(base) komalgulati@Komals-MacBook-Pro codes % python unmet\_demand\_calcy.py

ENHANCED NORTH CAROLINA INTERSTATE TRUCK PARKING ANALYSIS

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Features:

✓ Enhanced spatial matching for all interstate segments

✓ Integration of candidate facilities

✓ Unmet demand step plots for all 4 truck classes

✓ Budget allocation optimization

✓ Comprehensive analysis dashboard

✓ Urban counties identified: ['Cabarrus', 'Cumberland', 'Durham', 'Forsyth', 'Gaston', 'Guilford', 'Mecklenburg', 'New Hanover', 'Wake']

=== LOADING AND PROCESSING DATA ===

Loading traffic segments...

✓ Loaded 47071 traffic segments

Loading interstate data...

✓ Loaded 113 interstate segments

Loading existing facilities...

✓ Loaded 159 existing facilities

Loading candidate facilities...

✓ Loaded 128 candidate facilities

Processing candidate facilities...

✓ Processed 128 candidate facilities for target interstates

Candidate facilities by interstate:

I-40: 47 sites, 29240 estimated capacity, 584.8 acres

I-77: 16 sites, 9209 estimated capacity, 184.2 acres

I-85: 33 sites, 22314 estimated capacity, 446.3 acres

I-95: 24 sites, 26364 estimated capacity, 527.3 acres

I-26: 8 sites, 2944 estimated capacity, 58.9 acres

=== ENHANCED SPATIAL MATCHING ===

Enhanced spatial matching results:

I-40: 42952 segments

I-77: 268 segments

I-85: 352 segments

I-95: 2917 segments

I-26: 582 segments

Total segments assigned: 47071

Original segments: 47071

Assignment rate: 100.0%

=== CALCULATING COMPREHENSIVE DEMAND ===

Calculating demand for each class...

Class 1 (Short-Haul Rest Area): 38.16 trucks

Class 2 (Short-Haul Truck Stop): 127.76 trucks

Class 3 (Long-Haul Rest Area): 2957.43 trucks

Class 4 (Long-Haul Truck Stop): 9900.97 trucks

Demand by Interstate (All Classes):

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I-40: Total=8069.3, C1=24.3, C2=81.4, C3=1831.6, C4=6132.0

I-77: Total=728.4, C1=2.2, C2=7.4, C3=165.3, C4=553.5

I-85: Total=1732.1, C1=5.2, C2=17.5, C3=393.1, C4=1316.2

I-95: Total=2067.4, C1=6.2, C2=20.9, C3=469.2, C4=1571.0

I-26: Total=427.1, C1=0.2, C2=0.6, C3=98.1, C4=328.3

=== ANALYZING FACILITIES ===

Facility Summary (Existing + Candidate):

I-40:

Existing: 55.0 facilities, 2651 capacity

Candidate: 47.0 facilities, 29240 capacity

Total: 102.0 facilities, 31891 capacity

I-77:

Existing: 24.0 facilities, 577 capacity

Candidate: 16.0 facilities, 9209 capacity

Total: 40.0 facilities, 9786 capacity

I-85:

Existing: 30.0 facilities, 1407 capacity

Candidate: 33.0 facilities, 22314 capacity

Total: 63.0 facilities, 23721 capacity

I-95:

Existing: 7.0 facilities, 126 capacity

Candidate: 24.0 facilities, 26364 capacity

Total: 31.0 facilities, 26490 capacity

I-26:

Existing: 23.0 facilities, 763 capacity

Candidate: 8.0 facilities, 2944 capacity

Total: 31.0 facilities, 3707 capacity

=== CALCULATING UNMET DEMAND SCENARIOS ===

Scenario: Existing facilities only

Total unmet demand: 7836.2 trucks

Class 1: 23.6

Class 2: 79.1

Class 3: 1778.7

Class 4: 5954.7

Scenario: Existing + All candidate facilities

Total unmet demand: 0.0 trucks

Class 1: 0.0

Class 2: 0.0

Class 3: 0.0

Class 4: 0.0

=== CREATING UNMET DEMAND STEP PLOTS ===

Creating budget allocation scenarios...

✓ Unmet demand step plots saved to /Users/komalgulati/Documents/Project\_3\_1/simulation/results/enhanced\_interstate\_analysis/unmet\_demand\_step\_plots\_all\_classes.png

✓ Facility count vs budget plot saved to /Users/komalgulati/Documents/Project\_3\_1/simulation/results/enhanced\_interstate\_analysis/facility\_count\_vs\_budget.png

=== CREATING COMPREHENSIVE ANALYSIS DASHBOARD ===

✓ Comprehensive dashboard saved to /Users/komalgulati/Documents/Project\_3\_1/simulation/results/enhanced\_interstate\_analysis/comprehensive\_analysis\_dashboard.png

=== EXPORTING ENHANCED RESULTS ===

✓ Enhanced traffic segments saved to /Users/komalgulati/Documents/Project\_3\_1/simulation/results/enhanced\_interstate\_analysis/enhanced\_traffic\_segments.csv

✓ Interstate demand summary saved to /Users/komalgulati/Documents/Project\_3\_1/simulation/results/enhanced\_interstate\_analysis/enhanced\_interstate\_demand.csv

✓ Facility analysis saved to /Users/komalgulati/Documents/Project\_3\_1/simulation/results/enhanced\_interstate\_analysis/comprehensive\_facility\_analysis.csv

✓ Budget scenario (no\_service) saved to /Users/komalgulati/Documents/Project\_3\_1/simulation/results/enhanced\_interstate\_analysis/budget\_scenario\_no\_service.csv

✓ Budget scenario (full\_service) saved to /Users/komalgulati/Documents/Project\_3\_1/simulation/results/enhanced\_interstate\_analysis/budget\_scenario\_full\_service.csv

✓ Unmet demand scenario (existing\_only) saved to /Users/komalgulati/Documents/Project\_3\_1/simulation/results/enhanced\_interstate\_analysis/unmet\_demand\_existing\_only.csv

✓ Unmet demand scenario (existing\_plus\_candidates) saved to /Users/komalgulati/Documents/Project\_3\_1/simulation/results/enhanced\_interstate\_analysis/unmet\_demand\_existing\_plus\_candidates.csv

✓ Enhanced summary report saved to /Users/komalgulati/Documents/Project\_3\_1/simulation/results/enhanced\_interstate\_analysis/enhanced\_analysis\_summary.txt

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ENHANCED ANALYSIS COMPLETE!

Results saved to: /Users/komalgulati/Documents/Project\_3\_1/simulation/results/enhanced\_interstate\_analysis

Key outputs:

✓ unmet\_demand\_step\_plots\_all\_classes.png/pdf

✓ facility\_count\_vs\_budget.png/pdf

✓ comprehensive\_analysis\_dashboard.png/pdf

✓ enhanced\_analysis\_summary.txt

✓ All CSV data files