
PART
piedmont authority for regional transportation

Area Type Sub Model Estimation

- **AT classification used in:**

  -Estimating highway capacities

  -Stratifying work trip attractions

  -Summarize results of mode choice model

- **Why Modeling AT?**

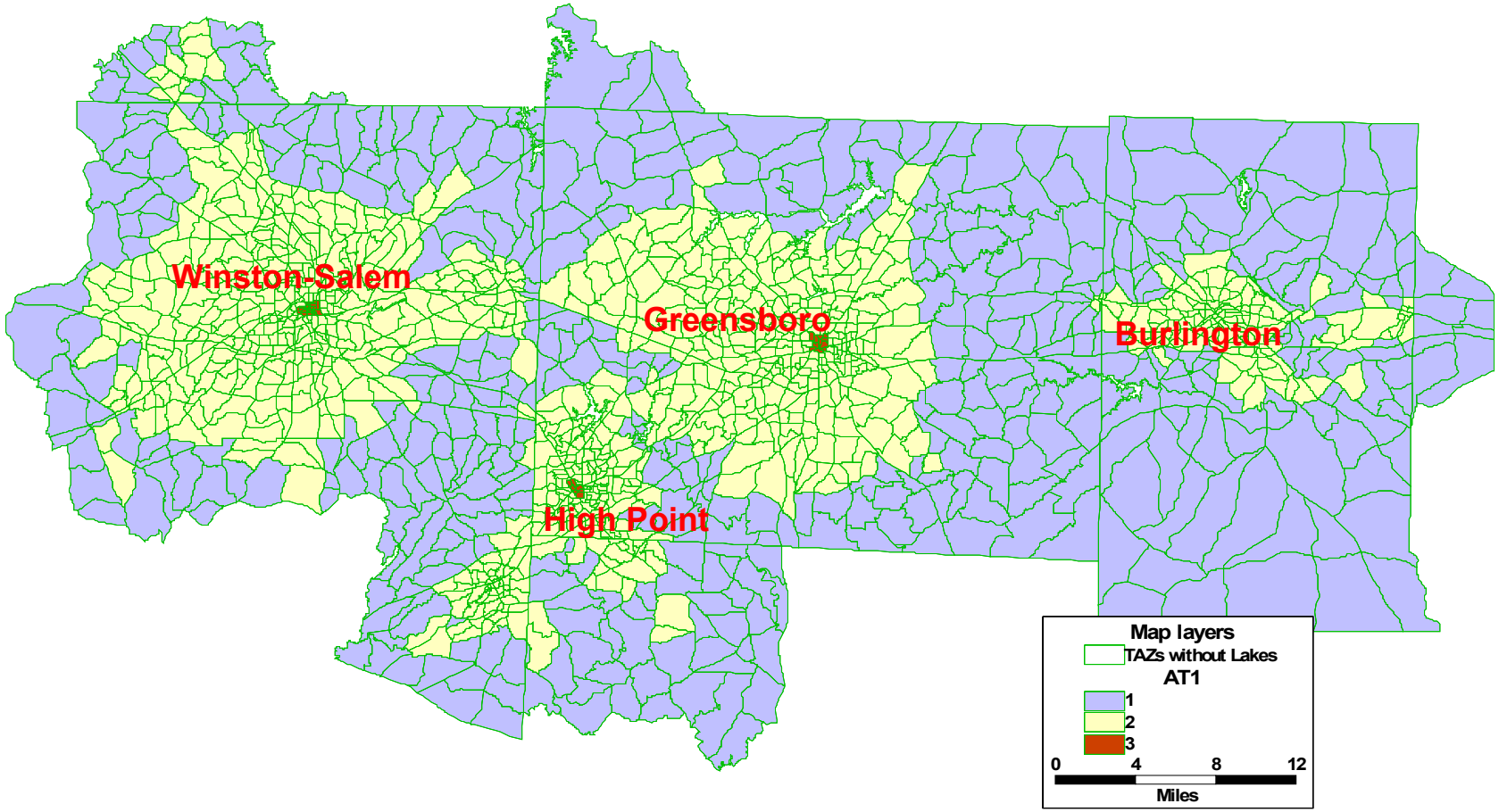
  - Should be sensitive with the changes in future data

  -Simple definitions not possible using individual zonal data

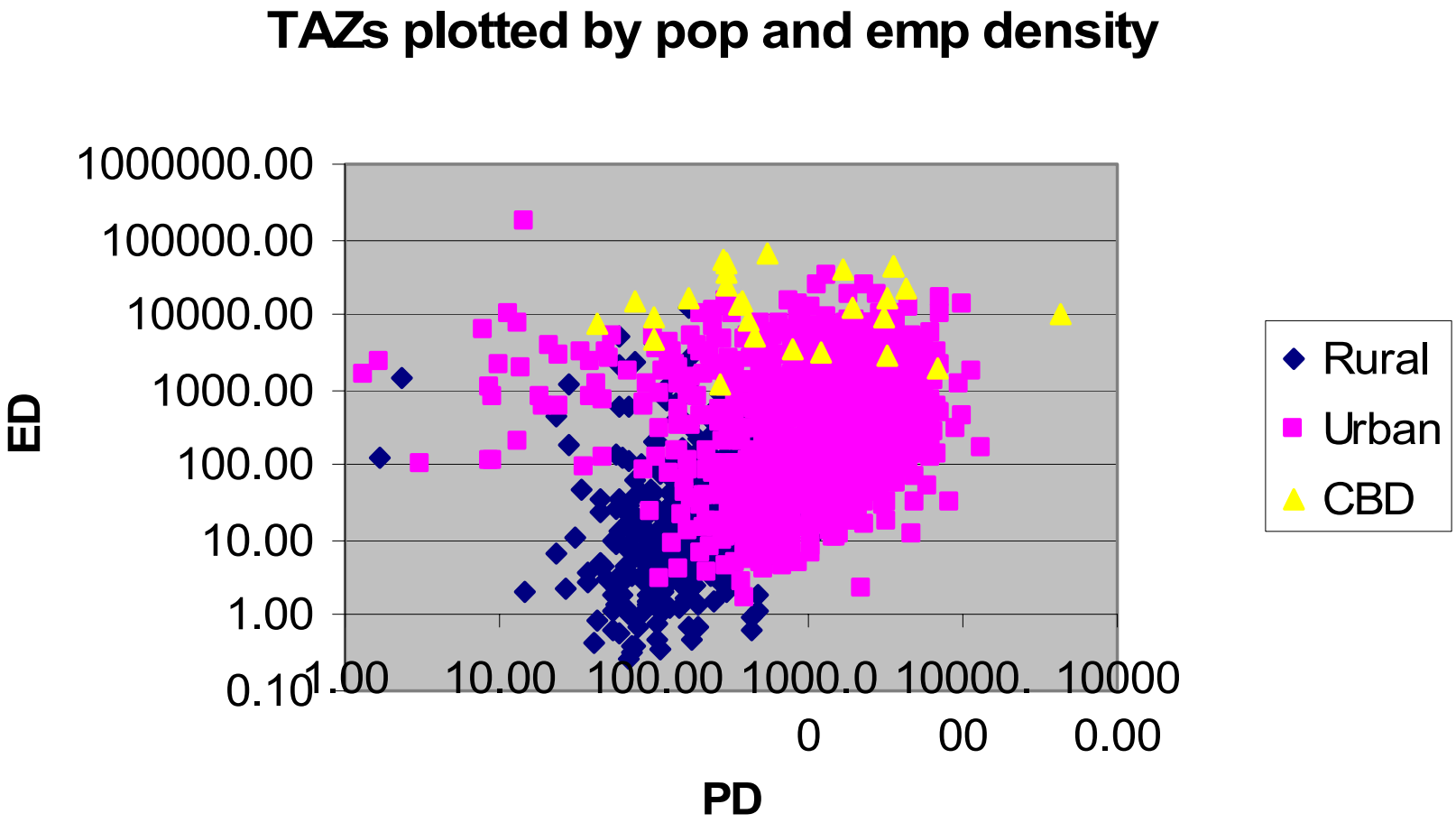
Model Estimation Methodology

- "Model team" prepared a "Subjective" map
  - Used as the "Target Map"
- Area Types based on geography and local knowledge
  - -Rural
  - -Urban
  - -CBD
- Assumptions in Model Estimation
  - -AT of a TAZ depends on the PD and ED and/or LOS
  - -AT of a TAZ is related to surrounding zones

“Subjective” AT Map

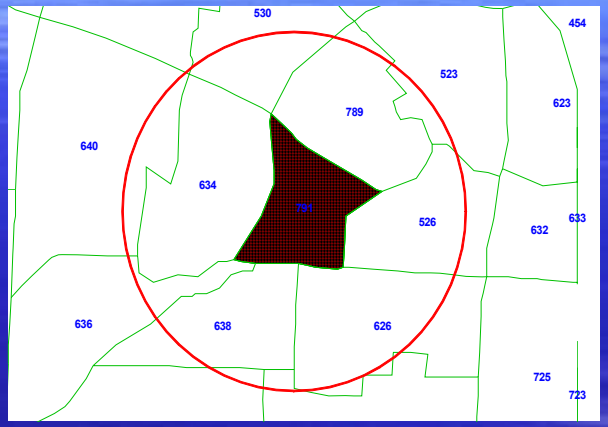


Original TAZ distributions



Model Estimation Methodology Contd.

- Need for considering the surrounding zones
- Which Surrounding zones need to be considered?



- 3 Approaches Tested

- Zones within a distance specified by

  - User (X)
  - A multiple (F) of Zonal Units (ZU),
    Where ZU = SQRT(A)

  and

  -Adjacent Zones (Physically touching)

Model Estimation Methodology Contd.

- **Which approach gives best results?**

  -Approach 1: X is varied from 0.5 to 2.5 mi. @ 0.5 interval.

  -Approach 2: F is varied from 0.75 to 2 @ 0.25 interval

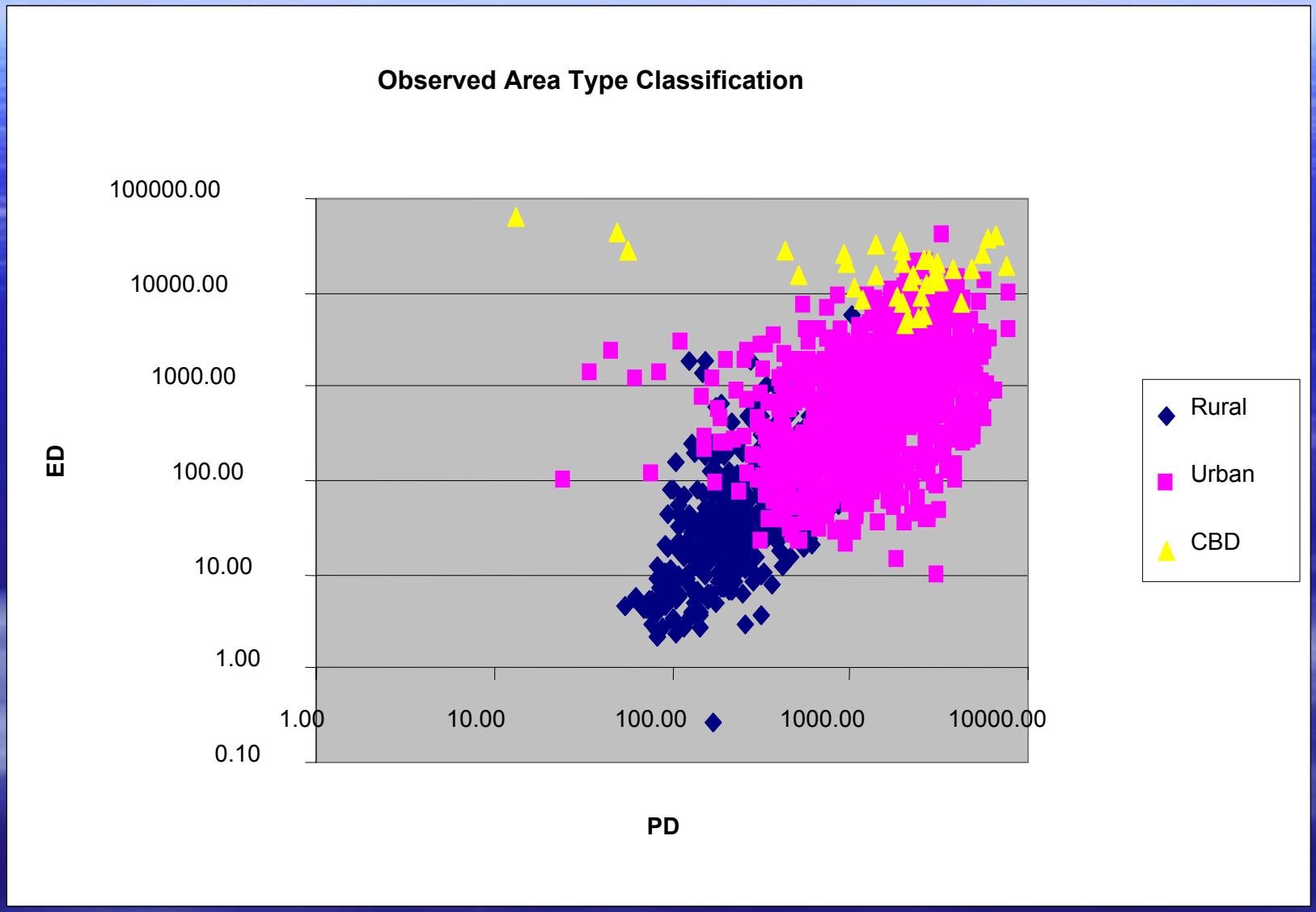
  -Approach 3: No variation

- **TAZs distributed graphically by W/Avg. of PD and ED & observed in GIS**

  - Better distribution of area types

  -Difficult to define AT

Observed AT classification from Approach 2, F=1.5



Model Estimation Methodology Contd.

- **Need of a statistical analysis**
- **Discriminant Classification Test:**

  -Target classes : Existing AT classes from “Subjective” map

  Rural =1, Urban = 2, CBD=3

  - Variables used : PD and ED

  - Results:

    – Classification function coefficients

    – Classification table

    – Case wise representation of observed and predicted AT
- **Classification tables compared for each approach**
- **Approach 2 with F = 1.5 is selected to be the best for Triad**

Discriminant Classification Results

Table 1: AT classification using PD and ED of individual TAZs

Classification Table

Act. Group	Pred. Group 1	2	3	Correctly Classified
1	505	2	0	0.996
2	428	664	17	0.599
3	15	4	20	0.513
Overall Correct Class. Rate				0.718

Table 2: AT classification using Approach 1, X = 0.5

Classification Table

Act. Group	Pred. Group 1	2	3	Correctly Classified
1	504	3	0	0.994
2	375	699	35	0.630
3	0	8	31	0.795
Overall Correct Class. Rate				0.746

Table 3: AT classification using Approach 1, X = 1

Classification Table

Act. Group	Pred. Group 1	2	3	Correctly Classified
1	496	11	0	0.978
2	334	701	74	0.632
3	0	6	33	0.846
Overall Correct Class. Rate				0.743

Table 4: AT classification using Approach 1, X = 1.5

Classification Table

Act. Group	Pred. Group 1	2	3	Correctly Classified
1	498	9	0	0.982
2	313	680	116	0.613
3	0	6	33	0.846
Overall Correct Class. Rate				0.732

Discriminant Classification Results Contd.

Table 5: AT classification using Approach 1, X = 2

Classification Table

Act. Group	Pred. Group 1	2	3	Correctly Classified
1	492	15	0	0.970
2	301	651	157	0.587
3	0	6	33	0.846
Overall Correct Class. Rate				0.711

Table 6: AT classification using Approach 1, X = 2.5

Classification Table

Act. Group	Pred. Group 1	2	3	Correctly Classified
1	485	22	0	0.957
2	296	619	194	0.558
3	0	6	33	0.846
Overall Correct Class. Rate				0.687

Table 7: AT classification using Approach 2, F =0.75

Classification Table

Act. Group	Pred. Group 1	2	3	Correctly Classified
1	503	3	1	0.992
2	422	670	17	0.604
3	12	6	21	0.538
Overall Correct Class. Rate				0.721

Table 8: AT classification using Approach 2, F = 1.00

Classification Table

Act. Group	Pred. Group 1	2	3	Correctly Classified
1	499	8	0	0.984
2	393	697	19	0.628
3	5	10	24	0.615
Overall Correct Class. Rate				0.737

Discriminant Classification Results Contd.

Table 9: AT classification using Approach 2, F = 1.25

Classification Table				
	Pred. Group			Correctly
Act. Group	1	2	3	Classified
1	502	5	0	0.990
2	360	734	15	0.662
3	2	9	28	0.718
Overall Correct Class. Rate				0.764

Table 10: AT classification using Approach 2, F =1.5

Classification Table				
	Pred. Group			Correctly
Act. Group	1	2	3	Classified
1	500	7	0	0.986
2	361	735	13	0.663
3	0	9	30	0.769
Overall Correct Class. Rate				0.764

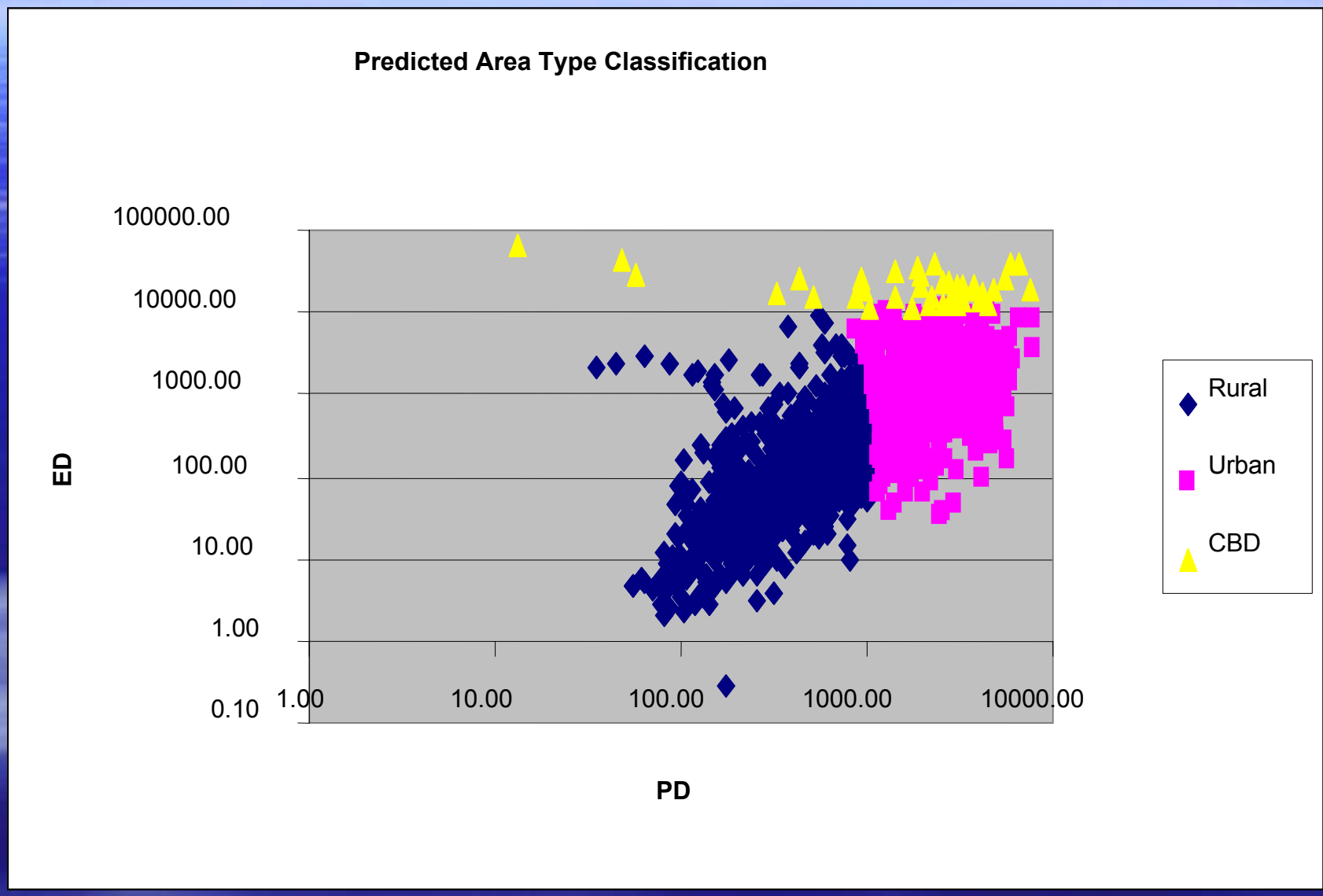
Table 11: AT classification using Approach 2, F = 2

Classification Table				
	Pred. Group			Correctly
Act. Group	1	2	3	Classified
1	499	8	0	0.984
2	362	733	14	0.661
3	0	10	29	0.744
Overall Correct Class. Rate				0.762

Table 12: AT classification using Approach 3

Classification Table				
	Pred. Group			Correctly
Act. Group	1	2	3	Classified
1	499	8	0	0.984
2	404	693	12	0.625
3	1	13	25	0.641
Overall Correct Class. Rate				0.735

Predicted AT Classification by Discriminant Analysis on Approach 2, F=1.5



Difference between Predicted AT Map and Target Map

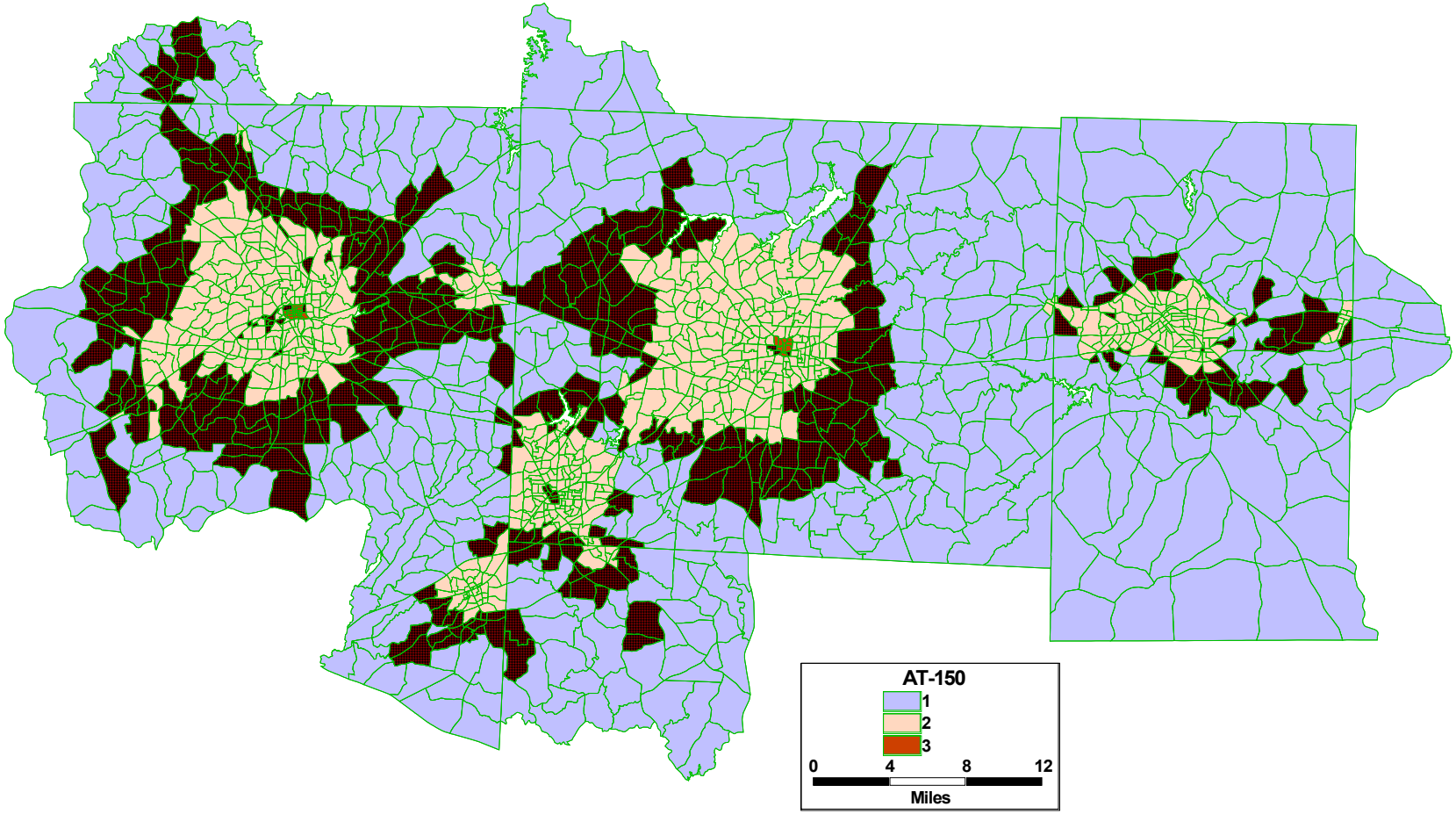
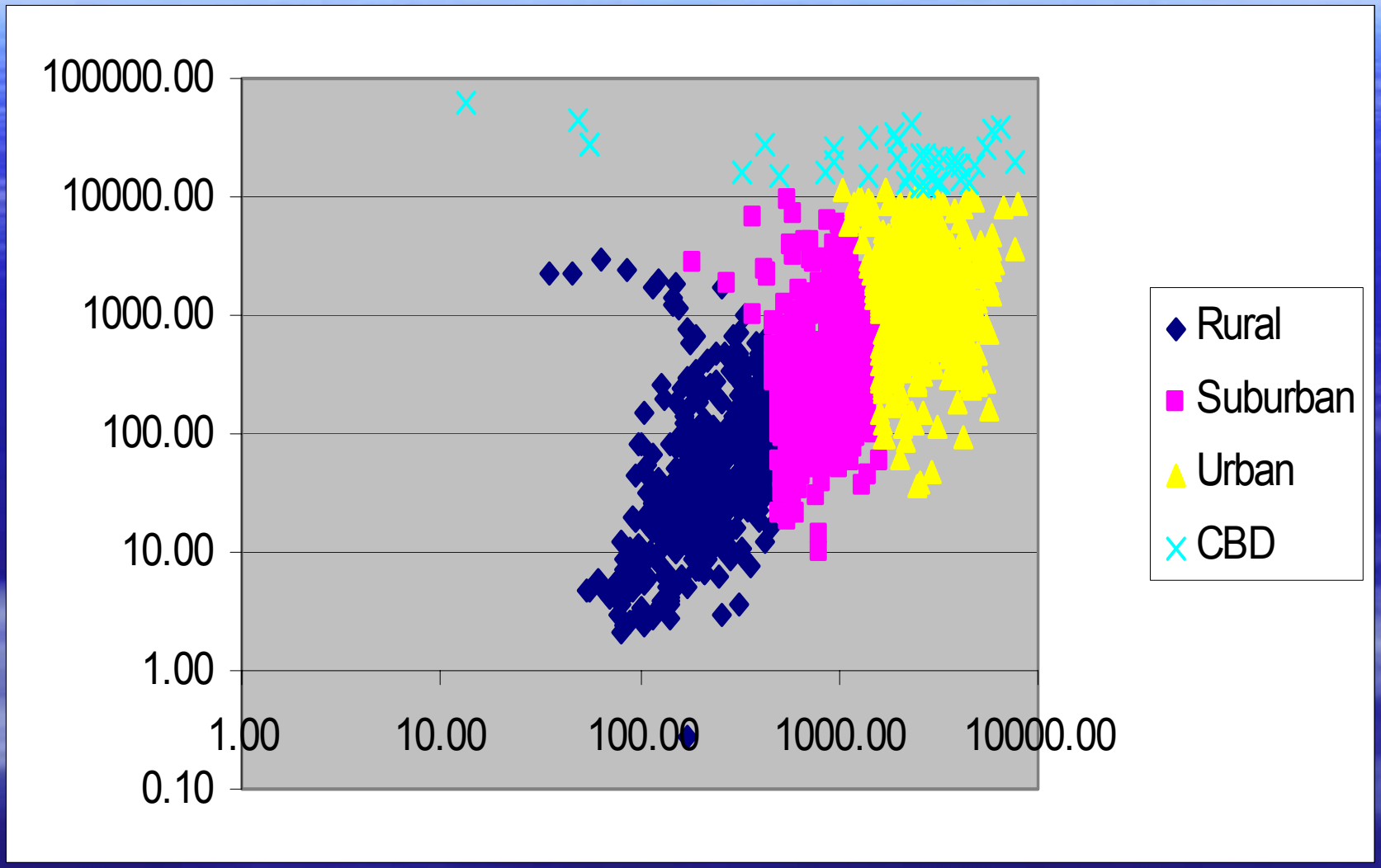
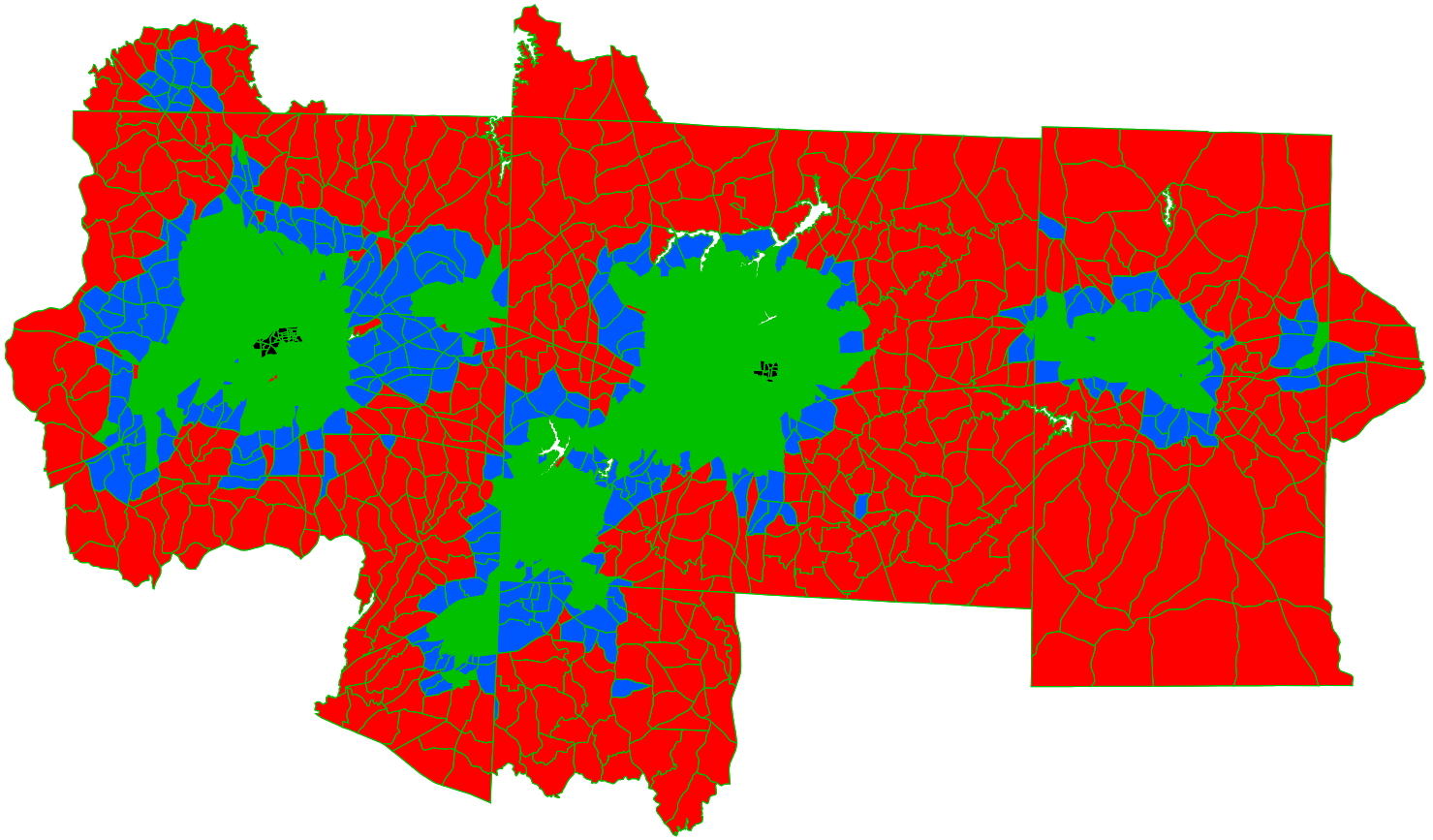


Figure 6: AT Classification using Temporary “Suburban” Category.



Predicted AT Map using Temporary Suburban Class



Final Adjustments

- **CBD**

  -CBD TAZs not properly separated from Urban

  - Some TAZs outside the target CBD have high ED

  -Not contiguous

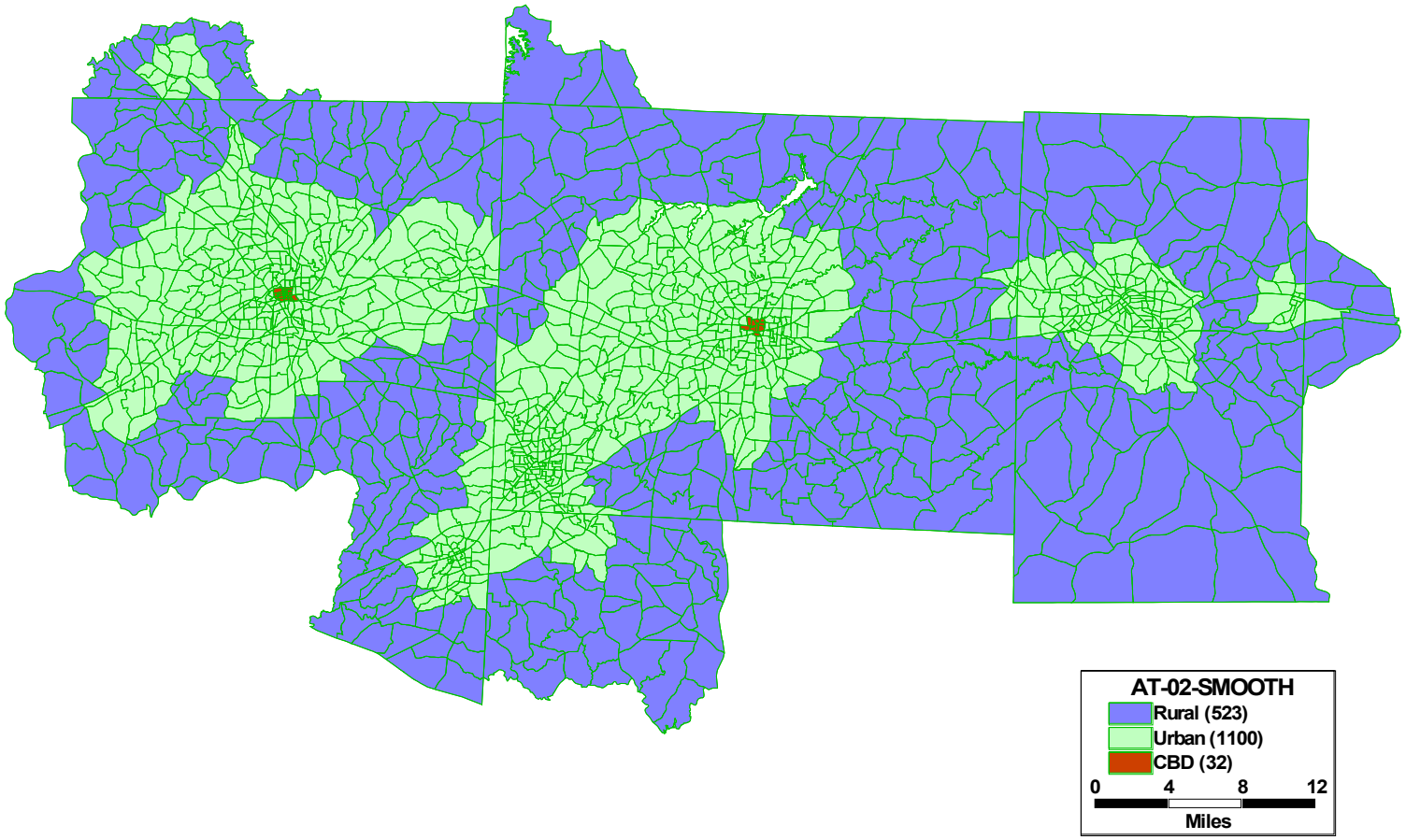
  -Network density is used as an additional variable

AT	Criteria
Rural	PD (between 0 and 500) and ED (between 0 and 1000)
Urb	<>rural and <>CBD
CBD	ED >= 10,000 and Hwy Network Density>=12

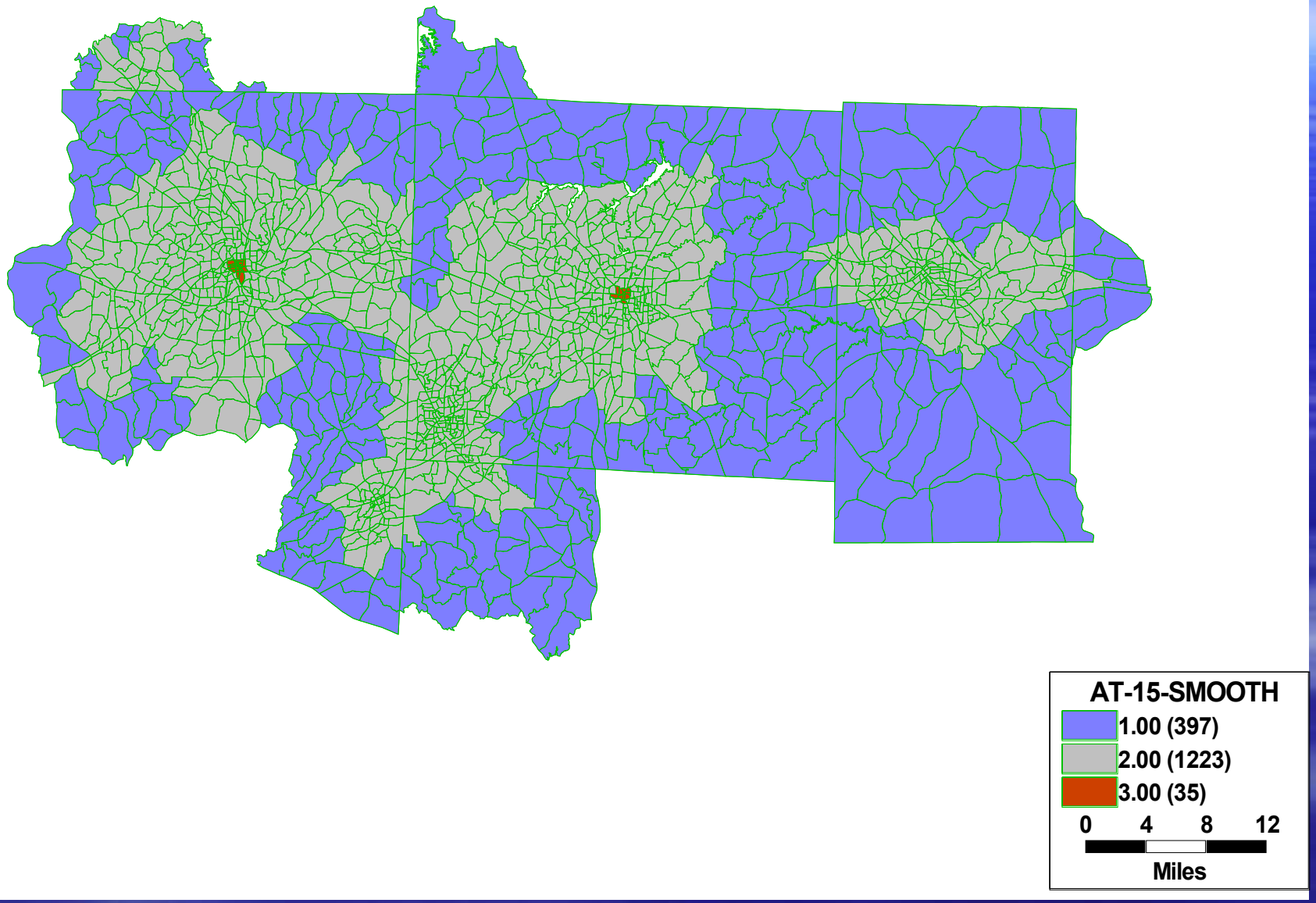
- **Outlying Zones**

  - If 70% or more zones surrounding a TAZ are of different AT

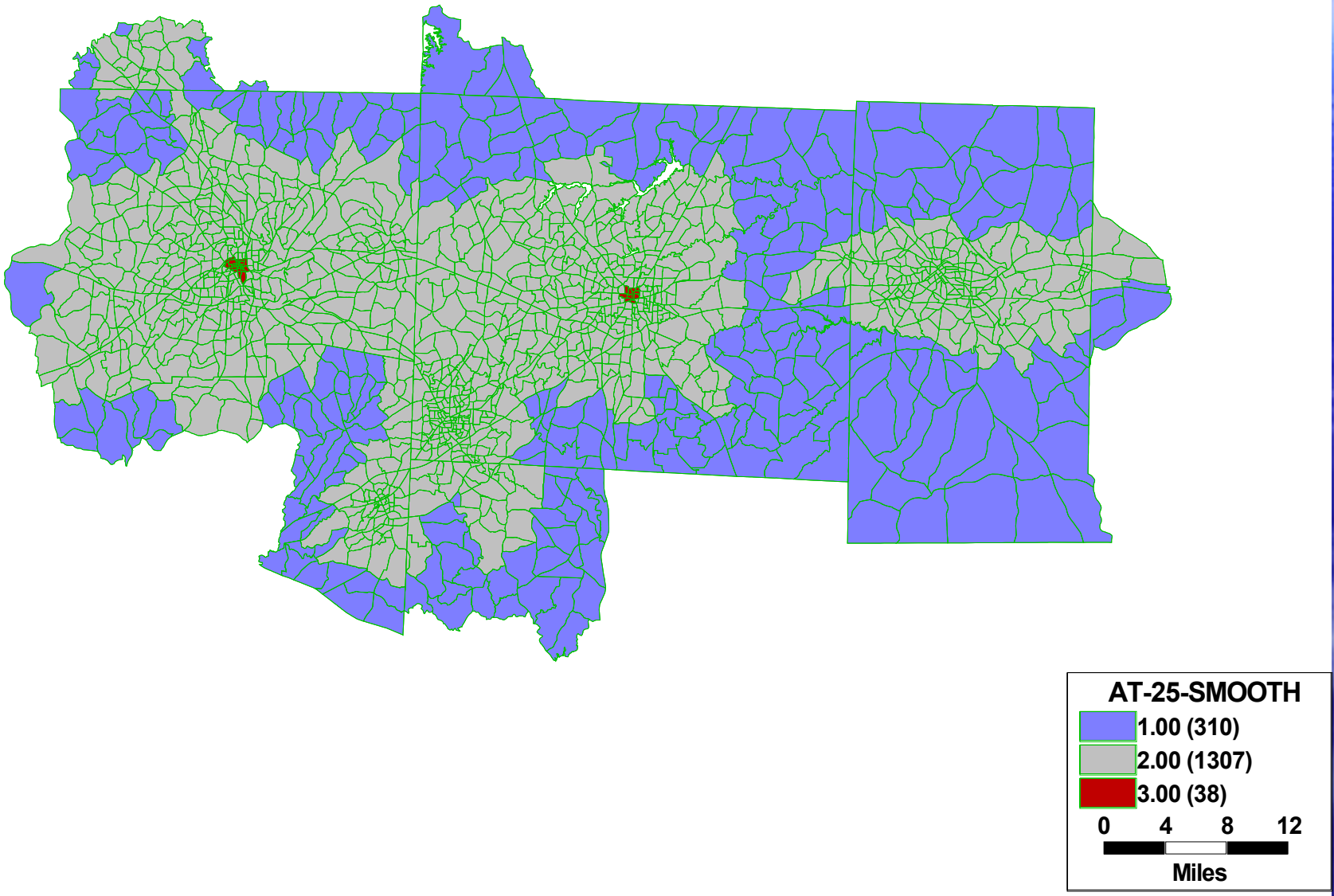
Base Year (2002) AT Classification



2015 AT Classification



2025 AT Classification



2035 AT Classification