

Scenario Planning Zone Development

Modeling Task Force Meeting

July 24, 2013



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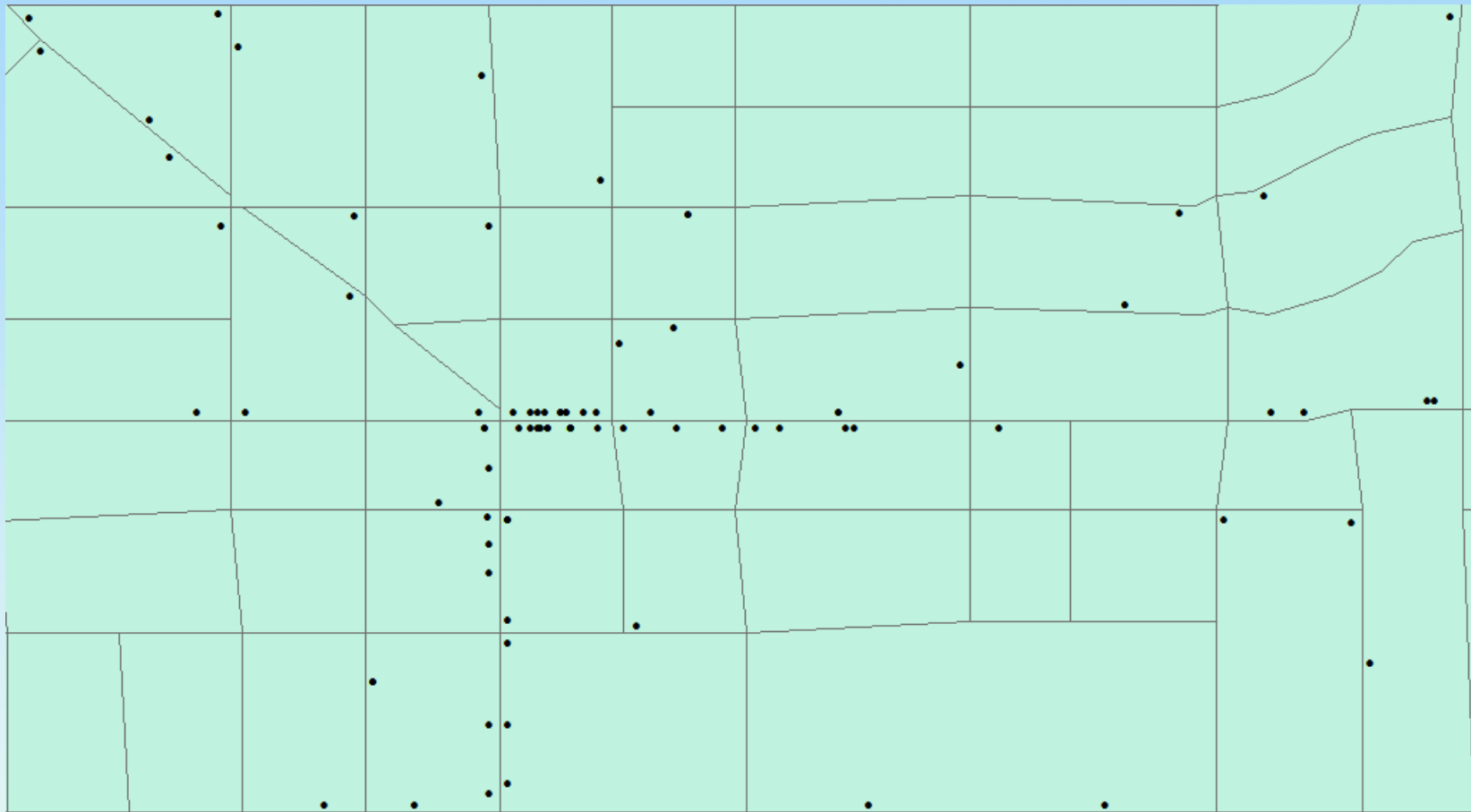
- Background
 - Why Scenario Planning Zone (SPZ)?
 - Requirements & Approach
- Method
 - Overall Workflow
 - Detailed Steps
- Technical Difficulties and Solutions
- Preliminary SPZ

Scenario Planning Zone (SPZ) System

- To provide a better spatial representation for region-wide land use scenario planning
- Existing boundaries
 - Grid is not accepted as a 'real' zone system
 - 4.7 million Parcels are too many
 - TAZ systems are too coarse
- Census Block can be an alternative, but...
 - No guarantee to align with jurisdictional boundary
 - Not reflect up-to-date growth

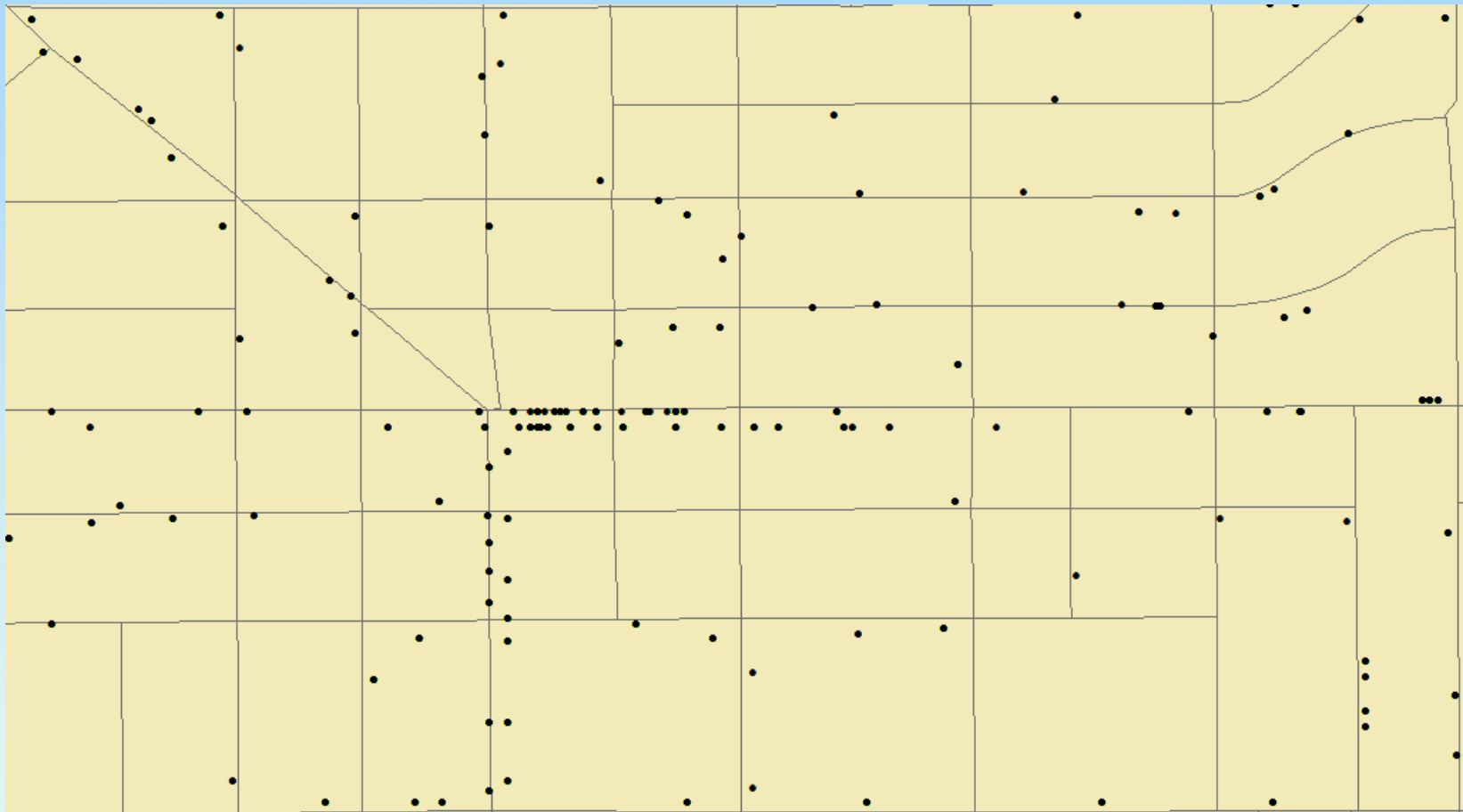
Census Block Boundary

- Employment Establishment (2000)



Census Block Boundary

- Employment Establishment (2010)



Requirements for SPZ

- Consistent to city & parcel boundaries
- Maintain nesting relationship with existing boundaries (census block, T2/T3 TAZ)
- “Reasonably” uniform land use within a zone
- Around 300K zones & 3 acres minimum

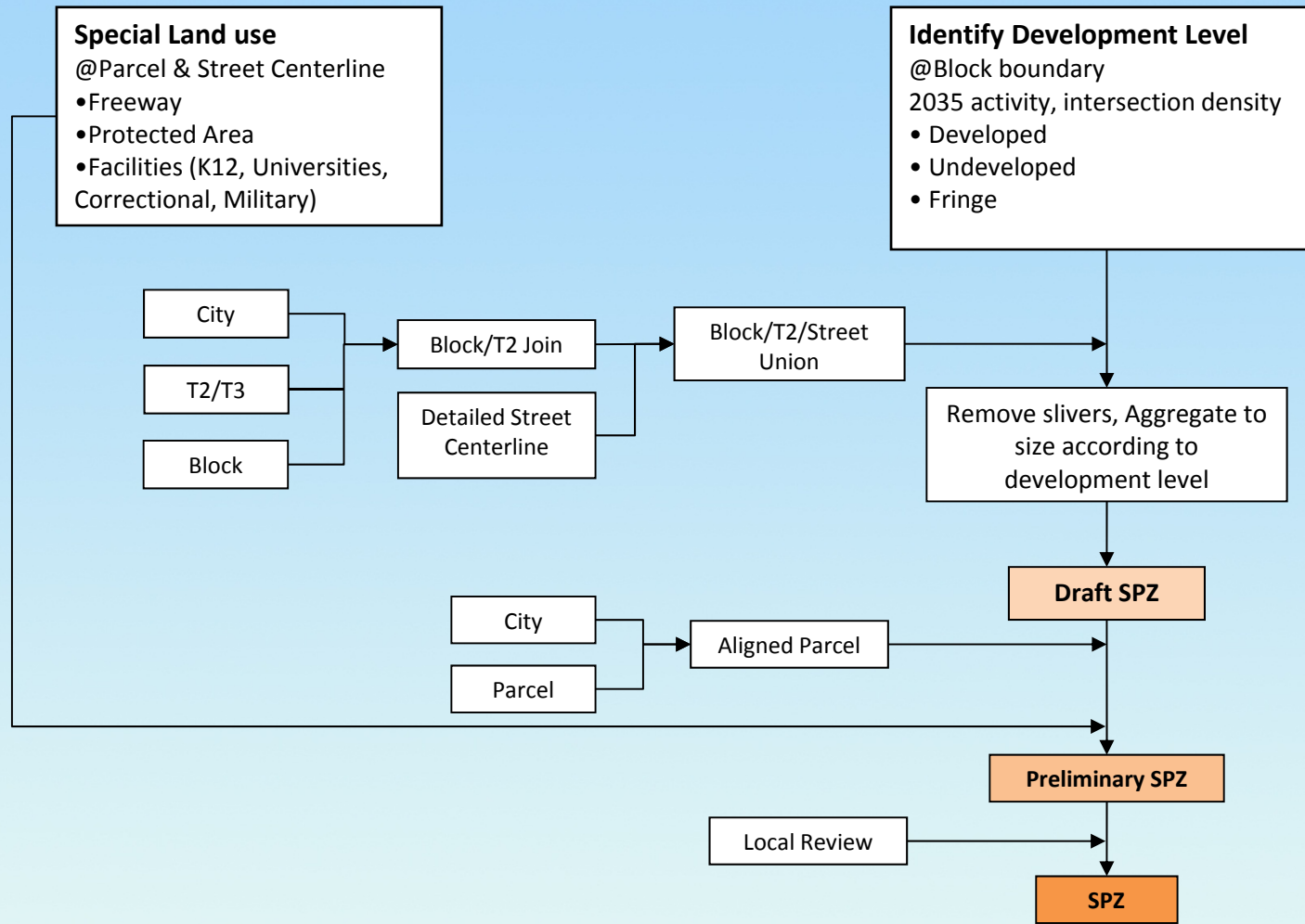
Approach

- Based on established geographic boundaries
 - Boundaries to be respected
 - Jurisdiction boundary
 - Parcel lines
 - Boundaries to be used as guide
 - Census block
 - Tier2 / Tier3 TAZ
 - Street centerlines to divide within block
- Steps of resolving inconsistency between the boundaries

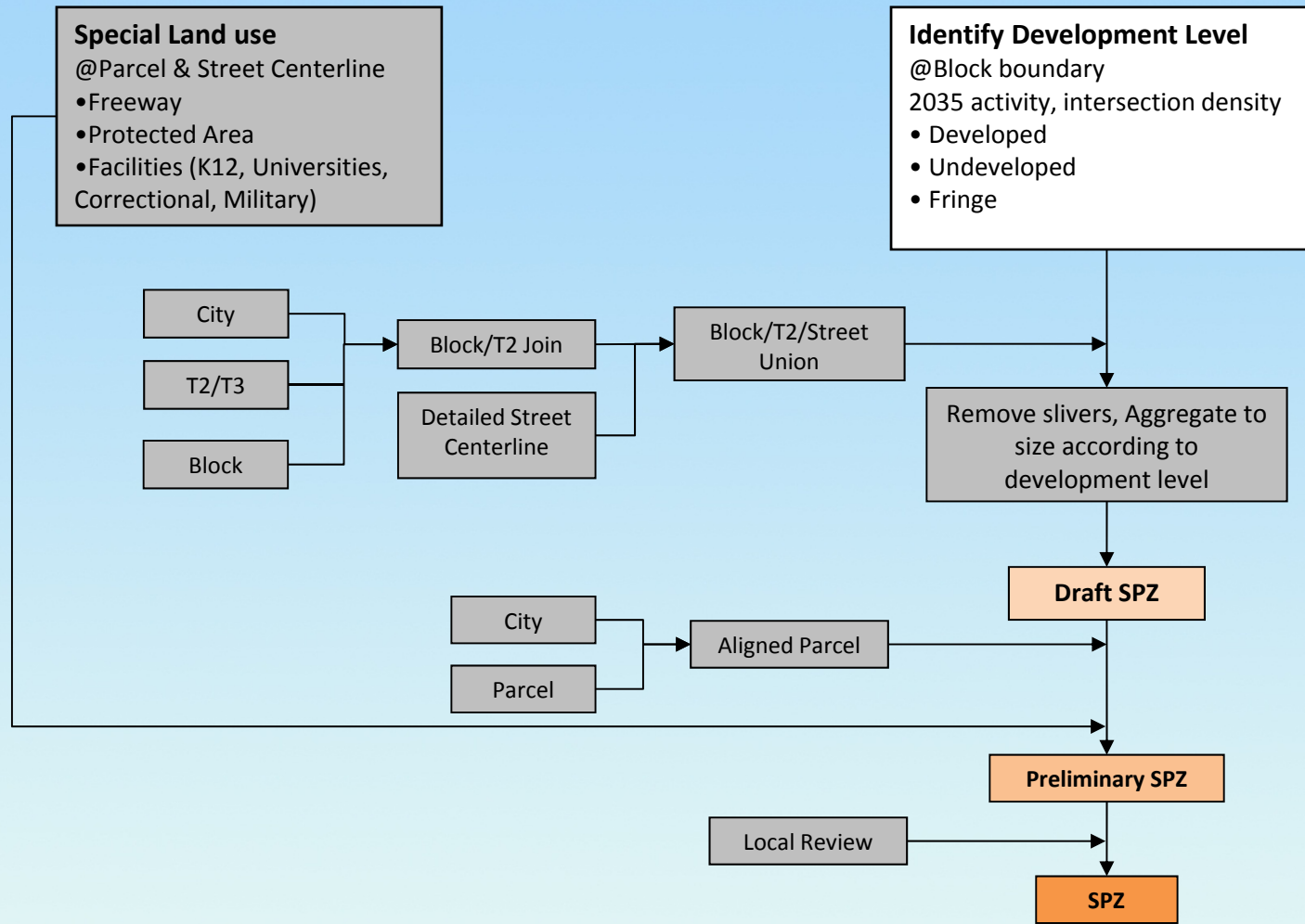
Procedure

- Split the region by guidance of established boundaries
 - Separate region into **developed, undeveloped** and **fringe** areas – which is a guide to determine zone size
 - Separate special land use into freeway, CPAD, school, utility parcels
- Micro-adjust boundary based on hierarchy
 - City boundary
 - Parcel
 - Street Centerline (to draw line on non-parcel street)
 - 2010 Census Block
 - Tier2/Tier3
- Stepwise aggregation, and disaggregation

Procedure



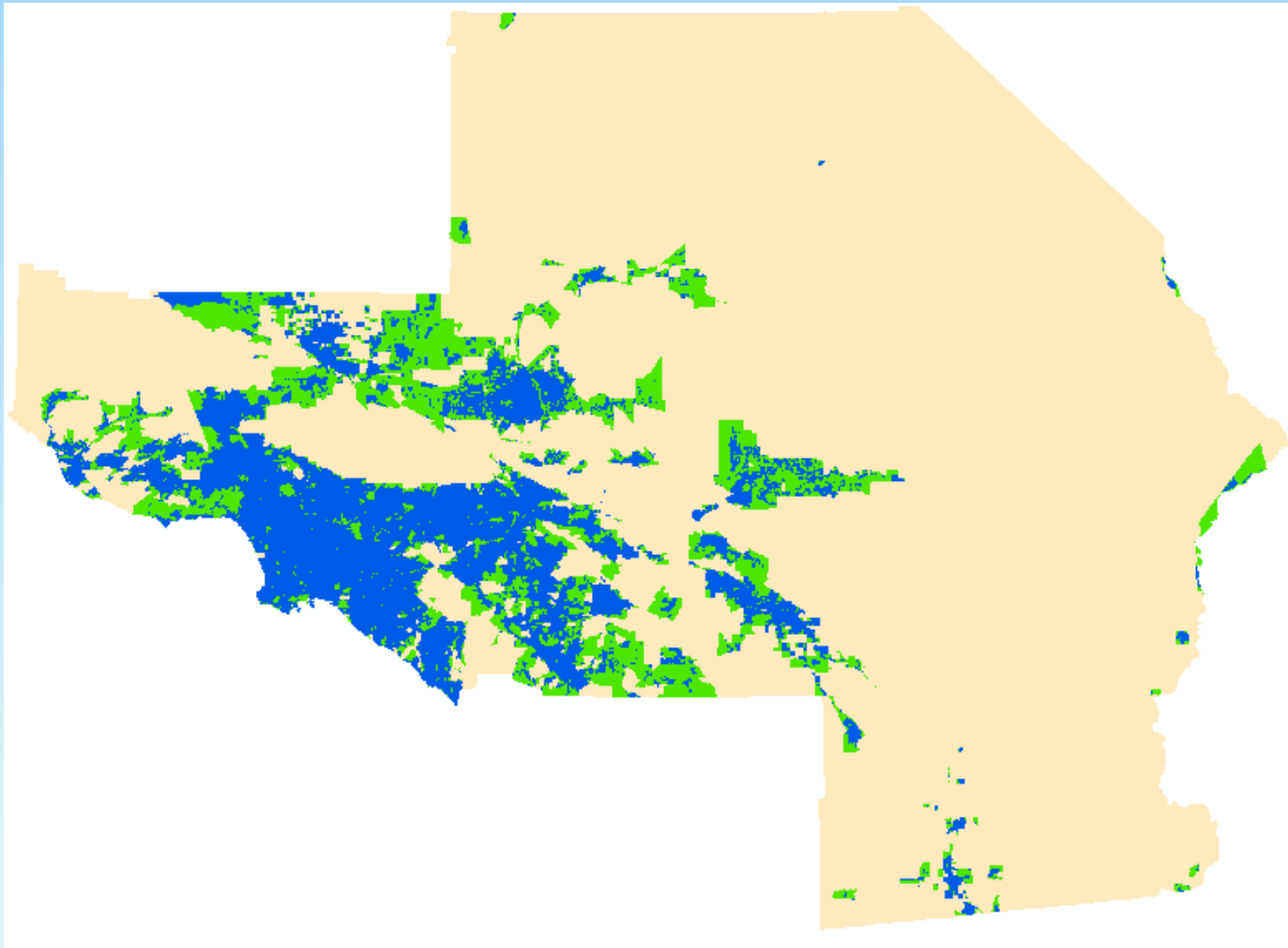
Identifying Development Level



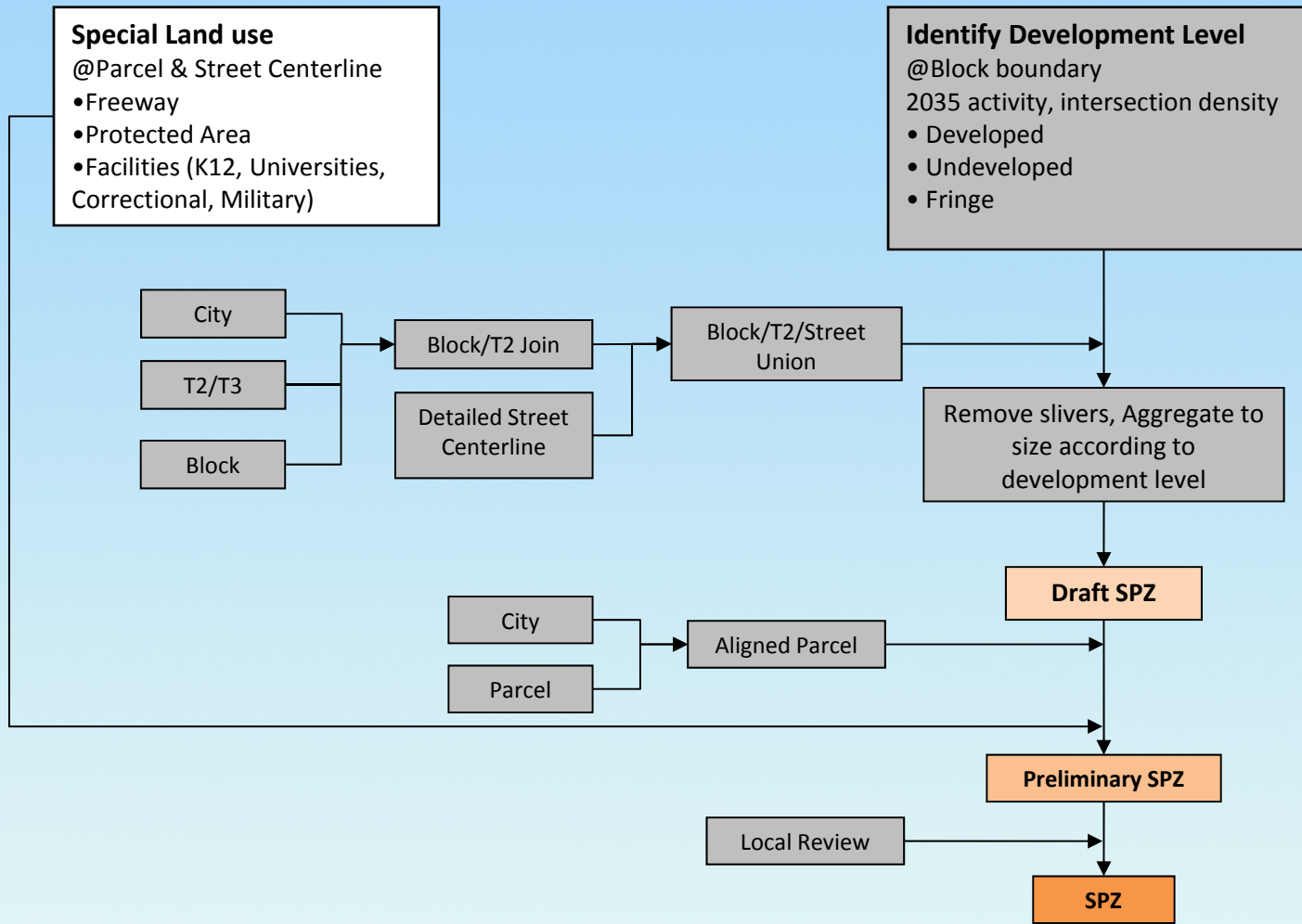
Identifying Development Level

- Color the region by development level
 - Developed, Undeveloped and Fringe area
 - Zone size depends on this development level, along with Area Type
- By measures on 2010 Block Boundary
 - Number of local street intersections near centroid
 - Activity index ($HH*3+Emp*2$ @ 2035)
 - Flocking : change color if surrounded by other color
- Adjust within T2/T3
 - 2010 Block + T2/T3 Join
 - Flocking within T2/T3

Identifying Development Level

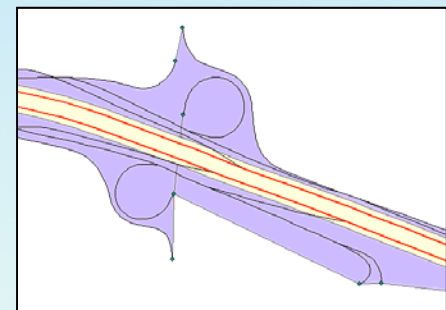
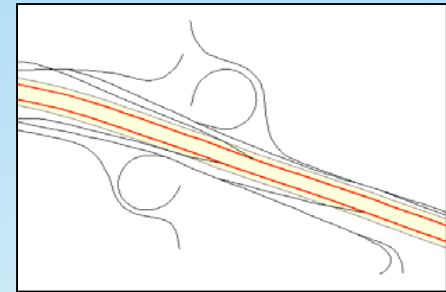
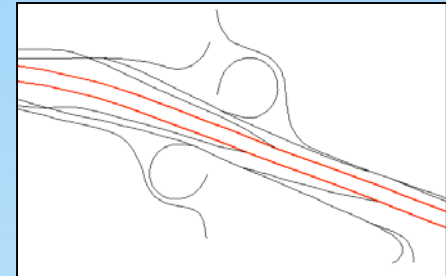


Special Land Use

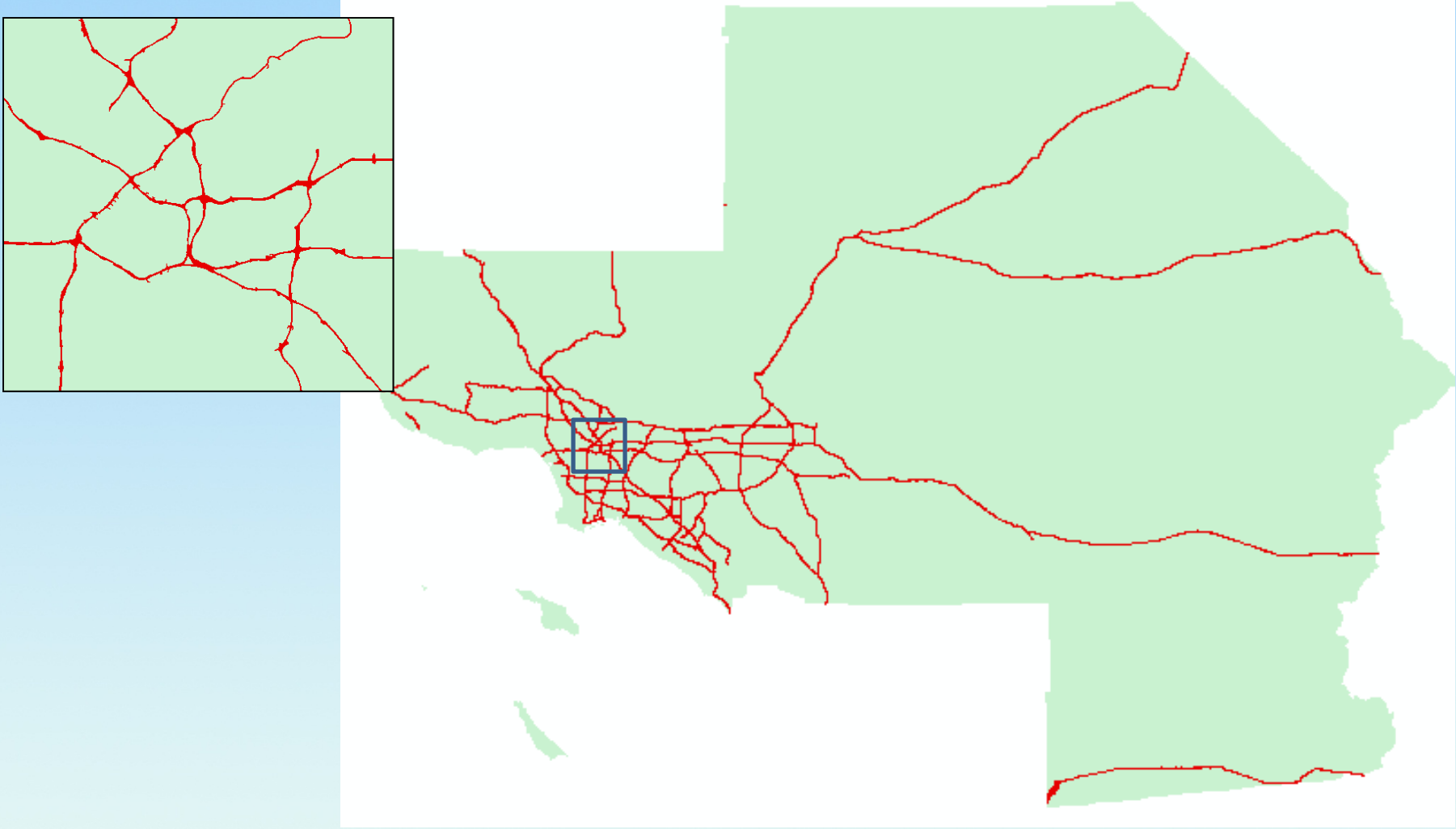


Special Land Use - Freeway

- Separate highway segments from TeleAtlas (TomTom 2009) lines
 - primary or interstate highway (limited-access)
 - Access ramps, cloverleaf or limited-access interchange
- Polygonize the Main Line
 - By enclosing ends on the freeway lines
 - Assumed width. Then expand by at least 30 ft
- Ramp Polygon
 - Identify end points from ramp lines
 - Create mesh by the connect the end points within $\frac{1}{4}$ mile and convert the mesh to polygon



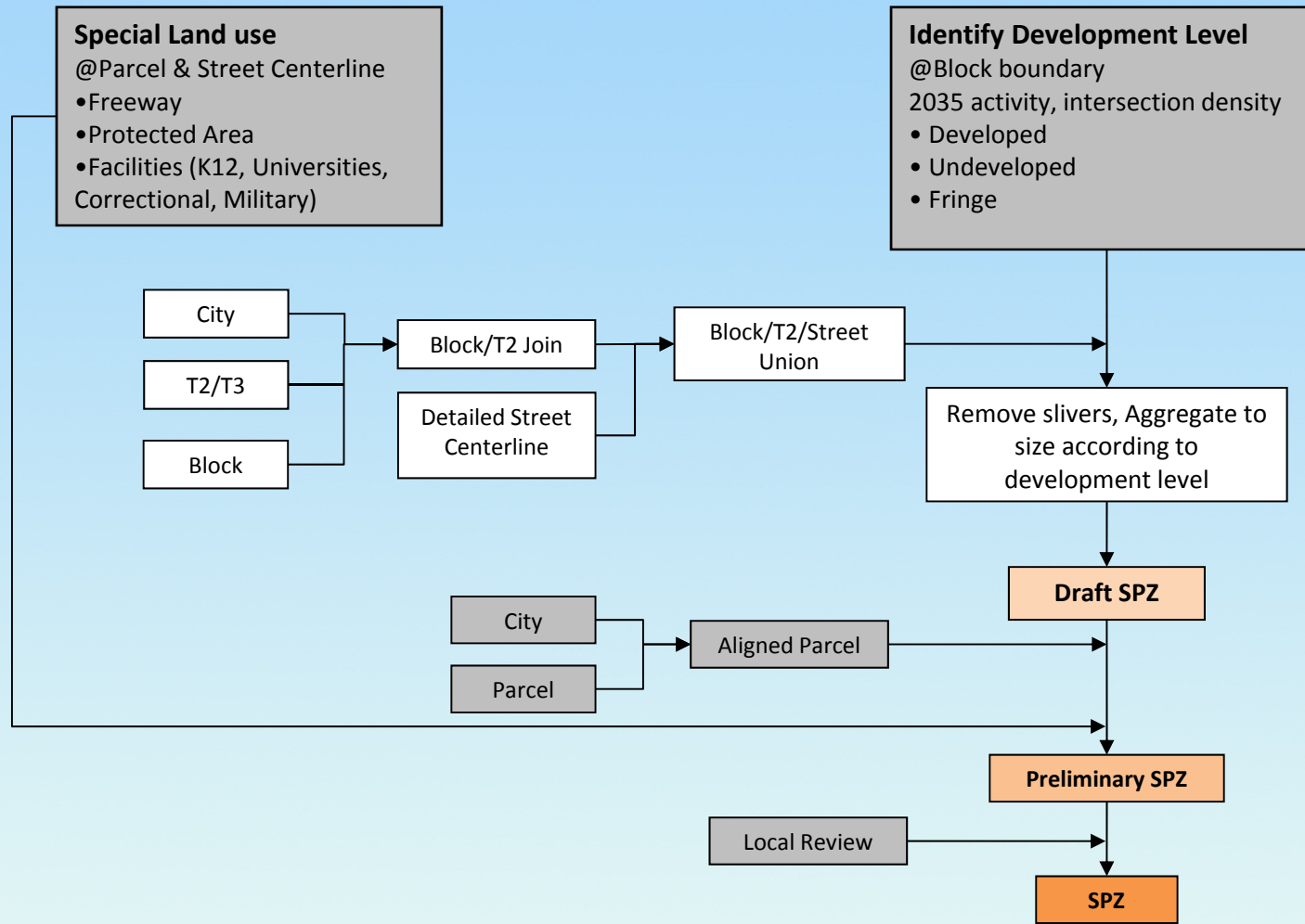
Special Land Use - Freeway



Special Land Use - Facilities

- School (K-12)
 - Join 2012 school points to parcel 2008
 - Non-residential and size > ¼ acre
- College : LU08=1265 and LU10=MSCH
- Correction : LU08=1251
- Military Base : LU08=1270~1275 and size > 1 acre
- Cemetery : (LU08=1840 or LU10=CCEM) and size > 1 acre
- CPAD for the blue area (assuming parks)

Draft SPZ



Draft SPZ

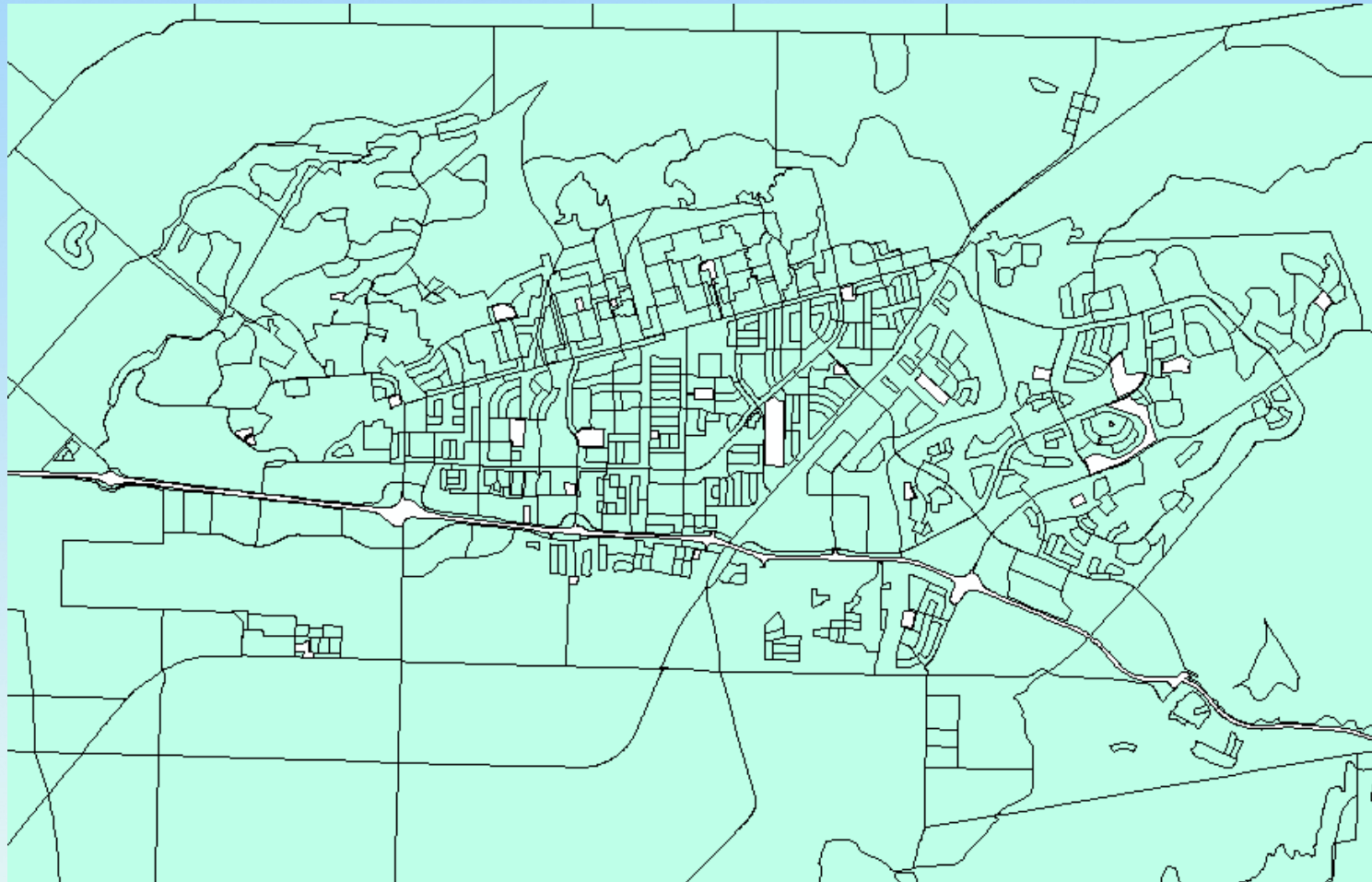
- Exclude the special land use Polygon
- New smaller boundary created by union 2010 Block (with development level identified) with
 - City
 - T3
 - Street centerline

Draft SPZ

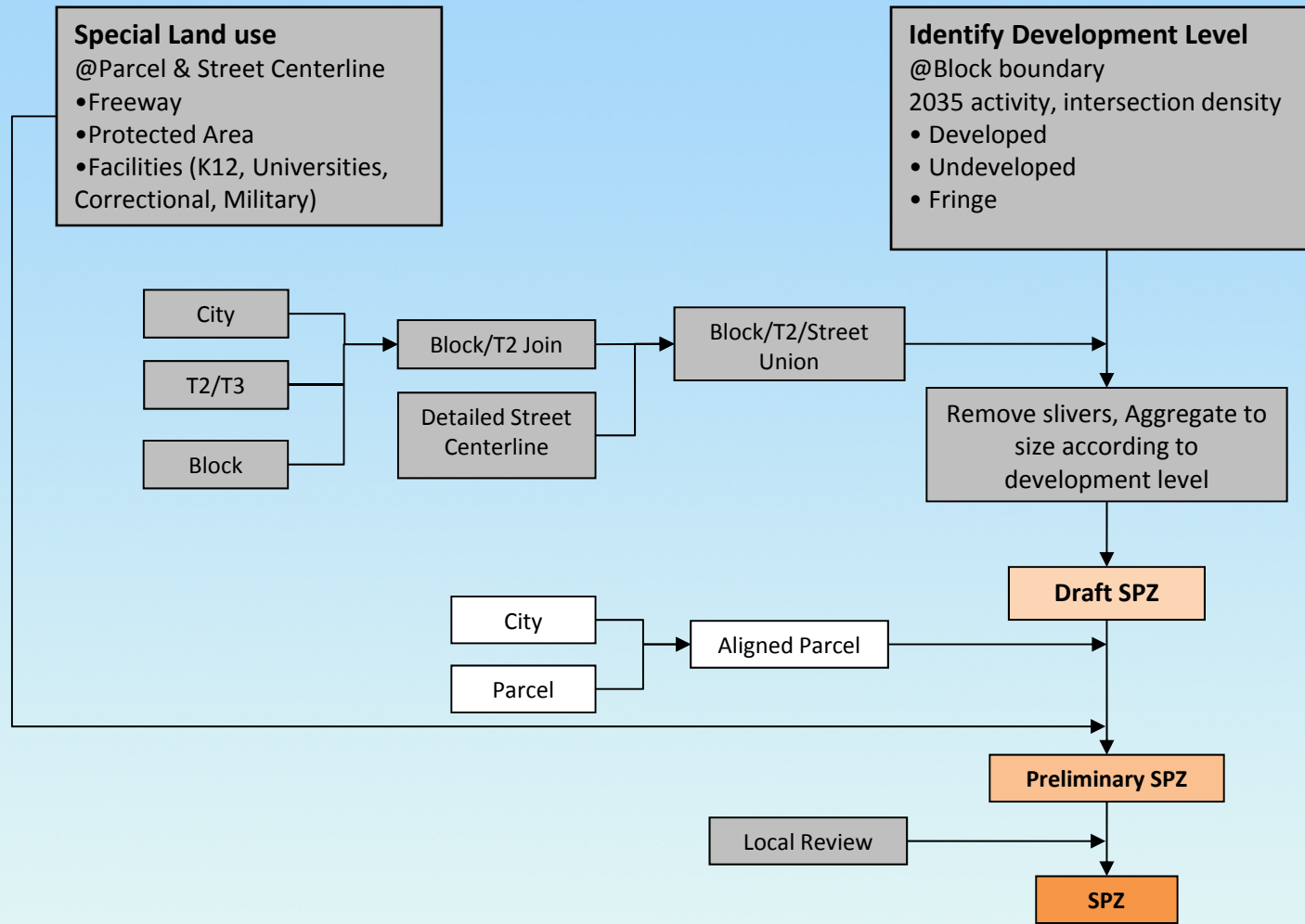
- Then,
 - Dissolve slivers
 - Silver = compactness < X or area < Y acres
 - Dissolve to neighbor with longest common boundary

 - Initial aggregate to make minimum acreage
 - 1 acre in blue and Area Type = 1
 - 2 acres in blue and Area Type = 2,3
 - 3 acres in blue and Area Type = other
 - 5 acres in green
 - 50 acres in beige

Draft SPZ

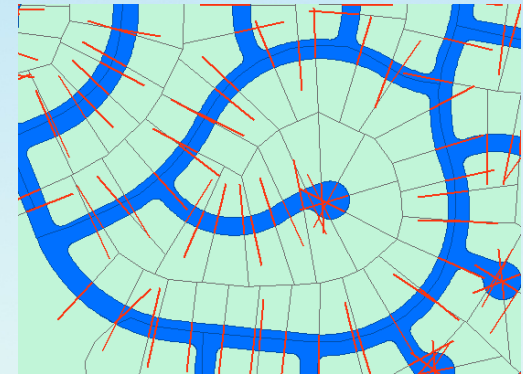
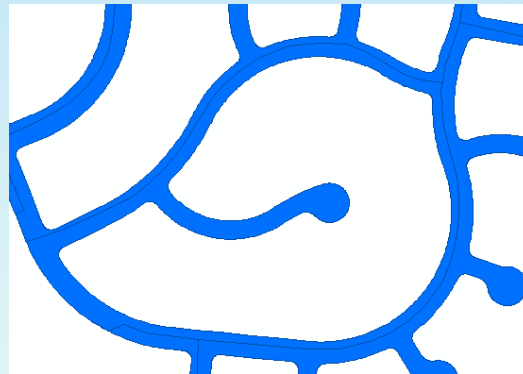


Draft SPZ to Preliminary SPZ



Preliminary SPZ

- Prepare Parcel Boundary
 - Align with City boundary : split should be $\frac{1}{4}$ acre or more
 - Fill in the street-blank (no parcel area)
 - Street-only area within a dSPZ
 - Extension from parcel vertex into street-blank
 - Split the street-blank with the extension, and dissolve with parcels according to size criteria

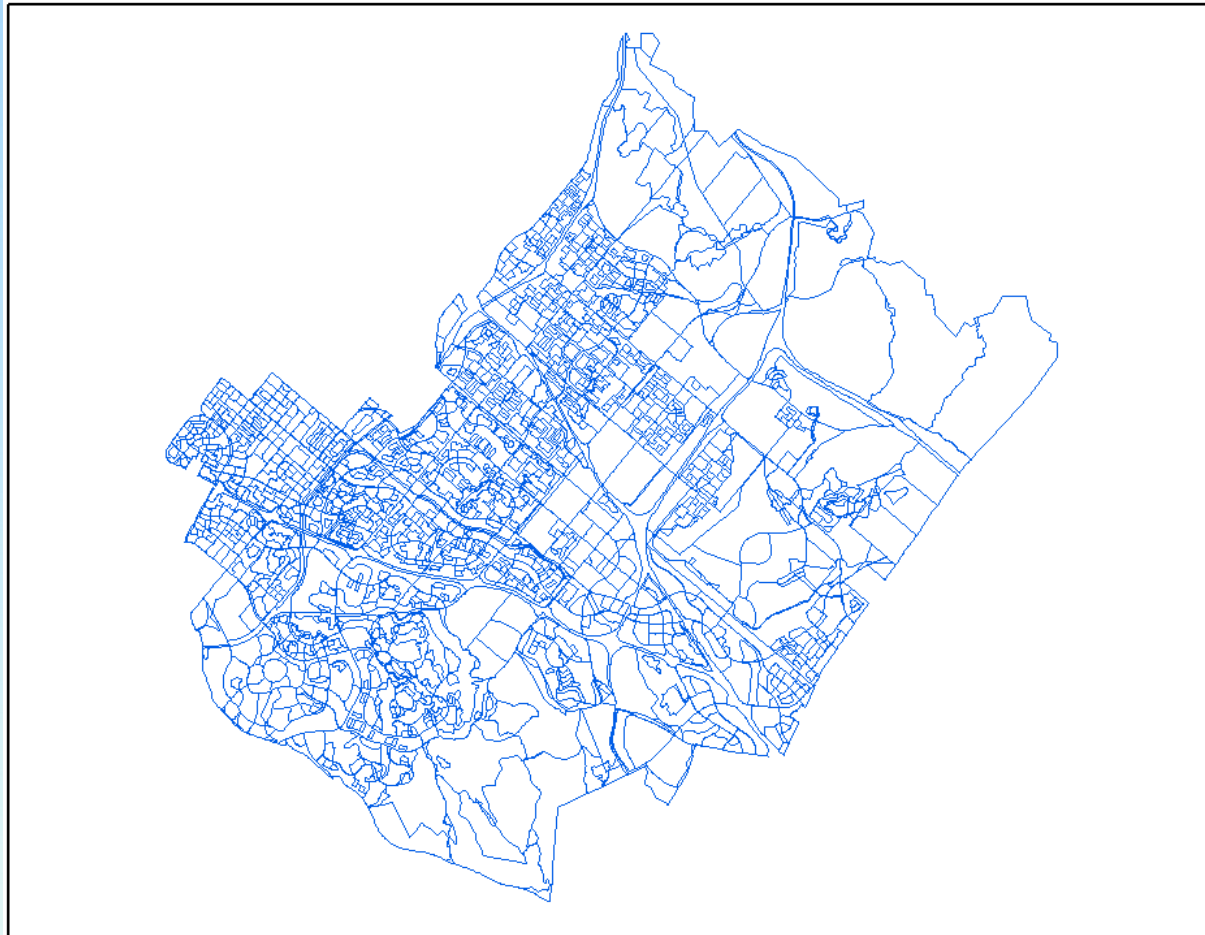


Preliminary SPZ

- Adjust dSPZ
 - Align with adjusted parcel line
 - Split dSPZ for size based on the adjusted parcel line
 - Detect tadpole shapes, split the tail and dissolve
- Minimum SPZ Size vs. Expected Activity
 - Region-wide SPZ to be 250K~300K
 - Activity Index 170 (30 HH+40 Emp) per SPZ
 - Maintain the minimum size (at least 3 acres), instead keep the number of SPZ (that corresponds to Activity Index)
 - For example, Irvine needs 5,124 SPZs in terms of activity, but 3010 zones were created to keep the minimum 3 acres.

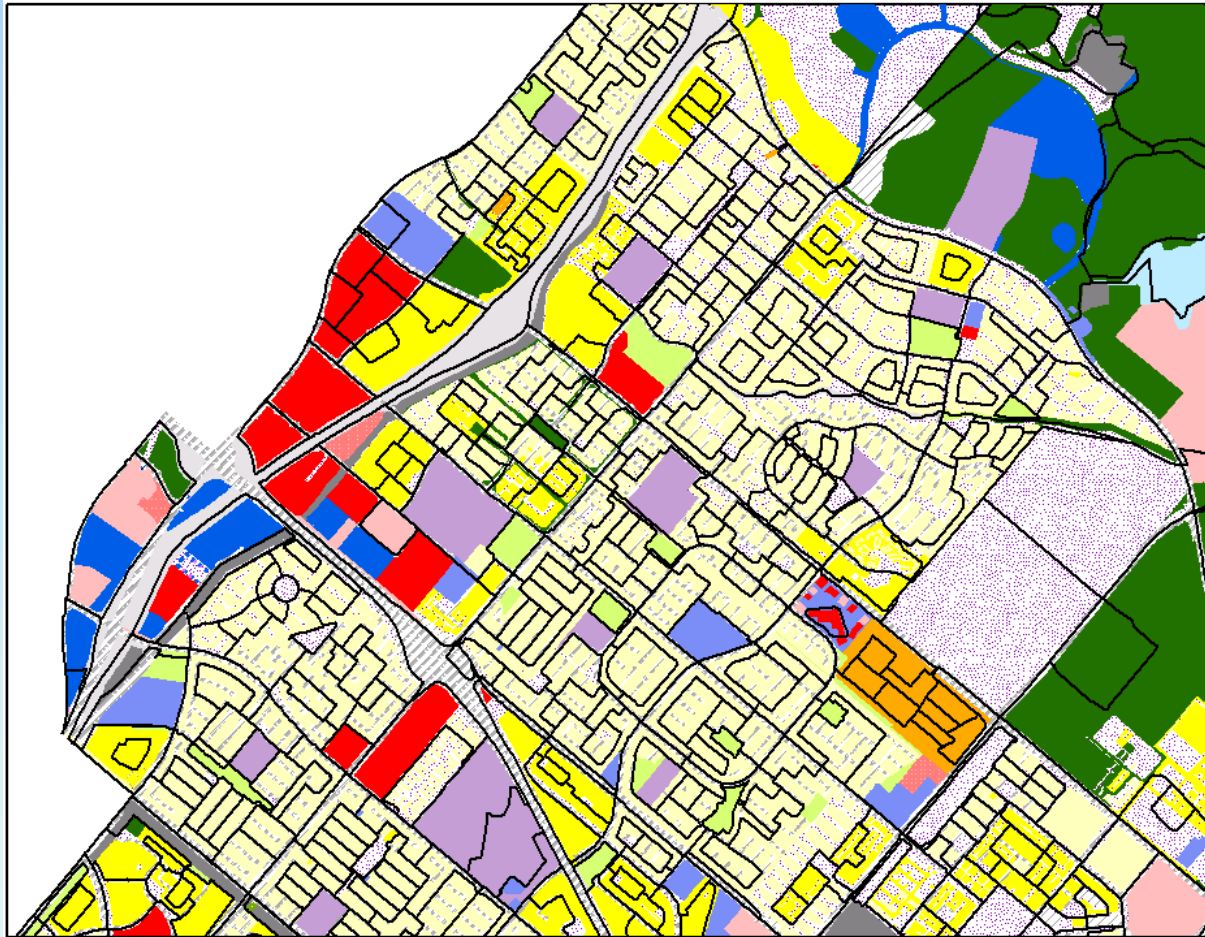
Preliminary SPZ

- Irvine Example



Preliminary SPZ

- Irvine Example



Preliminary SPZ - Summary

Modeling Area	2010 Census Block	CSA	Tier2	draft SPZ	SPZ
Imperial	8,875	15	239	3,929	8,720
Los Angeles	109,468	155	5,697	61,072	135,580
Orange	36,842	43	1,741	15,707	35,870
Riverside	35,718	38	1,532	20,788	47,150
San Bernardino	48,176	34	1,395	27,137	61,240
Ventura	14,811	17	663	6,257	13,010
Sum	253,890	302	11,267	134,890	300,000

Technical Challenges

- Scripting the procedure
 - Started with PostGIS + PostgreSQL for speed
 - Shifted to ArcGIS + Python
- Limited methods to characterize polygon shape
 - Slivers
 - Sliver is a relative term
 - Detection requires review both of geometry and attributes
 - Odd shapes
 - Remainder created after select out “regularly shaped polygons”
 - New measurements
 - Regroup small pieces into regular shape
 - No global optimum solution yet.

Technical Challenges

- Oddities

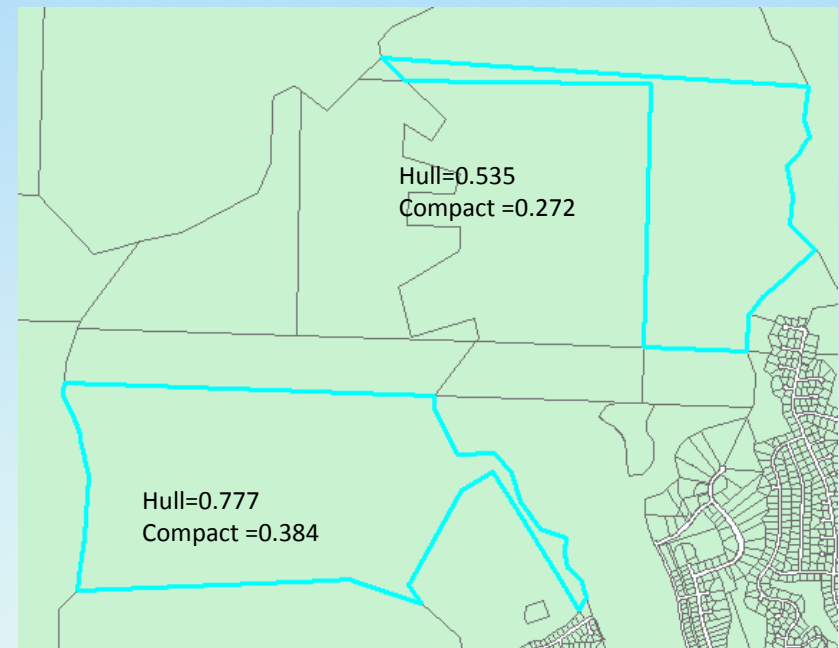
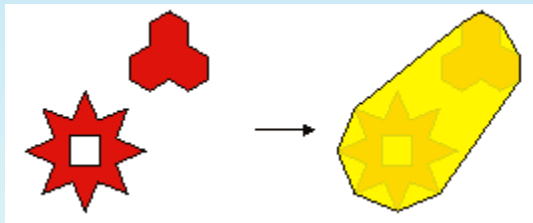


Technical Challenges

■ Tadpole Cases

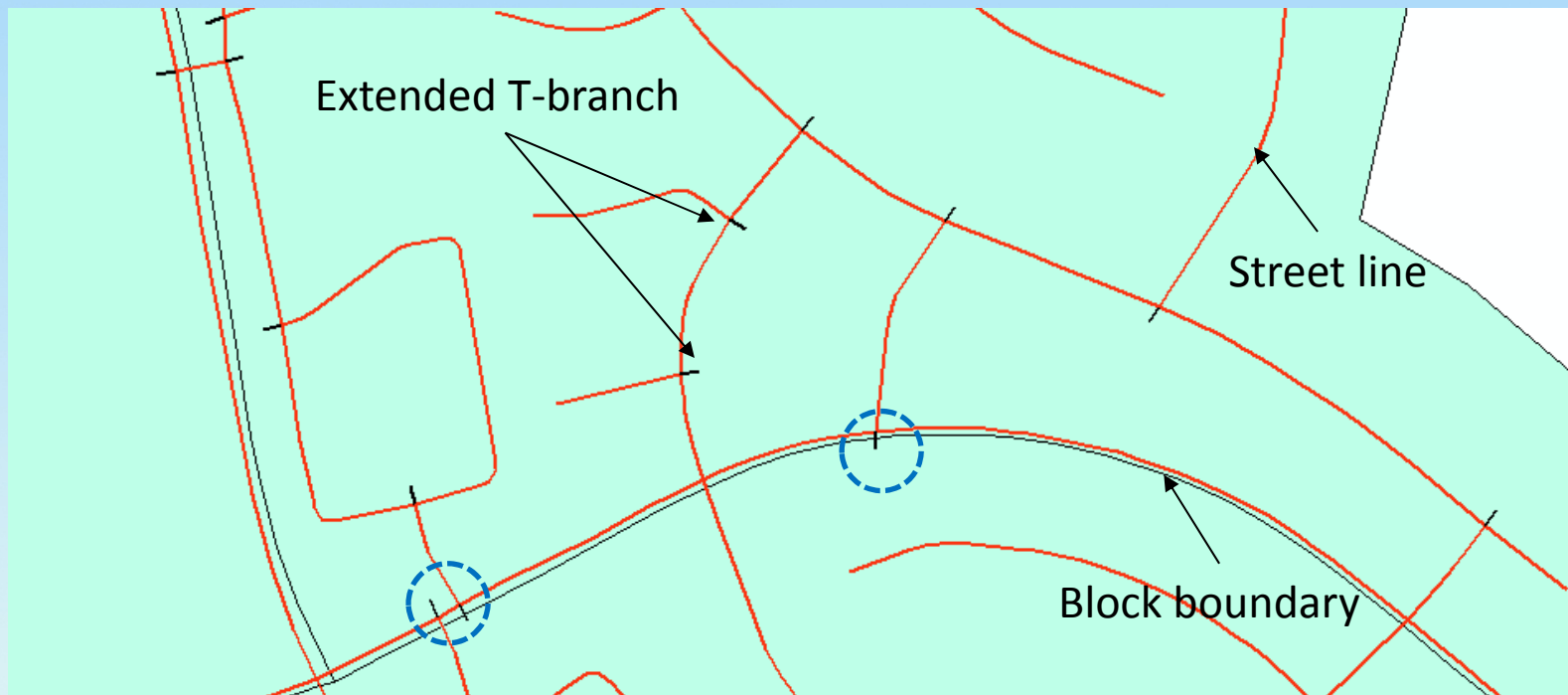
• Detection

- Average width = $\text{Area} / (\text{Length} / 2)$
 - More than 30 meters
- Compactiveness
 - 0.2 to 0.4
- Ratio to Convex Hull area
 - 0.5 to 0.8



Technical Challenges

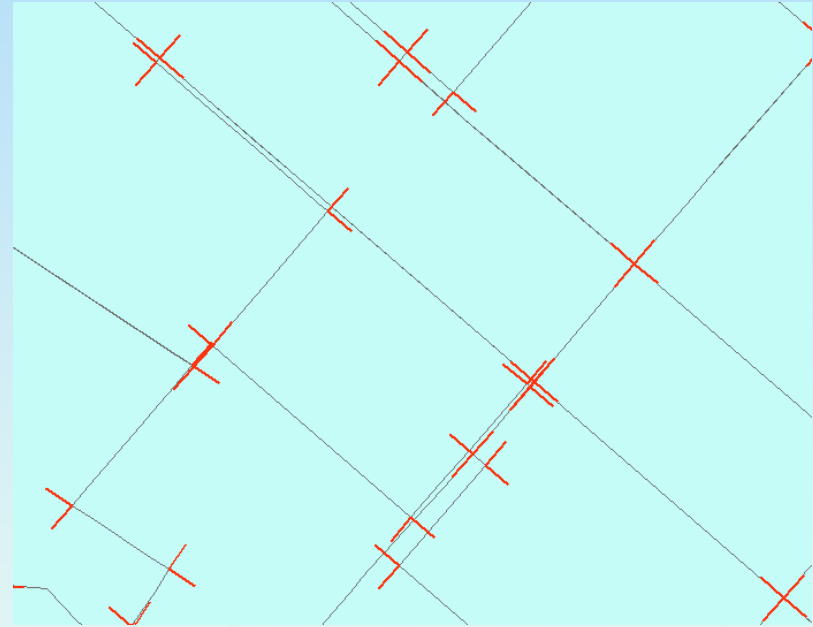
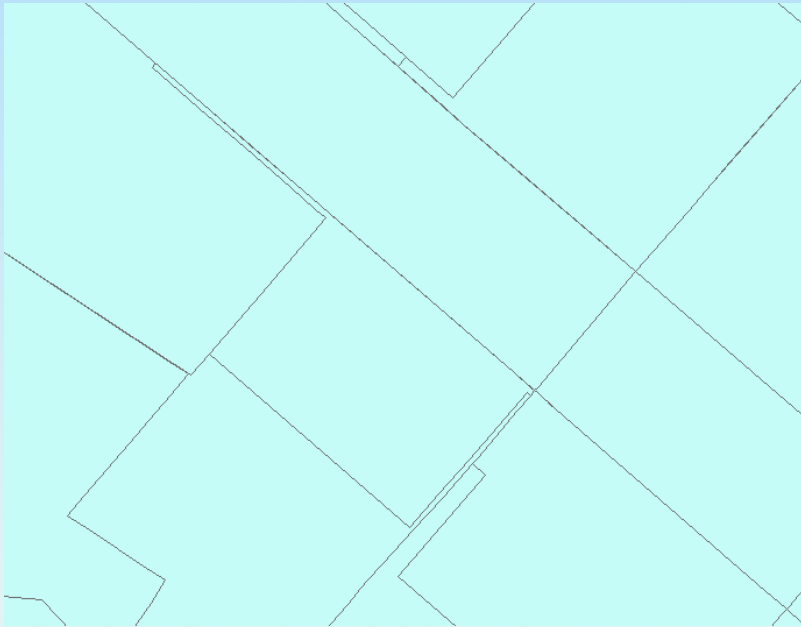
- Prevent Tadpoles by extension of T-branches



Preliminary SPZ

- Resolve Tadpole Cases

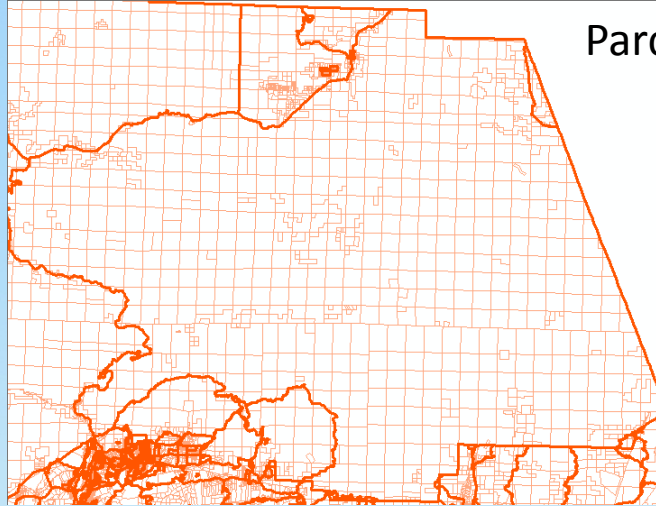
- Once detected, create L-shape hair-lines at every corner, split thin/long polygons from the body
- Reassigned the tail to neighboring polygon



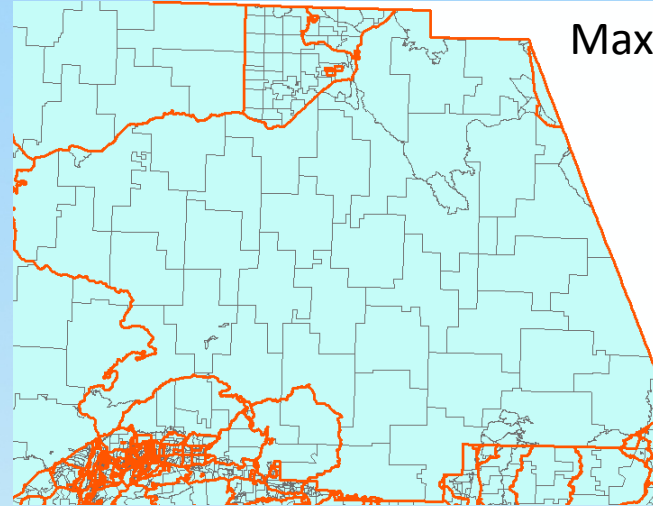
Technical Challenges

- Split Large dSPZ by Parcel
 - Or aggregate parcels
 - 3 Parcel Aggregation Strategies
 - By maximum Compactiveness
 - Compactiveness = $\text{Area} / \text{length} / \text{length} * 4\pi$
 - Result in circle-shape
 - By shortest distance from starting parcel
 - Result in half-circle
 - By shortest horizontal/vertical distance from starting parcel
 - Result in long / slender shape
 - Combination of all three, and adjust at border

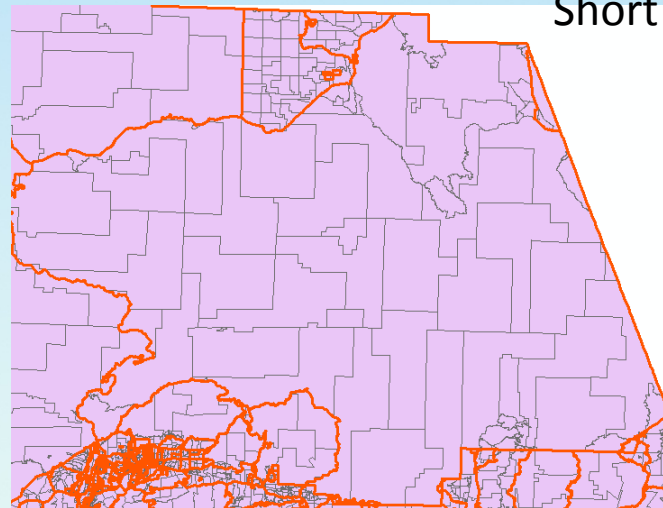
Technical Challenges



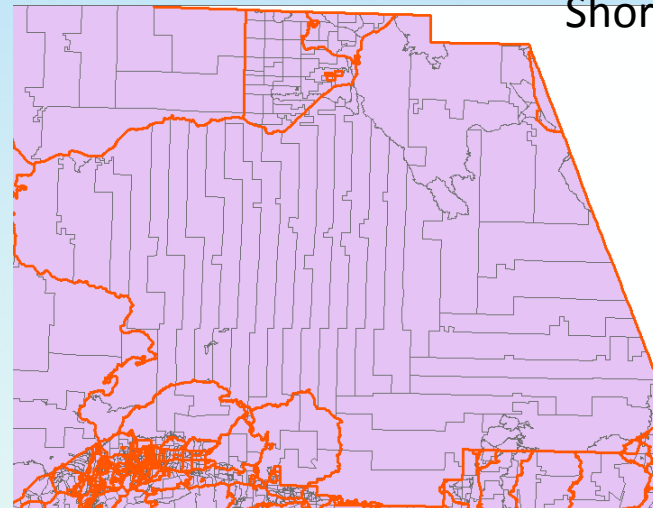
Parcel



Max Compact



Short Dist



Short H-V dist

Questions?