: 11/11/2004
Revision 33: 11/11/2004
Revision 34: 11/11/2004
Revision 35: 11/11/2004
Revision 36: 11/11/2004
Revision 37: 11/11/2004
Revision 38: 11/11/2004
Revision 39: 11/11/2004
Revision 40: 11/11/2004
Revision 41: 11/11/2004
Revision 42: 11/11/2004
Revision 43: 11/11/2004
Revision 44: 11/11/2004
Revision 45: 11/11/2004
Revision 46: 11/11/2004
Revision 47: 11/11/2004
Revision 48: 11/11/2004
Revision 49: 11/11/2004
Revision 50: 11/11/2004
Revision 51: 11/11/2004
Revision 52: 11/11/2004
Revision 53: 11/11/2004
Revision 54: 11/11/2004
Revision 55: 11/11/2004
Revision 56: 11/11/2004
Revision 57: 11/11/2004
Revision 58: 11/11/2004
Revision 59: 11/11/2004
Revision 60: 11/11/2004
Revision 61: 11/11/2004
Revision 62: 11/11/2004
Revision 63: 11/11/2004
Revision 64: 11/11/2004
Revision 65: 11/11/2004
Revision 66: 11/11/2004
Revision 67: 11/11/2004
Revision 68: 11/11/2004
Revision 69: 11/11/2004
Revision 70: 11/11/2004
Revision 71: 11/11/2004
Revision 72: 11/11/2004
Revision 73: 11/11/2004
Revision 74: 11/11/2004
Revision 75: 11/11/2004
Revision 76: 11/11/2004
Revision 77: 11/11/2004
Revision 78: 11/11/2004
Revision 79: 11/11/2004
Revision 80: 11/11/2004
Revision 81: 11/11/2004
Revision 82: 11/11/2004
Revision 83: 11/11/2004
Revision 84: 11/11/2004
Revision 85: 11/11/2004
Revision 86: 11/11/2004
Revision 87: 11/11/2004
Revision 88: 11/11/2004
Revision 89: 11/11/2004
Revision 90: 11/11/2004
Revision 91: 11/11/2004
Revision 92: 11/11/2004
Revision 93: 11/11/2004
Revision 94: 11/11/2004
Revision 95: 11/11/2004
Revision 96: 11/11/2004
Revision 97: 11/11/2004
Revision 98: 11/11/2004
Revision 99: 11/11/2004
Revision 100: 11/11/2004

OVERALL PLAN

1 L1.00

NOT TO SCALE

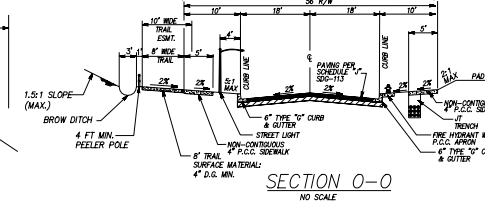
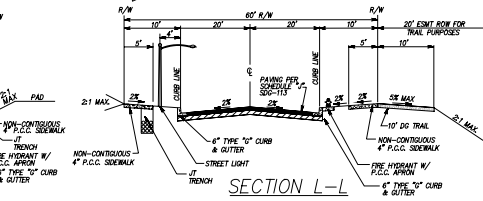
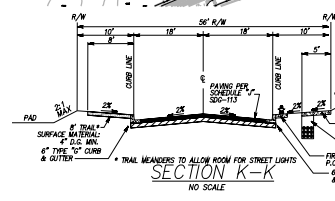
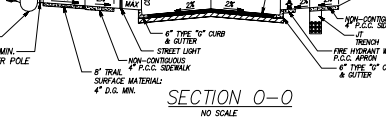
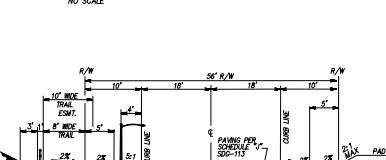
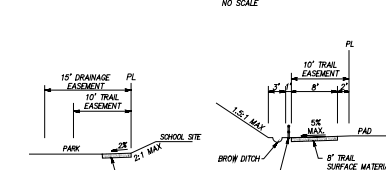
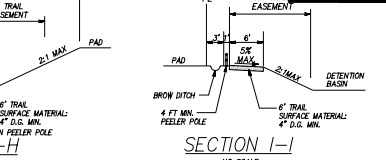
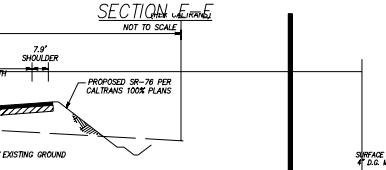
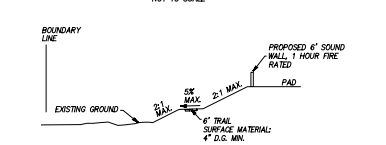
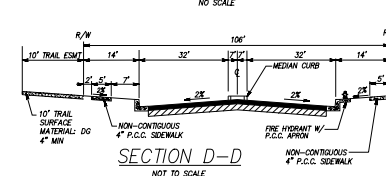
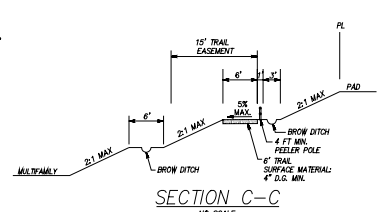
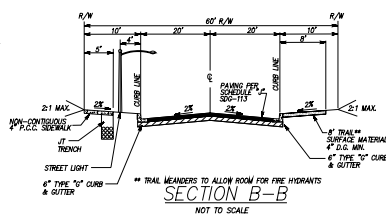
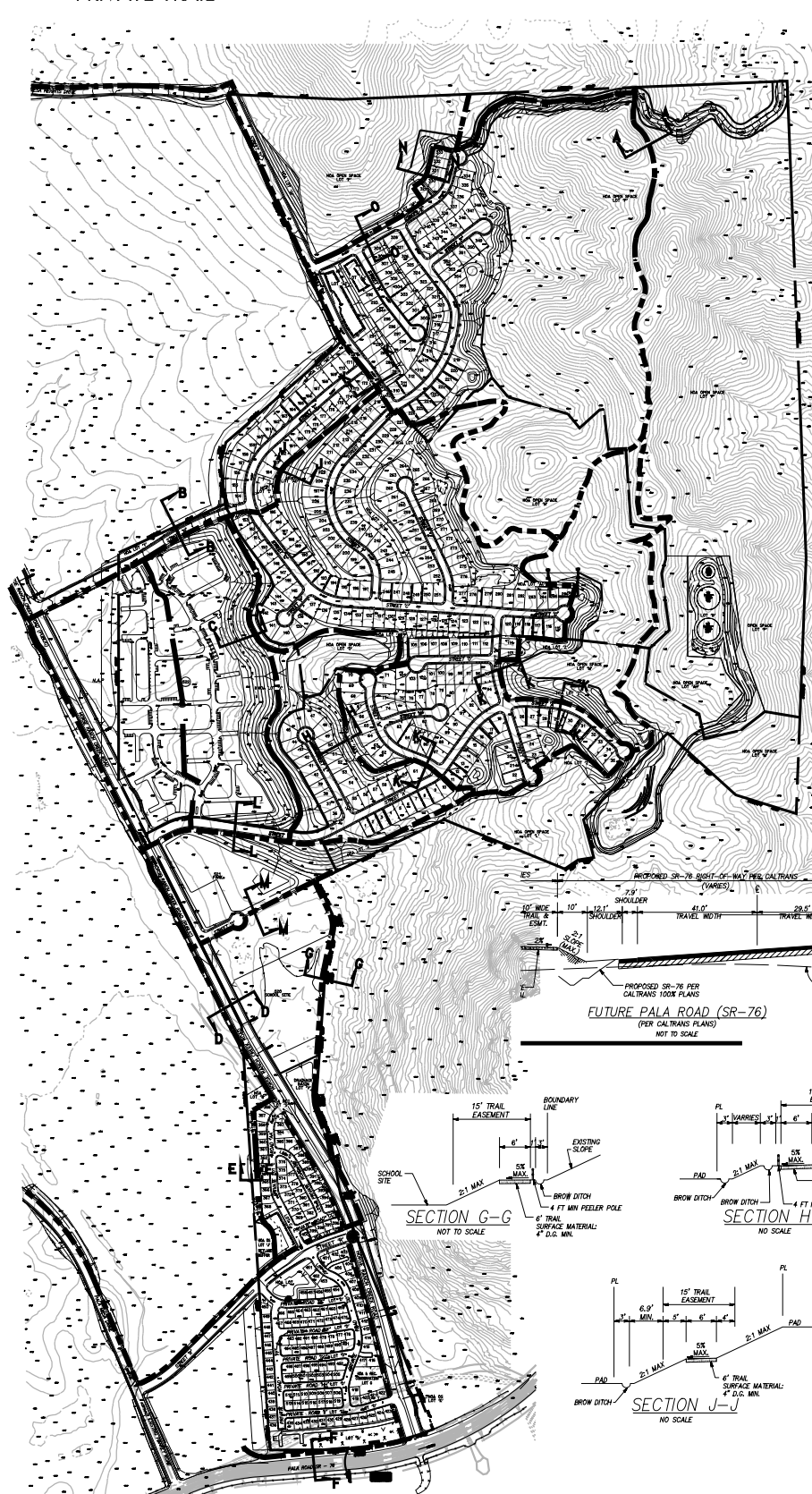
Appendix X

Trails Graphic

 PROJECT BOUNDARY
 PUBLIC TRAIL
 PRIVATE TRAIL

TRAIL EXHIBIT

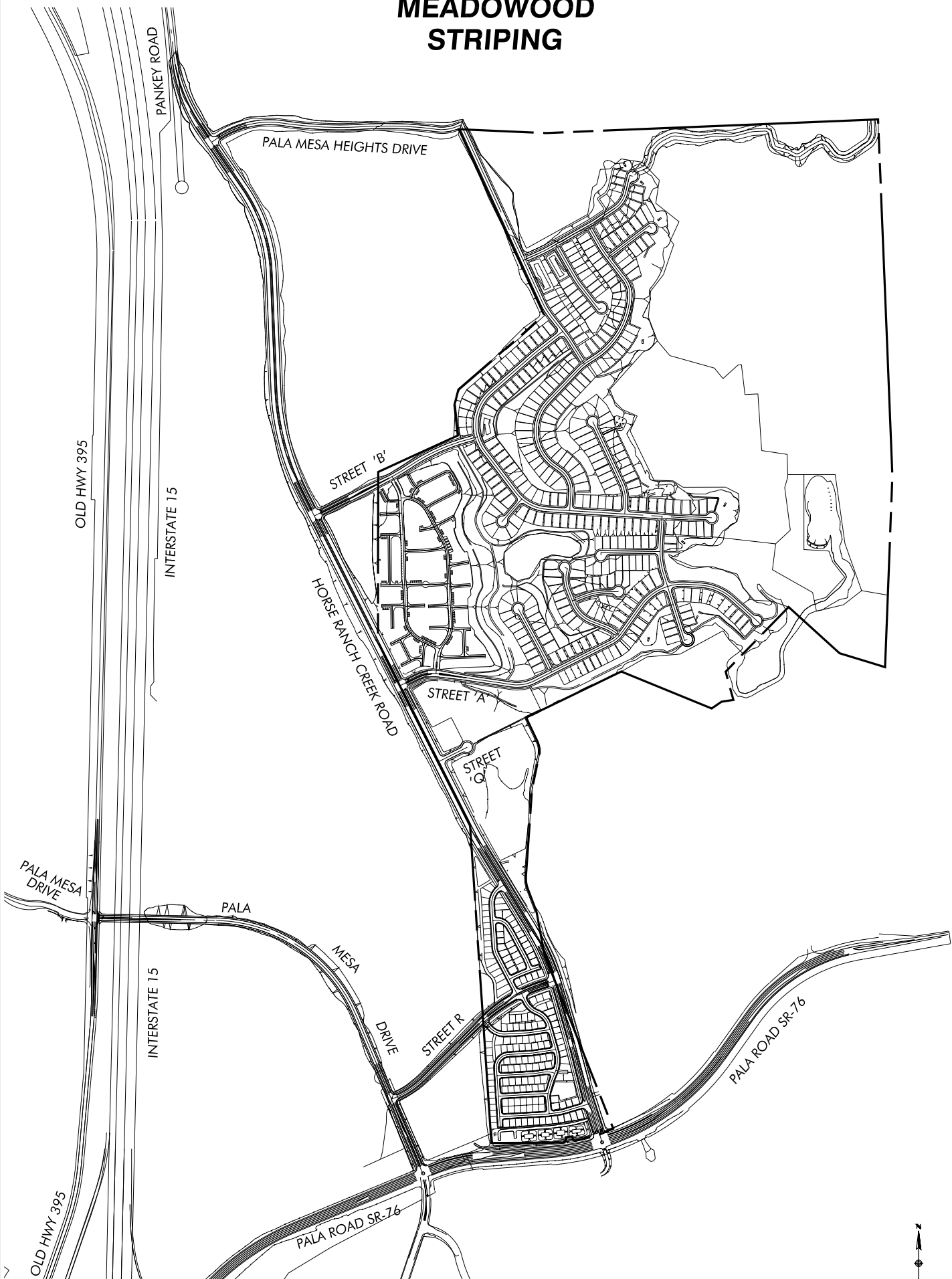
MEADOWOOD

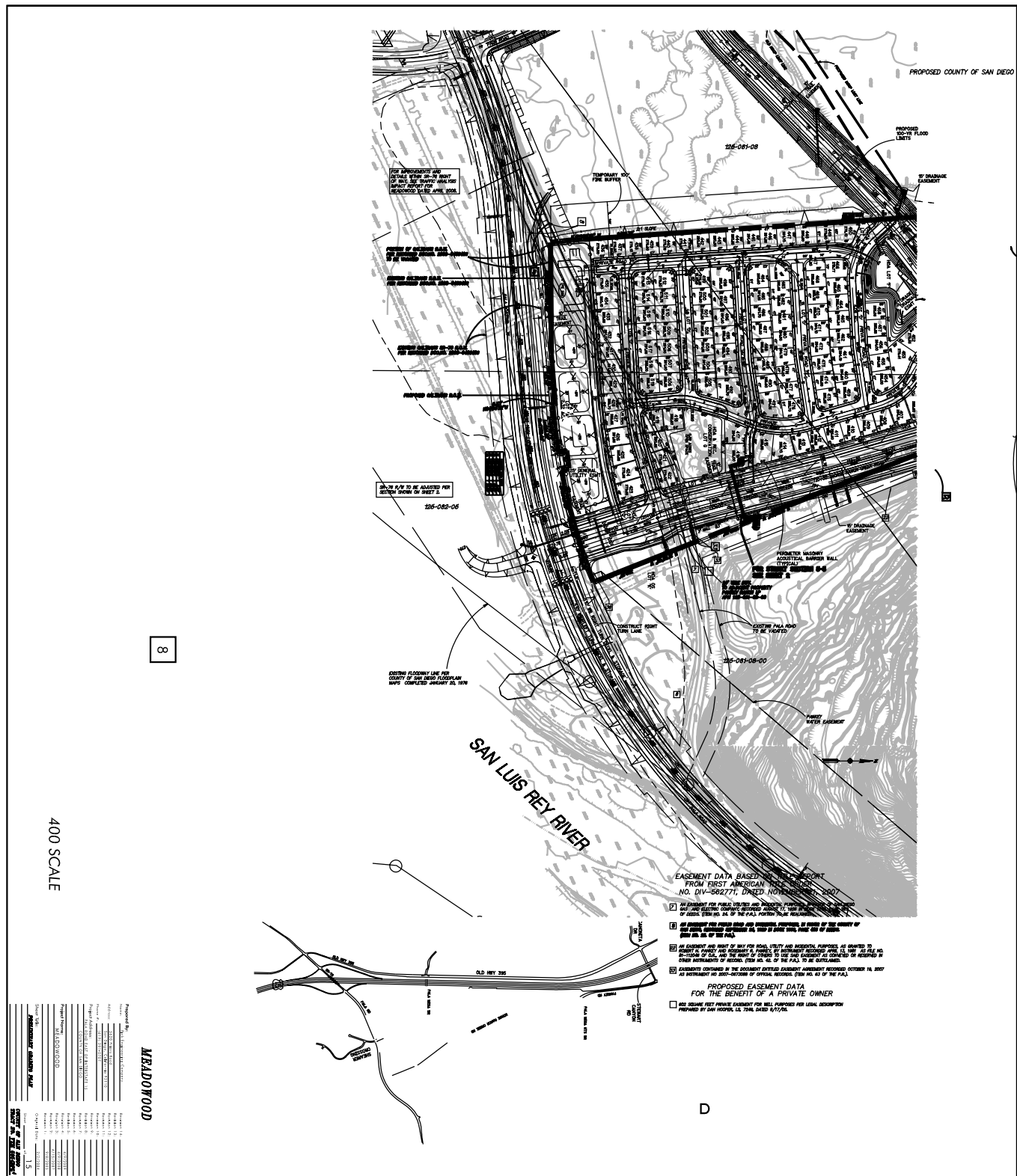


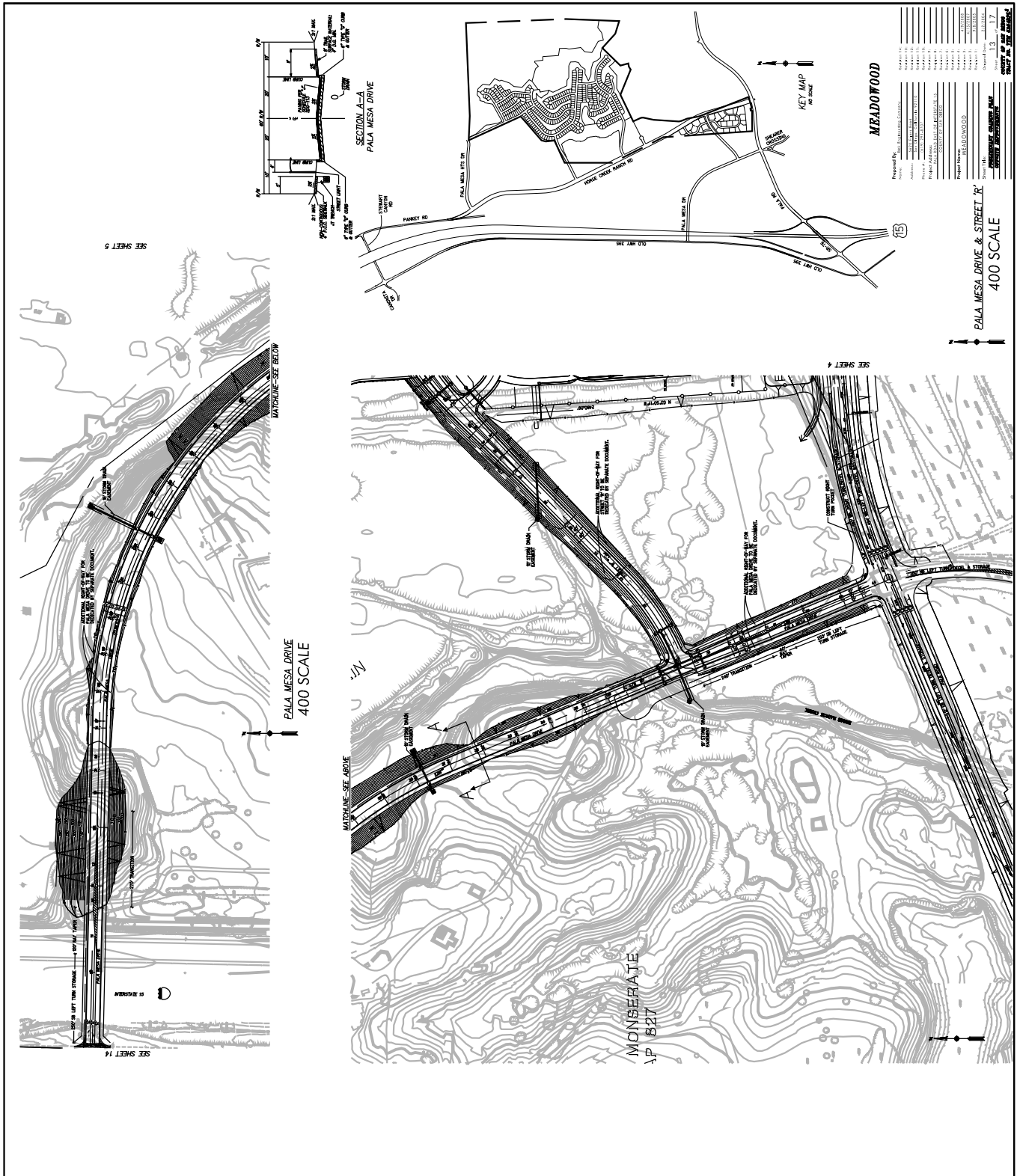
Appendix Y

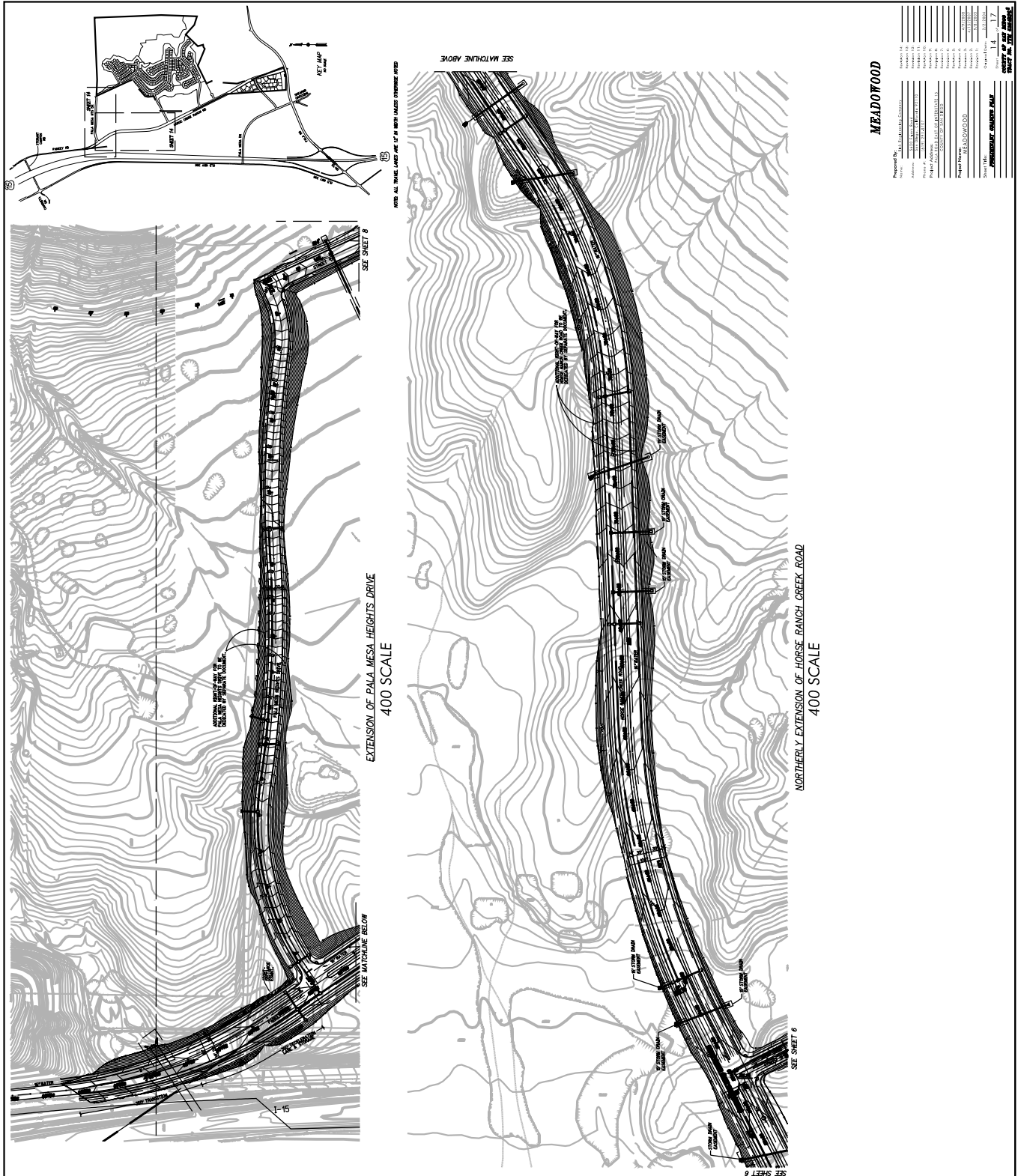
Proposed Roadway Striping

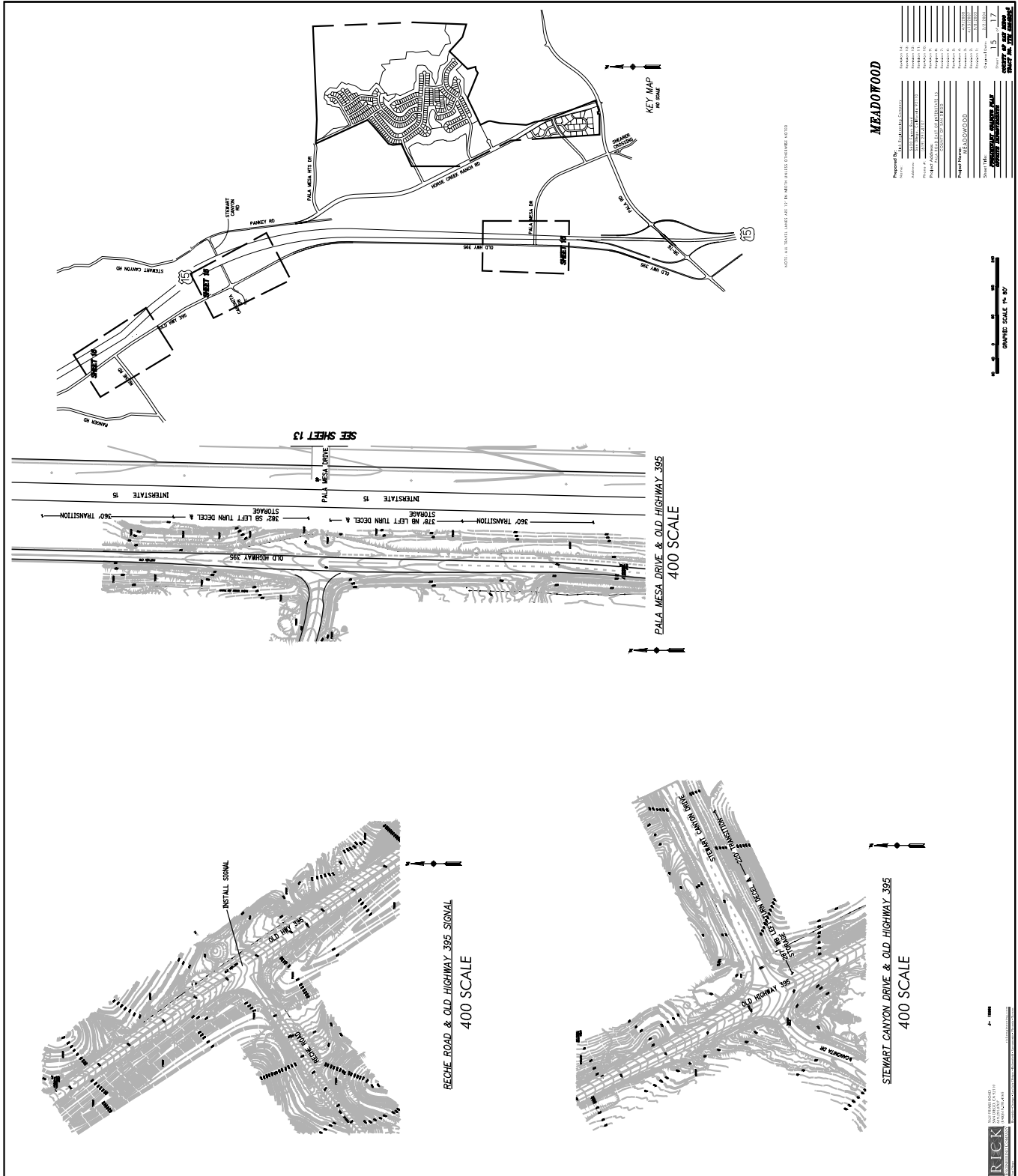
MEADOWOOD STRIPING











Appendix Z

Direct Impact Intersection LOS Calculations with Mitigation and Signal Warrants

AM Existing
15: Reche Rd & Old Hwy 395

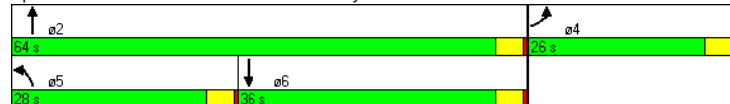
With Mitigation
Timings

	EBL	NBL	NBT	SBT
Lane Group	EBL	NBL	NBT	SBT
Lane Configurations	W	W	W	W
Volume (vph)	189	115	68	66
Turn Type	Prot			
Protected Phases	4	5	2	6
Permitted Phases				
Detector Phases	4	5	2	6
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	8.0	20.0	20.0
Total Split (s)	26.0	28.0	64.0	36.0
Total Split (%)	28.9%	31.1%	71.1%	40.0%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Lead/Lag	Lead		Lag	
Lead-Lag Optimize?	Yes		Yes	
Recall Mode	None	None	Min	Min
Act Effct Green (s)	20.2	9.2	20.8	10.1
Actuated g/C Ratio	0.41	0.18	0.42	0.20
v/c Ratio	0.62	0.43	0.09	0.44
Control Delay	16.7	24.4	8.6	13.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	16.7	24.4	8.6	13.3
LOS	B	C	A	B
Approach Delay	16.7		18.5	13.3
Approach LOS	B		B	B

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 49.3
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.62
Intersection Signal Delay: 16.3
Intersection Capacity Utilization 53.0%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service A

Splits and Phases: 15: Reche Rd & Old Hwy 395



LOS Engineering

AM Existing
15: Reche Rd & Old Hwy 395

With Mitigation
Queues

	EBL	NBL	NBT	SBT
Lane Group	EBL	NBL	NBT	SBT
Lane Group Flow (vph)	405	121	72	194
v/c Ratio	0.62	0.43	0.09	0.44
Control Delay	16.7	24.4	8.6	13.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	16.7	24.4	8.6	13.3
Queue Length 50th (ft)	73	32	12	22
Queue Length 95th (ft)	#211	79	29	74
Internal Link Dist (ft)	2555		3330	4880
Turn Bay Length (ft)		150		
Base Capacity (vph)	691	578	1271	835
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.59	0.21	0.06	0.23

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

LOS Engineering

AM Existing
15: Reche Rd & Old Hwy 395

With Mitigation
HCM Signalized Intersection Capacity Analysis

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1700	1700	1700	1900	1900	1700
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	1.00		1.00	1.00	1.00	
Frt	0.93		1.00	1.00	0.91	
Flt Protected	0.98		0.95	1.00	1.00	
Satd. Flow (prot)	1515		1583	1863	1701	
Flt Permitted	0.98		0.95	1.00	1.00	
Satd. Flow (perm)	1515		1583	1863	1701	
Volume (vph)	189	196	115	68	66	119
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	199	206	121	72	69	125
RTOR Reduction (vph)	33	0	0	0	89	0
Lane Group Flow (vph)	372	0	121	72	105	0
Turn Type	Prot					
Protected Phases	4		5	2	6	
Permitted Phases						
Actuated Green, G (s)	20.3		7.6	21.7	10.1	
Effective Green, g (s)	20.3		7.6	21.7	10.1	
Actuated g/C Ratio	0.41		0.15	0.43	0.20	
Clearance Time (s)	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	615		241	809	344	
v/s Ratio Prot	c0.25		c0.08	0.04	c0.06	
v/s Ratio Perm						
v/c Ratio	0.61		0.50	0.09	0.30	
Uniform Delay, d1	11.7		19.5	8.3	17.0	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	1.7		1.6	0.0	0.5	
Delay (s)	13.4		21.1	8.4	17.5	
Level of Service	B		C	A	B	
Approach Delay (s)	13.4			16.4	17.5	
Approach LOS	B			B	B	
Intersection Summary						
HCM Average Control Delay			15.1		HCM Level of Service	B
HCM Volume to Capacity ratio			0.50			
Actuated Cycle Length (s)			50.0		Sum of lost time (s)	12.0
Intersection Capacity Utilization			53.0%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

LOS Engineering

PM Existing
15: Reche Rd & Old Hwy 395

With Mitigation
Timings

	↖	↗	↖	↗
Lane Group	EBL	NBL	NBT	SBT
Lane Configurations	↖	↖	↖	↖
Volume (vph)	205	210	79	53
Turn Type	Prot			
Protected Phases	4	5	2	6
Permitted Phases				
Detector Phases	4	5	2	6
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	8.0	20.0	20.0
Total Split (s)	40.0	28.0	50.0	22.0
Total Split (%)	44.4%	31.1%	55.6%	24.4%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Lead/Lag	Lead		Lag	
Lead-Lag Optimize?	Yes		Yes	
Recall Mode	None	None	Min	Min
Act Effct Green (s)	17.2	12.6	24.4	10.9
Actuated g/C Ratio	0.34	0.24	0.48	0.21
v/c Ratio	0.73	0.59	0.09	0.46
Control Delay	22.5	27.1	8.9	13.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	22.5	27.1	8.9	13.8
LOS	C	C	A	B
Approach Delay	22.5		22.2	13.8
Approach LOS	C		C	B

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 51.2
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.73
 Intersection Signal Delay: 20.3
 Intersection Capacity Utilization 59.9%
 Analysis Period (min) 15

Splits and Phases: 15: Reche Rd & Old Hwy 395



LOS Engineering

PM Existing
15: Reche Rd & Old Hwy 395

With Mitigation
Queues

	↖	↗	↖	↗	↖	↗
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖	↖	↖	↖	↖	↖
Ideal Flow (vphpl)	1700	1700	1700	1900	1900	1700
Storage Length (ft)	0	0	150			0
Storage Lanes	1	0	1			0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50		50	50	50	
Trailing Detector (ft)	0		0	0	0	
Turning Speed (mph)	15	9	15			9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.938				0.900	
Flt Protected	0.974		0.950			
Satd. Flow (prot)	1523	0	1583	1863	1676	0
Flt Permitted	0.974		0.950			
Satd. Flow (perm)	1523	0	1583	1863	1676	0
Right Turn on Red	Yes					Yes
Satd. Flow (RTOR)	57				143	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30			30	30	
Link Distance (ft)	2635			3410	4960	
Travel Time (s)	59.9			77.5	112.7	
Volume (vph)	205	176	210	79	53	152
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	216	185	221	83	56	160
Lane Group Flow (vph)	401	0	221	83	216	0
v/c Ratio	0.73		0.59	0.09	0.46	
Control Delay	22.5		27.1	8.9	13.8	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	22.5		27.1	8.9	13.8	
Queue Length 50th (ft)	79		53	11	18	
Queue Length 95th (ft)	244		171	45	100	
Internal Link Dist (ft)	2555			3330	4880	
Turn Bay Length (ft)			150			
Base Capacity (vph)	842		615	1208	661	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.48		0.36	0.07	0.33	

Intersection Summary

Area Type: Other

LOS Engineering

PM Existing
15: Reche Rd & Old Hwy 395

With Mitigation
HCM Signalized Intersection Capacity Analysis

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1700	1700	1700	1900	1900	1700
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	1.00		1.00	1.00	1.00	
Frt	0.94		1.00	1.00	0.90	
Flt Protected	0.97		0.95	1.00	1.00	
Satd. Flow (prot)	1522		1583	1863	1676	
Flt Permitted	0.97		0.95	1.00	1.00	
Satd. Flow (perm)	1522		1583	1863	1676	
Volume (vph)	205	176	210	79	53	152
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	216	185	221	83	56	160
RTOR Reduction (vph)	38	0	0	0	112	0
Lane Group Flow (vph)	363	0	221	83	104	0
Turn Type	Prot					
Protected Phases	4		5	2	6	
Permitted Phases						
Actuated Green, G (s)	17.2		10.4	25.3	10.9	
Effective Green, g (s)	17.2		10.4	25.3	10.9	
Actuated g/C Ratio	0.34		0.21	0.50	0.22	
Clearance Time (s)	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	518		326	933	362	
v/s Ratio Prot	c0.24		c0.14	0.04	c0.06	
v/s Ratio Perm						
v/c Ratio	0.70		0.68	0.09	0.29	
Uniform Delay, d1	14.4		18.5	6.6	16.6	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	4.3		5.5	0.0	0.4	
Delay (s)	18.7		24.0	6.6	17.0	
Level of Service	B		C	A	B	
Approach Delay (s)	18.7			19.3	17.0	
Approach LOS	B			B	B	
Intersection Summary						
HCM Average Control Delay			18.5		HCM Level of Service	B
HCM Volume to Capacity ratio			0.58			
Actuated Cycle Length (s)			50.5		Sum of lost time (s)	12.0
Intersection Capacity Utilization			59.9%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

LOS Engineering

AM Existing + Project
15: Reche Rd & Old Hwy 395

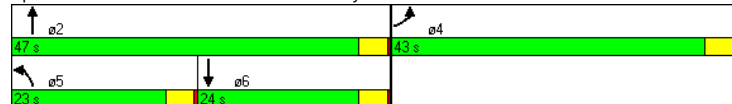
With Mitigation
Timings

	↖	↗	↖	↗
Lane Group	EBL	NBL	NBT	SBT
Lane Configurations	↖	↖	↖	↖
Volume (vph)	189	142	163	97
Turn Type	Prot			
Protected Phases	4	5	2	6
Permitted Phases				
Detector Phases	4	5	2	6
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	8.0	20.0	20.0
Total Split (s)	43.0	23.0	47.0	24.0
Total Split (%)	47.8%	25.6%	52.2%	26.7%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Lead/Lag	Lead		Lag	
Lead-Lag Optimize?	Yes		Yes	
Recall Mode	None	None	Min	Min
Act Effct Green (s)	17.3	10.4	24.8	13.2
Actuated g/C Ratio	0.34	0.19	0.48	0.26
v/c Ratio	0.74	0.48	0.19	0.46
Control Delay	22.0	28.1	9.6	19.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	22.0	28.1	9.6	19.6
LOS	C	C	A	B
Approach Delay	22.0		18.2	19.6
Approach LOS	C		B	B

Intersection Summary

Cycle Length: 90
 Actuated Cycle Length: 51.5
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.74
 Intersection Signal Delay: 20.2
 Intersection Capacity Utilization 57.0%
 Analysis Period (min) 15

Splits and Phases: 15: Reche Rd & Old Hwy 395



LOS Engineering

AM Existing + Project
15: Reche Rd & Old Hwy 395

With Mitigation
Queues

	↖	↗	↖	↗	↖	↗
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖	↖	↖	↖	↖	↖
Ideal Flow (vphpl)	1700	1700	1700	1900	1900	1700
Storage Length (ft)	0	0	150			0
Storage Lanes	1	0	1			0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50		50	50	50	
Trailing Detector (ft)	0		0	0	0	
Turning Speed (mph)	15	9	15			9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.930				0.926	
Flt Protected	0.977		0.950			
Satd. Flow (prot)	1514	0	1583	1863	1725	0
Flt Permitted	0.977		0.950			
Satd. Flow (perm)	1514	0	1583	1863	1725	0
Right Turn on Red	Yes					Yes
Satd. Flow (RTOR)	77				63	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30			30	30	
Link Distance (ft)	2635			3410	4960	
Travel Time (s)	59.9			77.5	112.7	
Volume (vph)	189	206	142	163	97	119
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	199	217	149	172	102	125
Lane Group Flow (vph)	416	0	149	172	227	0
v/c Ratio	0.74		0.48	0.19	0.46	
Control Delay	22.0		28.1	9.6	19.6	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	22.0		28.1	9.6	19.6	
Queue Length 50th (ft)	79		37	24	40	
Queue Length 95th (ft)	238		126	85	144	
Internal Link Dist (ft)	2555			3330	4880	
Turn Bay Length (ft)			150			
Base Capacity (vph)	870		509	1177	676	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.48		0.29	0.15	0.34	

Intersection Summary

Area Type: Other

LOS Engineering

AM Existing + Project
15: Reche Rd & Old Hwy 395

With Mitigation
HCM Signalized Intersection Capacity Analysis

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1700	1700	1700	1900	1900	1700
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	1.00		1.00	1.00	1.00	
Frt	0.93		1.00	1.00	0.93	
Flt Protected	0.98		0.95	1.00	1.00	
Satd. Flow (prot)	1513		1583	1863	1724	
Flt Permitted	0.98		0.95	1.00	1.00	
Satd. Flow (perm)	1513		1583	1863	1724	
Volume (vph)	189	206	142	163	97	119
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	199	217	149	172	102	125
RTOR Reduction (vph)	51	0	0	0	47	0
Lane Group Flow (vph)	365	0	149	172	180	0
Turn Type	Prot					
Protected Phases	4		5	2	6	
Permitted Phases						
Actuated Green, G (s)	17.3		8.5	25.7	13.2	
Effective Green, g (s)	17.3		8.5	25.7	13.2	
Actuated g/C Ratio	0.34		0.17	0.50	0.26	
Clearance Time (s)	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	513		264	939	446	
v/s Ratio Prot	c0.24		c0.09	0.09	c0.10	
v/s Ratio Perm						
v/c Ratio	0.71		0.56	0.18	0.40	
Uniform Delay, d1	14.7		19.5	6.9	15.6	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	4.6		2.8	0.1	0.6	
Delay (s)	19.3		22.3	7.0	16.2	
Level of Service	B		C	A	B	
Approach Delay (s)	19.3			14.1	16.2	
Approach LOS	B			B	B	
Intersection Summary						
HCM Average Control Delay			16.9		HCM Level of Service	B
HCM Volume to Capacity ratio			0.58			
Actuated Cycle Length (s)			51.0		Sum of lost time (s)	12.0
Intersection Capacity Utilization			57.0%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

LOS Engineering

PM Existing + Project
15: Reche Rd & Old Hwy 395

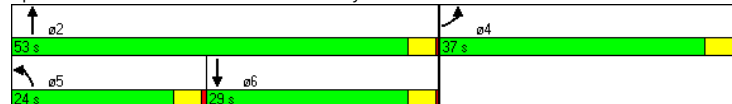
With Mitigation
Timings

	↖	↗	↖	↗
Lane Group	EBL	NBL	NBT	SBT
Lane Configurations	↖	↖	↖	↖
Volume (vph)	205	224	127	164
Turn Type	Prot			
Protected Phases	4	5	2	6
Permitted Phases				
Detector Phases	4	5	2	6
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	8.0	20.0	20.0
Total Split (s)	37.0	24.0	53.0	29.0
Total Split (%)	41.1%	26.7%	58.9%	32.2%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Lead/Lag	Lead		Lag	
Lead-Lag Optimize?	Yes		Yes	
Recall Mode	None	None	Min	Min
Act Effct Green (s)	20.6	13.9	31.2	17.0
Actuated g/C Ratio	0.33	0.22	0.50	0.28
v/c Ratio	0.80	0.68	0.14	0.65
Control Delay	29.9	37.7	9.2	27.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	29.9	37.7	9.2	27.2
LOS	C	D	A	C
Approach Delay	29.9		27.4	27.2
Approach LOS	C		C	C

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 61.8
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 28.3
Intersection Capacity Utilization 68.7%
Analysis Period (min) 15
Intersection LOS: C
ICU Level of Service C

Splits and Phases: 15: Reche Rd & Old Hwy 395



LOS Engineering

PM Existing + Project
15: Reche Rd & Old Hwy 395

With Mitigation
Queues

	↖	↗	↖	↗	↖	↗
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖	↖	↖	↖	↖	↖
Ideal Flow (vphpl)	1700	1700	1700	1900	1900	1700
Storage Length (ft)	0	0	150			0
Storage Lanes	1	0	1			0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50		50	50	50	
Trailing Detector (ft)	0		0	0	0	
Turning Speed (mph)	15	9	15			9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.932				0.935	
Flt Protected	0.976		0.950			
Satd. Flow (prot)	1516	0	1583	1863	1742	0
Flt Permitted	0.976		0.950			
Satd. Flow (perm)	1516	0	1583	1863	1742	0
Right Turn on Red	Yes					Yes
Satd. Flow (RTOR)	64				51	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30			30	30	
Link Distance (ft)	2635			3410	4960	
Travel Time (s)	59.9			77.5	112.7	
Volume (vph)	205	208	224	127	164	152
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	216	219	236	134	173	160
Lane Group Flow (vph)	435	0	236	134	333	0
v/c Ratio	0.80		0.68	0.14	0.65	
Control Delay	29.9		37.7	9.2	27.2	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	29.9		37.7	9.2	27.2	
Queue Length 50th (ft)	128		82	23	99	
Queue Length 95th (ft)	298		#208	64	233	
Internal Link Dist (ft)	2555			3330	4880	
Turn Bay Length (ft)			150			
Base Capacity (vph)	746		481	1186	706	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.58		0.49	0.11	0.47	

Intersection Summary

Area Type:	Other
#	95th percentile volume exceeds capacity, queue may be longer.
	Queue shown is maximum after two cycles.

LOS Engineering

PM Existing + Project
15: Reche Rd & Old Hwy 395

With Mitigation
HCM Signalized Intersection Capacity Analysis

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1700	1700	1700	1900	1900	1700
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	1.00		1.00	1.00	1.00	
Frt	0.93		1.00	1.00	0.94	
Flt Protected	0.98		0.95	1.00	1.00	
Satd. Flow (prot)	1516		1583	1863	1742	
Flt Permitted	0.98		0.95	1.00	1.00	
Satd. Flow (perm)	1516		1583	1863	1742	
Volume (vph)	205	208	224	127	164	152
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	216	219	236	134	173	160
RTOR Reduction (vph)	42	0	0	0	37	0
Lane Group Flow (vph)	393	0	236	134	296	0
Turn Type	Prot					
Protected Phases	4		5	2	6	
Permitted Phases						
Actuated Green, G (s)	20.6		11.2	32.2	17.0	
Effective Green, g (s)	20.6		11.2	32.2	17.0	
Actuated g/C Ratio	0.34		0.18	0.53	0.28	
Clearance Time (s)	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	514		292	987	487	
v/s Ratio Prot	c0.26		c0.15	0.07	c0.17	
v/s Ratio Perm						
v/c Ratio	0.76		0.81	0.14	0.61	
Uniform Delay, d1	17.9		23.8	7.2	19.0	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	6.7		15.0	0.1	2.2	
Delay (s)	24.6		38.8	7.3	21.2	
Level of Service	C		D	A	C	
Approach Delay (s)	24.6			27.4	21.2	
Approach LOS	C			C	C	
Intersection Summary						
HCM Average Control Delay			24.5		HCM Level of Service	C
HCM Volume to Capacity ratio			0.72			
Actuated Cycle Length (s)			60.8		Sum of lost time (s)	12.0
Intersection Capacity Utilization			68.7%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

LOS Engineering

**Figure 4C-103 (CA). Traffic Signal Warrants Worksheet
(Average Traffic Estimate Form)**

COUNT DATE E+P

DIST _____ CO _____ RTE _____ PM _____

Major St: OLD HIGHWAY 395

Minor St: RECHE RD

Critical Approach Speed _____ mph

Critical Approach Speed _____ mph

Speed limit or critical speed on major street traffic > 64 km/h (40 mph)..... ☒ or ☐ } **RURAL (R)**

In built up area of isolated community of < 10,000 population..... ☐ } **URBAN (U)**

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL..... ☒		Minimum Requirements EADT			
CONDITION A - Minimum Vehicular Volume		Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Satisfied ☒ Not Satisfied _____					
Number of lanes for moving traffic on each approach					
Major Street	Minor Street	Urban	Rural	Urban	Rural
1.....	1.....	8,000	5,600	2,400	1,680
2 or More..... <u>7380</u>	2 or More..... <u>3960</u>	9,600	6,720 ☒	2,400	1,680 ☒
2 or More.....	2 or More.....	9,600	6,720	3,200	2,240
1.....	2 or More.....	8,000	5,600	3,200	2,240
CONDITION B - Interruption of Continuous Traffic		Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Satisfied _____ Not Satisfied ☒					
Number of lanes for moving traffic on each approach					
Major Street	Minor Street	Urban	Rural	Urban	Rural
1.....	1.....	12,000	8,400	1,200	850
2 or More..... <u>7380</u>	2 or More..... <u>3960</u>	14,400	10,080 X	1,200	850 ☒
2 or More.....	2 or More.....	14,400	10,080	1,600	1,120
1.....	2 or More.....	12,000	8,400	1,600	1,120
Combination of CONDITIONS A + B		2 CONDITIONS 80%		2 CONDITIONS 80%	
Satisfied _____ Not Satisfied ☒					
No one condition satisfied, but following conditions fulfilled 80% or more..... A _____ B _____					

Note: To be used only for NEW INTERSECTIONS or other locations where it is not reasonable to count actual traffic volumes.

The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal.

