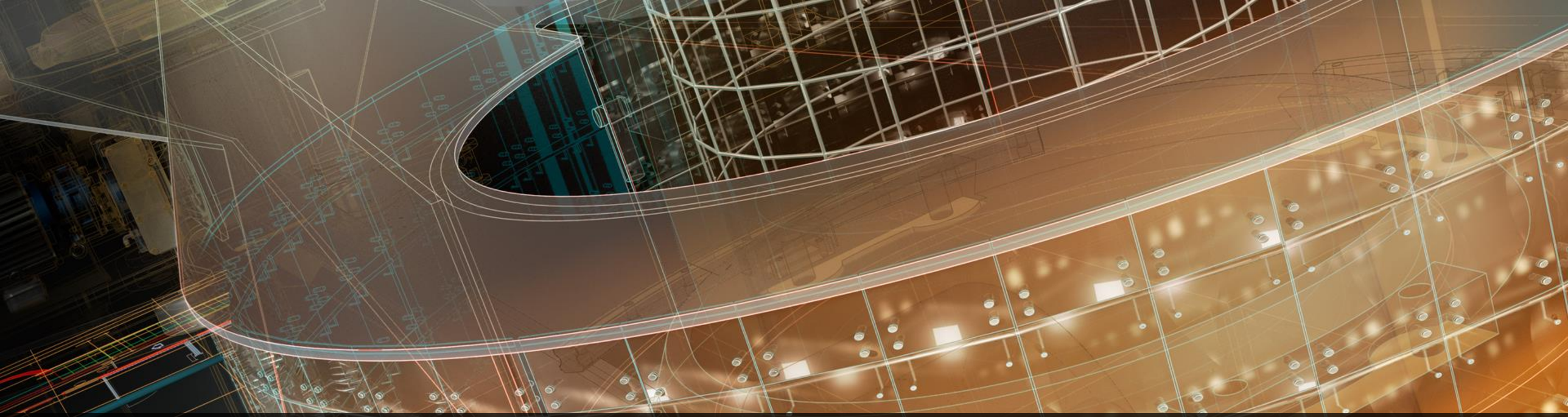

Islands in the Asphalt
Parking Lot Grading for Commercial Site Projects

Eric Chappell
Author, Consultant, CAD Manager

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Class Summary

In this class we will….

- Explore industry-proven design techniques
- That will result in designs that are
  - More accurate
  - More dynamic
  - More functional

- Experience with site grading would be nice

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Learning Objectives

At the end of this class, you will be able to:

- Use a predefined process to create grading designs that:
  - Are in full 3D
  - Are dynamic
  - Enable design iterations to be applied quickly and easily

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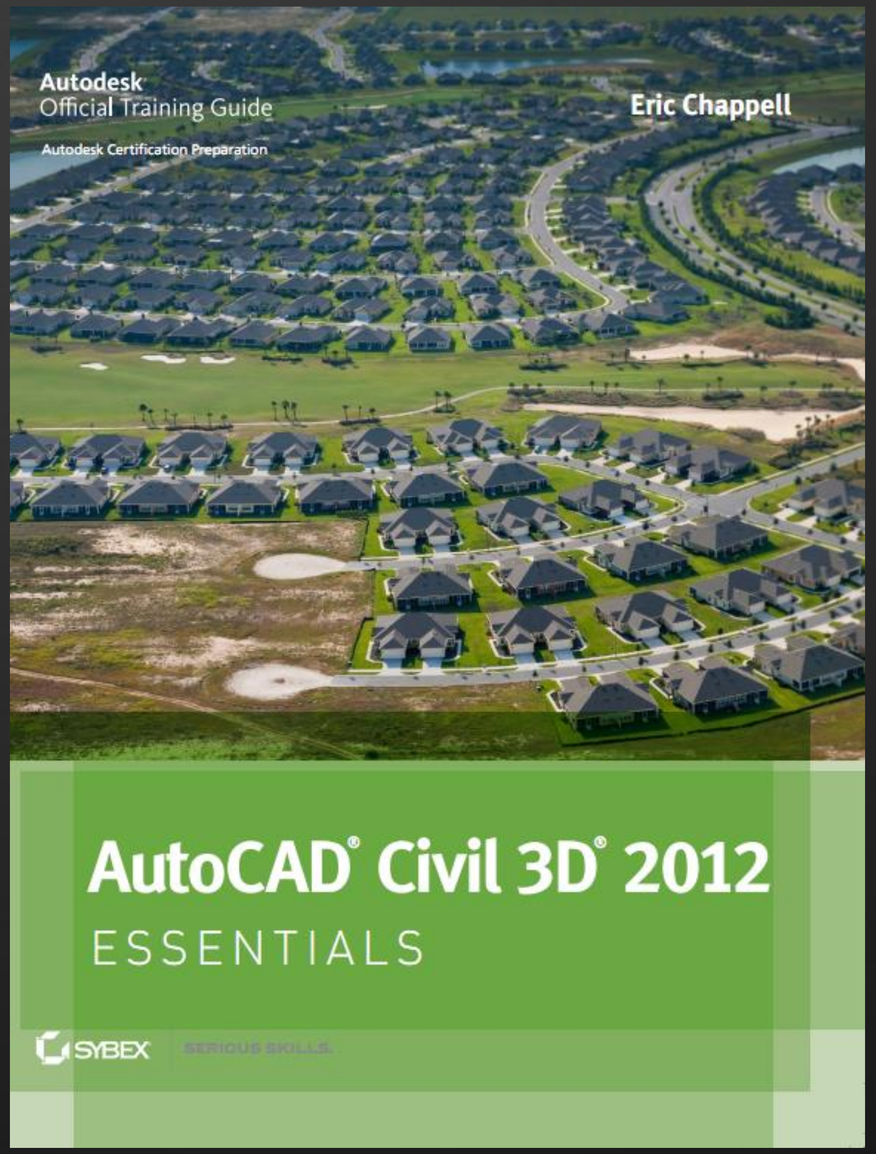
Who Is This Guy?

- Been working in the CAD world for 20 years
  - 4 years in the field
  - 6 years in production
  - 4 years in consulting
  - 6 years in CAD management and consulting
- Author
  - AutoCAD Civil 3D 2012 Essentials
  - AutoCAD Civil 3D Certification Exam
  - Various Autodesk Documents
    - Whitepapers
    - Tutorials
    - Internal Training Materials
- Consultant/Trainer
  - Various Autodesk and non-Autodesk projects
  - AU Instructor for 7 Years



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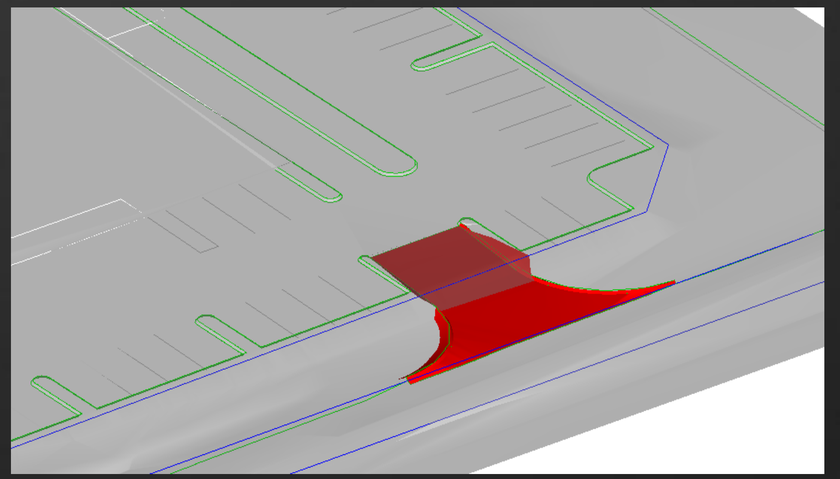
Introduction

Successful parking lot grading design requires

- A good conceptual understanding of the process
- Knowledge of key techniques
- Patience
- Ingenuity



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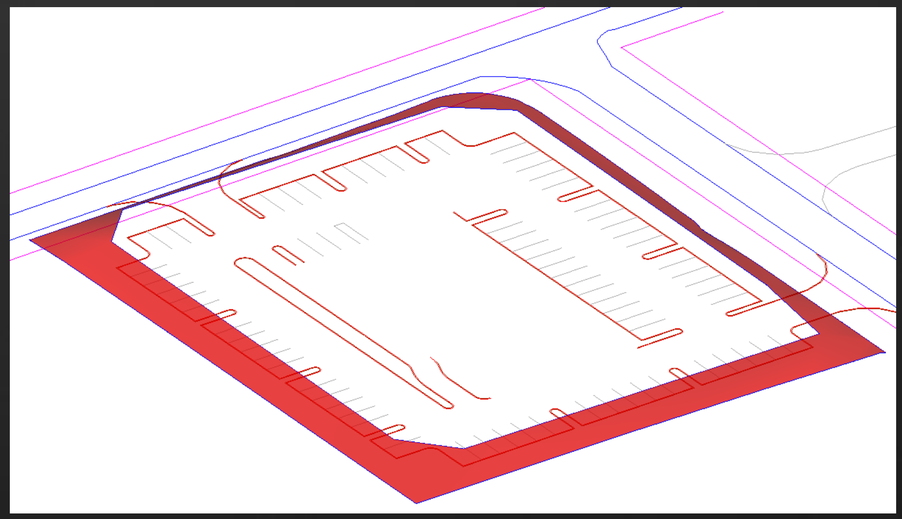
Introduction

Most grading projects can be boiled down to the following process:

1. Choosing a grading/drainage scheme
2. Building the grading/drainage scheme
3. Designing the perimeter
4. Checking volumes
5. Adding interior detail
6. Adding driveways



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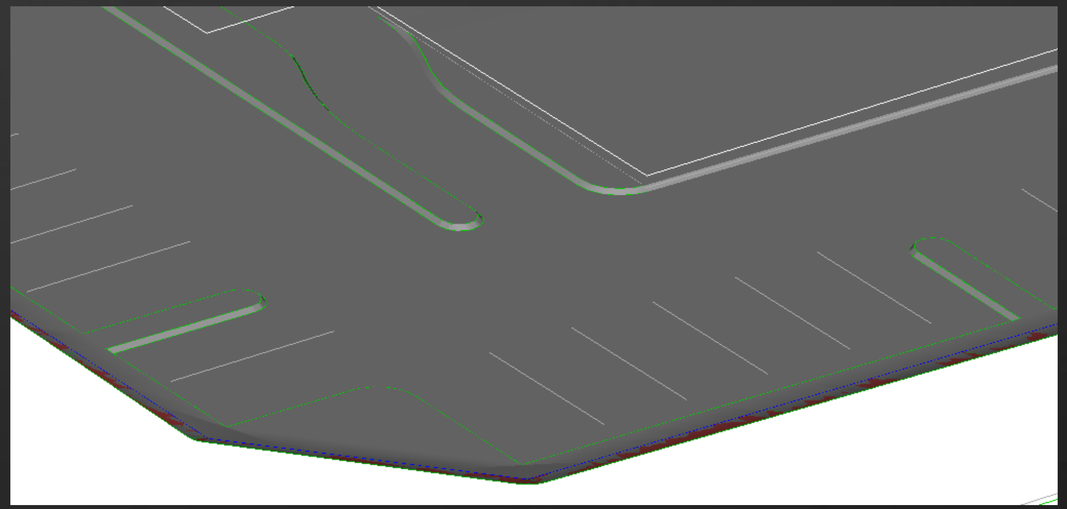
Introduction

By using this process you will…

- Take longer to do the initial design
- Create a design that is more easily adjusted when changes arise

…and they will.



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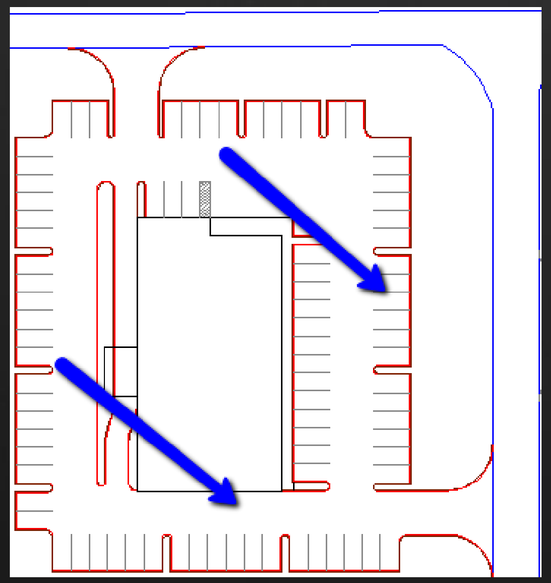
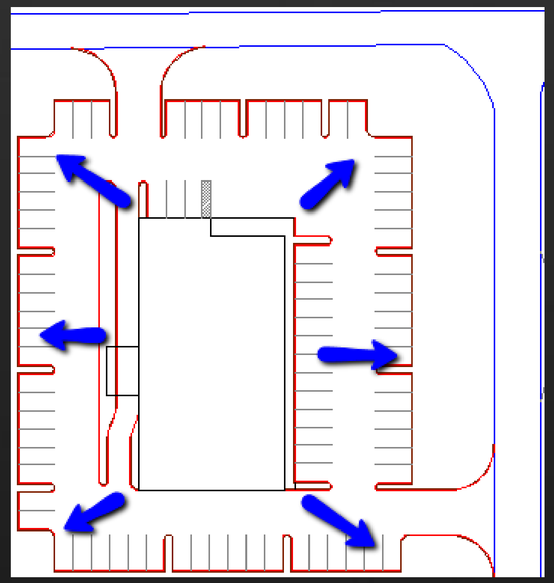
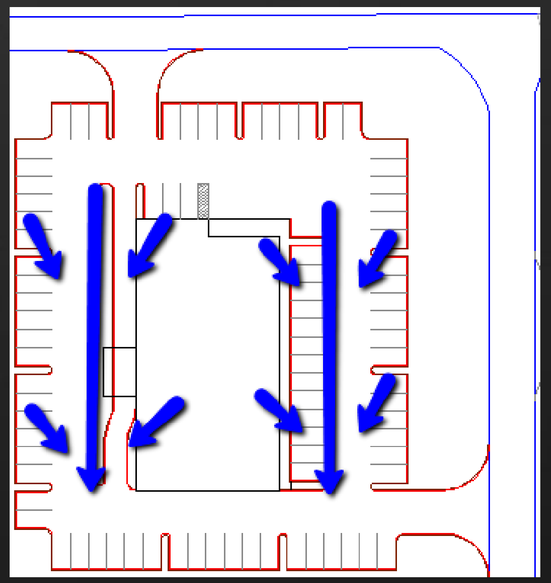
Choosing a Grading/Drainage Scheme

- Before design begins – decide on one or more general grading/drainage schemes







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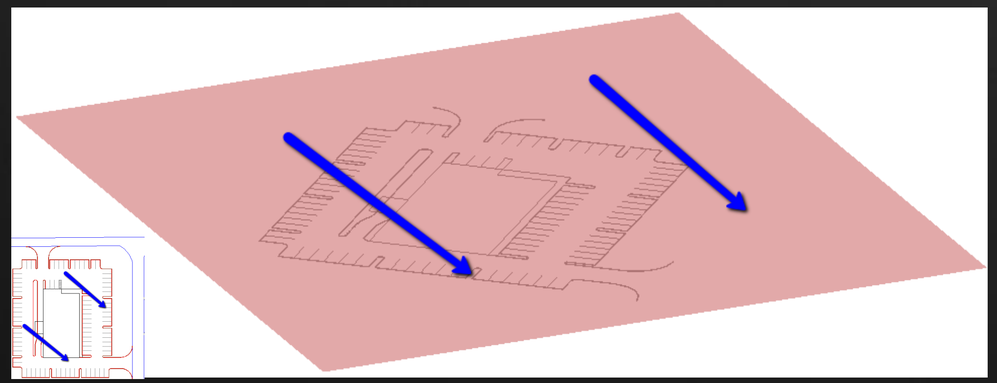
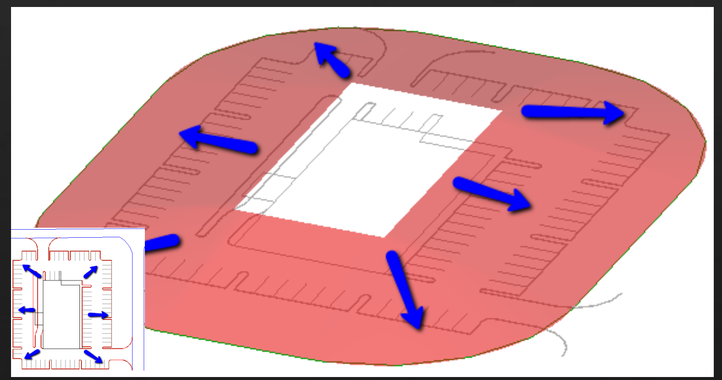
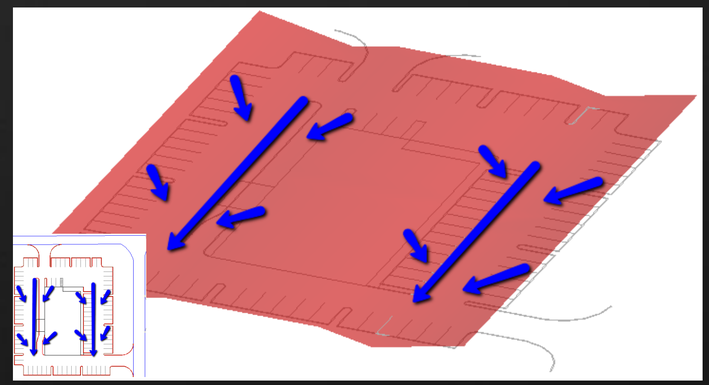
Building a Grading/Drainage Scheme

- Built quickly with simple geometry
- Ignores layout geometry
- Tools
  - Feature Lines
  - Grading objects
- End Result: *General surface*







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Building a Grading/Drainage Scheme

Let’s build some grading/drainage schemes…

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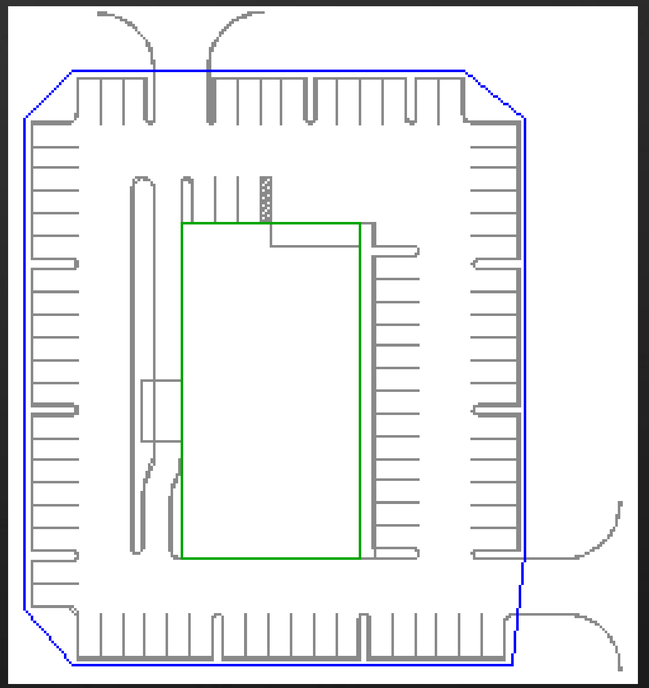
Designing the Perimeter

- Before getting into too much detail – figure out rough perimeter tie-in
  1. Shrink-wrap the layout (ignore driveways)
  2. Assign general surface elevations
  3. Tie in

- Why?
  - Make sure you have room for the layout and grading
    - If a layout change is needed – now's the time to find out
  - Set up rough volume calculations



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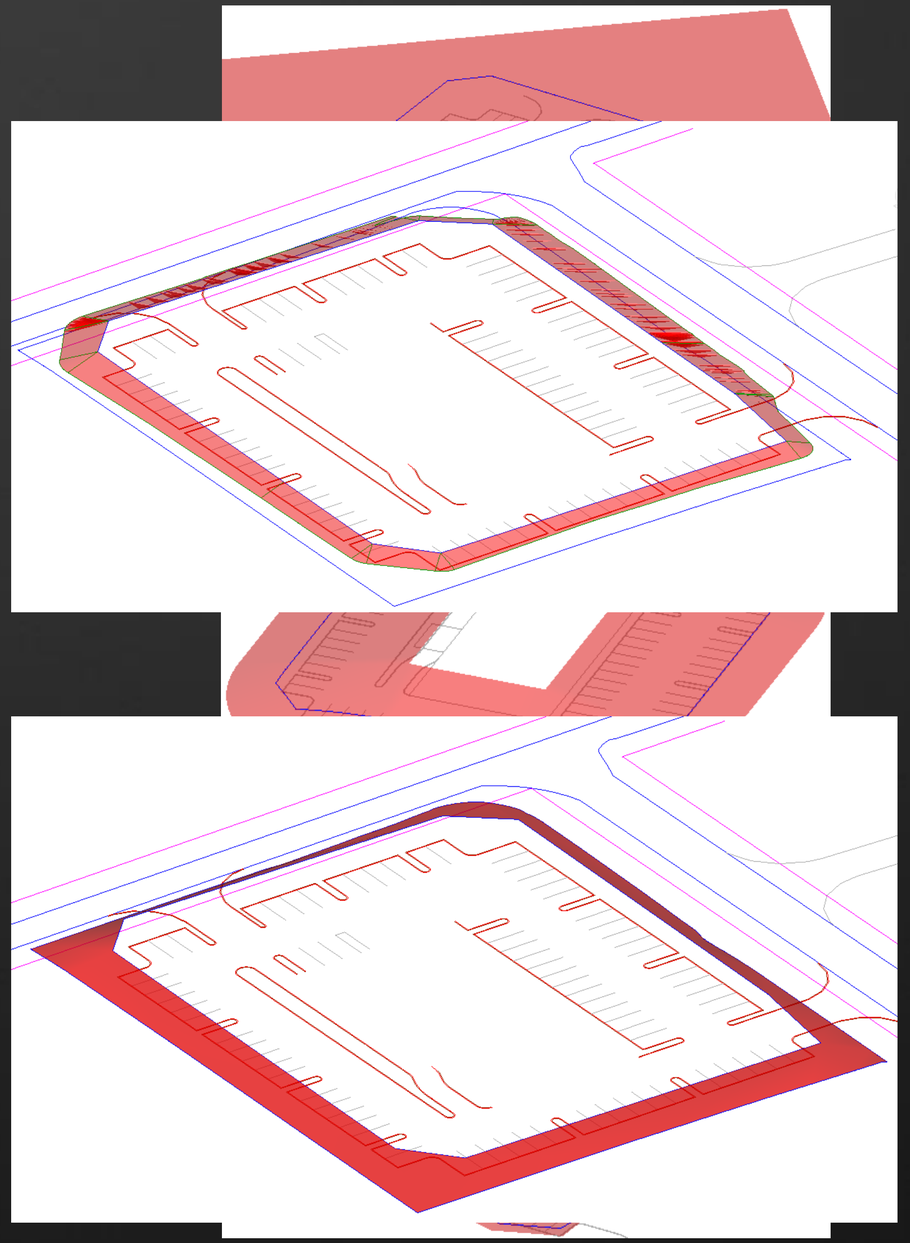
Designing the Perimeter

1. Shrink-wrap the surface
   1. Draw a polyline around layout
   2. Offset a little
2. Assign elevations from *general surface*
   1. Convert perimeter to a feature line
   2. Use Elevations from Surface command
3. Tie in
   - Use a Grading object OR
   - Use a tie-in feature line



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Designing the Perimeter

Let’s design a few perimeters…

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Checking Volumes

- Now is the time to check the model because:
  1. The design is simple and adjustments are easy
  2. You haven’t yet put a ton of time/effort in to the design

- Ways to check volumes
  - If you’ve used grading objects
    - Use Grading Volume Tools
  - If you cannot use the Grading Volume Tools
    - Volumes command
    - Volume Surface

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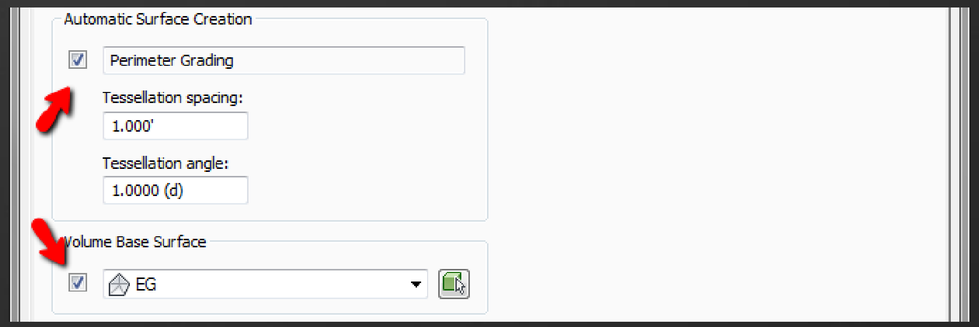
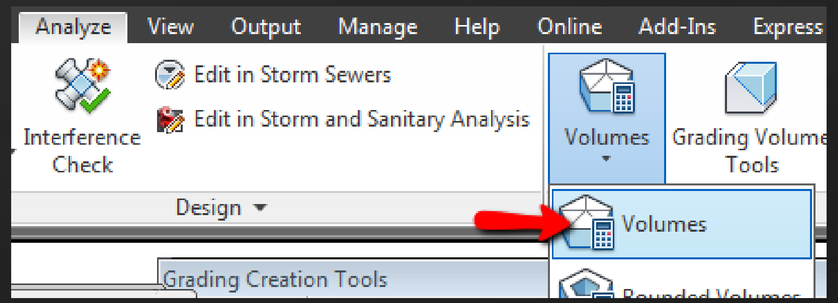
Checking Volumes

- Grading Volume Tools
  1. Add an infill
  2. Check Automatic Surface Creation
  3. Choose a Volume Base Surface
  4. Run the Grading Volume Tools command



- Volumes Command
- Volume Surface



- You may need to adjust your general surface depending on volume results

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Checking Volumes

Let’s check some volumes…

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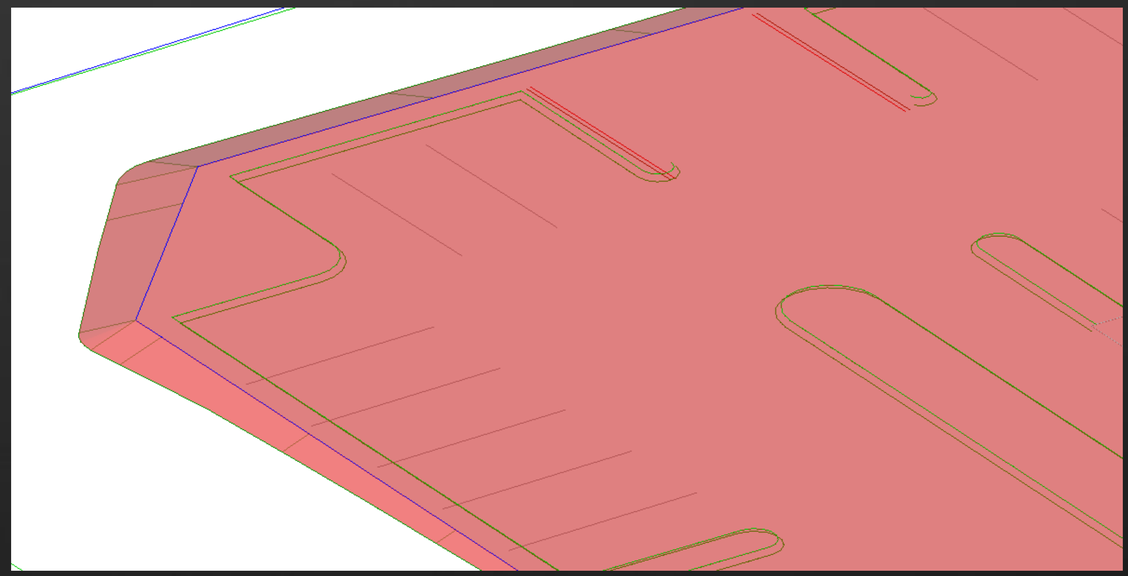
Adding Interior Detail

- Now that…
  - Perimeter design is done…and it works
  - Volume check made and design adjusted if necessary…
- It’s time to start adding detail
  - It is important to be patient and wait until now to address detail



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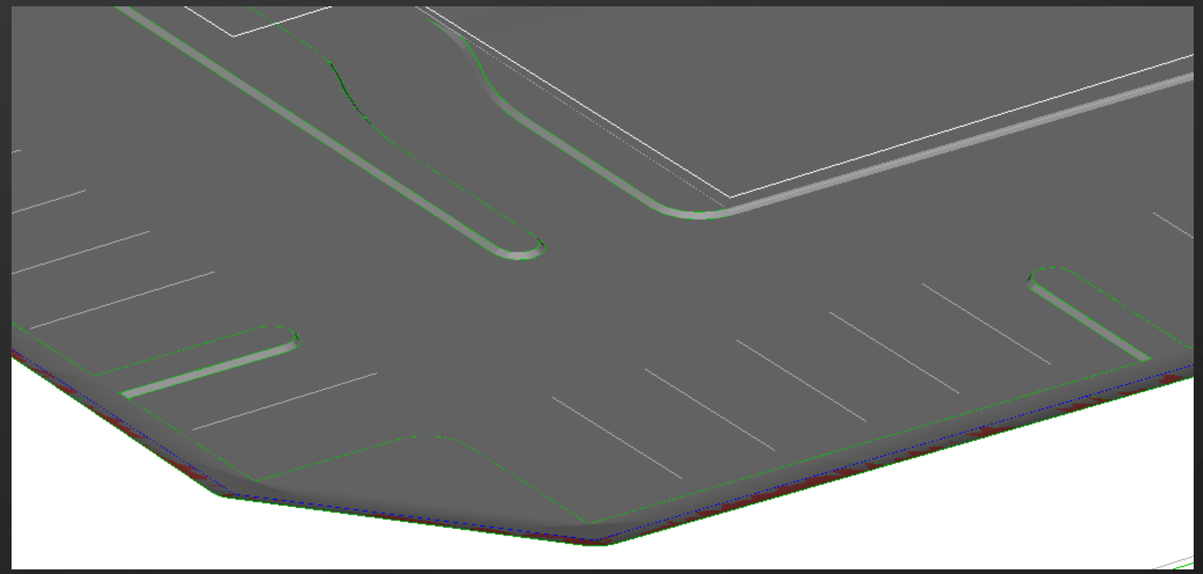
Adding Interior Detail

- To add detail
  - Turn your curbs and edges of pavement into feature lines
    - Use a different site
  - Use Elevations from Surface to project them to your general surface
  - Drop the flow line feature lines to create curb reveal
  - Make minor adjustments if necessary
  - Ignore driveways
  - Build an “interior detail” surface
  - Paste “interior detail” and “perimeter grading” into a third surface



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Adding Interior Detail

Let’s add some interior detail…

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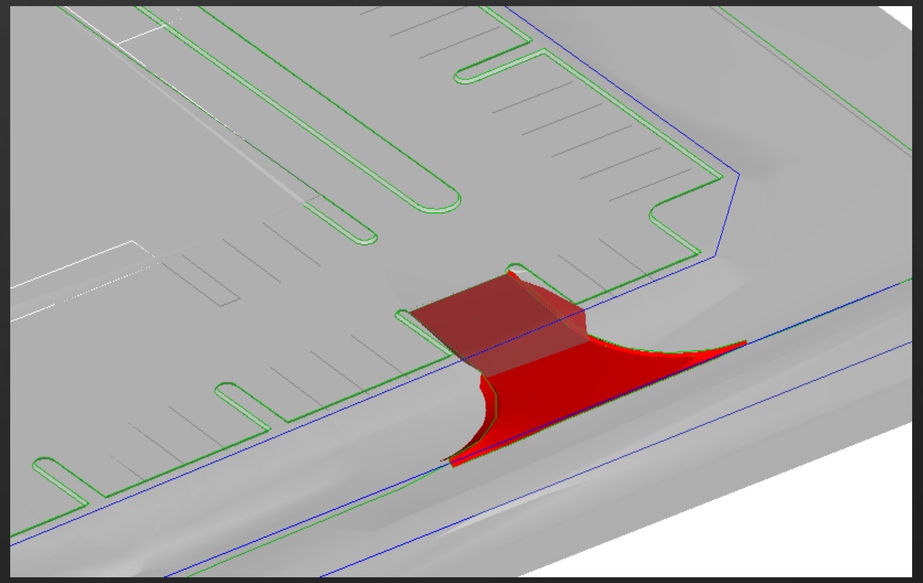
Adding Driveways

- Always save driveways for last
- Short, simple driveways can be done with feature lines
- Long, complex driveways can be done with corridors/intersections
- Process
  1. Create a composite EG-FG surface
  2. Draw feature lines that start at EG and end at FG (or alignment/profile/corridor)
  3. Daylight to composite EG-FG surface
  4. Create driveway surfaces and paste into overall surface



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Adding Driveways

Let’s add some driveways…

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Review: The Process

Most grading projects can be boiled down to the following process:

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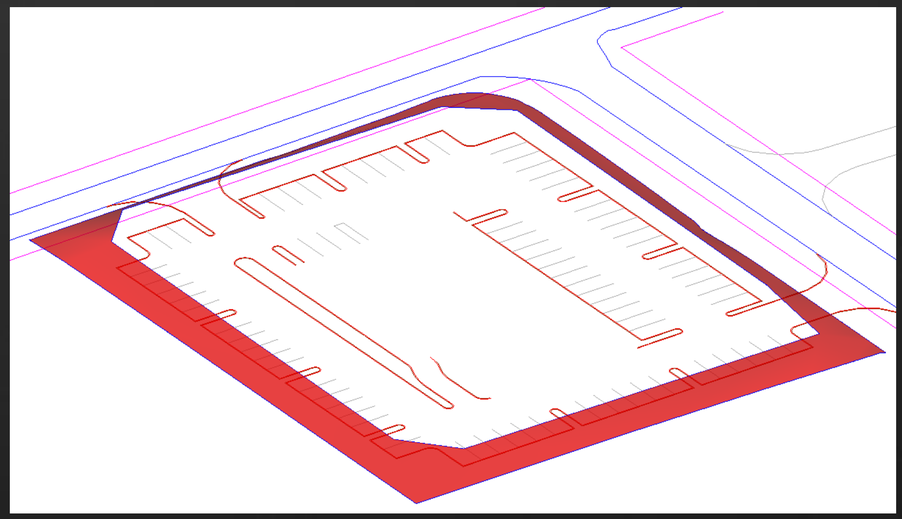

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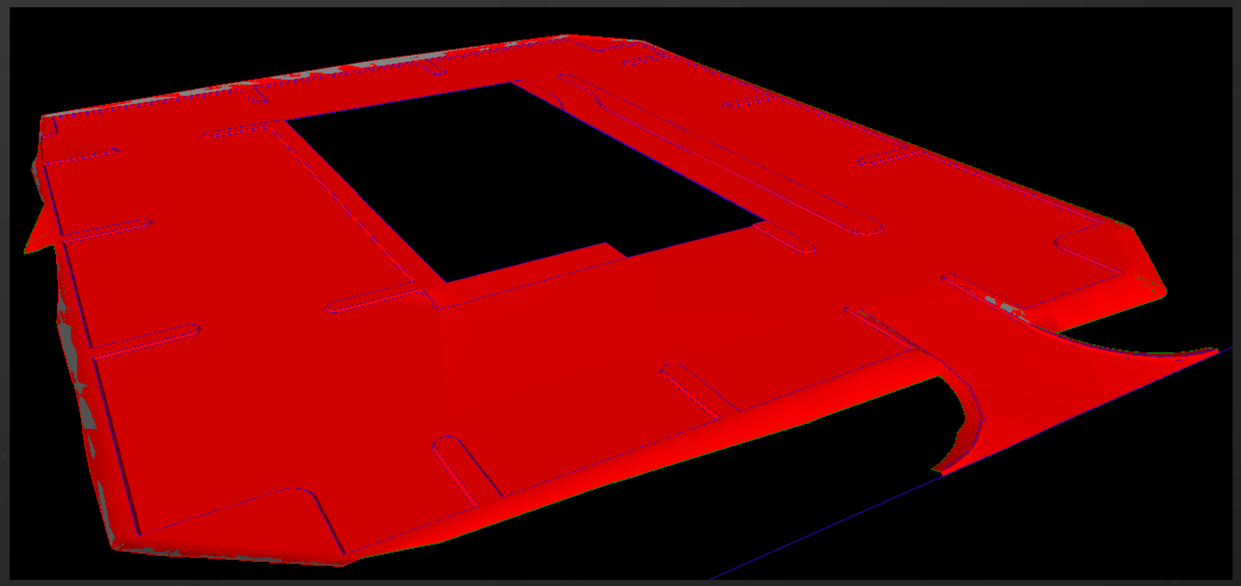
Key Takeaways

- Modularize your design
  - Grading is complicated
  - Break it down into small, manageable mini-designs
  - Trying to do it all at once is problematic
    - Software limitations
    - Your limitations
  - Easier to manage updates
  - Leverage Civil 3D’s dynamic nature
- You will have software issues – get over it.
  - The tools work…most of the time
  - Save often and make backups



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Thank You

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