



**SCCA NATIONAL  
CONVENTION**  
January 17-19, 2019

# Autocross Course Design - 201

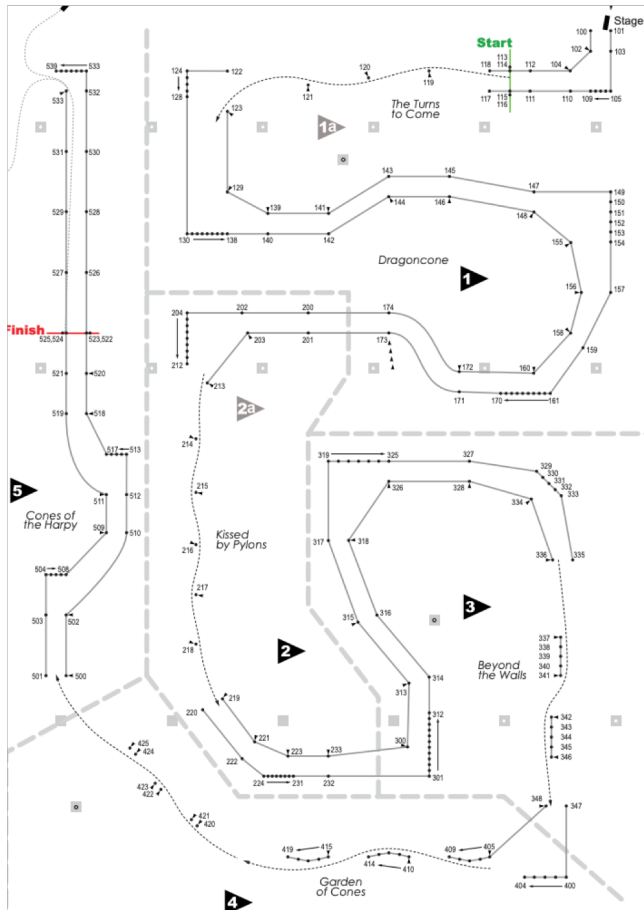
Designing courses for Tours,  
Pro Solos, and the National  
Championships

Karen Babb & Vivek Goel

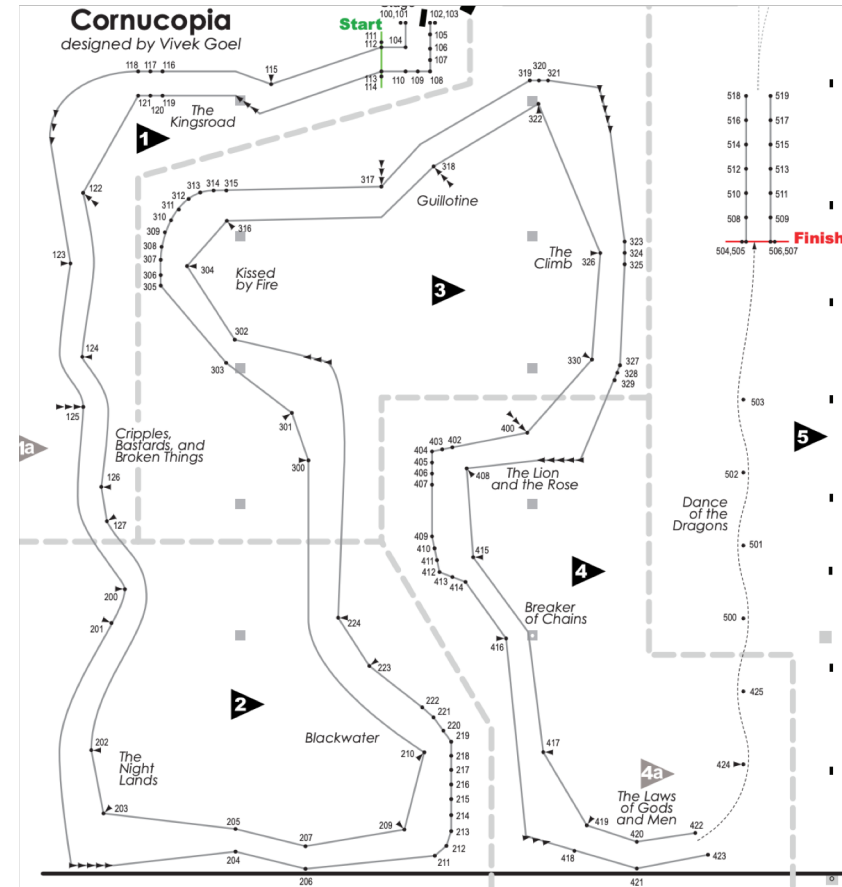


# Who we are

## Hi my name is Karen



## Hi my name is Vivek



# Agenda + Goal

1. What competitors expect (and what they do NOT want)
2. Parameters and constraints when designing a national course
3. What makes a balanced autocross course
4. Our thoughts on designing a nationals caliber course

**GOAL:** This session assumes you have a grasp on the basic aspects of course design, and aims to give you some ideas and things to think about in order to design fun and balanced national caliber courses.



Think back to your **all time** favorite autocross course  
**What did you like about it?**



# Competitor Expectations

~~Work of art~~  
**PRODUCT**

Our job is not to be admired as artists  
but to put forth a high quality product



# Competitor Expectations

Product features that are important to competitors

- Longer/bigger than their local courses
- Higher speeds than their local courses
- Balanced for different types of vehicles
- Balanced between being “technical” and “flowing”
- Have a mix of different types of elements and visuals
- More line choice
- Safe courses
- Easy to “see” but challenging to “figure out”



# Competitor Expectations

Take into account the constraints we have

- Size and shape of the lot
- Surface issues
- Safety margins
- Vehicle overlap
- Course entry and exit routes
- Worker stations





# Logistics and Safety

## Planning for bad weather

- Take that into account starting with the course design itself
  - Are the elements, spacing, and speeds appropriate in all weather conditions?
  - Which areas are likely to puddle up first (or, the worst)?
  - Are the visuals clear in all weather conditions?
  - Have a few contingencies planned for “higher risk” areas
- Have the appropriate materials to mark the course



# Balance

Why is a balanced course important?

What *IS* a balanced course?

- High hp vs low hp
- Lower grip vs higher grip
- Small car vs large car
- FWD vs RWD vs AWD
- Vehicle weight

What kind of course does a Miata actually like?

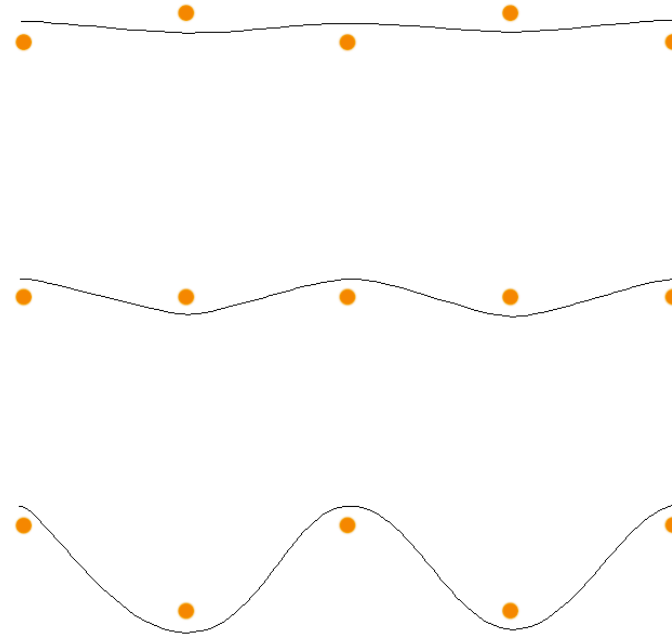
What kind of course does a Corvette actually like?



# Balance

Not all transitions are created equal!

Type of element	Miata	Corvette	Percentage difference
"Open" slalom (2 ft)	44"	53"	17%
Regular slalom	68"	77"	12%
Offset transitions (10 ft)	128"	137"	7%



# Balance

To make the course **MORE** power biased...

- More unimpeded acceleration out of elements
- The course does not have to be “fast” to be power biased
- It is not about the top speed, but the ability to use power (accelerate)



# Balance

To make the course **LESS** power biased...

- Raise the minimum speed
  - Take advantage of secondary characteristics of high hp vs low hp cars (for example, higher hp cars may also be larger cars)
  - Use transitions immediately after a corner
  - Use curved straights
- 
- You do NOT have to use a lot of cones
  - You do NOT have to make the course transition heavy



# Balance

Vehicle size: It's not just the width, wheelbase matters too!

To make the course more friendly for larger cars...

- Have fewer “open” transitions
- Increase longitudinal space between elements

To make the course more friendly for smaller cars...

- Fewer offsets, more regular or open slaloms
- More sweeper intensive (particularly longer connected sweepers)

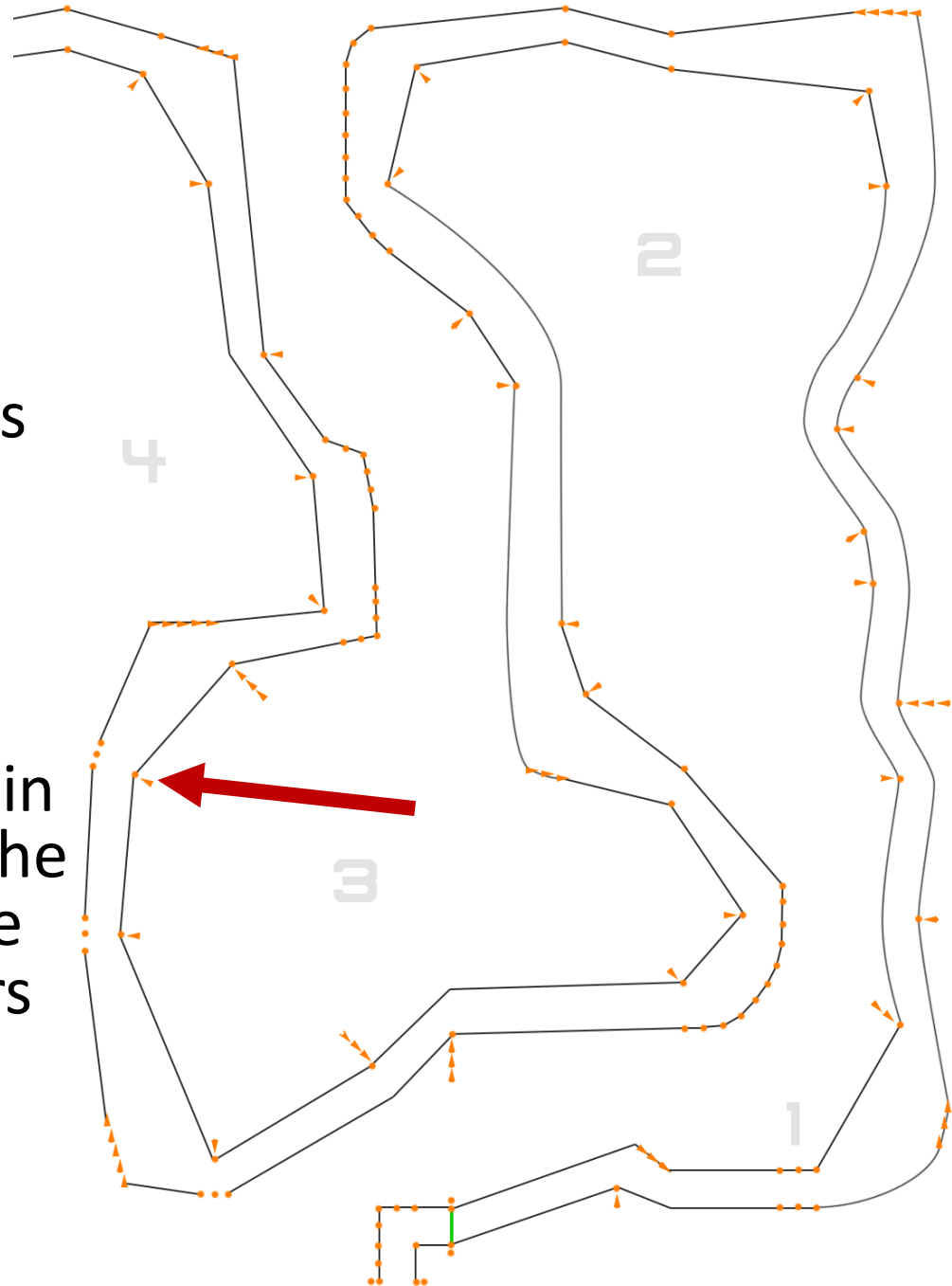


# Speed Control

We can limit the length of our acceleration zones to affect all cars

or...

By using curved straights (or certain types of transitions) before or at the end of a straight, we can affect the ***time and place*** when different cars reach terminal velocity



# Some General Guidelines...

- Higher average speed will favor lower hp cars
- More acceleration zones will favor higher hp cars
- Allowing unimpeded acceleration above typical autocross speeds will REALLY favor high hp cars
- More sweepers will favor race tires, and hurt FWD
- More transitions will reduce the race tire advantage, and help FWD relative to RWD
- Long higher speed sweepers will help smaller and lighter weight cars
- Etc...



# Design: How to start

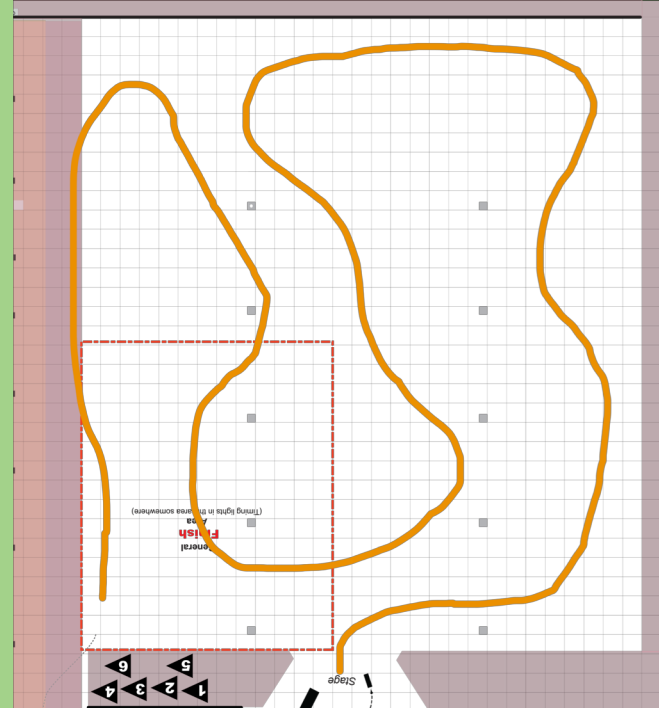
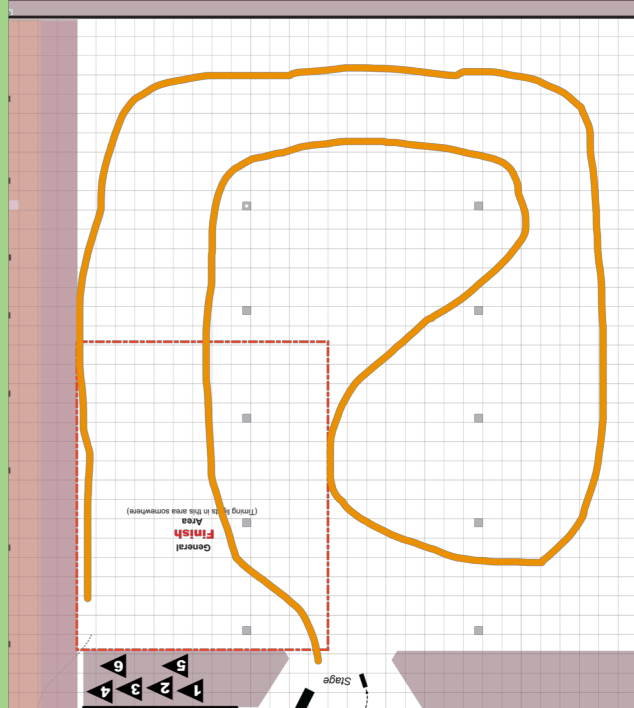
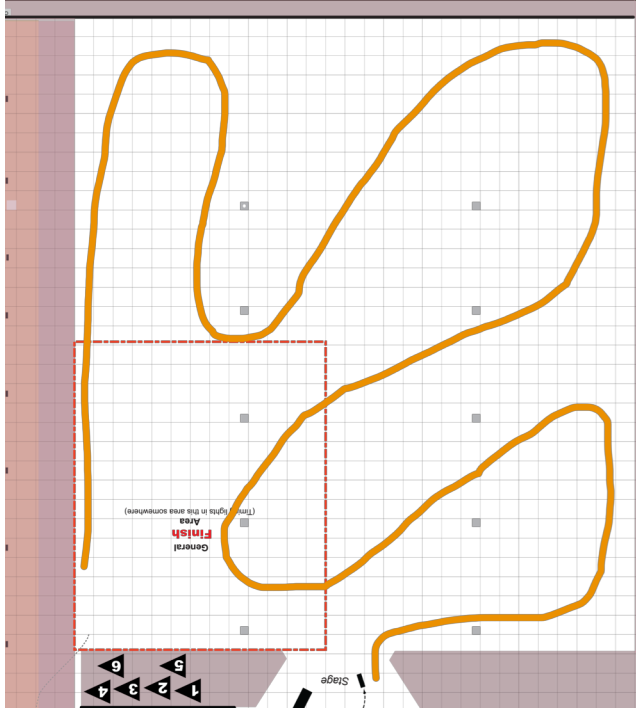
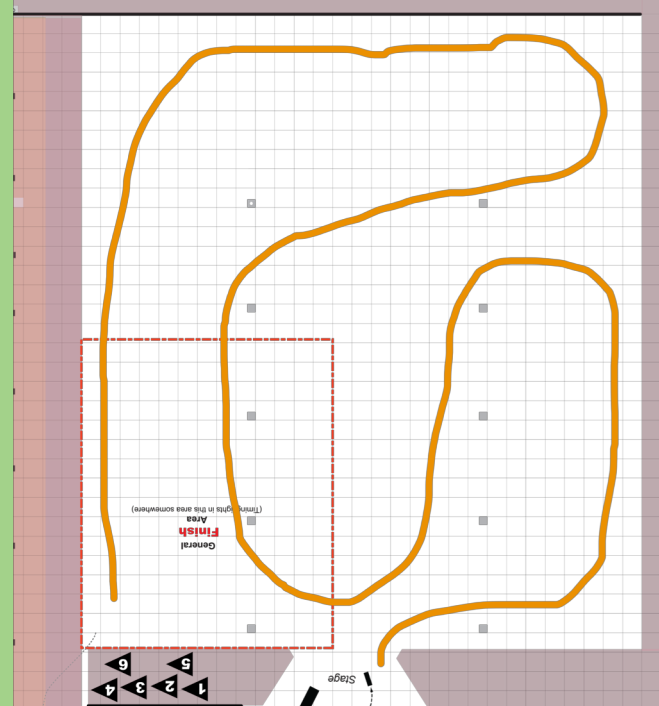
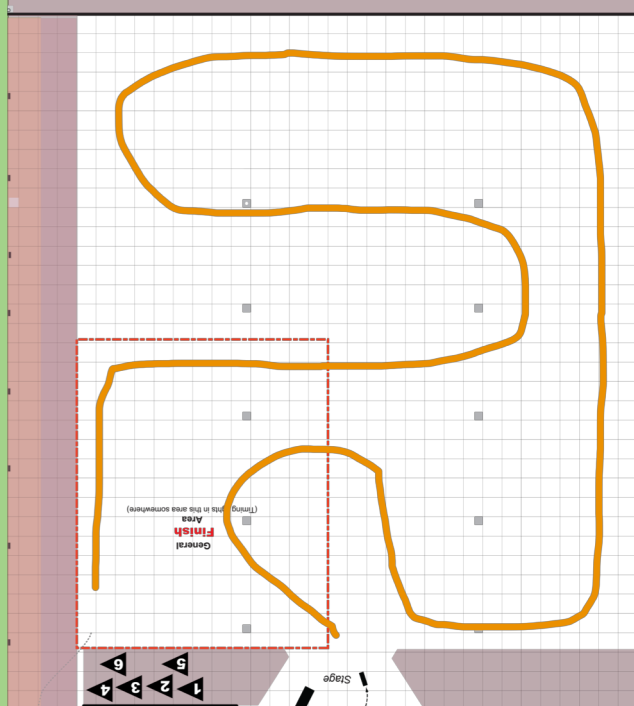
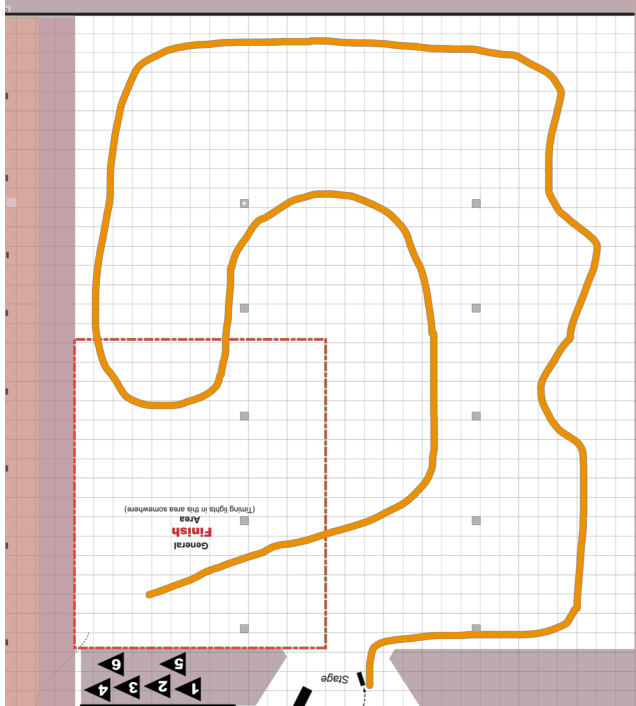
As we covered in 101...

1. Start by placing the finish
2. Then the start
3. Take into account the flow from/to grid, impound, etc

After that...

1. Some designers like to start by drawing a general route
2. Other designers start by placing a few key elements





# Design: Selecting and connecting elements

Constantly ask yourself

“What would be interesting to do *next*?”



# Designing an interesting and fun course

1. Utilize turns that are not 90 or 180 degrees
2. Utilize turns that are at different speeds
3. Allow for line choice
  1. Driver needs to figure out how to connect elements
  2. Driver needs to figure out compromise/payoff
4. Risk and reward (there *must* be a payoff)
5. Sequences that emphasize looking ahead



# Design: Risk & Reward

Elements or sequences where taking (and surviving) a risk results in a big payoff in time

1. A gap to “throw” the car through to carry speed
2. A higher speed section where the car is loaded side to side
3. A challenging corner exit

Generally, an element or section that you approach with the car totally in control, go through a section *barely* in control, to make it through to the other side with enough time for recovery.

**The “reward” is essential**



# Design: Emphasizing Looking Ahead

- This is not about obscuring the important parts of a corner
- Make the next element or key cone easy to find... IF THE DRIVER IS LOOKING FOR IT
- A course that emphasizes looking ahead lulls a driver who is *not* looking ahead into driving point to point



# Summary

1. Balanced
2. Allows for line selection
3. Good range of speed
4. Incorporates risk and reward
5. Emphasizes looking ahead



# Thanks for your time

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