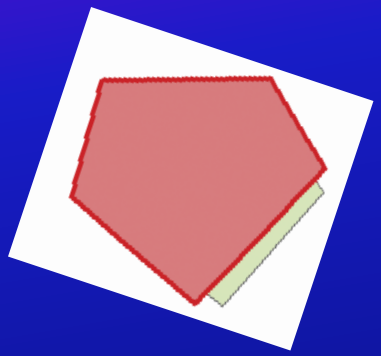
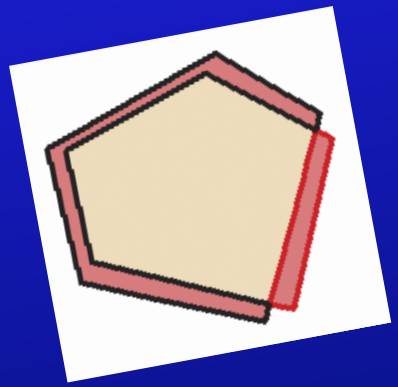
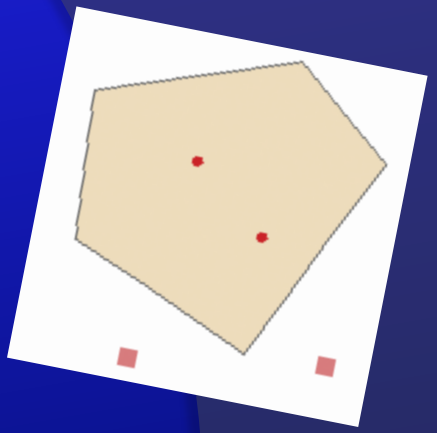
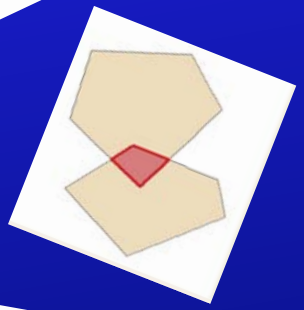
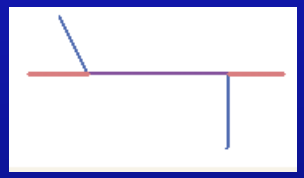
So You Think You Know How Topology Works?

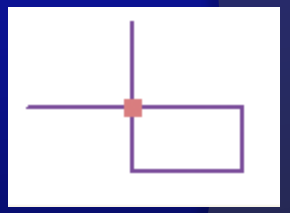


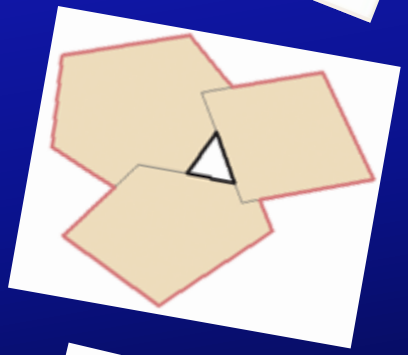


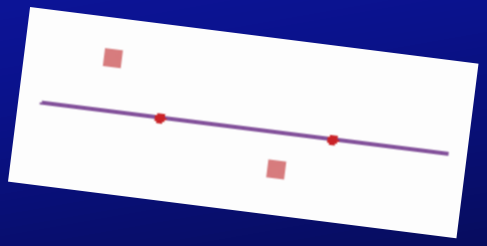


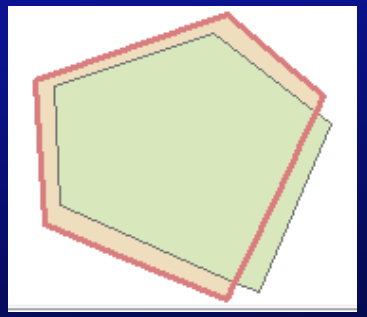


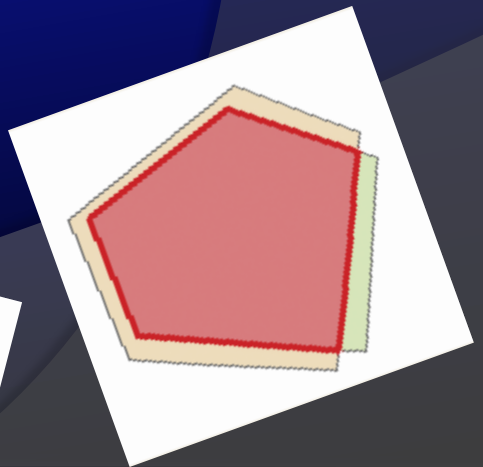


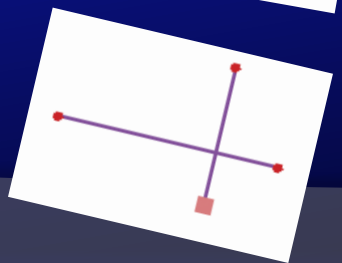


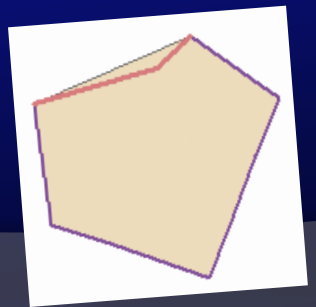


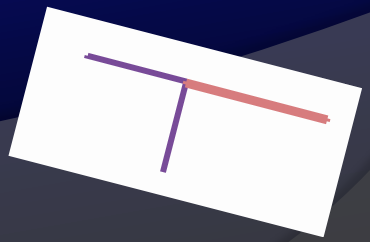












ESRI Topology Rules

Points

Points on points

Points on lines

Must be covered by endpoint of
Point must be covered by line

Points on polygons

Must be properly inside polygons
Must be covered by boundary of

Lines

Must not have dangles
Must not have pseudo-nodes
Must not overlap
Must not self overlap
Must not intersect
Must not self intersect
Must not intersect or touch interior
Must be single part

Lines on points

Endpoint must be covered by

Lines on lines

Must not overlap with
Must be covered by feature class of

Lines on polygons

Must be covered by boundary of

Polygons

Must not overlap
Must not have gaps

Polygons on points

Contains point

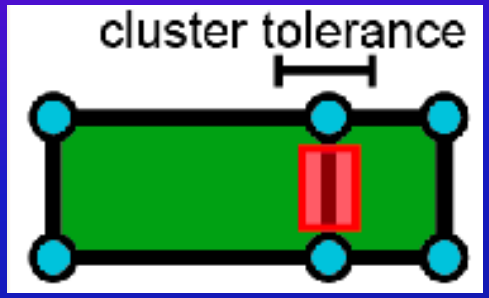
Polygons on lines

Boundary must be covered by

Polygons on polygons

Must be covered by feature class of
Must be covered by
Must not overlap with
Must cover each other
Area boundary must be covered by boundary of
Tessellate

First Things First



Cluster Tolerance is the distance range in which all vertices and boundaries in a shapefile or feature dataset are considered identical or coincident.

ESRI says, set the cluster tolerance to a value that is an order of magnitude less than the accuracy of your data.

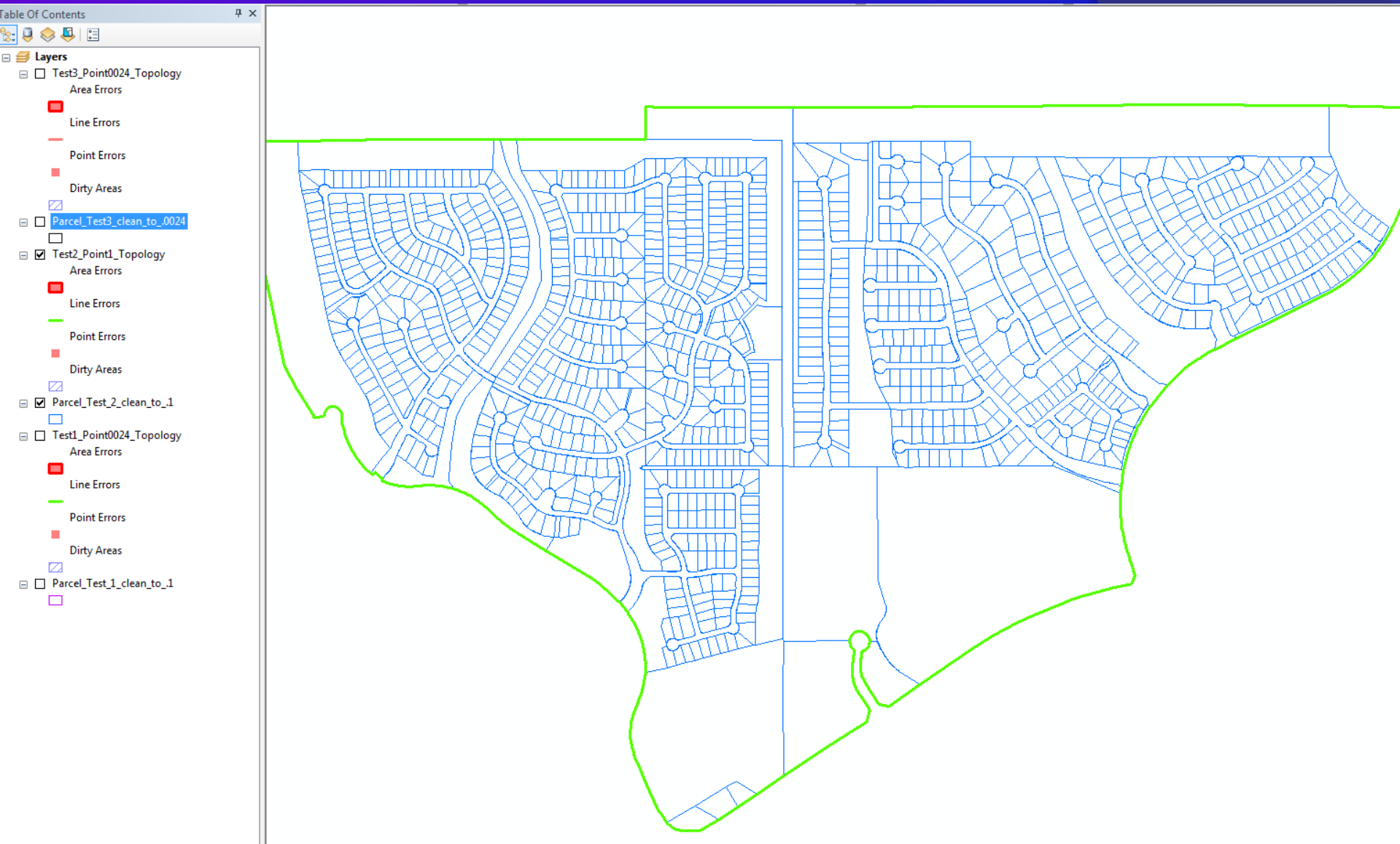
Kurt says, always use the minimum. If you're not sure what the minimum number is just use zero. ESRI software will set it at minimum.

First Things First
Cluster Tolerance

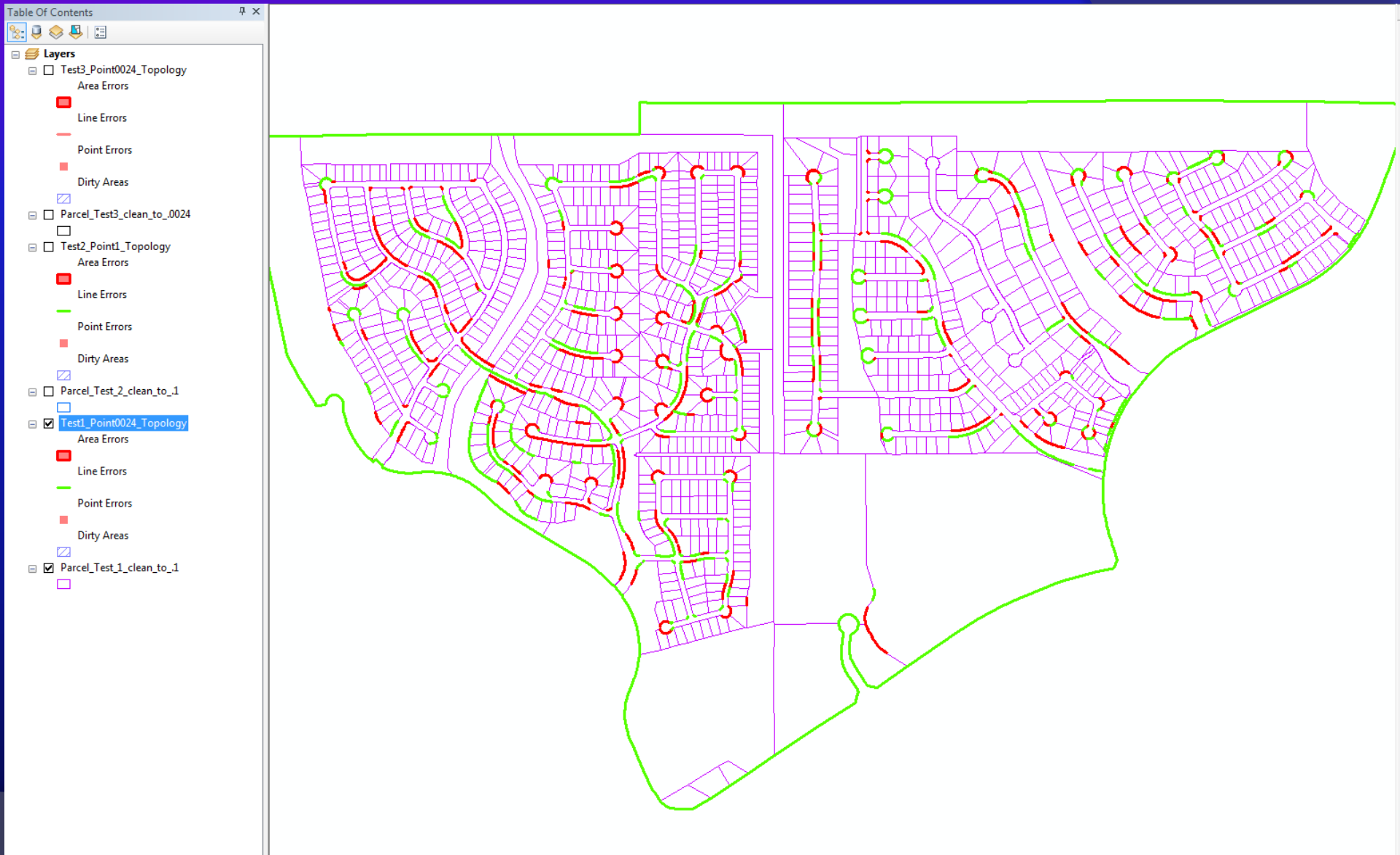
BCAD Experience:

- We originally set Cluster Tolerance (CT) at .1’
- Everything was fine for 8 years.
- City of SA found many topology errors in our data.
- BCAD copied parcels into topology with minimum CT
- 170,000 overlap and gap errors were found

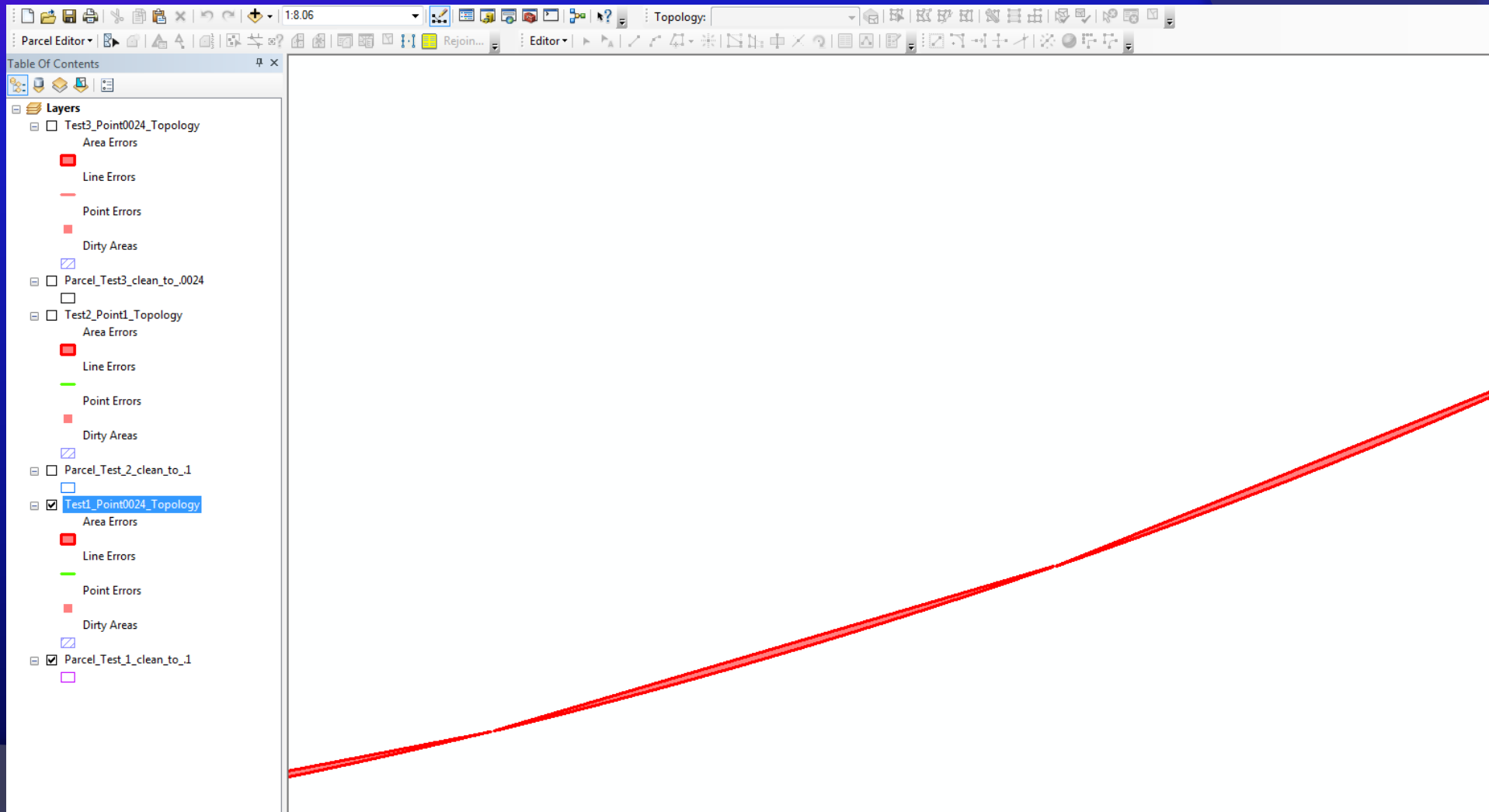
Cluster Tolerance .1’



Cluster Tolerance .0024’



Cluster Tolerance .0024’



Cluster Tolerance

What we learned

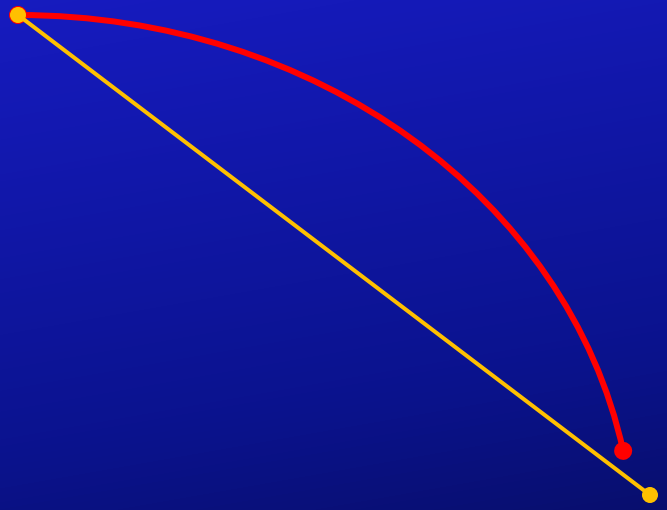
- Validate does not report all errors
- It only reports errors larger than the cluster tolerance
- It only snaps points to points or points to lines
- It rarely, if ever, snaps curved lines.

Most important thing we learned

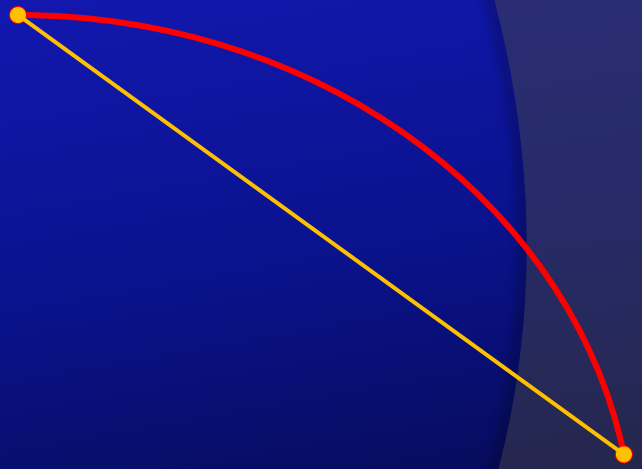
- Always use minimum Cluster Tolerance

Cluster Tolerance

Before Validate



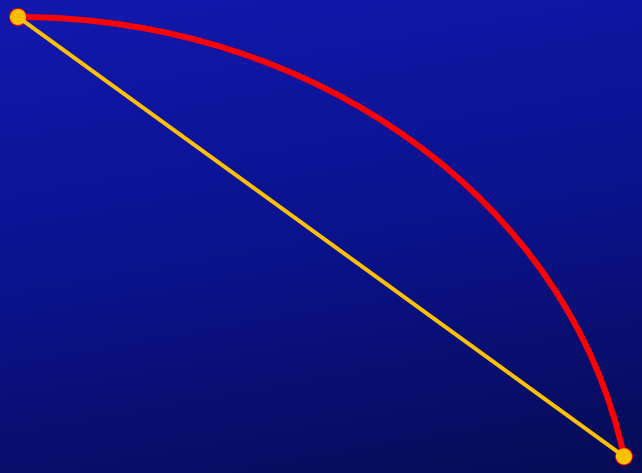
After Validate



Cluster Tolerance

Cluster Tolerance

Validate only flags this as an error if the gap or overlap is approx 3 times the Cluster Tolerance

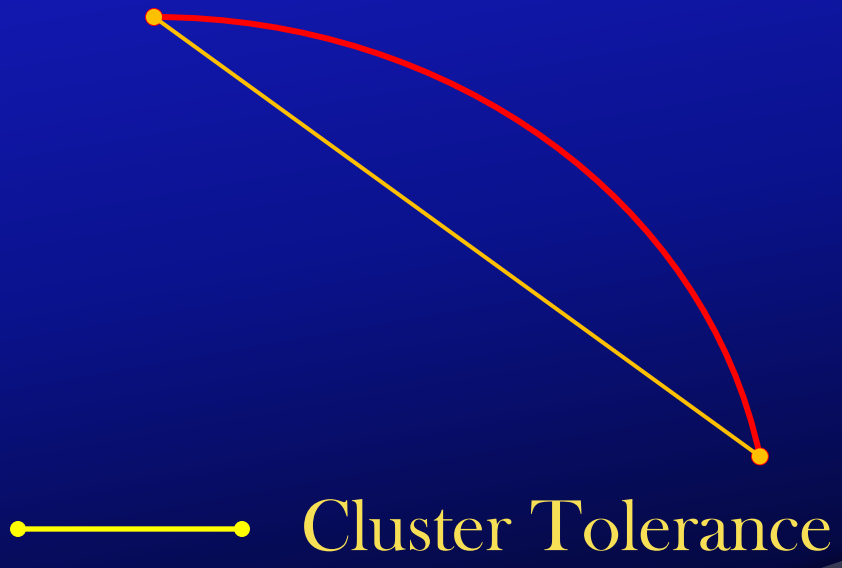


⊷ Cluster Tolerance

Moral of story: Make Sure Cluster Tolerance is at minimum

Cluster Tolerance

Even when overlap or gap is smaller than the cluster tolerance it won't snap the lines or report the error.



Cluster Tolerance

- If when you do “zoom to full extent”  your data shows up as a dot somewhere you may get very unexpected results with topology.
- You may not have enough significant digits for the cluster tolerance to work correctly.
- Areas you didn't even edit could move point locations and create new topology errors.

Validate Procedures
First Rule of Validate

- Make sure you have Dirty areas turned on

Validate Procedures

- Zoom into your edit area
- Validate your current map extent
  - Fix any errors
- Turn off all layers except topology
- Zoom to full map extent
- Validate current map extent (full extent) 
  - Fix any errors
- Reconcile (if in multi user Environment)
- Validate again
- Reconcile & Post

Validate Procedures

- Validating only the area you edited doesn't find all existing errors
- Any errors you miss are passed along to the default version (if you reconcile and post)
- As other users reconcile they now bring in everyone's errors into their version
- Errors can stack up on top of each other as reconcile and post occurs in the different versions

Validate Procedures
Other Helpful items

- Don't attempt to validate entire project when you have large number of dirty areas.
- Set smaller window and validate in pieces.
- You can validate 50 smaller windows faster then you can validate "all" (with lots of dirty).
- If you have only a few dirty areas validate works very fast even on your entire project area.

Correcting Topology Errors

- Some things you can fix in groups and some things you cannot.
- Work with errors one at a time until you get the hang of it then you can get more creative.
- Use the error inspector tool  to sort by error types or zoom to errors.

If you have any plans to migrate to parcel fabric you need to add the six topology rules required for fabric migration.