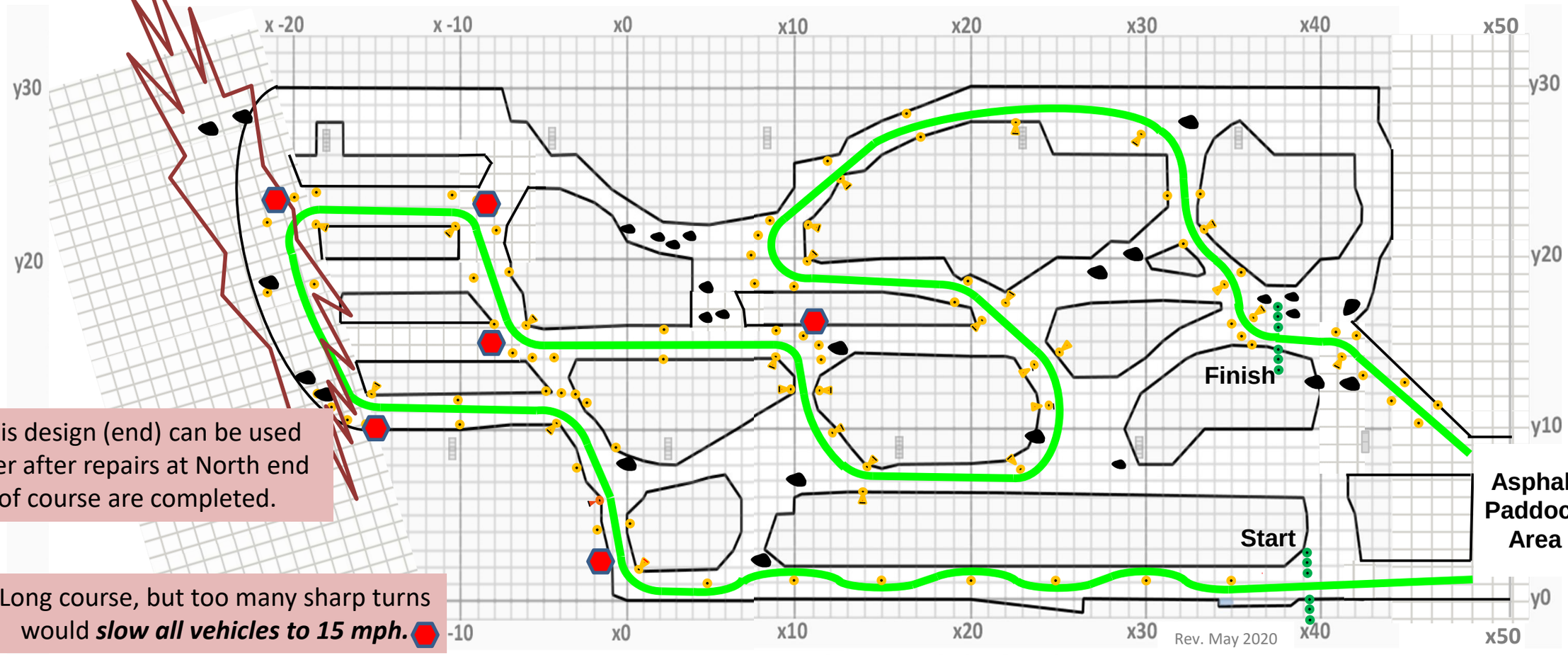
SCCA Sports Car Club of America

~~So[illegible]n Indi[illegible]gion~~
~~"Smooth[illegible] Autocross~~
~~[illegible]e 27, 2~~

SIR SCCA

Version 1: Too many sharp turns.



(Rough Surface)

This design (end) can be used later after repairs at North end of course are completed.

Long course, but too many sharp turns would ***slow all vehicles to 15 mph.***

Too slow. A 1.15 g, 0 to 60 mph in 3.8 sec, and 70 to 0 in 156 ft capable vehicle could complete the **2820 ft course in 61.98 sec (Avg 31.0 mph)**

* Dates and Autocross design order subject to change. Please watch www.sirscca.org website for schedule updates.

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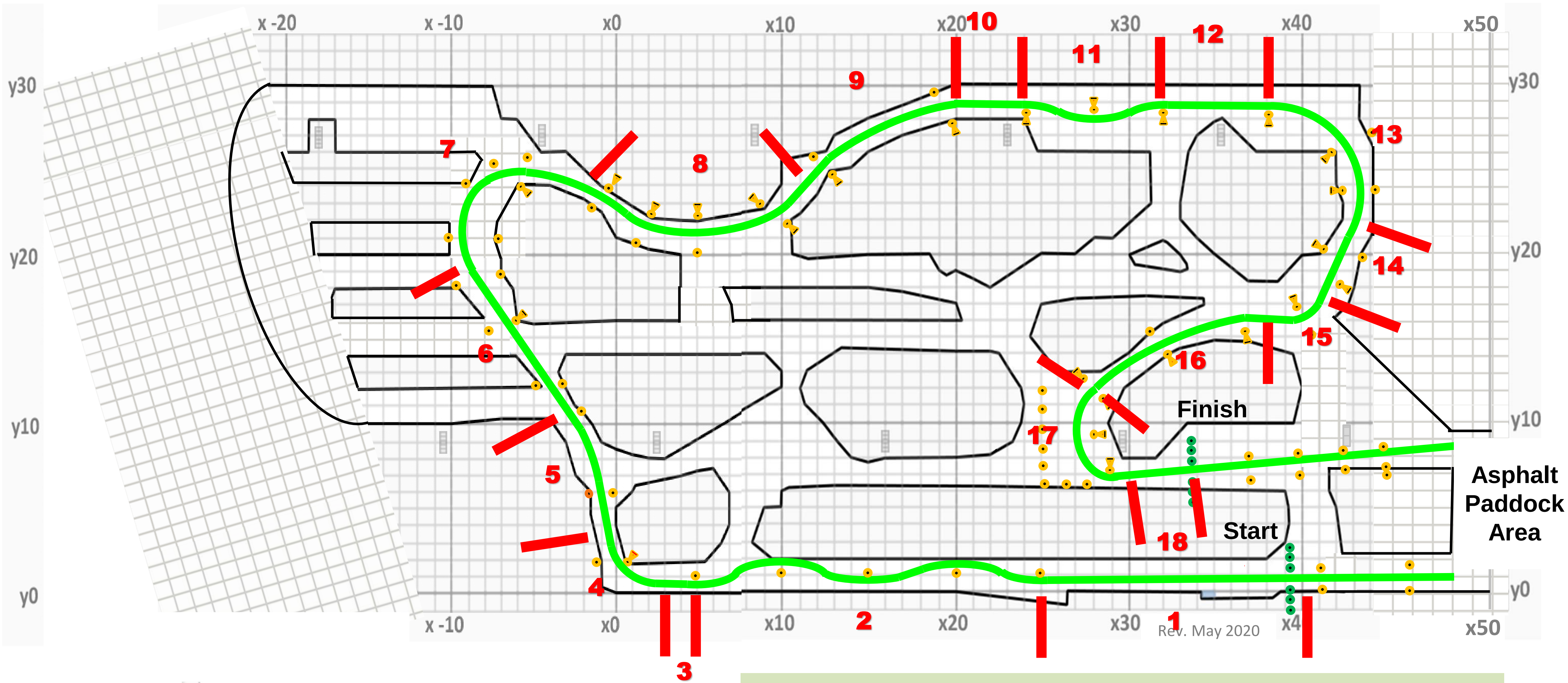
“Smooth ... Autocross
...e 27, 2...

Version 2: Segment References



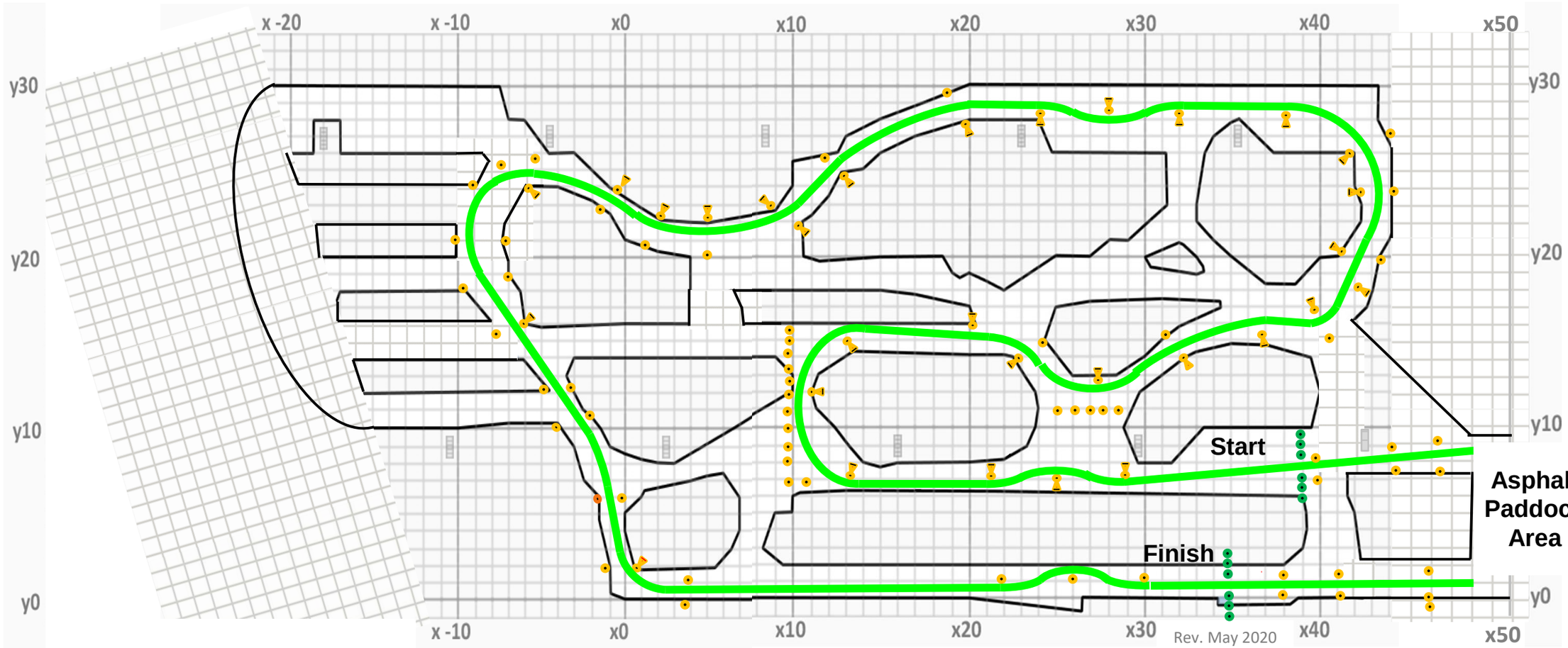
Quicker, smoother, but too short? Ver. 2. Two turns may slow vehicles to 25 mph. A 1.15 g, 0 to 60 mph in 3.8 sec, and 70 to 0 in 156 ft capable vehicle could complete this (shorter) 2197 ft course in 38.1 sec. (Avg 39.3 mph)

Southern Indiana Region
"Riley's Run" Autocross
June 27, 2020 *

Quicker and smoother Ver. 3. Two turns may slow vehicles to 25 mph. A 1.15 g, 0 to 60 mph in 3.8 sec, and 70 to 0 in 156 ft capable vehicle could complete this (shorter) 2983 ft course in 52.9 sec. (Avg 38.2 mph)

* Dates and Autocross design order subject to change. Please watch www.sirscca.org website for schedule updates.

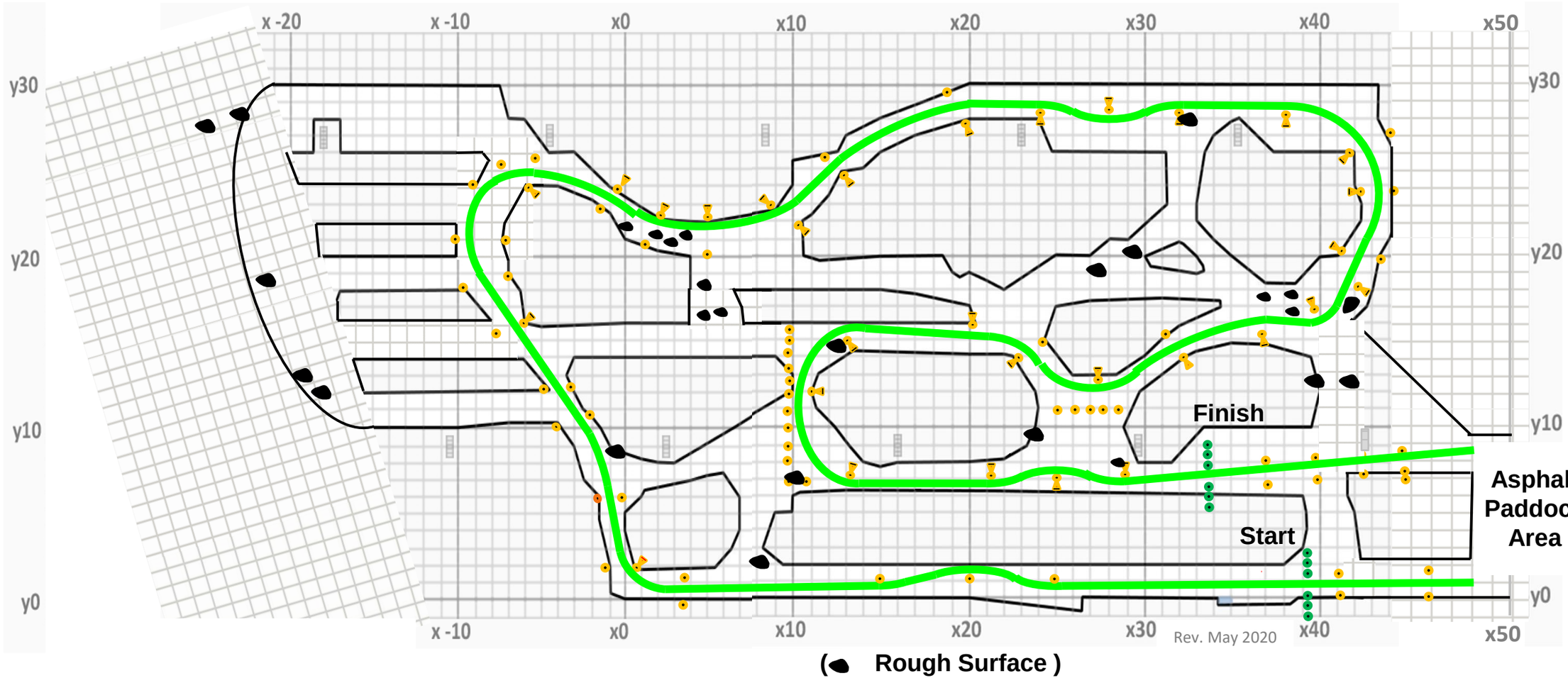
Southern Indiana Region
“Riley’s Run Too” Autocross
June 28, 2020 *



Quicker and smoother Ver. 3. Two turns may slow vehicles to 25 mph. A 1.15 g, 0 to 60 mph in 3.8 sec, and 70 to 0 in 156 ft capable vehicle could complete this (shorter) 2983 ft course in 52.9 sec. (Avg 38.2 mph)

* Dates and Autocross design order subject to change. Please watch www.sirscca.org website for schedule updates.

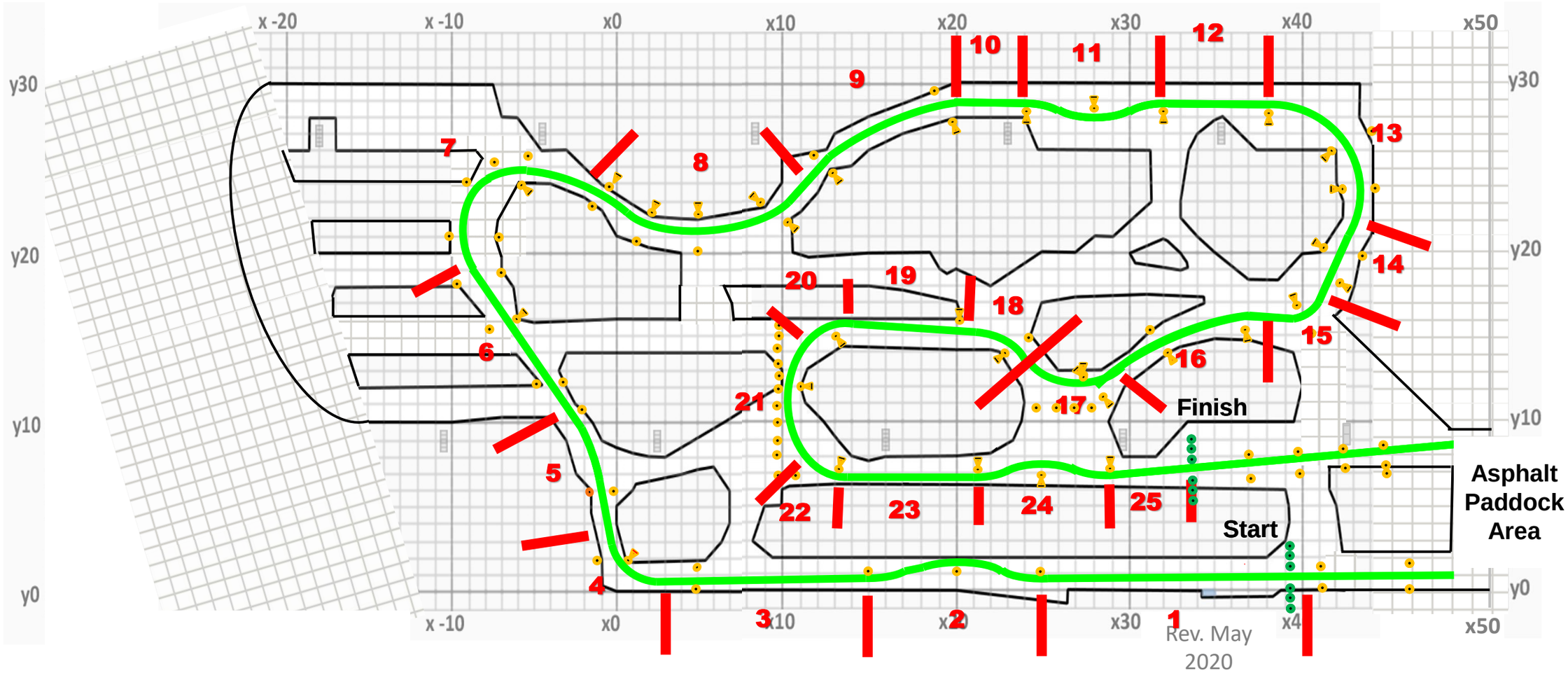
Southern Indiana Region
"Riley's Run" Autocross
June 27, 2020 *



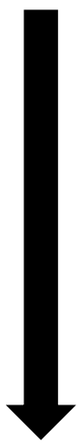
Version 3: Longer and faster while avoiding rough surfaces and sharp turns

Southern Indiana Region
"Riley's Run" Autocross
June 27, 2020 *

Version 3: Segment References



Rev. May 2020



27Jun2020 autocross ver 3 for a vehicle capable of 1.15 g cornering, 0-60 mph in 3.8 seconds, and 70-0 mph in 156 ft.											
Seg #	Segment	Radius	Circumference	Angle	Length	Starting MPH	Max MPH	End MPH	Avg MPH	Distance	Time
1	Straight				229.00						
1 Accel	Straight				167.00	0		60	30.0	167.00	3.795
1 Const	Straight				22.00	60		60	60.0	22.00	0.250
1 Brake	Straight				40.00	60		46	53.0	40.00	0.515
2	Slalom	125			150.00	46		46	46.0	150.00	2.223
3	Straight				195.00						
3 Accel	Straight				118.00	46		58	52.0	118.00	1.547
3 Const	Straight				12.00	58		58	58.0	12.00	0.141
3 Brake	Straight				65.00	58		35	46.5	65.00	0.953
4	Curve	70	439.6	60	73.27	35		35	35.0	73.27	1.427
5 Accel	Curve	210	1318.8	30	109.90	35		50	42.5	109.90	1.763
6	Straight				158.00						
6 Accel	Straight				90.00	50		58	54.0	90.00	1.136
6 Brake	Straight				68.00	58		35	46.5	68.00	0.997
7	Curve	70	439.6	180	219.80	35		35	35.0	219.80	4.282
8 Accel	Curve	125	785	60	130.83	35		46	40.5	130.83	2.203
9 Accel	Curve	175	1099	45	137.38	46		55	50.5	137.38	1.855
10 Brake	Straight				70.00	55		41	48.0	70.00	0.994
11	Slalom	100			123.00	41		41	41.0	123.00	2.045
12	Straight				90.00	41		38	39.5	90.00	1.554
13 Accel	Curve	85	533.8	120	177.93	38		38	38.0	177.93	3.193
14 Brake	Straight				35.00	38		24	31.0	35.00	0.770
15	Curve	35	219.8	60	36.63	24		24	24.0	36.63	1.041
16	Curve	250	1570	45	196.25						
16 Accel	Curve	250	1570	35	152.64	24		42	33.0	152.64	3.154
16 Brake	Curve	250	1570	10	43.61	42		35	38.5	43.61	0.772
17	Curve	70	439.6	90	109.90	35		35	35.0	109.90	2.141
18	Curve	70	439.6	45	54.95	35		35	35.0	54.95	1.070
19	Straight				90.00						
19 Accel	Straight				50.00	35		42	38.5	50.00	0.885
19 Brake	Straight				40.00	42		22	32.0	40.00	0.852
20	Curve	30	188.4	90	47.10	22		22	22.0	47.10	1.460
21 Accel	Curve	125	785	60	130.83	22		35	28.5	130.83	3.130
22	Curve	70	439.6	60	73.27	35		35	35.0	73.27	1.427
23	Straight				130.00						
23 Accel	Straight				110.00	35		48	41.5	110.00	1.807
23 Brake	Straight				20.00	48		41	44.5	20.00	0.306
24	Slalom	100			130.00	41		41	41.0	130.00	2.162
25 Accel	Straight				70.00	41		48	44.5	70.00	1.073
26 Brake	Straight				80.00	48		0	24.0		
"Riley's Run" D. Lehrschall 1May2020								Total	38.2 mph	2968.04	52.924

28Jun2020 autocross ver 3 for a vehicle capable of 1.15 g cornering, 0-60 mph in 3.8 seconds, and 70-0 mph in 156 ft.											
Seg #	**Segment**	**Radius**	**Circumference**	**Angle**	**Length**	**Starting MPH**	**Max MPH**	**End MPH**	**Avg MPH**	**Distance**	**Time**
1	Straight				80.00	48		0			
1 Accel	Straight				75.00	41		48	44.5	75.00	1.149
2	Slalom	100			125.00	41		41	41.0	125.00	2.079
3	Straight				200.00						
3 Brake	Straight				50.00	53		41	47.0	50.00	0.725
3 Accel	Straight				150.00	35		53	44.0	150.00	2.324
4	Curve	70	439.6	60	73.27	35		35	35.0	73.27	1.427
5	Curve	210	1318.8	30	109.90						
5 Brake	Curve				80.00	63		35	49.0	80.00	1.113
5 Accel	Curve				30.00	58		63	60.5	30.00	0.338
6 Accel	Straight				158.00	35		58	46.5	158.00	2.317
7	Curve	70	439.6	180	219.80	35		35	35.0	219.80	4.282
8 Brake	Curve	125	785	60	130.83	65		35	50.0	130.83	1.784
9 Accel	Curve	175	1099	45	137.38	55		65	60.0	137.38	1.561
10	Straight				70.00	41		55	48.0	70.00	0.994
11	Slalom	100			123.00	41		41	41.0	123.00	2.045
12	Straight				90.00						
12 Brake	Straight				14.00	45		41	43.0	14.00	0.222
12 Accel	Straight				76.00	38		45	41.5	76.00	1.249
13 Accel	Curve	85	533.8	120	177.93	35		38	36.5	177.93	3.324
14 Accel	Straight				35.00	24		35	29.5	35.00	0.809
15	Curve	35	219.8	60	36.63	24		24	24.0	36.63	1.041
16	Curve	250	1570	45	196.25						
16 Brake	Curve				60.00	50		24	37.0	60.00	1.106
16 Accel	Curve				136.25	35		50	42.5	136.25	2.186
17	Curve	70	439.6	90	109.90	35		35	35.0	109.90	2.141
18	Curve	70	439.6	45	54.95	35		35	35.0	54.95	1.070
19	Straight				90.00						
19 Brake	Straight				18.00	42		35	38.5	18.00	0.319
19 Accel	Straight				72.00	22		42	32.0	72.00	1.534
20	Curve	30	188.4	90	47.10	22		22	22.0	47.10	1.460
21	Curve	125	785	60	130.83						
21 Brake	Curve				55.00	45		22	33.5	55.00	1.119
21 Accel	Curve				75.83	35		45	40.0	75.83	1.293
22	Curve	70	439.6	60	73.27	35		35	35.0	73.27	1.427
23	Straight				130.00						
23 Brake	Straight				45.00	50		35	42.5	45.00	0.722
23Accel	Straight				85.00	41		50	45.5	85.00	1.274
24	Slalom	100			130.00	41		41	41.0	130.00	2.162
25	Straight				150.00						
25 Brake	Straight				35.00	52		41	46.5	35.00	0.513
25 Accel	Straight				115.00	0		52	26.0	115.00	3.016
"Riley's Run Too" D. Lehrschall 1May2020								**Total**	**39.1 mph**	**2874.14**	**50.125**

Time and distance estimates are derived or extrapolated from tables I created using Car and Driver vehicle performance test data for my vehicle and GPS g-force data.

Car and Driver 12Apr2018	
2018 Mustang GT 5.0 PP1 10-spd Auto	
Braking:	70 - 0 156 feet
Acceleration:	0 - 30 1.7 sec
	0 - 40 2.4 sec
	0 - 50 3.0 sec
	0 - 60 3.8 sec
	0 - 70 4.8 sec
	0 - 80 5.8 sec
	5 - 60 4.6 sec
	30 - 50 2.5 sec
	50 - 70 2.9 sec

Change (start)	Avg MPH	Avg FPS	Avg SPF	Req Feet
0 - 30 1.7 sec	15	22.0	0.045455	37.4
0 - 40 2.4 sec	20	29.3	0.034091	70.4
0 - 50 3.0 sec	25	36.7	0.027273	110.0
0 - 60 3.8 sec	30	44.0	0.022727	167.2
0 - 70 4.8 sec	35	51.3	0.019481	246.4
0 - 80 5.8 sec	40	58.7	0.017045	340.3
70 - 0 156 feet	35	51.3	0.019481	156.0
5 - 60 4.6 sec	32.5	47.7	0.020979	219.3
30 - 50 2.5 sec	40	58.7	0.017045	146.7
50 - 70 2.9 sec	60	88.0	0.011364	255.2

Math-based Process:

1) Develop a preliminary path strategy
2) Breakdown that course path into individual elements
3) Estimate each turn or curve radius measure
4) (My) Suggested estimates of driven slalom radii are 100 ft for 3 cones at 45-ft intervals and 125 ft for 3 cones at 60 ft
5) Note each element's speed limits based upon vehicle's turn (g-force) capability. – Ref: SCCA Solo Rules Section 2.2
6) Estimate the length of straight sections joining these curved elements.
7) Record each straight's beginning speed based upon the limiting speed of the linked, preceding element. Record the ending speed based upon the limiting speed of the linked, following element.
8) Determine* the "optimum" straight elements' and longer curve speed strategies:
   a) Increasing
   b) Increasing then decreasing
   c) Increasing, held constant (?), then decreasing
   d) Decreasing

*Each element's range is defined by it's connecting elements.

9) Adjust path strategy and repeat

Example A:

Given:

a) A vehicle with a 1.15 g cornering capability, 0-60 mph in 3.8 seconds, and 70-0 in 156 feet
b) Seg 4 a 90-degree, 80-foot radius / Seg 5 a 300 foot straight / Seg 6 a 90-degree, 40-foot radius

SCCA Solo Rules Section 2.2: Seg 4 = 37 mph max / Seg 6 = 26 mph max

Y1 MPH	Y2 MPH	Avg MPH	Avg FPS	X1 Sec	X2 Sec	Time	Req Feet
35	40	37.5	55.0	0.625	1.250	0.625	34.4
35	45	40	58.7	0.625	1.875	1.250	73.3
35	50	42.5	62.3	0.625	2.500	1.875	116.9
35	55	45	66.0	0.625	3.125	2.500	165.0
35	60	47.5	69.7	0.625	3.750	3.125	217.7

Y1 MPH	Y2 MPH	Avg MPH	Avg FPS	X1 Sec	X2 Sec	Time	Req Feet
60	55	57.5	84.3	0.434	0.651	0.217	18.3
55	50	52.5	77.0	0.651	0.868	0.217	16.7
50	45	47.5	69.7	0.868	1.085	0.217	15.1
45	40	42.5	62.3	1.085	1.302	0.217	13.5
40	35	37.5	55.0	1.302	1.519	0.217	11.9
35	30	32.5	47.7	1.519	1.737	0.217	10.3
30	25	27.5	40.3	1.737	1.954	0.217	8.8

35-55 mph: 165 ft 2.50 sec
35-60 mph: 218 ft 3.125 sec
(20 mph = 165 ft & 25 mph = 218ft
8.25 ft/mph & 8.72 ft/mph)
37-61 mph: 218 ft -(3x8.5 ft + 8.72 ft)= 201 ft

55-25 mph: 76.4 ft 1.3 sec
60-25 mph: 94.7 ft 1.5 sec **
65-25 mph: 114.6 ft 1.7 sec

**** 61-26 mph = 60-25 mph: 94.7 ft**

201 ft + 94.7 ft = 295.7 ft
< 300 ft

Seg 5: 37 mph to 61 mph brake at 201 ft to 26 mph

Walking the course:

1) Develop a preliminary path strategy **(Green path minimizes sharp turns)**
2) Breakdown that course path into individual elements **(Note number segments)**
3) Estimate each turn or curve radius
4) (My) Suggested estimates of driven slalom radii are 100 ft for 3 cones at 45-ft intervals and 125 ft for 3 cones at 60 ft
5) Note each element's speed limits based upon vehicle's turn (g-force) capability. – Ref: SCCA Solo Rules Section 2.2

Estimate your speed capability for each turn and slalom

6) Estimate the length of straight sections joining these curved elements.
7) Record each straight's beginning speed based upon the limiting speed of the linked, preceding element. Record the ending speed based upon the limiting speed of the linked, following element.
8) Determine* the "optimum" straight elements' and longer curve speed strategies:
   a) Increasing
   b) Increasing then decreasing
   c) Increasing, held constant (?), then decreasing
   d) Decreasing

Estimate your speed capability for each considering your turn or slalom exit speed, the next segment entry speed, and the straight segment's length related to acceleration and braking distances.

*Each element's range is defined by it's connecting elements.

9) Adjust path strategy and repeat